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NORTH EAST LONDON POLYTECHNIC

DEPARTMENT OF PHYSICAL SCIENCES

DIVISION OF CHEMISTRY

MORTAR ANALYSIS REPORT ON PRUDHOE CASTLE

Introduction:

Analysis of mortars, concretes and plasters does not give absolute dating evidence, as no one particular period, apart possibly from the Roman military material, used a characteristic recipe. The gravel/sand/lime ratios employed for various building tasks in the past are much the same as those used today. At best analysis can only give relative dating evidence, i.e. which walls etc. are likely to be contemporary. Even here, interpretation usually depends on the use of an aggregate having quite distinct characteristics.

30 samples were submitted for analysis. 22 were in good condition showing little or no sign of leaching, the remainder were totally degenerate. None appeared to contain unusual aggregate, it being made up mainly of gravel and sand. Most samples contained little chalk/limestone aggregate but in most cases this did not exceed 5% of the observable total. Sample 1115 was exceptional in that a large lump,accounting for approximately 50% of the total,was present. Odd fragments of charcoal were present in most samples but in 74, 164 and 252, sufficient charcoal fragments were present to impart a distinct grey tone to the colour. Odd fragments of brick/burnt clay were also noted throughout the samples. The colours of the samples, after drying, ranged from buff to dark brown, excluding the three samples previously mentioned.

Analysis:

Approximately 100g samples of dried material were treated with dilute hydrochloric acid to remove the acid soluble material, mainly calcium carbonate. The residue was filtered off, thoroughly washed with distilled water and dried. The dried fraction was then subjected to mechanical sieving to obtain the particle-size distribution. The raw weight data was converted to a percentage system for ease of comparison. Wherever possible, analyses were carried out in duplicate and the mean values used for comparisons. After separation the nature of the aggregates was investigated.

Results:

Analysis suggested that the mortars formed 7 groups as shown in the following table:

GROUP	SITE SAMPLE NUMBERS
A	1104, 1117, 1131, 1355, 1391.
B	63, 253, 548(i), 548(ii), 1059, 1115, 1196, 1304.
C	74, 164, 252, 463.
D	978, 1044, 1048, 1074, Great Hall (bag 2035).
E	254, Great Hall (bag 2036), Curtain Wall (bag 2393).
F	1059, East Tower (bag 2394), Bake House (bag 2038).
I	1679.

GROUP	SITE SAMPLE NUMBERS
No useful results	55

Most samples contained odd fragments of coarse aggregate (i.e. > 2mm) consisting of coarse sandstone and/or fine sandstone. One assumes these are dressing debris and therefore have little significance. All samples contained sub-angular sand most likely from a glacial outwash or similar deposit. All, except 1059, 548(i) and 548(ii) are typical mortar mixes ranging from 2.8:1 3.3:1, sand: lime ratios. 1059 would be more correctly described as a light weight concrete as it is a mix of approximately 1:2:1 of gravel:sand:lime. (All ratios are based on volume and not weight). Such a mix would provide a suitable wall footing or path etc. The two 548 samples were lime rich systems, the mix being of the order of 1:2, sand:lime. In view of their position on the site one would assume they are remnants of a preparation area (possibly mixing zone) and not genuine floor screeds.

John Evans
Division of Chemistry
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