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"Evan Water aqueduct and other unusual bridges"

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# *A minor mapping mystery: the Evan Water Aqueduct (and some other unusual bridges)*

***Stephen JG Hall*** [1]

Ordnance Survey maps of all scales are important resources for railway historians, although it is well understood that they can be inaccurate or inconsistent in detail. This is not a novel idea. In 1963, a railway historian noted sadly that "… the general maps of all periods are teeming with railway inaccuracies".[2],[3] A single demonstration of an error will only be of major interest to a few enthusiasts, but when a context is found within which the error can be placed, it may be possible to draw conclusions or generate hypotheses of more general significance.

The Beattock Bank, a ten-mile incline on the West Coast Main Line (WCML) reaches its summit at 315 m ASL. It is very well known to railway enthusiasts and will also be familiar to a wide public due to its inclusion in W.H. Auden's poem "Night Mail", of 1936. Near the summit the WCML crosses from Dumfriesshire into Lanarkshire on the watershed between the River Clyde and the Evan Water, the latter eventually reaching the Solway Firth as the River Annan. The incline from Beattock station to the summit was very challenging in the days of steam power. The WCML, now electrified, continues to be heavily used and much of the original infrastructure has changed over the years.

About a mile south of the summit, at grid reference NS 9999 1439, bridge no. 258, known as Tank Bridge to railway workers, carries the Evan Water and a farm access road across the railway. Babtie, Shaw and Morton were consulting engineers for its construction during electrification of the WCML which was completed in May 1974. It replaced the original and rather remarkable structure, designed by Isaac Dodds (1801-1882) and illustrated in his biography[4] (Plates 1-4). Dodds played a part in the development of the box girder, carrying out experiments at least since 1838 on malleable or wrought iron (post-processed iron with a very low carbon content). Before the advent of steel this was the only material, other than masonry and timber, for the economical construction of railway bridges, cast iron being notoriously weak in tension though strong in compression. The original plan for dealing with the Evan Water was a timber

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[2] JH Denton 'Railway inaccuracies in general maps', *Journal of the Railway and Canal Historical Society,* 9 (1963), 60-62.

[3] Also see R Dean, 'Off the rails - a significant error in Old Series one-inch revision', *Sheetlines* 54, 23-25; 'Off the rails – again', *Sheetlines* 74, 33; R Eckersley, 'An anomaly on the Cromford & High Peak Railway', *Sheetlines* 76, 63; R Wheeler, 'Representation of railway track layouts on the County Series', *Sheetlines* 112, 31; 'The six-inch survey of Lancashire and Yorkshire and railway revision', *Sheetlines* 113, 25.

[4] S Snell, *A story of railway pioneers. Being an account of the inventions and works of Isaac Dodds and his son Thomas Weatherburn Dodds*. London, Selwyn & Blount, 1921. In a footnote, the author describes how original Caledonian Railway records and drawings of the bridge were not traceable.

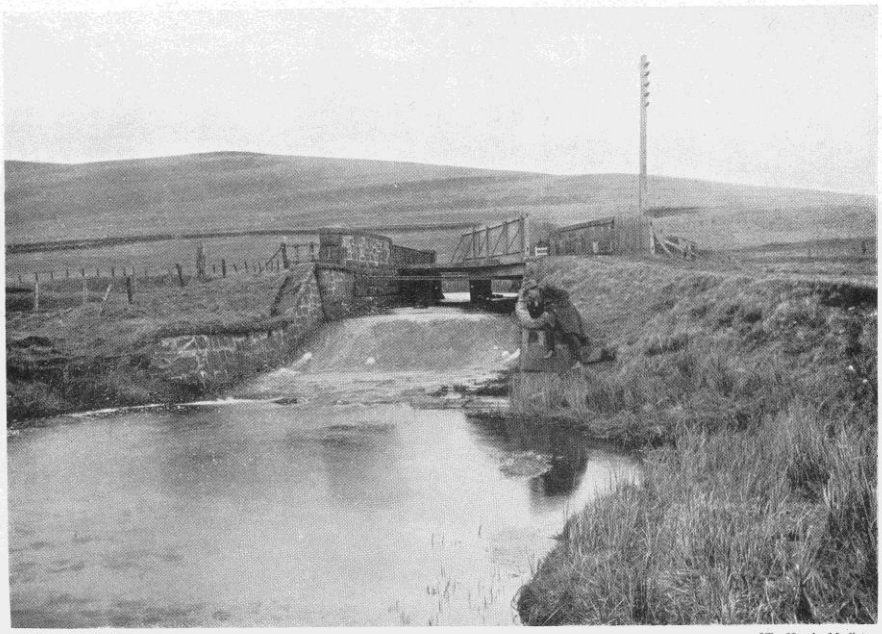
trough spanning almost 30 metres. Dodds, consulted by the principal engineers of the line, proposed a rectangular-section trough of malleable iron for the stream to run through, with the road on the top, referring to his own experimental studies. The initial objections of the government inspector, based on the previous lack of data on the behaviour of malleable iron girders under load, were overcome.

