

**EXCAVATION
OF THE
BRICK SLUICE
IN THE
RANDALL LOWER
LAKE DAM**

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on behalf of the
Community Archaeologist
at
Shorne Woods Country Park
May, August & September 2008

EXCAVATION OF THE BRICK SLUICE IN THE RANDALL LOWER LAKE DAM in May, August & September 2008

1. Description of the site as found

1.1 The shallow valley and occasional stream forming the NW boundary of the Randall Manor archaeological site are blocked by clay and earth dams at three points. In front of the lowest dam, a lake forms in periods of modest rainfall [Photo 1]. A shallow channel across the centre of this dam must at one time have allowed excess water to run north-eastwards out of the lake into the surviving stream way. However a more elaborate arrangement was subsequently made at the SE end of this earth dam.

1.2 A brick facing in an English Bond, 1½ bricks thick, inclined 12 ° from vertical away from the lake, rested against the last 5 metres of the earth dam [Photo 2]. Although it may have been built with a level top, the centre of the facing had been eroded or cut down to form a deep vee notch. The SE side of the vee was formed of concrete not brick and this could be seen to fill a vertical slot in the brickwork, 0.470m wide [Photo 3]. The slot extended downwards out of sight into the lake silt which had accumulated against the brickwork. This clearly related to some kind of sluice by which the flow of water out of the lake could be controlled.

1.3 Behind the brick facing and concrete a shallow vee-shaped channel some 1.5m deep had been cut through the thickness of the earth dam for 8m before turning NW and rejoining the surviving stream way below the dam [Photo 4]. Immediately behind the brickwork, the SE side of this shallow channel had been consolidated with clay-filled plastic bags. Beyond the turn in the channel, the level dropped by 1m and a circular brick conduit consisting of a series of abutting rings of 12 bricks emerged at near stream level [Photo 5]. Apart from a period in late summer 2008, water flowed continuously from this conduit and into the stream, though the vee shaped channel above it was dry, except in times of heavy rainfall [Photo 6].

2. Objectives of the investigation

At the request of the Country Park authorities, it was agreed that the archaeological volunteers would:

1. Recover the design and intended function of the brick facing and sluice
2. Record the surviving features
3. Assess the possibility of reconstructing the sluice and restoring its function.

3. Constraints on the work

The following constraints were observed, except as described:

1. The present flow and restriction of the water from the lake must not be altered beyond that specified by the Park authorities
2. In-situ brick features must not be removed

3. Public access across the width of the dam must be maintained (in the event, given that passage across the dam was already somewhat precarious, we blocked all public access during the excavation).
4. The site must be safe for the public whenever it was left unattended. (The immediate vicinity of the brickwork was surrounded by warning tapes and orange plastic builders' fencing. The excavations themselves were quite deep and would have been dangerous to anyone falling into them).

4. Investigation in the lake

4.1 The first task was to investigate the SW face of the brick facing, most of which was covered by lake silt lying, for the most part, under water. At this time, May 2008, the water level in the lake was almost up to the bottom of the vee notch in the brickwork, so to provide some dry working space a temporary dam was constructed 1m to the SW, in the lake. This was made up of timbers and plastic sheeting, weighted down by excavated lake silt. It was quite effective – so much so that in a few days, the water level in the lake rose and overtopped the temporary dam itself. In the meantime though, the silt was removed from much of the face of the brickwork and 24 brick courses were revealed, from the highest remaining bricks at the NW end down to the level of the water which continuously seeped past the temporary dam. It was not possible to explore much below water level and the bottom course of the brick facing could not yet be found.

4.2 By late August 2008 when the excavation on the Randall Manor site had ended, lack of rainfall had caused the lake to virtually dry out and work on the sluice began again. Clearance of the silt eventually exposed the whole depth of the brick facing, including the concrete block mentioned above, bringing the number of brickwork courses visible to 35. It was found that there was no brick coursing beneath the 0.470m vertical slot in the facing. The brickwork on either side rested upon an apparently natural deposit of grey clay with some water-rounded pebble.

