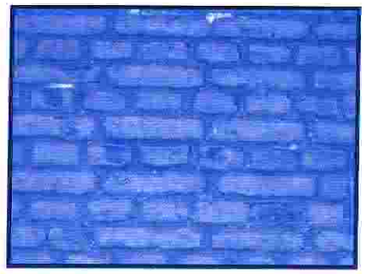
Chapel Court
North Facing Elevation
Hampton Court Palace



Historic Building Recording

oxford

HISTORIC ROYAL PALACES

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Chapel Court, North Facing Elevation, Hampton Court Palace

HISTORIC BUILDING RECORDING AND INVESTIGATION

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HISTORIC BUILDING RECORDING AND INVESTIGATION

SUMMARY

Oxford Archaeology were commissioned by Historic Royal Palaces to record the north facing elevation of Chapel Court at Hampton Court prior to masonry repair and cleaning work. The survey took place intermittently between September and December 2006 and included full recording of the diaperwork decoration and mortars prior to raking out and after raking out was completed. The stonework of the south facing elevation that was to be repaired or replaced was also photographically recorded at this time.

Records indicate that Wolsey had already constructed the Chapel Royal prior to his handing over of Hampton Court to Henry VIII in 1525. Building records for the period of Henry's occupation of the palace indicate that the Chapel was completed and decorated during the first few years of occupation. Further changes were made after Henry's marriage to Jane Seymour and the northern range to Chapel Court, Prince Edward's lodgings, was built for Henry's only son Edward VI. The Prince was born at Hampton Court was christened in the 'newly completed chapel' in 1537. Amongst the changes made to the Chapel Court north facing elevation are the insertion of casement windows in 1711, and the replacement of the windows and stonework in the mid to late 19th century.

The survey and recording work done upon the Chapel Court East elevation enabled a close study to be made of the various mortar types connected to the changes to the elevation. Using the Brick Typology Data Sheets and analysis of the different mortar types it can be seen that there are many different phases of work upon the elevation. These include: The primary building phase under Cardinal Wolsey; the Tudor ruddling and diapering of the elevation; the replacement of primary Tudor windows with casements in 1711; the decoration of the elevation with false diaperwork in the 19th century; the addition of the plinth to the base of the elevation; the replacement of the casement windows with perpendicular windows in 1893/1894; the addition of black ash mortar to the elevation and finally the replacement of the crenellations in the 1950s/1960s.

All of the changes to the elevation build up a picture of the evolution of the Chapel to its present condition, and show how changes in fashion and ownership have affected its treatment.

1 INTRODUCTION

1.1 Background

1.1.1 Oxford Archaeology (OA) were commissioned by Historic Royal Palaces (HRP) to undertake a programme of historic building investigation and recording on the north facing elevation of Chapel Court, Hampton Court Palace, Surrey.

1.1.2 Historic Royal Palaces have initiated a programme of restoration and repairs which will remove the Victorian black ash pointing and replace damaged bricks and stonework to ensure the future structural stability of the elevation and to prevent further deterioration/loss of important building fabric. The mortaring will replicate the changes and repairs made to the elevation rather than make it uniformly the same mortar, in order to facilitate interpretation and show the constructional changes made in the evolution of the chapel. Chapel Court is not fully open to the public and it is the intention of HRP to eventually create a garden within the Chapel Court for public view.

1.1.3 HRP did not issue a specific archaeological brief for this project. The brief for another current project, the Tiltyard Tower, was used by OA as the basis for this survey, as the projects are very similar.

1.1.4 Alison Kelly (with Jane Phimester) carried out the investigations, and the main survey work took place during September and October 2006. Further monitoring of the raking out and stone replacement works was done in November and December 2006.

1.2 Aims and objectives

1.2.1 The purpose of the investigation was to:

- inspect and record in detail the use of vitrified bricks and paintwork within decorative schemes;
- inspect and record in detail all pointing, mortar and bond types in order to produce a phased summary of the works upon the elevation;
- inspect and record in detail other details such as fixings, putlogs and other features of significance;
- record the brickwork used upon the elevation and reformat the existing English Heritage brick typology where necessary;
- add to our knowledge of fabric and phasing of the Chapel Royal;
- create an ordered archive of the work for deposition with HRP.

1.3 Methodology

1.3.1 A test panel, comprising the area above the easternmost window was recorded initially to allow HRP, English Heritage, the project architects (Gilmore Hankey Kirke) and the project contractors (Carrek) to agree the course of action and types of repair mortar for the works. The survey first recorded pointing and painted diaperwork and then, following raking out, the bedding mortar types and the extent of red paint were recorded and examined (Plates 5 & 6). The remainder of the elevation was then recorded, prior to and after raking out providing a full record of the elevation.

1.3.2 The survey comprised three principal elements. The ***photographic survey*** consisted of general shots and specific details and was undertaken using 35 mm black and white print film and colour slide film. Digital shots were also taken to ensure a full photographic record.

1.3.3 The ***drawn survey*** used a Photogrammetric drawing of the elevation that had been provided by HRP. Permatrace was overlain on this drawing (scale 1:40) and the elevation was recorded in two stages; prior to raking out and after raking out.

1.3.4 The ***descriptive survey*** complemented the other two surveys and added further analytical and descriptive detail.

1.3.5 Instances of graffiti found on the lower level of the elevation were recorded on acetate at a scale of 1:1 and are illustrated in Appendix V (plates 13 & 14).

1.3.6 Weathered and damaged stonework upon the both the north and south facing elevations were recorded and photographed prior to their removal and a list is included within this report as Appendix VI.

1.4 The brick typology

1.4.1 For the purposes of brick analysis the elevation was divided according to the scaffolding lift (7 levels plus crenellations) and the bays of the elevation were labelled A to D. Brick recording sheets were completed for each section. The brick recording sheets included the recording of brick measurements, bond, pointing, mortar, brick colour and other features.

1.4.2 The measurements taken for each brickwork phase (length, width, depth and arris to arris) were input into an Excel spreadsheet and from this average measurements were produced (see Appendix III). These were converted into inches and compared with the English Heritage brick typology data sheets that have been devised by Daphne Ford. The descriptions used upon the data sheets were also compared to the brickwork upon the elevation and the results are discussed in §3.2.2.

2 HISTORICAL BACKGROUND

2.1 Historical background

2.1.1 Cardinal Wolsey purchased the lease for Hampton Court in 1514 from the Estate of Lord Daubney who had originally purchased a lease for the property from the Knights Hospitaller in 1514. Since a chapel already existed upon the site there was not an immediate need to build a new one and it wasn't until the later phase of Wolsey's occupation that construction began on the present chapel. It is likely that when Henry VIII took possession of the palace from Wolsey in 1525 the chapel was in the final stages of construction. The chapel form is T-shaped, which is similar to the college chapels of Oxford, a form known to Wolsey as he had been educated in Oxford (Thurley, 2003).

2.1.2 After the possession of the palace came to Henry VIII he embarked upon a building programme that shaped much of the palace we see today. In 1529/30 a council chamber was added beside the antechapel on the north side. The period 1530 to 1535 saw the construction of the tennis court (later converted into the Duke of York's lodgings). After refurbishment of the chapel in 1537 the chapel court was completed with the addition of Prince Edward's lodgings, which form the south facing side of the courtyard (Thurley, 2003).

2.1.3 The main changes that affected the north facing elevation of chapel court are the replacement of the chapel windows in the 18th and 19th centuries. The original Tudor windows were replaced with casement windows during refurbishment of the chapel in 1710/1711. After a proposal in 1847 to refenestrate the chapel was rejected, the windows were finally replaced in 1894 (plate 1), in a style based upon a design of existing 16th century windows located in the organ loft. After a request from SPAB (Society for Protection of Ancient Buildings) the trompe l'oeil windows within the chapel that show the 18th century window design were retained (plate 2). Many of these changes have been outlined within the 'Royal Pew, Chapel: Summary Statement of Significance' which is included in Appendix III.

2.1.4 The 19th century also saw further changes with replacement of stonework with Bath stone, painting of diaperwork and ruddling upon the elevation, the addition of a brick plinth to the base of the elevation, and the addition of black ash mortar which is to be removed as part of the current works. Changes to the elevation in the 20th century include the replacement of crenellations in the 1950s or 60s as well as ongoing small mortar repairs.

3 DESCRIPTION

3.1 Introduction

3.1.1 The Chapel Royal at Hampton Court is predominantly brick-built with stone string coursing, windows and pilaster buttresses. On the lower level there is a brick plinth with a rough arched entrance to the sewer system below ground. The top of the elevation consists of brick and stonework crenellations, which were built in the

1950s or 60s. The crenellations and plinth do not have the thick layer of black ash mortar that is being raked out.

3.2 Brickwork description

3.2.1 The greater part of this elevation consists of Wolsey stock brick (dated 1522/1528) and defined as Type B by Daphne Ford in the English Heritage brick typology (1991). This brick type is consistent with the probable date for the main construction phase under the final part of Wolseys occupation of Hampton Court. The Type B bricks are a highly varied red/brown/orange in colour with small to medium sized stone inclusions. The bricks have no frog and the brickwork is laid out in an English bond. Some bricks have large inclusions, pebbles and pebble fragments, and there are holes where inclusions have fallen out. Bricks may also have fractures caused by weathering and the adhesion of the black ash mortar or have natural fractures formed during the forming and firing process. There are overfired and vitrified bricks present in the elevation but as discussed in §4.1.1, they do not form part of the overall pattern upon the elevation.

3.2.2 The average Type B brick size is 9¼ x 4½ x 2⅛ inches, which is consistent with the brick typology data. However the arris to arris measurement, at 9¾ inches, is slightly smaller than the typology data sheet where the average is 10 - 10½ inches. This is probably due to the extent of the thick black ash mortar affecting measurements taken. All measurements in this instance were taken post raking out and are therefore more likely to be accurate.

3.2.3 The brickwork around the windows inserted in 1893/1894 mainly consists of reused Type B Wolsey stock brick with some new brick. This brickwork is laid in an English bond but this varies where bricks have been cut to fit around the window and the stone pilasters. Tiles are occasionally used to fill gaps between brickwork and the adjacent stonework and the lowest level of the elevation has one small glazed tile adjacent to a stonework pilaster. Other bricks used within this phase are 19th century stock bricks which are consistent with the late 19th century date for the window replacement.

3.2.4 There is a brickwork plinth at the base of the elevation that is topped by a stone weathering course (plate 7). There is calcification upon the brickwork and mortar. The bricks are 19th century Type T stock bricks in various shades of orangey-red, the mortar is flat and a light grey in colour. There are patches of friable soft bricks, probably due to weathering. There is a large quantity of organic growth on the brickwork, mostly a mossy substance.

3.2.5 Within the plinth in Bay C is the entrance to underground sewers, the brickwork of which is the same phase as upon the plinth. Chamfered bricks are used upon the jambs and rough arched sill of the entrance.

3.2.6 The crenellations date to the 1950s or 1960s (A. Meshaka (Architect) pers. comm.) and replace earlier crenellations. Laid out in an English bond, most bricks have straw impressions and some have horizontal stacking imprints, all from the drying

process before firing. The colours are mixed with orange, brown, greyish pink and dark pink tones – there are vitrified bricks within the brickwork but these are not laid in any pattern. Some bricks have black spots upon, again possibly related to the firing process or contaminants/inclusions within the bricks. The bricks do not appear on the brick typology data sheets but are simply classed as 'modern'.

3.2.7 There are patches of replacement brickwork within the elevation which have used using Type T 19th century stock bricks. In many cases care has been taken to match the bond and coursing of the existing brickwork with the use of tiles and stretchers which have been cut to look like two headers (plate 8).

3.2.8 Removal of damaged brickwork has revealed a concrete lacing piece behind the outer skin of bricks at the top of the rebuilt brickwork (plate 22). The lacing piece rests upon a thin layer of wood and above the concrete is a layer of grey/blue coloured slate. The 3.8cm thick concrete is failing in parts - probably due to damp. The extent of the concrete lacing pieces was not revealed during the works but the assumption is that they run the width of the rebuilt brickwork.

3.3 Mortar description

3.3.1 The majority of the elevation brickwork was pointed in a thick layer of black ash mortar that was applied during Victorian works, most likely after the diaperwork (see § 4.1) and replacement of windows (plate 3). The black ash mortar is very solid to the touch and the colour ranges from dark grey/charcoal to almost black. There is a high amount of small to medium sized gravel and pebbly inclusions giving the mortar a rough texture. The pointing has extensive penny rolling with mostly horizontal lines but there is vertical scoring between the bricks in some parts of the mortaring. Patches of the black ash mortar were removed prior to raking out as part of the investigative process for the building works.

3.3.2 The black ash mortar to the brickwork below the windows in Bays C and D has a slightly sandy colour fading through the black. This could be from discolouration of the mortar from weathering of brickwork, or possibly a slightly different mix of mortar. It does not appear to be a different phase.

3.3.3 The brickwork associated with the replacement windows did not have black ash mortar pointing but instead had a dark cream coloured pointing which had been painted black - the black has mostly worn off leaving the rebuilt section of brickwork as an obvious phase on the elevation (plate 4). Once raking out had begun it was clear that these areas of mortaring had comprised of several different layers.

- A sandy coloured bedding mortar which was hard to the touch with a large amount of small to medium sized stone inclusions
- A thin layer of very pebbly mortar, pale greyish cream in colour.
- A thick layer of medium grey coloured ash mortar, with no inclusions

- A thin layer of sandy textured dark cream mortar with a gritty texture and small inclusions
- A layer of black paint, mostly weathered off

There was evidence of horizontal penny roll pointing upon this section of brickwork, although it was unclear as to which layer had been scored in this way.

3.3.4 The bedding mortar found in connection with the extant Type B Wolsey stock bricks is a pale cream colour with small to medium regular lime inclusions and occasional clay inclusions. This mortar is in good condition and so has been left exposed by contractors working upon the elevation.

