

## THE EXCAVATION OF THE GRAVESEND BLOCKHOUSE, 1975-76

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### INTRODUCTION

After King Henry VIII's break with the Pope, the possibility of invasion from the Continent led to the building of a system of coastal fortifications from Hull to Milford Haven, among them being five small blockhouses in the Thames estuary, the order to build these being given in 1539.

Of these five blockhouses, one was built at East Tilbury and one at Higham, although neither of these are now in existence so far as can be ascertained. Another was built at Tilbury (now buried under the curtain wall of Tilbury fort) and the remaining two at Gravesend, one (Milton blockhouse) at the western end of the canal basin and the other at the site of the Clarendon Royal Hotel. It is this last one which is the subject of this paper.

This historical background to this blockhouse has been published in *Arch. Cant.*, lxxxix (1974), (V. T. C. Smith, 'The Artillery Defences at Gravesend') and should be read in conjunction with this paper.

### THE STRUCTURE

The overall dimensions of the building were approximately 28 × 21 m.; of two storeys, it was built upon a substantial chalk raft. Its construction was predominantly of brick, the external wall faced with ashlar blocks. The ground plan consists of a D-shaped front, behind which there is an oblong section; the walls then converge to form the apex of a triangle to the rear.

Internally, there were two parallel walls: the first bisects the building midway to form the rear portion of the D-shaped front, the other forms the base of the triangular rear portion of the blockhouse. In addition, a small D-shaped bastion is sited towards the rear on the west side of the structure.

That the front portion of the building extended into the river is shown by the existence of a river wall, which runs at right angles and extends up to the wall of the blockhouse at a point approximately eight

metres behind the front of the structure. This river wall will subsequently be referred to as the 'old river wall'.

The site (N.G.R. TQ 650743) is situated under the lawn and car park in front of the Clarendon Royal Hotel, and the excavation was carried out by the Thameside Archaeological Group under the joint direction of Mrs. V. Smith and Mr. D. Thompson, on behalf of the Kent Defence Research Group of the Kent Archaeological Society.

Investigations were commenced on 19th July, 1975, by carrying out a probe survey of the area, but this failed to establish any significant irregularities to indicate where excavation should begin. However, by superimposing a plan drawn in 1715 onto a modern survey map of the area, the locations of the walls could be predicted and the excavation was started.

#### THE EXCAVATION

The sea wall running across the northern end of the site was taken as a base line (A.O.D. 13.31 - 4.05 m.), offsets of 40 m. were taken at points 4 m. west of the extreme easterly corner of the present sea wall (junction of the lawn and car park) and a further 17 m. west of this point; the area of excavation was thus enclosed in a rectangle 17 m. x 40 m. that we anticipated would make available the north-west quadrant of the building. After removing the turf and topsoil the area was found to be covered by a layer of chalk and compressed rubble, the remains of the Victorian pleasure gardens and tennis courts occupying the site, which when removed showed that they had been laid directly upon the destruction level of the blockhouse.

Subsequent excavation of this mass of débris, which completely filled the remaining undestroyed lower portion of the building, provided the following results:

#### *1539, the exterior wall, period I (Figs. 1 and 2, Wall 1)*

This wall is the north-west half of the D-shaped front of the blockhouse and the principal remaining wall of the Tudor period. It is 2 m.-wide and survives to a height of 2.70 m. of brick construction faced with large rectangular blocks of ashlar. An offset 11 cm.-wide and 23 cm. below the existing top of the wall, runs parallel with the entire length of the excavated outer face with the exception of two points, a short gap of 17 cm. adjacent to the old river wall, and the other where this offset rises vertically for 57 cm. Unfortunately, this feature could not be pursued owing to the limitation of the excavation area. Between the shaped blocks of ashlar forming the offset and the stonework immediately below was a packing of oyster-shells, which

*The Tudor Blockhouse, Clarendon Hotel, Gravesend, Kent.*

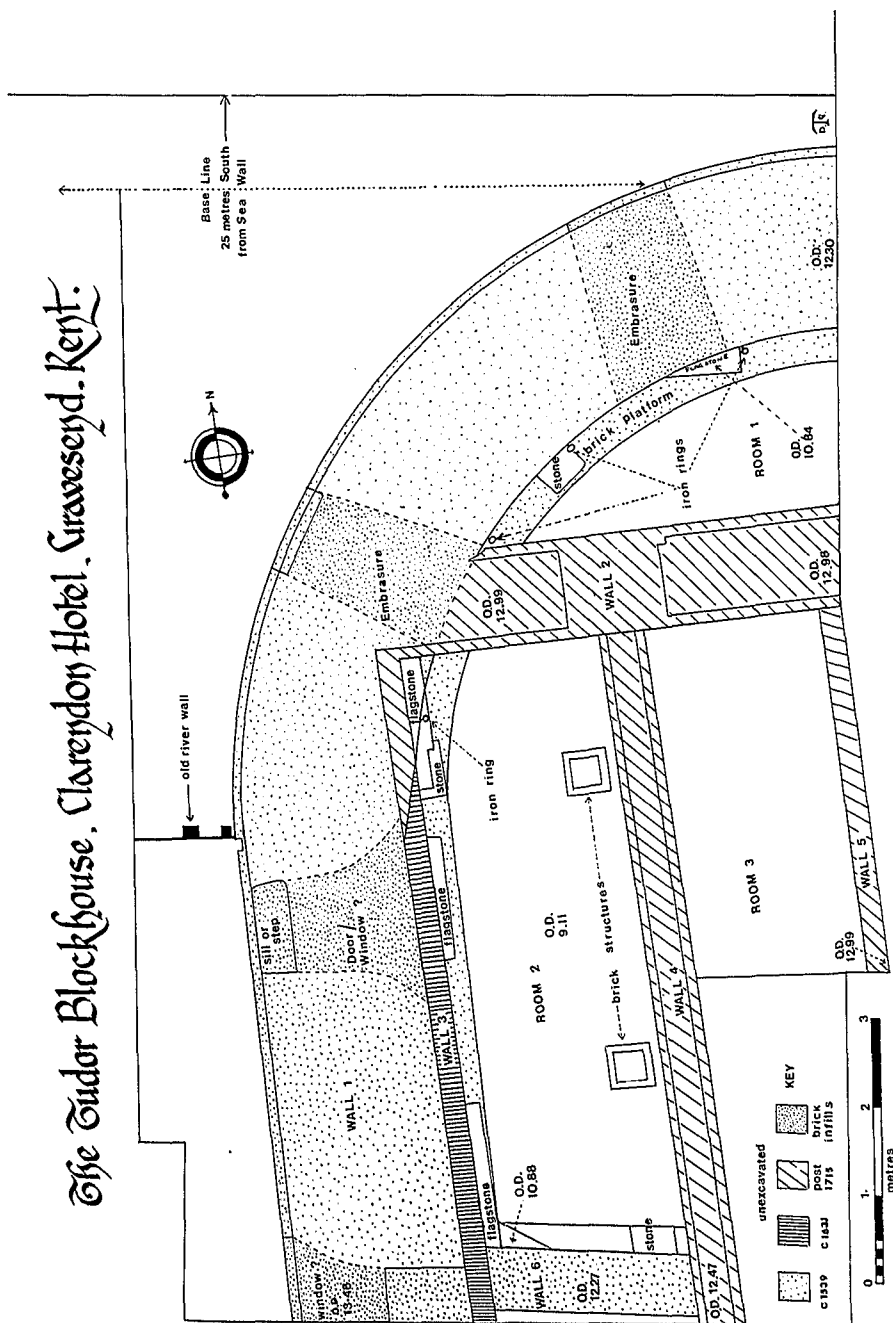


Fig. 1. Plan of Excavation.

