



## Bridge of the Month No81, September 2017 Railway Viaduct Nr Todmorden



I very nearly dipped out this month. Life has been, and continues, frantic. Last week of Sept included an evening lecture to ASCHB in London on Tuesday and an all-day Archie Seminar in Bristol on Friday. There was to be another in London on 3<sup>rd</sup> October but we got not a single taker. A talk to do in London again Tuesday 3rd Oct, 1800 at IStructE on our recent work at the Liverpool Road Station in Manchester (That's the one, the first inter-city railway station in the world).

The other feature of this week is it marks 50 years since I met Sue. We need a little time to mark that.

At the end of August, I had a couple of days at the Scottish Lime Centre in Fife. One bridge from there has already featured but I took the opportunity on the way north to stop by in Cornholme to look at a very skew bridge I had interacted with through Archie-Help some years ago but never seen. Just a mile before that I was brought up short and suddenly pulled off the road and parked [about here](#). In this picture, you can't see why:



You can see it was a beautiful day. Walk a little closer and the reason for stopping becomes obvious.



I still can't quite work out why there is so much going on when the core damage is obviously very old.

From this distance, you can see the hump, with a hinge at the crown and one about  $\frac{1}{4}$  span each side where the curve straightens considerably. You can also make a reasonable assessment of how far it has moved by looking at the kink at the top of the pilasters on the abutment. And, of course, masses of tying and strapping.

Looking at this picture again I thought I could see a join in the piers but the wonder of modern cameras allows a much closer view to be cropped from this image and it is clear below that the apparent marks are something else.

Incidentally, my current camera is a Sony HX90V which lives comfortably in a bag on my belt so is always handy, and which offers a 30x zoom, the benefit of which you will see shortly. To be able to use this hand held is quite remarkable.





So maybe it is time to use some of that zoom and look closer.



