OBVIS

Bridge of the Month No17 May 2012
Great Wester Railway, Littlehempston

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Brunel and his team of engineers built some amazing bridges. This one, though small is in a class of its own. Only two pictures and neither of them really tells the story so it is quite important to look at the map (http://g.co/maps/9un47).
The railway was originally single track, broad gauge. When widened, the only way was with a beam bridge.

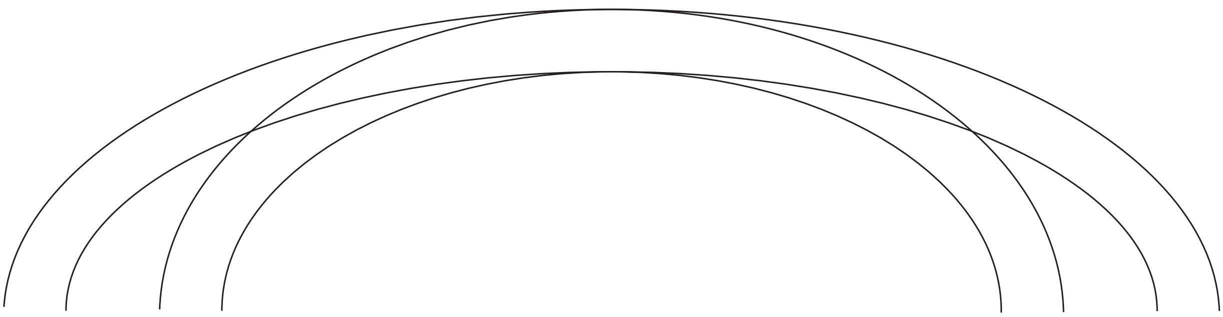
Here, we are looking from the east. The picture shows only two spans of the three. The road runs beside a river but just beyond the bridge they cross. The road bridge is visible in this picture. The road and river diverge sharply as they approach the bridge. The engineer overcame this with two skew spans of opposite hand with the river through one and the road through the other. Between these two is a third span which tapers. Fine in a metal bridge but rather more difficult in an arch. The tapered span is the left hand one in this picture. Overleaf we get a view from upstream.

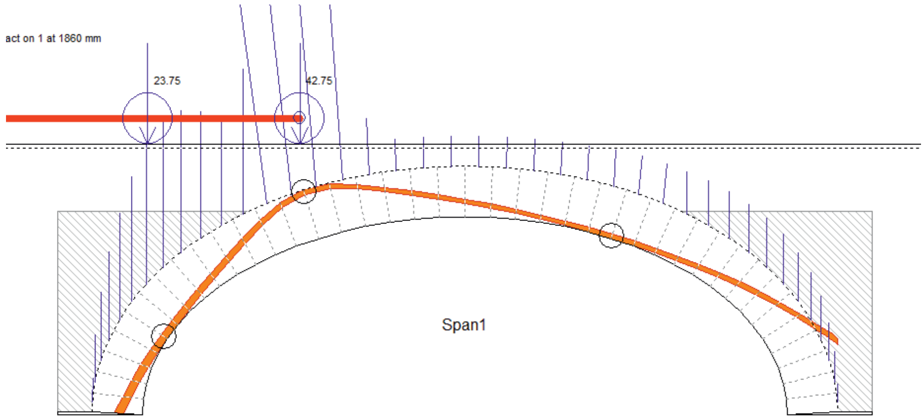
I can't imagine how the centres for this bridge were specified or built. The expense of building a series of different frames to cope with the changing span would have been very great since they probably could not have been employed again elsewhere.

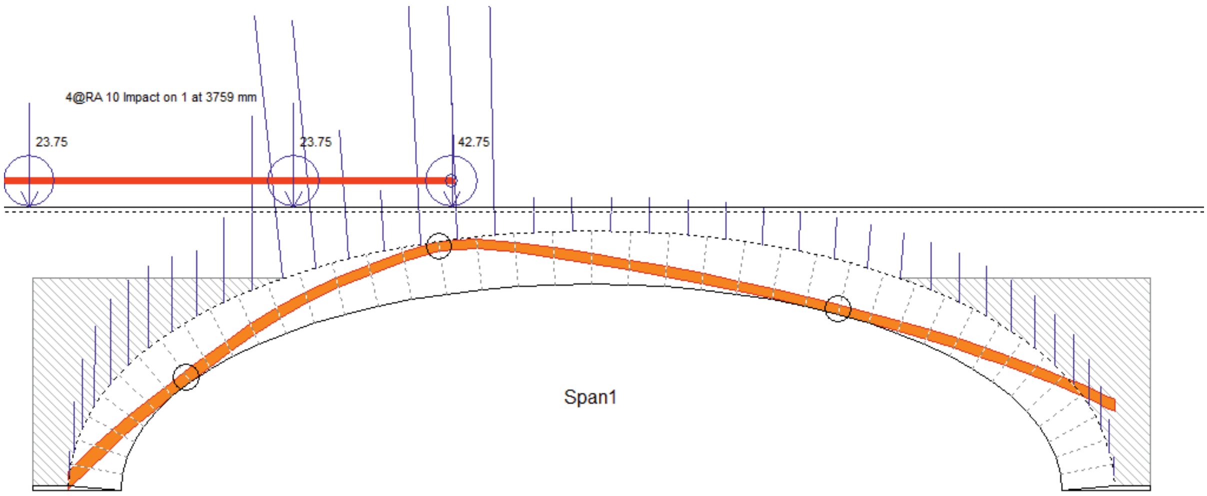
This picture was taken deliberately from a point at which the faces of the piers are not visible . The river goes to the right of the right hand pier and the road to the left of the left pier. The arch spans about 25ft on the west side and 35ft on the east. That’s 7.6 and 10.7m.

