



Hampton Court Palace The Tiltyard Tower

**Historic Building Recording and
Investigation**



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The Tiltyard Tower Hampton Court Palace

HISTORIC BUILDING INVESTIGATION AND RECORDING

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The Tiltyard Tower Hampton Court Palace

Historic Building Recording and Investigation

Summary

The Tiltyard Tower is a brick-built structure dating from the 16th century, and is the sole surviving example of a group of five towers, which comprised Henry VIII's Tiltyard. A programme of conservation works was undertaken in the Spring/ Summer of 2006, which provided the opportunity to archaeologically investigate the building, which resulted in seven key phases of development.

Phase 1, pre-c.1537 *The tower may originally have served as a herber, used to embellish Cardinal Wolsey's Great Orchard.*

Phase 2, c.1537 *The exact date of construction is not known, but there is evidence that in 1537 substantial building work took place. The single storey Tower had a substantial stair turret facing north, and within the east and south elevations large projecting windows and diaperwork. Significant features identified include the plaster splays, putlogs and a possible shaft or drain constructed within the west elevation.*

Phase 3, 1600-1689 *The function of the Tiltyard Tower changed to lodgings and with this came a major episode of reconstruction. A floor level was added, the Tudor jambs cut back, windows infilled and smaller casement windows inserted at first and second floor levels of the east and south elevations. The investigations in particular identified a plaster reveal, and joist pockets relating to earlier floor levels.*

Phase 4, late 17th-mid 18th century *The use of the tower at this time is not known and it may have continued to serve as a lodgings, it was certainly occupied at this time as further building work continued. Investigations show that the casement window of the east and south elevations were infilled, and smaller windows inserted with arches at (the then) ground floor level. Structural works also occurred at this time with individual brick replacement, consolidation of the infilled stair turret and minor changes to the floor levels.*

Phase 5, 19th century *The external phases of the parapets were rebuilt with Tudor and 19th century bricks, and the internal faces consolidated. Investigations revealed that the internal Tudor core of the parapets survive, but that the outer faces have been rebuilt.*

Phase 6, 1888-1924 *The conversion of the tower to a tea-room resulted in the insertion of a third floor without heightening the structure. The larger windows were infilled and replaced by two tiers of smaller windows (as existing), and two smaller windows within the north elevation were also infilled. In the 19th and 20th centuries major consolidation work took place aimed at repairing structural faults, as well as repair and construction of floors/ceilings. Internally, much of the décor dates from this period and externally the appearance was also enhanced. Several phases of pointing are extant which is predominantly black ash, although areas of paler mortar also survive which have been darkened. At this time the building was also painted in red which would have contrasted with the pointing, and improved the legibility of the building.*

Phase 7, 1932-1995 *Kitchens were added to the north-west in 1932 and the existing tea-house was built in the 1960s.*

1 Introduction

1.1 Background

1.1.1 Oxford Archaeology (OA) has been commissioned by Historic Royal Palaces (HRP) to undertake a programme of historic building investigation and recording at the Tiltyard Tower, Hampton Court Palace, Surrey. The Tiltyard Tower is a brick-built structure dating from the 16th century, and is the sole surviving example of a group of five such structures which comprised Henry VIII's Tiltyard. The unique structure is therefore of high significance and is protected under the scheduled ancient monument status of Hampton Court Palace.

1.1.2 The Tiltyard is now showing clear signs of structural failure and a project was therefore initiated by HRP to undertake external and internal conservation repair work. This will ensure the future structural stability of the building, and prevent further deterioration and loss of important building fabric. This work, in particular the replacement of bricks, provided the opportunity to interpret the history of the building. Appendix III shows the extent of brick replacement by CWO Contractors. Additional intrusive works were also undertaken, such as the removal of internal plaster, which further enabled a more in-depth understanding of the complex phasing of this unique structure.

1.1.3 This history and phasing of the Tiltyard is complex and therefore the report has been presented to illustrate the results of the investigations in a clear and concise format. This introductory section includes the aims, methodology and previous work, and section 2 details the known history of the Tiltyard. Section 3 is divided into the six phases of the development of the Tiltyard and assimilates all the information within the following sections: brick typology results, documentary sources, cartographic sources and the finding of the archaeological investigations. More specific information concerning the brick typology analysis (mortar descriptions etc.) is not included within this report but is detailed within a separate document. This is the Hampton Court brick typology produced by Daphne Ford which has been updated with the information gained through the investigations at the Tiltyard Tower.

1.2 Aims and objectives

1.2.1 The overall aim of the investigation was to provide further understanding of the history of the Tiltyard Tower, and to create a record of the structure. The main focus of the work was to understand the complex phasing during extensive brick replacement concentrating on the structure, construction, history and use of the building. Additional intrusive work, undertaken as part of the conservation works, was observed in order to substantiate and provide a more complete understanding of the archaeology of the building.

- 1.2.2 The Tiltyard Tower was not included within the Hampton Court Brick Typology produced by Daphne Ford, and therefore a second aim was the enhancing and updating of this document.
- 1.2.3 *Externally*, these objectives were undertaken in two main phases of external investigation; the first prior to raking out of bedding joints, was to generally review and update the existing brick typology of all external elevations. More specific objectives within this were to inspect and record:
- Significant evidence of former painted schemes
 - Significant evidence of vitrified diaperwork
 - Significant changes in pointing and bonding
 - Features of particular archaeological interest.
- 1.2.4 Subsequent to the raking out of bedding joints, the objective was to record bedding mortar types of all brickwork subject to repointing. This information further substantiated the updating of the brick typology and phasing, within this more specific objectives were to inspect and record:
- Evidence of putlog holes, significant changes in bonding etc.
 - Features of particular archaeological interest.
- 1.2.5 The works involved considerable brick and stone replacement, and the recording of these was as instructed by Andrew Harris, the project architect. Generally, this revealed construction and archaeological features which were recorded during the programme of archaeological investigation and recording.
- 1.2.6 A further objective was to provide a watching brief for all internal and major external opening up works as instructed by Andrew Harris. This included:
- Attendance during opening up, where there is a risk to the fabric
 - Photograph recording of areas of the building or fabric subject to works, prior to their being opened up and removed.

Areas observed and recorded during works include the following:

- Parapets – the east parapet was substantially deconstructed and rebuilt, and recording therefore concentrated on this area. Areas of rebuild and brick construction within the internal faces of the remaining parapets also provided opportunity for investigation.
- The roof – the replacement of the lead roof and some timbers allowed areas of the roof to be viewed during works.
- Ceiling – exposed areas of timbers and plaster were investigated prior to replastering.

- Removal of window – the west elevation second floor window was removed facilitating further archaeological investigation of this area.
- Basement – removal of floor slabs revealed a culvert.
- Lightning conductor pits – two shallow pits were dug by CWO directly to the east of the east elevation, which were subsequently recorded.
- Brick replacement – a large area of bricks within the north area of the west elevation revealed an interesting vertical feature, which was recorded and investigated.

1.2.7 **Internally**, overall the objective was to archaeologically record all areas of exposed brickwork, in particular features of archaeological interest such as joist pockets, blocked windows etc.

1.2.8 A further objective was to use this information, in conjunction with the external investigations, to generally review and update the existing Hampton Court Palace Brick typology. Therefore changes in mortar, bond, brick type etc. were also recorded.

1.2.9 A further aim is to create an ordered archive of the work for deposition with HRP.

1.3 **Methodology**

1.3.1 Overall the work comprised three principal elements: a photographic, drawn and written survey. These three elements are described below followed by a more detailed methodology for the reformatting of the Hampton Court Brick Typology.

1.3.2 The **photographic survey** consisted of general photographs and specific details (external and internal) and was undertaken using 35 mm black and white print film and colour slide film. Digital photographs were also taken using a Caplio 400G 3.2 megapixel camera.

1.3.3 Rectified photography was also used in recording large areas of internal exposed brickwork, predominately in the east and south elevations. The survey consisted of recording selective internal elevations of the tower tied into the existing digital plan and external elevations (see Section 1.3.10). A temporary control network was established within the tower and tied into the existing external elevations by observation of points on the previously supplied external elevations, as no control data for this original survey were available.

1.3.4 The survey's main objective was to capture the position of areas of brick work exposed internally, both as a record and to allow comparison with external brickwork features. A Leica TCRP 1200 TST (Total Station Theodolite) with REDM (Reflectorless Electro-magnetic Distance Measurement) was used; data were

recorded via the system firmware onto a flashcard, downloaded later using Leica Geo-Office 4.0 and exported to AutoCAD DWG format.

- 1.3.5 The basic method was to take square-on photos of each area of exposed brickwork, using a digital SLR camera. Each photo taken had a minimum of four targets in the picture. The position of these targets was fixed using the TST and they could then be used to rectify the photos at a later stage onto the elevation. Once the position of the exposed brickwork had been established, an outline survey was conducted of each internal elevation where these occurred.
- 1.3.6 Once a basic outline of each required elevation had been recorded, salient points of detail were added. Key points were identified and surveyed in, and photographs taken of these areas, using a similar technique to that described above. These photos were later rectified using the key points as a reference. To supplement the photos taken brief measured sketches were also used of some more complex, details. Once the survey was complete the data was exported into AutoCAD 2004 as described above. The data was then split into individual two-dimensional elevations. Additional detail was added from the rectified photos and sketch drawings. Onto these were rectified the photos of the exposed brickwork. The photos were then trimmed so they just showed the areas of the exposed brickwork.
- 1.3.7 The *drawn survey* is divided into the following sectors:
- 1.3.8 All drawn records followed IFA Standards and Guidelines and English Heritage specifications (2006).
- 1.3.9 Photogrammetric drawings of external elevations were provided by HRP, and had been undertaken by the Downland Partnership in 1999. Permatrace was overlain on the drawings, and external elevations (1:50) were recorded in two stages of recording. The first phase was prior to the commencement of intrusive works. A second phase of drawings were annotated during and following intrusive works (raking out and brick replacement).
- 1.3.10 Internal elevations (1:50) that had been stripped of internal plaster, predominately the east and south elevations, were recording using rectified photography. These were overlain with permatrace and annotated prior to and during consolidation works. During investigations further smaller areas of plaster were removed, and these were hand-drawn at an appropriate scale (1:20) and photographed.
- 1.3.11 A rectified survey was provided of the internal elevations of the parapets by Martin Ashley Architects (1:50), and permatrace was overlain on these drawings and descriptive annotation added.
- 1.3.12 Floor plans (1:50) provided by HRP, were used to provide reference to archaeological recording, and annotated if required.

- 1.3.13 Further drawings were produced at an appropriate scale (generally 1:20) to record and interpret features of particular interest.
- 1.3.14 Historic views of the Tiltyard Tower and surrounding landscape were provided by HRP, these were used in the analysis of the phasing and are referenced throughout this report (Figs. 7-9 and 19)
- 1.3.15 The *descriptive survey* complemented the photographic and drawn surveys and added further analytical and descriptive detail. OA building archaeology record sheets were used and referenced to the drawn and photographic surveys, and samples to ensure a complete assimilated archive. Brick typology sheets were also completed in analysing the brick and mortar types both externally and internally.

1.3.1 Hampton Court Palace Brick Typology

- 1.3.16 The Brick Typology was completed by Daphanne Ford and this document establishes a typology for the bricks used at Hampton Court Palace, and includes drawings of the majority of the Palace which have been phased according to this typology. This document however does not include the Tiltyard Tower and therefore a further objective was to add the information gained through the investigations undertaken at the Tiltyard.
- 1.3.17 The basis of the methodology used in updating the brick typology was the completion of brick data sheets. These enabled easy cross referencing to the brick typology as well as other elements of the recording programme (photographic, drawn and written). The following information was included in the sheets:
- Brick measurements - arris to arris, length, width and depth
 - Brick type and date
 - Description/ Features - description of brick colour etc.
 - Bond and pointing
 - Mortar
 - Comments.
- 1.3.18 Professional judgement was used on site to identify the brick type, and this was re-addressed during desk-based analysis. Brick measurements were recorded on an Excel spreadsheet in centimetres and converted to inches (as used in the brick typology) to facilitate comparison. Descriptions of the brick and mortar recorded in the data sheets were assimilated in a Word document to enable easy comparison with the typology.
- 1.3.19 Overall, the brick typology is a very useful tool, and as a complete study of Hampton Court Palace is invaluable to our understanding of the Scheduled Ancient Monument. Oxford Archaeology have recently used the typology in the analysis of

other structures at Hampton Court Palace including the Chapel North Elevation (2007), The Chapel East Elevation (2008) and the Anne Boleyn Gatehouse within Base Court (2008). It was found that many of the bricks had similarities and therefore ideally the typology should be used in conjunction with other dating methods, for example by considering adjacent features.

1.4 **Previous work**

1.4.1 The history of the Tiltyard Tower was investigated as part of the Statement of Significance (OA 2006), which also described how the tower is significant for a number of reasons:

- It is the only surviving building associated with Henry VIII's passion for jousting
- It is a rare survival of a type of building which although often elaborate was usually only temporary
- It is the only surviving tower of the many detached towers which were found throughout the Tudor gardens at Hampton Court
- Despite many alterations it still retains its original size and form.

1.4.2 A small programme of intrusive investigations was undertaken by OA in 2005. These investigations consisted of the removal of plaster on internal walls on the second floor, the raising of floorboards in a room on the first floor and the raising of a stone slab in the basement. The investigations revealed that there are features within the wall (windows, alcoves, putlogs) which are not visible on the external elevations. It also suggested that much of the internal fabric of the tower related to the post 1898 re-ordering of the floor levels (Oxford Archaeology 2005). The small size of the interventions means that many questions remained unanswered, particularly those relating to the phasing of the blocked features visible on the exterior of the building.

1.4.3 Past investigations of the tower which also informed this report, included visual analysis of the exterior fabric by Jonathan Foyle, and archaeological investigation of the tiltyard area carried out by Oxford Archaeology (Oxford Archaeological Unit 1994 and 1995). Analysis of the internal west elevation was undertaken by English Heritage (undated) (Fig. 18) and this information has been assimilated within this report as it was not included in the 2006 phase of works.

2 **Historical Analysis: The Tiltyard Landscape**

- 2.1.1 The following is an overall description of the known history of the Tiltyard, and specific analysis of the Tiltyard Tower is included within the six phases of the development of the building.
- 2.1.2 Tiltyards were a feature of many of the greater houses of the Thames Valley and Hampton Court was the last of Henry's houses to be provided with one. This elaborate setting for jousts and tournaments surrounded by a large perimeter wall, measured 650ft long and 250ft wide, and included five towers (Thurley 2003). The earliest view to show the towers is Antonis van den Wyngaerd's view of 1558 (Fig. 7) which depicts four towers running north-south along the centre of the field. Two almost identical towers (one of which survives, this is the second Tower from the right on the drawing) are situated along the east wall of the Tiltyard. In the centre of the field two sub-rectangular towers sit either side of a small castle with large windows on numerous projecting rounded 'bastions'. This large area to the west of the palace gardens was created as a Tiltyard and until c1700 was an open field. Within this field stood five towers, two along the eastern boundary wall and three standing detached, in a line
- 2.1.3 Documentary investigation of the towers was undertaken by Heath (1982) who provides a full account of known references to the five towers and their demise. Unfortunately it is difficult to determine to which towers the references are made and therefore it is of less value in elucidating the individual history of each of the structures. It is certain that the towers were still present in 1653 but by 1661 the timbers of the middle tower (the largest and most ornate of the five) were taken down, followed by the masonry. A view of 1669 commissioned by Cosimo De Medici shows the four remaining towers just before the three lost Towers were demolished or fell (Fig.8). The southern tower has lost its crenellated roof, which has been replaced with a pitched tile roof. On its south side the tower appears to curve, a detail not clear on the earlier view of 1558. The yard itself is still open and along the western side are a number of small buildings. By 1674 three towers are still listed but by 1703 only one survived as shown on Knyff's drawing (Fig.9). This also shows that the former Tiltyard has been divided by walls and turned into a garden with planted beds and avenues of immature trees.
- 2.1.4 The early use of the towers is uncertain, although Office of Works records relate to phases of minor repair and maintenance. The towers were probably designed as a theatrical backdrop for the tournaments, which is supported by the fact that one of the major viewing windows faces towards the Great Orchard, not the Tiltyard. There is no evidence that the yard was used in Henry's reign and it was not until 1557 that its use for its intended purpose is recorded when jousts for Christmas were held by Queen Mary and King Philip¹. There is no evidence that the yard was used before this date for practice tilting or other martial sports. In November 1569 the Queen's

accession-day tilts were held at Hampton Court and attracted many thousands of visitors.

- 2.1.5 The yard may have been used briefly during the reign of James I when he ‘ran at the ring’ at Hampton Court during Christmas 1603-4. There is, however, debate as to where this actually took place (Young 1987). Records from later in the 17th-century relate to occupation of the towers by physicians, apothecaries and laundresses (1628), French priests in quarantine (1625) and apparently ambassadors.²
- 2.1.6 Knyff’s drawing (1703) shows the Tiltyard divided into six equal sections separated by high brick walls. After the departure of the court from the palace in 1737 the area fell into disrepair until the 1760s when it (with the adjacent Melon Grounds) became the Fruit and Kitchen Gardens (Longstaffe-Gowan 2005). It was not until 1923 that redevelopment of the Tiltyard was proposed, and in 1925 the Office of Works transformed the grounds into the ‘Tiltyard Gardens’ and the building which forms the focus of this study was converted into a tearoom.

3 **The Tiltyard Tower: General prior to works**

3.1 **Introduction**

3.1.1 The Tiltyard Tower is a rectangular structure with a small rectangular projection to the north. It is four storeys high extending from basement to second floor level, and is of brick masonry construction with timber upper floors and a flat timber roof. The stonework is confined to the crenellated parapet, and externally a moulded string course at its base and a blocked Venetian door at ground floor level of the east side. A stairwell is positioned at the north end of the tower. No original openings remain in the elevations and the existing door and window openings date from later alterations (Figs.2-5) (Plate 1).

3.1.2 Extending around the south, west and north sides of the tower is a one storey framed structure accommodating a cafeteria (Plate 2). Access is currently via the east elevation and an opening in the west elevation inside the cafe. Internally the configuration, fixture and fittings of the building date from the 19th and 20th centuries (Fig. 6).

3.2 **Description by floor**

3.2.1 *The Basement* is currently used as a boiler room and as additional storage space for the tea-rooms. It is divided into five main spaces by internal walls. Many of these walls date from the 19th or early 20th-century and there is one modern breeze block wall. The floors of the rooms on the western side are covered by high quality Purbeck marble flags and the floors of the eastern part are concreted.

3.2.2 *The Ground Floor* has been substantially altered by the insertion of the tea-rooms. The tea-rooms seating space area (TYG017) is accessed by a large void in the west wall. In the centre of the room are two piers which support cased joists of either wood or iron. The walls are plastered and apart from the frame of the eastern window all fittings are 20th-century. The room at the north end (TYG016) is accessed from a door within the tea-room, the staircase is located within this room and beneath is a door leading to the stair to the basement.

3.2.3 *The First Floor* is divided into two main rooms as well as two small lavatories, a hall and staircase. Fires with surrounds are extant in rooms TYFF002 and TYFF001 and the latter is clad in heavily varnished but thin match boarding (removed as a result of investigations). The floors of the first and second floor are of softwood boards. The second floor is subdivided into three main rooms and features include an iron grate in room TYSF001 and an integral bench in TYSF002. Access is provided to the lead roof via a narrow hatch at the top of the staircase and this previously held large water tanks.

4 **Phase 1 (pre 1537): Before the Tiltyard**

4.1.1 *Documentary Sources*

4.1.2 Two of the towers within the Tiltyard are originally thought to have been herbers, used to embellish Cardinal Wolsey's Great Orchard (Thurley 2003). The positioning on the extant Tiltyard Tower along the eastern side of the wall dividing the Tiltyard from the Great Orchard, suggests that the tower and its companion belong to the creation of the walled orchard rather than the Tiltyard. The quality of the construction at the Tiltyard cannot be compared to other structures at Hampton Court, which suggest that the building was a temporary structure not meant for long term use. It is therefore possible that the extant Tiltyard Tower was converted to a secondary use, and predates the possible Tiltyard construction date of 1537 (see below). No definitive physical evidence for this phase was found during the investigation.

5 **Phase 2 (c.1537): Construction**

5.1 **Brick Typology Analysis**

5.1.1 Henrician Stock Bricks (Type C) dating from 1529-1566.

5.2 **Written Sources**

5.2.1 The exact date of the construction of the Tiltyard Tower is not known, as there is no documentary evidence directly relating to its construction. There is evidence that in 1537 substantial building work took place to create the Tiltyard, when accounts show that 258,000 bricks were used by William Clement to build the Tiltyard wall. Records also show that measurements for the Tiltyard were not taken until 1538, and therefore the exact sequence of events is confusing because measuring and setting out should precede building. It is possible that the Tiltyard was built before 1537 and that the bricks were used to repair or replace a timber palisade between the Towers (Foyle 2001). It is also possible that the measurements relate to paying the builders.

5.2.2 In taking into account the human aspect it seems likely that the Tiltyard was built for Henry, who famously had a great love of sports as illustrated by the tennis courts and bowling alleys erected at the Palace. Nevertheless the King seems never to have used the Tiltyard, and died before it first served its original purpose. The only other reference during the Tudor period is within the Pipe Roll account for 1575 –1576 which states ‘repairing the five Towers in the Tylteyarde’ (Heath 1982).

5.3 **Drawn sources**

5.3.1 The earliest drawing showing the tower is Wyngaerde’s drawing of 1558 (Fig.7), which depicts the towers in their historical setting. In terms of the Tiltyard Tower the most significant aspect of this view is that it depicts a substantial stair turret with a small entrance facing north, and possibly a small window at the top of the tower. Four faces are shown with that to the north providing access, and its height suggests it was also possible to gain access to the roof. It is possible that the Tower was octagonal in plan and internally circular, and that some artistic licence has been employed.

5.3.2 At first floor level within the north section of the west elevation two small parallel windows are shown. The south section of the west elevation is depicted as a blank wall, although it is evident that the stair turret extended to this extent. Significantly the south edge of this elevation is depicted as curved, indicating a circular turret as evident on the towers to the north. The north elevation is also shown as a blank wall with no windows and fencing projects to the north; a further wall also projects to the east.

5.3.3 Wyngaerde's drawing does not depict a substantial opening as would be customary on such a building. The east elevation and south elevations are not shown and therefore we can only assume that such an opening (if it did exist), would have been located here. The building also lacks the large grand windows evident on the towers in the foreground of the illustration, which are located on the east and south elevations.

5.4 **Function**

5.4.1 The tower rarely served its original purpose as a Tiltyard Tower, designed to act as a theatrical backdrop to grand jousting events. The accession day tilts of 1569 during the reign of Elizabeth I may have been the first time in which the Henry VIII's Tiltyard was actually used. During the reigns of Henry and Elizabeth the towers main function would have been as lodgings for courtiers and guests, often housing ambassadors in them (Foyle 2001).

5.5 **Archaeological investigation**

5.5.1 Substantial sections of the Tudor building survive in all four of the external elevations. The construction of the tea rooms and their kitchens at ground floor level means that this area is entirely obscured, with the exception of the east elevation.

5.6 *Tudor windows*

5.6.1 The central sections of the **east and south elevations** indicate the location of former large windows, which have been infilled at several stages since the 17th century (Plate 3). Internal investigations focused on these complex areas to substantiate the archaeology, in particular the fenestration of the Tudor phase.

5.6.2 Externally, on the east elevation, Tudor brickwork laid in English bond lies to the north and south, and on the south elevation to the east and west (Plate 4). The structural breaks are clearly visible, although on the east elevation just above ground level the line is less clear.

5.6.3 The breaks were also identified internally and follow the same vertical alignment but significantly are stepped in a further *c.* 0.30 m (Plate 5). Figs. 3 and 4 show internal phasing breaks on the external elevation, thus depicting the difference in internal and external phasing breaks. This discrepancy represents the wall thickness of the former projecting window, though whether this was a grand oriel windows as illustrated on the towers in Wyngaerde's drawing, is doubtful.

5.6.4 External investigations during brick replacement of the **south elevation** identified window plaster at the west (Plate 6). The surrounding brick construction was not

indicative of an oriel window, because no evidence of protruding headers was identified which would have been necessary to create the curved alignment. Further internal investigations illustrated that the plaster reveal measures 0.07 m in thickness and is visible to a depth of 0.10 m (Figs. 10 & 11). The Tudor brick here has been cut back 0.08 m at a width of 0.55 m, which occurred during the 17th century infilling of the window to provide a relief for the blocking and bond the two phases (Fig. 14). The surface of the brick is clearly ragged where it has been cut back, and the later brick has been built up to the window reveal.