3.3.5 The stone pilaster buttresses have a different mortar which is creamy/pale grey with a small amount of small to medium sized mixed inclusions including lime and occasional small dark pebbles. It is therefore assumed that the current stonework replaced earlier stonework in a separate phase to the 19th century replacement windows. It is worth noting that within the thin sections of brickwork that run between the pilasters and the window jambs, there are patches of original bedding mortar which indicate that both the pilasters and the windows were inserted with care not to disturb the original fabric as much as possible (Fig 5 and plate 16).

3.3.6 There are patches of reused brick and modern mortar dating to the adjoining 1980s remortaring works between the window in Bay D and the adjoining Jut 1.

3.3.7 The main mortar for the 19th plinth at the base of the elevation is grey and has a gritty texture with small inclusions. This is then covered with a very thin layer of black ash mortar that has a smoother texture than the upper levels. This mortar has weathered to a pale grey colour. The plinth has three vents with recent sandy mortaring around which is probably a recent (20th century) repair.

3.4 Stonework description

3.4.1 The stonework was surveyed and identified by Robin Sanderson and a copy of his report appears here as Appendix IV. The crenelation stonework was found to be Clipsham type Lincolnshire Limestone.

3.4.2 The remainder of the elevation mostly consists of Bath stone. The pilasters show two different types of blistering caused by weathering suggesting there have been two instances of replacement. According to Robin Sanderson, Bath Stone was not readily available in London until after the Kennet and Avon Canal was opened in 1814. Therefore it is surmised that most of the present stonework is after this date. The difference in bedding mortar beside the pilasters is evidence for a separate phase for the pilasters replacement, i.e. it was not contemporary with the insertion of the windows.

3.4.3 The following phasing is proposed - The stonework pilasters and string courses were replaced with Bath Stone in the early 19th century. The upper portions of the

pilasters were possibly refaced with bath stone in the later 19th century, probably at the same time as the insertion of the replacement windows.

3.4.4 Two stones upon the lower string course have been identified as Portland stone. It is probable that the Portland stone is either a later replacement or a reuse of stone from elsewhere within the palace. Portland stone, where available, had been used during the building work by Wren for William and Mary in the late 17th century.

3.4.5 Removal of stonework from the upper string course revealed a loose fill of plaster, mortar and stone fragments with the inner brickwork of Type B Wolsey stock bricks and primary phase mortar behind (plate 24).

4 OTHER DETAILS

4.1 The paint scheme

4.1.1 The exterior walls of the chapel had been painted soon after Henry VIII took possession of the palace. The dating of this is unclear with suggestions that the decoration was done c.1525 (White, 2004). This would imply that at the time of decoration the north facing exterior wall would have been visible from the surrounding parkland and palace gardens.

4.1.2 We can picture how the decoration of the chapel exterior walls would have looked from a surviving paintwork scheme that was found after the discovery of the Chapel east wall in 1981 (Curnow 1984). This wall was originally an external wall but it had been covered during Wren's works to the Palace in the 18th century, thus protecting the decoration. The east wall has a red wash applied with a regular diamond grid pattern painted in black pigment and uses half-painted stretchers to ensure the pattern is uniform. There is a relieving archway picked out in alternately coloured bricks (fig 7). The mortar is double struck with the joint picked out using a fine white plaster. It is likely that the chapel court north facing elevation was decorated in a similar, if not identical, scheme.

4.1.3 The survey recorded the substantial fragmentary painted diaperwork upon the north facing elevation (fig. 4 and plate 9). The diaperwork includes the use of many half-painted stretchers as well as headers within the design, and vitrified bricks are generally not used for the pattern but instead randomly used within the brickwork. There are no changes to the regular coursed English bond brickwork to incorporate any diaperwork. This diaperwork is thought to be part of the Victorian works of the early to mid 19th century and not from the original Tudor paint scheme.

4.1.4 Upon the north facing elevation the paint is barely visible in parts but nonetheless it was possible to decipher the design of much of the elevation. There appears to be two levels of the paintwork, currently showing as a pale grey and a dark black colour. The pale grey colour is more widespread and the darker black appears to have been painted over the top - possibly a later touch up. Some of the darker paint 'drips' onto adjoining bricks (plate 10).

4.1.5 It was originally thought that the remnants of ruddling found upon the bedding mortar within the test panel was part of the original Tudor paint scheme, where the entire elevation would have been covered with a red pigment wash (Curnow 1984 and White 2004). However as raking out progressed, patches of red paint were also found upon bedding mortar associated with later repair works as well as upon the primary mortar (plates 20 & 21). The mortar affected is similar to that of the 1894 window insertion but there are less medium sized inclusions and the overall colour is slightly lighter. It is possible that the elevation was painted red prior to the painting of the 19th century diaperwork. The absence of red paint upon the mortar connected to the window insertion suggests this activity occurred prior to 1893/1894.

4.1.6 There is an overall mottled black rub over the majority of the brickwork; however, this is likely to have been pollution which was brushed off prior to black ash pointing being added to the elevation.

4.1.7 The diaperwork scheme is unlike any Tudor scheme seen elsewhere in the palace and the original paintwork would probably have been a simple repetitive diamond grid style as seen upon the east wall of the chapel (Fig 7) and in other parts of the Palace. The 19th century works that were probably concerned more with style than historic accuracy would have instigated the complex geometric design reconstructed in Fig 6.

4.2 Scaffold marks

4.2.1 There are marks located throughout the extreme north-eastern section of the elevation. The marks are approximately 50mm in diameter and formed by a hollow tube rubbing against the brickwork creating a slightly oval shape (plate 11). The absence of weathering or signs of pollution within the worn shape suggest that these have been formed since the last phase of Victorian works in which the elevation was cleaned. Tubular scaffolding was developed at the beginning of the 20th century but only really became widely used from the 1920s onwards after the commercial development of the 48mm diameter tube. The marks were found in Bay D of the elevation and so could be related to the 1980's remortaring works on the adjacent antechapel wall.

4.3 Graffiti and marked bricks

4.3.1 Two examples of graffiti were found at ground level. On a lower level stone (17.5 x 39.5cm) forming part of the pilaster between Bays A and B there are pencil markings (Appendix V, A and plate 13) showing the initials 'CP' and some illegible signatures. This is possibly a list of workmen's names and is similar in style to those found upon stonework within the chapel. Close to this stonework is a replacement brick (23 x 6cm) which has been decoratively inscribed with the initials 'PT' and the date of '1864' (Appendix V, B and plate 14). The size of brick is consistent with brick typology type 'T', a red face brick used in the construction of the plinth and therefore may date to repairs made at the same time as the plinth construction.

4.3.2 Beside this inscribed brick is a brick (Type B Wolsey stock brick) with 'x' incised upon it. This appears to have been done at time of manufacture and is likely to be a batch mark used during brick production. The 'x' mark is also found on a brick in the garden wall south of the Tiltyard Tower.

4.4 Downpipes, and other fixings

4.4.1 There are two main downpipes to this elevation, located beside the two outer pilasters. The hoppers of these have the insignia of Queen Anne and a date of 1711 and were possibly added to the elevation at the same time as the casement windows (plate 12).

4.4.2 Both of these downpipes are squared for the majority of the elevation. The lowest parts have been replaced with a round pipe with 'GR IV', giving a date of 1820-1830 for this work. There are metal fixings belonging to the earlier downpipes at this point downwards.

4.4.3 At the junction with the west range of Chapel Court there are metal nails and fixings at various points down the height of the elevation which relate to the presence of a downpipe. The stonework upon the plinth is also cut away at this point. The downpipe has at some point been moved to the adjacent west facing elevation of the Court leaving the metal fixings behind.

5 CONCLUSION - PHASING THE ELEVATION

5.1 Introduction

5.1.1 According to the physical and documentary evidence the elevation has nine main phases of construction and repairs. However, some of the phases cannot be seen on the elevation fabric and are therefore not shown on Fig. 3, which aims to phase the fabric of the elevation as it was at the time of survey. The Tudor paint scheme did not survive sufficiently and the only evidence for a paint scheme on the elevation dates to the 19th century. The casement windows were also replaced in the 19th century.

5.2 The main phases of work

5.2.1 Through observing the changes in mortars, brickwork and findings reported within the Lithological report by Robin Sanderson, the following phasing for the elevation is suggested:

Phase 1 - Primary build under Wolsey, pale cream bedding mortar - c. 1526.

Phase 2 - Tudor paint scheme - Paintwork scheme of ruddling with simple diamond diaperwork pattern and pencilling, during Henry VIII's work to the Palace - c. early to mid 16th century.

Phase 3 - Insertion of casement windows and lead downpipes - c. 1711.

Phase 4 - Replacement of stonework with Bath stone – probably early to mid 19th century due to the availability of Bath Stone at this time.

Phase 5 - Brickwork brushed clean and diaperwork painted on - c. early to mid 19th century possibly at same time as Phase 4.

Phase 6 - Addition of plinth - mid to late 19th century (1864?).

Phase 7 - Replacement of casement windows - c.1893/1894.

Phase 8 - Addition of black ash pointing. Black paint added to areas of window replacement mortar - late 19th/early 20th century.

Phase 9 - Addition of crenellations – 1950s/1960s.

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May 2007

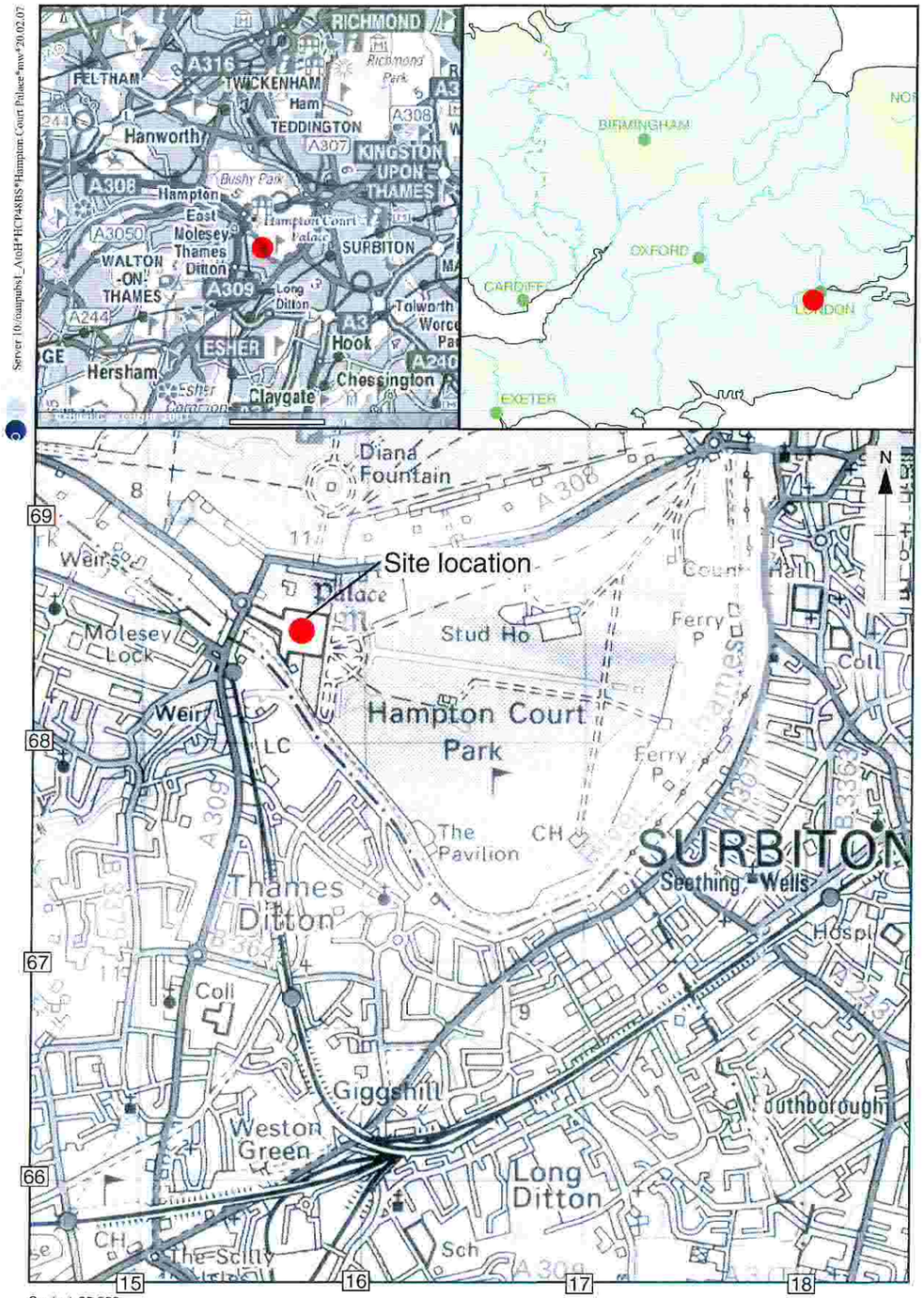

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Figure 1: Chapel Court, North Facing Elevation - Site location

