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RESTORATION OF BRINDLEY'S LOCKS ON THE CHESTERFIELD CANAL by Christine Richardson

The official re-opening of the Thorpe and Turnerwood flights of locks on the Chesterfield Canal in South Yorkshire is planned for June 2003. The works have received a Highly Commended Certificate from the ICE for 'excellence, concept, design and execution of civil engineering works'. They were also short listed for the 'Waterways Renaissance Awards 2002'. The locks were derelict for almost one hundred years and were a major opportunity to study the construction methods of structures planned and initially overseen by James Brindley.

There are twenty-two chambers in one mile, including four staircase configurations – two trebles, and two doubles – a unique achievement in the pioneering era of canal construction in this country. The locks scale the eastern flank of a limestone ridge, where, on the summit pound, Brindley commenced construction in 1771, working downhill. Therefore, as today's visitors climb the flights, the locks become progressively older, culminating in Thorpe Top Treble staircase.

Convenient towpath access is at Shireoaks, Nottinghamshire, adjacent to the railway station. The ascent of the Turnerwood flight starts after crossing the aqueduct over the river Ryton, and thereby passing into Rotherham, South Yorkshire. This is important because Rotherham Metropolitan Borough Council has been diligent in allocating Grade II listed structures status to all the locks and bridges between here and the eastern portal of Norwood tunnel.

Restoration was made possible via a £3.3 million Derelict Land Grant from English Partnerships in 1995, with a further £1 million from the Heritage Lottery Fund in 2001. Rotherham has also undertaken to fund the maintenance of the locks for 25 years.

The scheme was undertaken by Galliford, contractor to British Waterways, and overseen by BW's North-East Region Projects Manager, John Nuttall. The restoration of the twenty-two locks has revealed many facts about the construction of canals in Brindley's pioneering era as Rotherham's Conservation Officer (Christopher Drage) required that they be taken down to a sound base by hand, and that the 18th century features be investigated and recorded by trained industrial archaeologists. The subsequent report will be published later this year, with



Chesterfield Canal, Turnerwood. Work being done by British Waterways' Contractors on the Thorpe Flight bottom double staircase locks. This is a Listed structure at map ref SK58SW. The timber framework can clearly be seen, also the chamber floor, and original lower brickwork, 23 September 1996.

© Christine Richardson

public access via the borough's central library, and its website.

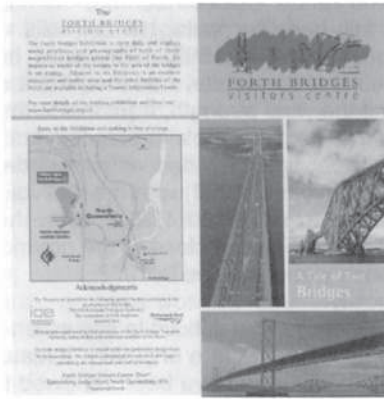
The most important feature of lock construction recorded was the use of timber sub-frames. Often these consisted of vertical posts at approximately 2m apart, with a horizontal waling beam parallel to the lock side, and horizontal tie beams at right angles to the lock. A waling beam was usually a square-section of timber, approximately 2.5m with a staggered overlapping joint, one immediately above the other. The overlap ranges from 0.1m up to 0.4m, with the joints centred on the vertical posts. The timbers appear to have been laid in wet mortar, immediately above the stone, low-water, rubbing course. The waling beams do not appear to be fixed to the other timbers, but simply clasped below the junction of the tie-beams and posts.

The locks were built by a number of contractors so it will be interesting to see when the archaeological report is published the differences and/or similarities produced by Brindley's management system.

Also recorded were traces of the original by-weirs at each lock, all of which were subsequently changed to a simpler system. Whenever possible the overflow channels around the locks, beyond the by-weirs, have been retained in their original state – that is, with the entrance and exit paved and edged with stones or cobbles where the flow is greatest, but with the channel left unlined through the ground where it runs parallel to the lock chamber. British Waterways have chosen to put loose chippings in the channel as they think the water may erode the natural clay of the area but it remains to be seen if that will be required in practice.