- 5.6.5 Internally, to the west the break is evident running from just below the ceiling to first-floor level, although it is lost at first floor level due to 20th century patching (visible extent is 2.92 m; Plate 7). To the east it extends the full length of the first and second floors although major 19th century and 20th century patching means that the exact alignment is becomes lost midway. This illustrates that the internal width of the window is 2.98 m. Closers are evident within the Tudor brickwork running along the edge of break, and in places this has been infilled with 17th century mortar.
- 5.6.6 Within the *east elevation* the Tudor plaster reveal is also visible to the north at second floor level (room TYSF003), and again the brickwork has also been cut back to receive the 17th century blocking (Plate 8; Figs. 15 and 16). This characteristic is also evident externally to the north of this elevation, in particular between ground and first floor levels. Internally, at first floor level the south edge of the former window is clearly defined, and significantly three of the bricks are chamfered (Plate 9, Fig. 11). This is thought to be an original feature of the window that has been lost elsewhere as the brickwork has been cut back .
- 5.6.7 To the south (room TYSF002) the alignment of the Tudor window is difficult to determine below the current ceiling level, as a result of the insertion of the stock bricks (also evident to the north; Plate 10). These were used to level off the area with the alteration in floor levels. Below, the line is clear with closers at either side although this becomes truncated towards the base.
- 5.6.8 At first floor level to the north a thin section of brickwork was exposed in room TYFF03 (the water closet) which although revealing further Tudor brickwork did not expose the north edge of the Tudor window. To the south within room TYSF002 the brickwork is of a later phase, and therefore the break of the Tudor window must be situated behind the current partition wall.
- 5.6.9 The length of the windows is difficult to determine, in part because of the loss of evidence at ground floor level. The plaster reveal is identified at its lowest point within the south elevation at c.2.9 m below the parapet. External investigations of the east elevation shows that the Tudor brickwork has been rebuilt between the ground and first floor levels (evident below the 17th century window infill), as mortar analysis shows a higher quantity of lime inclusions (Plate 11). Investigations

did not provide any further evidence of the manifestation of the window(s). The date of the rebuild with Tudor bricks is not known; mortar analysis suggests that it is not contemporary with the 17th-century rebuild and therefore it is likely to have taken place between *c.*1537 and *c.*1671/2. The other examples of towers depicted in Wyngaerde's view have large windows at two or three levels and no grand entrances are apparent (presumably situated in the east elevations). It is not known whether the east and south elevations each contained two windows, or equally whether there was an entrance at ground floor level; however, evidence suggests large grand windows.

5.6.10 Within the north section of the *west elevation*, there is no evidence of the two small windows as depicted in Wyngaerde's drawing at the (then) first floor level, and it can only be assumed that this was artistic licence.

5.7 *Stair turret*

5.7.1 The Tudor brickwork of the north and west elevations substantiates evidence for the stair turret as illustrated on Wyngaerde's drawing of 1558. The stair turret would have been a substantial structure that wrapped around the building's west elevation, as defined by the 17th century repair. To the north it extended between half and two third across this west section of the elevation, although the exact extent is not known here because the junction between the Tudor brickwork and the 17th century is lost to 18th century repair (Plate 12). Internally, an area of plaster was removed at second floor level which exposed some Tudor brickwork laid in English bond at the base (Fig. 15). This survives from prior to the removal of the stair turret and appears to extend to roughly mid-width of the external brickwork (i.e half way through the 18th century repair) illustrating that the stair turret is likely to have projected to this extent.

5.8 *Shaft*

5.8.1 Within the west elevation and to the north of the extant windows, investigations revealed an interesting vertical feature which appears to have run the height of the building and is contemporary with the Tudor phase (Plate 13; Fig. 16). Internally this feature is rendered to all four faces creating a shaft (0.16 m by 0.19 m) which has been infilled with rubble, wall plaster and 1888-1923 red bricks (with frogs) some of which are bonded. At the base the shaft slopes eastwards suggesting it extended into the ground floor, and bricks have been inserted below this although they are not bonded into the surrounding brickwork. The revealed length of the shaft is *c.*2.5 m, but it was also identified at second floor level (not observed by OA), suggesting that it ran the length of the building on at least the first and second floors.

5.8.2 The purpose of this feature is uncertain, but the most likely explanation is that it is a drain. The cleanliness of the extant plaster however suggests that it is not the

function for which it was used. It is possible that it relates to the use of the building as a laundry and that the drain led to the basement, certainly there are historical references to the building used by laundresses (OA 2006). Alternatively the projection of the building to the north here is suggestive of an enclosed area, and it is possible that this area may have been used as a closet or wardrobe and the shaft relates to this former function.

5.8.3 Sections of timber were identified within the shaft and these are thought to be surviving elements of a former (probably 19th century) staircase (Plate 14).

5.9 *Diaperwork and ruddling*

5.9.1 Tudor diaper work is evident in the east and south elevations incorporated into the corresponding faces of the south-east corner (Plate 15). On the east elevation diaper bricks formed in chevrons are situated below the parapet to the south. The pattern here seems incomplete, particularly with the two random bricks at the top of the formation, and the pattern seems to stop abruptly between second and first floor level. Further diaper work is evident in the form of a cross on the corresponding corner edge of the south elevation. Such religious imagery is typical of the period and is also evident on the gatehouse of Clock Court and the Henrician boundary wall of the palace (Foyle 2001). Again this pattern appears incomplete in particular because it does not follow a mirror image at the top and bottom.

5.9.2 Investigations indicate that this was the intended design and no further evidence for diaper work was found. This suggests that bricks were used as available and the pattern was established according to supply not demand, which is typical for this period (White 2004). Random vitrified bricks are also evident within the Tudor brickwork, which as the typology indicates is typical of Henrician stock bricks.

5.9.3 During the Tudor period colour washing was common in an attempt to unify and brighten brick facades, and pencilling would also have been the 'norm' (White 2004). The brickwork and mortar were investigated for Tudor ruddling, although none was identified. Several examples of red paint were evident both on the surface of the bricks and the mortar but these appear to be later in date, and probably date from the 19th century. Identification was problematic because of the damage and disturbance caused by the later black ash pointing. Also, the building has been subject to several phases of major reconstruction as well as ongoing repair works throughout history, all of which would have reduced the probability of survival of such a fragile resource.

5.10 *Putlogs*

5.10.1 Removal of plaster within the north area of the east elevation (room TYSF003) revealed three probable holes for scaffolding within the Tudor brickwork (Fig.16).

These are situated 0.80 m from the present floor level, and in section these show that the brickwork is bonded and three skins deep (Plate 16). The central feature has been infilled with two later headers, and the most southern of these possible putlogs has been gauged from the brickwork and has an incurved end (Plate 17). This suggests that it is not a putlog but it is also too shallow to function as a floor joist (and is certainly different to those identified elsewhere, and therefore the exact purpose is uncertain. It is possible that these three features date from the primary construction of the building, although they may also relate to the 17th century reconstruction work.

- 5.10.2 Externally, removal of bricks at second floor level within the east elevation also revealed two probable putlogs at the north edge (0.12 by 0.14 m) and close to the diaper work of the east elevation (0.37 by 0.14 m; Fig. 3; plate 18).

6 Phase 3 (1600-1689): Lodgings

6.1 Brick Typology Analysis

6.1.1 The typology of brick is Type R Stock brick dating from the 17th-18th centuries. Henrician stock bricks (Type C) have also been used within the brickwork.

6.2 Written sources

6.2.1 There is little documentary evidence relating to the Tiltyard Tower during the reign's of Charles I and James II, with the exception of general references to the 'Towers'. In the early 17th century it is known that the towers were refitted to use as lodgings (Foyle 2001). In the period 1660-89 works accounts show that there was considerable repair work and demolitions, although it is difficult to determine which of the five towers is being referred to during this period. However, it seems likely that the existing Tiltyard Tower was allocated to Colonel Russell of the Footguards which aids in the phasing of the structure.

6.2.2 A reference in 1662 states that there was payment to 'the ploumber laying 3 sheets of lead in the Tower in the Tiltyard which is made read for Colonel Russell'. Also in 1662 there was payment for '2 double casements in Colonel Russell's lodgings', and carpenters were paid for work in Colonel Russell's lodgings. In 1670 bricklayers were paid for taking down six windows of Colonel Russell's Tower and working them up again, and in 1671/2 there was payment for partitioning and flooring in the same Tower (Heath 1982).

6.3 Drawn sources

6.3.1 A drawing of Hampton Court Palace commissioned by Cosimo III de Medici in 1669 depicts the west elevation (Fig. 8). This drawing shows little detail and it does not provide any further information regarding the fenestration of the present structure. The drawing does illustrate the stair turret showing that this was in existence in 1669. It is possible to see a wall extending to the east from the tower, which does not appear to continue as substantially to the west (although this may be perspective). This less substantial wall continues to the west meeting another tower at the same alignment, the more substantial wall then again extends to the west. It is possible that these two towers are former gate towers to the Tiltyard which accounts for the changes described.

6.3.2 Knyff's 1703 sketch of the palace and gardens from the south depicts the tower without the stair turret, and it was certainly removed by 1710-13 (Ford, pers comm. 2006; Soane Mus.Plan.F.II No.39; Fig.9). Knyff's drawing illustrates the south and east elevations with large windows (depicted as roughly square in the drawing)

positioned at the same levels on both elevations. This also demonstrates that by this time a floor level had been inserted creating a two storey structure.

- 6.3.3 The documentary sources therefore illustrate that the turret was certainly removed between 1669 and 1703, and that the floor levels and casement windows were added between 1662 and 1670/1. It is probable that these major episodes of reconstruction are contemporary and that the removal of the stair turret, insertion of windows and change in floor levels occurred in 1670/1.

6.4 **Function**

- 6.4.1 At the beginning of the 17th century there are several references to the Towers serving as lodgings, although it is not known to which Towers these are intended. For example the Towers were used by physicians, apothecaries, laundresses as well as a place of quarantine for Queen Henrietta's Maria's French priests during the plague (Heath 1982). It seems likely that at this time the existing Tiltyard Tower was allocated to Colonel Russell of the Footguards (Ford 2006).

6.5 **Archaeological investigations**

Installation of (casement) windows

- 6.5.1 17th-century brick was used to infill the large Tudor windows of the east and south elevations, as well as the stair turret extending around the west and north elevations (Plate 19). This brickwork also includes some reused Henrician stock bricks (Type C).
- 6.5.2 Internal investigations of the *east elevation* at second floor level show the 17th century brick has been built up to the plaster reveal with rough pieces of brick (rubble) used to infill the space at the south edge of the plaster. To the north and south it is evident that the Tudor brickwork has been cut back (c. 0.10 m) in order to 'receive' the 17th century infill (as described and illustrated previously).
- 6.5.3 At this time a smaller (casement) window was inserted which is confirmed through external and internal phasing. Internally the plaster reveal to this window is evident at first and second floor levels (0.01 m thick) and is situated to the south of the north Tudor jamb (Plate 20; Fig. 10 & 11). The termination of the window is evident in room TYFF002 at first floor level, showing that it is 2.26 m in height (excluding lintel). Internally, it is not possible to ascertain the width of the window because of the insertion of the later sash window although external phasing provides some further evidence.

- 6.5.4 External brick analysis shows that this window was infilled with late 17th - early 18th century (Phase 4) brick of which a substantial patch is visible to the north of the second floor window. The phasing to the south of the window is 17th century in date although ten courses at the base have an ashey mortar, which represent the base of the former window. Closers are however visible both to the north and south of the window depicting the width of this former opening as 2.38 m. A comparison of the alignments of the internal reveal and the external infill shows that the latter extends further to the north than the actual reveal. There is a cast lead hopper bearing a cherub and incomplete 17th century date to the south of this infill, which may date from 1628 when the stone architrave of the west door at ground floor level is also thought to have been constructed (anon author 2001).
- 6.5.5 At first floor level internal investigations exposed a timber lintel directly below the present window and two reveals (Plate 21, Figs.10-11). The visible timber measures 2.84 m in length, (although the full extent is not visible to the north) with the plaster reveals to the north and south measuring 0.13 m in thickness and the opening is 2.30 m in width. Internally, to the south, it is possible to see that the reveal extends back 0.18 m at a gentle south-west angle and immediately to the south of this is 17th century brickwork; the timber here is supported on two pieces of tile (Plate 22). The reveals line up exactly with the external 18th century blocking below the truncated arch.
- 6.5.6 Externally, the widths of these two openings align showing they would have presented a uniform appearance in the 17th century. This interpretation conforms with Knyff's drawing of 1703 depicting large square flat windows. There is a possibility that the lower reveals and lintel indicate a grand opening, but this seems unlikely. Firstly the opening would have been exceptionally large, although it is possible that such an opening would have allowed for the entrance of horses at this time. Historical accounts however indicate that the Tower was rarely used for its intended purpose, and at this time was being fitted out for lodgings. It therefore seems more likely that Knyff's view is correct, and the archaeological investigations have confirmed its validity.
- 6.5.7 External and internal investigations illustrate that the same typology of 17th century brickwork was also used to infill the large Tudor window of the *south elevation* (Figs. 4, 12-13). As previously described the Tudor brickwork has been cut back to 'receive' the infill.
- 6.5.8 Internally, at the edge of the Tudor reveal is a timber lintel depicting a later smaller window and the reveal of this window survives *in situ* to the west, extending to first floor level at a length of 2.28 m (Plate 23). This reveal is 0.13 m in thickness and projects slightly to the south-east and was also identified externally during brick replacement (Plate 24). The infill above this timber and to the east of the reveal dates from the 17th century. There is no evidence that this brickwork has been cut back to accommodate this window and therefore the two events of the infill of the

larger window and the construction of the smaller one occurred at the same time. This bonding is irregular because a 'best fit' method was used, however it is roughly English including some Henrician stock bricks (Type C).

- 6.5.9 The eastern alignment of the window is less easy to determine and the reveal is not visibly extant, but it is possible to discern at first and second floor levels that the width of the window is *c.*2.25 m. Externally, it is not possible to determine the eastern edge because the alignment is lost in the later 1888-1923 blocking.
- 6.5.10 A timber lintel is evident at the base of the exposed brickwork (first floor level) which is situated directly behind the external arch, illustrating a similar architectural form to the east elevation (Plate 25). This lintel measures *c.*0.12 m in width and extends *c.*2.74 m to the east. The arch represents a former opening at ground floor level *c.* 0.32 below the former floor level. Internally, the brickwork above this feature dates from the 17th century showing this later fenestration is contemporary with the infill. The brickwork below this possible window lintel to the west is difficult to phase because only a small area is visible, and this is covered in a layer of cementitious mortar. The archaeology of the area to the west is unclear and a break in the brickwork is difficult to discern, and the window reveal is also no longer extant,
- 6.5.11 The archaeological sequence of the area to the east is clearer and further removal of plaster (following the rectified photography) exposed the plaster reveal (Plate 26). The brickwork below the lintel dates from the 19th century is of reclaimed bricks of various colours (dark rose, yellow, painted white), as well as some reused 1700-1750 brick. A small break extending two courses (*c.* 0.30 m) from the eastern end of the window lintel indicates the possible position of a former window.

Floor Levels

- 6.5.12 The insertion of the two windows within the east and south elevation is also indicative of a change in floor levels; this would have been situated roughly mid-height in the elevation.
- 6.5.13 The internal exposed brickwork of the ***east elevation*** revealed three pockets at second floor level, on the same alignment, which had been infilled in the 19th century (of varying sizes but *c.*0.20 by 0.10 m; Plate 27; Fig. 11). The level at which they are situated suggests that they are joists pockets from the former two storey layout of the building, which were infilled when the present additional floor level was added. Externally, to the north of the window this feature aligns with an area of 1888-1923 brickwork, and this repair work may also have occurred as a result of this alteration.
- 6.5.14 Internal investigations of the ***south elevation*** showed that at first floor level in particular this has been disturbed. There is a small mortice (possibly from a former joist) to the west, surrounded in later cement, which probably relates to a former

floor level. Also, to the east, there is a large area of cement at the same level, again representing the continuity on the same alignment. The alignment also follows with that of the east elevation, and in both elevations these lower features are situated at the same level as the top of the arch of the infilled feature, again demonstrating continuity with the east elevation. Furthermore a small patch of plaster was removed to the south of the first floor window within the west elevation, clearly exposing an infilled joist pocket at the same alignment (Plate 28).

Stair Turret

- 6.5.15 The addition of the windows and floor level in the 17th century meant the stair turret was redundant and as a result this was infilled, as previously discussed. The brick which repairs the scar is similar to that of the north-west turret of the west gatehouse, which was rebuilt in the mid-17th century (Ford 2006). The building's corner was squared off at this point and the break between the Tudor and 17th-century brickwork would have extended roughly half way across the south section of the west elevation.
- 6.5.16 The later insertion of the windows means that the alignment is only visible between the first and second floor windows, and this has become disturbed as a result of this later fenestration (Plate 29). The area includes a mixture of phases including later c.19th century bricks (Type T), 16th (Type C) and 17th century bricks (Type R) and varying mortars are also evident, in particular a significant patch of 18th century ashey mortar. Within the north elevation the 17th century infill may formerly have extended further to the north, although repair to this area in the 18th century means that this alignment is lost.

7 Phase 4 (Late 17th – Mid 18th Century): Lodgings

7.1 Brick Analysis

7.1.1 Analysis of the bricks according to the typology suggest these are Wren stock bricks (Type J) dating from the late 17th to early 18th centuries. This brick differs to that used to infill the door of the east elevation at ground floor level which has a sharper arris and a flat surface. These are London stock bricks (Type O) dating from the mid-18th century.

7.2 Written Sources

7.2.1 No references were found relating to the Tiltyard Tower during this period.

7.3 Drawn Sources

7.3.1 Knyff's 1703 sketch of the palace and gardens from the south depicts the tower without the stair turret. The south and east elevations are shown with large windows (depicted as roughly square in the drawing) positioned at the same levels on both elevations. This demonstrates that at this time the building was two storeys.

7.3.2 The next view of the tower is by Law in 1898 which shows the Tower with two arches at ground floor level of the east and south elevations, and what appear to be smaller windows above this (Fig.19). This evidence therefore shows that the windows were replaced and arches inserted between 1703 and 1898.

7.4 Archaeological Investigations

7.4.1 Brickwork dating from the late 17th to early 18th centuries is evident on the east and south elevations. It infills the larger (casement) windows as well as being used for the Venetian arches below. This brickwork has also been used to repair the central panel of the west section of the north elevation.

Windows

7.4.2 Externally, on the *east elevation*, late 17th - early 18th century brick extends 2.74 m between the second and first floor windows to the north of the windows (Plate 30). To the south of the windows the infill is lost as a result of the later 1888-1923 brickwork.

7.4.3 Internally, the late 17th - early 18th centuries phasing is also evident, and this is thought to be the same type used to level the brickwork below the ceiling level (Plate 31). This illustrates that internally the blocking of the window is

contemporary with the levelling off relating to changes in floor levels (see Plate 10). As described in the previous section, the major change in floor levels must pre-date this fourth phase, and therefore this is thought to relate to later (less substantial) alterations.

- 7.4.4 Contemporary with the blocking of the 17th century window, a smaller window is likely to have been inserted (as seen also within the south elevation). Internally, the brickwork surrounding the window is unclear because of the insertion of the 19th century windows (Phase 5), and no reveals are evident relating to the former fenestration. The external infill and the fact that the size of the east elevation windows is likely to have mirrored that of the south, suggests that they measured 2.8 m in length and *c.* 1.7 m in width.
- 7.4.5 Externally, the *south elevation* follows a similar pattern to the east elevation, with late 17th - early 18th infill to one side of the Phase 6 infill (1888-1924), and the addition of an arch below. Comparison between the internal reveal and the external infill shows that this extends beyond the alignment of the reveal, which would have allowed the brickwork to be sufficiently keyed in (see Plate 23).
- 7.4.6 Internally, the late 17th - early 18th century brickwork extends to the east edge of the window reveal. The bond is roughly English but this is not consistent because it has been used to infill in a 'best fit' method. A comparison between the external and internal brickwork, shows that this follows almost exactly the same space internally and externally. At first floor level the break between the late 17th - early 18th century brickwork and that of Phase 6 (1888-1924) is just visible, although this evidence has been lost externally.
- 7.4.7 The final fenestration of the south elevation is a third smaller window which was infilled in 1888-1923, and brick analysis shows that this also includes some late 17th - early 18th century bricks. To the west the break between the late 17th - early 18th century bricks and later infill is clear, although the window reveal has not survived. An attempt has been made to key in the later brickwork with a single brick (see Plate 23). It is thought that this smaller window is contemporary with the infill of the larger window, and investigation of the brickwork revealed the eastern edge of this later window giving a width of 1.64 m.

Arches

- 7.4.8 At ground floor level architectural embellishment was added to the east and south elevations in the form of arches (Plate 32). Unfortunately the archaeology of the south elevation has been lost to the construction of the tea rooms, however on the east elevation it is evident that a door was constructed at this time with a strainer arch below to support the brick pier. The form suggests that this was formerly a door which was no longer required following the construction of the door lying directly to the south (Plate 33).

Stair Turret

- 7.4.9 The central panel of the west section of the north elevation has been repaired with late 17th to early 18th century brick (see Plate 12). It is possible that this was in order to repair cracking that occurred because of the removal of the stair turret. Works at parapet level however revealed a feature which appears to be an outlet (measuring 0.34 m by 0.33 m) (Plate 34). It is situated roughly centrally between the crenellations just above the roof floor level and infilled with a rubble, cementious mix.
- 7.4.10 Brickwork evident to the west of this feature is thought to date from the 19th or 20th centuries, and has been salvaged and reused, judging by the white paint on the surface. The small quantity means that they are difficult to date but they are similar to salvaged bricks identified elsewhere (such as those evident within the exposed brickwork to the north of the second floor west elevation window). It is possible that this feature is related to the central panel of patching below, and/or may have been an outlet for a drainpipe which has subsequently been removed.
- 7.4.11 Internally, at first floor level, plaster was removed below this feature in order to provide further insight into this area (Fig. 16). The brickwork here also contains salvaged bricks with white paint on the surface and the two episodes may be related, although this is uncertain (Plate 35). This archaeological sequence of this area is disturbed, as is the exposed brickwork on the opposite east wall, which is likely to have occurred as a result of the change in floor levels.
- 7.4.12 Brick replacement in this area provided some further insight, and those removed below the parapet showed that the second skin of brickwork is constructed from reclaimed bricks. White paint is visible on the surfaces, which conforms with those identified internally at first floor level (Plate 36). This suggests that much of the inner core of this elevation has been rebuilt, although internal investigations show that Tudor brickwork also survives (Plate 37).

Floor Levels

- 7.4.13 The phasing of the south elevation indicates that the third window (Phase 4) was roughly the same length as the former window (Phase 3), and therefore there would have been no reason to undertake the major task of a further change in floor levels at this time. Evidence suggests however that some alterations were made at this time.
- 7.4.14 Internal investigations of the east and south elevations also showed a later phase of bricks below the ceiling level, and it is thought that this relates to the levelling off of brickwork and changes in floor levels (Figs. 10-13). In particular, within the east elevation below roof level, is an area of dark stock bricks, which have been cut to measure 0.68 m in width and height (Plate 38). These are situated directly below the timber which extends the length of this area, as well as in a small area below this level. A small quantity of these bricks was also identified below the current roof

level of the south elevation. These bricks are difficult to date but appear to be of the same phase as those used to infill the 17th century window of the east elevation, which would also conform with the interpretation of the north elevation.

7.4.15 Raking out of the central section of the north elevation revealed seven features which follow the same alignment as those found in the remaining elevations relating to former floor levels (Plate 39, Fig. 2). There are repairs to bricks with grey ashy mortar (of varying colour depth) at three levels (c and d are at the same level), listed from top to bottom below:

- (a) 1888-1923 headers set in soft light grey mortar
- (b) Tudor headers in hard grey cement mortar
- (c) 1888-1923 headers set in hard dark grey mortar
- (d) Tudor headers blocking hole in Tudor stretcher with dark grey mortar

7.4.16 The later headers must reflect a change in the 19th century works (Phase 6) and the earlier bricks may represent changes in the late 17th to early 18th century phase. However, similar mortars are evident throughout the brickwork which reflect repair to individual bricks and not changes in floor levels. It is difficult to determine which features relate to changes in Phases 3 and 4, and whilst these have been categorised as appropriately as possible there may be some overlap within these areas.