*Photograph by*] [*T. Hood, Moffat*

MALLEABLE IRON BRIDGE AT THE BEATTOCK SUMMIT

Carrying the Evan Water over the Caledonian Railway.

(*See also illustration facing page* 91.)



*Photograph by*] [*T. Hood, Moffat*

VIEW OF THE BRIDGE AT BEATTOCK SUMMIT FROM THE WESTERN SIDE

Showing the stream passing through the bridge underneath the roadway.

(*See also illustration facing page* 89.)

*The Evan Water Aqueduct in the early twentieth century. This has been replaced by Bridge 258, known to railway operational staff as Tank Bridge. (Snell, 1921; see footnote 4).*

On completion of the section from Beattock village to near Motherwell, the main line from London to Glasgow was opened throughout on 15 February 1848. Two days later the southbound journey was described in the Caledonian Mercury: "… Not five minutes after the Clyde becomes invisible … we are going down the tiny source of the Elvan, one of the tributaries of the Annan … very soon … we see it carried in an aqueduct 20 feet above our heads …".

Evidently not only was the Evan Water aqueduct innovative in engineering terms, it was also considered worthy of note by the Mercury's readership. Its peculiarity, however, seems to have passed by the Ordnance Survey.

*Above: the Evan Water Aqueduct in April 1966 (author's photograph)*

*Left: freight train driver 's view of the present-day Tank Bridge, from the south. 9 January 2010 (photograph: Adrian Nicholls)*

The first edition six-inch map, surveyed in 1859, depicts the railway as crossing the stream (*Figure 1*) – manifestly in error. This could only be correct if (a) the Caledonian Mercury account was wrong and (b) the final gradient to the summit had been very considerably eased in the decade after the opening of the line – and there is no evidence of any kind for that.