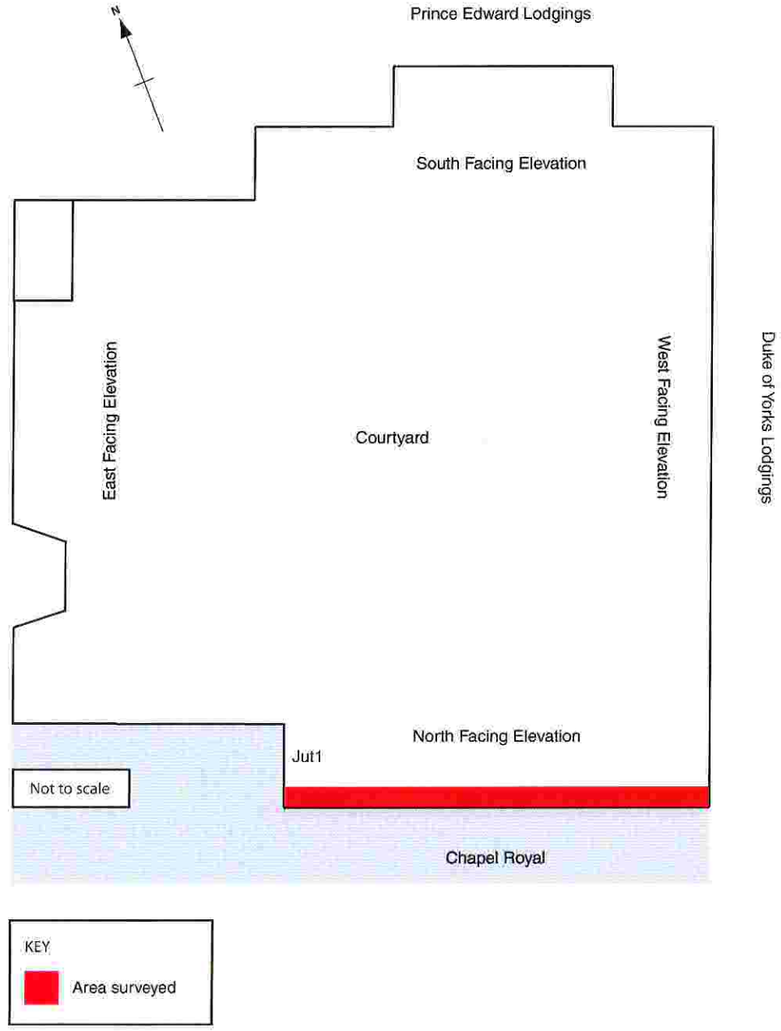

Figure 2: Chapel Court, North Facing Elevation - Plan showing location of works

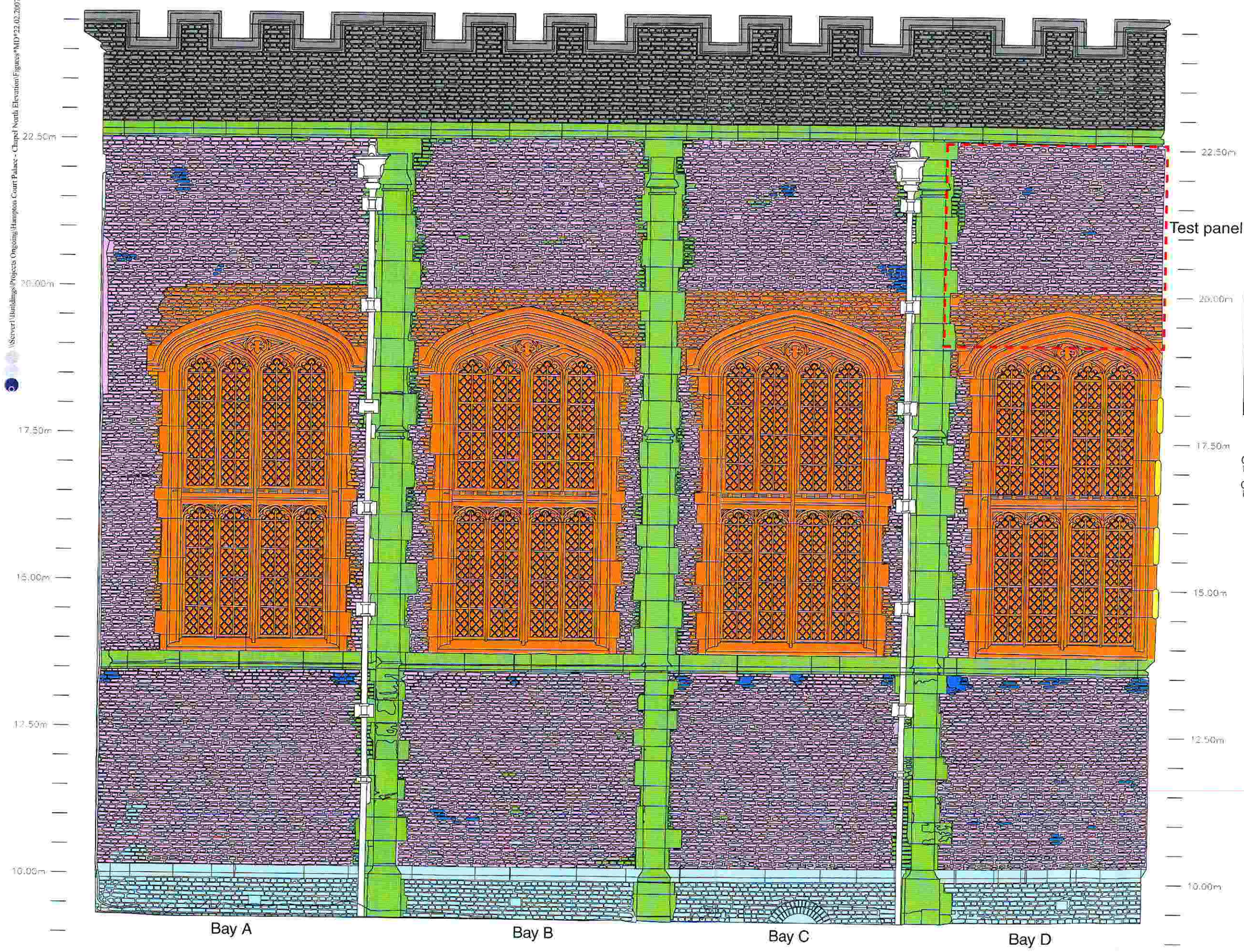

Figure 3: Chapel Court,
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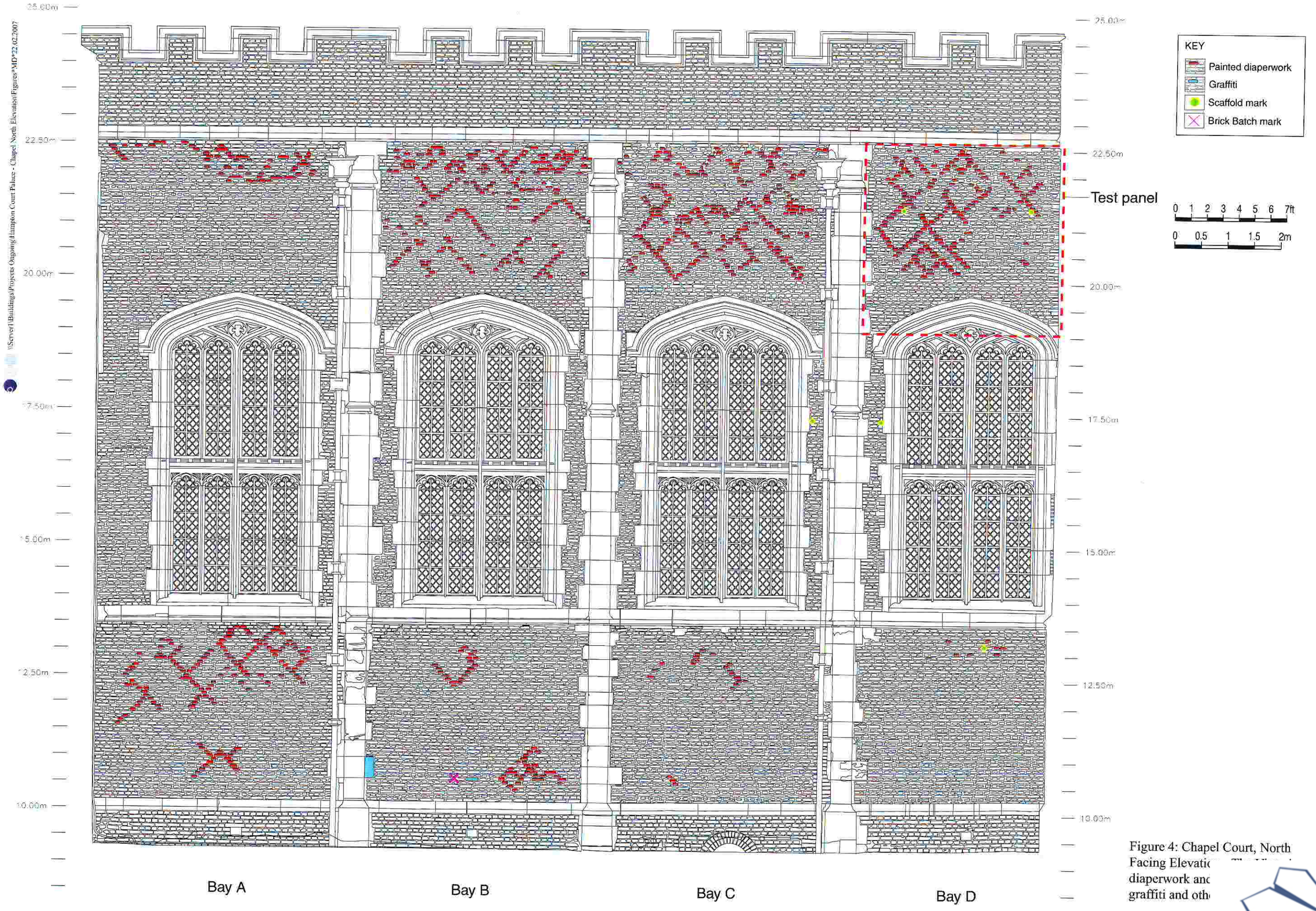
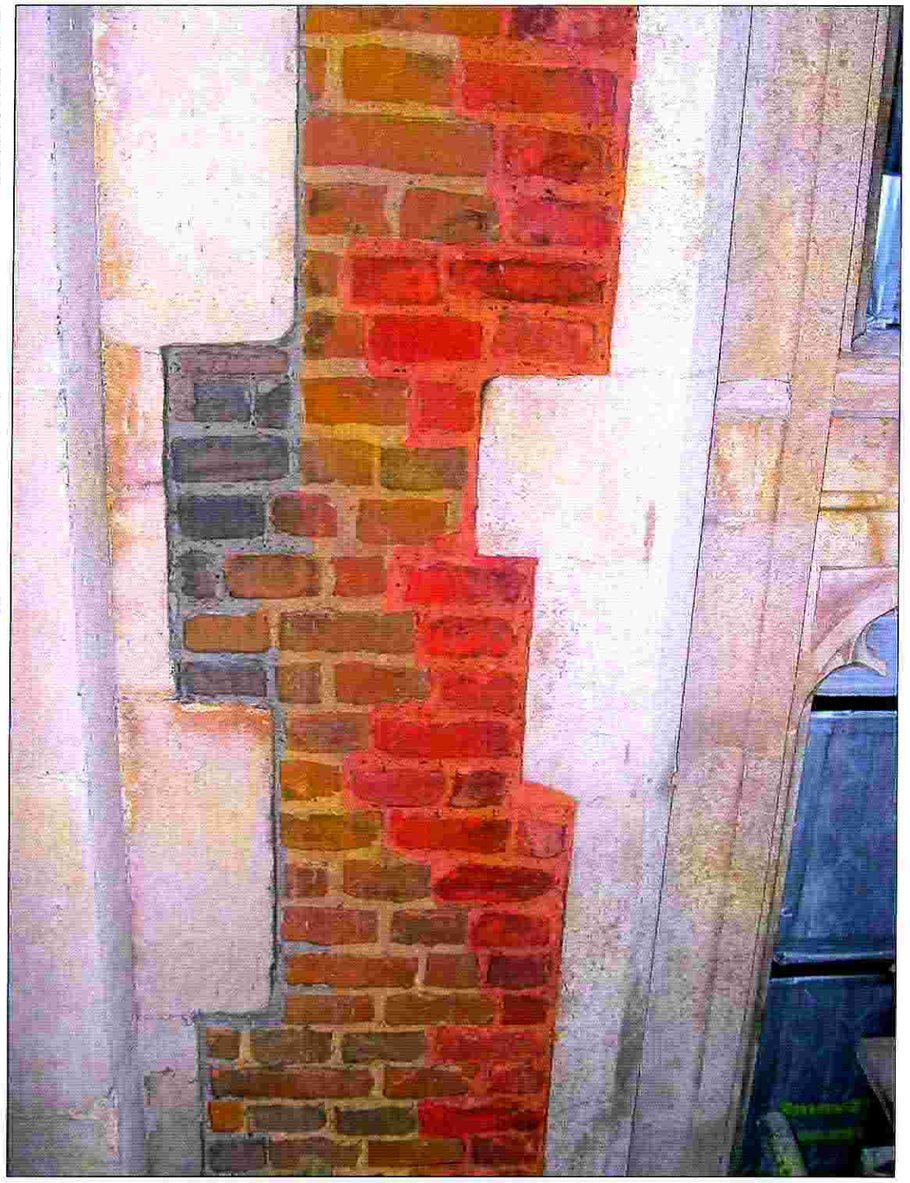


Figure 4: Chapel Court, North Facing Elevati... diaperwork and... graffiti and oth...



KEY

Original mortar
c. 1526. Creamy coloured smooth textured with regular medium to large lime and occasional brown clay inclusions. Solid to touch.

Pilaster replacement mortar
c. early to mid 19th century. Grey/cream coloured with regular mixed small lime/stone inclusions. Solid to touch.

Window replacement mortar
1893/4. Dark sand coloured with gritty texture and large amount of small to medium sized stone inclusions. Solid to touch.