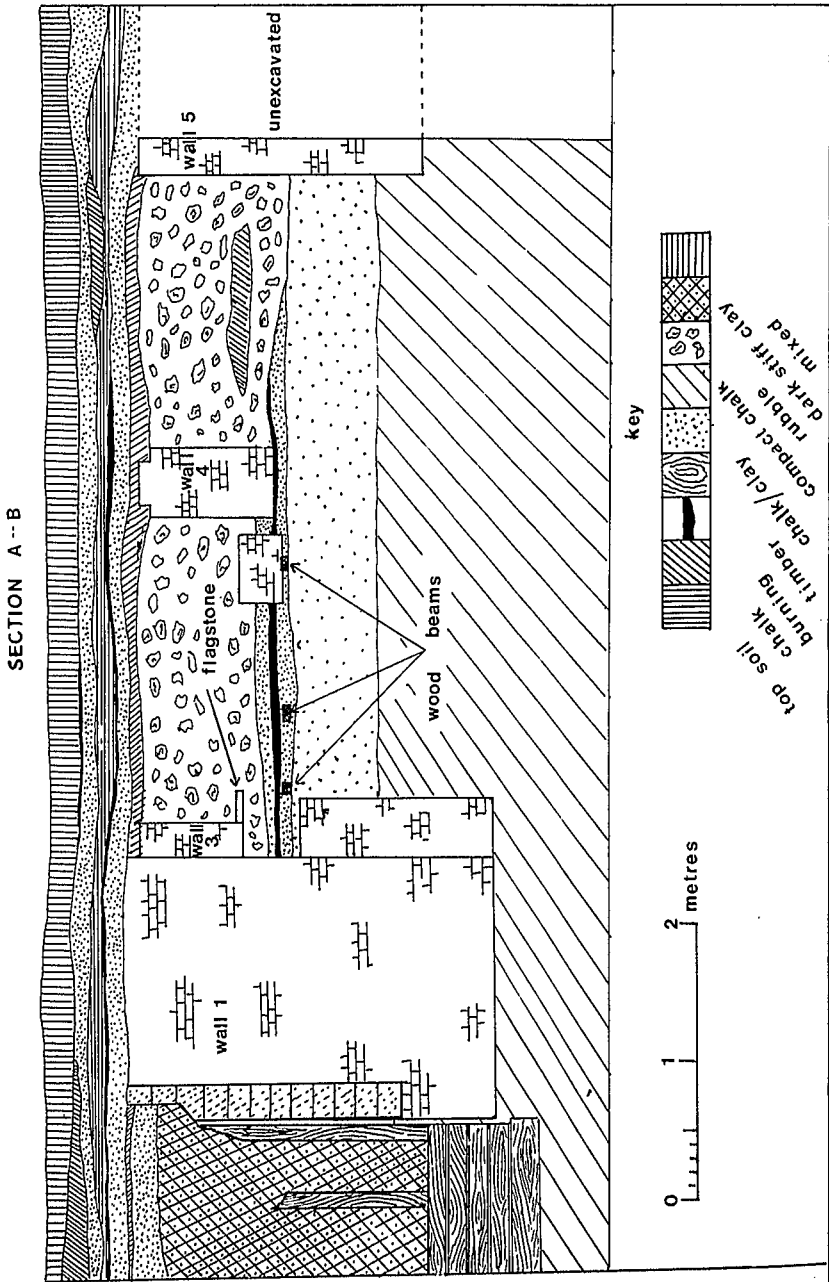


Fig. 2. East-West Section through Excavation.

only occurred on the portion of wall behind the river wall. A number of mason's banker marks (Fig. 3, a-i) were found on the stonework in the area. Apertures, presumably gun-ports, although bricked-in at a later period could be clearly discerned. Two other apertures were also visible, one of which had a large stone slab on the outer edge held in place by iron staples on either side. These could possibly have been windows as their position would have made them impracticable for use as gun emplacements. The inner face of the wall was excavated to a depth of 2.30 m. A brick-built platform protruded from this inner face 1.07 m. below the existing top and extending to the base. This platform was 44 cm. wide and followed the entire excavated length of the wall, large stone blocks had been laid at intervals on this platform. Iron retaining rings, presumably for use with cannon, were found on either side of each gun-port; these rings were embedded in blocks of masonry, which were set into the brickwork. On one of these blocks a further banker mark was found (Fig. 3, j). A line of plaster 48 cm. below the top of the wall indicated that there had been a floor at this level.

#### THE INTERNAL WALLS

During the course of the excavation a number of brick-built interior walls were found, none of which appears on the 1715 plan mentioned in the introduction, and must be of later construction.

##### *Post 1715, period III - wall 2*

This wall is of substantial proportions being 1.10 m.-wide and 2.08 m.-high; brick-built in English bond, it seals off the D-front of the blockhouse. It is assumed that this wall served as the outer retaining wall of the building at a later period when the fortifications of the Tudor wall had either become obsolete or ruined. A ledge 10 cm.-wide and 5 cm.-deep runs the entire length on either edge along the top of this wall. There is also a central depression 1.12 m. in length and 5 cm.-deep along the complete width of the wall. This depression was found to be filled with burnt material. A feature of this wall at its junction with wall 1, shows this wall is not simply butted directly against it, but the upper half is sprung by means of an arch so that only the top portion is in contact (Fig. 4). Initially, it was assumed that this method of construction was to accommodate the protruding platform of wall 1. However, the arch technique was later found to be employed elsewhere. The only explanation so far offered is that the later builders did not trust the foundations of the earlier walls and this could have been a way of overcoming this problem.

