Society of Antiquaries of Scotland

Bearsden

A Roman Fort on the Antonine Wall

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Chapter 8

MORTAR ANALYSIS

G C MORGAN

The samples, all from the bath-house, were examined physically before the lime matrix was dissolved in dilute acid. The residues were then graded and identified. The samples were somewhat friable but were all very resistant to dissolution in the dilute hydrochloric acid used to dissolve the lime matrix. It was necessary to heat the samples for a week before the lime finally dissolved. This led to the loss of some of the iron bearing compounds.

Table 8.1
Analysis of mortars

The breakdown of the mortars into the insoluble aggregate grades and the amount of soluble material, which is mainly lime but includes any other acid soluble material. The sizes are: 'gravel' > 2mm, 'sand' 0.15mm–2mm, 'silt' < 0.15mm.

	Gravel	*Sand*	*Silt*	*'Lime'*
1	43%	31%	26%	19%
2	53	18	29	32
3	46	31	23	21

The particle size distribution graphs show that sample two has a lower 'sand' size content and that they all have a similar, very high, silt (silica) content.

1. Floor sample. A coarse friable pink to grey gravel mortar with decayed tile traces. The residue was mainly red, orange and yellow, with some black, crushed brick or tile with quantities of vitrified clay or brick. Also present was; quartz, sandstone, quartzite and micaceous schist. The finer quartz sizes, 0.25–0.15mm, were mainly round to sub-angular sand, probably derived from the sand in the tile.
2. Cold bath. A coarse friable pink brown mortar. The residue was very similar to 1 without the yellow or black tile or the vitrified clay.
3. Hot bath. A very coarse and friable pink to brown mortar with large stones. The residues were similar to 1 with the addition of pebbles of a fine pink granite like rock and quantities of vitrified clay. Amongst this were fragments of what appeared to be iron working furnace lining, although this may possibly have been tile kiln lining, it must have been heated to around 1,000°C, which is much hotter than a tile kiln would have needed to be and too hot for a lime kiln. It may have been accidentally produced but the result is a pozzolanic material which produced an excellent hydraulic mortar. The vitrified fragments in the other samples would have had a similar effect.

The grading of the samples was fairly typical for crushed tile or brick based mortar, but the very fine silt size particles contained very large amounts of fine or colloidal silica resulting from the hydraulic mixture (table 8.1). It is possible that some of the silica may have come from the lime used but without comparison of local limestones this is conjectural.