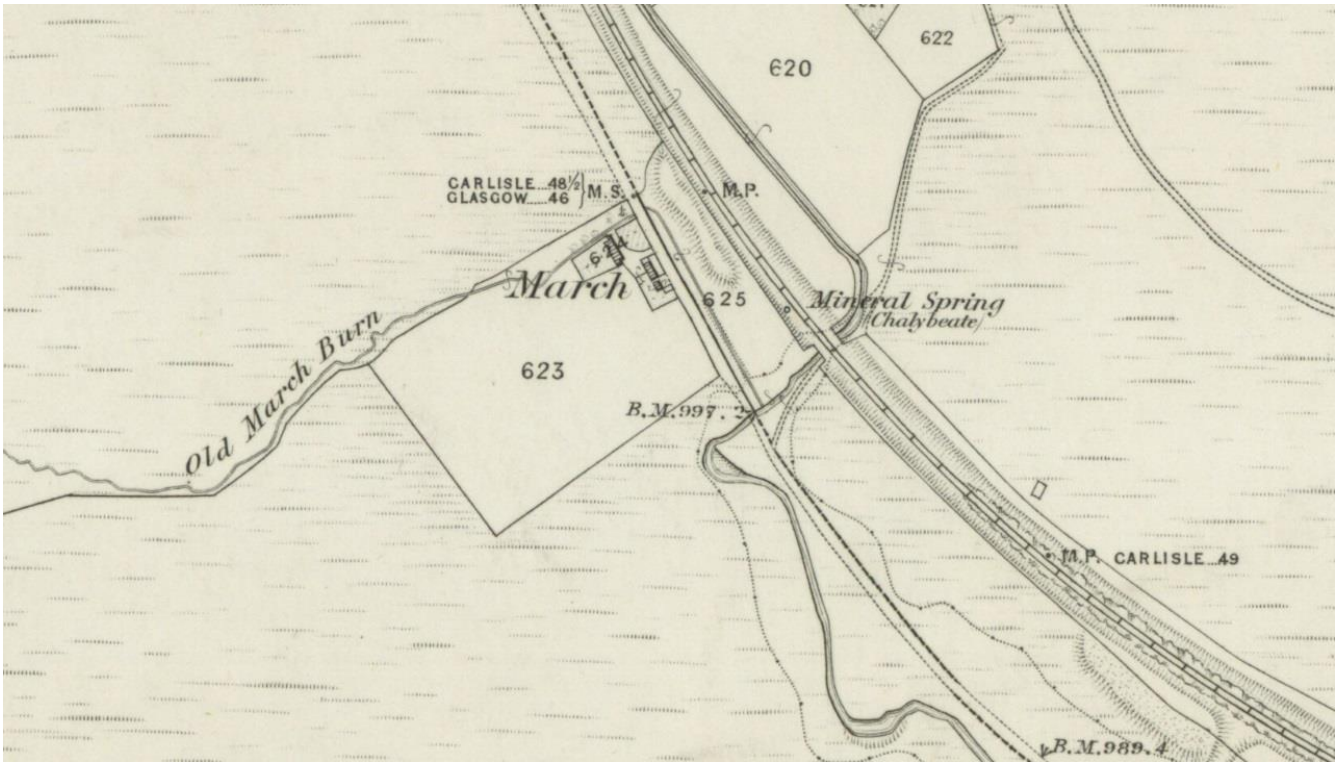
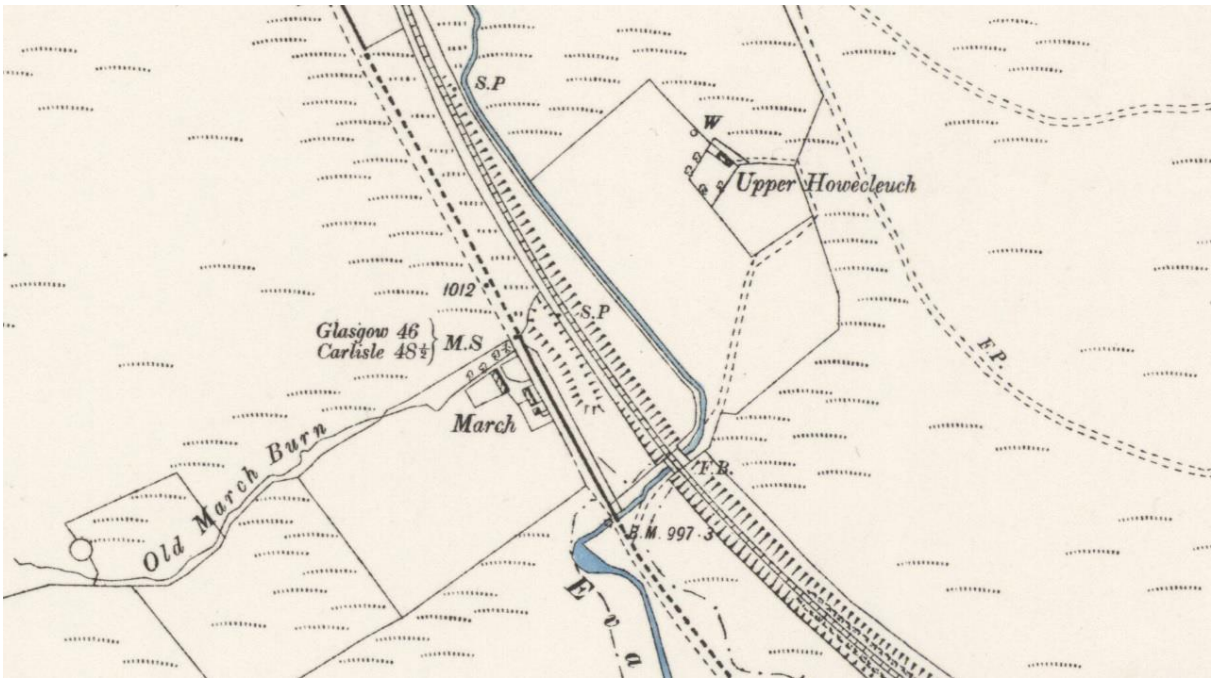



*Figure 1: from Lanarkshire, Sheet L (includes: Crawford). Ordnance Survey Six-inch First edition, Scotland, 1843-1882 Surveyed 1859, published 1863*

In the second edition, the depiction is muddled, and a footbridge is labelled but not shown (*Figure 2, below*).



