

The Institution of Civil Engineers

Panel for Historical Engineering Works

NEWSLETTER

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HAER: 25 Years of Documenting Engineering Structures in the United States • Eric Deloney

A brief report of a public lecture held at the Science Museum, London, 6 April 1995

Introduction

The underlying principle of the presentation was that the recording and documenting of surviving industrial heritage provides the foundation for informed decisions regarding the preservation and re-use of industrial and engineering fabric.

The Historic American Engineering Record (HAER) was established in 1969 and its history was presented in three phases:

1969-79

Discovering, inventing, proselyting a new field of Heritage preservation.

1980-84

A crises period during which major Governmental changes occurred.

1984-

Years of growth in respect of activity and finance etc. resulting in funds for a total operating programme of \$1.3m in 1994.

The Legal Framework

The work was initially based upon the National Historic Sites Act (1935) which established the documentation mandate, resulting in a national archive of America's architectural, historical and cultural achievement. More recently the National Historic Preservation Act (1966) charged Federal agencies with the responsibility for their historic properties and established a Federal-State partnership to create:

- a national register of historic places
- a historic preservation grants programme
- a national archaeological programme
- an information distribution mechanism
- a Presidential advisory council on historic preservation

It also provided the means for funds to encourage preservation activities in the private sector. With specific reference to industrial heritage, it mandated documentation to the Historic American Buildings Survey (HABS) and to HAER. This mandate has resulted in a steady flow of documentation to the HAER collection, primarily of sites, structures and objects often of state and local interest.

Why has HAER succeeded?

Factors contributing to the success of HAER were described:

- a. The work was established at the highest level of government (The Department of the Interior, National Park Service). Ultimate responsibility for HAER's activities rests with the Secretary of the Interior within the Executive branch of government.
- b. HAER is a 'partnership'. In addition to Federal government support, it enjoys the cooperation and support of public sector groups, including the American Society of Civil Engineers (ASCE), and

similar bodies representing Mechanical, Electrical, Chemical, Mining, Metallurgical and Petroleum engineers.

- c. HAER represents the 'national standard' of engineering and industrial heritage documentation in respect of both performance and quality.
- d. The documentation, created to a 500 year standard, is squarely in the 'public domain'. It is repositied in the prestigious Library of Congress where it is curated and made available to the public without restriction.
- e. HAER is not solely dependent for funding upon Federal monies (with its attendant whims), it aggressively seeks funds from industry, state governments, other Federal agencies, private groups and individuals.
- f. HAER operates, as a central feature of its activities, a summer recording programme which provides professional 'hands-on' experience to student architects, engineers, historians, photographers, landscape architects, industrial archaeologists etc. This has proved popular with higher education and has developed skills in drafting, research, writing and documentary photography in the context of a multi-disciplinary approach to industrial heritage preservation.

HAER's Achievements

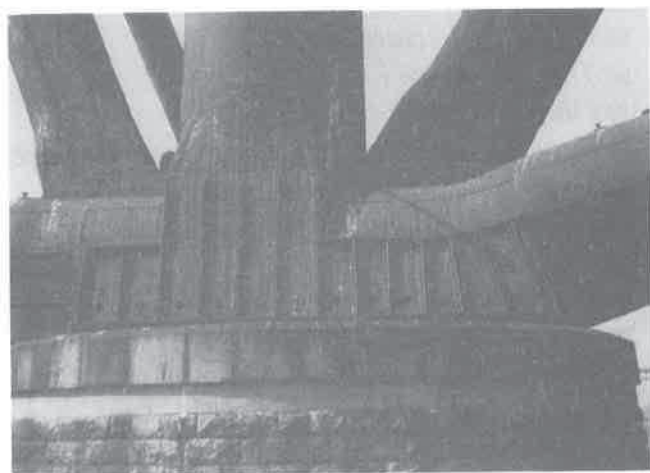
Nearly 4000 sites have been recorded. There are c.35,000 photographs, nearly 30,000 data pages, and approaching 4000 measured and interpreting drawings. Several thousand people have been involved in the work. The somewhat pedantic process of documentation has proved to be a powerful tool in developing a national awareness and understanding of industrial heritage and has brought to the fore hitherto forgotten contributions of industrialists, entrepreneurs and engineers. It has greatly contributed to the significance and meaning of the industrial workplace, and its setting in the vast panoply of American History. HAER was figuratively characterised as a 'treasure chest' of industrial history and as a 'national memory' with its component records forming 'the grey cells'. It has unquestionably provided a sound foundation for informing opinion in respect of preservation and conservation issues.