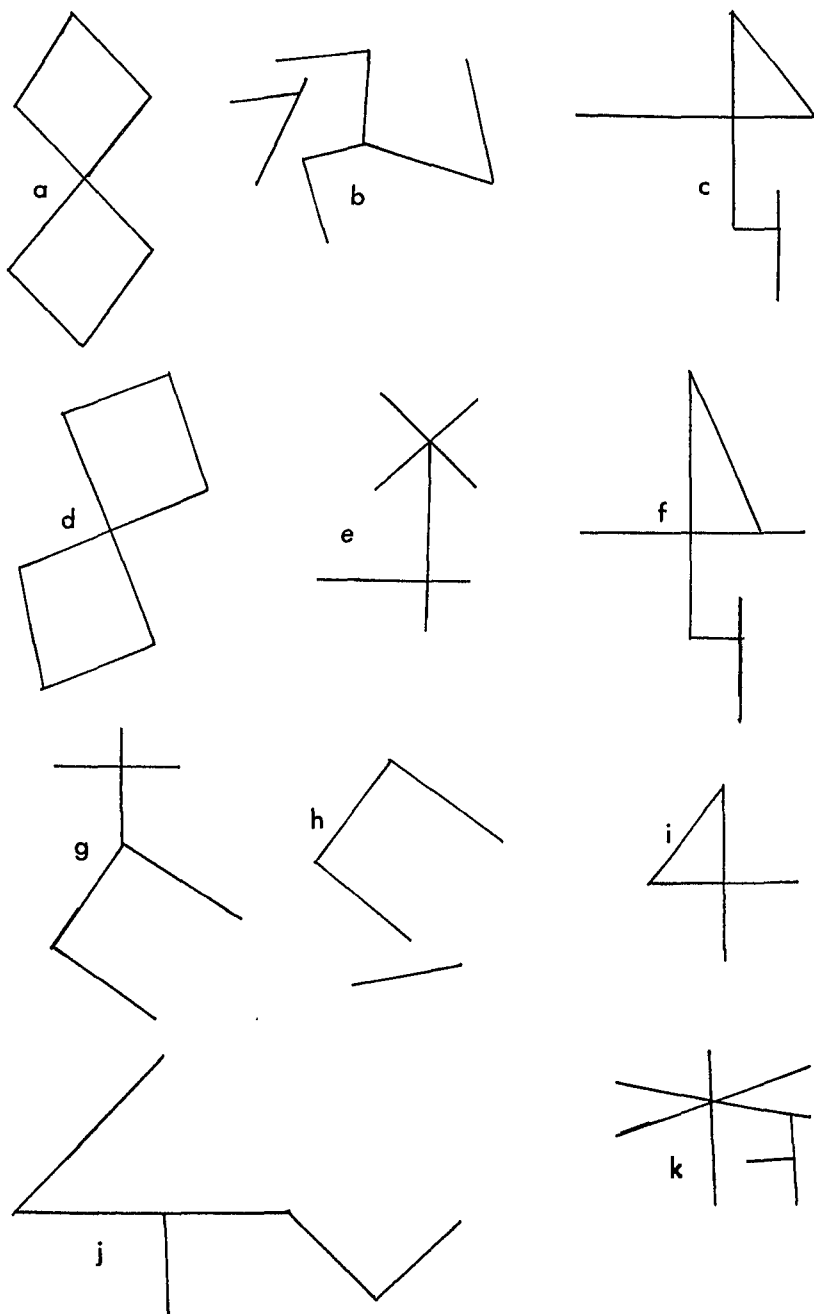


Fig. 3. Mason's 'Banker' Marks.

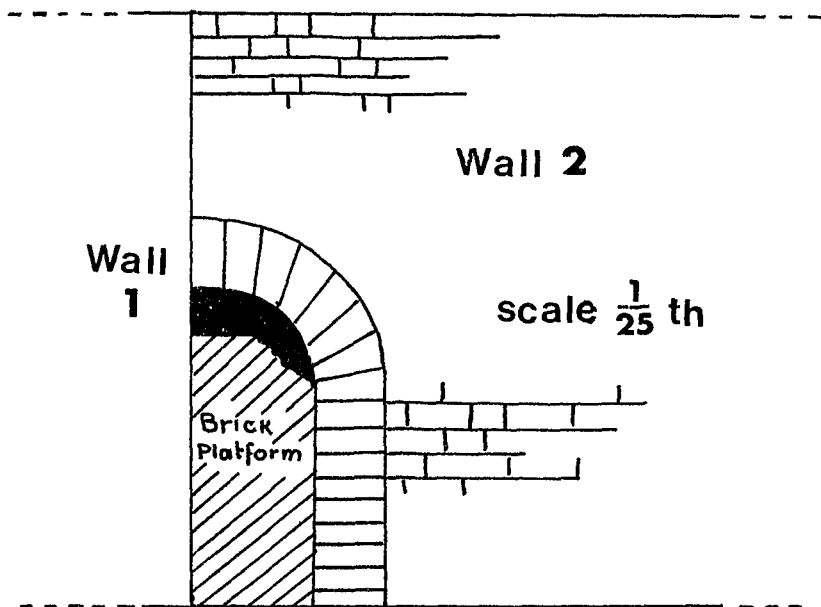


Fig. 4. Detail of arched Construction.

*1633-post-1715, periods II and III – wall 3*

A survey for repairs was made in 1633, of which one item recorded was the laying of a stone paved floor. Evidence for the carrying out of this work was confirmed by the discovery of a number of portions of flagstone *in situ* around the inner perimeter of wall 1. This floor had been laid on a foundation of rubble and evidence exists to show it to have extended over the entire internal area excavated. Wall 3 was built onto this floor, it is only 25 cm.-wide and 73 cm.-high and runs parallel to and abuts wall 1 for its entire length. Where it meets the radius of the D-shaped front of the Tudor wall, the curve is eliminated by the employment of a spliced joint. At the southern end, it crosses wall 6 (see below) using an arched construction similar to wall 2. This wall was not merely a refacing of wall 1, but was built to support floor joists. Evidence to support this theory is shown by the top course of brickwork being complete and having no trace of mortar, but traces of a wooden beam were found overlaying this wall. A break of 1.20 m. at one point in the flagstones, coupled with the fact that the wall extends several courses lower between this gap, indicates that some feature existed at this point; a row of bricks laid end-on built into the wall centrally above this feature may have had some association (Fig. 5).

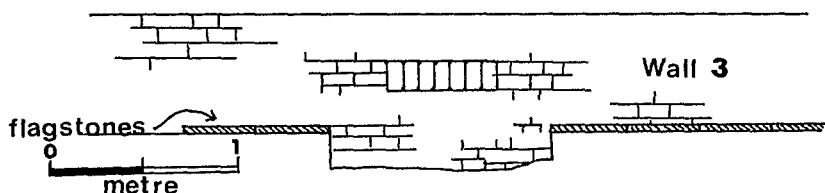


Fig. 5. Detail of Feature at Centre of Wall 3.

*Post-1715, wall 4*

This wall, 2.25 m. from wall 3, runs at right angles to wall 2, to which it is connected by a simple butt joint. It is of modest dimensions, being only 46 cm.-wide and 98 cm.-deep. A foundation trench for this wall had been cut through the rubble foundations of the flagstone floor. This trench although filled with the same rubble as the general area was discernible. At its south end where it crosses wall 6 the same method of arched construction as in walls 2 and 3 was found to exist. Conclusions concerning its function are identical to those made for wall 3.

*Post-1715, wall 5*

This wall is similar in construction and proportions and stands at right angles to wall 2. Unfortunately, owing to the limits of the excavation area, it was only possible to examine its west face, which bore no significant features. An exploratory trench into the adjacent flower beds was cut to ascertain its width, which proved to be 1.40 m., but unlike wall 4, the joint with wall 2 had been securely keyed-in and is undoubtedly contemporary.

*Periods I and III, wall 6*

The 1715 plan, which was the pattern on which the excavation was based, showed an interior cross-wall approximately 12 m. south of the extreme front of the building. This was successfully located, and it was apparent by its construction that it had been rebuilt. However, subsequent excavation showed that this rebuilding only applied to the top seven courses of brickwork below which remained the original Tudor work. At the junction of these two periods were further portions of flagstone *in situ*. The brick platform of wall 1 was found to return along this wall although its width was reduced to 28 cm. A stone block laid on this part of the platform contained another banker mark (Fig. 3, k).



