

A MEDIEVAL ROYAL COMPLEX AT GUILDFORD: EXCAVATIONS AT THE CASTLE AND PALACE

Table 33 Chemical analyses of glass from the collections in Guildford Museum

| Oxides/elements detected | | Tunsgate | | | Castle | Hambleton | | |
|--------------------------|--------------------------------|--------------|-----------|-----------|------------|---------------|--------------|-------------|
| | | 50/51 beaker | 68 beaker | 37 beaker | 439 urinal | AS3595 vessel | AS3592 waste | AS3594 scum |
| Soda | Na ₂ O | 15.2 | 14.1 | 16.0 | 2.8 | 2.8 | 2.6 | 0.3 |
| Magnesia | MgO | 1.7 | 2.9 | 0.9 | 6.9 | 6.8 | 7.1 | 0.7 |
| Alumina | Al ₂ O ₃ | 0.4 | 0.8 | 0.8 | 0.6 | 0.5 | 1.0 | 6.2 |
| Silica | SiO ₂ | 65.5 | 65.5 | 70.4 | 55.4 | 59.1 | 56.9 | 79.7 |
| Phosphorous pentoxide | P ₂ O ₅ | 0.2 | 0.3 | nd | 3.6 | 2.9 | 3.0 | nd |
| Chlorine | Cl | nd | nd | nd | bd | nd | nd | nd |
| Sulphur | SiO ₂ | 0.3 | 0.4 | 0.4 | 0.2 | 0.3 | nd | nd |
| Lime | CaO | 6.8 | 9.2 | 2.9 | 12.1 | 13.0 | 14.6 | 1.2 |
| Potash | K ₂ O | 4.9 | 3.4 | 4.9 | 12.5 | 9.7 | 9.6 | 7.1 |
| Titanium oxide | TiO ₂ | nd | nd | nd | nd | 0.1 | 0.2 | 0.3 |
| Chromium oxide | Cr ₂ O ₃ | nd | nd | nd | nd | nd | 0.2 | nd |
| Manganese dioxide | MnO | 1.8 | 0.8 | 0.5 | 1.4 | 1.2 | 1.2 | 0.3 |
| Iron oxide | Fe ₂ O ₃ | 0.6 | 0.4 | 0.2 | 0.8 | 0.7 | 0.9 | 4.1 |
| Copper oxide | CuO | nd | nd | nd | nd | 0.3 | nd | nd |
| Tin oxide | SnO ₂ | nd | nd | nd | nd | 1.0 | nd | nd |
| Lead oxide | PbO | nd | 1.8 | nd | nd | 0.5 | nd | nd |
| Total | | 97.5 | 99.8 | 97.1 | 96.4 | 98.9 | 97.4 | 99.9 |

nd = not detected (at or below minimum detectable limits).

Minimum detectable limits = 0.2% for most oxides/elements, but 0.1% for PbO and Fe₂O₃

Table 34 Occurrence of glass by phase and type

| Phase | Vessel | Bottle | Window (plain) | Window (dec) | Frit | Total |
|-------|--------|--------|----------------|--------------|------|-------|
| 1 | 2 | – | – | – | – | 2 |
| 2 | – | – | 2 | – | – | 2 |
| 3 | 1 | – | – | – | – | 1 |
| 4 | – | 1 | 18 | 89 | – | 108 |
| 5 | 1 | – | 23 | 3 | – | 27 |
| 6 | 5 | – | 6 | 15 | 3 | 29 |
| 7 | 44 | 119 | 57 | – | – | 220 |
| Total | 53 | 120 | 106 | 107 | 3 | 389 |

Table 35 Quantity of building mortar and plaster by phase (weight in g)

| Phase | Mortar | Plaster | Mortar/plaster | Painted plaster | Total |
|--------------|-------------|-------------|----------------|-----------------|---------------|
| 1 | 85 | – | 280 | – | 365 |
| 2 | 705 | 10 | 8870 | – | 9585 |
| 4 | 2087 | 10 | 13,024 | 130 | 15,251 |
| 5 | 950 | 850 | 840 | – | 2640 |
| 6 | 3001 | 342 | 3884 | – | 7227 |
| 7 | 2255 | 45 | 7970 | – | 10,270 |
| u/s | 570 | 205 | 645 | – | 1420 |
| Total | 9653 | 1462 | 35,513 | 130 | 46,758 |

Table 36 Quantity of slag by phase

| Phase | Weight (g) |
|--------------|-------------|
| 1 | 250 |
| 2 | 16 |
| 4 | 5100 |
| 5 | 580 |
| 6 | 77 |
| 7 | 118 |
| Total | 6141 |