In the next revision matters have finally been put to rights (*Figure 3*):

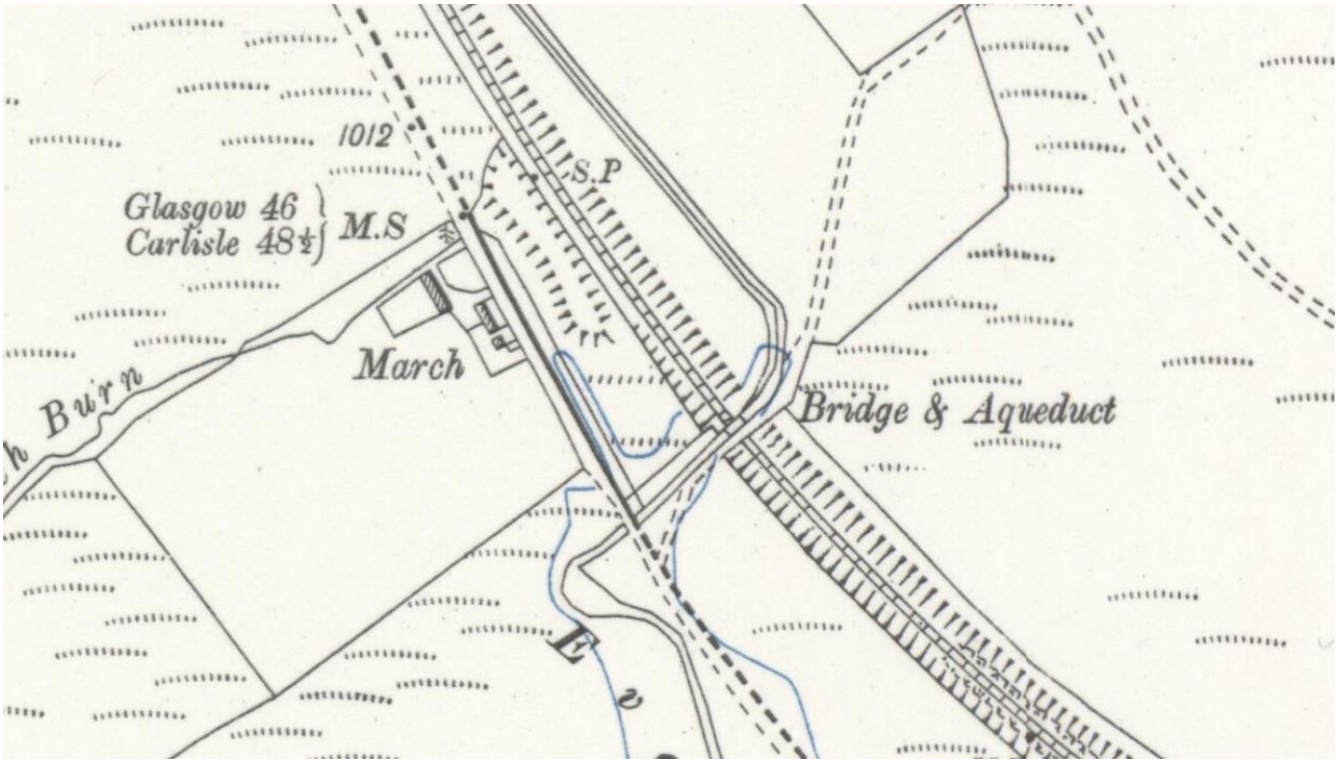



*Figure 3 : from Lanarkshire Sheet L.NE (including Crawford) Ordnance Survey Six-inch Edition of 1913. Surveyed 1858, revised 1909, published 1913.*

***Wider significance***

It is hard to accept that the surveyors were at fault for the error, given the detail with which other nearby infrastructural and landscape features were depicted. A detailed investigation might show how it arose and persisted, but it does provide a starting point for a more general investigation of how unfamiliar or novel infrastructure has been labelled or captioned. This has contemporary resonance, for example in how wind farms are treated.[5] Many nineteenth century railway bridges were of innovative and therefore unusual design, and unlike much industrial infrastructure they were often encountered by the public. Change, or continuity, in the ways these features were labelled, might be indicative of changes in official views of the functionality of maps in general.