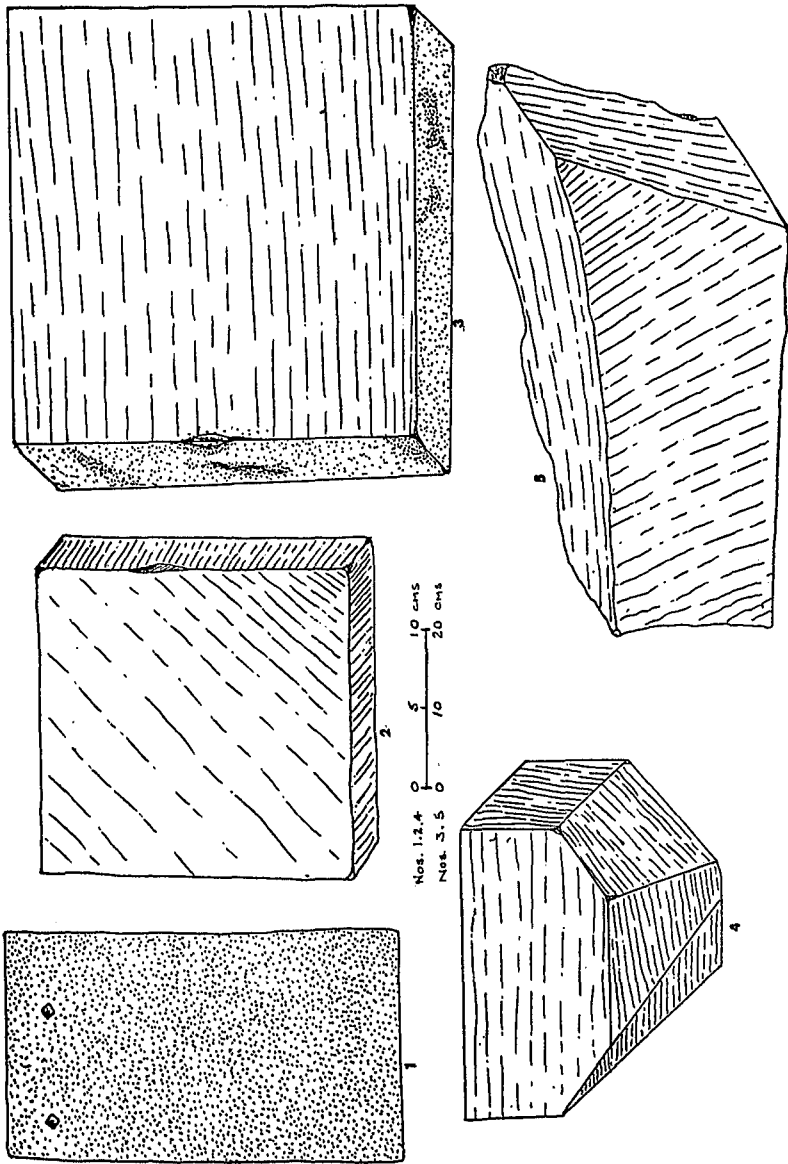


Fig. 6. Masonry Fragments.

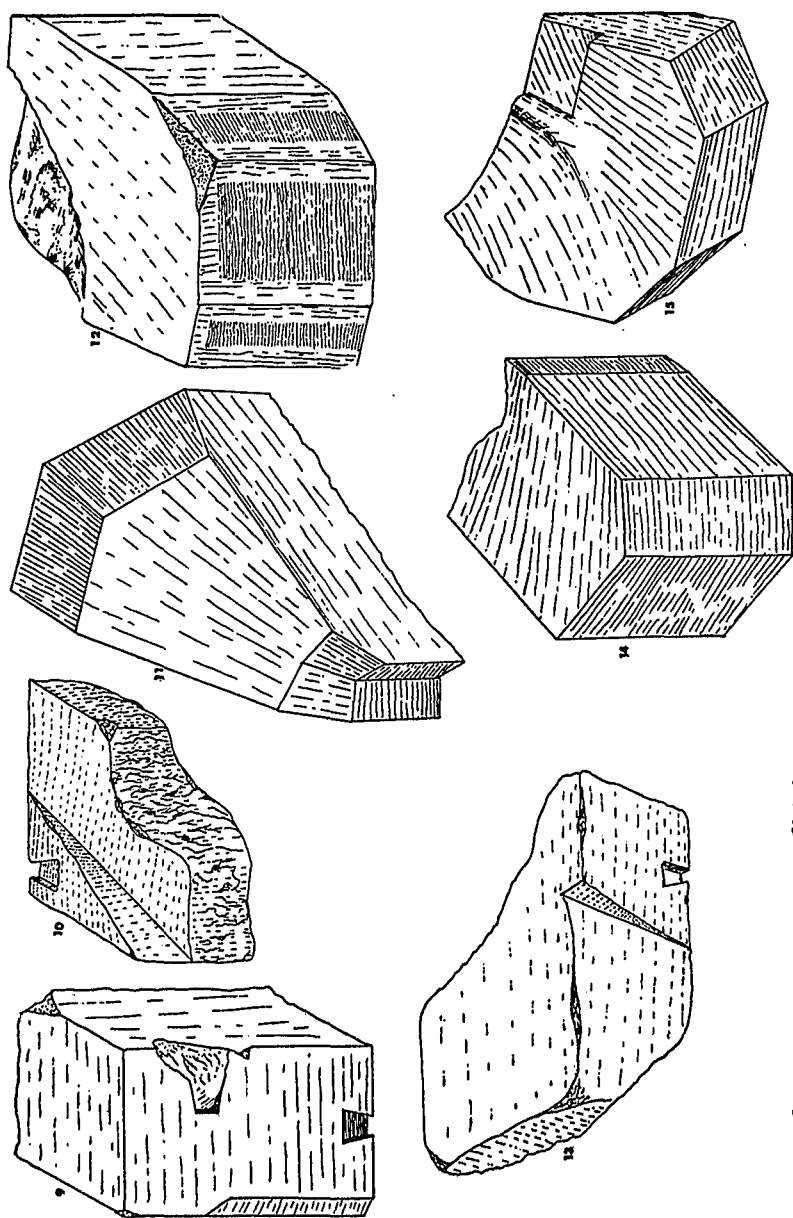


Fig. 7. Masonry Fragments.

These six walls combine to divide the excavated area of the blockhouse into three parts conveniently described in this report as rooms 1, 2 and 3.

### *Room 1*

This is the area delineated by the D-shaped exterior wall and the cross-wall 2. The clearing of this area showed that the infill consisted of brick and mortar rubble, below which the material although still predominantly rubble contained an admixture of clay in which a number of pieces of cut masonry were found (Figs. 6 and 7) indicating that the laying of the flagstone floor was accompanied by other considerable structural alterations. Below this second layer was found a layer of crushed chalk into which the foundation trench for wall 2 had been cut. Removal of this layer showed it to be 70 cm.-thick and overlay an extremely solid mass of clean chalk, which was later confirmed as being the original raft upon which the whole structure was built.

### *Room 2*

The area of this room is contained by the cross-walls 2 and 6 and walls 3 and 4 which are at right angles to them, its dimensions being 2.30 m.  $\times$  6.50 m. The infill was found to be identical to that described for room 1, except that between the mixed rubble and clay layer and the crushed chalk, an uneven layer of burning was discovered. Beneath this burning, there was a deposit of clay into which three timber joists appeared to have been laid (Fig. 6). This may have been the remains of an early wooden floor as several dozen iron arrowheads were found at this level. The two brick structures noted on the site plan were built directly on to this burnt layer; they are of solid construction, 50 cm. square, but their function has not been determined. The foundations of wall 4 were also found at this level.