Figure 5: Chapel Court, North Facing Elevation - The bedding mortars at location of replacement stonework and windows (see plate 16)

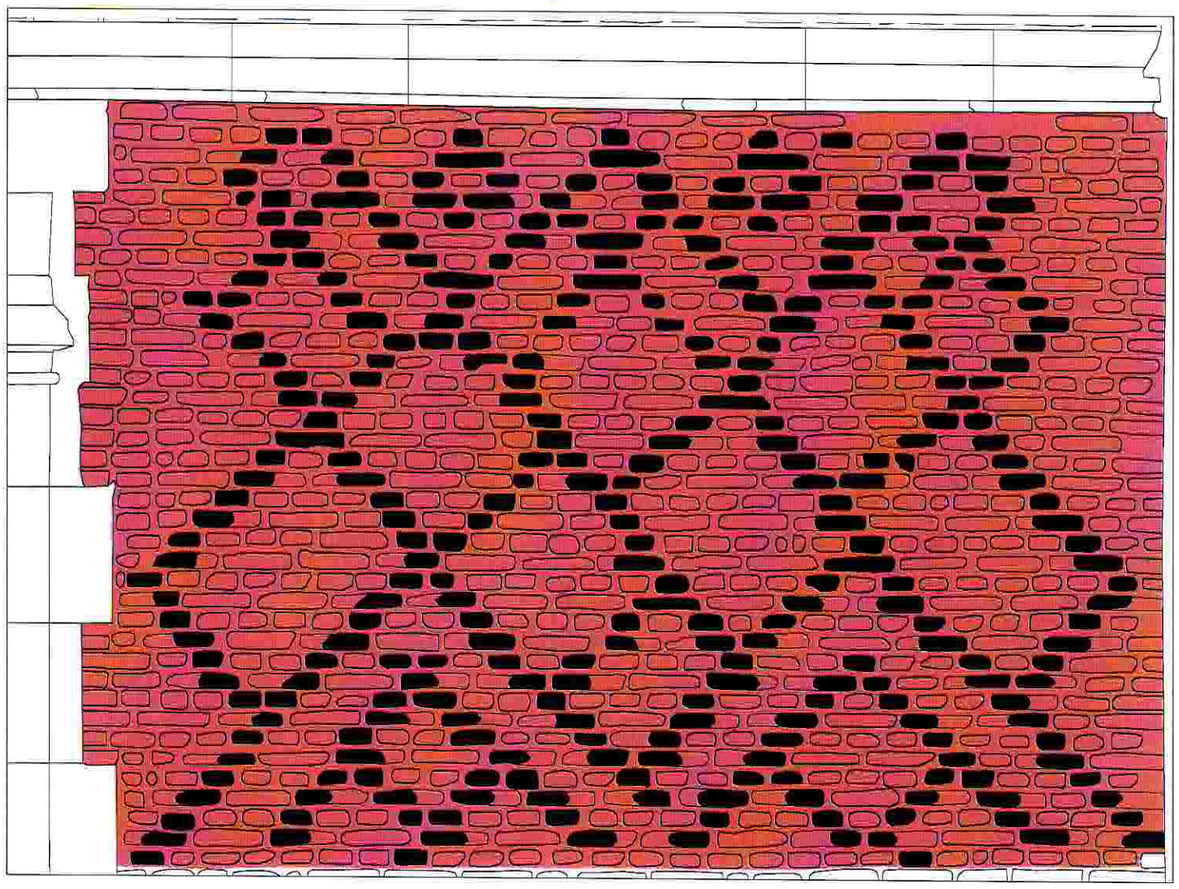


Figure 6: Chapel Court, North Facing Elevation - Reconstruction of possible Victorian diaperwork design on the test panel

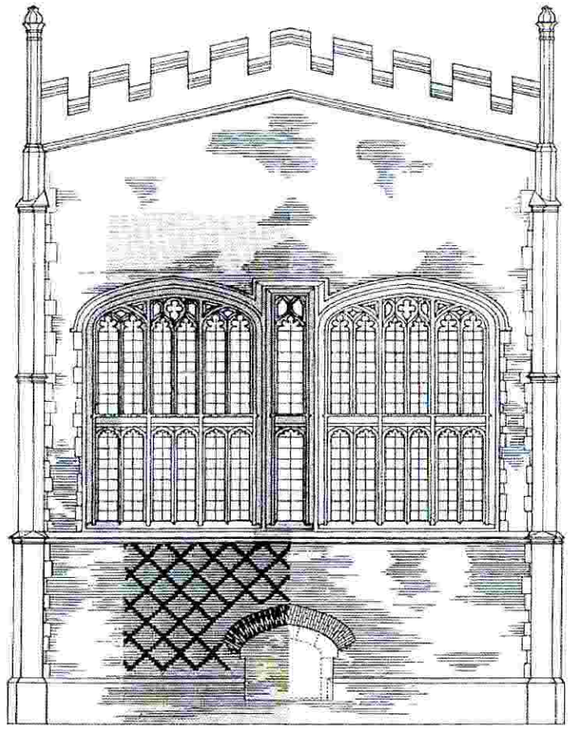


Figure 7: Chapel Court, North Facing Elevation - The probable Tudor diaper-work design as seen beside the Chapel east window (drawing: Daphne Ford)

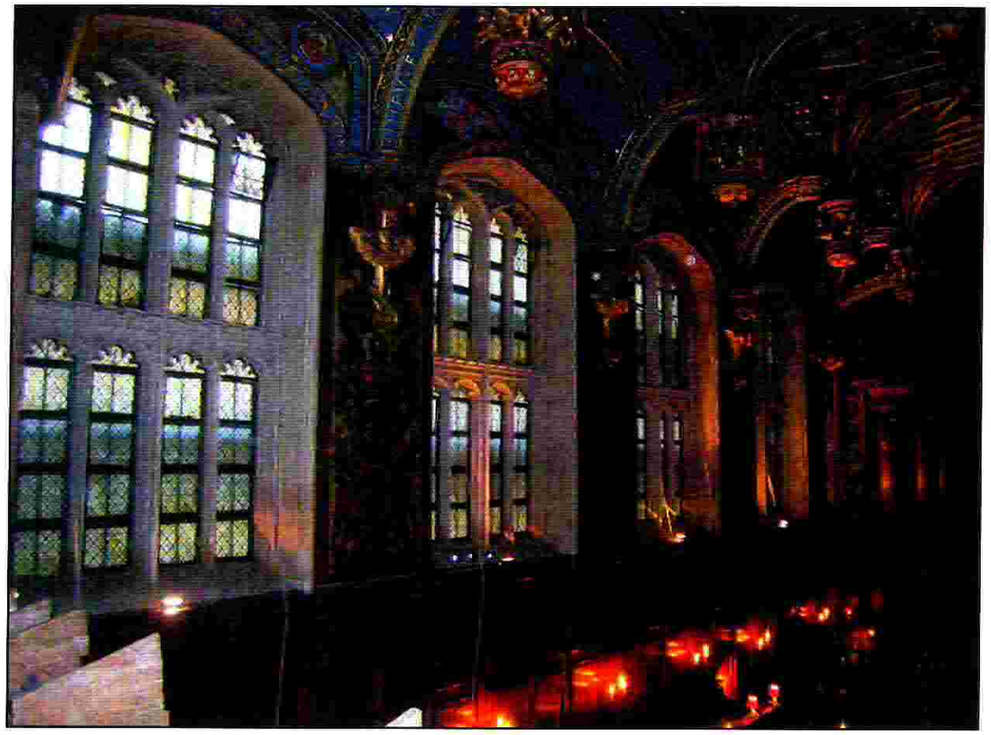


Plate 1: Chapel Court, North Facing Elevation - The 1894 chapel windows

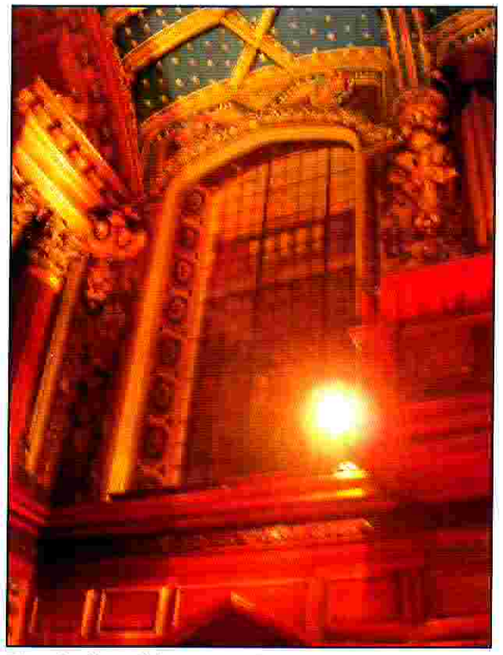


Plate 2: Chapel Court, North Facing Elevation - The trompe l'oeil window inside the Chapel

Plate 3: Chapel Court, North Facing Elevation - The black ash mortar

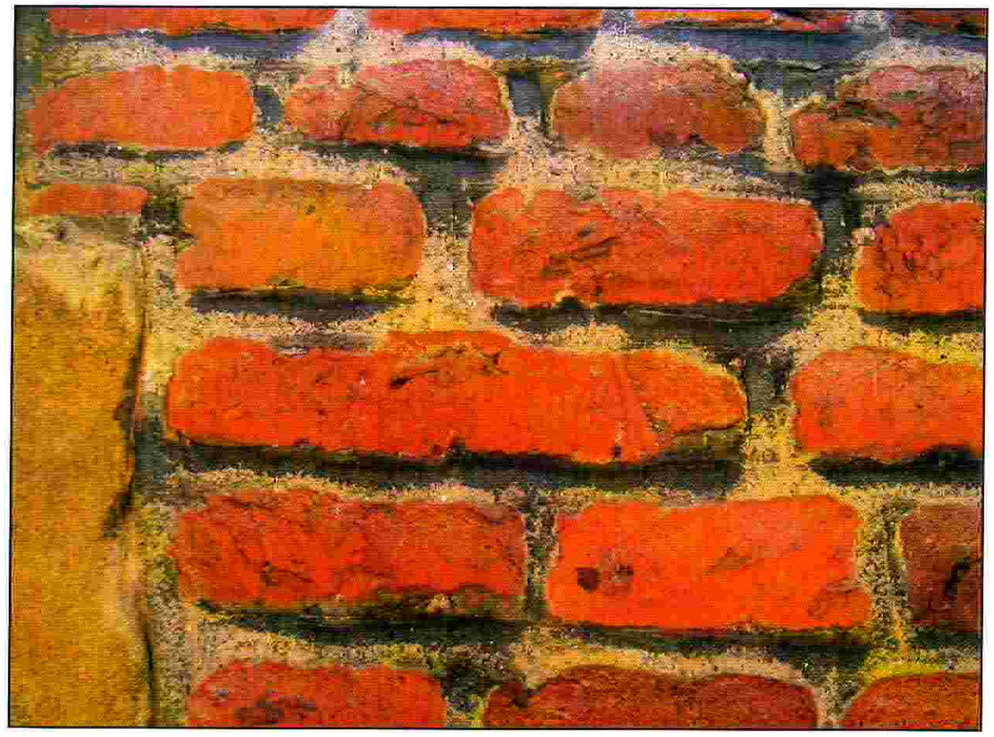


Plate 4: Chapel Court, North Facing Elevation - The painted mortar

Plate 5: Chapel Court, North Facing Elevation - Test panel prior to raking out

Plate 6: Chapel Court, North Facing Elevation - Test panel after raking out

Plate 7: Chapel Court, North Facing Elevation - The plinth

Plate 8: Chapel Court, North Facing Elevation - 19th century repair with stretcher cut to look like headers

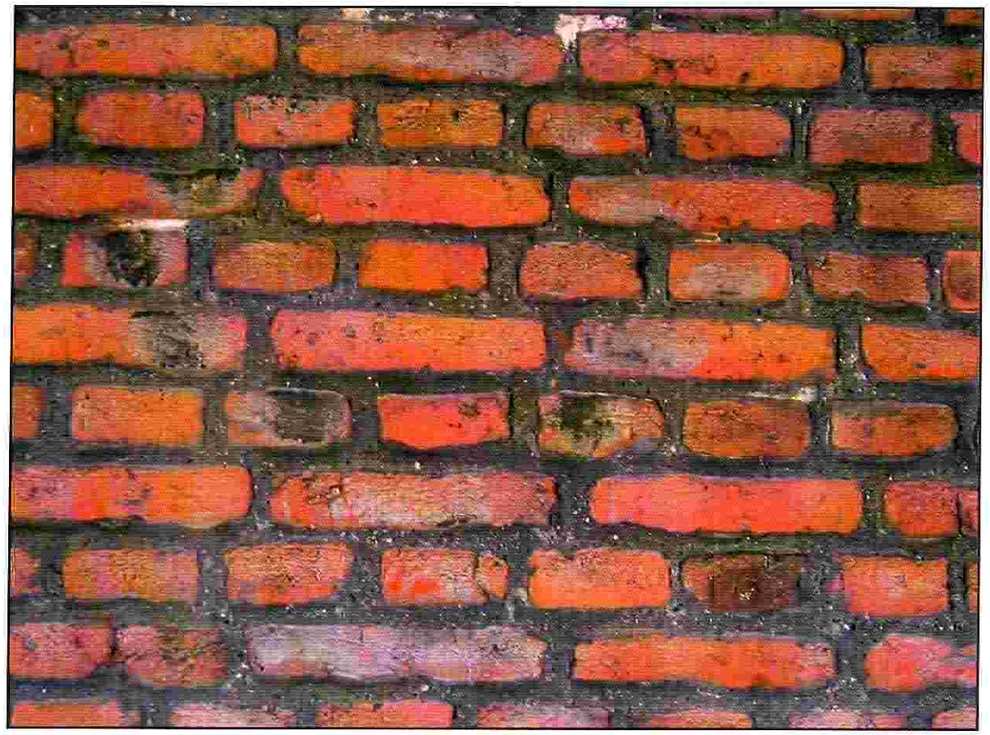


Plate 9: Chapel Court, North Facing Elevation - Diaperwork

Plate 10: Chapel Court, North Facing Elevation - Black paint roughly applied

Plate 11: Chapel Court, North Facing Elevation - 20th century scaffold mark

Plate 12: Chapel Court, North Facing Elevation - 1711 hopper

Plate 13: Chapel Court, North Facing Elevation - Pencilled graffiti upon lower stonework

Plate 14: Chapel Court, North Facing Elevation - Inscribed graffiti upon 19th century stock brick

Plate 15: Chapel Court, North Facing Elevation -
19th century new brick repairs beside replaced stonework

Plate 16: Chapel Court, North Facing Elevation -
Three main bedding mortars (see also fig. 5)

Plate 17: Chapel Court, North Facing Elevation -
Blistering on window stonework

Plate 18: Chapel Court, North Facing Elevation - Blistering on lower pilaster stonework

Plate 19: Chapel Court, North Facing Elevation - Plinth stonework

Plate 20: Chapel Court, North Facing Elevation - Red paint on original bedding mortar