Table 37 Distribution of the early tiles from the 1990–4 excavations by context

| Context | T1 | T2 | T3 | T7 | T8 | T9 | T11 |
|---------|----|----|----|----|----|----|-----|
| 100 | | # | # | | | | |
| 106 | | # | # | | # | | # |
| 110 | | | # | # | # | | |
| 110/124 | | | | | # | | |
| 112 | | # | # | | # | | |
| 115 | | # | # | # | # | | # |
| 117 | | # | # | | | | |
| 120 | | # | | | | | |
| 121 | # | | | | | | |
| 126 | | | | # | # | # | |
| 133 | | # | # | # | | | |
| 138 | | # | | | | | |
| 139 | | # | # | # | | | |
| 143 | | | # | | | | |
| 145 | | # | # | | | | |
| 153 | | # | # | # | | | |
| 154 | | # | # | | | | |
| 201 | | # | | | | | |
| 204 | | | # | | # | # | |
| 205 | | | # | | | | |
| 210 | # | | | | | | |
| 213 | | # | # | | | | |
| 217 | | | # | | | | |
| 219 | | | | # | | | # |
| 220 | # | | # | | | | |
| 222 | | | # | # | | | |
| 223 | | # | # | # | # | # | # |
| 224 | | | | | | | |
| 225 | # | # | # | # | | | # |
| 231 | | # | # | | | | |
| 235 | | | # | | | | |
| 238 | | | # | # | | | |
| 239 | # | # | | | | | |
| 240 | | # | | | | | |
| 242 | | # | # | | | | |
| 243 | | # | | | | | # |
| 247 | | | # | | # | # | |
| 250 | | # | # | | | | |
| 252 | | # | # | # | | | |
| 254 | | # | | | | | |
| 263 | | # | | | | | |
| 267 | | | # | | | | |
| 268 | | # | | | | | |
| 269 | | # | | | | | |
| 272 | | | | # | # | # | |
| 300 | | # | | | # | # | # |
| 325 | | # | | | | | |
| 327 | | | # | | | | |
| 346 | | | | # | | | |
| 348 | # | | | | | | |
| 359 | | | | # | # | # | |
| 365 | | | # | | | | |
| 366 | | | # | | | | |
| 368 | | # | | | | | |
| 370 | | # | # | | | | |
| 383 | | # | # | | | | |
| 396 | | | # | | | | |
| 397 | | # | | | | | |

Table 37 Distribution of the early tiles from the 1990–4 excavations by context (continued)

| Context | T1 | T2 | T3 | T7 | T8 | T9 | T11 |
|---------|----|----|----|----|----|----|-----|
| 409 | | # | # | | | | |
| 410 | | | | | | | # |
| 412 | | | # | | | | |
| 413 | | # | # | | | | |
| 420 | # | # | # | | | | # |
| 425 | | | # | | | | |
| 430 | # | | # | | | | |
| 437 | | # | # | | | | |
| 438 | | # | # | | | | |
| 443 | | # | # | | | | |
| 444 | | | # | | | | |
| 500 | | | | # | # | # | |
| 501 | | | # | | | | |
| 505 | | # | | | | | |
| 515 | | | | | # | # | |
| 516 | | # | # | | | | |
| 517 | | | | # | # | # | |
| 518 | # | # | # | | | | |
| 524 | | | # | | | | |
| 535 | | | | | # | # | # |
| 539 | | # | # | | | | |
| 551 | # | | | | | | |
| 606 | | # | | | | | |
| 610 | | # | | | | | |
| 615 | # | # | # | # | # | # | |
| 628 | # | # | # | | | | |
| 631 | | # | | | | | |
| 636 | # | # | | | | | |
| 638 | | # | | | | | |
| 723 | | | | | # | # | |
| 730 | | | | # | | | |
| 731 | | | | | # | | |
| 800 | | | | # | | | |
| 801 | | | | # | | | |
| 802 | | | # | | | | |
| 805 | # | # | # | | | | |
| 809 | | | | | # | # | |
| 815 | | | # | | | | |
| 817 | # | | | | | | |
| 821 | # | # | | | # | # | |
| 900 | | | # | | # | | |
| 902 | | | # | | | | |
| 907 | | | # | | | | |
| 908 | | | # | | | | |
| 910 | | # | # | # | | | |
| 911 | | # | # | | | | |
| 912 | | # | | | | | |
| 916 | | # | # | # | | | |
| 930 | | | | # | | | |
| 934 | | # | # | | | | |
| 938 | | | # | | | | |
| 947 | | # | | | | | |
| 949 | | | | | # | # | |
| 952 | | | | | | | # |
| 965 | | # | | | | | |