4.3 The concrete block had a flat top and its SW side, facing the lake, was flush with the brick facing for a depth of 0.5m. Below that, the concrete projected out from the lake-facing brickwork as a roughly surfaced block with a half-octagonal plan shape as it continued down [Photo 7]. The sides of this lower block tapered as they descended, ie it was narrower as it went deeper, like a flower pot. The total depth was 1.430m. On the NE side of the facing, the top of the block extended a further 0.650m to a narrower brick facing behind the main brickwork.

4.4 The lower, rougher, part of the concrete block appeared to have been the cast of an exploratory excavation in front of the vertical slot in the brickwork. The brickwork and the slot appeared to have been constructed to house a sluice device to regulate the water flow out of the lake. When the device became decayed or defective, an exploratory excavation must have been made into the lake bed as deep as the base of the slot, then both excavation and slot were filled with concrete up to lake bed level. Above that, boarding must have been placed against the brick facing, before pouring the concrete for the upper part of the block up to the level required for the overflow channel.

4.5 The August 2008 excavation found a flat iron bar in the lake silt which was perhaps originally used to hold a hinge or catch. The lowered level of the lake water eventually allowed excavation as far as the underside of the lower block and the lowest course of brickwork [Photo 8]. At this stage, the interior of the slot was still not visible, but some water was still reaching the brick conduit at the other end of the feature. This appeared either to be seeping under the bottom of the brick facing, or possibly through gaps around the concrete block.

4.6 It appears that at some date after construction of the concrete block, the brickwork and/or the concrete were considered to be obstructing the water flow too much and so the outlet was deepened by breaking away the NW edge of the concrete and some of the adjoining brickwork into the vee-shaped notch. This resulted in the state of the remains visible in August 2008. Given that the earth channel immediately behind the brick facing had been given a similar profile by insertion of the clay filled polythene bags, this work could have taken place around 1960-70.

5. Investigation of the brick facing

5.1 In September 2008, the Park staff removed the concrete block in the brickwork, using a pneumatic hammer. This revealed that a rectangular brick enclosure 0.470m wide and extending back 0.650m behind the brick facing, had been built to enclose the vertical slot in the main brick facing on its NE side [photo 9]. Unlike the main facing, the facings of the enclosure were vertical, but of poorer workmanship. This brickwork was also in English Bond.

5.2 A substantial horizontal timber of 0.470m square cross section (which subsequently proved to be a pipe) was set at the base of the vertical slot in the main brick facing, fitted closely between its sides. To the SW, it projected slightly beyond the face of the facing, into the lake. The last 25mm of the timber had been cut down to a circular section and were enclosed by a substantial iron collar, now very corroded [photo 10]. The visible surfaces of the timber were blackened and slightly softened, but it was generally well preserved. To the NE, at the back of the enclosure, the timber passed beneath the wall of thinner brickwork. It became noticeable when excavating from the other side, that where this brickwork rested on the timber it remained level, but at each corner, where it was unsupported, it had subsided [Photo 11].

5.3 On the flat top of the timber pipe, towards the back of the enclosure, was a vertical circular section hole 190mm in diameter and tapering upwards, which gave access to the circular bore through the centre of the pipe, now blocked largely with earth [Photo 12]. Segments of a tapered wooden plug (identified as oak by Dr Damien Goodburn) remained in the hole and when pulled upwards would originally have restricted flow through it. Some fragments of thinner, vertical timbers were set on top of the main timber pipe on either side of the vertical hole. Excavation inside the bore of the pipe towards the SW end showed (by touch as the access hole was too small to admit a head or a camera) that the pipe was closed by a tapered wooden bung. The outline of such a bung could not be seen within the pipe diameter from outside, but it is assumed that the iron collar had been shrink-fitted on the timber pipe to prevent it cracking under pressure from the bung.

6. Investigation of the channel and conduit

6.1 An excavation was made north-eastwards from the brick facing, to try to explore the relationship between the timber pipe, the channel above it and the circular brick conduit which emerged at the far end. The cutting of this excavation [Photo 13] was constrained by the roots of trees, which we attempted not to harm and by the depth of the cut through slippery clay - and indeed by the height of the rising ground on either side of the cut. The excavation was taken down as far as the depth of the original cut which must have been made to insert the timber pipe and the brick conduit. However we were unable to find the sides of that cut and all the material which we excavated, apart from woodland soil and plastic bags, appeared to be backfilled clay and earth.