8 Phase 5 (1800-1900): Residential use

8.1 Brick Analysis

8.1.1 Investigations suggest that the external faces of the parapets have been rebuilt with Tudor bricks in the 19th century.

8.2 Written Sources

8.2.1 There are no identified documentary sources relating to this period.

8.3 Drawn Sources

8.3.1 A drawing by Ernest Law in 1898 shows the south and east faces of the Tiltyard Tower. This depicts the Tower at two levels with an arched entrance at ground floor level, the deeper shading of this area suggests that it is distinct from the brickwork and a door was in place at this time. A wall extends from the south elevation, illustrating that by this time the former opening had been infilled.

8.4 Archaeological Investigations

8.4.1 This phase of construction is evident within the parapets only. Consolidation and patching dating to the 19th Century is evident throughout the tower, but is distinct from this phase and is detailed within Phase 6 of this report.

8.4.2 A lithological survey of the masonry of the Tiltyard Tower was undertaken by Robin Sanderson, and this report and drawings are included in Appendix II of this report. Overall this shows that much of the stonework (the majority of which is within the parapets) of the moulded string course has been replaced with Bath Stone dating from the 19th century. The crenellations include substantially Lincolnshire List stone (date unknown) and some Bath stone. A few examples of Wheatley stone are also extant which may date from the 16th century. Portland stone is extant at ground floor level of the east elevation (to the north and south of the infilled door) which dates from the 18th century.

The Parapets

8.4.3 Investigations of the *east parapet* provided the greatest insight into the construction of the parapet, which was substantially rebuilt during the current works. In section this revealed three skins of brickwork with the survival of the internal Tudor core and the reconstruction of the two outer phases (Plate 40). Less extensive investigations of the other parapets indicate that these also follow a similar structural sequence.

- 8.4.4 The internal phase of the east parapet shows that it has been subject to several phases of repair as a result of structural problems, and has been considerably rebuilt in the 19th and 20th centuries with the insertion of an RSJ to the north. The brickwork at the north end is in poor condition and has been consolidated with large patches of cementitious render (Plate 41). Other areas have been cut back and new brick added leaving surviving earlier projections, and these brick corbels survive at a different alignment to the later brickwork. In general, the parapet is poorly constructed and the three courses are unbonded with rough infilling between the inner and outer cores with bits of brick and mortar.
- 8.4.5 Preliminary investigations of the external face show that it is uniform, and has been rebuilt in one phase, at the same time as the remaining three elevations. Tudor bricks have been reused with the inclusion of some later Type T bricks, pointed in hard cementitious mortar (Plate 42). During investigations five courses of brick were raked out directly above the stone course revealing early mortar, similar to that of the inner core. This demonstrates that only the upper courses were rebuilt.
- 8.4.6 Deconstruction at the north end revealed two skins of brick within the first crenellation, and mortar analysis showed that the top two courses have been rebuilt possibly with the replacement of the stonework. To the south of this crenellation brick analysis shows that Tudor and 19th century bricks have again been used.
- 8.4.7 Repair to the *north parapet* indicates this follows the same structural sequence as the east parapet. The internal face has been consolidated and the east section below the stone course is clad in a layer of cement render (probably 19th century). A projecting corbel survives which corresponds with that of the east parapet, and is at the same alignment (Plate 43). This suggests that this corbel once ran along the four faces, and has been lost elsewhere.
- 8.4.8 Analysis of the east section shows that the internal face has been rebuilt, in particularly the prominent 20th century section in the east corner. This was removed to reveal Tudor brickwork beneath the outer skin, thus confirming the structural sequence of the east parapet (Plate 44). In the central section an area of brickwork was exposed below the eastern-most crenellations revealing six courses of brickwork (mostly headers) which date from the Tudor phase (Plate 45). An area of plaster was removed below the parapets, again revealing Tudor brickwork. Three courses of brickwork below the west crenellation also revealed Tudor brickwork.
- 8.4.9 Externally, brick analysis of the outer face shows that many of the bricks date from the Tudor period and have been reused, although there has been some brick replacement in the eastern section.
- 8.4.10 Investigations of the *south parapet* show that it follows the same structural sequence as the east elevation. Internally, particularly to the east, there has been considerable brick replacement, and the parapet has largely been repointed in a hard

20th century cementitious mix with no gravel inclusions (Plate 46). Many of the bricks are 20th century stock bricks, however during the works Tudor brickwork was identified below a row of headers at the western end, demonstrating that the inner primary core again survives (Plate 47).

- 8.4.11 Investigation of the *west parapet* show that the crenellations are Tudor bricks with some later replacements (about five). Internally, at the north end, there is a clear break with an area of much later stock bricks, and at this time the whole area has been repointed in a 20th century cementitious mortar (Plate 48). To the south of this break the bricks are largely reused Tudor although a few later bricks are evident. In the north section of the elevation, directly to the south of the stair entrance, cement render (used to previously consolidate the brickwork) was removed below the crenellations. This exposed poorly coursed brickwork and it is evident that an earlier attempt has been made to repair this area. A clear break is visible and earlier Tudor brickwork is visible immediately to the south of the stairwell entrance (Plate 49).

9 Phase 6 (1888-1934): early tea-rooms

9.1 Brick Analysis

9.1.1 Analysis of the bricks according to the typology suggest that the bricks used to infill and surrounding the extant windows are red face bricks (Type T), dating from c.19th century. Within the east elevation a second phase dating from the c. 19th to 20th centuries (Type V), are evident below the ground floor window and surrounding the current entrance door.

9.2 Written Sources

9.2.1 No documentary sources were found for this period. Investigations by English Heritage show that Windows 1 and 2 in elevation C-C and Door 4 in elevation A-A (Fig. 18) belong to this phase (1990).

9.3 Drawn Sources

9.3.1 This period relates to the tower from 1888 as shown in Law's view (Fig. 19), and to the addition of the tea room against the west face of the Tower.

9.3.1 *Function*

9.3.2 The 1920s tea-room and 'Royal Nurseries' were (somewhat unofficially) run from the tower. In 1924 the Tiltyard Tower was converted to a tea house, and this was built against the west face of the Tower together with the kitchens to the south-east.

9.3.1 *Archaeological Investigation*

9.3.3 The most significant event during this period was the conversion of the tower to a three storey structure without heightening the original structure. The larger windows were removed and replaced by two tiers of smaller windows, and the east entrance was also moved further to the south (both as existing). These two events are illustrated by the brickwork surrounding the features.

Infill of windows

9.3.4 Externally Type T brickwork is evident on all four of the elevations. This brickwork has been used to infill the former windows of the east and south elevations, in addition to two smaller windows within the north elevation (Plate 50). The date of

the latter windows is not known but they must date from Phase 3 (1671/2), because one is at second floor level, and prior to this the building was single storey.

- 9.3.5 Type T bricks are also evident surrounding the later sash windows of the west, east and north elevations. A patch of red brick extending to the north of the first floor window in the west elevation, which may relate to the infill of a feature. No further information was gained from this area during investigations, however it may relate to the shaft exposed to the north of this area. Internal investigations of the east and south elevations also revealed clear sections of this later brickwork in mainly English bond (although this is not consistent).
- 9.3.6 Within the east elevation internal investigations revealed Type T brickwork surrounding the second floor window, and (particularly in the south) this extends into the 17th century brickwork resulting in the loss of the 18th century phase. At first floor level this later brickwork is evident to the north of the window, as a thin vertical strip due to the insertion of the window. To the south the brick projects further to the south at the top of this window and then extends back to the north (Plate 51). This line represents the bottom of the former window, which mirrors the base of the 18th century infill to the north of the window. Hence, to the north, the original infill of the window is extant, and to the south it has been lost. Externally the base of the window is less clearly mirrored by the infill, but an area of late-17th to mid-18th century bricks set in ash mortar indicate the position.
- 9.3.7 Within the south elevation the brick used to infill the former 17th to mid-18th century window is clearly visible (Plate 52). Internally it is also evident and the break between this and the late-17th to mid-18th century to the west, and earlier 17th century brickwork to the east, is evident.

Sash windows

- 9.3.8 Sash windows are evident on the west elevation (four), east elevation (two) and north elevation (two). Type T brickwork surrounds these four windows and has been used to architecturally embellish the structure in the form of shallow arches in brick headers. These windows may replace some earlier windows, and the removal of the south window at second floor level of the west elevation provided some further insight.
- 9.3.9 Investigations during replacement of this window revealed two oak lintels situated behind the brick of the external face, which may relate to a former opening (Plate 53). The outer timber measures 1.91 m in length, 0.16 m in height and 0.09 m in depth and is situated behind the second skin of brick. The timber has been cut in two places, and to the north a trench has been made to receive the S plate (which extends 1.09 m), and at a distance of 0.68 m from this north end a circular trench has been made to hold a lead pipe. Further investigations of the brickwork show that it is the same three skin construction as the east parapet.

- 9.3.10 A lead pipe remains *in situ* extending behind the outer skin of the brickwork to a drainpipe situated to the north. In the location of the window the pipe has been squashed behind the later brick, and at the northern edge of the window two pieces of tile have been inserted to accommodate the thickness of the lead pipe behind (Plate 54). The date of the lead pipe is uncertain, although the fact that it has been unusually squashed behind the later brickwork surrounding the window suggests that it predates this later fenestration.
- 9.3.11 The brickwork surrounding this pipe above the timber lintels is crudely constructed. The bricks are fragmentary and as a result it is difficult to accurately determine a date. However, the size of the bricks suggest they date from the 19th century (and are quite possibly contemporary with the later window). As evident in the east parapet this area is poorly bonded, although an odd bonding brick is evident.
- 9.3.12 The two lintels were removed showing they are of equal length (1.90 m), and a hard cementitious mix has been added to infill the gap between the brickwork and the south end of the timber (Plate 55). The inner timber measures 0.17 m in height and 0.11 m in depth and sits directly below the stone cornice with three trenches measuring 0.08 - 0.09 m in width. It is possible that these are joist pockets although they do not line up with the joists *in situ*. The base of the timbers show lath nails which extend to the bearings of the joists, thus demonstrating that the timbers have been reused.
- 9.3.13 The timbers may relate to a former window opening pre-dating the installation of the 1888-1924 window. The timbers fall within this later brickwork surrounding the window and the earlier brickwork (Type R to the north, and Type C to the south) is undisturbed. This and the size of the timbers illustrate that the window must have been roughly of equal size to those now *in situ*.

Floor levels

- 9.3.14 Internally during this phase of work the building was reconfigured and an additional third level was added. A central chimney stack was also inserted and considerable work was undertaken to the roof structure.
- 9.3.15 The building has a flat lead roof which is drained through two outlets, although another (now blocked) outlet existed in the north-east corner of the present stair (Foyle 2001). The roof prior to the commencement of works had steel beams on an east/west alignment between the parapet walls, which also supported a water tank. Softwood boards lie over the joists (and under the lead).
- 9.3.16 The area between the chimney and west elevation revealed softwood joists on a north/south alignment which have been reinforced with additional elements, and these are *c.*0.26 m apart and measure *c.* 0.10 by 0.13 m (Plate 56). They sit on large trusses projecting on an east/west alignment, which are secured with large iron straps (no foundry markings were identified; plate 57). The roof is a somewhat ad

hoc construction and has been reinforced and replaced throughout the course of time. Investigations showed that the floor level has been heightened as some timbers and trenches are evident at a lower level. Four joists to the south-east of the chimney stack, are situated below the trusses. These are numbered III, IIV, VII and are substantially different to those seen elsewhere; they may survive from an early phase or have been reused from elsewhere.

- 9.3.17 Replastering of the ceiling provided the opportunity to view sections of the ceilings. The configuration of the floor levels means that these elements must date from the 19th century (although some timbers appear to be earlier and reused). Patches of plaster are probably Victorian in date although a substantial amount is later. This probably dates from the later part of phase five or the refitting of the tea-room in phase six.
- 9.3.18 Removal of plaster within the north, south and east elevations in particular revealed large areas of cement and patching. This is particularly evident on the north and south elevations at first floor level and relates to the consolidation of the area following the change in floor levels (Figs 10-13).

Structural repairs

- 9.3.19 In the 19th and 20th centuries major consolidation works occurred at the tower; evidence for this was revealed during internal investigations of exposed brickwork. Generally, the north, east and south elevations show that thin sections of wood have been inserted into the Henrician brickwork. In some cases these appear to have been used to tie the brickwork together, whilst others have chamfered edges to 'receive' later phases.
- 9.3.20 The consolidation work is however most clearly shown within the brickwork of the south elevation at first floor level (Plate 58). Here two distinct phases of patching are evident, predominately consolidating the Tudor break to the west and east. The mortar is clearly later and cementitious, but the variation in colour and bricks illustrates that it does not all relate to one phase of works. These phases of patching are also evident on the west and north elevations at first floor level.
- 9.3.21 Following rectified photography, an area of plaster was removed within the west elevation at first floor level, to the north of the south window, showing consolidation of this area (Fig. 17). The earliest phase of brickwork conforms with the external analysis and is Type J; it contains a section of stone measuring 0.48 by 0.16 m (Plate 59). This is not thought to have a particular significance, but has simply been salvaged and reused in the reconstruction of this area. Much of this brickwork has been lost to later repair which must have followed the insertion of the window.
- 9.3.22 At the base of this area (below the widow sill) is an area of patching which is also evident at first floor level of the south elevation. The brickwork is a mixture of

phasing with some early (possibly 16th and 17th century) bricks (particularly to the south of this area) and some later 19th and 20th centuries bricks. The cementitious pointing is significantly different from other areas of patching and is much paler, almost white in colour.

- 9.3.23 Throughout the tower there are numerous examples of bricks surrounded in ash-coloured mortar, which varies in shades of grey and consistency and is thought to date from the 18th and 19th centuries. In some examples the bricks have simply been reused, while in others they have been replaced with later 1888-1923 bricks (these are identified on the drawings where later bricks have been replaced only). Other examples may also relate to repair works or the reconfiguration of the building during the course of time.

Fixtures and Fittings

- 9.3.24 In general the interior fittings and décor appear to be late 19th or early 20th century, however they actually date from the creation of the tea-rooms after 1923, but use somewhat old-fashioned detailing and design. The internal partition walls date from this sixth phase, because these must have been reconfigured following the addition of a floor level. Only small sections of plaster were removed during investigations and therefore more accurate analysis of partition walls was not possible. A thin strip of brickwork removed on the east internal wall within room TYSF001 exposed reclaimed brick, of the same type evident within the exposed brickwork of the south, north and west elevations. This demonstrates that the consolidation of these external elevations is contemporary with the insertion of the partition walls.
- 9.3.25 At ground floor level the stairs appears to be of one build and have turned softwood spindles and posts, probably dating from the conversion of *c.* 1923. At first floor level, the internal fabric including the windows is late 19th - early 20th century or later in date. Within room TYFF001 there is a decorative open fire surround, as also evident in room TYFF002 which has tile cheeks and a grate (Plate 60). The second floor has an iron grate in room TYFF001 and an integral bench in room TYSF002, again thought to date from the late 19th - early 20th century.
- 9.3.26 Investigations of the paint schemes within the first and second floor level revealed a stratigraphy of paint colours which must date from and pre-date Phase 6. Overall, the sequence of colours are similar, which indicates that the rooms were all repainted at the same time, rather than on a piecemeal basis. Examples of wall paper were also evident, as well as an ornate embossed frieze which extends 0.27 m below the ceiling around room TYSF001.
- 9.3.27 At second floor level a pipe was revealed just below ceiling height along the east wall. Within room TYSF003 this measures 2.10 m in length and extends 0.12 m from the wall, and is supported on a wood ledge (painted blue) and has a bulb-shaped opening at the north end (0.07 m in diameter). This also extends into room TYSF002 above the window and runs down at the south end of the room

terminating in a tap. At the north end an additional pipe extends down through the floor boards, where it has been cut off to allow for the insertion of later pipes. (Plate 61).

- 9.3.28 Investigations at first floor level in room TYFF003 (the water closet) revealed brickwork dating from Phase 6 extending *c* 0.33 m from the edge of the partition wall. This relates to the conversion of the space into a water closet.
- 9.3.29 Within the basement a dumb waiter survives which is thought to relate to the 1923 tea room and suggests that food preparation was carried out here, possibly using the blocked fireplace. Investigations of the paintwork at first floor level (room TYFF002) revealed the remains of a wall scar from its operation (Plate 62). A number of floor boards were also lifted which revealed the open space for the lift, and 20th century softwood joists.

Culvert

- 9.3.30 A culvert was identified in room TYBA001 of the basement constructed from 18th/19th century bricks, some of which with plastered surfaces, have been reused from elsewhere (Plate 63). The feature extends *c*.0.40 m below the current floor level and has been infilled in part with rubble which includes plates, nails, plaster, knives and part of a marble table top. This dates from the use of the building as a cafe and probably dates from the work undertaken during the 1930s. Other areas have been infilled with a grey cementitious mortar which includes pebbles. The culvert extends to the south wall of the building, and at the terminus bricks have been placed loosely on end. This wall shows evidence of a join at the same alignment as the culvert, which may be related.
- 9.3.31 As part of the 2005 investigations a slab was removed at the foot of the stairs, which also identified a narrow culvert (Oxford Archaeology 2005). The bricks to the culvert were thought to be 16th/17th century in date, although this was at a different alignment to the one identified as part of the 2006 investigations.

External appearance

- 9.3.32 Overall, there are numerous different examples of pointing within the Tiltyard Tower. Archaeological investigations show that the building has undergone conservation works during the course of history, and in particular in the 19th and 20th centuries. This is evident in the various phases of patching and repair, as well as the external repointing and paint scheme of the building.
- 9.3.33 Examples of red paint identified during investigations indicate that the Tiltyard Tower was painted, probably in its entirety, during the 19th century. Such work is typical of the period and at Hampton Court Palace was seen in the recent investigations of the external north elevation of the Chapel (OA 2007). The work at the Tiltyard probably relates to the building's conversion to a tearoom and the desire

to improve and represent the building during the 19th and 20th centuries. Several examples of red paint are evident on the surface of the bricks and overlying the pointing. In places a lighter coloured pointing has been darkened to a charcoal colour to improve the definition of the brickwork. Elsewhere, darker ribbon pointing is evident which is a more cementitious mix with gravel inclusions.

- 9.3.34 The three sections of the *north elevation* have ribbon pointing in black ash, with the exception of the central phase of the west division which has been pointed in a lighter grey cementitious mix. Throughout the Tiltyard Tower this hard pointing has evidently damaged the bricks, causing the edges to become friable and break. The pointing of the later brickwork surrounding the window here and throughout the building, is a lighter grey in colour and has less depth.
- 9.3.35 At first floor level, to the east of the window, there has been some repair to bricks and cementitious mortar has been placed over the brickwork. In places this has been painted with a red paint to bridge the gap between arrises, and create a more uniform external appearance. Evidence of 19th century cement repair to individual bricks is also visible throughout the elevation, and 20th century cement repair work is evident in the area of the drainpipe and outlet at ground floor level. Similar 20th century repair is also evident at second floor level, to the east and west of the window, and at three levels where bars have been secured over the sash windows.
- 9.3.36 At first floor level the small window infilled in 1888 - 1924 shows evidence of red paint, and it is possible that the bricks were painted red and then repointed as this underlies the ash pointing (Plate 64). Some examples of penny roll pointing are also evident, and these two methods combined would have increased the definition of the external appearance. Directly to the west, the Tudor brickwork has been repaired and a cementitious mortar with large gravel inclusions has been used to bridge gaps between bricks. At the western edge, roughly central between the two infilled windows and a second floor level, the bricks are worn in distinct ridges, which is probably a result of previous vegetation (ivy?).
- 9.3.37 Overall, the *west elevation* has black ash ribbon pointing, although at ground floor level much of this had been removed at the time of investigation. Within the north and south sections there has been some repair, and cementitious mortar with small gravel inclusions has been overlain on bricks at ground and first floor level in order to repair the surface of damaged bricks. This is distinct in having penny roll pointing, and where it overlays the pointing it has been painted black to communicate a uniform appearance (Plate 65). It is particularly evident in the south section at first and second floor levels, especially at the southern corner at first floor level where the bricks are more weathered. At ground floor level this is now light pink in colour but presumably was primarily red, and has faded in the course of time.

- 9.3.38 At first floor level there is some 20th century cement repair at the join of the extension of the tea-room to the west, and elsewhere there is minor 19th century repair to single bricks or a small group of bricks at first and second floor levels. There has been considerable repair work in the southern section of the west elevation below the parapet, and to the north of the window. The removal of the window showed that this is related to a lead pipe which ran behind the brickwork.
- 9.3.39 Red paint was again used to improve the definition of the building, particularly on the later brickwork surrounding the windows. It seems likely that this area was covered in a layer of red paint following the infill, and subsequently has been pointed in a thin layer of ash coloured mortar. To the north of the windows at first floor level red paint is also evident overlying the black ash pointing (Plate 66). Although this red paint underlies the ribbon pointing, overall the two events are probably contemporary, and the paint has been used to brighten the appearance of the bricks and add contrast to the dark pointing.
- 9.3.40 Within the area of the diaper work of the *east elevation* the pointing is a mixture of types as areas have been repaired on a piecemeal basis, but it differs from the black ash ribbon seen elsewhere. Generally it is a cementitious mix with gravel inclusions and the pointing is scored in places and flat in others. At the south edge of the elevation black ash ribbon pointing is visible, and it is probable that the gravel pointing post-dates an earlier black ash phase. Overall, to the south of the window at all levels there is a mixture of both types of pointing. At the north of the windows the pointing is more friable and lighter in colour, although it has evidently been darkened and scored to define the edges of the bricks (Plate 67).
- 9.3.41 Several examples of pieces of red/orange brick were identified which had been mixed with the pointing and placed over the break between the Tudor and 17th-century phases (also evident on Plate 67). This is particularly evident between structural and phasing breaks, to provide a continuous alignment to the coursing, and close to the north edge where the brickwork (particularly headers) have been damaged. Here this method has been used with scoring to define the edges of the bricks, and false joints has been used to provide some consistency to the coursing.
- 9.3.42 The Henrician brickwork to the north of the first and ground floor windows showed several examples of red paint on the surface of the bricks, thought to date from the 19th century. A substantial area of red paint was also identified on the surface of the bricks at ground floor level (Plate 68). Cream coloured pointing has been used (as above) which has been darkened; in areas this has been placed over the edges of the bricks and painted red. In other places the pointing has clearly been scored, and charcoal coloured paint added to define edges only. Bright red paint is evident within the pointing of the truncated arches, and instead of being used to define edges between the bricks and mortars it has been used to portray these as solid features. The black ash ribbon pointing has been retained within the Type O brickwork used to infill below the arch.

- 9.3.43 The north section of this elevation is entirely black ash, generally this pointing is ribbon but in places it has been scored. Below the parapet 19th century red paint is visible (as on the remainder of the elevation) on the surface of a number of the bricks.
- 9.3.44 The pointing of the *south elevation* is the same type as that to the north of the window on the east elevation, and is of a creamy friable consistency with small pebble inclusions. This has also been darkened to a charcoal colour although it has faded in many places leaving darkened edges around the outline of the bricks only. Red paint is evident on the surface of the bricks, as well as the surface of the mortar, which demonstrates that the pointing and paint scheme are contemporary (Plate 69). It was probably intended to paint the bricks and this is a ‘slip of the hand’ by the workman. The differential cracks between the phases have also been patched up and again this is contemporary with the pointing. The mortar has been coloured to conform with the surrounding bricks in an effort to provide a straight alignment to the coursing.
- 9.3.45 The pointing of the infilled arch is red in places, as seen in the east elevation, and appears to have been mixed in with the mortar. Cement repair (20th century) has been used to patch up the differential crack at the west edge of the 18th century phase.

Access

- 9.3.46 The current external entrance to the Tiltyard is in the east elevation, although there is also an internal entrance via the cafe in the west elevation. This was added in 1924 (Type V brick), and it is clear that this time the lower section of the former central entrance was infilled and a window inserted within the top division. Investigations by English Heritage show that access Doors 2 and 3 were also built in 1924 (see Fig. 18), together with the refacing of the lower course of the 16th century boundary wall.
- 9.3.47 The alteration in floor levels also led to an alteration in access arrangements to these levels. A staircase would have been added, and during examination of the shaft within the west elevation, sections of timber were identified which are thought to relate to a former staircase here (Fig.16). A staircase must have been necessary following the conversion of the building to two storeys, which may also have been located within this area. However, the sections of timber identified appear to be later in date and probably date from Phase 6.