### *Room 3*

The area designated room 3 is contained to the north by wall 2 and to the east and west by walls 4 and 5. Although it was not possible to excavate to the southern end, it is presumed to be bounded by wall 6. The rubble infill of this area was superficially similar to that in rooms 1 and 2. However, the mortar content appeared to be lighter in colour and of a more powdery texture and, on analysis (see appendix), proved to be of a completely different type. This infill penetrated down to the chalk floor noted in rooms 1 and 2 with the exception of an area

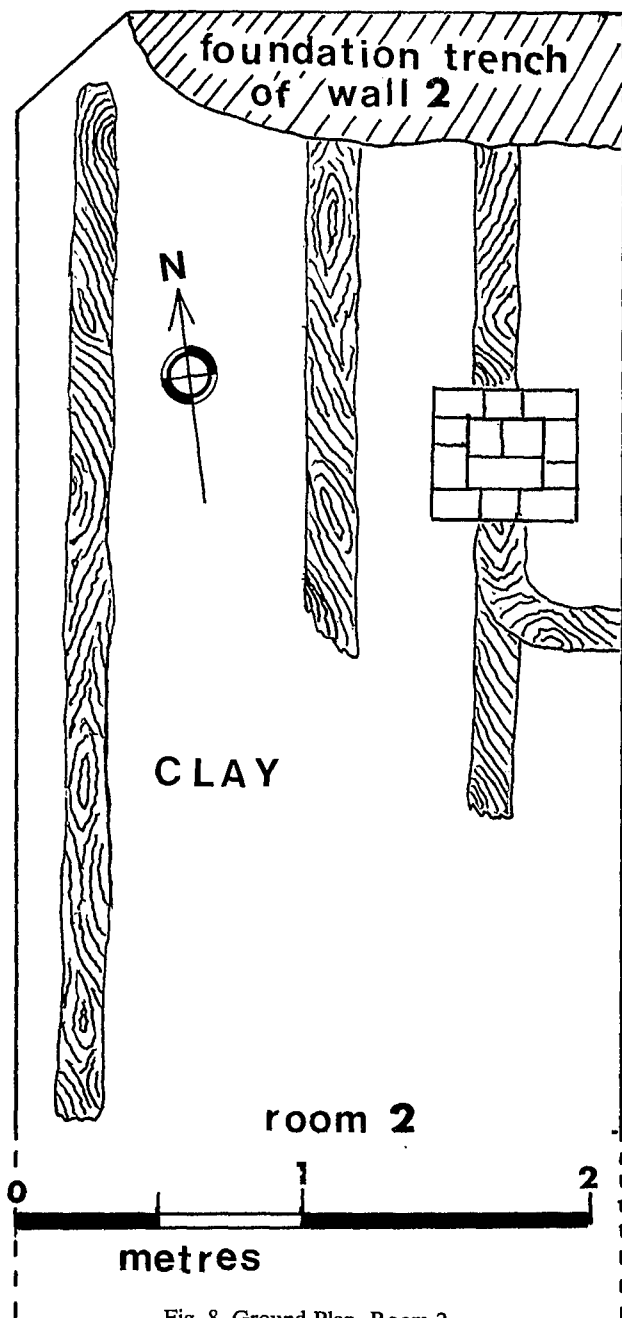


Fig. 8. Ground Plan, Room 2.

adjacent to wall 4, where the layer of burning and its associated clay layer extended under the foundations of wall 4 running out at varying distances from 20-30 cm. into this area. No evidence was found for a wooden floor over the remaining major portion of this room and, as it is obvious that rooms 2 and 3 were originally one, the wooden floor noted in room 2 may possibly have been merely a free standing platform for storage or a walkway. The dissimilarity in infill material between rooms 2 and 3 would indicate differences in periods of use, but no dating evidence to prove this point was found, though room 3 must have been in use at least until the construction of wall 4.

### *The foundations*

To investigate the chalk raft on which the blockhouse was built, a section was dug immediately in front of the exterior wall. This attempt had to be abandoned due to enormous portions of fallen masonry which would have required the use of heavy lifting tackle to remove. A second attempt made outside the west of the building proved more successful and the lowest courses of stone facing were found at 1.61 m. below the offset. Below this, the brickwork extended for a further 61 cm. where it was found to be laid directly onto a compact mass of chalk. An attempt to ascertain the depth of this chalk had to be abandoned at a further 70 cm., owing to the instability of the trench sides. However, a small trial hole was continued for a further 50 cm., but this still failed to establish the total depth of the chalk.

### *The old river wall*

During the investigation of the foundations a timber structure was found which has been identified as an earlier wall. It consisted of two oak uprights, their dimensions being 18 x 16 cm. As excavation proceeded, it was found that planks approximately 19 cm.-wide and 3 cm.-thick had been bolted horizontally to the landward side of these uprights, which were ultimately discovered to be attached to a sleeper beam laid into a slot cut into the chalk raft. Subsequent removal of the cross members allowed the uprights to be withdrawn from the sleeper beam, which showed the method of attachment; this consisted of a mortise and tenon joint secured by large iron bolts. Although corroded beyond recovery their diameter could be assessed as approximately 5 cm. by the size of the holes drilled through the timber to accommodate them. Behind this timber structure a backfill of dark firm clay, evenly interspersed with crushed chalk, was filled to the level of the top of the offset of wall 1, which extended backward to the southern limit of the excavation area. During the removal of this

backfill, it was found to contain several longitudinal holes retaining the imprint of wood grain and pieces of decayed timber. One of these holes, 15 cm. in diameter and over 2.40 m. long, runs parallel to the outer wall and may indicate the site of a drain as one end extended to the edge of the old river wall, and the other turned slightly inward towards the blockhouse. It has not been possible to ascertain a date for this backfill, but it cannot be contemporary with the original building as a bricked-in feature associated with the vertical rise in the offset noted in wall 1 was buried by this fill. The riverward side of the river wall was filled by predominantly pure mortar and was possibly used as a dump for waste from the cleaning of building materials at one stage of reconstruction.

### *Discussion*

Unfortunately, the area available for excavation allowed only partial investigation of the blockhouse to be undertaken. However, sufficient evidence was found to confirm the authenticity of the 1715 plan and to establish its precise location. Throughout its long and varied history, alternating between periods of decay and subsequent restoration during times of crisis, a number of structural alterations, mentioned in the text, had been carried out, but there is little evidence to show a chronological sequence for these events, the only exception being the 1633 proposal for the laying of a stone floor and its foundations which seal the lower layers – provided that the correlation of the documentary evidence concerning this feature and the actual flagstone floor found is accepted. A report of 1730 regarding the collapse of the front wall of the building can be substantiated by the finding of a large portion of wall fallen from the superstructure, which the stratification shows to have been sealed before the general destruction level.

The completion of the excavation leaves problems which require elucidation, one of which is the reason for the arched construction employed in the post walls, another concerns the iron retaining rings on either side of the gun-ports, which seem unusual at this early date. However, the excavation is not to be completely backfilled, as the owners requested this and intend to re-landscape the area and generally keep the structure in good repair for viewing by the public.

### ACKNOWLEDGEMENTS

We are indebted to the landowners, Messrs. Berni Inns Ltd., for allowing us to excavate on their property; also, to the manager of the Clarendon Royal Hotel, Mr. M. Hayden and his staff, for their co-operation.

Our thanks are due to Mr. V. T. C. Smith, of the Kent Defence Research Group, for inviting us to dig on their behalf and for supplying us with a copy of the 1715 plan.

The excavation was carried out entirely by members of the Thameside Archaeological Group, of whom the following deserve special mention for their sustained efforts: Mrs. L. Peasey, Mrs. R. Geer, Miss K. Mercer, Miss N. Egan, Messrs. R. Mills, F. Holder, K. Morris, K. Webster, J. Dryden and P. Relf; and also Mr. B. Fitzpatrick and Mr. L. Mercer, for surveying the site; Mrs. L. Smith and Mrs V. Docksey, for drawing the small finds; Mr. E. Tilley, for identifying the coins and the report on the clay pipes; Mr. J. Shepherd, for the glass report; and, finally, our thanks are due to Mr. A. Swaine, B.A., F.R.I.B.A., Mr. P. J. Tester, F.S.A., and Mr. F. W. Jessup, C.B.E., M.A., LL.B., F.S.A., for their valued comments and encouragement.