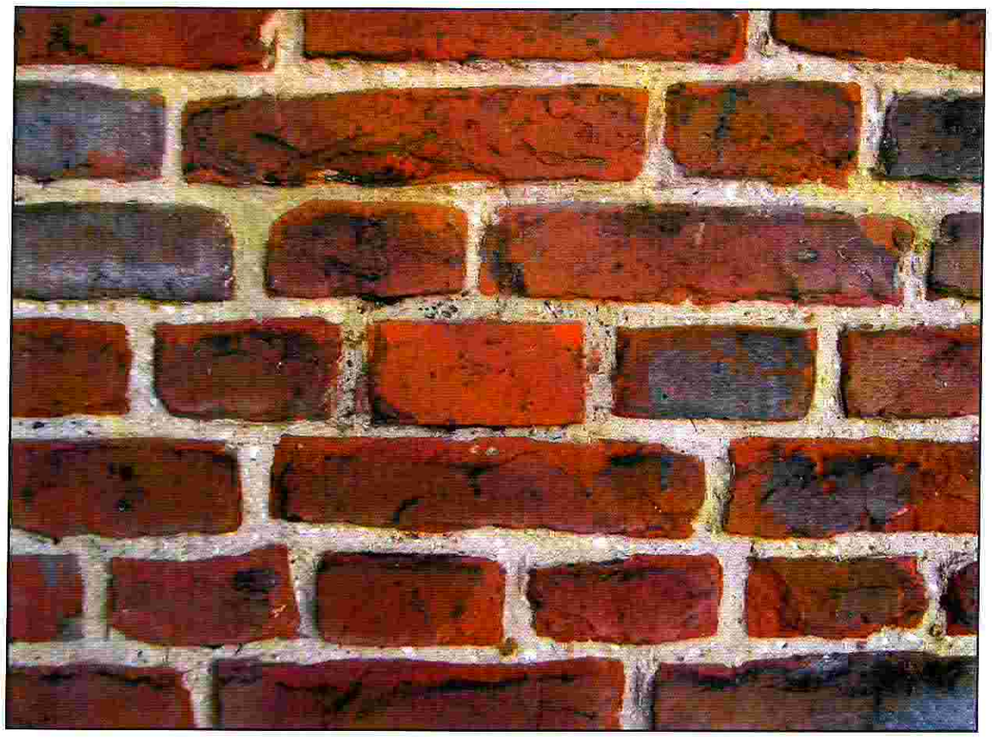


Plate 21: Chapel Court, North Facing Elevation - Red paint on 19th century repair bedding mortar

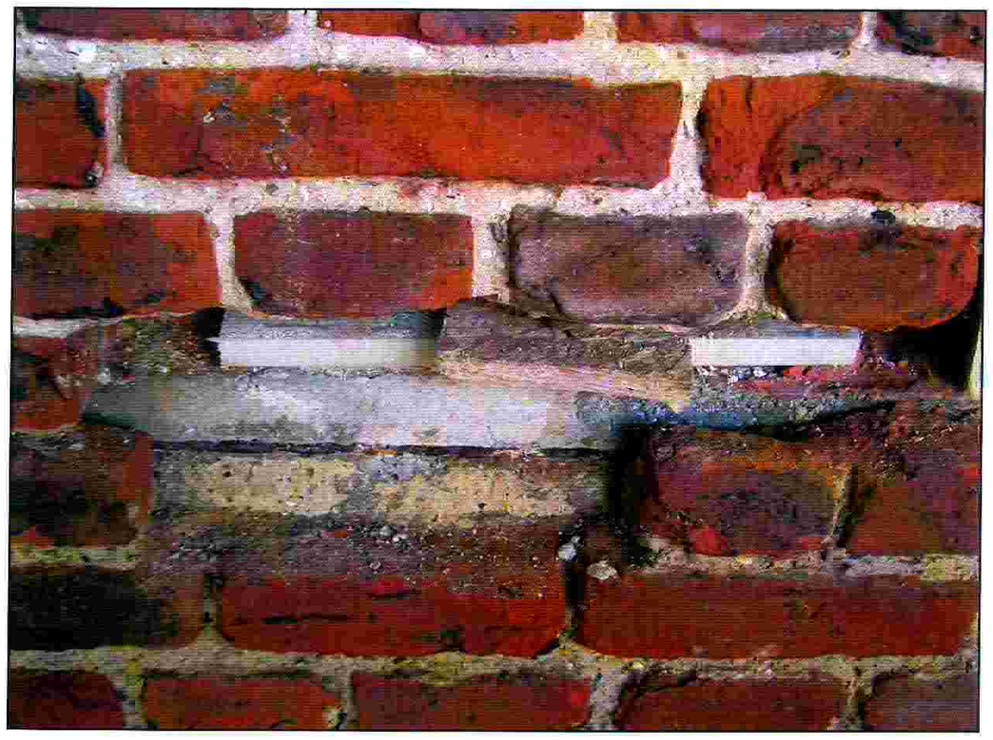


Plate 22: Chapel Court, North Facing Elevation - Concrete lacing piece located behind window insertion brickwork

Plate 23: Chapel Court, North Facing Elevation - Window stonework before replacement

Plate 24: Chapel Court, North Facing Elevation - Brickwork and fill from behind upper string course stonework

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APPENDIX II CHAPEL ROYAL - SUMMARY STATEMENT OF SIGNIFICANCE

Chapel Royal, Hampton Court Palace (Royal Pew)

Summary Statement of Significance

Kent Rawlinson (Curator of Historic Buildings, Hampton Court Palace)
July 2005

This summary *Statement of Significance* was produced to support an application for scheduled monument clearance (to be submitted to the DCMS) proposing the removal of sections of late-17th century panelling enclosing the 'Royal Pew' in order to facilitate structural investigations.

Careful removal of this panelling is an appropriate response to the structural problems exhibited by the Royal Pew. The removal of this panelling – under the controlled conditions proposed – poses only a very minor (and necessary) risk to the architectural, archaeological or historic significance of the Royal Pew.

The proposed works are required to ensure the ongoing protection and use of this unique element of the Chapel Royal. In addition, the proposed removal of panelling will expose substantial portions of sixteenth-century, and later, fabric to archaeological investigation, thus providing an invaluable opportunity to better record and understand the chapel's architectural development.

1. Summary History & Significance

There appears to have been a chapel continuously on the present site since 1338 (at the lastest). The construction of the present chapel was begun for Cardinal Wolsey, probably in the later phase of his occupancy (1514-28), and completed or remodelled for Henry VIII (most significantly between 1535-6). The majority of the existing structure dates to two main building phases (I & II, see below), although the interior of the chapel was substantially remodelled by William III & Mary II, and further by Queen Anne, between 1689 and 1712 (phases V.& VI). These works also included the renewal of all (or most) of the buildings windows.

Various works and repair programmes were undertaken during the course of the 18th and 19th centuries to ensure the structural stability of the building, as well as to provide necessary refinements and services. The building was refenestrated, according to a version of the original 16th-century scheme, in 1894.

The western section of the chapel consists of a 'Royal Pew'; otherwise referred to as the 'Holyday Closet(s)' or 'King's' or 'Queen's' 'Closet(s)'. This structure is contemporary with the chapel constructed for Thomas Wolsey. It was substantially remodelled by Henry VIII and later enclosed and remodelled in the late-17th and early-18th centuries by Christopher Wren and Grinling Gibbons.

As it exists today the framework of the Royal Pew retains substantial elements of both 16th-century and later-17th century timberwork which stands within a structural envelope of 16th-century brick and stonework. It is significant both as a rare extant example of a western gallery in a private, and in this instance royal, chapel; and also as an example of how the leading architects and designers of the late-17th and early-18th centuries chose to modify and adapt such a historic gallery for contemporary royal use. The Royal Pew is unique in so much as it combines these two qualities.

The Chapel Royal has been in continuous use as a chapel since before 1338, and as a Chapel Royal since the early-16th century.

2. Summary of Building Phases (Chapel Royal & Royal Pew)

1845-7 **First major restoration**

A major restoration programme was undertaken, which concentrated in particular upon the chapel roof. A substantial amount of the roof structure was found to be decayed and was subsequently removed, repaired, repainted and re-gilded.

Repairs were also undertaken to the structure of the *Ante-Chapel* according to the following references:

- *Ceiling panels to Ante-Room and Staircase to be cleaned and painted… Also diagonal marble squares to be taken up, excavated, and the bottom concreted. Portions of the ceiling have been discovered to be quite rotten* (Work 19/302, 28 January 1847)

- An estimate was requested for: *making good all the decayed wainscot in the Ante-Chapel and of columns therein and probable cost of taking up the marble paving of the Ante-Chapel and relaying it on a bed of concrete* (Letter Books of the Board of Works, 17 May 1847)

- *Occupants of apartments above ceiling of Ante-Chapel to be prepared to remove furniture to allow floors to be taken up to get at decayed timbers.* (Letter Books of the Board of Works, 12 July 1847)

- *Work on general and re-embellishment of Chapel and Ante-Chapel now in progress* (Letter Books of the Board of Works, 13 September 1847)

1847 Refenestration of chapel, along Tudor lines *proposed*, but no undertaken.

The architect Edward Blore was involved in specifying a scheme of redecoration following the above repair works.

1851 Use of the 'Royal Closet' restricted to members of the royal family by the Board of Works.

1866-68 Anthony Salvin produces designs for re-seating the chapel. Services were held in the Great Watching Chamber whilst this scheme was implemented.

1890 Chaplain claimed of the early 18th-century windows that, that '*these lights are a very poor substitute for the windows which originally occupied these positions. They are also extremely unsightly and totally out of character with the building.*'

1894 **Restoration of chapel windows**

Chapel windows all renewed to the form of extant 16th-century mouldings in the organ loft, despite protest of the SPAB. The *trompe l'oeil* windows and views were, however, retained at their request.

1899-1902 Renovation of the organ over a period of three years

PHASE IX (20th Century)

1909 Electricity provided for the *ante-chamber to Royal Pew*.

1918 Members of the general public first admitted to the chapel, including the Royal Pew, as visitors (rather than worshippers) for the first time.

1927 The chapel roof was found to be riddled with rot and deathwatch beetle:

- *a number of timbers had decayed owing to dry rot and action of wood-boring beetle* (Work 19/586, 19 July 1927)

- *Periodic examinations have been made of the space between the Tudor ceilings and the trusses. Dry rot has been extended to the ornamental carvings* (Work 19/586, 12 December 1927)

1928 Electric lights provided for the choirstalls.

1929 Electric lights provided for the Royal Pew.

1929 **Second major restoration**

Emergency repair work undertaken on the chapel roof between January and December. The decay was found to be worse than anticipated and also to have effected the Gibbons

Refurnishing and refitting of the chapel. Rich new fittings introduced into the chapel, including a new altar table, new rails, pews and tapestries. An organ, previously in the Great Hall, is installed in the chapel.

1662-1689 Minor repair works carried out throughout this period to boarding, pews etc.

PHASE V (William III & Mary II)

Major and minor works to the chapel appear to have been undertaken throughout the reigns of William & Mary. Two periods of substantial remodelling appear to have been *c* 1689-91 and *c* 1698-1700.

The loss of the any detailed building accounts from the years 1698-99 makes a clear understanding of the process by which the 16th-century Holyday Closets were repartitioned to create six distinct spaces difficult to establish.

1689-91 **Remodelling of Royal Pew (first phase)**

The first major phase of remodelling under William & Mary is undertaken. This work appears to have included the panelling of much of the interior and some remodelling of the Holyday Closets.

The Board of Works accounts include references to:

- *glazing in the Chappell Closett* (October 1689)

- *Working the foundations of the Collumns in the Kings Chappell* (March 1689/1690)

- *Labourers clearing timber & Rubbish out of the Chappell* (March 1689/90)

- *compass barcketting & pticoning & ceeling joysts in Chappell closet* (March 1689/90)

- *Making more foundations in the Kings Chappell for the halfe collumnes; working up two windows att the West end of the Chappell Closetts and cutting out a door way into the Cloyster 9 ft high by 5 ft wide and 5 brick thick* (March 1689/90)

- *Plaistering the lower Ceeling in the Ante-Chappell and lathing two coves ceelings in the Chappell Closetts* (April 1690)

- *Shoreing the foundations of the Chappell* (October 1691)

- *Rendering a chimney in the Chappell Closetts* (December 1691)

- *Laying a Hearth in the Queens Closett att the Chappell to dire the painting worke* (December 1691)

These references strongly imply that by the end of 1691 a major phase of the conversion of a pair of Holyday Closets into a Royal Pew composed of six distinct spaces had been undertaken.

1690 A new organ installed.

1694-6 Reconstruction of a marble altarpiece from Whitehall palace in the chapel under the supervision of Grinlin Gibbons. Gibbons also provided decorative woodwork (*cornishes, mouldings, picture frames, Architrave, Freese, Subbase and other carvings*) for the chapel.

1698-1700 **Remodelling of Royal Pew (second phase)**

The second major phase of remodelling under William & Mary is undertaken.

It is reported in a letter to the Earl of Shrewbury (18 January 1700) that '*the Chapel at Hampton Court is now near finished.*'

Works in these years included:

- The lowering of part of the ceiling and the provision of an additional chimney to create a 'winter closet' in part of the former 'King's Holyday Closet' (1699)

- The demolition of the southern 16th-century vice stair (1700-1)

- Further refitting of the Holyday Closets

screen:

- *The general state of the structural timbers and decorative features is considerably worse than was anticipated* (Work 19/586, 3 May 1929)

- *Examination has shown that a considerable portion of the Grinling Gibbons altar carving has been so attacked by wood boring beetle that a mere shell is left in many cases* (Work 19/586, 3 May 1929)

The paintwork of the ceiling was also restored at this time.

1973 **Substantial conservation and remodelling**

A major works programme in the chapel was undertaken which included: the redecoration of the chapel ceiling; the removal of the central pews; the partial relaying of the marble floor; the removal of some choirstalls; and the introduction of newly designed desks for choristers.

1981 **Discovery of sixteenth-century east window**

The southern-most half of the double east window of Wolsey's chapel, blocked as part of the works of 1710-12, was uncovered.