10 Phase 7 (1932-1995) Later Tea-rooms

10.1 Drawn Sources

10.1.1 Cartographic sources relating to the Tiltyard during this period were not available for use within this section.

10.2 Written Sources

10.2.1 English Heritage have undertaken some plan regression using Ministry of Works plans relating to the kitchen area, although these were not available for the 1920s and 1930s and therefore a more detailed breakdown of works at this date is not possible. In 1932 kitchens were added to the north-east of the tower, and doors 6 and 7 may relate to this work (English Heritage 1990).

10.2.2 This research shows that the existing tea house was built in the 1960s. Door 1 was added, door 4 is thought to have been converted to a hatch and the breeze block infill also date to this time. In 1994-5 the tea-rooms were modified and given something of the appearance of the earlier (1932) tea-rooms (English Heritage, undated).

10.3 Function

10.3.1 During this period the Tiltyard Tower continued as a tea-house (Fig,20).

10.4 Archaeological Investigations

Fixture and fittings

10.4.1 There are numerous interventions relating to the 20th century, for the insertion of boilers, electric and water supply. The ground floor appears to be largely 20th century, which is related to the insertion of the tea rooms and improvements to these. At first floor level in room TYFF001 the walls are clad in varnished thin match boarding probably dating from the mid 20th century.

Lightning Pits

10.4.2 Two small lightning pits were dug in front of the east elevation. The first measured 0.50 m by 0.38 m and was 0.29 m in depth, and the second was of the same depth and measured 0.41 m by 0.56 m. It was hoped that this would identify Tudor elements, perhaps relating to a bay window, but the areas consisted of made-up ground and modern pipes.

11 Conclusion

- 11.1.1 Archaeological investigation of the Tiltyard Tower has elucidated the complex phasing of the building within seven key episodes, showing that it has been subject to several major episodes of reconstruction and continued consolidation. The investigations largely concord with the historical views of the structures and provide further understanding of the stratigraphy of the building. They also increase our understanding of the external appearance of the building, in particular the large projecting Tudor windows, and the 19th century paintwork to improve the uniformity of the building.
- 11.1.2 The conservation works were aimed at consolidating through an informed understanding of the archaeology of the building, and the replacement bricks and mortar were matched to the phases of construction. The functions of some features remains undetermined, such as the shaft in the west elevation, and these have been recorded and preserved *in situ*, in the event that further evidence may come to light. Overall the investigations demonstrate that the building was built as a temporary structure, as shown by its poor construction. Its survival, through numerous changes of use and ad hoc alterations to the structure, can be regarded as something of an architectural miracle. The conservation and archaeological work means that its history may now more easily be communicated through the external elevations.

APPENDIX I Bibliography

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APPENDIX II: Lithological Survey**LITHOLOGICAL SURVEY OF THE MASONRY OF THE TILTYARD TOWER,
HAMPTON COURT PALACE.**

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

6th June 2006**Introduction:**

This report was requested by Ms Susan McDonough of the Department of the Surveyor of the Fabric, Historic Royal Palaces, to identify the stone types present and assess their historical importance.

Identification of the stone types was made visually *in situ* from scaffolding, during maintenance and conservation work carried out during the summer of 2006. Identification of individual stones has been noted on the following photogrammetric drawings, of the exterior elevations, surveyed by The Downland Partnership, at a scale of 1:20, December 1999.

HCP/TLT/501. North elevation.

HCP/TLT/502 South elevation.

HCP/TLT/503 East elevations.

HCP/TLT/504 West elevations.

No photogrammetric drawings of the interior faces of the crenelated parapets were available at the time of the survey. Outline sketches of the stonework, prepared from tracings of ordinary photographs and the photogrammetry of the exterior of these areas by the writer are presented as Figures 1-4 in the Appendix, below.

Most of the structure of the tower is of brick, of various dates, and stonework is confined to the crenellated parapet and a moulded string course at its base, on the exterior, and a blocked Venetian door at the base of the east side. Window sills may be of stone, but were thickly painted and the details could not be seen. A few small areas of mortar repair are present in the stonework.

Stone identification was achieved by *in situ* examination, no samples were removed for laboratory analysis. Extensive moss growth, lichen encrustation and dirty patination obscured the finer detail of surface textures at the time of the survey, but it is considered that the identifications are in general satisfactory

The following stone types were identified during this examination :-

Bath stone (undifferentiated).

Lincolnshire Limestone. Weldon type.

Portland stone.

Wheatley Limestone.

Stones.

Bath Stone (undifferentiated on drawings). (Middle Jurassic, Great Oolite Formation)

A group of medium to coarse grained, matrix prominent, more or less shell-rich oolitic limestones from the Cotswold Hills around Bath. There appear to be at least two variants present here.

1. a shell debris rich type where the shell is concentrated in thin lamellae which weather-out as small ridges. This stone is of the Combe Down Oolite type, and seems to be characteristic of the crenellation copings.
2. a more homogeneous type with little or no obvious shell debris. This is the type present in the string course.

There appear to have been two phases of use of type 2, as that in the south elevation string is well preserved and similar lithology can be seen pieced-into the weathered powdery stones of the northern aspects. Apart from the south side, nearly all the small basal roll moulding at the bottom of the string course has been replaced.

Bath Stones were rarely brought to London before the opening of the Kennet-Avon canal at the beginning of the 19th century, but with the development of the railway system, they became very common (and cheap) from the 1840's onwards.

Lincolnshire Limestone. Weldon type. (Middle Jurassic, Upper Lincolnshire Limestone Formation)

Grey patinated, grain prominent oolitic limestone with little intergranular cement. Abraded and micritised shell fragments are scattered throughout. The structure is macroporous.

This lithology is typical of the area around Weldon in northern Northamptonshire, where it has long been quarried. It has a very good reputation for weather resistance, and it is surprising that no other undisputed uses of this stone in the Thames Valley are known to the writer.

In the Tiltyard Tower it is concentrated in the crenellation copings, where it is associated with shell laminated Bath Stone, and as replacement to Wheatley Stone in the weathering course below the crenellations of the interior face of the parapet. A small quantity is also to be seen pieced-in in the string course.

Portland Stone. (Upper Jurassic, Portland Formation)

Only three pieces of this near white medium grained oolitic limestone from south Dorset were noted. They form the threshold, and the two lateral lintols of the blocked Venetian door of the east side.

Portland Stone has been used extensively at Hampton Court since Sir Christopher Wren's remodelling at the beginning of the 18th century, for new build and patching.

Wheatley Limestone. (Middle Jurassic, Corallian Group)

A series of slightly variable, fine to medium grained, granular to flaky shell debris porous grey-buff limestones formerly quarried at the adjacent parishes of Headington and Wheatley, now in the outskirts of Oxford. It is not possible to distinguish between the produce of these quarries.

Heavily patinated Wheatley Limestone may be distinguished from the Weldon Stone, to a large extent, by its pitted weathering. This was caused by growth of scattered moss colonies, and consequent solution by retention of acidified moisture. Associated Weldon Stone does not show this pitting.

Apart from three possible pieces in the eastern and northern string course, it is largely present in the weathering course of the interior parapet. It has a poor reputation in Oxford, but is plentiful and often well preserved at Hampton Court (see e.g. the Great Gate House windows and Base Court arch (16th century), and the Fountain Court cloisters (late 17th century). The only later work using this stone near London, known to the writer, are Asgill House, Richmond on Thames and Danson House, Bexleyheath, Kent, built by Sir Robert Taylor in the 1760's.

One stone in the weathering of the east side of the tower, is inscribed "GH 1967". As the Wheatley quarries were more or less abandoned before the Second World War (Arkell, 1947), it is unlikely that this refers to the emplacement of newly quarried Wheatley Stone at Hampton Court.

Reference

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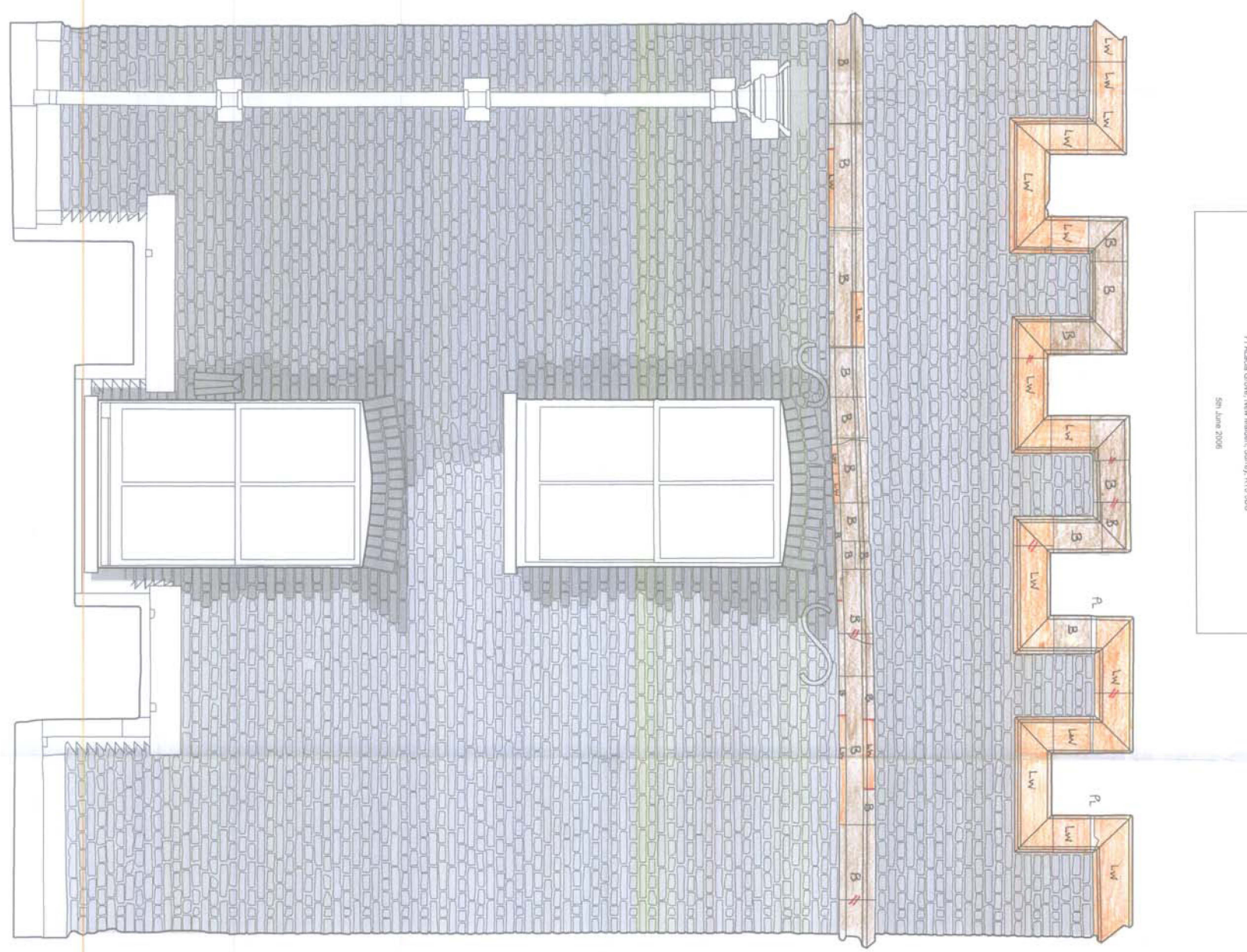
R. W. Sanderson.

APPENDIX

Outline sketches of the stones of the parapet interior faces.



B



H

Lithological Colour Key

- B Bath Stone Underlaid
- LW Lincolnshire Lst. Weldon type
- PL Plastic repair

Additional mortar joints marked in red. Erroneous joints struck-out with double red ticks.

Lithological survey by
Robin W. Sanderson,
71 Kasal Grove, New Malden, Surrey, KT3 3BU
28 June 2006

This corner represents a rebuild in Tudor bricks following the demolition of a stair turret; its date is probably C1670, and certainly before C1705 as xxxx shows no turret. It is basically Flemish bond.

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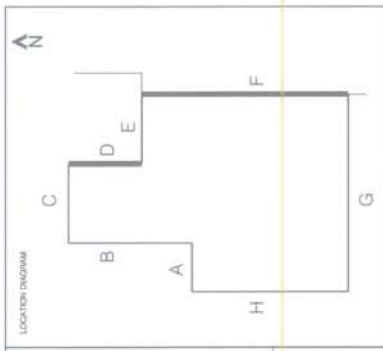
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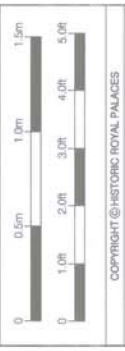


	C. 1537
	C. 1600-1670
	C. 1700-1750
	C. 1800-1900
	C. 1888-1923
	C. 1923 -

REV	DATE	DETAILS
A	28/9/01	LETTERS ADDED TO ELEV KEY

TILTYARD TOWER
HAMPTON COURT PALACE

EAST ELEVATIONS



HISTORIC ROYAL PALACES

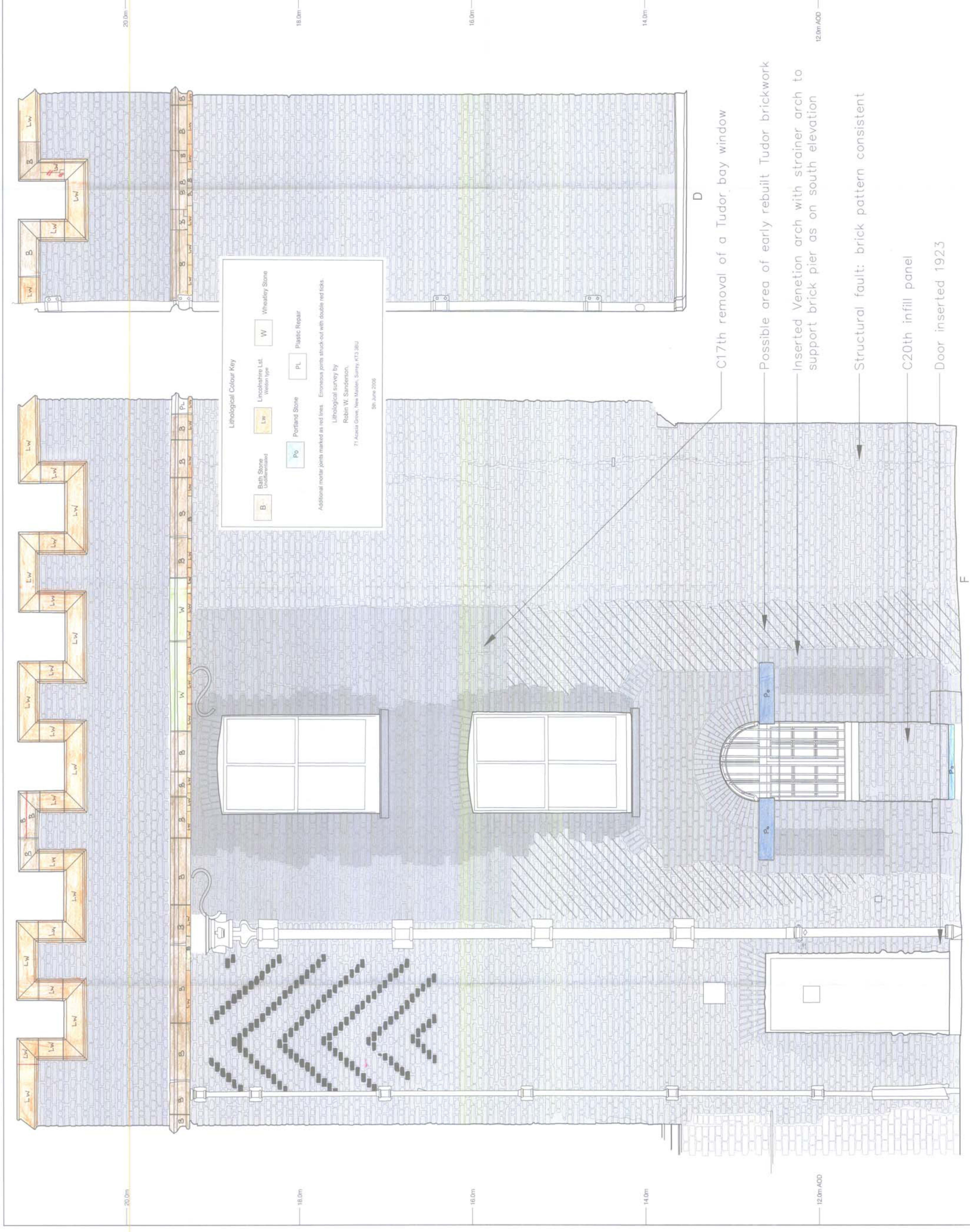
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HCP/TL/7503 A



Lithological Colour Key

	Bath Stone Undifferentiated		Lincolnshire Lst. Weldon Type		Wheatley Stone
	Portland Stone		Plastic Repair		

Additional mortar joints marked as red lines. Erroneous joints struck-out with double red ticks.

Lithological survey by
Robin W. Sanderson,
71 Alesia Grove, New Malden, Surrey, KT3 3BU
26 June 2006

- C17th removal of a Tudor bay window
- Possible area of early rebuilt Tudor brickwork
- Inserted Venetian arch with strainer arch to support brick pier as on south elevation
- Structural fault: brick pattern consistent
- C20th infill panel
- Door inserted 1923

D

F

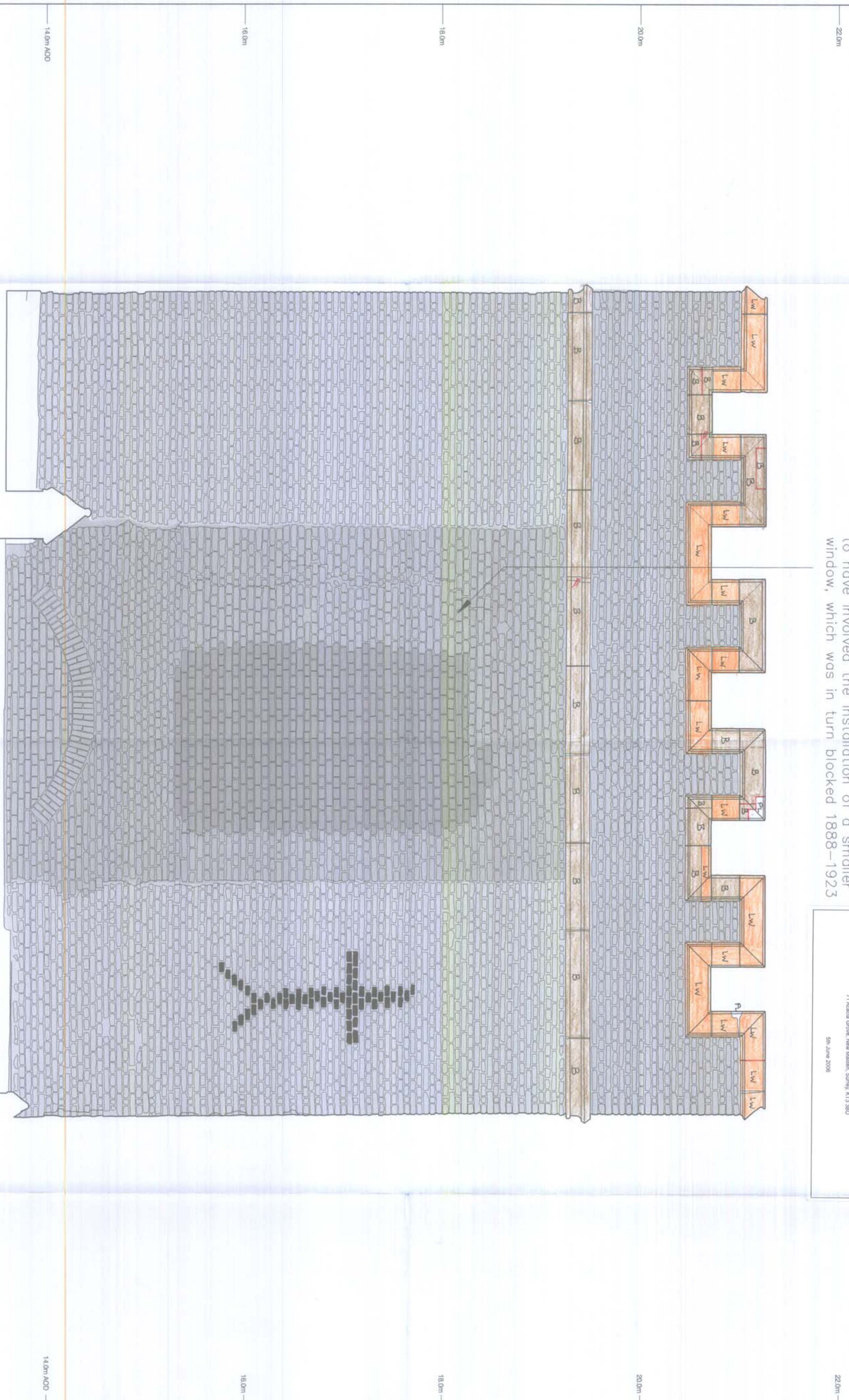
C18th infill of late C17th window – this seems to have involved the installation of a smaller window, which was in turn blocked 1888–1923

Lithological Colour Key

B	Bath Stone Undersetted	LW	Limestone Lint Window type	PL	Plastic repair
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Additional mortar joints marked in red. Erosion joints struck-out with double red ticks.

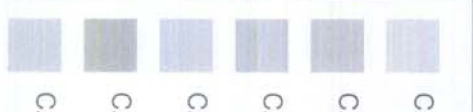
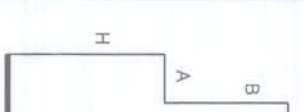
Lithological survey by
Robin W. Sanderson,
71 Acacia Grove, New Malden, Surrey, KT3 3BU
5th June 2006



There is no information on the Tudor fenestration. This could represent the demolition of a Tudor bay window or blocking for reinforcement. That there is no bonding makes this unlikely, however.