Table 38 Distribution of the later tiles from the 1990–4 excavations by context

| Context | T4 | T5 | T6 | T10 | T12 |
|---------|----|----|----|-----|-----|
| 100 | # | # | | | |
| 101 | # | # | | | |
| 103 | # | # | # | | |
| 106 | # | | | | |
| 110 | # | # | | | |
| 110/124 | # | # | # | | |
| 112 | # | | | | |
| 115 | # | # | # | | |
| 121 | # | # | | | |
| 131 | # | | | | |
| 133 | | # | | | |
| 136 | # | # | # | | |
| 139 | # | # | | | |
| 143 | # | | | | |
| 145 | # | | | | |
| 206 | # | # | | | |
| 213 | # | # | | | |
| 216 | # | # | # | | |
| 220 | # | | | | |
| 222 | # | # | # | | |
| 230 | # | # | | | |
| 232 | # | # | # | | |
| 233(1) | # | # | # | | |
| 233(2) | # | # | | | |
| 235 | # | | | | |
| 238 | | | # | | |
| 240 | # | # | # | | |
| 247 | # | | | | |
| 248 | # | # | # | | |
| 249 | # | # | | | |
| 252 | # | # | | | |
| 253 | # | # | | | |
| 254 | # | # | # | | |
| 255 | # | # | | | |
| 256 | # | # | | | |
| 263 | # | # | | | |
| 265 | # | # | | | |
| 280 | # | # | | | |
| 300 | # | # | # | | # |
| 313 | # | # | | | |
| 335 | # | # | # | | |
| 336 | # | # | # | | |
| 345 | | | # | | |
| 346 | # | # | | | |
| 347 | # | # | | | |
| 353 | # | # | | | |
| 358 | # | # | | | |
| 368 | # | # | # | | |
| 369 | | | # | | |
| 375 | # | # | # | | |
| 399 | # | # | | | |
| 402 | # | # | # | | |
| 403 | # | # | # | | |
| 407 | | | # | | |
| 412 | # | | # | | |
| 413 | # | # | # | | # |
| 420 | | | | | # |

Table 38 Distribution of the later tiles from the 1990–4 excavations by context (continued)

| Context | T4 | T5 | T6 | T10 | T12 |
|---------|----|----|----|-----|-----|
| 425 | # | # | | | |
| 431 | | # | | | # |
| 436 | # | # | # | | |
| 438 | | | | | # |
| 439 | # | # | | | # |
| 440 | | | # | | |
| 442 | # | # | | | |
| 443 | | # | | | |
| 503 | # | # | # | | |
| 505 | # | # | # | | |
| 512 | # | # | # | | |
| 514 | # | # | # | | |
| 549 | # | # | # | | |
| 556 | # | # | # | | |
| 604 | # | # | # | | |
| 613 | # | # | # | | |
| 614 | # | # | | | |
| 615 | # | # | # | # | |
| 616 | | | # | | |
| 617 | # | # | # | | |
| 621 | | | # | | |
| 625 | | # | # | | |
| 628 | # | # | # | | |
| 630 | # | # | | | # |
| 639 | # | # | | | |
| 701 | | | # | | |
| 702 | # | # | | | |
| 703 | # | # | | | |
| 715 | | | # | | |
| 722 | # | # | # | | |
| 725 | # | # | | | |
| 728 | # | # | | | |
| 729 | # | | | | |
| 730 | # | # | # | | |
| 731 | # | # | # | | |
| 739 | # | # | | | |
| 800 | # | # | # | | |
| 801 | # | # | # | | |
| 804 | # | # | # | | |
| 805 | | | | | # |
| 817 | # | # | | | |
| 821 | | | | | # |
| 900 | | # | | | |
| 902 | # | # | | | |
| 904 | # | # | | | |
| 910 | # | # | | | |
| 911 | | # | | | |
| 913 | # | | | | |
| 916 | # | # | # | | |
| 920 | # | # | | | |
| 926 | # | # | # | | |
| 930 | # | # | # | | |
| 934 | | # | | | |
| 963 | # | # | | | |
| 988 | # | # | # | | |

Table 39 All ceramic building materials from the 1990–4 excavations by context (continued)

| Context | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 | Ridge | Kiln |
|---------|-----|----|----|----|----|----|----|----|----|-----|-----|-------|------|
| 912 | | # | | | | | | | | | | | |
| 913 | | | | # | | | | | | | | | |
| 916 | | # | # | # | # | # | # | | | | | | |
| 920 | | | | # | # | | | | | | | | |
| 924 | n/d | | | | | | | | | | | | |
| 925 | n/d | | | | | | | | | | | | |
| 926 | n/d | | | # | # | # | | | | | | | |
| 930 | | | | # | # | # | # | | | | | | |
| 934 | | # | # | | # | | | | | | | | |
| 935 | | | | | | | | | | | | | # |
| 938 | | | # | | | | | | | | | | |
| 947 | | # | | | | | | | | | | | |
| 948 | n/d | | | | | | | | | | | | |
| 949 | | | | | | | | # | # | | | | |
| 952 | | | | | | | | | | | | # | |
| 953 | n/d | | | | | | | | | | | | |
| 956 | n/d | | | | | | | | | | | | |
| 963 | | | | # | # | | | | | | | # | |
| 965 | | # | | | | | | | | | | | # |
| 972 | n/d | | | | | | | | | | | | |
| 978 | n/d | | | | | | | | | | | | |
| 988 | | | | # | # | # | | | | | | | |