1983 An Henrician culvert running east-west under masonry of the Wren vestry staircase was identified and recorded by English Heritage.

1986 Plans and estimates for improvement to the underground heating produced by the PSA.

1987-9 New heating and lights designs proposed by PSA (a variant of these presumably implemented).

Structural engineers, Hockley & Dawson, appointed to undertake an investigative survey and report on condition of the structure of Royal Pew.

1990 Inner-face of the Royal Pew opened up at first-floor level and a drawn and photographic record produced. Sixteenth-century timbers were identified which remain evidence of earlier floor and lower-ceiling levels.

PHASE X (21st Century & Current Structural Investigations)

2004 Maintenance work in ante-chapel revealed a large pencilled drawing of a fish on the inner side of the western wall of the chapel, to the left of the west door. The style appears sixteenth-century. This is probably part of a larger scheme.

Preliminary structural investigations

Structural investigations in the Royal Pew reveal significant movement of the internal structure.

As a result elements of 16th-century plaster and stonework were exposed at ground-floor level in the ante-chapel. These surfaces were graffiti-ed and retained partial evidence of limewashing(?). Sockets, possibly for a screen separating the chapel from the ante-chapel, were also identified.

The cause of the structural movement could not be identified from visual inspection without the removal of further panelling.

3. Significance of the Royal Pew

Architectural Significance

The Chapel Royal at Hampton Court is of the greatest architectural significance, being one of the very last royal, or indeed private, chapels to be constructed prior to the English Reformation.

Architecturally, it should be related *primarily* to the class of medieval private (or household) chapels as a whole, not solely to other royal or episcopal chapels. In common with many medieval private chapels

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APPENDIX III BRICK ANALYSIS SPREADSHEET

Hampton Court Palace - Chapel North Elevation

Brick Measurements

Type B - Wolsey Stock Brick c. 1522-1528
Uneven surface, Friable, Occasional pebble inclusions. No Frog. Random vitrified brick. Pointing is double struck.

Type T - Red Face Brick c. 19thC
Smooth surface texture with sharp arris. Shallow or no frog. Pointing is flat with scored or penny pointed.

Modern

No Data - but according to records the crenelations are circa 1950/60's. The identifying features are straw marks incised upon the face of bricks. Probably has frog. Mortar is hard and has a large amount of pebble inclusions. Pointing is flat with no scoring.

Crenelations - Modern c. 20thC (cms)				
L	W	D	Arris to Arris	Location
22.0	10.0	5.2	27.5	Cren
22.0	10.2	5.0	27.5	Cren
22.0	10.0	5.2	28.0	Cren
Average (Inches)				
8.66	3.96	2.02	10.89	
HCP Measurements (Inches)				
N/A				

Upper Tudor - Type B Wolsey Stock Bricks (cms)				
L	W	D	Arris to Arris	Location
23.0	10.0	6.0	24.8	1A
23.0	10.0	6.0	25.0	1A
23.5	10.0	5.5	24.9	1A
23.0	11.0	n/a	25.0	1B
23.0	11.0	n/a	26.0	1B
23.5	11.0	5.0	26.0	1C
24.0	11.0	5.0	27.0	1C
n/a	10.8	6.0	26.0	1C
23.5	11.0	6.0	25.5	1D
24.0	11.0	5.0	26.0	1D
24.0	10.5	5.0	25.5	1D
23.4	11.0	5.0	24.5	2A
23.2	13.0	5.0	24.0	2A
23.1	10.5	5.0	n/a	2A
24.0	11.0	5.0	25.0	2B
23.5	11.0	5.0	24.2	2B
23.8	11.5	5.3	24.4	2B
23.3	11.1	5.0	24.8	2C
23.5	11.0	4.8	24.4	2C
24.0	10.4	5.0	23.8	2C
23.0	11.2	5.5	24.7	2D
24.0	11.1	5.0	25.0	2D
23.0	11.0	5.0	24.2	2D
24.0	11.0	5.0	26.0	3A
23.5	13.0	5.5	24.4	3B
Average (Inches)				
9.25	4.33	2.04	9.84	
HCP Measurements (Inches)				
9 to 9.5	4.25 to 4.5	2 to 2.25	10 to 10.75	

Hampton Court Palace Chapel North Elevation HCP50

Brick Measurements

Measurements in cms				Location	Notes
L	W	D	Arris to Arris		
22	10	5.2	27.5	Cren	
22	10.2	5	27.5	Cren	
22	10	5.2	28	Cren	
23	10	6	24.8	1A	
23	10	6	25	1A	
23.5	10	5.5	24.9	1A	
23	12	*	25	1B	NEW BRICK
23	11	*	26	1B	
23	11	*	25	1B	
23.5	11	5	26	1C	
24	11.1	5	27	1C	
11	10.8	6	26	1C	ODD MEASUREMENTS AS PART BRICKS
23.5	11	6	25.5	1D	
24	11	5	26	1D	
24	10.5	5	25.5	1D	
23.4	11	5	24.5	2A	
23.2	13	5	24	2A	
23.1	10.5	5	*	2A	
24	11	5	25	2B	
23.5	11	5	24.2	2B	
23.8	11.5	5.3	24.4	2B	
23.3	11.1	5	24.8	2C	
23.5	11	4.8	24.4	2C	
24	10.4	5	23.8	2C	
23	11.2	5.5	24.7	2D	
24	11.1	5	25	2D	
23	11	5	24.2	2D	
24	11	5	26	3A	
23.8	10	5.3	24.4	3A	
22.8	10.2	5	22.8	3A	
23.5	13	5.5	24.4	3B	
*	13	5.2	25.5	3B	
23	11	5.6	24.2	3B	
23	10	5	26	3C	
24	12	5	25	3C	
24.4	15	5	25	3C	
19	12.4	5	26	3D	ODD MEASUREMENTS AS PART BRICKS
21	17	5	26.5	3D	ODD MEASUREMENTS AS PART BRICKS
23	10	5.5	25	3D	
23	*	2.8	21	4A	TILE
23.3	11	5.5	25	4A	
14.8	9.5	4.8	24.8	4A	ODD MEASUREMENTS AS PART BRICKS
19	10.8	5	26	4B	ODD MEASUREMENTS AS PART BRICKS
17	11	5	26	4B	ODD MEASUREMENTS AS PART BRICKS
*	*	*	*	4B	
*	11.2	4.8	24	4C	
21.5	11.8	5.4	25.5	4C	
*	*	*	*	4C	
*	10.5	5	24	4D	
*	*	*	*	4D	
*	*	*	*	4D	
21.8	11.2	6	26	5A	
22.8	11	5	25.3	5A	
*	12.2	5.2	24.8	5A	

Alison Kelly
December 2006

APPENDIX IV LITHOLOGICAL SURVEY REPORT BY ROBIN SANDERSON

Robin W. Sanderson, B.Sc., C.Geol., F.G.S.

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Ms Julia Grinham,
Historic Royal Palaces,
Conservation Dept.,
Apartment 21,
Hampton Court Palace,
Surrey,
KT8 9AU.

Date: 4th December 2006
My ref: 0522

Dear Julia,

Hampton Court Palace. Chapel Court stonework. Chapel Royal elevation.

I took the opportunity today to look at the stones of the newly cleaned elevation, and am now able to comment further on the facing stones.

1. Buttress stones. Drawings HCP-CCR-NF(01), NF(02)

These are all Bath Stone, as I reported, but variation in preservation allows some division. Below the level of the window sills the stones show blistering along the arrises and mortar joints (plus pieced-in repairs), and brown oxidation/sulphation discolouring (this is washed away from projecting features). The upward extensions of the buttresses between the windows are in good condition with sharp arrises and minimal discoloration.

My interpretation of these effects is that two phases of refacing are present. The upper fresher-looking sections apparently being co-eval with the insertion of the gothicised windows in 1894. The lower buttresses and the string courses would thus seem to belong to the early 19th century.

The ground floor window of the projecting western elevation (Drawing HCP-CCR-NF(03)) is probably also of late 19th century date.

2. Plinth weathering course. Drawing HCP-CCR- NF(03)

Since cleaning the second stone from the Chapel wall now can be seen to be Portland stone.

I will correct the marked-up drawings when next I am at Hampton Court.

Yours sincerely,

R. W. Sanderson.

Report 0522

LITHOLOGICAL SURVEY OF THE CHAPEL COURT ELEVATIONS, HAMPTON COURT PALACE.

R. W. Sanderson, B.Sc., C.Geol., F.G.S.

17th November 2006

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LITHOLOGICAL SURVEY OF THE CHAPEL COURT ELEVATIONS, HAMPTON COURT PALACE.

R. W. Sanderson, B.Sc., C.Geol., F.G.S.

17th November 2006

Introduction:

This report was requested by Ms Julia Grinham, who requested the identification of the stone types and their possible sources. The area surveyed is marked with a thick outline in Fig.1., and the details are marked on the photogrammetric plots listed below.

Plot	Elevation (see Fig.1)
HCP-CCR-SF(1)	SF4, lower part.
HCP-CCR-SF(2)	SF4, upper part.
HCP-CCR-SF(03)	SF3 & SF5.
HCP-CCR-JUT	Juts 2, 3, 4.
HCP-CCR-WF(01)	WF1
HCP-CCR-WF(02)	WF2
HCP-CCR-WF(03)	WF3
HCP-CCR-NF(01)	NF1
HCP-CCR-NF(02)	NF2
HCP CCR-NF(03)	NF3

Identifications were effected by *in-situ* examination over three days from the 4th – 6th October 2006. No samples were removed for further analysis. Stone masonry is restricted to the dressings of the parapet coping, buttresses, string courses, windows and door surrounds. Eight lithological types were noted. These are

English stones

- Great Oolite Group limestones,
  - Bath Stones (B)
  - Taynton stone (T)
- Inferior Oolite Group, Lincolnshire Limestone,
  - Clipsham Stone. (LC)
- Reigate Stone. (R)
- Reconstituted Stone. (Art)

Imported Foreign stones

Calcaire Grossier, *Ditrupa* Limestone. (CG)

Savonnières stone. (S)

Unidentified marble (U)

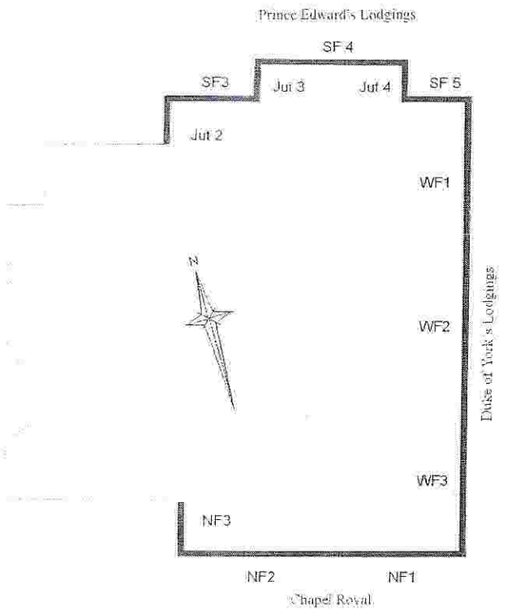

Fig. 1 Sketch Plan of Chapel Court.
Area surveyed during October 2006 shown by thick outline.
and elevation identifiers indicated.

Identification of the Stones.

Calcaire grossier limestone. (Figs. 2, 3)

The stone of the four embedded buttress weatherings (elevation SF5) is from the Eocene age 'Calcaire grossier' group of the Paris Basin, France, specifically from the basal beds known as the '*Ditrupa* limestone', or 'Banc de St Leu' of the quarriers. It crops out and has been quarried in the valleys of the Oise, Aisne and Ourthe, north & west of Paris. It is a fine shell debris limestone characteristically containing remains of *Ditrupa sp.* (a marine annelid worm) and the large discoidal foraminiferan *Orbitolites*. (Fig. 3) The common occurrence of *Ditrupa* in the present material suggests that the area around Soissons is most probable (Worssam *et al.*, 1990).

Although the stone dressings of the parapet and buttresses appear to be modern reconstructs, it is possible that more of the Calcaire grossier may be present in the east face overlooking the Broad Walk. For example, there is a single block of pale stone of unknown purpose tucked into the east face/stair turret angle at the same level as the middle weathering of the buttresses, and the lower few courses of the parapet shafts within Henrician brickwork are paler than the upper stones and copings.

Calcaire grossier Ditrupa limestone is recorded in British Roman or pre Conquest and early medieval (re-used salvage from Roman sites?) contexts (Worssam *et al.*, 1990), and in possibly 19th century contexts at the Tower of London (Sanderson, 2006a). These latter stones are concentrated within the 19th century refaced small block zone above 11.75m AOD on the south-west Byward Tower, but they could be cut-down and refitted older stones.

There has been a fashion for Calcaire grossier, in its widest sense, to be used in England during the last 50 years (Honeyborne, 1982.). These seem not to be of the *Ditrupa*-bearing types.

Great Oolite Group limestones.

Bath Stones.

More or less shelly matrix prominent oolitic limestones, sometimes showing fine lamination. These stones form most of the window and string courses dressings of the north and south sides of the Court. At least three variants may be distinguished, related to different stages of repair. They are unusually pale coloured where not showing sulphated surfaces. Most probably derive from the Combe Down Oolite of the Great Oolite Group.

Bath Stone was not brought to London until the R. Avon was made navigable from Bath to Bristol in 1727. Little seems to have come to London until the early 19th century, after the opening of the Kennet-Avon canal in 1814, although it is recorded as having been used for repairs to Croydon Parish Church in 1763 (Parish of Croydon Trustees).

Prince Edward's Lodgings. Elevations SF3 & 4.

The first, second and third floor windows and string courses are of pale sparsely shelly stone showing variable degrees of decay. The more exposed sills and string courses show most decay, but there is no sign of fire reddening from the 1886 fire (Fig.4).

Mullions of the ground floor windows (Fig. 5) are of strongly ochre-coloured stone resembling the Box Ground variety from the Box quarry. These structures have a dense dark grey patination which contrasts with that seen elsewhere on Bath stones in the eastern part of the Court.

Chapel Royal. Elevations NF1 – 3.

