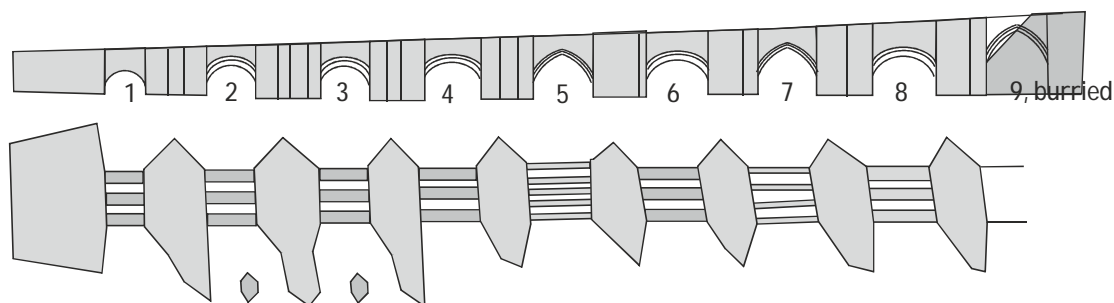


Bill Harvey Bill Harvey Associates Ltd and OBVIS Ltd

This is the first of what will be a short series of structures linked by both locality and engineering. The Exe bridge (<http://bit.ly/BH-EXE>) is a sad truncated thing compared with many of a similar age scattered around Britain, but it is at home and it does give the lie to the often heard statement that skew bridges were invented in the railway era. The plan view linked above in Google Maps shows clearly how the cutwaters are skewed to receive the flow of water but it is not clear here that the spans themselves are skewed. Close observation makes that clearer. The skew is not great, but it is real.



This elevation of the remains of the bridge is traced from a drawing by Stewart Brown. There were originally 17 or 18 spans. The 9th now vanishes under a new road. The sketch plan above shows how the builders dealt with a skew flow using spans skewed at up to 10 degrees and cutwaters further skewed to meet the flow.

The bridge is known to have been complete before 1220 so it is a contemporary of the old London Bridge (completed 1206). <http://www.exetermemories.co.uk/em/exebridge.php>

The other obvious feature from the plan is the fact that the spans and piers are roughly equal in width. The biggest span is about 5.7m or 18ft 6in. The arches are built on ribs. That is more likely to be an economy measure than a decorative or even structural feature. A rib can be built on a small centre which can then be moved to build the next.

Six of the remaining nine spans are of more or less semi-circular shape. They are built on three substantial ribs with dressed voussoir edges and rubble infill and are about 1m wide. The photograph below shows span 8. Above the ribs is a continuous shell of stone of relatively complex construction.



The ends of the arches are vertical, or nearly so, and required no support. They could therefore be built in rubble. The photograph below shows that the lowest portions were of dressed stone. This was probably to maximise resistance to the damaging effects of flowing water. Above this dressed stone is a layer of rubble masonry and above that, much larger stones were used.

The mixed quality of the stone is also interesting. The picture above shows the outer voussoirs of alternate colours and quality.

The inner section of this span seems rather different from some of the others. The central section of the central rib is of single large pieces of (possibly Heavitree) breccia. The crown of that rib doesn't fit well. As can be seen below.



A closer look at this central section shows that it has probably been replaced and the masons had trouble fitting the rib properly. Perhaps they were working in haste to restore a badly needed road.



The kink is also visible in the photo above which shows how the different stone fits in with the old in a rather obvious way.

Span 6, below has three ribs of identical shape and construction which reinforces the idea that span 8 has been rebuilt.





The mixed nature of the arches is confusing. The natural assumption would be that the round and pointed arches are of different date but the archaeologists say not. The bridge was built across the river from the Exeter end and all the construction is contemporary. We must assume, then, that the pointed arches are either a decorative feature or the work of a different team of masons. The elevation suggests that rounded arches are normal since there is a run of four before the first pointed arch, but the first three arches were buried beneath St Edmund's church, and so invisible from the upstream side, and there was also a chantry chapel on the downstream side which would have similarly obscured the view there. Indeed, by 1770 there were houses on both sides of the bridge as far as span 9.

The pointed arches have much narrower ribs, more closely related to those of a cathedral vault. The webs between are constructed entirely from small rubble, probably using only a very simple support near the top edge. This can be seen on the photograph below.

A first look at the photo above suggests that the chequerboard effect is only on the internal ribs but, though they are apparently similar in colour, the alternate blocks of the near rib are obviously differently weathered.



The picture below shows the complex construction around the Exeter end of the bridge. St Edmunds church spread towards the camera from the remaining tower and was supported on the columns and probably also on vaulted walls.



The western end of the bridge was demolished to allow a new bridge to be built. It had bigger spans and better alignment and was opened in 1778 along with a new extension of Fore Street through the city wall to form (appropriately enough) New Bridge Street. All that remains of the 18th Century bridge is the skew arch (below) which spanned a mill leat. The three span stone bridge was replaced with a single span Steel and Iron one in 1930 but even that proved too much of an obstruction and was replaced with a bleak concrete double bridge in about 1970. Note the horizontal coursing in this skew arch.



News

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>