***Some other unusual railway bridges***

Weedon, Northamptonshire, is also on the WCML, 250 miles south of Beattock Summit. It too possessed an unusual bridge, at SP 63104 59646. This length of line was opened by the London and Birmingham Railway in 1838 and here it runs close beside the Grand Union Canal (opened 1796). A branch of the canal served the adjacent Royal Ordnance Depot (a remarkable Georgian military establishment) [6], the water level being only slightly below that of the railway track. Just as in the case of the Evan Water aqueduct, there was a degree of

[5] B Anderson, 'Disappearing wind turbines on OS maps', *Sheetlines* 116, 25-29.
[6] https://historicengland.org.uk/listing/the-list/list-entry/1076515

public interest in the situation. In The Penny Magazine of 1838 [7], a temporary bridge is mentioned: "… a bridge is to be erected … intended to be a kind of self-acting 'swing' bridge". In fact, a "drawbridge" was designed by the railway's chief engineer, Robert Stephenson.[8] A removable section of the trackwork was mounted on a trolley which was manhandled to one side when a boat required passage. This procedure was under the authority of the Weedon station master on receipt of a request from the Commissary of Ordnance.[9]

The six-inch map of 1884 gives no hint of this remarkable feature on a nationally important main line (*figure 4*). The general public was probably not so nonchalant. Indeed, an article in the Northampton Herald (22 July 1882) had described it as "a contrived trap in the line which were the slightest error or omission to occur … might cause a hideous railway accident".