G

LOCATION PLAN

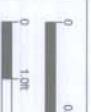


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TILTY HAMPTON

SOUTH

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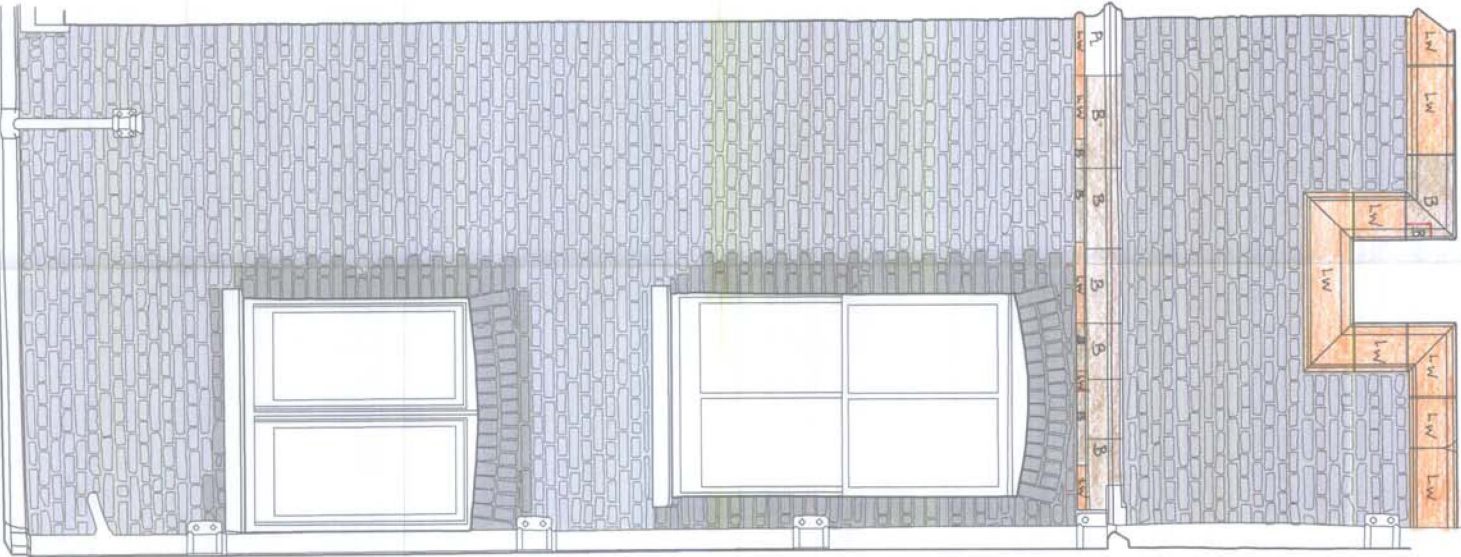
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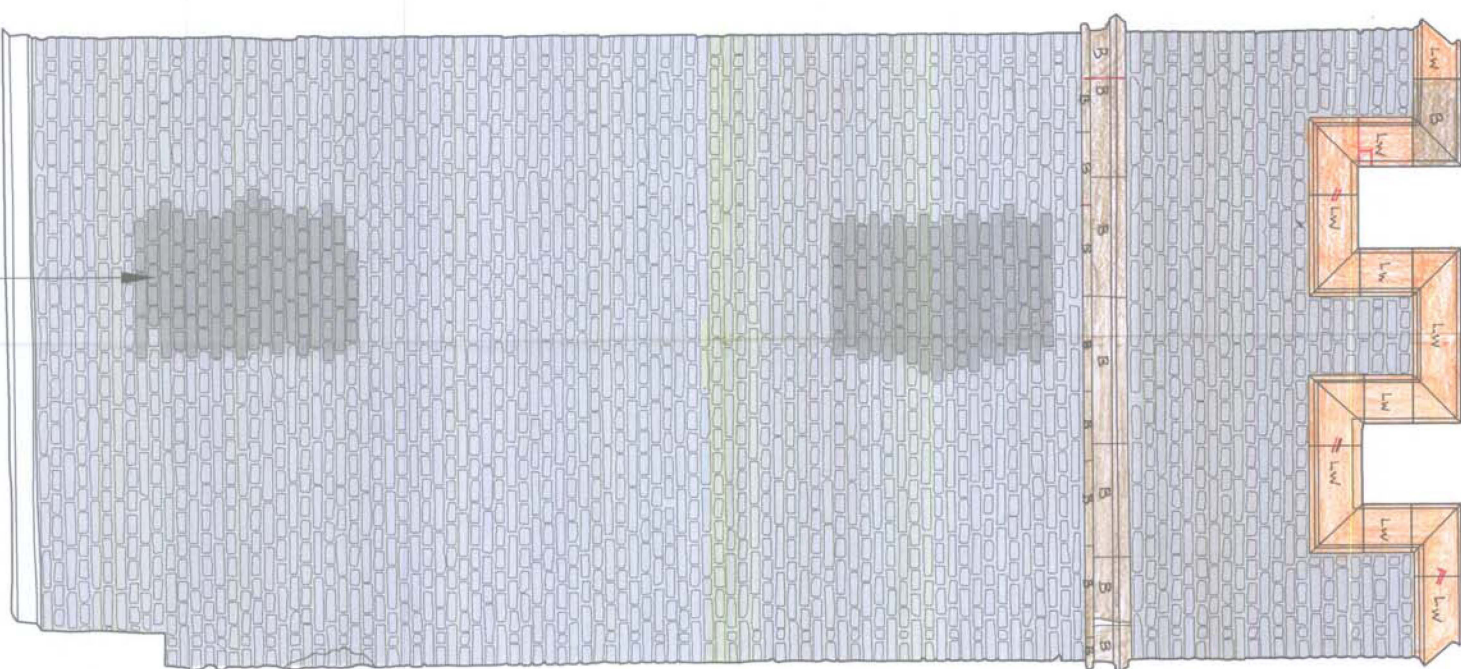
E

Lithological Colour Key

- B** Bath Stone Underpinned
- LW** Lincolningate Lint. Window type
- W** Wheelwright Stone
- PL** Plastic repair

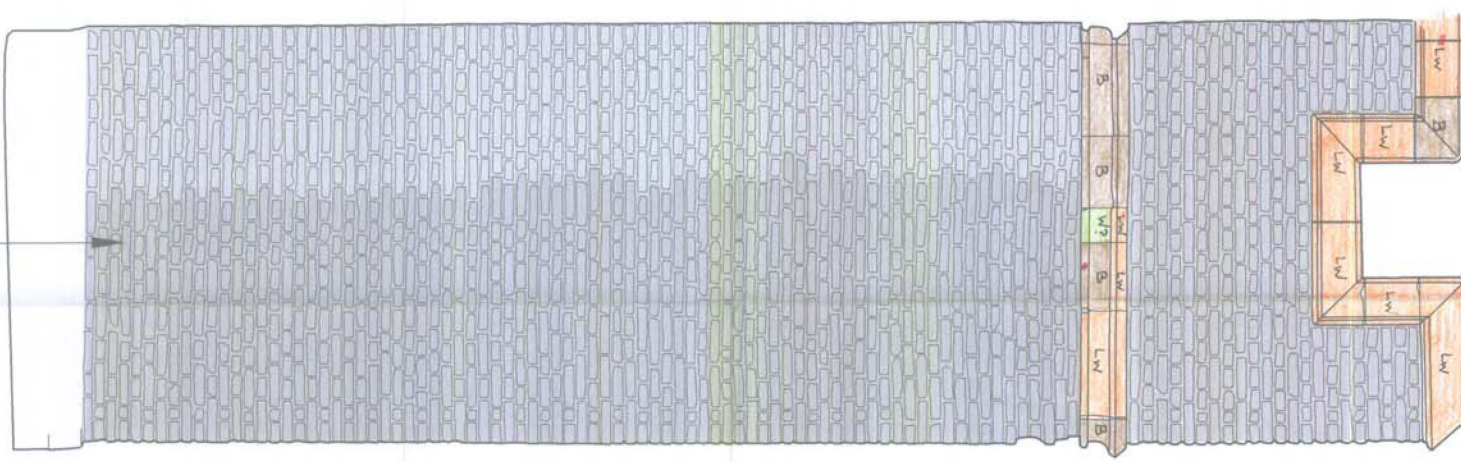
Additional mortar joints marked in red. Emersay joints struck-out with double red ticks.

Lithological survey by
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71 Alcazar Grove, New Malden, Surrey, KT13 8JU
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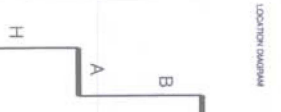
C

Infill to small windows

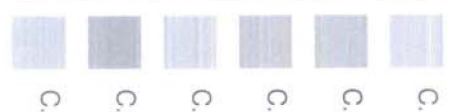


A

C18th repair to crack caused by differential settlement at the junction of the brick corner of C.1670 that replaced the Tudor stair turret.



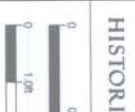
LOCATION DIAGRAM



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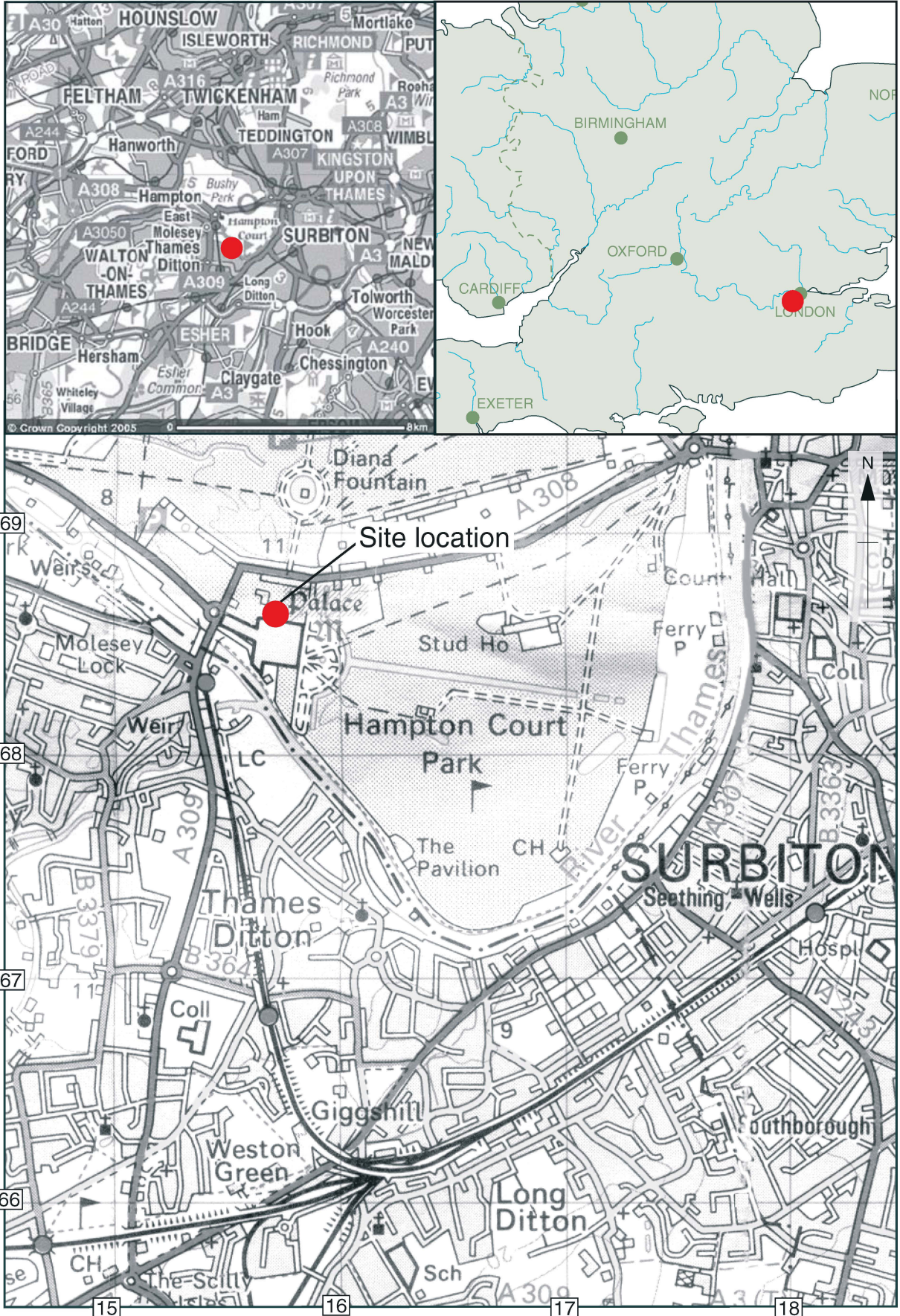
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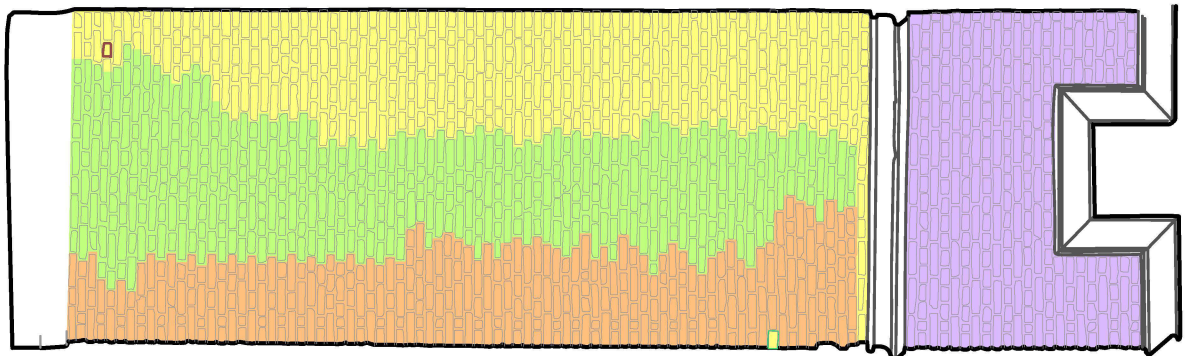
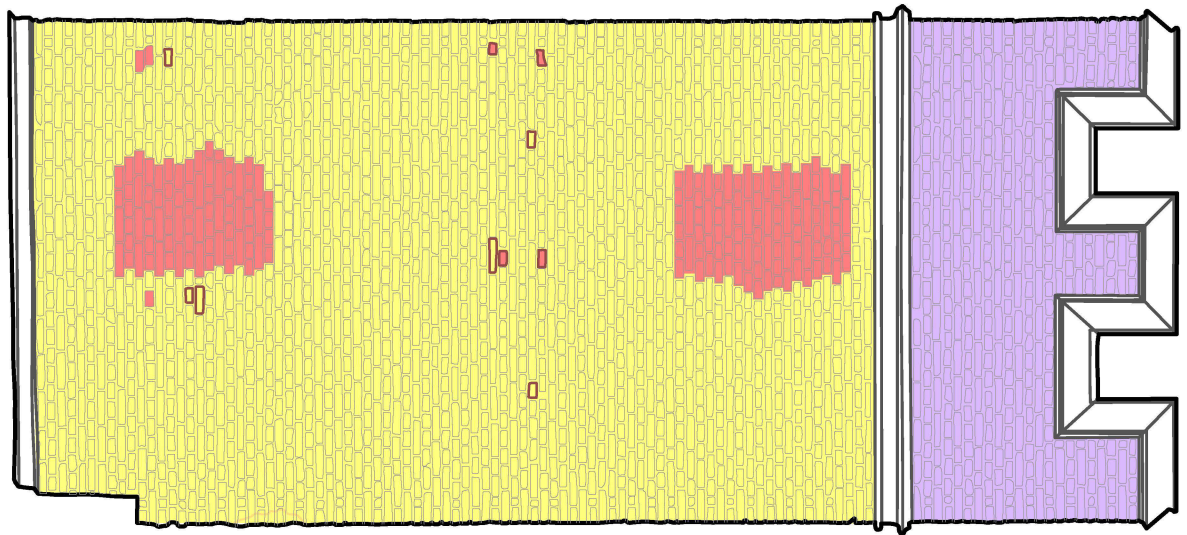
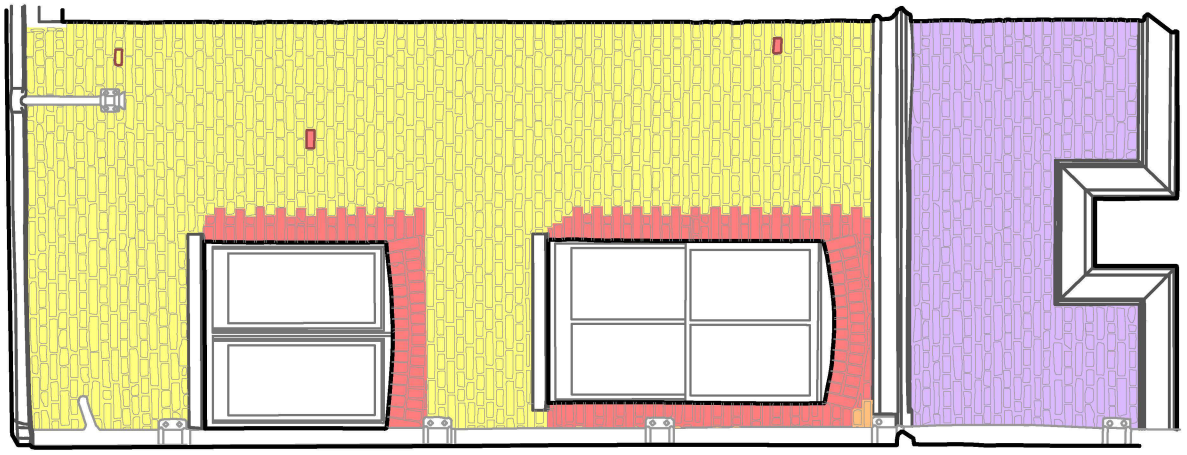
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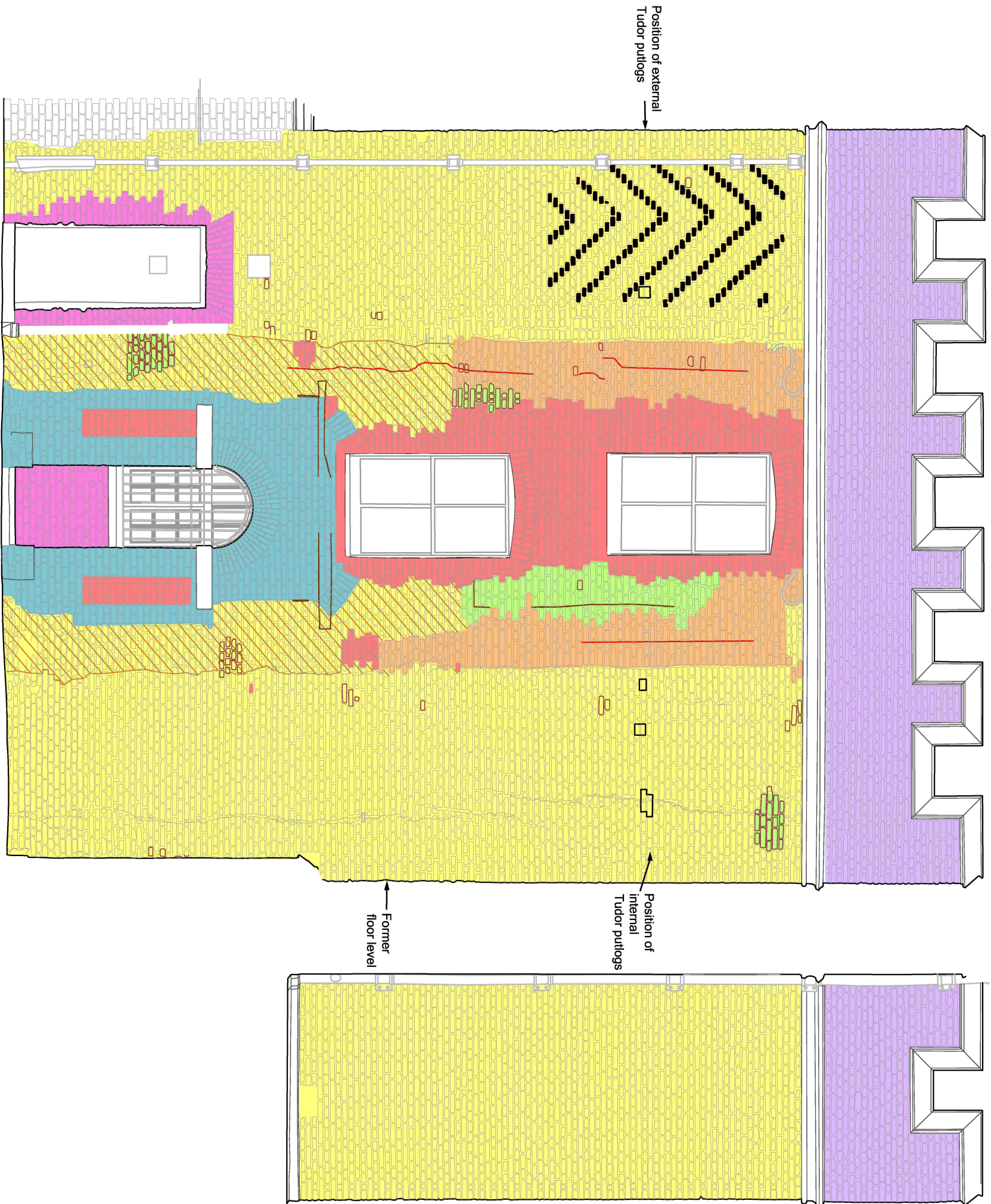
Figure 1: Site location



Brick Typology	
Phase 2 c: 1537 Type C: Henrician Stock brick (1529-1566)	Yellow
Phase 3 c: 1600-1689 Type R: Stock brick (17th-18th Century)	Orange
Phase 4 Late 17th - mid 18th Century Type J: Wren stock brick (late 17th - early 18th Century)	Green
Phase 5 19th Century Rebuild using Tudor and 19th Century brick	Purple
Phase 6 1888-1924 Type T: Red face brick (c. 19th Century)	Red
Bricks repointed in Ash Mortar (probably 18th Century)	White outline

0 1m
1:50

Figure 2: North elevation



Brick Typology	
Phase 2 c. 1537 Type C: Henrician Stock brick (1529-1566)	Phase 3 c. 1600-1689 Type R: Stock brick (17th-18th Century)
Phase 4 Late 17th - mid 18th century Type J: Wren stock brick (late 17th - early 18th Century) Type O: London stock brick (mid 18th Century)	Phase 5 19th Century Rebuild using Tudor and 19th Century brick
Phase 6 1888-1924 Type T: Red face brick (c. 19th Century) Type V: Stock brick (c. 19th - 20th Century)	Bricks repointed in Ash Mortar (probably 18th Century)