The Chairman's Column

Roland Paxton

The Panel is continuing to take an active interest in the conservation of historically important works. On learning in early March that Brunel's Thames Tunnel masterpiece was unlisted and that its architecturally-styled interior was about to be shotcreted by London Underground, the Panel, its equivalent in ASCE and JSCE, and others, took a lead in trying to ensure that any necessary repair work was commensurate with the tunnel's historical

status. Letters to this effect were written to the Rt Hon Stephen Dorrell MP, Secretary of State for National Heritage urging English Heritage to list the tunnel immediately and thus provide an opportunity for full and proper consideration to be given to any proposed alteration. These direct approaches, together with a similar request through the columns of *NCE* and the national media, including letters in *The Times* and *The Independent* orchestrated with commendable efficiency by Julia Elton, fortunately were successful. On 24 March, English Heritage listed the tunnel Grade 2* and immediately set up a panel of engineers with appropriate expertise, including Denis Smith for PHEW, under the chairmanship of Sir Alan Muir Wood, to give the matter full and proper consideration. Sir Alan tells me that the members of the panel are now hard at work. We wish them well.



North cantilever skew-back, west side - 11 April 1995
Flaking of red paint has commenced

Further north, it is disappointing to have to report that much of the famous red paint is flaking off the Forth Bridge and is likely to continue to do so, at least from its tubular members, until c.2001, thus adding to the present public concern about its future. Railtrack maintains that the red paint is only cosmetic as there is an undercoat beneath it and that there are other priorities for its limited resources. In April, the *Evening News* chartered the MV 'Maid of the Forth' and invited a technical panel including myself to inspect its lower parts. We noted the absence of numerous inspection covers which could result in driving rain and spray entering the skew-backs which we were told was being attended to, but in general the bridge appeared well maintained, except for substantial although essentially superficial deterioration of the red paintwork (see photograph above). The condition of the painting seemed markedly worse than when I visited the bridge in 1990 and the problem could run away from Railtrack unless the present annual maintenance budget of £0.5m is increased. One can sympathise with the cost-benefit aspect of Railtrack's task which, for a train time advantage of only 12 minutes to Dundee and points north over the alternative via Stirling, requires the maintenance

of two Class A listed bridges (including Barlow's Tay Bridge) which are also potent symbols of Scotland. Railtrack talk of a sum up to £100m being necessary to paint the whole of the Forth Bridge immediately. Surely this figure is too high but undoubtedly the cost would be substantial. If neither Railtrack nor the government can be prevailed upon to fund the restoration of the red paint, the bridge's first line of defence against corrosion, then consideration should be given to forming a charitable trust with this remit.

The Panel has been invited to contribute to an initiative by the International Committee for the Conservation of the Industrial Heritage through Mr Stephen Hughes of the RCAHMW. The committee's objective is to produce a list of the most important waterway sites in order to assist decision making by the World Heritage Committee. The draft list and content is impressive, but less so the quality of comment on Pont Cysyllte Aqueduct which omits mention of Telford's fundamental role in inventing and carrying the whole into execution, describing him merely as *resident engineer working under Jessop*. Telford was the 'Engineer' with a brief including planning and design, the resident engineer being John Duncombe (as the matter has been covered already in Newsletter 60, I shall say no more!) This initiative deserves the Panel's support and Roger Cragg is coordinating our response.