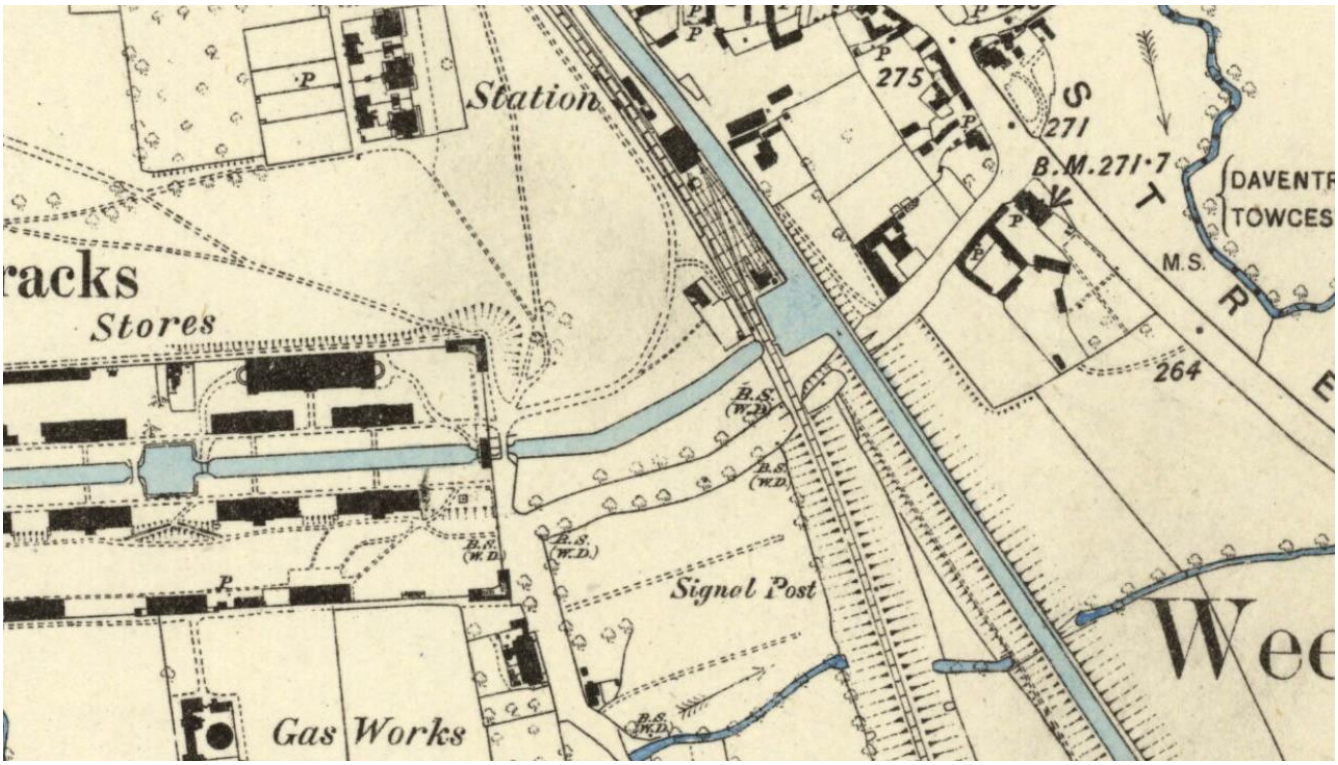



*Figure 4 : from Northamptonshire Sheet XLIII.SE (includes: Dodford; Everdon; Flore; Weedon Bec). Ordnance Survey Six-inch First Edition of England and Wales, 1842-1952. Surveyed 1883 to 1884, published 1884.*

In 1888 (no such accident having occurred) the arrangement was abolished, the main line being realigned and its elevation increased, the original track

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[7] 'Railway Trips. London and Birmingham – No. 1' *Monthly supplement of The Penny Magazine,* 8**,** no. 411, July 31 to August 31, 1838, 329-336.

[8] J Jebb, 'Description of a drawbridge on the London and Birmingham Railway, at Weedon', *Papers on Subjects Connected with the Duties of the Corps of Royal Engineers* 3**,** 1839, 189-191.

[9] Extract from *London & North Western Railway Appendix to Working Timetable January 1879* (Booklet in the Clinker Collection at Brunel University).

(retaining the drawbridge) being used to serve sidings. The drawbridge was scrapped in the 1950s.[10]

The drawbridge was identified as such on the 25-inch map of 1900, the main line being carried on a conventional bridge (*figure 5*).