The lowest of the Thorpe flight, Thorpe Bottom Double staircase, was the first to be restored and does not reflect the methods formed by experience – in retaining and recording the original structures – but the paddle-gears have subsequently been updated to comply with the standards elsewhere on the flights, including the paddle-gear brackets unique to this canal; their design copied from derelict items found here and in Chesterfield.

THE CHAIRMAN'S COLUMN by Professor Roland Paxton



Forth Bridges Visitor Centre Trust leaflet – May 2003
© Roland Paxton

The legendary Maurice Barbey, the Panel's indelible (at least to me!) driving influence in its early years, whom I first met at York when joining in 1975, used to remind us that there was more to being a Panel Member than meeting our core function of producing records. Missives from Maurice on every conceivable matter regarding HEWs came thick and fast, as many as three a week, so much so that Ann, who came to recognise the writing on envelopes from York, would say "Have your lunch first, dear, before opening this"! Maurice encouraged us to promote knowledge of historical engineering works as widely as possible through personal involvement with outside bodies. He has much to answer for! For me this led to making countless lectures and publications, organising events, becoming actively involved with the Forth Bridge Visitor Centre Trust, the Scottish Industrial Archaeological Panel, Laigh Milton Viaduct Conservation Trust, the ICE's East of Scotland Museum, the Historic Bridge and Infrastructure Award Panel and to becoming a Commissioner of RCAHMS. Incidentally, the Commission has continued its newly found civil engineering association by appointing Gordon Masterton, ICE Vice-President, as my successor. Congratulations Gordon!



Lord Elgin and myself at launch of
100 Years of the Forth Bridge, October 1990
© Sandra Purves

In this my penultimate *Column*, as in September I am handing on the PHEW chairmanship to Brian Crossley, a former Panel Member, friend, and former Vice-President of the Institution, it seems appropriate to give a brief account of one of the outside bodies with which I have had an involvement for 17 years, since 1996 as chairman, the **Forth Bridges Visitor Centre Trust**. This Trust promotes knowledge of the two magnificent bridges over the River Forth, essentially by means of a free exhibition in the Queensferry Lodge Hotel, North Queensferry, overlooking the bridges, and our extensive web site <http://www.forthbridges.org.uk> which also includes a list of

trustees. Also, by means of media interviews – I seem to be on every journalist's contact list as soon as any question of the Rail Bridge's future arises, hosting and guiding visits, and producing promotional leaflets. We have just published 10,000 copies of our latest leaflet with generous sponsorship from ICE East of Scotland and Network Rail. Copies are obtainable free of charge from the ICE Library or myself.



Dr Scott Arthur pointing out a suspension bridge anchorage to students
© Roland Paxton

The Trust was founded in December 1985 with ICE East of Scotland's support on the recommendation of PHEW Scotland following an approach by Douglas McBeth who became the Trust's first Chairman. The exhibition first opened to the public in 1987 at South Queensferry near the Hawes Inn in portacabins supplied by ScotRail with a professionally estimated potential attendance of 120,000 visitors each year. In 1989, the exhibition was re-housed at the west end of the promenade in the geodesic dome from Glasgow Garden Festival generously provided by Lord Elgin. As one of the Trust's numerous centenary events his Lordship very kindly launched *100 Years of the Forth Bridge* which within five years had sold 7,000 copies, including 2,000 in Japanese! After the 1992 summer season planning permission for the dome lapsed and the exhibition materials were placed in store at Kirkcaldy whilst a new home was sought. After much preparation the exhibition reopened at the Queensferry Lodge Hotel on 31 July 1996 and for its high quality and, not least, the standard of care in keeping it clean and well lit by the hotel, it was awarded a *Commendation* by the Scottish Tourist Board.



Eusebi Casanales, President TICCIH on top of
Forth Bridge, September 2000
© RCAHMS

The exhibition displays have in total cost upwards of £40,000 all donated by well-wishers, particularly the bridge owners and the ICE in Scotland, a significant element of which was raised from the sale of encapsulated rivets which are now collectors' items as there are no more available! The exhibition has been viewed by several hundred thousand people since 1987. One of the Trusts most ambitious and enjoyable events in the millennium year was hosting the

TICCIH (International Committee for Conservation of the Industrial Heritage) conference which included a visit for its delegates to the top of the Rail Bridge by means of the lift shown in the picture. This year, in addition to hosting visits from parties of Heriot-Watt University students in the spring, the Trust is providing guides for an ASCE presidential party in June, the Newcomen Society in July and PHEW in September. The exhibition, which is unstaffed, consists mainly of panels to be read (see 1990 picture) dating from 1987. Although the displays are still relevant, the Trust feels that the time has come to upgrade them and is embarking on a project involving more interactive exhibits for which it hopes to attract lottery funding. The Panel wishes the Trust a successful future and thanks all who have so unstintingly supported its objectives through the years.

