

Bill Harvey [Bill Harvey Associates Ltd](#) and [OBVIS Ltd](#)

Here is one of the bravest designs I have yet seen. In Bethnal Green, a short walk east of the station is [Morpeth St](#). The bridge has been refurbished but the road is now closed to traffic because vehicles kept driving into it. This picture was taken in the early stages of refurbishment.



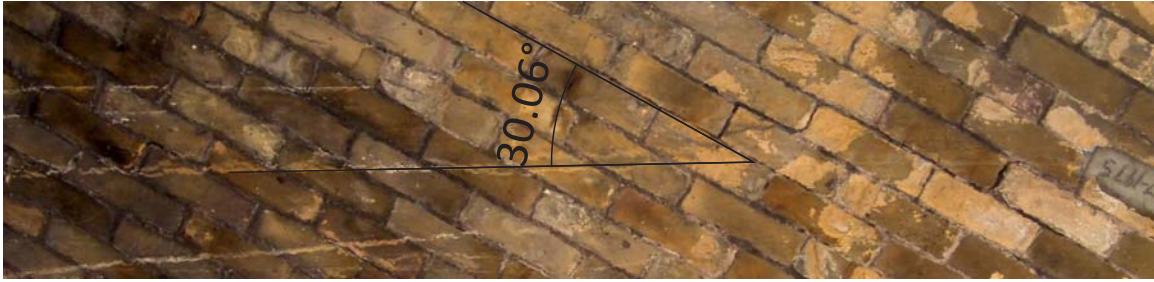
The bridge has a modest skew of about 30° but the most spectacular thing is the very flat arch. The measured skew span is 12.39m or 40.65ft which would indicate a square span of about 35ft. The rise is measured at 990mm or 3.25ft so even on the basis of square span, the span rise ratio is 10. There is no apparent inclination in the spandrel coursing or sag in the parapet or string course to indicate spread of the abutments or settlement under stress. That is very surprising.



The abutment is suitably chunky. The arches here are mere decoration the total width is of the order of 10m. I don't have a suitable photograph, but if you go to Google street view from the map link above you will see that, to the left of this abutment is a viaduct with the arch springings at about 500mm above pavement level.

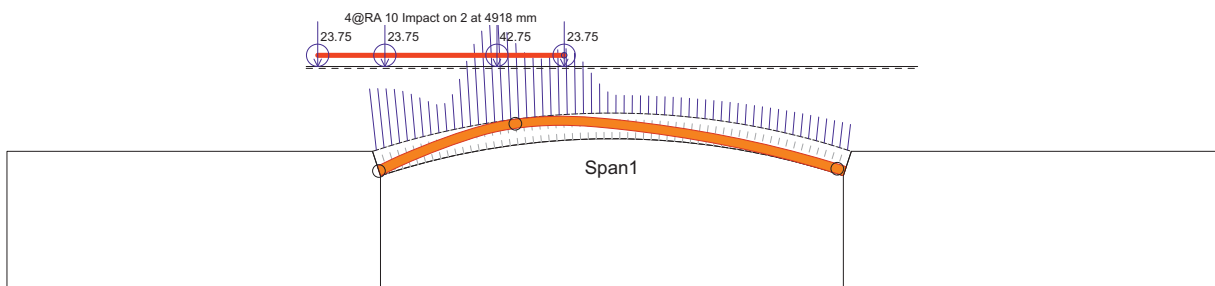


The East abutment runs on to an embankment so that is where we must assume the weakest resistance to sliding.



Looking up at the crown of the arch, the score marks from vehicle roofs indicate the direction of the road, indicating the skew angle of 30° . There is also some indication of a crown crack running through beds and perpends and indicated by the mortar dab (a traditional but useless “monitoring” system still in too common use on the railways).

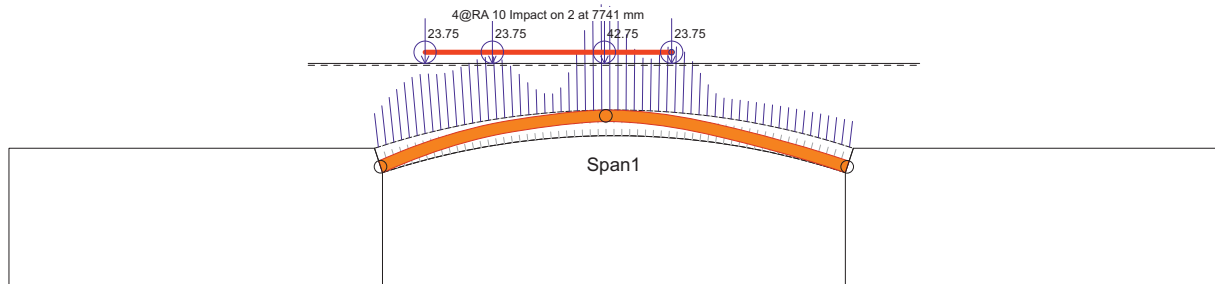
It is particularly interesting to look at the thrust pattern in this bridge. Using normal load factors, distribution, etc. and applying an RA10 load from two adjacent bogies produces the result below.



Here the thrust remains three hinged in form but the depth of material required is approaching half the thickness of the arch.

A simple calculation of overturning and sliding suggests that the abutments are more likely to slide than to overturn. It is clear that this has not happened so it might be that the foundations are deeper than assumed and/or that there is a good key into the founding soil, perhaps through a saw tooth base to the abutment.

Moving the live load to the centre of the bridge produces more thrust and is probably the critical load case in this bridge. Note, however, that the distribution models in the various codes of practice are flawed. The thrusts shown here are unlikely to be truly representative of the behaviour of the structure under real loads.



The largest horizontal thrust from these analyses is 1540kN/m width. In practice, the working thrust on the abutment is likely to be less than two thirds of that value.

News

Local Talks

Bill will be speaking in Salisbury on 10th November. See the flier at: <http://bit.ly/tgByoY>

Bridge Management and Maintenance: Bill is convenor of the Study Group at IStructE. It is open to anyone with an interest in bridges. Ideas for meetings are always welcome. We are trying to set up a discussion group and also a meeting to discuss preparation for and response to floods and issues of mechanical parts of bridges (eg bearings and expansion joints. Contact Sarah.Okoye@istructe.org to join or bill@obvis.com with any ideas or offers of assistance.

Archie-M The latest version of can be downloaded from: <http://bit.ly/BillH5>

Seminars and courses. Courses are run as a profit making concern by Bill Harvey Associates and need take £3000 to cover the costs so say 10 people at £300 each. The standard charge for Seminars, run as part of the support for Archie-M is £100 which is intended to cover costs only.

If you would like us to run a course (a full day intensive training) or a seminar (intended as an update on arch studies and Archie plus discussion between users) near you, please let Philip@obvis.com know.

Continuing thoughts about arches and Archie at <http://billharvey.typepad.com>

Moiré Tell Tales: High sensitivity, long range reading. <http://bit.ly/BillH6>