## APPENDIX I

*The Pottery*

During the excavation only a small amount of pottery was found, ranging from a survival sherd of thirteenth-century ware, several small fragments of stone ware, two examples of Staffordshire ware and the remainder datable to the Victorian and later periods. As they are all from unstratified deposits no further mention need be made.

## APPENDIX II

*The Glass*, by J. Shepherd  
(Fig. 9)

Bottles (free-blown). Fragments of four free-blown bottles can be identified:

- No. 1 Neck and rim, natural green nineteenth-century soft drinks bottle.
- No. 2 Neck and rim fragment, the surface completely corroded and the glass looks opaque, but an amber-brown tint shows on a recent fracture. Late-seventeenth-century wine bottle.

Fragments not detailed. Part of a cylindrical bodied bottle, pale green, varying in thickness from 6-10 mm. The fragment is completely coated with heavy iridescence. Late-seventeenth-early-eighteenth-century wine bottle.

Fragment, pale green, part of a cylindrical bottle, thickness varies from 2-4 mm. Eighteenth-century wine or beer bottle.

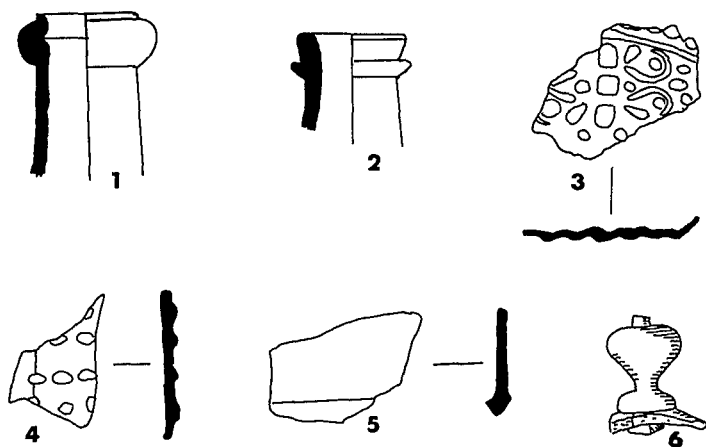


Fig. 9. Glass Fragments (Scale:  $\frac{1}{2}$ ).

#### Vessels (mould-blown)

- No. 3 Fragment, transparent blue glass with mould-blown pattern, possibly the side of a small square jar or bottle. Nineteenth–twentieth century.
- No. 4 Fragment, clear amber, blown in a two- or three-part mould, regular pattern of raised blobs of same colour, a mould mark is also visible. Nineteenth–twentieth century.
- No. 5 Two adjoining fragments of colourless glass from an unidentifiable vessel.

#### Wine Glass

- No. 6 Stem and base fragment from a wine glass, colourless, but now has a fine iridescent coating. The angular knop-and-cushion stem formation is a close approach to one of John Green's patterns of 1660 to 1680. He was a London glass importer who corresponded with a Venetian glass maker, Alessio Morelli. Letters and drawings of glasses ordered are preserved in the British Museum.

#### Window Glass

Eight fragments of window glass can be divided into two groups:

- (a) Three fragments, 1.5 mm.-thick, colourless, cylinder sheet process and not manufactured until 1832.



- (b) Five fragments, 1 mm.-thick, pale green, but now brown with corrosion. The fragments come from a diamond pattern leaded lights and date before group (a).

### APPENDIX III

#### *The Round-shot and Arrowheads*

During the excavation of the lower rubble fill of room 2, a number of round-shot was found. The first had a diameter of 6.3 cm. and is consistent with that of a projectile intended to be fired by a gun called a falcon. The falcon had an extreme range of 1,300-1,500 yards. As a gun-type, it was in use in England through the entire period when guns were mounted in the blockhouse itself. Falcons were in the original armament and were definitely present as late as 1600.

Six other shot were also found having a diameter of 5.1 cm. and may have been fired from a weapon called a falconet. The falconet was a slender, almost fragile looking, gun which was used in the sixteenth and seventeenth centuries, although this gun is not listed in any armament list yet found for the blockhouse. (We are grateful to Mr. V. T. C. Smith, for the above information.)

On the remains of the wooden floor of room 2 were discovered several small iron objects resembling arrowheads, which were later identified at the Tower of London as being the tips of cross-bow bolts.

### APPENDIX IV

#### *Coins and Clay Pipes, E. W. Tilley*

##### Coins

1. Unstratified.  
Chinese brass 'cash' of the Ch'ing or Monchee dynasty c. 1780  
Emperor Kien Lung, 1736-1796. Mint illegible.
2. From the rubble filling of room 2.  
Dutch copper 'Doet' of the province of Holland c. 1758  
obverse - Lion within a fence  
reverse - HOL/LAN/DIA and date below  
N.B. The Dutch provinces all struck copper Doets bearing the arms  
as the obverse and the name of the province on the reverse.

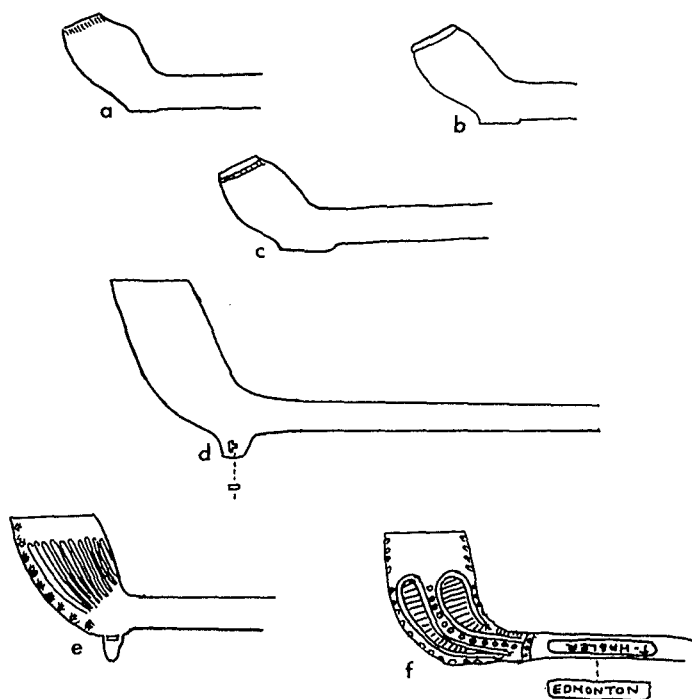


Fig. 10. Clay Tobacco Pipes (Scale:  $\frac{1}{2}$ ).

### Clay Pipes (Fig. 10)

- (a) Base parallel with stem, *c.* 1620–1650.
- (b) Heart-shaped base wider than the stem, lip of bowl rouletted London type II, *c.* 1640–1670.
- (c) Small heart-shaped base, lip of bowl grooved, London type II, *c.* 1640–1670.
- (d) Common standard south-eastern type of the eighteenth century. The thickness of the stem and bowl decreases as the century wears on. This type is mid-eighteenth-century, *i.e.* 1750–1760. This example is marked on the base 'T.I.', most probably the initials of Thomas Johnson, who was a freeman of Gravesend in 1733.
- (e) Thin brittle bowl. Line of the mouth parallel with the line of the stem. Prominent spur with the initials 'I.S.', possibly made by the local manufacturer Joseph Sloper, who worked from 1841 to 1870 in Bath Street, Gravesend.
- (f) Pipe marked Thomas Hasler, of Edmonton, London, mentioned in 1828. This pipe can be dated to the mid-nineteenth century.

## APPENDIX V

*Miscellaneous Small Finds*

## 1. Victorian Dress Weights

- (a) Bronze – diameter 3 cm.
- (b) Steel – diameter 2.5 cm.
- (c) Lead – diameter 3.2 cm. All three unstratified.