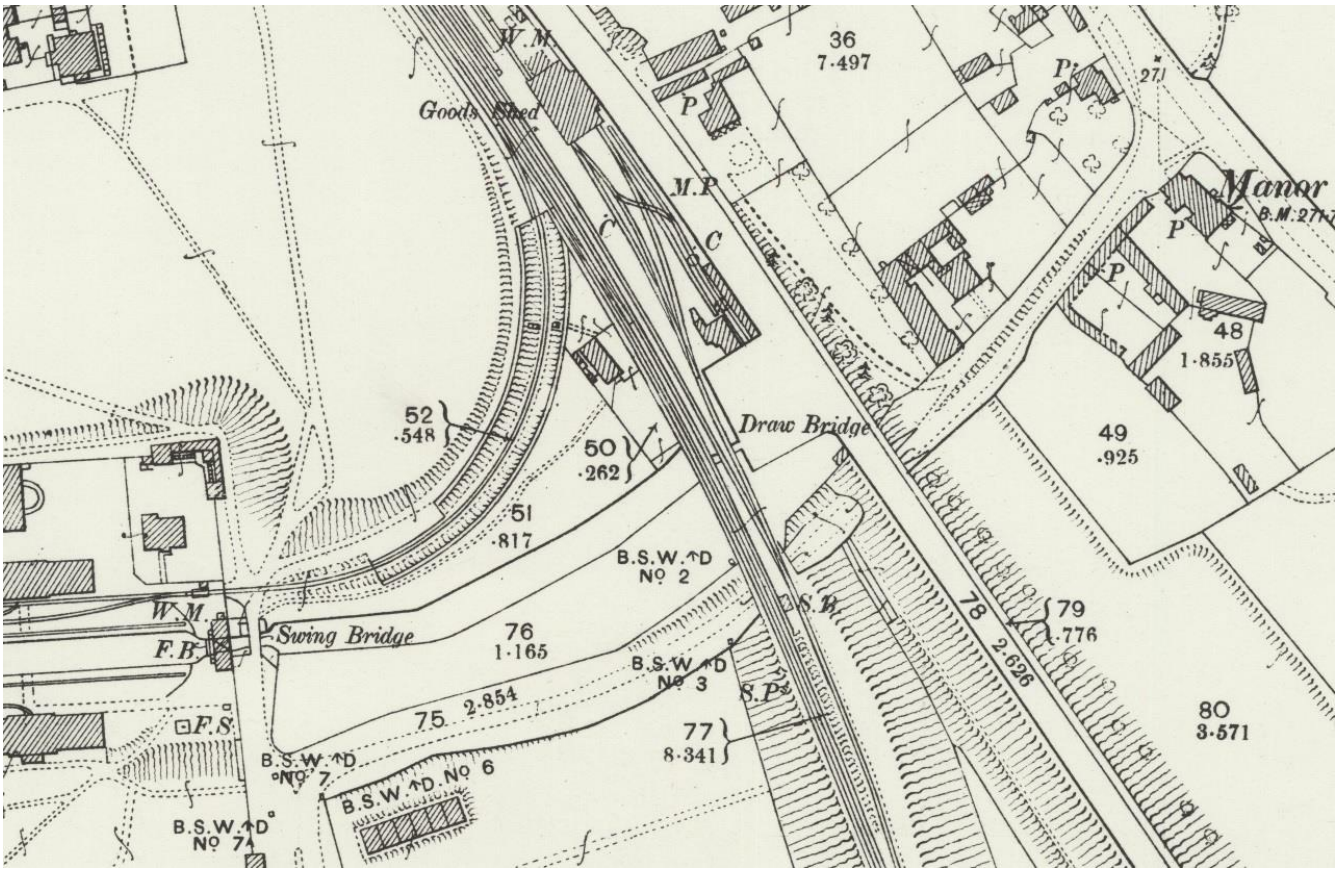


*Figure 5 : from Northamptonshire XLIII.12 (Dodford; Flore; Nether Heyford; Stowe Nine Churches; Weedon Bec). Revised: 1899, published: 1900. Ordnance Survey 25-inch England and Wales, 1841-1952.*

Early twentieth century comparative accounts of railway bridges seem to be scarce, but in 1907 there appeared a general article in the Railway Magazine.[11] The author mentioned the Weedon drawbridge and also paid particular attention to the swing bridge carrying the Oxford-Bletchley line over the Sheepwash Channel, that connects the Oxford Canal to the Thames. This is the Rewley Road swing bridge, which gave access to the eponymous passenger station and goods yard which closed in October 1951 and May 1984 respectively. Conservation is proceeding of the bridge whose historic significance is now recognised.[12] Built in 1850-51, also to a design of Robert Stephenson, the 85-ton, hand-operated bridge

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[10] A Jordan, 'Weedon (letter to Editor)', *Journal of the Railway and Canal Historical Society* 28**,** 1986, 367.

[11] AM Phillp, 'Swing and other opening bridges No. 2 - on London and North-Western Railway', *Railway Magazine*, March 1907, 228-232.

[12] J Martinez, 'Oxford Rewley Road Railway Swing Bridge: Communicating the value of a redundant industrial relic', *Institute of Field Archaeologists – Buildings Archaeology Newsletter* 33**,** 2012, 8-11.

served the Oxford terminus of the London and North Western Railway (LNWR) line from Bletchley, though the original one was upgraded progressively from 1890. In contrast the parallel bridge carries heavy traffic on the former Great Western Railway (GWR) line and is of conventional construction. Its greater clearance over the Sheepwash Channel was made possible by the ground level having been raised for the GWR station.[13] The swing bridge was not captioned in the (admittedly cartographically dense) six inch map surveyed in 1876, but it was adequately labelled in the 25 inch map of 1911 (*figure 6*).