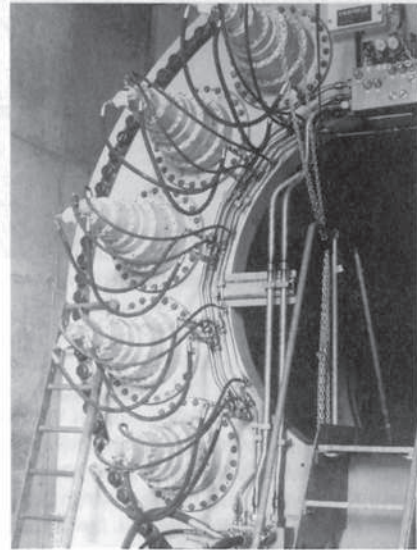


Sir William McAlpine & Sandra Purves, PHEW Scottish Secretary, at 'Wheel' gate
© Roland Paxton



Forth Bridge – Lord Cullen and Professor Paul Jowitt in cantilever on TICCIH visit
© Roland Paxton

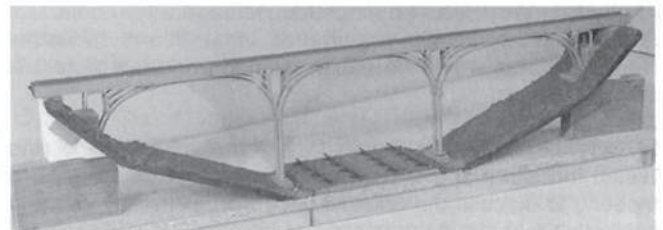
The rather curious-looking picture within the axle of the 'Falkirk Wheel', not when it was moving I hasten to add, was taken on a recent visit arranged by PHEW Scotland to this unique world-class facility at which our guest was Sir William McAlpine, who has been most helpful to the Panel in so many ways. Our able cicerone was Iain Herbert, the Wheel's Manager. A visit behind the scenes enabled us to get a close up view of the hydraulic motor gear-box units which drive one end of the Wheel's axle to rotate its arm 180° in 4 minutes. As the loaded caissons on the arm ends basically counterbalance each other, the motors are only required to perform a regulating function.



Falkirk Wheel hydraulic motors
© Roland Paxton



Inside the 'Falkirk Wheel' Axle – note Sandra Purves's hat!
© Roland Paxton



Model of 3-span cast iron aqueduct over Slamanan Railway, c.1839 or c.1846
© Richard Chown

Finally, one of the most gratifying items in my recent correspondence was a letter from Richard Chown of West Lothian, who took an interest in 1989 in recording for PHEW a cast iron aqueduct of c.1839 (or c.1846) carrying a burn over the former Slamanan Railway at NS 944 742. He, and indeed the Panel, would like to see this remarkable structure, which is probably unique, saved from collapse. Richard has not only compiled a record, but has also made a finely executed model, for his efforts on which I am delighted to extend the Panel's thanks.

LETTERS TO THE EDITOR

Laminated Greenheart Timber Bridges From Paul Dunkerley

An experienced timber engineer, Christopher Mettem and Paul Dunkerley of the Institution of Civil Engineers' Panel for Historical Engineering Works, are trying to ascertain whether or not the elegant two-span bridge carrying the towpath of the Weaver Navigation over the back river near Dutton Viaduct in Cheshire is unique. The bridge was designed by John Arthur Saner, Engineer to the Weaver Navigation, and was built by direct labour in 1915-1919.

Quite a number of British bridges built during the 19th century used mechanically laminated timber, but most employed softwood or oak for this purpose, not always with the sapwood excluded and usually without the types of protective design feature now recommended. Since then,