The bridge is built of local undressed, but partly selected stone. The faces of the arch ring are of longer flat stones, but the indications are that the main arch is entirely of relatively small random pieces. In fact, building such a complex shape would be very difficult in any other material.

The two profiles below show how much the two sides of the bridge differ.

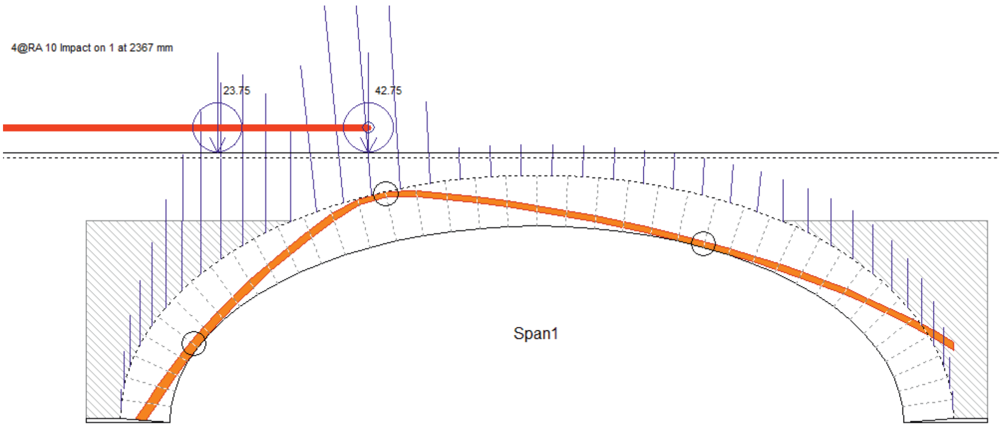


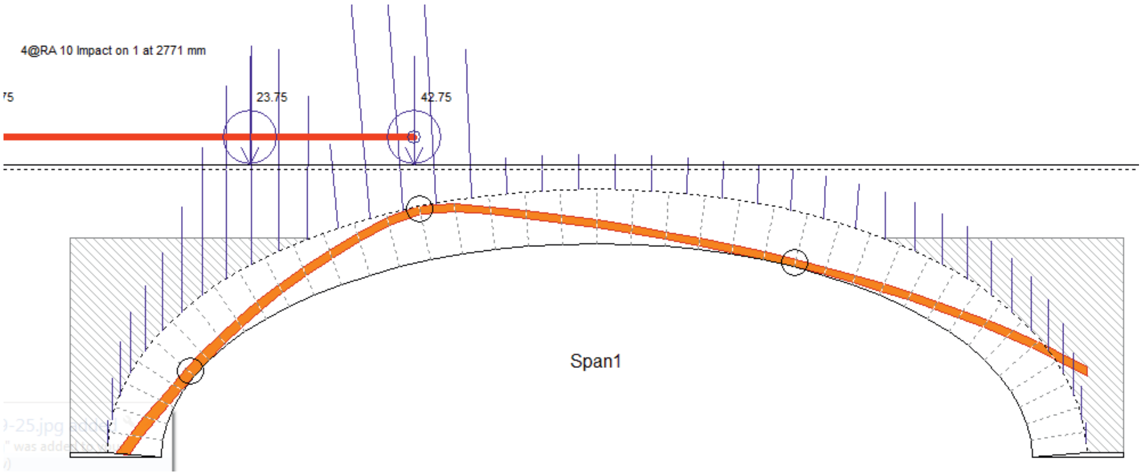




This, very quick, analytical view shows the bridge capable of carrying maximum weight railway vehicles but it does, of course, ignore stiffness effects. The very flat central portion of the arch might work perfectly well in maidenhead, where the scale, and therefore the force, is much greater, but in this small bridge we can expect mid span cracks and longitudinal cracks alongside the spandrel wall.

These plots show loads applied at the maximum and minimum span, whereas the actual loads are only 5 feet apart in a bridge that is rather more than three times that (It was originally built for broad gauge). So the bridge width is about 19ft and the working spans under the rails will be about





Here we see the analysis based on the span under the rails. Over this width, the change is only 3ft and the difference in the thrust lines is much less. The fact remains that the bridge is much stiffer on the shorter span and is likely to twist as a train crosses.

News and Events

Bill's Sutherland History Lecture from 16th Feb is now available to watch on the web at http://www.istructe.org/resources-centre/webinars

After a long struggle with the new protection software we think that the Demo, available from http://www,obvis.com is now stable and can be properly activated when paid for. It will work in standalone or network mode. If you are ready for an update or thinking of buying please download this version and then contact us for activation.

We are now ready to embark on the next phase of proper development.