Internal Phasing Breaks	
Phase 2: Tudor	Phase 3: 1600-1689



Figure 3: East elevation

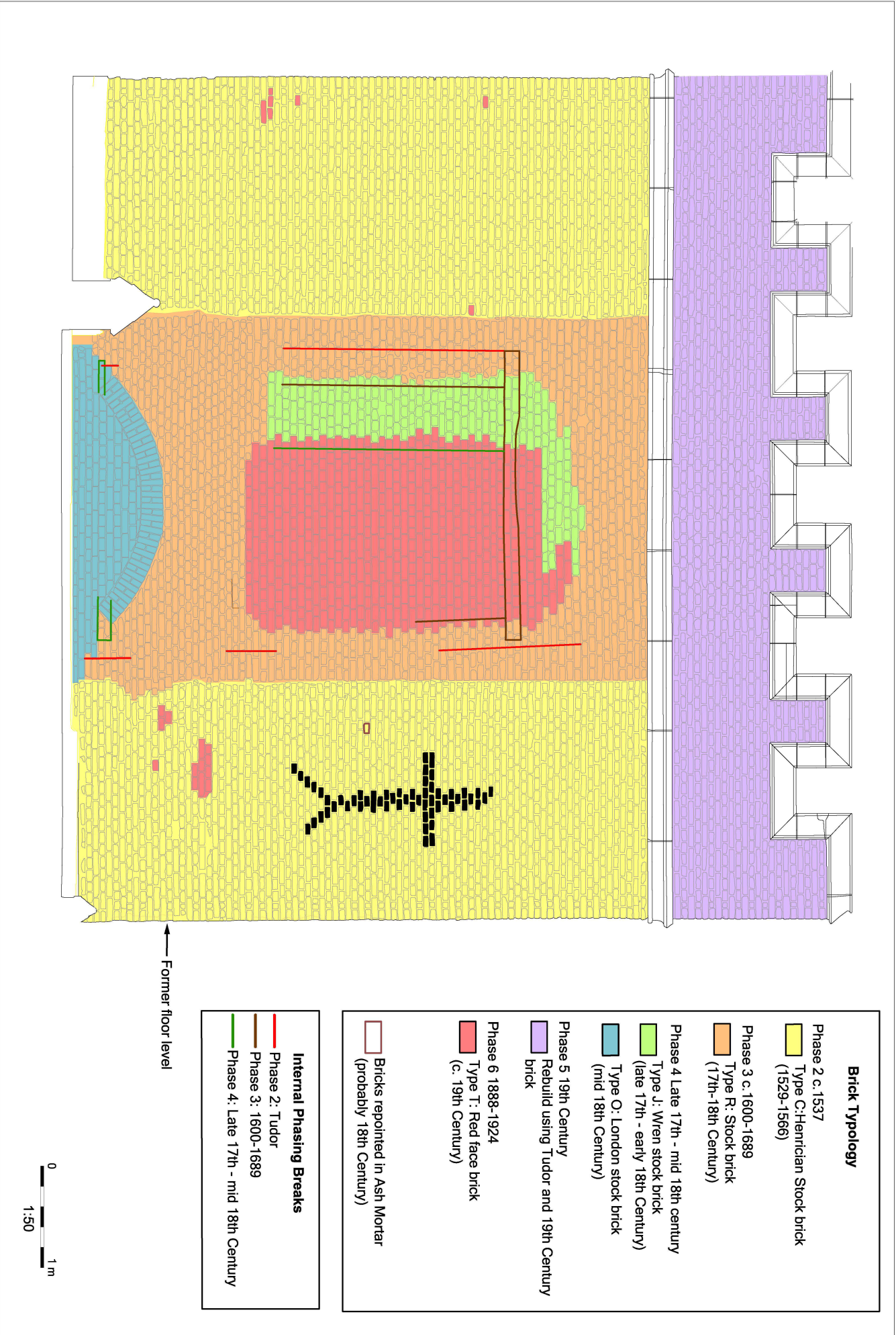
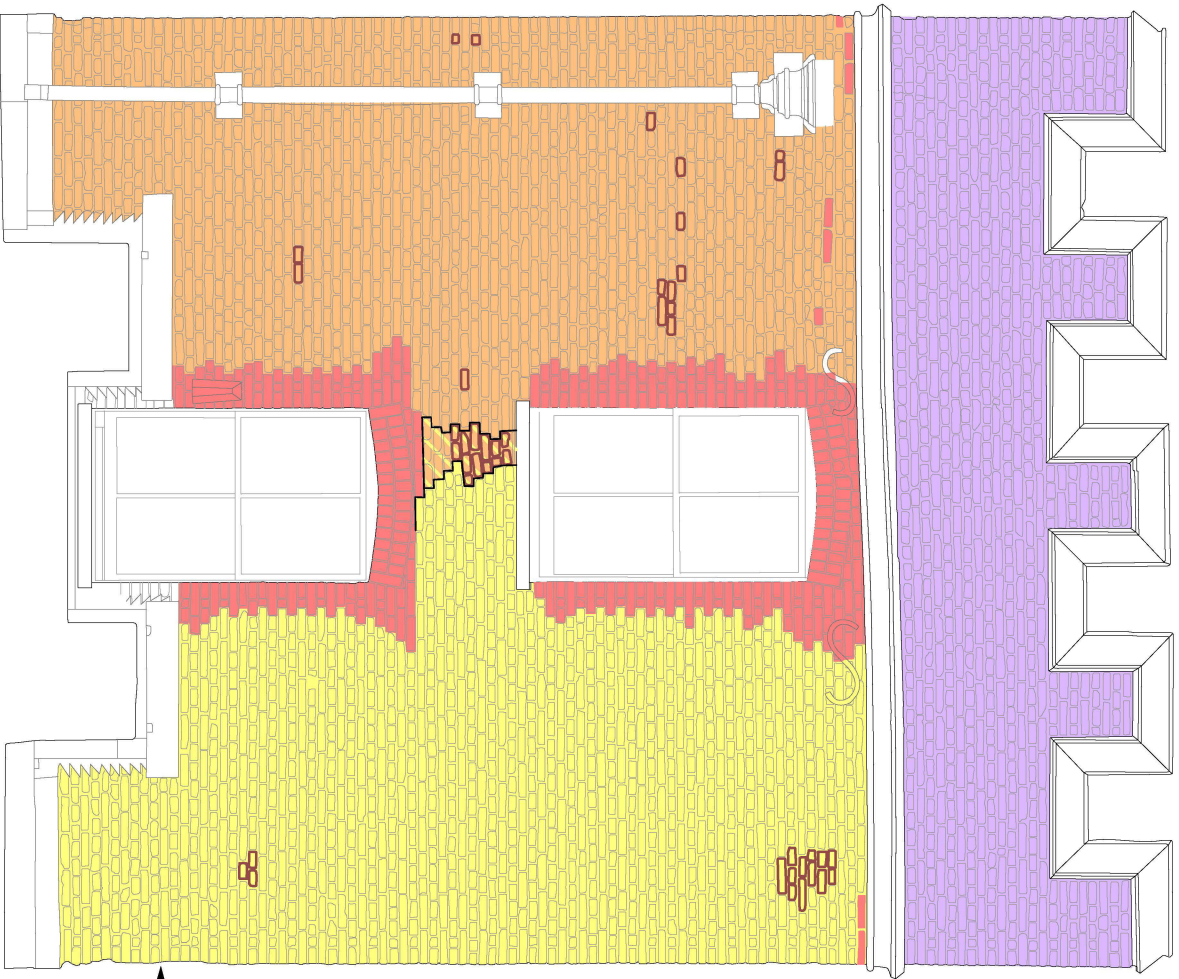
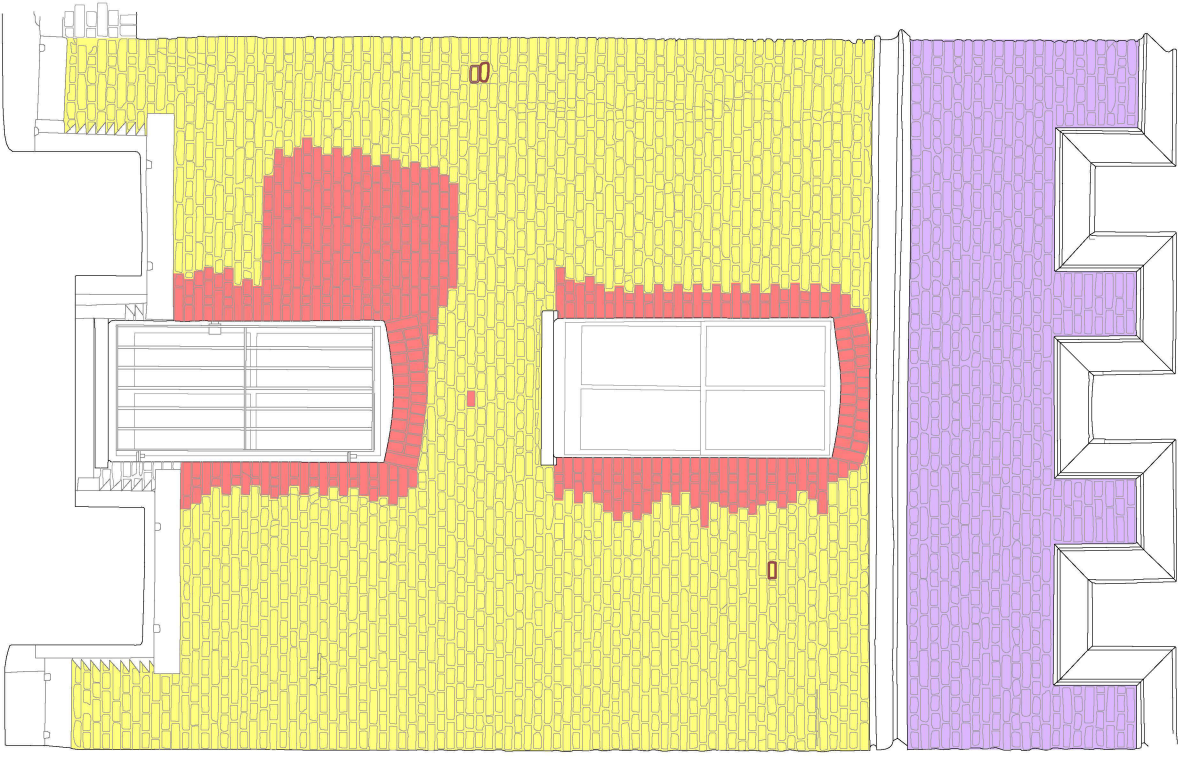


Figure 4: South elevation

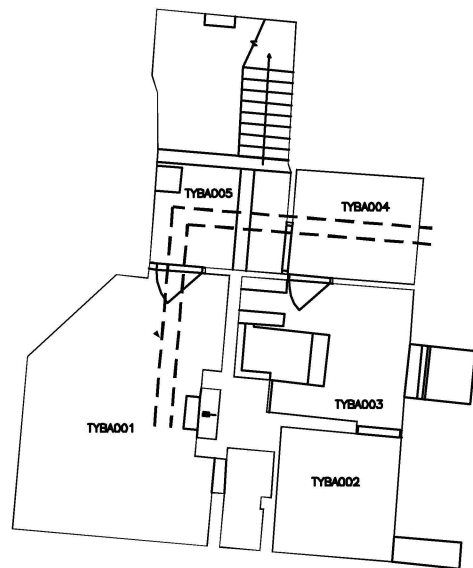


Brick Typology	
Phase 2 c. 1537 Type C: Henrician Stock brick (1529-1566)	Yellow
Mixed phase patching	Diagonal lines
Phase 3 c. 1600-1689 Type R: Stock brick (17th-18th Century)	Orange
Phase 5 19th Century Rebuild using Tudor and 19th Century brick	Purple
Phase 6 1888-1924 Type T: Red face brick (c. 19th Century)	Red
Bricks repointed in Ash Mortar (probably 18th Century)	White outline

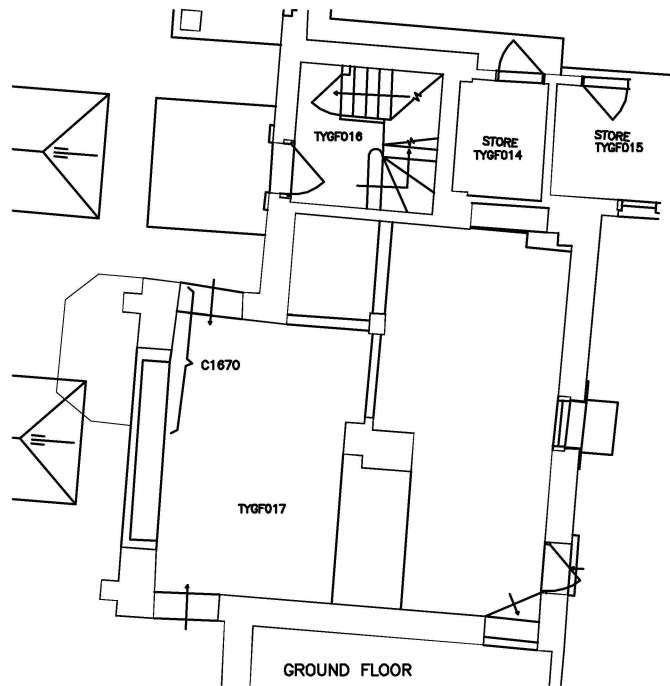
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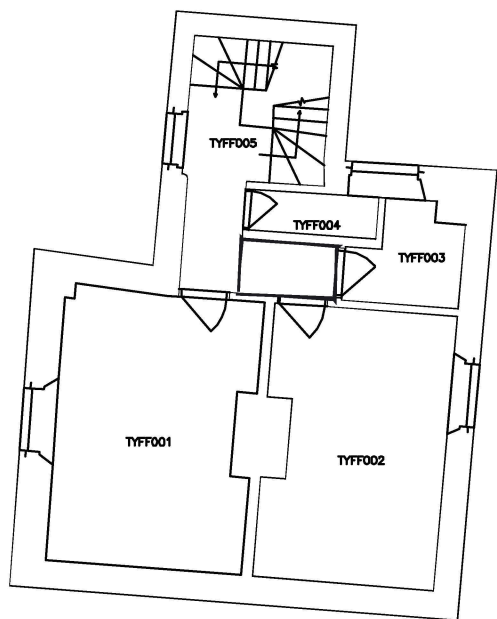
Figure 5: West elevation



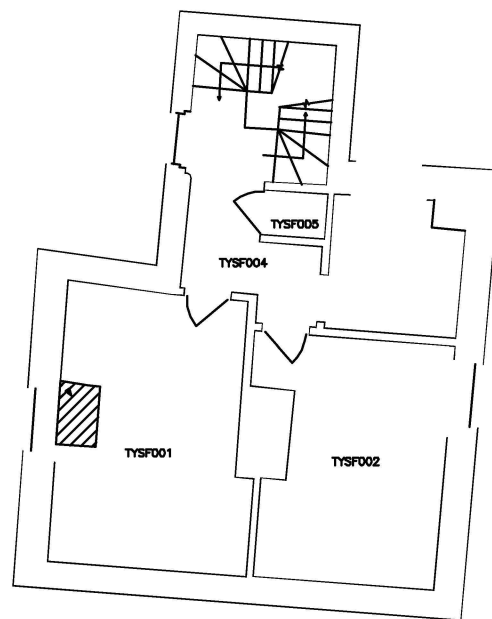
BASEMENT



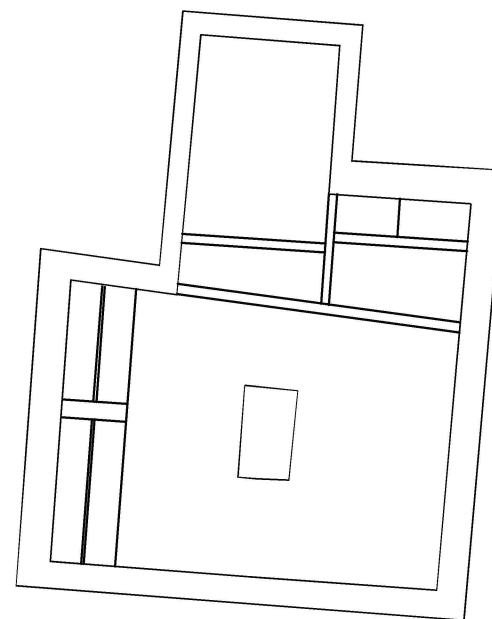
GROUND FLOOR



FIRST FLOOR



SECOND FLOOR



KEY:

- REVISIONS/NOTES
- BRW BRICK WALL
 - BSL BEAM SOFFIT LEVEL
 - COL COLUMN
 - CSL CEILING SOFFIT LEVEL
 - DRL DOOR HEAD LEVEL
 - FCSL FALSE CEILING SOFFIT LEVEL
 - FL FLOOR LEVEL
 - LL LANDING LEVEL
 - RSJ ROLLED STEEL JOIST
 - WHL WINDOW ARCH HEAD LEVEL
 - WSL WINDOW ARCH SILLING LEVEL
 - WL WINDOW LEVEL

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SHEET LAYOUT

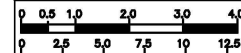


HAMPTON COURT
 PALACE
 TILYARD TOWER

BASEMENT, GROUND,
 FIRST & SECOND
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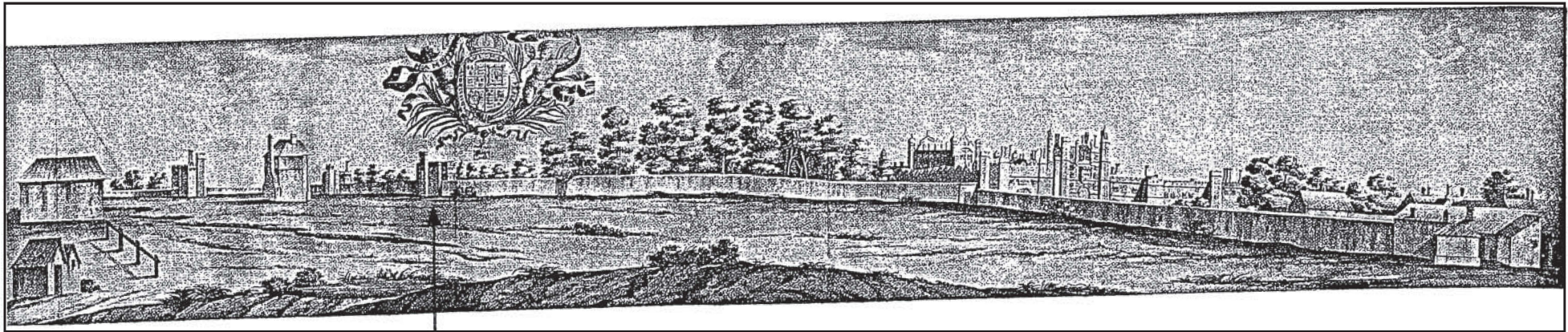
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PRELIMINARY ISSUE

Figure 6: Floor plans



SURVIVES

Figure 7: Wyngaerde's View (1558)

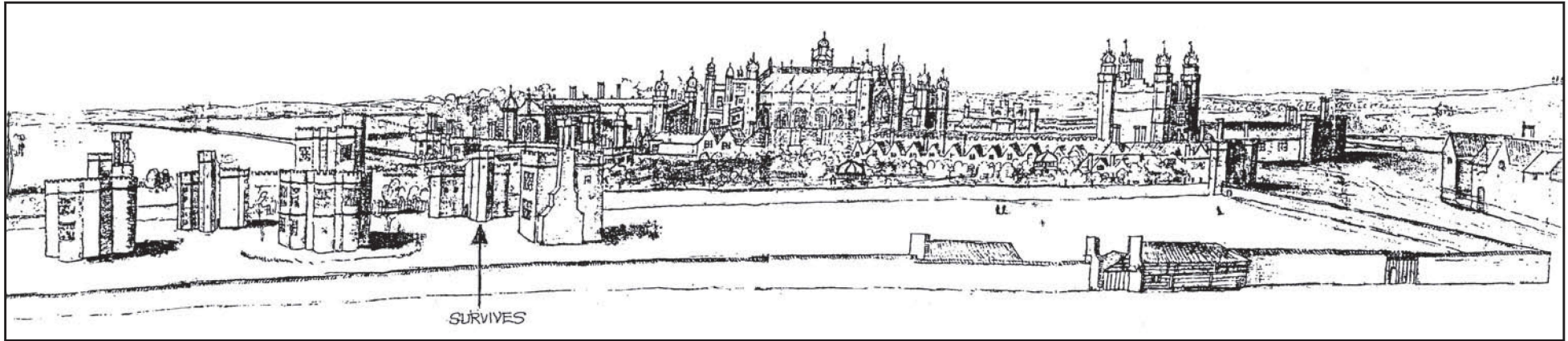


Figure 8: Cosimo de Medici III's View (1669)

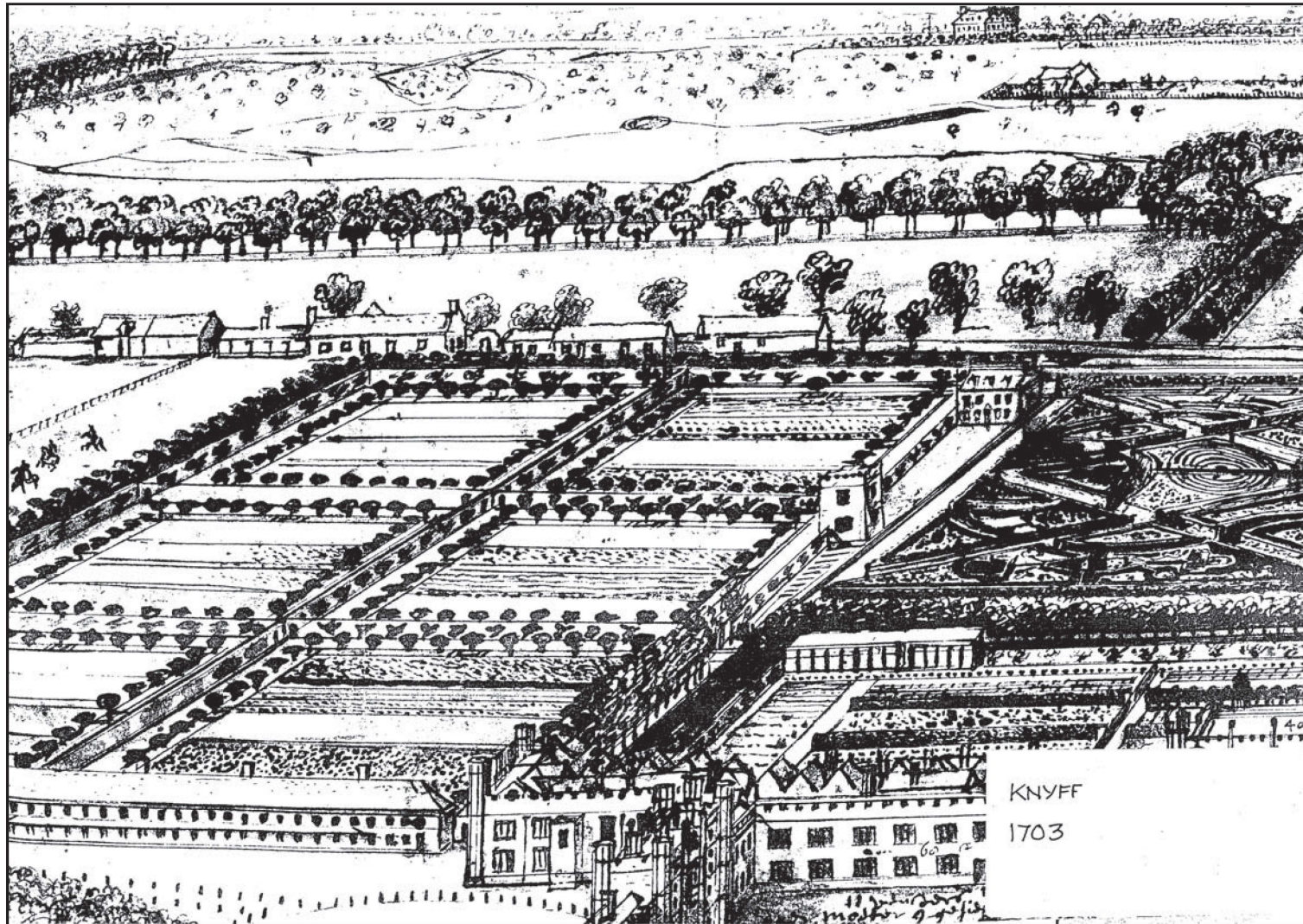


Figure 9: Knyff's View (1703)



Brick Typology	
	Phase 2 c. 1537 Type C: Henrician stock brick (1529-1566)
	Phase 3 c. 1600-1689 Type R: Stock brick (c 17th - 18th Century)
	Phase 4 Late 17th - mid 18th Century Type J: Wren stock brick (late 17th - early 18th Century)
	Phase 6 1888-1924 Type T: Red face brick (c. 19th Century)
	20th Century patching with reclaimed brick
	Timber
	Window ledge/skirting board

0 0.5 m
1:20

Figure 10: East wall, internal phased brickwork, first and second floor

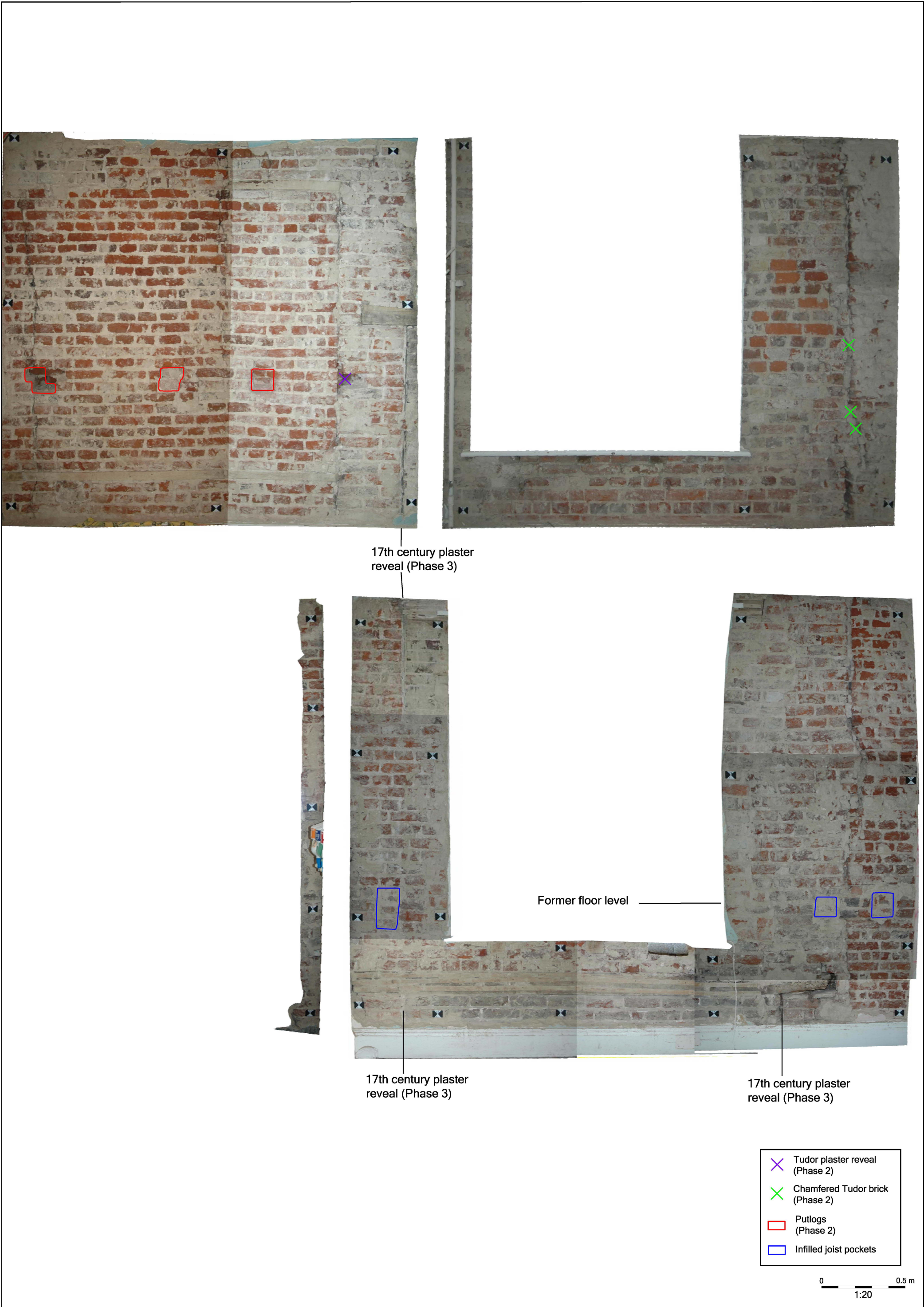


Figure 11: East wall, internal phased brickwork, first and second floor, showing further archaeological detail