6.2 The SW end of the brick conduit was eventually located by a collapse of the channel surface 5.5 m NE of the brickwork enclosure [Photo 14] and the excavation was not taken beyond this point. There proved to be two timber pipes, each 2.750 m long. The exterior of the “upper” pipe, nearer the lake, became less sharply rectangular the further it extended from the brick enclosure. Its NE end tapered to a sharp nose, clearly to fit into the “lower” pipe [Photo 15]. The lower half of the circle of the nose was intact, but the upper half was partially broken away. Its internal bore was of 210 mm diameter and was a well formed, smooth circle [Photo 16].

6.3 The “lower” pipe had a similarly smooth internal bore, swelling out where it fitted over the nose of the “upper” pipe [Photo 17]. The overlap was 90 mm. Unlike the “upper” pipe, the “lower” one had lost the whole of its top portion and the bottom portion remaining on the clay was somewhat rotten. The bore of this pipe had a noticeable twist in it, which would not have been easy to make with an auger (unless it had originally been straight and had twisted after insertion in the ground). Possibly it had been an unshaped tree trunk used for this purpose because its centre had rotted hollow, which might account for the poor condition in which it was found. This pipe appeared to have butted up against the face of the brick conduit, though little of it remained at this point.

6.4 The brick conduit, mentioned above, consisted of a series of abutting rings of 11 bricks, 2 wedge shaped at the top and 9 normally shaped ones forming the rest of each ring. No mortar was observed in the construction, as far as the camera could see [Photo 18]. At the far end of the conduit, where it had turned left and was heading back NW towards the stream way, some of the rings had doubtless been lost over the years as the water flow along the overlying channel dropped down to the lower level and had cut back the end of the channel.

6.5 The “upper” pipe was solidly packed with lake silt and remains so. Water had, perhaps for many years, been reaching the brick conduit through cavities in the surrounding soil. These cavities must have been made by leakages through or under the dam and where the “upper” pipe fitted into the brick facing. The cavities were generally above the “upper” pipe, but had eroded away much of the “lower” pipe as it approached the brick conduit.

7. Drawings accompanying this Report

This Report is accompanied by a plan of the brickwork and the channel at a scale of 1:20 and cross sections of the front and back of the brick facing and at the SE end of the brick conduit and a lengthways section along our excavation along the line of the drainage channel, all at a scale of 1:10.

8. The original construction of the brick and timber features

8.1 It is not really possible to say whether the clay dam and the brick facing and control features were contemporary. On the whole, we would think not, because the clay dam is higher and even if the water level rose as high as the topmost remaining bricks, the plan area of the lake would not have filled with water. However we cannot tell how high the brickwork may originally have been.

8.2 Doubts have been expressed as to whether the brick facing was built at its present 12° incline from the vertical, or whether it has subsided to that position. Cracks certainly are present along some jointing lines, but if the facing has moved, it has done so very evenly and the portions on both sides of the vertical slot have moved in unison. As far as can be seen, the clay material behind the brickwork is very compact and does not appear to be infilling behind a subsiding facing [Photo 19]. The “upper” timber pipe and its brick enclosure give no indication of any subsidence. Thus we think that the face of the clay dam was cut at the 12° angle to receive the brickwork facing which was built to rest upon it.

8.3 The question then arises as to whether the main brick facing and the timber pipes are contemporary. The inside faces of the vertical slot certainly look as if they had been built as they now appear and there is no indication that a once-continuous facing was cut through to make the slot. But if the slot is original, there must always have been an original valve or sluice gate to control the water flow through it. However no traces of any earlier control arrangements can be seen. The square “upper” pipe fits closely in the slot and the brick enclosure has been built on top of it. From the evidence remaining, we see no reason to think that all the brick and timber features are not contemporary.