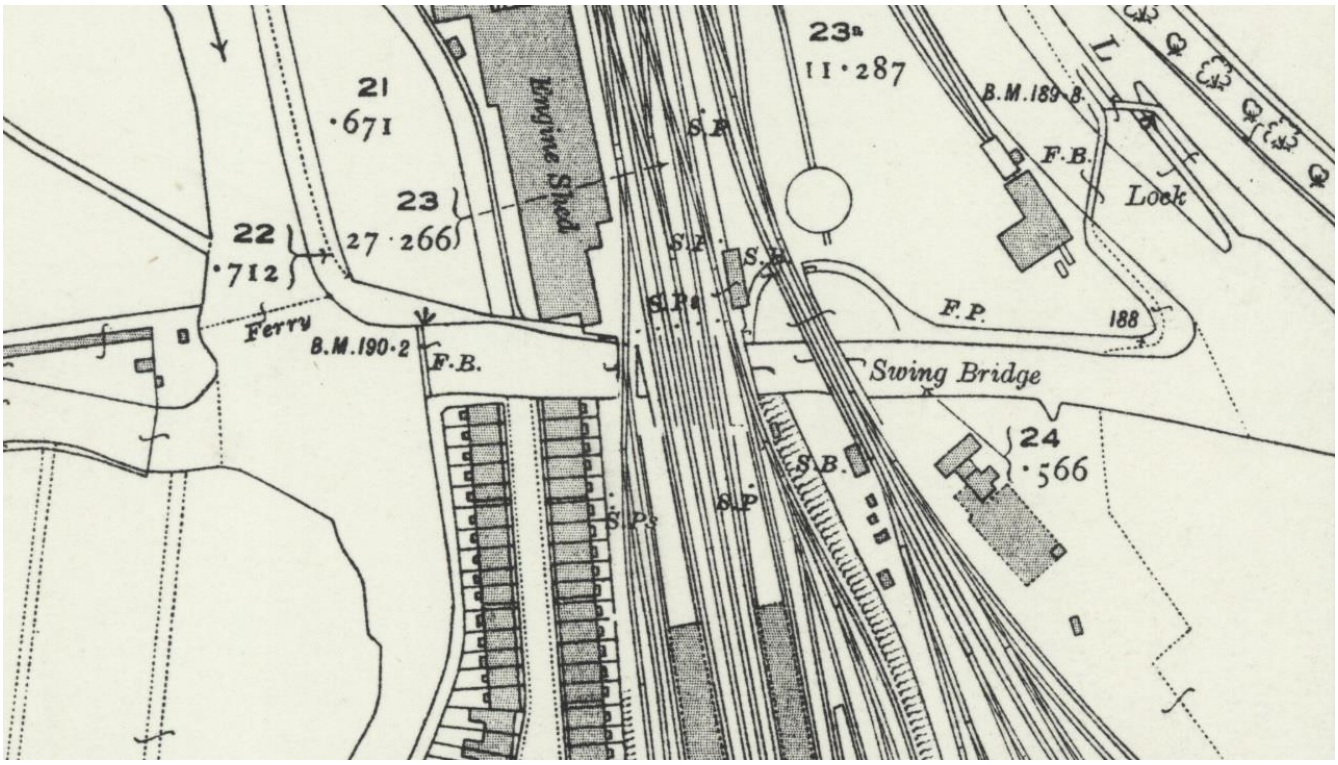


*Figure 6 : from Berkshire II.14 (North Hinksey; Oxford; Wytham). Ordnance Survey 25-inch England and Wales, Edition of 1921 Revised 1911 Published 1921.*

The other swing bridges cited in the Railway Magazine article were in the Liverpool, Widnes and St Helens areas (see appendix) and in all these Merseyside cases except one the bridge is appropriately captioned on the twentieth century revisions of the 25 inch maps. Perhaps the local names for these rather unfamiliar structures were adopted for the labelling of the maps. The available maps are of limited time depth and the wording of the captions lacks uniformity, indicating an *ad hoc* approach, but the quality of labelling clearly improves over time.

***Conclusions***

The map, surveyed in 1859, whose inaccuracy in respect of the Evan Water Aqueduct prompted this study, is full of incidental interest. On this sheet, labelled railway infrastructure includes *Signal Post, Water Column, Electric Telegraph* and *M.P.* (milepost). Antiquities are labelled; *Roman Camp, Roman Road, Tower* and

[13] L Waters, *Railways of Oxford : A Transport Hub that Links Britain,* Barnsley, Pen and Sword Books, 2020.

*Cairn*, and the *Site of the Battle between Johnstone of Whampray and Crichton of Sanquhar, AD 1597*. Also located are *Sheepfolds, Sheep Shelters*, and *Sheep Rees*, indicating an appreciation of some of the technicalities of sheep husbandry. In a large font is *Mineral Spring (Chalybeate)*, occupying a space which would have conflicted with an adequate label for the Evan Water Bridge, had one been deemed appropriate. In the 1909 revision, the *Mineral Spring (Chalybeate)* is no longer on the map, and the bridge has been more accurately rendered (after a half-hearted attempt at correction in the 1898 revision), with a satisfactory label (*Bridge & Aqueduct*). An economical explanation of the error would be that in 1859 the notion of a stream crossing a railway was incomprehensible to the cartographers.

These maps also illustrate how the labelling of an unfamiliar piece of infrastructure improved as the editions progressed. This is paralleled to varying degrees in the labelling of the Weedon, Oxford and Merseyside bridges. Maybe there was a shift during the late nineteenth century /early twentieth century in cartographic priorities in the Ordnance Survey towards a fuller appreciation of functional infrastructure?

***Acknowledgements***

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