Dr Emory Kemp, Director of the Institute for the History of Technology and Industrial Archaeology (IHTIA) at West Virginia University continues to forward copies of the Institute's publications to the Panel. We congratulate IHTIA on five years of successful achievement since its inception, involving the restoration of more than 20 projects including Philippi and Milton covered bridges, the detailed documentation of many sites, and numerous authoritative publications. Dr Kemp has also forwarded the *Journal of the Society for Industrial Archaeology*, vol.19, no.2, 1993, which contains four excellent papers on the theme of iron and steel bridges.

Contacts with Japan have been maintained through Mr Hiroshi Isohata of NKK Steel, who has written an authoritative paper on *The Development of Bridge Construction Technology and Western Influence on Modern Japan* which will be published soon in *Structural Engineering Review*. Contact has also been maintained with Mr Shigeru Onoda in connection with JSCE's support, through Dr Hideo Igarashi, for the Thames Tunnel campaign and in connection with a mutual interest in the masonry skew arch, a fine example of which by Il Tribolo existed near Florence as early as 1530.

The Panel was also pleased to receive from Mr John Pollard, Chairman of IPENZ's National Committee for Engineering Heritage, copies of the 28 papers given at the First Australasian Conference on Engineering Heritage held at Christchurch, New Zealand from 27-30 November 1994. The subjects included Victoria Bridge

at Christchurch, reputedly New Zealand's first cast iron arch bridge erected in 1863-64 and Rakaia Gorge wrought iron truss bridge of 1879-82. The papers are available for consultation at the Institution's Library.

Finally, on 28 April following a most commendable effort by Mike Chrimes, Jim McCafferty and Jim Bowie, the Institution's excellent *William Mackenzie - Giant of the Railways* exhibition was re-opened, most appropriately alongside an old locomotive, at Glasgow's Museum of Transport, by Dr Paul Prescott, Scottish Director of its sponsors Railtrack, under the auspices of the Glasgow and West of Scotland Local Association of the Institution. The Association's Chairman Mr Neil Buchan, in introducing Dr Prescott, welcomed this opportunity of promoting Mackenzie's immense achievement. The exhibition, which got off to an outstanding start, with an attendance of more than eighty from all parts of Scotland and distinguished guests from the Mackenzie family and the French Consulate, will be on display for two months. For those who cannot attend, a finely produced, illustrated catalogue is available from the Institution's Library, price £6.00.

On the Turning of Arches Professor R B Schofield

An interesting article by Thomas Day was published in the September 1994 issue of the Newsletter on *Masonry Arches: How Quickly Were They Built?* Mr Day raised a few queries which did not seem to elicit any response, but perhaps the following may help confirm that 'turning' means 'completing', when applied to the construction of arches.

A paper *On the Construction of a Concrete Railway Viaduct* by A Wood-Hill and E D Pain was published in the Proceedings of the Institution for December 1904 (vol.cix). In the discussion to this paper, a Mr John Strain referred to the design and construction of several concrete arches in Scotland with which he had been associated. He mentioned the Killin line, a branch of the Callander and Oban Railway, where 'rubble concrete was used for all works' and in particular, to the viaduct over the River Dochart (built circa 1886) which was 60 to 70 feet high, having three skew spans of 35 feet each, built with stone facework packed with rubble concrete. The arches were formed entirely of concrete in-situ.

He stated that: 'Haunches were brought up to the preferred level with a radial joint, and arrangements made so that an arch was turned completely in one day. In my opinion, that, along with good material, is the secret of success in building any concrete arch in-situ'. Presumably the radial construction joint was just above springing level; it seems reasonable to suppose from Strain's comments that each arch was cast to the full width of the structure in one day.

Strain also claimed that the bridge '...was the first