8.4 We do not in fact know whether the top of the brick facing originally continued horizontally south-eastwards from dam to bank. Given that the clay/earth dam behind the facing dips down to form the present channel at this point, a level facing unsupported by the dam behind it looks unlikely. The vertical slot at its centre would have been around 2.500 m above the clay/earth dam behind it, and unless it was arched over or otherwise joined at some point, would have been somewhat unstable. An original facing profile dipping down towards the channel and not much higher than the existing remains seems much more likely on the evidence remaining.

9. A note on the bricks etc

9.1 As many as possible of the bricks which had been washed down the stream to the NE, or were in the shallow channel behind the brick facing, were recovered. The bricks were dark red in colour and on average measured 23 x 11 x 6½ cm. Most had no frog cavity, but a small proportion, perhaps 10%, had shallow, scooped out frogs.

The brick coursing was in a generally English Bond, with occasional extra courses and fractions of bricks.

9.2 A small number of specially shaped bricks 39 cm long were found, with a chamfer at each end. These, if laid transversely, could have formed a capping to the brick facing. Westwood House in Southfleet, which was rebuilt in 1806, has a garden wall with such a capping.

9.3 Some of the tapered bricks used for the brick conduit had been specially moulded, but others had been cut down from normally shaped bricks.

9.4 Four sherds of pottery were recovered from unstratified deposits [Photo 20]. The upper 3 in the photograph are fragments of hard sandy wares and probably medieval, but the 4th sherd looks more like briquetage, ie fired clay supports used in a pottery kiln. Probably all had been washed down from the Randall Manor site over the centuries.

10. Purpose of the brick facing and the timber control device

10.1 It appears that a small, continuous flow of water could be allowed out of the lake whenever the level was above the top of the timber pipe in the brick facing. Water would flow into the brick enclosure, down through the hole in the top surface of the timber pipe, along its bore and through the brick conduit to the stream. The water flow could be stopped, or perhaps reduced, by pulling the wooden plug up into the tapered seating of the hole. If the flow was stopped for long enough, or if there was heavy rainfall, water would rise above some now destroyed threshold level in the brickwork and flow down the shallow channel to the stream.

10.2 Perhaps these somewhat complicated arrangements were thought necessary to prevent the continuous water flow eroding a channel through the clay/earth dam itself.

10.3 It has been suggested that the features described above might be the remains of an hydraulic ram - an 18th century invention which used a large flow of water at a low level to pump a small flow of water to a higher level. The brick recess and the circular hole in the timber within it may perhaps be reminiscent of an hydraulic ram, but the absence of the necessary iron pressure vessel and of any metal piping and control valves and also the remote location of the dam, make this explanation unlikely.

11. The water flow beyond the dam

11.1 The water flow from the Randall Wood lower lake has probably always been small as the catchment area is limited and the stream bed is narrow. After leaving the Country Park it passes across a field, under the lane from Thong to Shorne and through Ifield Farm, running to the east of the unsurfaced Muggins Lane, before disappearing from view.

11.2 Beyond this point, the contours of the modern 1:25,000 Ordnance Survey map show that the stream once entered a small valley, which has come from the shallow valley east of Thong and derives from Randall Bottom Pond and the Laughing Water lakes. This small valley then forms the parish boundary between Chalk and Shorne, as

it heads NNW and crosses the A226 road. It then passes between Queen's Farm and the site of a former medieval settlement. It is shown as a watercourse again as it traverses the flat ground between Filborough Marshes (in Chalk) and Shorne Marshes and eventually reaches the River Thames.

12. Reconstruction of the brick facing

There are several arguments against undertaking reconstruction of the brick sluice, the principal one being that the original profile of the upper brickwork has entirely gone and we have found no examples of such a feature in the literature. Another difficulty is that while the "upper" timber pipe is in quite good condition, the "lower" pipe has almost rotted away and would need replacing. The final point is that there are several cracks in the brickwork, as a result of some quite large blocks of bricks shifting slightly. A full reconstruction would require that these blocks were taken apart and rebuilt, which would mean that very little of any reconstructed sluice would be original work.

13. Acknowledgements

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