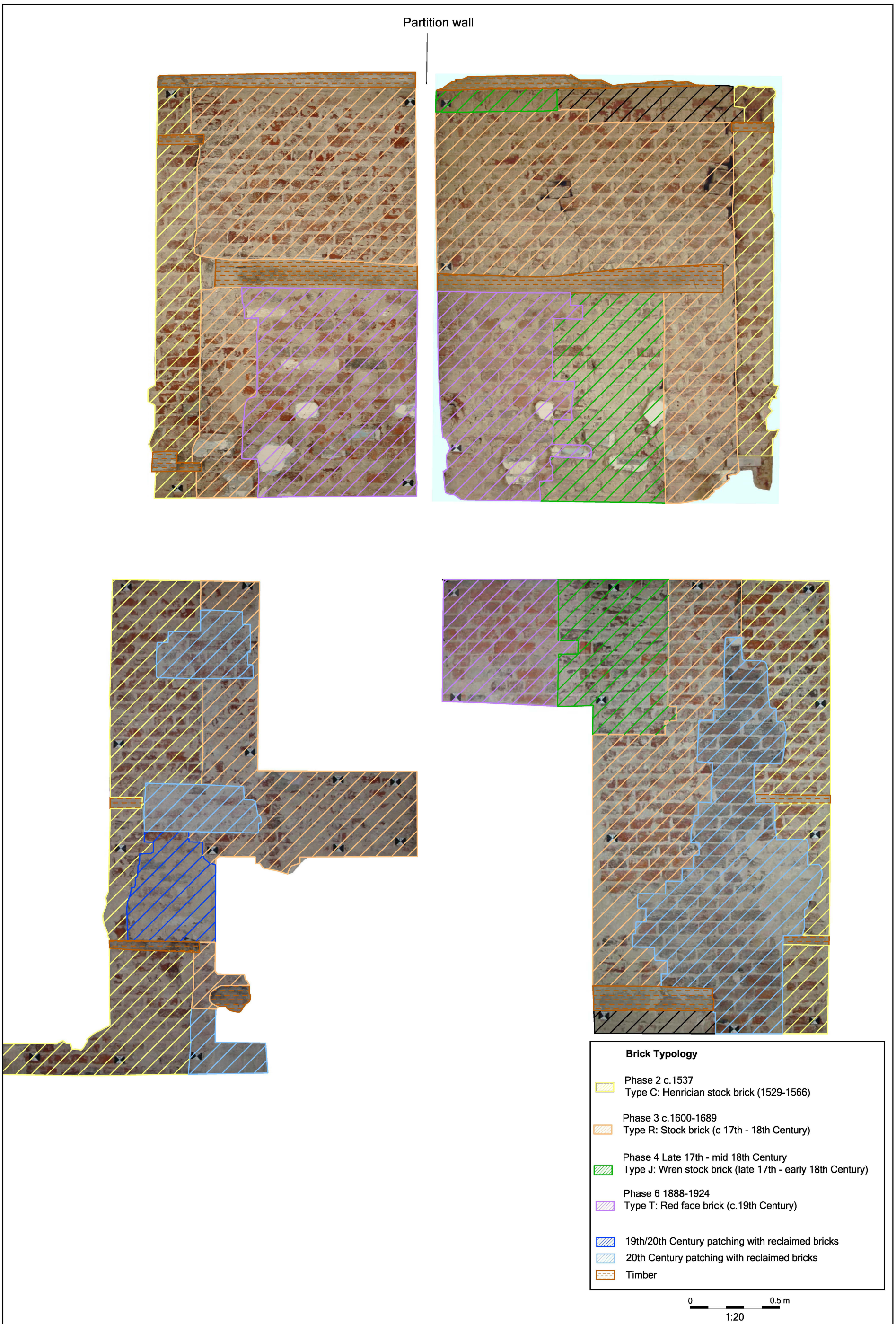


Figure 12: South elevation, internal phased brickwork, first and second floor

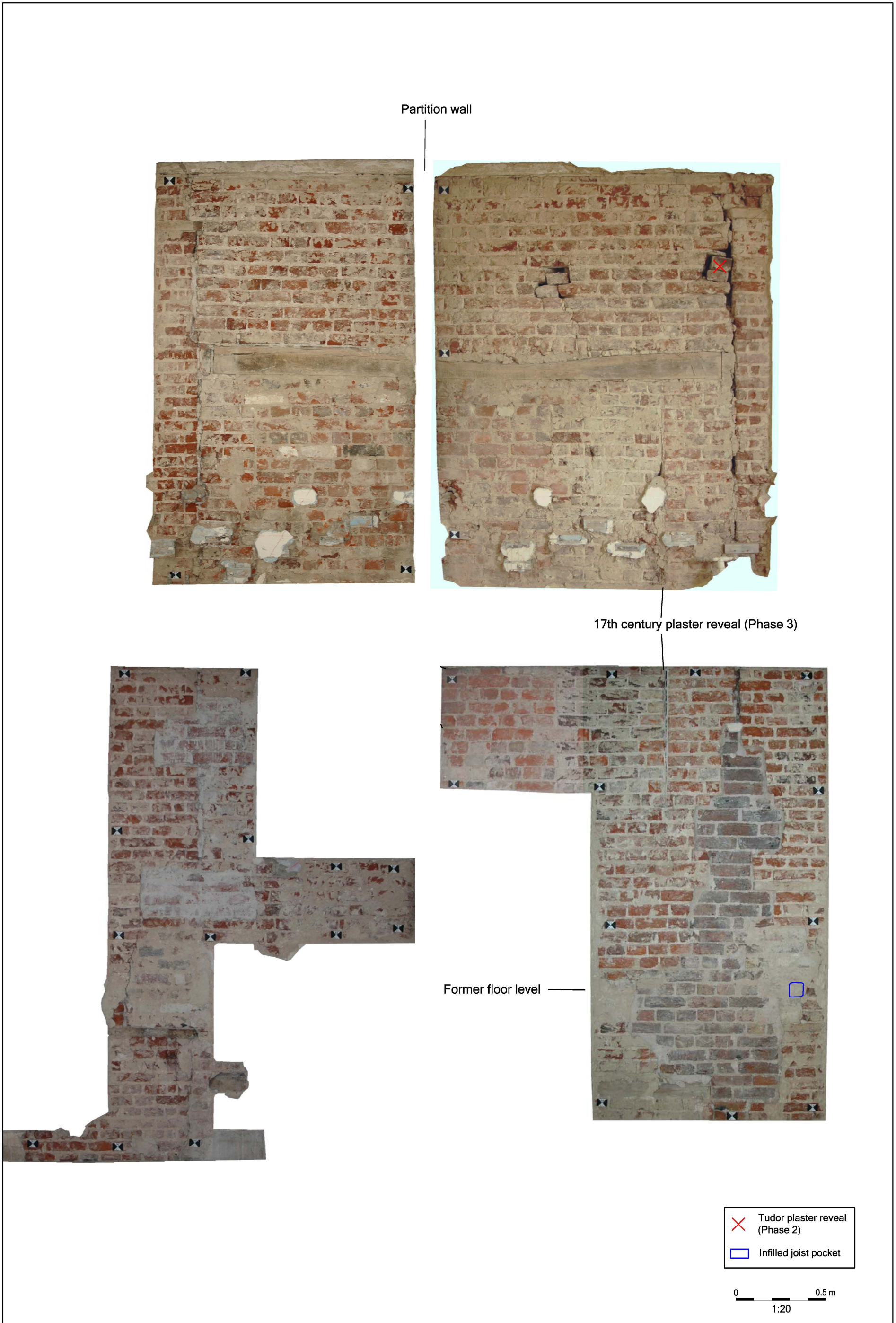
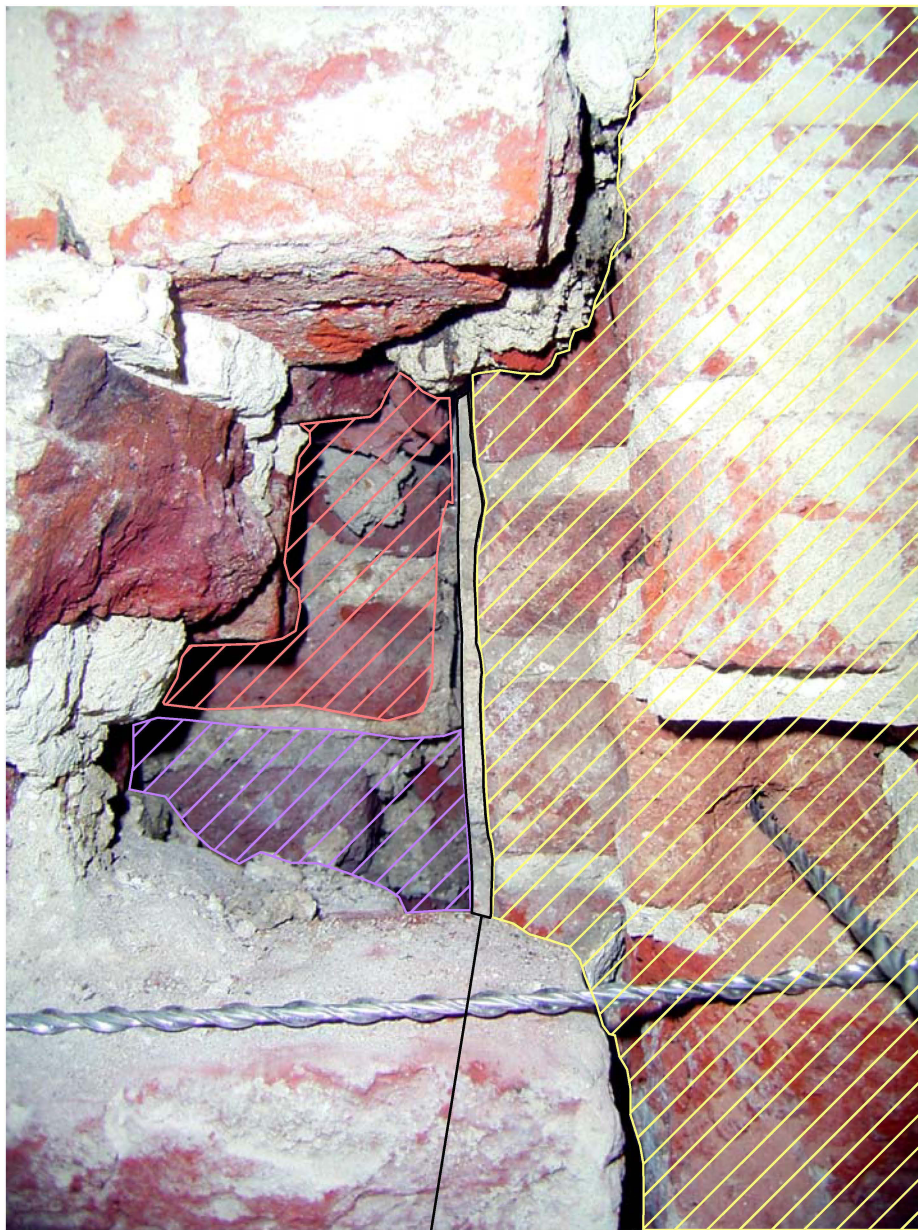





Figure 13: South wall, internal phased brickwork, first and second floor, showing further archaeological detail



Tudor plaster reveal

Bricks cut back
0.11m

-  Phase 2 c. 1537
Type C: Henrician stock brick (1529-1566)
-  Phase 3: c. 1600-1689
Type R: Stock brick (17th-18th Century)
-  Phase 6 1888-1924
Type T: Red face brick (c. 19th Century)

Not to scale

Figure 14: East elevation, internal view, second floor, showing infill to Tudor window

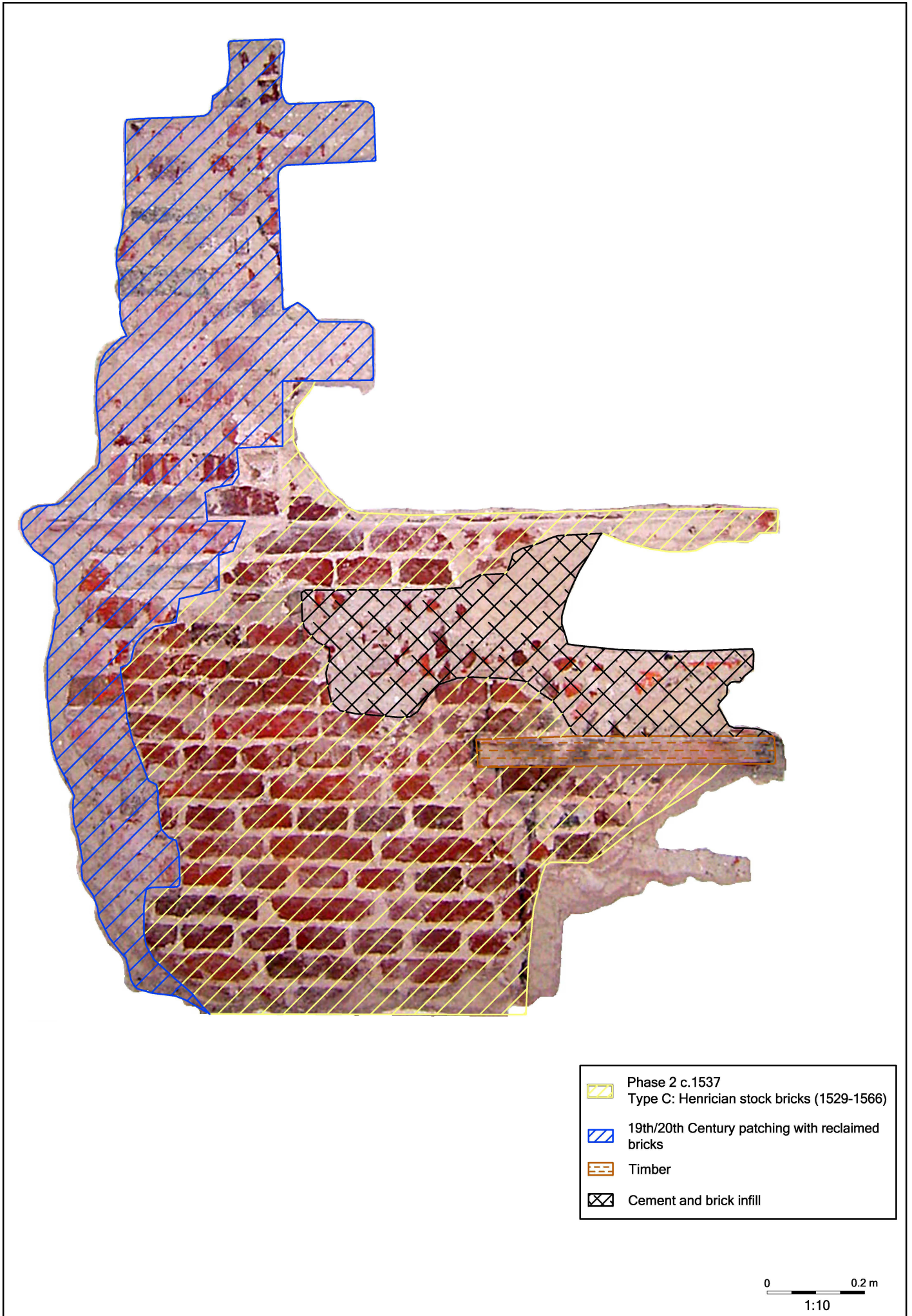


Figure 15: North elevation, first floor, internal exposed brickwork

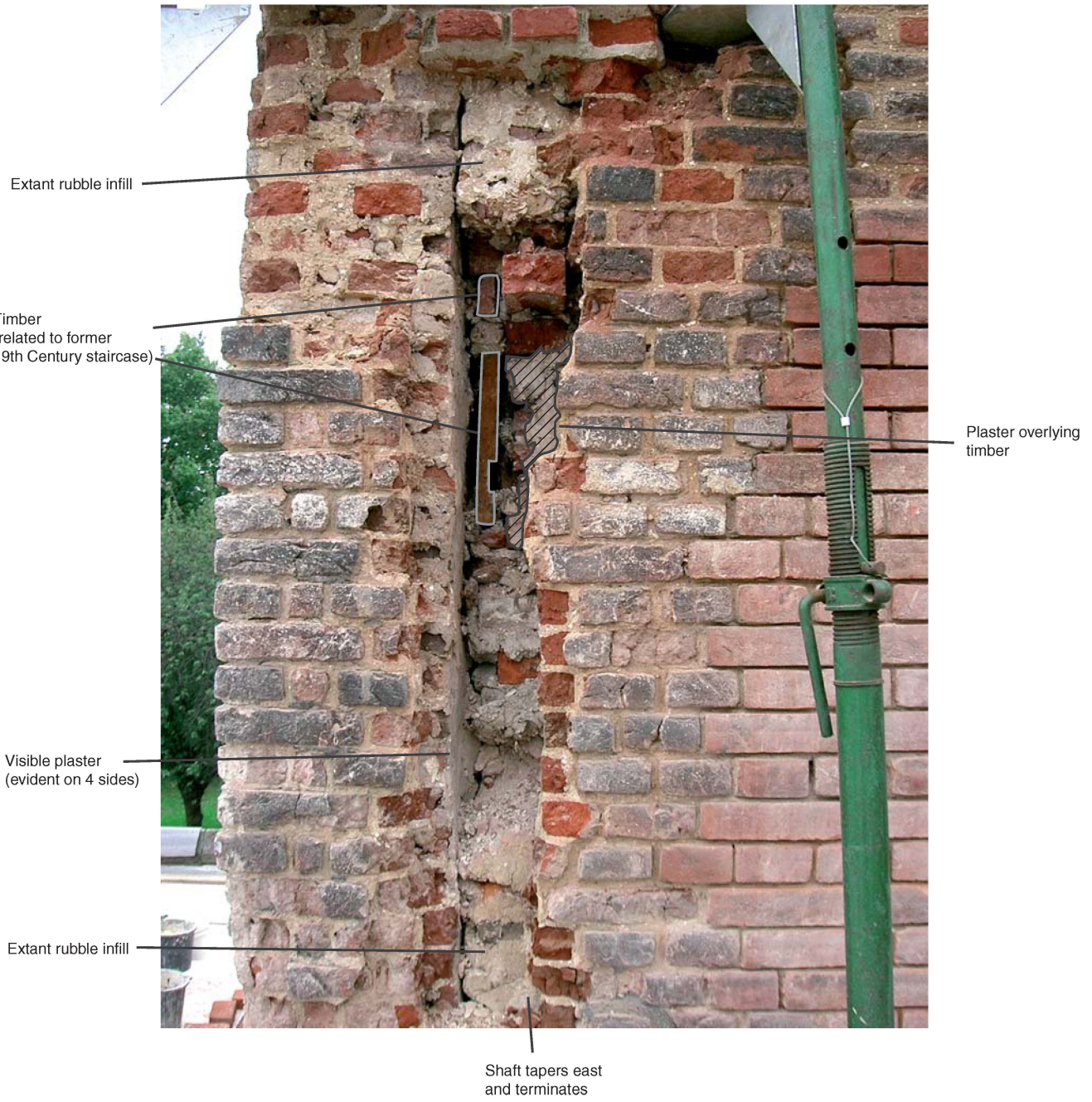


Figure 16: West elevation, ground floor, external Tudor shaft

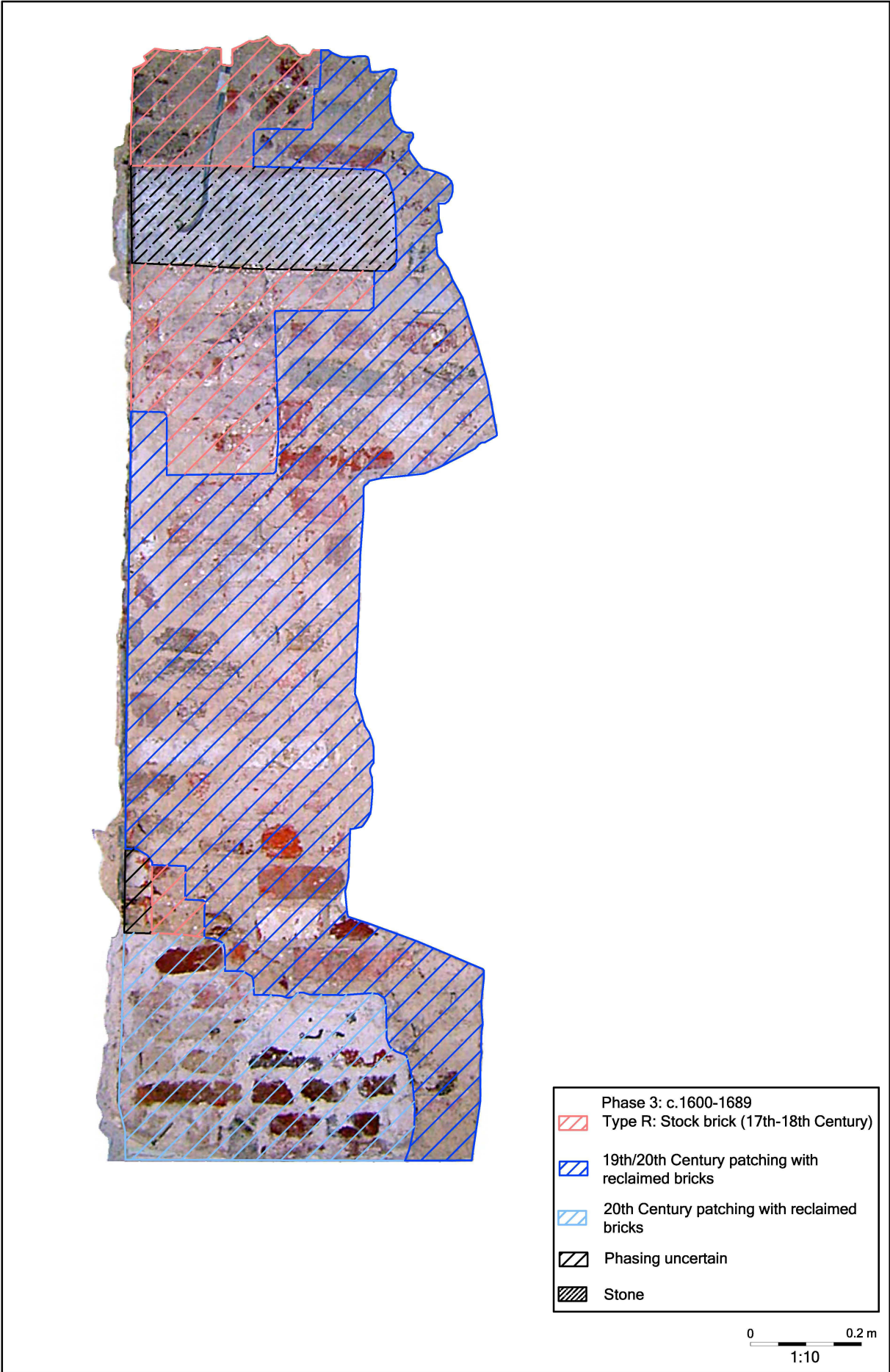


Figure 17: West elevation, second floor, internal exposed brickwork to north of window



• Old Tower in the Tilt Yard.

