Bridge of the Month No30 June 2013
Bannawell Street Viaduct, Tavistock

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News and Events

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Sutherland History Lecture 2012 at http://bit.ly/J4gblz

Seminars and Lectures

Next Seminar will be in Hertfordshire. Date to be fixed. Contact Philip@obvis.com

Please contact Philip@obvis.com if you are interested in attending a day seminar on Arches and Archie. The program for this year includes:

Bill's recent work (some interesting bridges!)

Skew Arches

Ring separation

Causes of live load damage

We charge £100 for the day but if you wish to host a session at your office we then wave the charge.

Recent Publications

Bill's paper received the John Henry Garood King Medal. The medal is awarded annually for the best paper published by the Institution on tunnels, soil mechanics or bridges.

Stiffness and damage in masonry bridges. Proceedings of the Institution of Civil Engineers, Bridge Engineering 165 September 2012 Issue BE3 Paper 1100032 Pages 127–134

http://dx.doi.org/10.1680/bren.11.00032

A spatial view of the flow of force in masonry bridges, Proceedings of the Institution of Civil Engineers, Bridge Engineering 000 Month 2012 Issue BE000, Paper 1100026, Pages 1–8

http://dx.doi.org/10.1680/bren.11.00026

Forthcoming Lectures

18th July Poole City Club "*The Devil is in the Detail*"

Tavistock, Bannawell St, Viaduct

Do disused viaducts count? This one has a lot to offer in the way of strange details. Years ago, Tavistock was served by two independent railways. The Great Western came along the valley floor in 1859 and the Southern (well, strictly the Plymouth, Devonport and South Western Junction Railway) arrived in 1890, High above the town to the north. This note is written (or at least begun) in the Station which now offers high class accommodation.

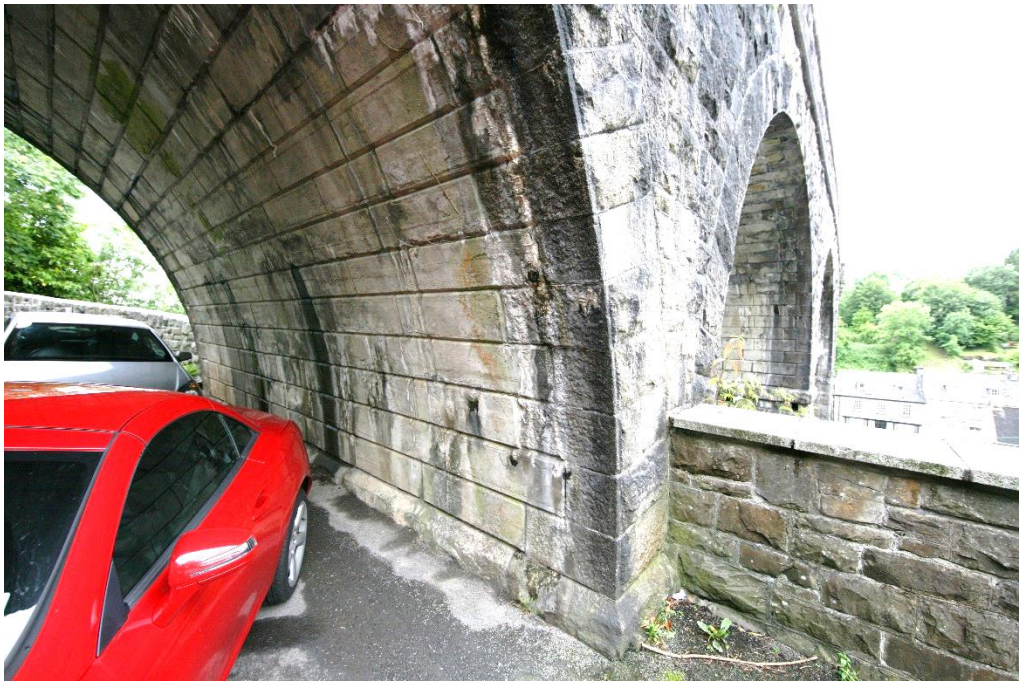
The Google eye view at http://goo.gl/maps/HqXj8 shows that the alignment has been thoroughly built on between the station and the viaduct. That will be fun when the Dawlish sea wall gets washed away and they need to reinstate this line.

Anyway, the viaduct.

What can be seen here is 5 spans at 50ft (15.24m) and 2 at 32ft (9.14m). There is another 32ft span off camera.

One thing I found very noticeable is the almost total lack of vegetation on a bridge that has been uncared for since 1968. I don't think I have seen a working railway bridge with so little. One assumes that the basic granite construction just provides no nutrients, but what about the mortar?