Table 40 Tile kiln production figures

| | Kiln volumes (m ³) | | | | |
|-----------|--------------------------------|------|-------|------|-------|
| | Height | 1m | 1.25m | 1.5m | 1.75m |
| Volume | 5.6 | 7 | 8.4 | 9.8 | 11.2 |
| Tile type | | | | | |
| T2 | 3318 | 4148 | 4977 | 5807 | 6637 |
| T3 | 3572 | 4465 | 5358 | 6252 | 7145 |
| T7-9 | 4377 | 5472 | 6566 | 7661 | 8755 |
| T11 | 3946 | 4933 | 5919 | 6906 | 7893 |
| T13 | 3704 | 4629 | 5555 | 6481 | 7407 |

Table 41 Catalogue of kiln bar fragments

| Context | Description of part and measurements |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 147 | Right-hand wing of bar to scar joint with lug. Wing 73mm long and 79mm wide. Bar 52mm thick with traces of combing on two faces. All heavily fired. |
| 147 | Fragment of heavily fired wing showing joint with lug. No full dimensions survive. |
| 149 | Fragment of bar. 53mm thick. |
| 225 | Rectangular block. 53 x 82 x 85mm. ? Spacer. |
| 225 | Left half of bar with nib void. Wing 78mm to lug and 94mm wide. Nib 160mm from bar end. Traces of knife cut marks around nib void. Bar 50mm thick and has traces of combing on two faces. End of bar shows graded level of firing. |
| 225 | Right-hand end of bar showing junction of wing with lug. Wing 78mm to lug and 94mm wide. End corner shows less fire damage than main part of bar. |
| 225 | Nib with fragment of bar. Nib is 48 x 55mm at joint with bar, traces of knife cut marks around junction. Nib is 25 x 30mm at front, flat along the bottom, 64mm long, and side faces with a rounded top. Bar 54mm thick. |
| 225 | Rectangular block with traces of combing on two faces 49 x 73 x 79mm. ? Spacer. |
| 225 | Nib fragment without any bar attached. Nib 48 x 50mm at front and 61mm+ long. |
| 226 | Almost complete kiln bar – the nib is missing c 325mm long x 166mm wide overall. Wings are 108mm on right and 82mm on left, lug is 70 x 196–200mm. Nib scar is 145mm from right and 132mm from left and scar is 52 x 80mm. Bar is 50–53mm thick. Combing traces on four faces, knife cut marks along wing and lug faces and along scar edges of nib. This piece is all one colour, very highly burnt and semi-vitrified to a dark greyish purple. |
| 239 | Fragment of left-hand end of bar with joint to lug and showing position of nib. Nib is 55 x 67mm on bar face, bar 50mm thick. |
| 239 | Four further fragments of kiln bar: one lug and three of wing, none provide any full dimensions of original bar. All heavily burnt. |
| 239 | Fragment of right-hand end of bar to junction with lug. Wing is cut so that it is narrower across the bar at junction with lug, at 82mm, than at the end where it is 98mm; wing edge to lug is 72mm. Bar is 50–53mm thick, combed on two faces, knife cut on face to lug. Graded levels of firing so corner of wing is less fired than body of bar. |
| 239 | Another similar fragment. This is square cut and is 70mm from edge to junction with lug, and 88mm wide. Bar is 51mm thick. |
| 239 | Spacer. Similar to 225 above. 49 x 73 x 79mm. |
| 243 | Nib fragment without bar. 44 x 46mm at front and 62mm+ long. Curved top with square sides and base. |
| 274 | Substantial part of right-hand side of kiln bar. Very fire damaged and heat twisted. Wing 80mm along edge to lug and 94mm wide. Lug is 72mm deep and unknown width. Nib is placed 172mm from bar end, and has a squared profile, not rounded, 68 x 66mm and projects 55–60mm. Bar 50–53mm thick. Combing visible on three faces with knife cut marks on wing, lug and nib. Wing end is less fire damaged and is in red colour range, remainder of bar in greys and blacks. |
| 412 | Nib fragment. No bar. 49 x 50mm at front, 58mm+ long. |
| 412 | Nib fragment. No bar. |
| | Total: 22 identifiable pieces with a further 19 small fragments. |