## 2. Buttons

- (a) Plain brass flat-faced button 2.2 cm. diameter, with the fixing loop soldered to the back.
- (b) Plain brass button made in two halves, both slightly convex 1.6 cm. in diameter. The two halves are joined by means of the back being slightly larger in circumference and the edge being folded over to grip the front portion. The fixing loop is soldered to the back.
- (c) Flat gilded button 1.6 cm. in diameter, bearing the figure of a Roman-type soldier holding a shield in the left hand and a spear in the right. An inscription – ‘West of England’ and the date 1807. The reverse bears the maker’s name and address – Firmin and Sons, 153 The Strand.

All three unstratified.

## 3. Bronze Objects

- (a) Bronze plaque 8.2 × 7.3 cm., bearing traces of black paint and with four fixing holes along the edge of three sides. The fourth side had been damaged and therefore the actual length is not known. From the fill of room 3 (Fig. 12, 5).
- (b) Bronze knob 2.2 cm. diameter, made in two halves, the top half being attached to the lower by being folded under the top edge of the lower half. Unstratified. (Fig. 11, a).

## 4. Oval Victorian Tie-pin

Gilded, with a pale-green glass ‘stone’ set into the centre. Unstratified. (Fig. 11, d).

## 5. Lead Objects

- (a) Folded lead object 6.1 × 4.8 cm., with a hole through the centre. Possibly a floor joist packing piece. (Fig. 12, 6). From lower fill of room 2.
- (b) Several lead strips in various lengths and widths.

## 6. Iron Objects

- (a) Large iron hinge 17.5 × 5.4 cm. Lower fill of room 3. (Fig. 11, c).
- (b) Large iron staple 8.3 × 5.6 cm. Lower fill of room 3.

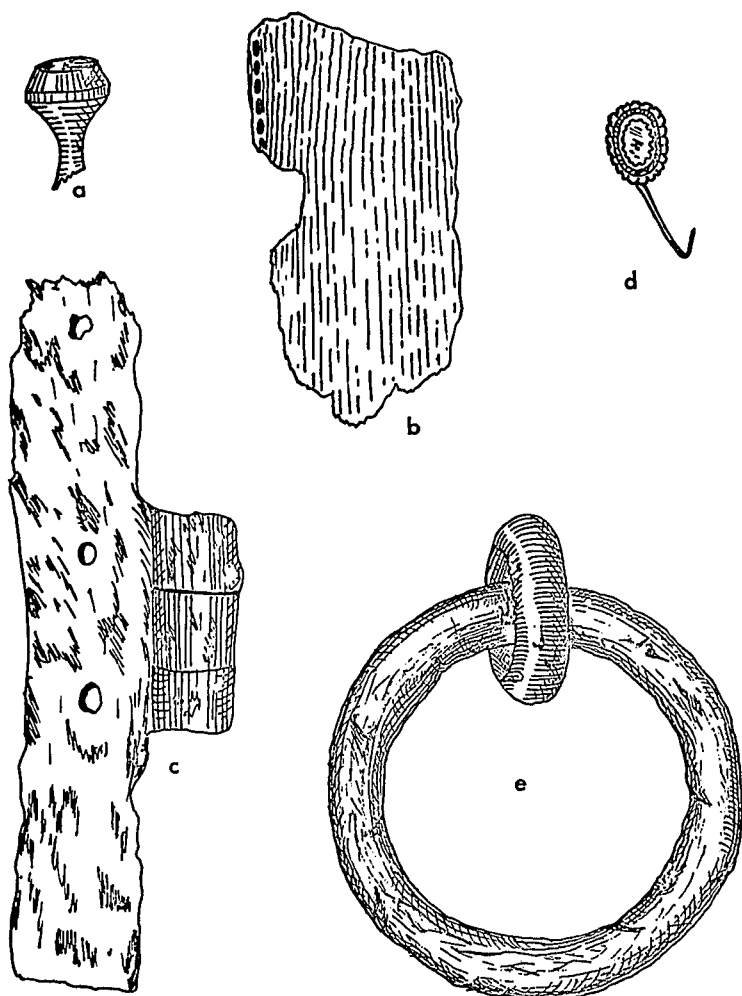


Fig. 11. Miscellaneous small Finds (Scale:  $\frac{1}{2}$ , except e = dia. 14.5 cm.).

- (c) Large quantity of hand-forged nails of various sizes.  
(d) One of the four retaining rings mentioned in the text. (Fig. 11, e).

#### 7. Leather

Portion of shoe. Lower fill of room 1. (Fig. 11, b).

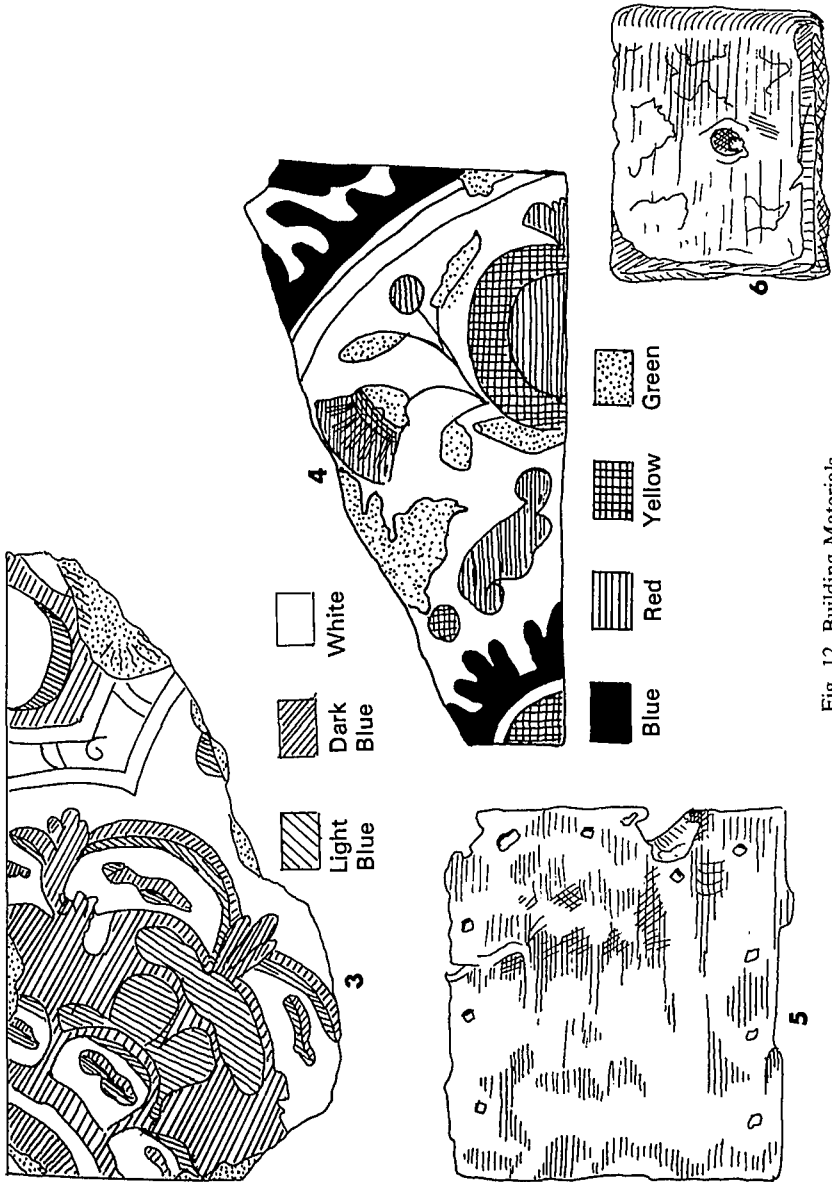


Fig. 12. Building Materials.