The main arch-headed windows of 1894 are of moderately shell-rich yellowish stone. Differences in appearance between the hood mouldings and tracery are attributable to differences of exposure to rain wash. The same stone has been used for refacing the intervening buttresses (Fig.6)

The pilaster buttresses are faced with strongly brown sulphated stone, which commonly shows powdery decay and blistering (Fig. 7). These are thus of earlier date than the windows (compare Fig.7 with Fig. 6).

String courses are mostly of the pale stone showing powdery decay, and are probably much restored. The lower string in elevation NF3 passes through the near-white stone of the corner buttress which is much less decayed. This may also indicate difference in aspect rather than date of insertion.

The pre-1852 ground floor window in Elevation NF3 is also of Bath Stone, but its patination obscures detail of structure. It is therefore not possible at present to determine its relationship with, for example, the stone of the buttresses.

Taynton Stone.

The door case to the Duke of York's Lodgings (elevation WF2. Figs 8-11) is largely composed of Great Oolite type, yellow patinated, shelly oolitic limestones showing concentrations of shell debris in wide bands (Fig. 9). Although of similar facies to the Bath Stones the pronounced wide shelly bands indicate that this stone is from the Taynton Limestone Formation of the Windrush Valley, Oxfordshire.

This stone is consistent with the 1670 date of the door, as much Taynton stone was being brought down to London after the Great Fire.

The stone is somewhat decayed and the upper courses of the jambs and the pediment are much replaced and patched with Bath Stone (Figs 10, 11). A single course at the base of both jambs appears to be Bath Stone similar to the stone of the 1894 windows of the Chapel Royal.

Inferior Oolite Group limestone.

Lincolnshire Limestone. Clipsham Stone.

Coarse grained rough weathering peloidal shelly limestones, identified as Clipsham Stone from the Middle Jurassic Inferior Oolite, Lincolnshire Limestone, near Grantham, Lincolnshire, is found used for all the parapet coping and also the ground floor window and string course of elevation SF5. The latter turns the corner to Jut 4, where the string continues in badly decayed Bath Stone.

Clipsham Stone appears mostly to have been a 20th century introduction to the London area. It does not figure in an authoritative 1923 account of the building stones of London (Elsden & Howe). However, similar stone is present, mixed with Ketton Stone (another of the Lincolnshire Limestones) in the parapets' and chimney stacks' dressings of the Bloody and Wakefield Towers, HM Tower of London (Sanderson, 2004, 2006). These occurrences appear to be continuations of the 1886 rebuilding campaign of the Lanthorn Tower and the connecting South Inner Curtain, where the dressings seem to be all of Ketton Stone (these areas have yet to be surveyed in detail)

Reconstituted Stone.

The ground floor windows of Prince Edward's Lodgings (Fig. 5), apart from the extreme eastern one of elevation SF5, are either completely (Jut3) or extensively restored with grey medium grained 'sandstone'. These appear to be cast blocks of artificial material, and are in a good state of preservation.

A number of patent stones were developed, and widely used for moulded work as well as paving and plain block, during the 19th century (see Currey, H., 1871, Ransome, 1872). They were based on calcium silicate cement for cohesion rather than lime or Portland cement.

Reigate Stone.

Pale green-grey fine grained glauconitic malmstone from the Lower Cretaceous Upper Greensand of Surrey, is seen as poorly preserved remnants in the lintol and jamb dressings of the two much restored ground floor windows of Prince Edward's Lodgings (elevation SF4; Fig. 5). Reigate Stone was commonly used by both Cardinal Wolsey and King Henry for ashlar and dressings at Hampton Court Palace, and probably also by Lord Daubency at an earlier date.

This, together with the Calcaire grossier limestone described above, form the only Tudor stonework remaining in the eastern half of the Chapel Court.

Savonnières Limestone.

Pale coloured spar prominent oolitic limestone forms most of the upper string course of elevation NF3 at the west end of the Chapel Royal. This stone has an unusual porous tuffaceous structure owing to almost complete loss (from the exposed surface) of the ooliths.

Savonnières stone is recorded as having been used for restoration at Hampton Court Palace in 1977 (Honeyborne, 1982. p.62). The source of the stone is near St Dizier, Dept of Meuse, north-eastern France.

Unidentified marble.

Tucked into the corner of elevation NF3 immediately below the window is a single block of neatly cut striated blue-grey and white stone. Its preservation does not allow a certain identification, but it may be an Italian stone similar to Bardiglio from Lombardy.

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Illustration Notes.

Fig. 1. Sketch plan of the Chapel Court.

Fig. 2. Buttress of 1533 Close Tennis Play showing original weathering stones embedded in south wall of Prince Edward's Lodging (to left). Elevation SF5.

Fig. 3. Close-up view of *Ditrupa* limestone of the upper weathering stone of Fig. 2. The circular sections and cylindrical object at bottom centre are *Ditrupa* tubes. The narrow white streak at top right is a cross section of the discoidal foraminiferan *Orbitolites*.

Fig. 4. Bath Stone window, 3rd floor of Elevation SF4. Note accelerated decay of the sill.

Fig. 5. Much restored Tudor window to Prince Edward's Lodgings. The jambs and arched light-headings are of Reigate Stone.

Fig. 6. Chapel Royal window of 1894. Note different degree of weathering between the hood moulding and the tracery. The buttress to the left has been refaced with similar stone.

Fig. 7. Chapel Royal buttress, elevation NF1. The lower part is strongly sulphated and shows lamination. Sulphation has been lost from the upper stone exposing powdery decayed material.

Fig. 8. Duke of York's Lodging doorway (1670)

Fig. 9. Ditto. Detail of weathering to Taynton stone jambs. Note finer bedding in the basal Bath Stone course.

Fig. 10. Ditto. Detail of repairs.

Fig.11. Ditto. Renewed pediment.

R.W. Sanderson

R. W. Sanderson.
17.11.2006

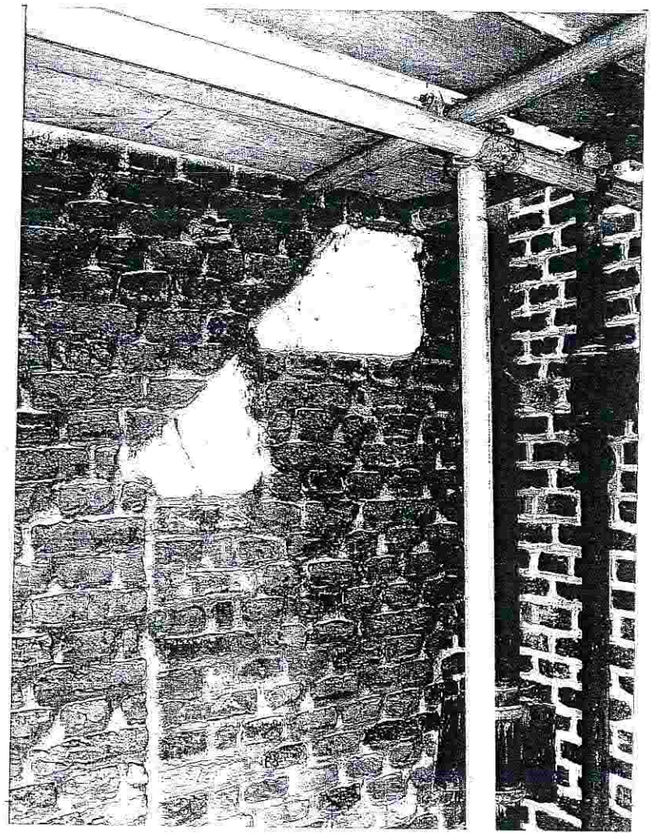


Fig. 2. Calcaire grossier weatherings to Tudor period buttress.

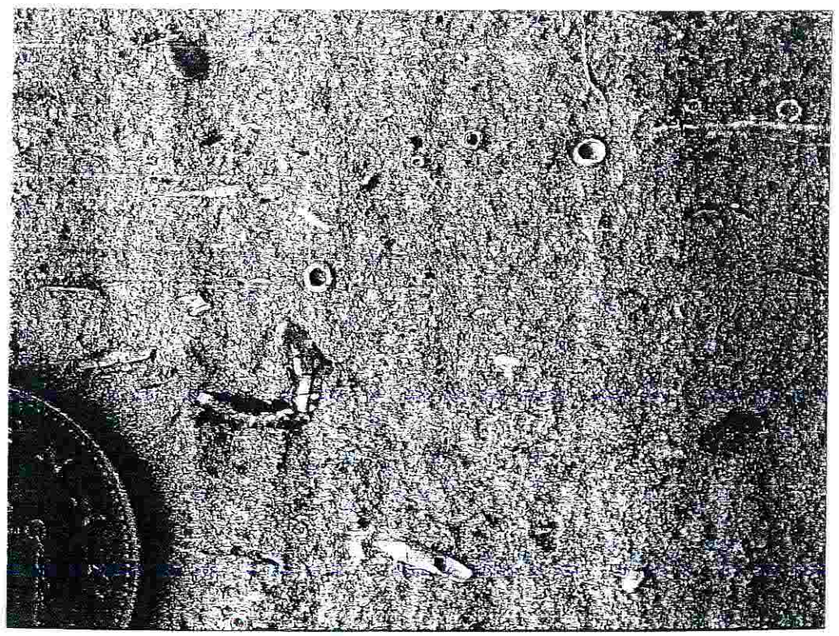


Fig. 3. Calcaire grossier, *Ditrupa* limestone.

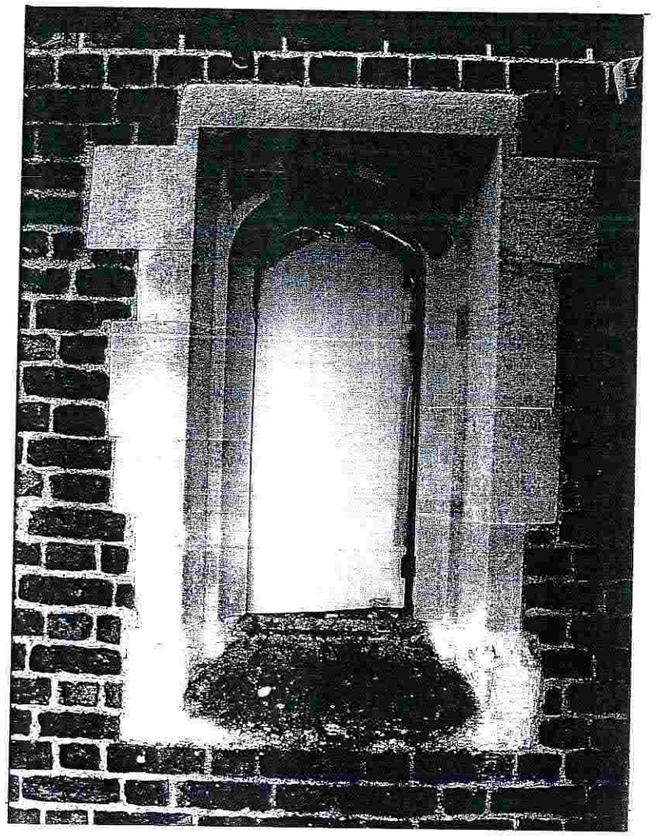


Fig. 4. Bath Stone window. 3rd floor Elevation SF4.

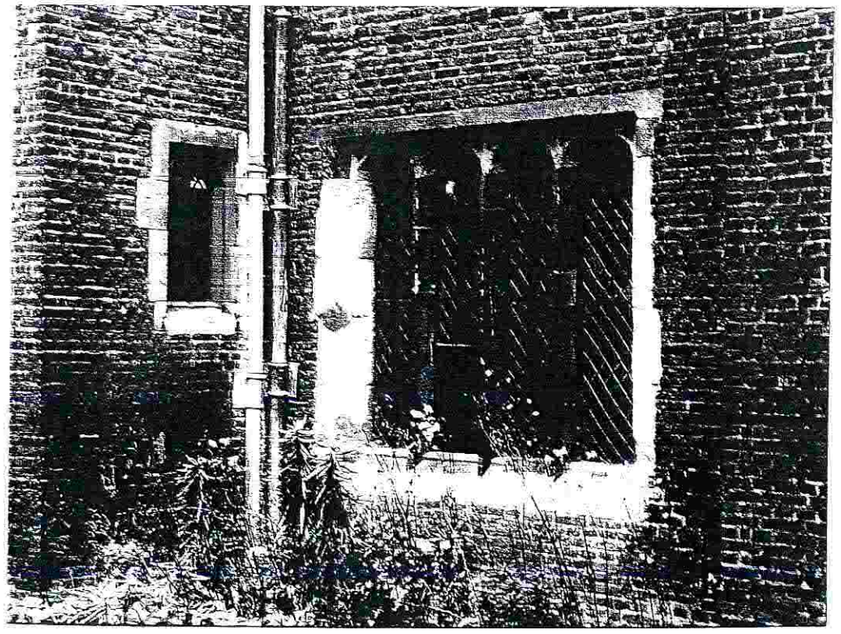


Fig. 5. Prince Edward's Lodging. Ground floor Tudor window.

Fig. 6. Chapel Royal. Bath Stone elements of 1894.

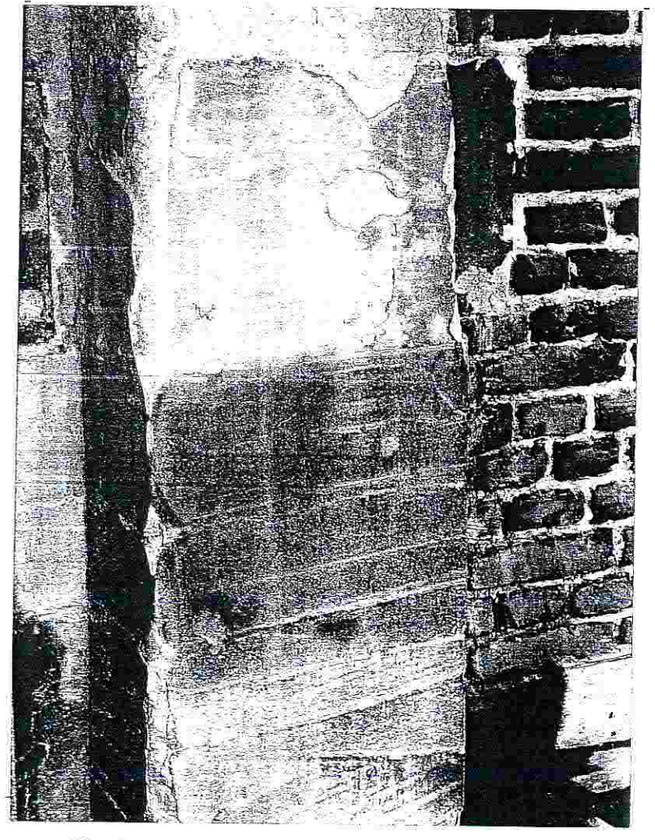


Fig. 7 Chapel Royal. Decayed Bath Stone buttress.