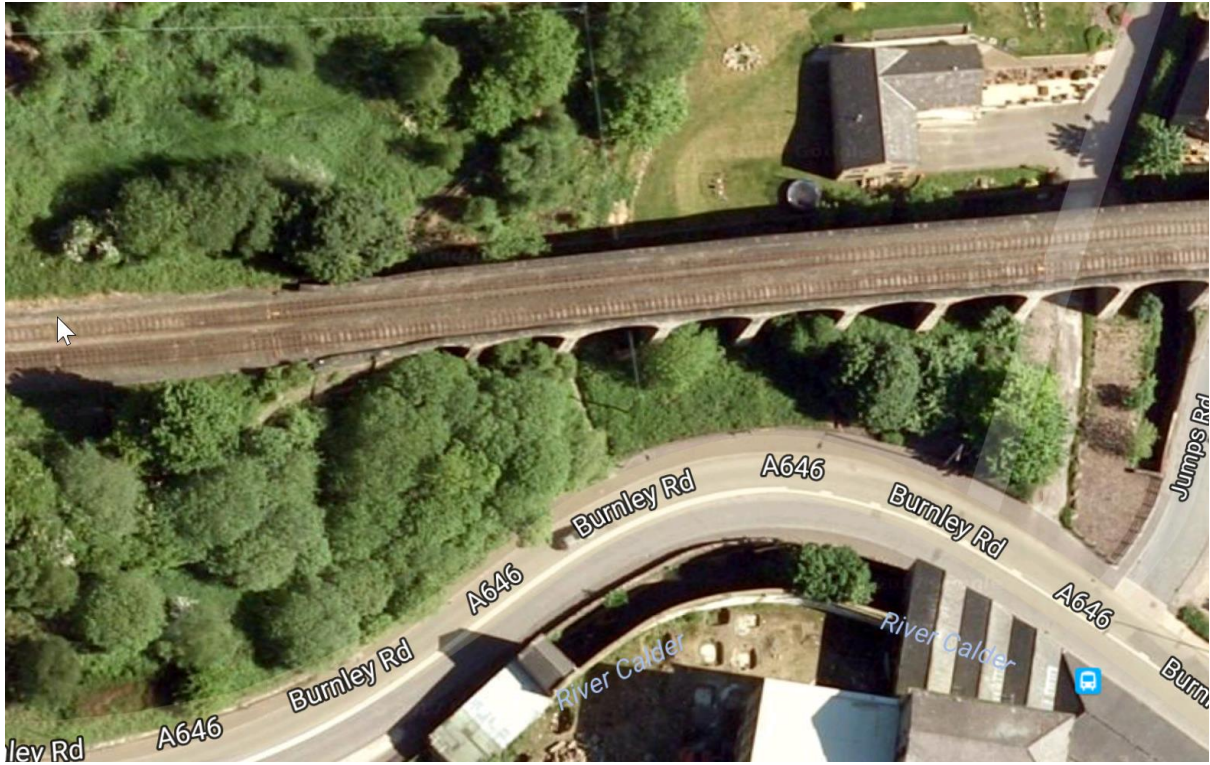


When you do this to an arch, push the abutments together that is, you are quite likely to get longitudinal cracking caused by the compressive stresses. I expect the cross ties are for that. Very pleased to see they have done the sensible thing and put ties above and below the arch rather than drilling through the ring which does irreversible damage and is especially bad in brick arches.



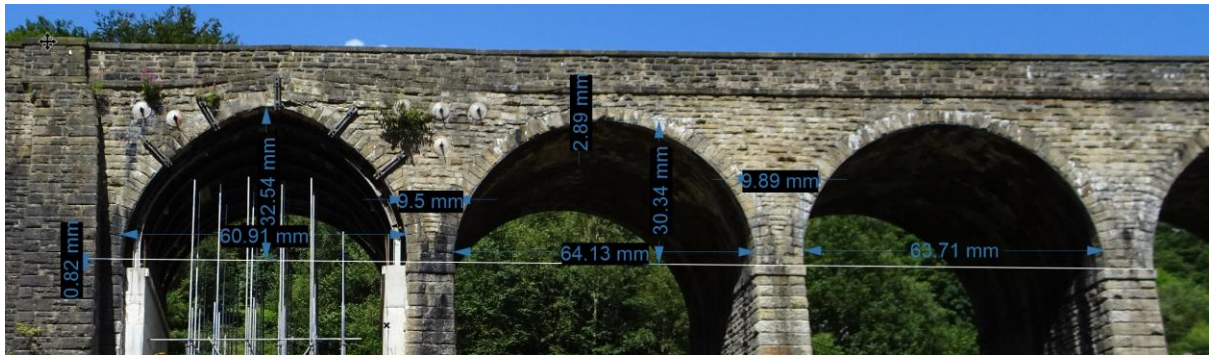
Another passing comment, even just the Microsoft Word, as here, it is possible to push photographs to reveal detail. Why does NOBODY do that when submitting reports? Just click on the photo then format appears on the menu bar click that and corrections and choose a balance of brightness and contrast.

And what does that reveal, timbers between those steel rings, but much more significantly, look how the shape of the rings changes from sharply pointed at this side to a smooth curve at the far side. The abutment has rotated in plan, not just slid down the slope. I think that kink is visible here in the Google Maps satellite view. You can also see why it might have happened, with the abutment perched on the steep end of a spur.



Can we see how far it has all gone without getting into the site?

This pic is near enough square to the face in plan, though tilted up somewhat. The two right hand spans scale the same so we can work the rest from that. Let's assume they are 30ft.



The piers are then 4ft6in, the left-hand span 28ft6in, the left hand rise 16ft versus the original 15ft and the left hand springing has dropped 0.4ft. Quite a movement.

It's also worth a closer look at the parapet over that damaged span.





Here we see the spectacular zoom on that tiny camera. This image has not been cropped. The top of the ring is very badly crushed, as is the first course of stone above. The string course seems to have accommodated most of the movement by rising into a hump and the parapet has been brought back to level. I think that suggests this is very early damage and has been present for much of the life of the bridge. It is noticeable that the bond in the stonework is completely broken in the top two or three courses, especially to the left where they have been pushed sideways.

And finally:

There are diagonal cracks right up the wing wall.





And the massive joggles in the top of the pilasters.





Oh, but I keep seeing more.....



At the right hand side of the span we do, of course, have more crushing, but with such a long run of wall to push against there is little movement. Notice, though, a split in the string course above the crown here and some obvious damage round the top of the ring. As we move to the left there is much jostling for position as the stone tries to squeeze into a shorter, higher band. Since there is little growth across the rest of the structure we can assume that the bush there has found a crack to anchor in. And at the end of the steel arch there is a new piece, making it clear that the concrete there is creating a more substantial support for the rings.

And now, this really is finally. The gaps and displacement around these stones shows that the steel rings have now lifted the arch to the point where it isn't working in compression.

Next month we will move up the road a little to the skew bridge I was really aiming for.

Don't you love the herring bone dressing on that string course. Are the coarser patches replacements?

Still happy to receive invitations for further day seminars. Host provides room and catering and we get to sell a few outside tickets to cover our costs.



