Assessment of mortar samples from Cathedral Street and Monk's Road, Lincoln (LCSZ03 and LCMR03)

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Archaeological fieldwork on the site of the Blackfriars precinct to the north of Monk's Road, Lincoln carried out by Lindsey Archaeological Services revealed several mortared walls. Samples of the mortars were taken, primarily with the hope that analysis of the mortars might be able to date the structures and perhaps indicate which walls were built as part of the same building phase.

Description

Eight samples were taken in total, four from Cathedral Street and three from Monk's Road. Some of these, noted as FRIABLE in Table 1, were damp when submitted and were air-dried. When dry, all the samples were examined at x20 magnification using a binocular microscope.

The samples could be grouped into two groups.

Group A

These samples contained abundant quartz sand, up to 0.5mm across, and sparse rounded calcareous pellets. These pellets usually show no internal structure and are probably composed of recrystallised calcite. However, some appear to consist of rounded chalk pellets, identified through their microfossils. This would imply that the slaked lime used to make the mortar was made from chalk, This is, however, such an unlikely possibility that it would require confirmation by thin-section analysis.

The Group A mortars all have a considerable clay content. Some of this may be due to the infilling of pores in the mortar with soil, some may indicate the use of a sand with a sizable clay content but it is also possible that clay was deliberately mixed with the mortar.

Group B

The Group B mortars are all hard and lighter in colour than those of Group A. They too have a quartz sand component, but in lower quantities than in Group A. Rounded calcareous pellets like those in Group A are also present.

In one case, the samples come from a plaster skim and have a flat, tooled surface and were applied onto a sandy, red mortar.

Table 1

Sitecode	Group	subfabric	Context	REFNO
lcsz03	A	FRIABLE;A SA Q SAND; S R CALC NODULES (HEAT-ALTERED LST?	35/1	
lcsz03	B	HARD;A SA Q SAND; S R CALC NODULES (HEAT-ALTERED LST?	31/1	
lcsz03	A	FRIABLE;A SA Q SAND; S R CALC NODULES (HEAT-ALTERED LST?	39/4	
lcsz03	A	FRIABLE;A SA Q SAND; S R CALC NODULES (HEAT-ALTERED LST?	39/3	
lcsz03	A	FRIABLE;A SA Q SAND; S R CALC NODULES (HEAT-ALTERED LST?	35/5	
LCMR03	B	HARD;A SA Q OVER A RED SANDY MORTAR	11/3	SF4
LCMR03	A	FRIABLE;A SA Q;S R CALC GRAINS, SOME LOOK LIKE CHALK;OTHERS HEAT-ALTERED	11/20	SF3
LCMR03	A	FRIABLE;A SA Q;S R CALC	8/1	SF2

Discussion

Mortars were composed of slaked lime, water, sand and aggregate. In some of the Group A mortar samples there were fragments of limestone rubble, which could have been mixed in as aggregate, but otherwise all the samples consist of lime and sand. The harder, lighter-colour of the Group B samples is due to a higher lime content, as well as to the lack of clay.

Sample LCMR03 11/3 was clearly a plaster surfacing on top of a coarser mortar core. However, the colour of that core is quite unlike that of the Group A samples and may indicate that the wall was burnt before being plastered. The other Group B mortar, LCSZ03 31/1, has no traces of surfaces and may indicate the use of a high lime mortar throughout the wall.

It is quite possible that all the samples come from contemporary structures and differ in composition because of their different functions. In this interpretation, Group A mortars would be used for foundations in which the mortar is not intended to have any strength but simply to hold the rubble footings together. The Group B mortar samples might then come from upstanding walls, of which LCSZ03 31/1 might have a high lime mortar throughout whereas LCMR03 11/3 has a sandier core.

The quartz sand present in all the samples is visually similar to that found in the Witham terrace sands which outcrop to either side of the river and underlie the site itself. The obvious source of lime would be the Lincolnshire Limestone which outcrops in the cliffs

above the site but the possible identification of chalk amongst the calcareous pellets would imply that the lime was imported from the Wolds.

Fragments of coal or wood charcoal are frequently observed in mortars. Some of these may be present as a result of contamination with ash from the lime kiln but none were noted in these samples.

Recommendations

The identity of the raw materials used in these mortars could be established using thin sections. A single section of each group would be required. The sections should be stained using Dickson's method (Dickson 1965) since Jurassic limestone is composed in the main of ferroan calcite whereas chalk is composed of non-ferroan calcite. Any unslaked residue in the mortar should be easily identified using this method.

The clay and sand content of the mortars could be determined by dissolving the mortar with HCl and passing the residue through a set of sieves and weighing the fraction retained by different sieves. This is the standard approach to mortar analysis and has the advantage of establishing the textural characteristics of the sand fraction which can be summarised by three statistics: mean diameter, skewness and kurtosis. It cannot be used where the sand itself is calcareous but in this case it has already been established that the sand is composed mainly of quartz. Alternatively, it would be possible to establish the overall sand:lime:clay ratios using ICPS analysis. This is a much quicker method and probably cheaper, since the laboratory time required is lower. It is recommended that the latter method is used. This analysis would establish, for Group A, the amount of variation in these ratios between the samples and for Group B the similarity of the two samples.

Task	Unit Cost	Cost
Thin sectioning of samples of both mortar groups	£22.50	£45 plus VAT
ICPS Analysis of all samples	£22.50	£157.50 plus VAT
Total		£202.50 plus VAT = £237.93