Figure 19: Law's View (1898)



Figure 20: 20th Century view of Tiltyard and tea room



Plate 1: East elevation, external view (pre-works)



Plate 2: West and south elevations, external view (pre-works)



Plate 3: South (and east) elevation, showing central panel of infill and location of former window (pre-works)



Plate 4: East elevation, external view, illustrating Tudor brickwork and phasing break to north of the window (the jagged break is structural)



Plate 5: East elevation, internal view, second floor, illustrating vertical Tudor break to south



Plate 6: South elevation, external view, showing Tudor plaster reveal



Plate 7: South elevation, internal view, first floor, illustrating Tudor break below ceiling and 20th century patching



Plate 8: East elevation, internal view, second floor, showing Tudor plaster reveal



Plate 9: East elevation, internal view, first floor, showing chamfered Tudor brick



Plate 10: East elevation, internal view, second floor, illustrating truncated Tudor break below ceiling

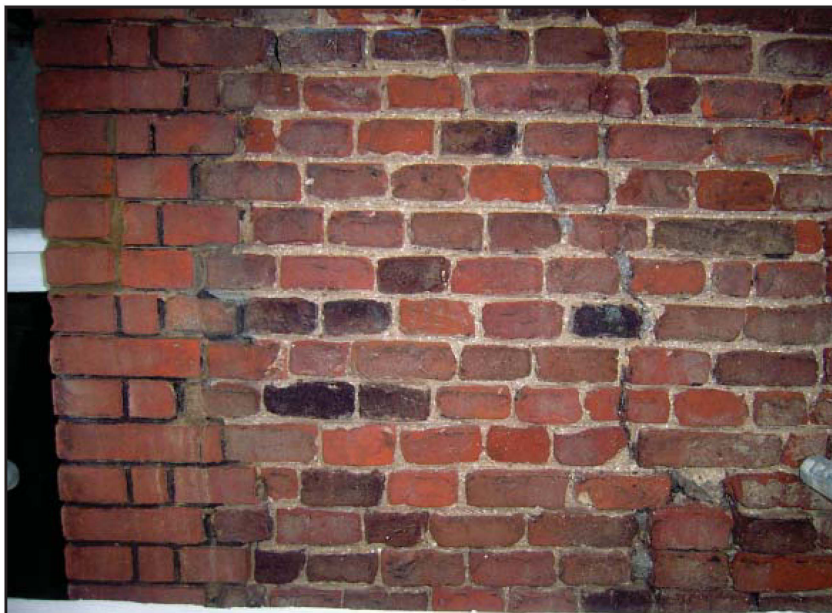


Plate 11: East elevation, external view, first floor, showing Tudor rebuild



Plate 12: North elevation, external view, second floor, showing central panel of 18th century patching



Plate 13: West elevation, external view, showing vertical shaft during removal of rubble infill



Plate 14: West elevation, external view, illustrating timber elements within vertical shaft



Plate 15: East elevation, external view, second floor, illustrating Tudor diaperwork



Plate 16: East elevation, internal view, second floor, showing possible Tudor putlog (north)

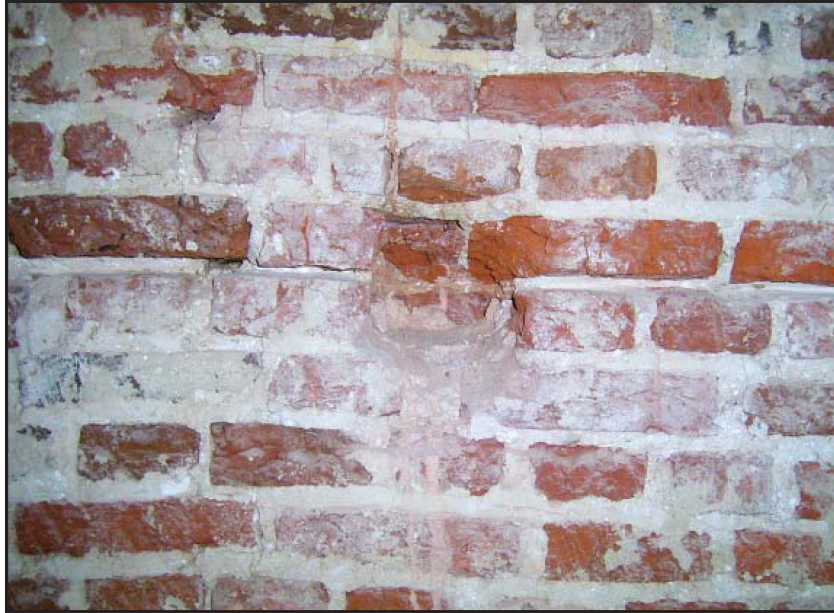


Plate 17: East elevation, internal view, second floor, showing possible south Tudor putlog (south)



Plate 18: East elevation, external view, second floor, showing possible Tudor putlog

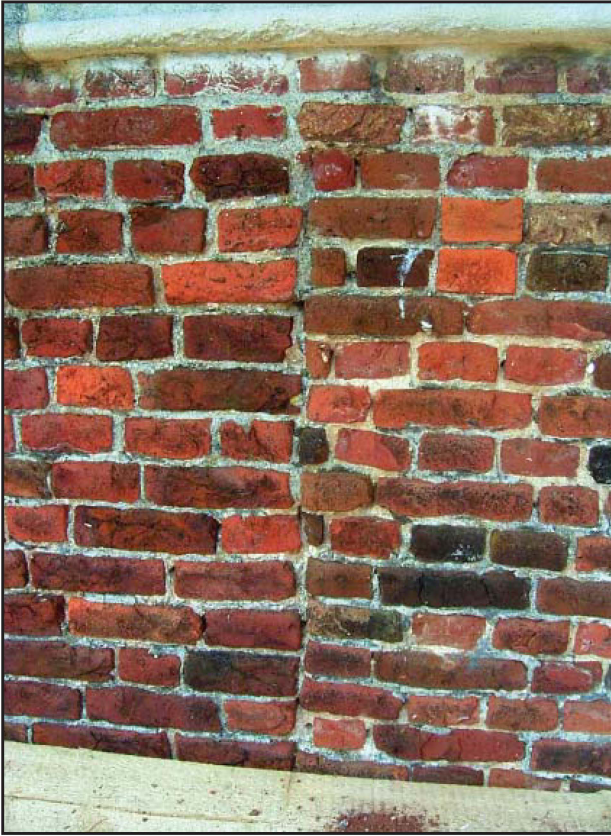


Plate 19: South elevation, external view, second floor, illustrating break between Tudor and 17th century brickwork used to infill primary windows

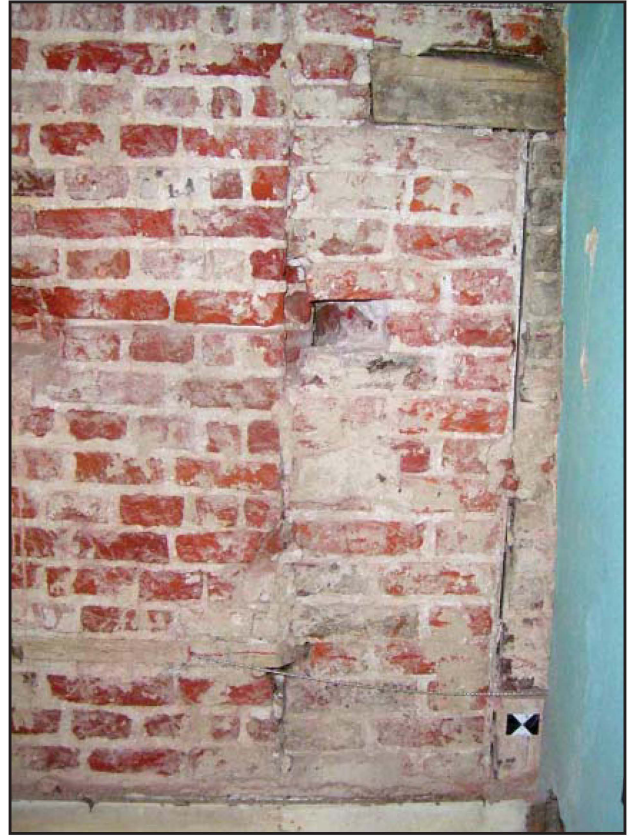


Plate 20: East elevation, internal view, second floor, illustrating 17th century window (plaster and lintel)



Plate 21: East elevation, internal view, first floor, illustrating timber lintel and south reveal



Plate 22: East elevation, internal view, first floor, illustrating timber lintel and north reveal



Plate 23: South elevation, internal view, first floor, showing termination of 17th century reveal and infill



Plate 24: South elevation, external view, second floor, showing 17th century window reveal identified during brick replacement



Plate 25: South elevation, internal view, first floor, showing timber lintel at base of exposed brickwork (to west)



Plate 26: South elevation, internal view, first floor, showing timber lintel at base of exposed brickwork (to east)



Plate 27: East elevation, internal view, second floor, showing two infilled joist pockets (to right of picture)



Plate 28: West elevation, internal view, first floor, showing infilled joist pocket to south of window

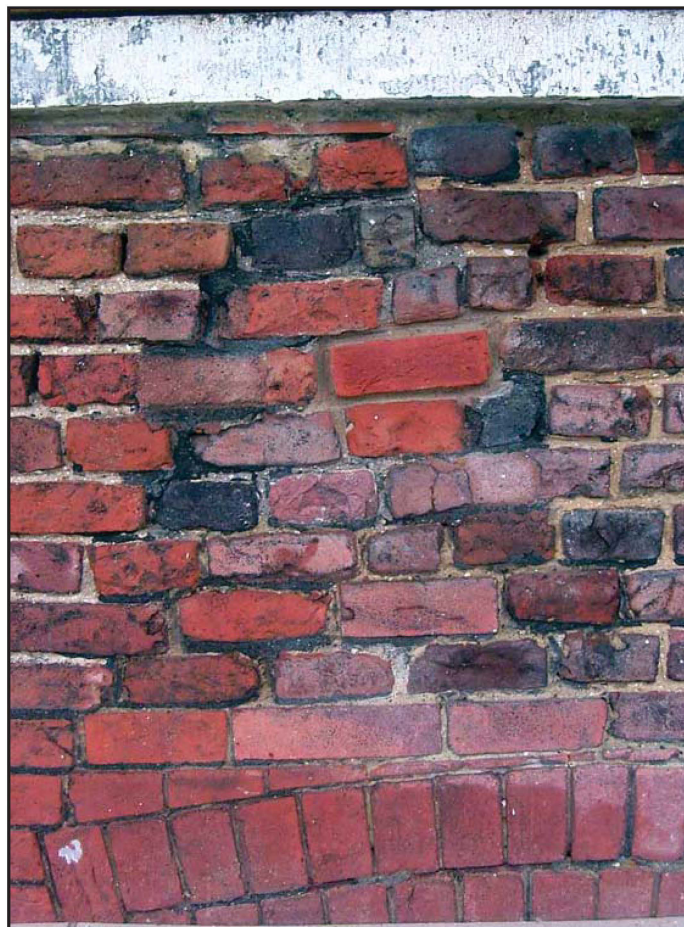


Plate 29: West elevation, external view, between first and second floors, showing mixed phased patching at break between Tudor and 17th century brickwork

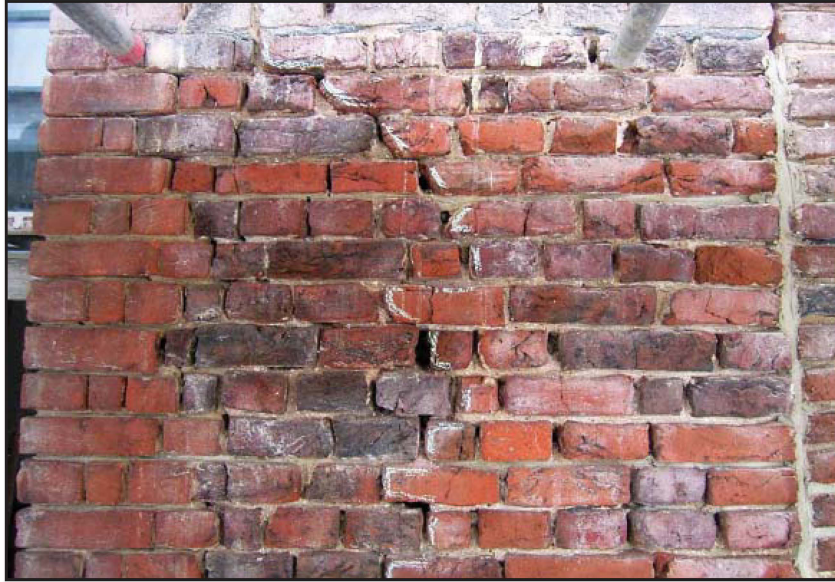


Plate 30: East elevation, external view, second floor, showing late 17th - early 18th century infill to 17th century window



Plate 31: East elevation, first floor, showing 17th plaster reveal and infill



Plate 32: South elevation, external view, ground floor, late 17th - early 18th century arch



Plate 33: East elevation, external view, ground and first floors, illustrating truncated arch and strainer arch below



Plate 34: North elevation, north-west corner of parapet, infilled outlet/drain



Plate 35: North elevation, first floor, internal view, illustrating salvaged bricks at top of exposed brickwork



Plate 36: North elevation, second floor, exposed brickwork during brick replacement, illustrating reclaimed bricks on second skin



Plate 37: North elevation, first floor, internal view, illustrating surviving Tudor bricks to base of exposed brickwork



Plate 38: East elevation, second floor, internal view, showing late 17th - early 18th bricks used to level off below ceiling level



Plate 39: North elevation, first floor, external view, showing brick repair



Plate 40: East parapet, internal face, showing inner Tudor core



Plate 41: East parapet, internal face, north end illustrating earlier consolidation



Plate 42: East parapet, external face, north crenelation illustrating Tudor and later bricks in top course



Plate 43: North parapet, east section, internal face, showing consolidation and surviving brick corbel



Plate 44: North parapet, east section, internal face, illustrating inner core



Plate 45: North parapet, central section, internal face, showing Tudor brickwork

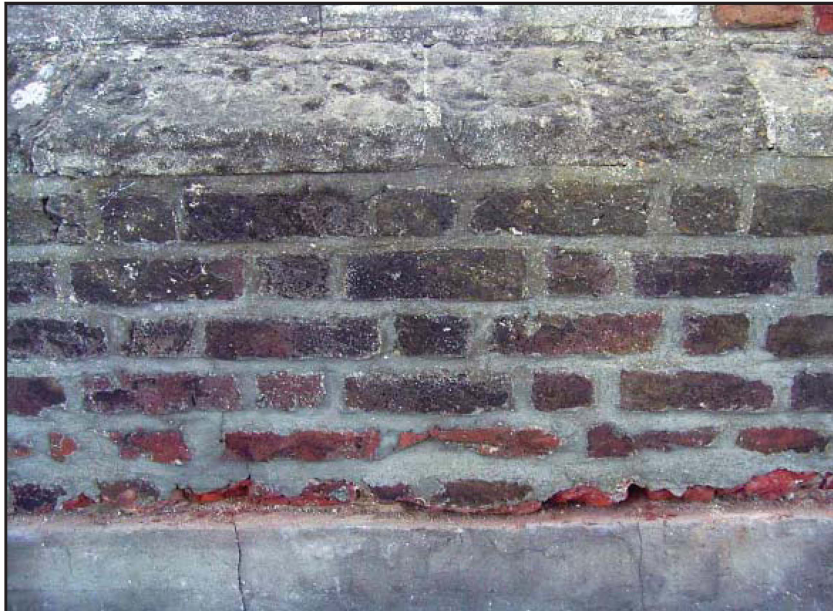


Plate 46: South parapet, internal face, illustrating 20th century rebuild



Plate 47: South parapet, internal face, illustrating Tudor brickwork



Plate 48: West parapet, internal face, showing 20th century rebuild (to right of picture)



Plate 49: West parapet, internal face, showing consolidation and Tudor brickwork

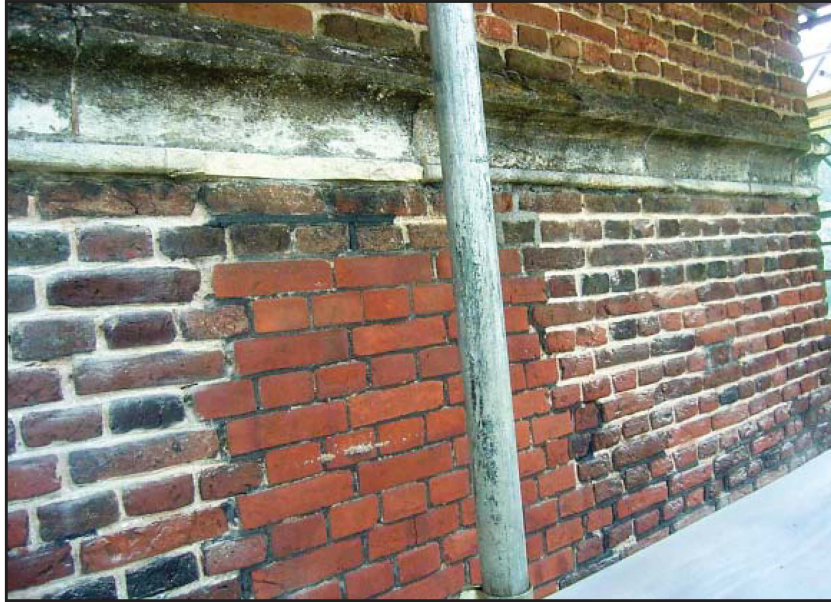


Plate 50: North elevation, external face, showing infill to second floor window



Plate 51: East elevation, internal view, illustrating 1888-1924 brickwork to south of window (and Phase 3 and 2 further to right of picture)

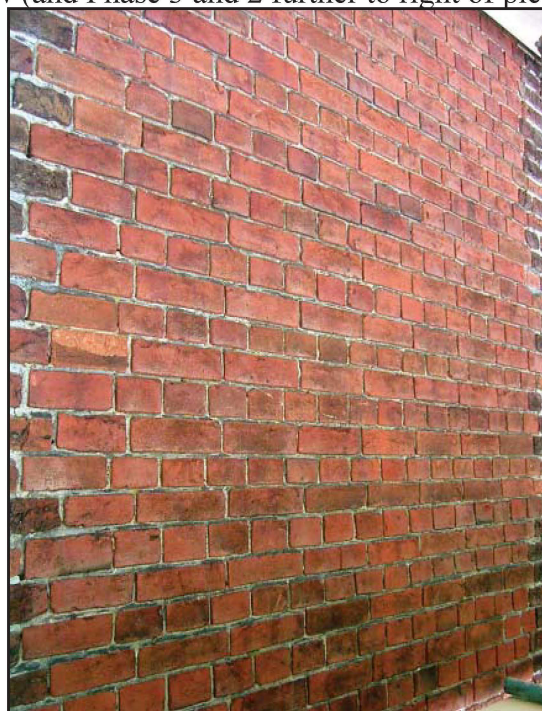


Plate 52: South elevation, external view, second floor, 1888-1924 brick infill



Plate 53: West elevation, external view, second floor, timber lintels exposed above window



Plate 54: West elevation, external view, second floor, illustrating lead pipe squashed behind brick



Plate 55: West elevation, illustrating two removed timber lintels exposed above second floor window



Plate 56: Parapet floor, north view



Plate 57: Parapet floor, south view illustrating iron strap secured on truss



Plate 58: South elevation, first floor, internal view, showing 19th and 20th century patching



Plate 59: West elevation, first floor, internal view, showing stone within 17th century area of rebuild



Plate 60: Fireplace, first floor, internal view, room TYFF01



Plate 61: East elevation, internal view, second floor, pipe exposed below ceiling



Plate 62: Internal west wall, first floor level, illustrating wall scar from dumb waiter



Plate 63: Culvert, internal view, exposed in basement

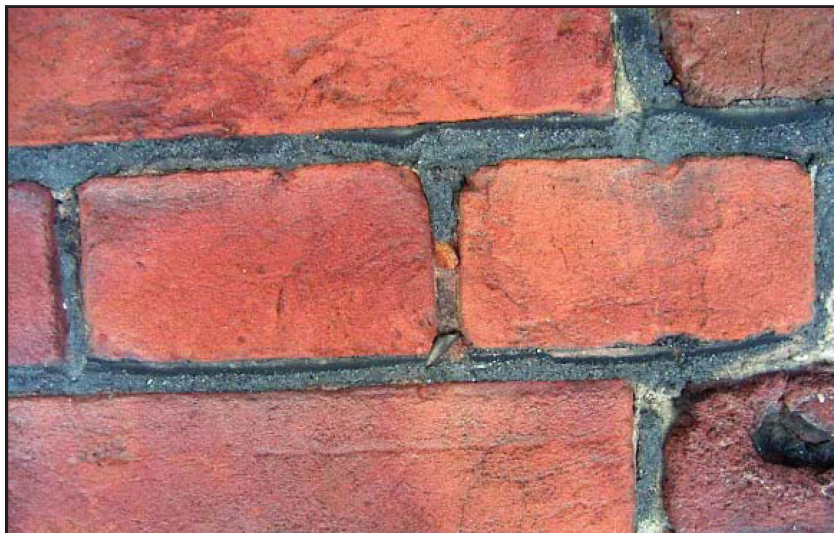


Plate 64: North elevation, first floor level, external view, red paint evident in area of 1888-1924 infill (centre of picture)



Plate 65: West elevation, ground floor, external view, illustrating repair to bricks and penny roll pointing



Plate 66: West elevation, first floor, external view, illustrating red paint on black ash pointing

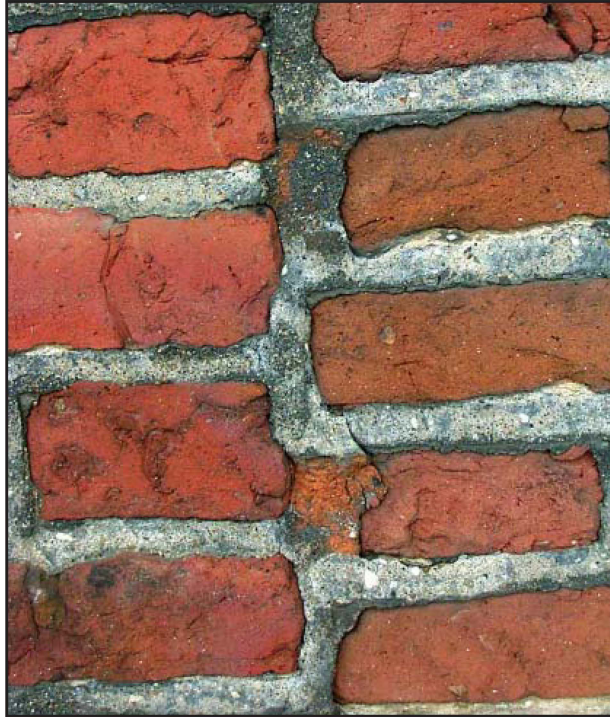


Plate 67: East elevation, second floor, external view, area to north of window, illustrating darkened mortar used to define edges of bricks and red mortar used to bridge structural gaps

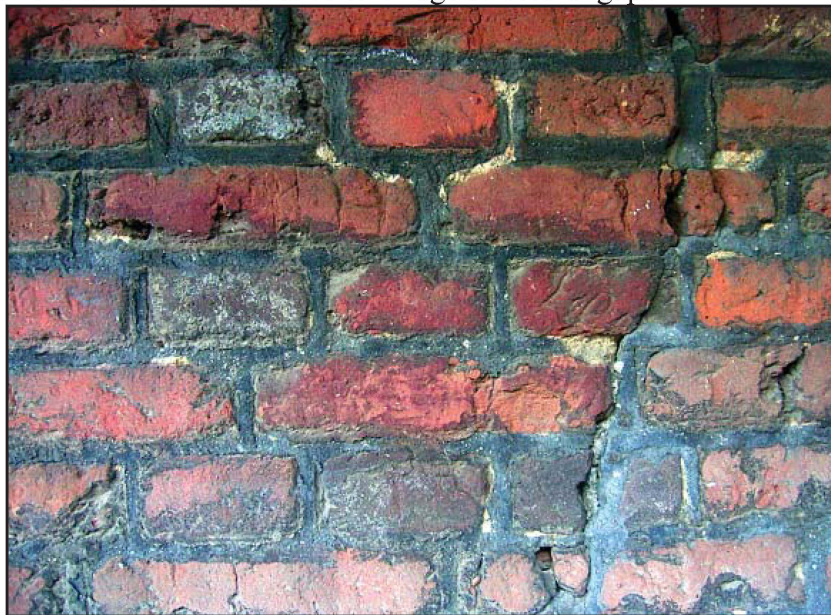


Plate 68: East elevation, ground floor, external view, illustrating red paint on the surface of Tudor bricks (centre of picture)



Plate 69: South elevation, external view, red paint evident on brick (centre of picture)



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