## APPENDIX VI

*Building Materials*

During the excavation a large quantity of building material was found, consisting of brick and mortar rubble, roof-tiles and fragments of stonework. The majority of it is too numerous to mention although a number of items deserve to be noted.

- Fig. 5a, no. 1 Roof-tile  $25.2 \times 14.8$  cm., with two square peg-holes.  
 no. 2 Red unglazed floor-tile 19.6 cm. sq.  
 Fig. 5b, no. 3 Fragment of glazed floor-tile, light- and dark-blue on a white background.  
 no. 4 Fragment of multicoloured floor-tile.  
 Fig. 5a, no. 3 Example of Purbeck flagstone.  
 Fig. 5a, nos. 4 and 5 Examples of cut stone (Kentish rag)  
 Fig. 5c, nos. 9 and 15 found in the lower rubble fillings of rooms 1 and 2.
- Not drawn Six examples of 'Dutch Clinker' bricks with dimensions varying between  $17.5 \times 7.5 \times 4.5$  cm. and  $16.0 \times 7.0 \times 3.0$  cm.  
 Six examples of Tudor bricks with dimensions varying between  $17.0 \times 7.5 \times 4.3$  cm. and  $18.5 \times 9.0 \times 4.5$  cm.

## APPENDIX VII

*Surveys*

1. A preliminary survey was undertaken on 12th July, 1975, with the purpose of establishing a base line from which all further measurements could be taken. Details of this survey are described in the text.
2. A further survey was carried out on 26th August, 1975, by Mr. L. Mercer, to obtain accurate spot heights on which to base all measurements required during excavation. Details are as follows:

EXCAVATION OF THE GRAVESEND BLOCKHOUSE, 1975-76

	Backsight	Inter	Foresight	Collimation	Ordnance datum or reduced levels	
B.M. Bench mark on St. Andrew's Church	3.10			20.48	17.38 ft.	5.297 m.
End of green iron fence, left of church	4.30		5.82	18.96	14.66 ft.	4.468 m.
Corner of river wall, junction of lawn and car park		5.65			13.31 ft.	4.056 m.
Flagstone - room 1		8.12			10.84 ft.	3.303 m.
Tree stump		3.27			15.69 ft.	4.782 m.
End of green fence	5.87		4.29	20.54	14.67 ft.	4.471 m.
B.M. St. Andrew's Church			3.14		17.40 ft.	5.303 m.

note: Bench mark error 0.02 ft. =  $\frac{1}{4}$  in.

From the above information it was possible to obtain accurate levels for each structural feature of the blockhouse. (Fig. 13)

- |                                   |   |
|-----------------------------------|---|
| 1. The Tudor exterior wall, south | 2. The Tudor cross-wall (wall 6)          |
| 3. Wall 4, south                  | 4. Wall 2, east side                      |
| 5. Wall 1, north                  | 6. Wall 2, west                           |
| 7. Wall 5, south                  | 8. Flagstone floor                        |
| 9. Flagstone floor                | 10. Brick platform associated with wall 1 |

APPENDIX VIII

*Mortar Analysis*

It was noted that a significant difference in colour and texture occurred between the mortar found in room 2 and that found in room 3. An analysis was therefore carried out to ascertain the reason for this difference and the results are as follows.

SURVEYED LEVELS (metres)

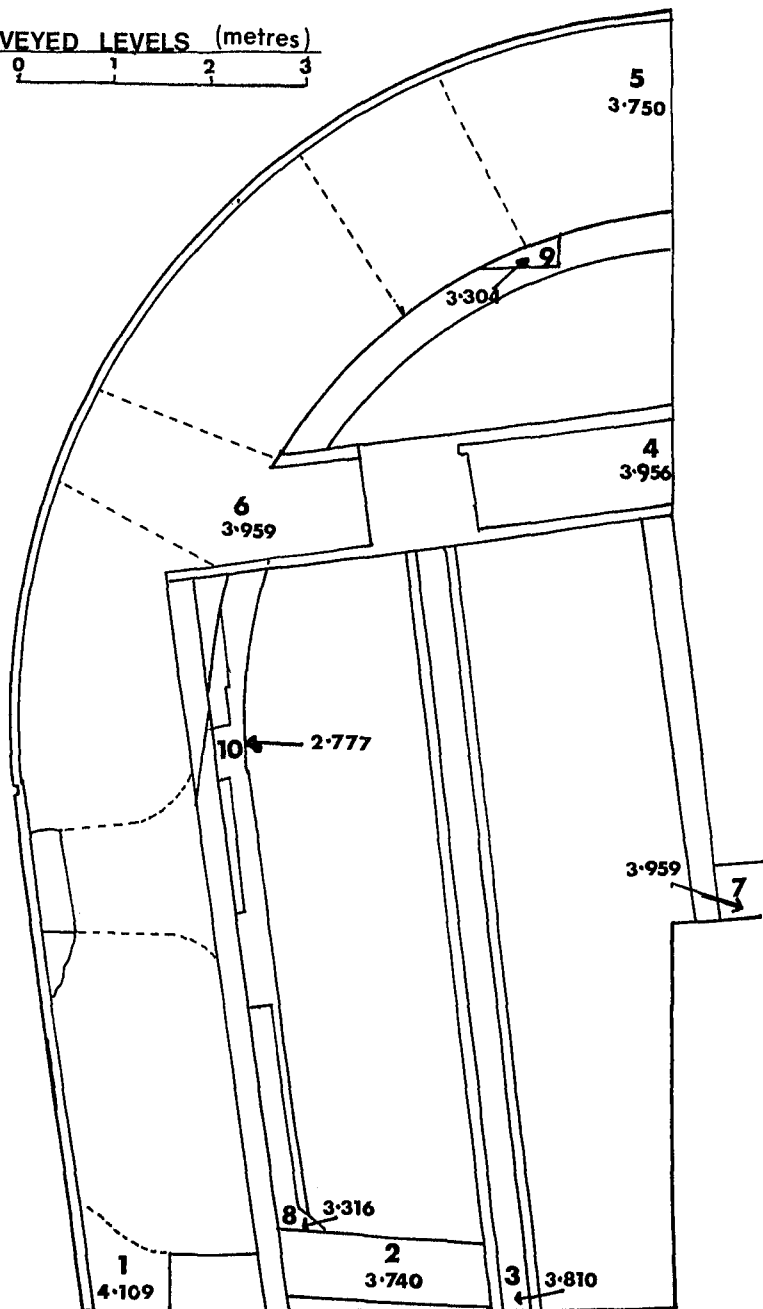


Fig. 13.



## EXCAVATION OF THE GRAVESEND BLOCKHOUSE, 1975-76

Colour	Room 2 Buff	Room 3 Pink/Grey
pH	8	4
Coarse sand	5.25 per cent (dark)	2.85 per cent (light)
Medium sand	1.75 per cent (dark)	1.80 per cent (light)
Fine sand	4.60 per cent (light)	5.75 per cent (light)
Clay and silt	25.0 per cent (light)	31.25 per cent (light)
Proportion of sand to lime mortar	1-1	2-1
Admixture	Nil	Crushed tile

It will be seen from the above that the two mortars were of different types, the proportion of sand to lime mortar and the lighter coarse sand accounting for the difference in texture and colour. The admixture of crushed tile was of significant quantity to assume that it was a deliberate addition because of the pozzolanic quality it would produce. This would also account for the pink hue.

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