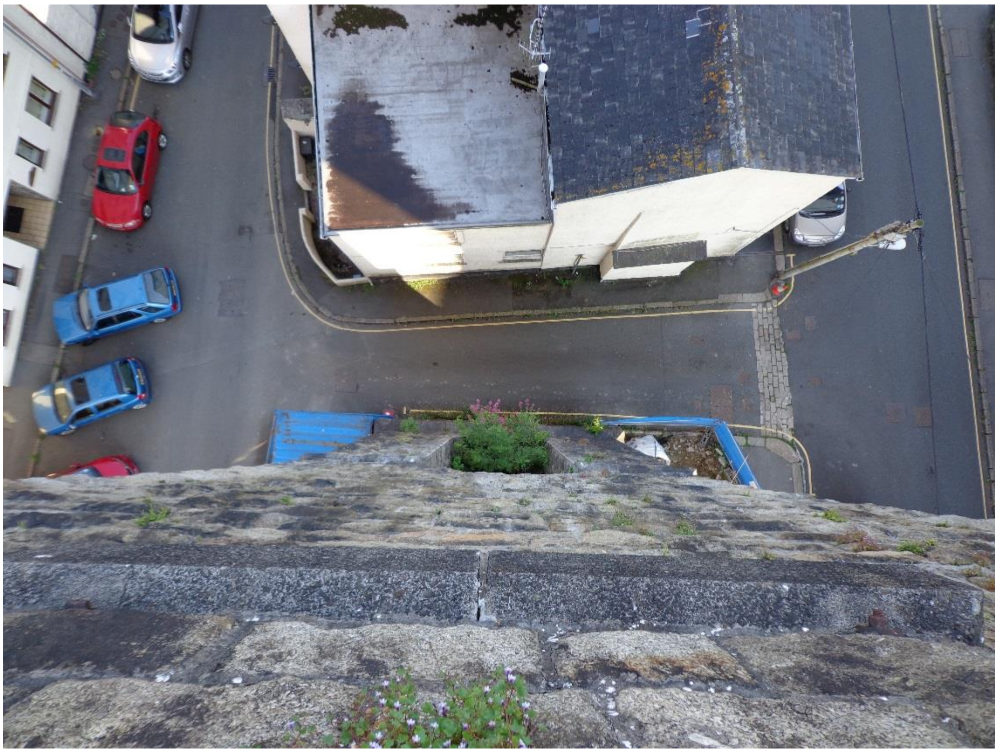
Point number 2 is that this is a granite structure in general but the arch (and presumably the pier fill) is poured concrete.



Here you can see the board marks on the concrete. The “joints” are simply fillets fastened to the shutter. I am often asked about the need for hinge formers in concrete arches and the answer from here is clear. The arch doesn’t care. A V groove like this is probably enough of a stress concentrator to ensure that any cracks form in the joints.

The next feature that I noticed some years ago when passing through Tavistock, but never properly understood, is the double pier in the middle of the valley.

At first sight one thinks of a king pier but it isn’t that because the two legs would not work compositely. It turns out to be a function of the pre-existing road layout below. Looking over the parapet provides a worthwhile view.



Notice that the two streets are very close with really only one (albeit extended) house between them. The double pier occupies a large part of the space, with the result that the 50ft spans each side carry the next piers to the back of the footpath of the street. Note also the vegetation in the bottom of the spit. This is the only place that soil can accumulate and provide an anchor for plants to grow.

Looking through from Taylor Square to Bannerwell Street showing how the span fits there.

Here (in Taylor Square) again the pier sits on the back of the footway.

Incidentally, the Taylor in question was a local mining engineer John Taylor whose business eventually grew to be Taylor Woodrow.

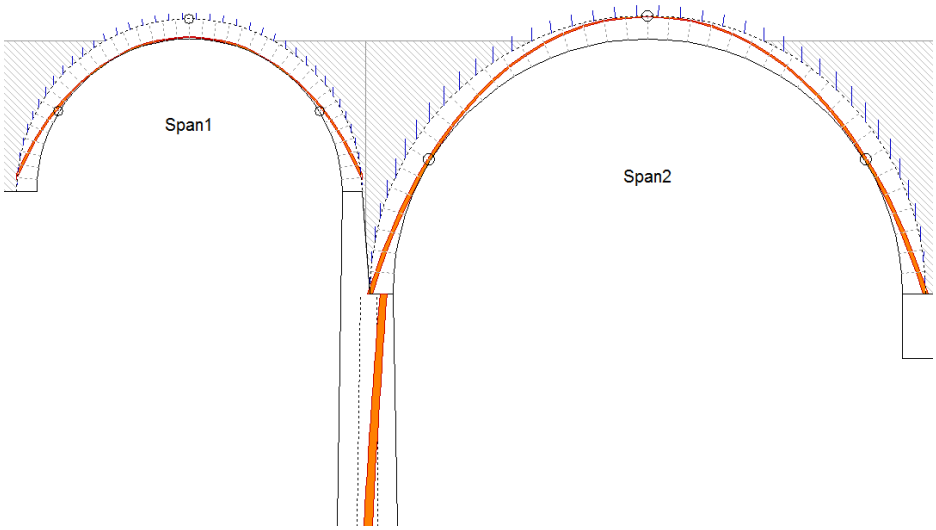
And the last detail to be picked out this month is the change from 32ft to 50ft spans.

Here you can see how the 32ft arch springs from a point 10ft above the 50ft one. The granite of the pier is carried up to that springing level.

The change in span was dictated by similar considerations to those which required the split pier. The road to the station rises through one arch and turns back through another. A 50ft span from this pier would have landed in the middle of the road wile 3 spans of 32ft fill the gap and allow appropriate access.

Perhaps all that will be clearer from the old aerial photograph at

http://www.britainfromabove.org.uk/image/epw023602?keyword=1779&ref=3



In plotting this I see a constraint in Archie that I hadn't noticed. The program batters the piers from the springing point on both sides, rather than coming down vertically on one side to the springing level on the other. That is clearly not the case in the bridge in question.

This photo from Maurice Hopper shows the granite wall lifting the springing of this span very clearly. Note that the corbels for the centre are still at the lower level. These may pass right through the pier. Also visible in the second span is the change of colour of the concrete arch at the top of backing level.