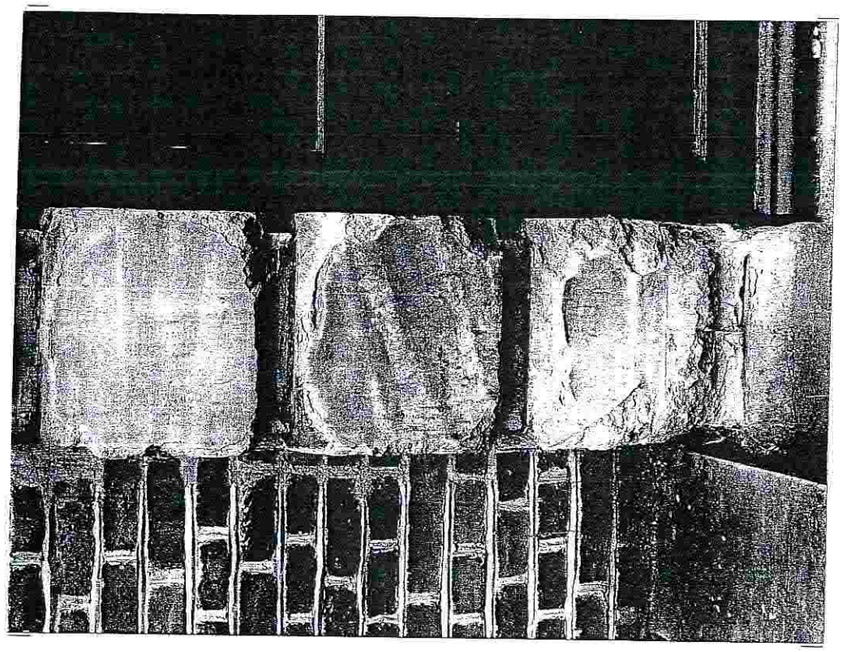


Fig. 9. Duke of York's Lodging doorway.
Weathered Taynton stone and Bath stone.

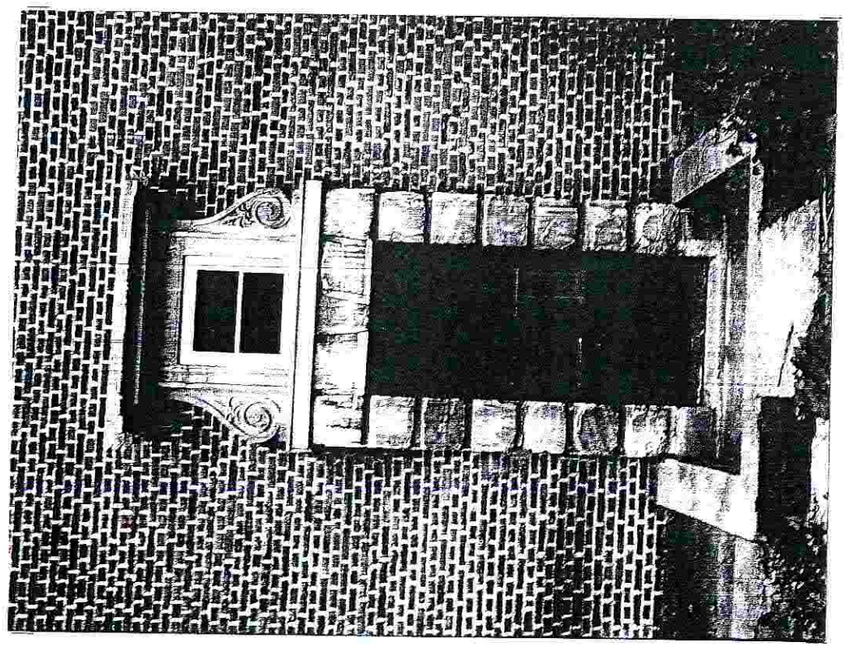


Fig. 8. Duke of York's Lodging doorway.

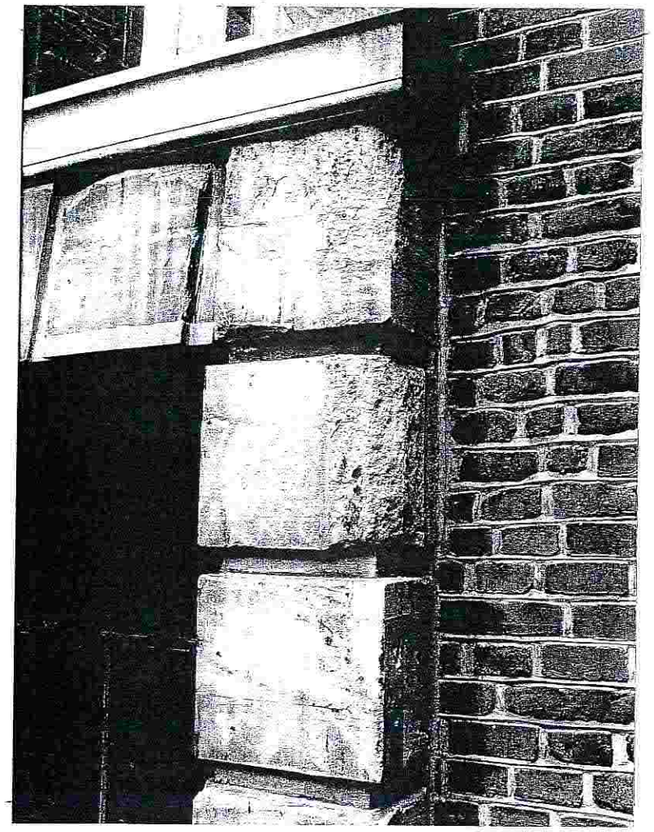


Fig. 10. Duke of York's Lodging doorway. Patching & replacement of Taynton stone with Bath stone.

Fig. 11. Duke of York's Lodging door pediment. Mostly 'new' Bath stone.

ice - Chapel Court
orth Face (sheet 1)

OBSCURED

Legend

B'	Great Oolite limestone Bath Stone
LC	Lincolnshire Limestone Lincolnian type
	Additional mortar joints
	Joints marked in error

Lithological survey by
Robin W. Sanderson,
71 Acacia Grove, New Malden,
Surrey, KT3 3BU
Report 0522
October 2008

OBSCURED

Palace - Chapel Court
- North Face (sheet 2)

2)

Legend

B — Great Oolite limestone, Bath Stone

Lc — Lincolnshire Limestone, Clipsham type

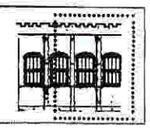
Po — Portland Stone

Additional mortar joints

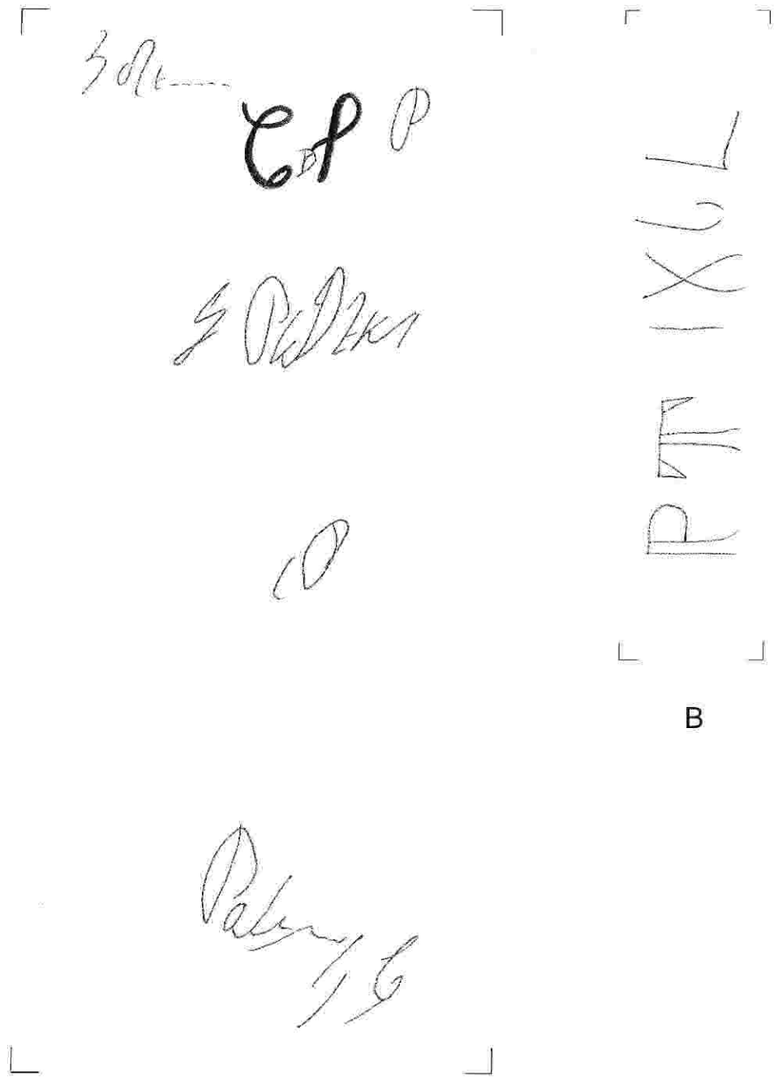
Joints marked in error

Lithological survey by

Robin W. Sanderson,
t 0522 October 2006



APPENDIX V GRAFFITI RECORDED



KEY

Stone/Brick outline

Scale 1:2

Appendix V:
Graffiti Recorded.
Hampton Court Chapel North Elevation

APPENDIX VI RECORD OF REMOVED STONEWORK

Hampton Court Palace, Chapel North Facing Elevation

Site Code: HCP50

Stonework removed during works

For locations please refer to architects drawings within the archive file which were marked up on site. Colour slide (films 9-11) and digital images were taken of each stone.

No.	Location (Bay)	H (cms)	W (cms)	D (cms)	Digital Image No	Comment
1	A	3	69	3	3013	Window mould hood
2	A	3	20	3	3014	Window mould hood
3	A	3	27	3	3015	Window mould hood
4	A	3	60	3	3016	Window mould hood
5	A	3	69	3	3017	Window mould hood
6	A	30	17	-	3018	
7	B	3	10	3	3019	
8	B	3	7	3	3020	
9	B	3	7	3	3021	
10	B	3	7	3	3021	
11	B	3	22	3	3022	
12	B	3	12	3	3023	
13	C	10	-	-	3024	
14	C	3	25	3	3025	Window mould hood
15	C	3	19	3	3026	Window mould hood
16	C	3	14	3	3027	Window mould hood
17	D	3	28	3	3028	Window mould hood
18	D	3	9	3	3029	Window mould hood
19	D	3	9	3	3029	Window mould hood
20	D	3	55	3	3030	Window mould hood
21	D	3	12	-	3031	Window mould hood
22	D	3	10	3	3032	Window mould hood
23	A	9	15	-	3033	
24	A	3	-	-	3033	
25	A	13	7	-	3034	
26	A	8	22	-	3034	
27	B	10	20	-	3035	
28	-	-	-	-	-	Number unused
29	A	38	25	-	3037	
30	A	38	40	-	3039	
31	A	3	77	3	3038	
32	A	3	99	3	3040	
33	A	3	60	3	3041	
34	A	29	55	-	3042/3/4	
35	A/B	27	40	-	3042/3/4	
36	B	-	-	-	3042/3/4	
37	A	-	-	-	3042/3/4	
38	B	3	100	3	3045	
39	B	29	70/10	-	3045	
40	B	3	45	3	-	
41	B	29	71	-	3046	
42	B	3	70	3	3047	
43	B	-	-	-	3048	
44	B/C	-	-	-	3048	
45	B	-	-	-	3048	
46	C	3	175	3	3049	
47	C	3	50	3	3049	
48	C	3	36	3	3049	
49	C	23	10	-	3050	
50	C/D	3	40	20	3051	

Hampton Court Palace, Chapel Court South Facing Elevation

Site Code: HCP50

Stonework removed during works

For locations please refer to architects drawings within the archive file which were marked up on site. B&W, Colour slide (films 12-13) and digital images were taken prior to removal.

No.	Location (Bay)	H (cms)	W (cms)	D (cms)	Digital Image No	Comment
1	Lift 7	93	26	20	0022/3	Sill of window
2		72	23	?	0024-36	Corner stone
3		92	23	?	0024-36	Centre stone
4		88	23	?	0024-36	Pipe stone
5	Balcony	25	95	25	0037-39	Decorative sill
6	Balcony	25	52	25	0037-39	Decorative sill
7		25	76	25	0040-42	Decorative sill
8		25	76	25	0040-42	Decorative sill
9		25	76	25	0043-45	Sill as stone REF 4
10		25	76	25	0043-45	Sill as stone REF 4
11		8	52	19	0049-52	Part replacement of sills.
12		8	52	19	0049-52	Part replacement of sills.
13		n/a	n/a	n/a	0053-55	Decorative lintel
14		n/a	n/a	n/a	0053-55	Decorative lintel
15		n/a	n/a	n/a	0053-55	Decorative lintel
16		n/a	n/a	n/a	0056-58	Decorative lintel
17		n/a	n/a	n/a	0059-60	Weathered stone
18		n/a	n/a	n/a	0061-64	Base of 8

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