

WEST LOGGIA ROOF

Hardwick Hall, Derbyshire



Historic Building Record

July 2021

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SUMMARY OF PROJECT DETAILS

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National Grid Reference:	SK 46290 63740 (centred)
Postcode:	S44 5QJ (nearest)
County:	Derbyshire
District/Unitary Authority:	Bolsover District Council
Parish:	Ault Hucknall
Elevation:	c.176m above Ordnance Datum
Planning Reference(s):	NP/DDD/0620/0475
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NTHBSMR:	60019 / MNA112811
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Derek Monahan of Midland Conservation are thanked for providing safe access to facilitate the survey.

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EXECUTIVE SUMMARY

This report presents the results of a Historic Building Survey and a Structural Watching Brief of the West Loggia Roof at Hardwick Hall, Derbyshire, centred on National Grid Reference SK 46305 63733. The archaeological recording has been undertaken in accordance with a Written Scheme of Investigation approved by the National Trust.

Hardwick Hall is a Grade I Listed Building (NHLE: 1051617) and falls within a Grade I Registered Park and Garden (NHLE: 1000450). The scheme of works comprised the replacement of lead that forms the roof above the Loggia, repairs to the underlying timber frame and the lath and plaster ceiling above the colonnade below and was undertaken in the Autumn/Spring of 2020-21.

Hardwick Hall was built between 1590-97 to a design by Robert Smythson for Bess of Hardwick to replace the Old Hall and as a new residence to Chatsworth. It is built from sandstone and forms an H-Plan, with a stepped extension at either end. There are Loggias in the central sections of the West and East elevations, and although never completed the original design for the building intended that they should form a complete circuit. The East Loggia was repaired during 2018.

The archaeological recording has established that the majority of the timber frame that forms the West Loggia dates to the 1590s and as documented in the surviving building accounts. There have been three phases of repairs during the mid-late 20th Century with written dates of 1950 and 1966 recorded. The roof structure is formed from reused timbers, being supported upon ten half trusses, seven of which retain painted red letters on the end posts indicating that they were prefabricated prior to being erected. Additional written markings were noted on the underside of the boards below the leads and carpentry marks survived in places denoting a logical sequence of construction. Two narrow ledges were recorded at either end of the roof, which follow the existing pitch of the rafters but 1.2m from the west elevation change to a form a horizontal surface. The ledges would have been formed when the walling of the west elevation was constructed and the original intention may have been to have a narrow flat walkway below the windows the Low Great Chamber and Lady Shrewsbury's Withdrawing Chamber.

The form of the roof is notably different to the East Loggia and appears to have been executed with more attention to detail using carefully constructed half trusses, whereas large tie-beams were inserted into the masonry walling surrounding the East Loggia with principal rafters above.

The resulting archaeological archive will be deposited with the National Trust at Hardwick and a copy of this report uploaded to the Archaeological Data Service.

I INTRODUCTION

BACKGROUND

This report presents the results of a programme of historic building recording and a structural watching brief during repairs to the West Loggia roof at Hardwick Hall, Hardwick Hall Drive, Chesterfield, Derbyshire, S44 5QJ (**Figure I**), centred on National Grid Reference SK 46290 63740. Hardwick Hall is owned by the National Trust (hereafter NT).

This programme of works has been prepared to address a condition of planning consent for the repair and consolidation of the West Loggia roof (Ref: 20/00082/LBC) and has been undertaken in accordance with a Written Scheme of Investigation (WSI; TJC 2020) approved by the NT.

The existing lead roof of the West Loggia was leaking and unventilated leading to deterioration of the plasterwork to the soffit of the Loggia ceiling. It is formed of very wide and exceedingly long bays with hollow roll joints on a shallow pitch of 4 degrees. The lead has been stressed and is suffering fatigue failure leading to leaks. A similar scheme of repair was undertaken in 2018 of the East Loggia roof (see TJC 2019).

The principal aim of the project is to produce a Level 2/3 (HE 2016) archaeological building record of the extant historic fabric that comprises the roof above the West Loggia and the colonnade below (including its presence or absence, character, extent, date, integrity, state of preservation and quality), to make a permanent record in advance of and during the approved scheme of conservation repairs. Additional observations were made of the extant masons' marks and graffiti on the surrounding walls (see separate report TJC 2021).

DISSEMINATION

Copies of this report will be distributed to the NT and the Derbyshire Historic Environment Record. In addition, a digital copy will be uploaded to the OASIS (Online Access to the Index of archaeological investigationS) with the reference number: **thejesso1-404516**.

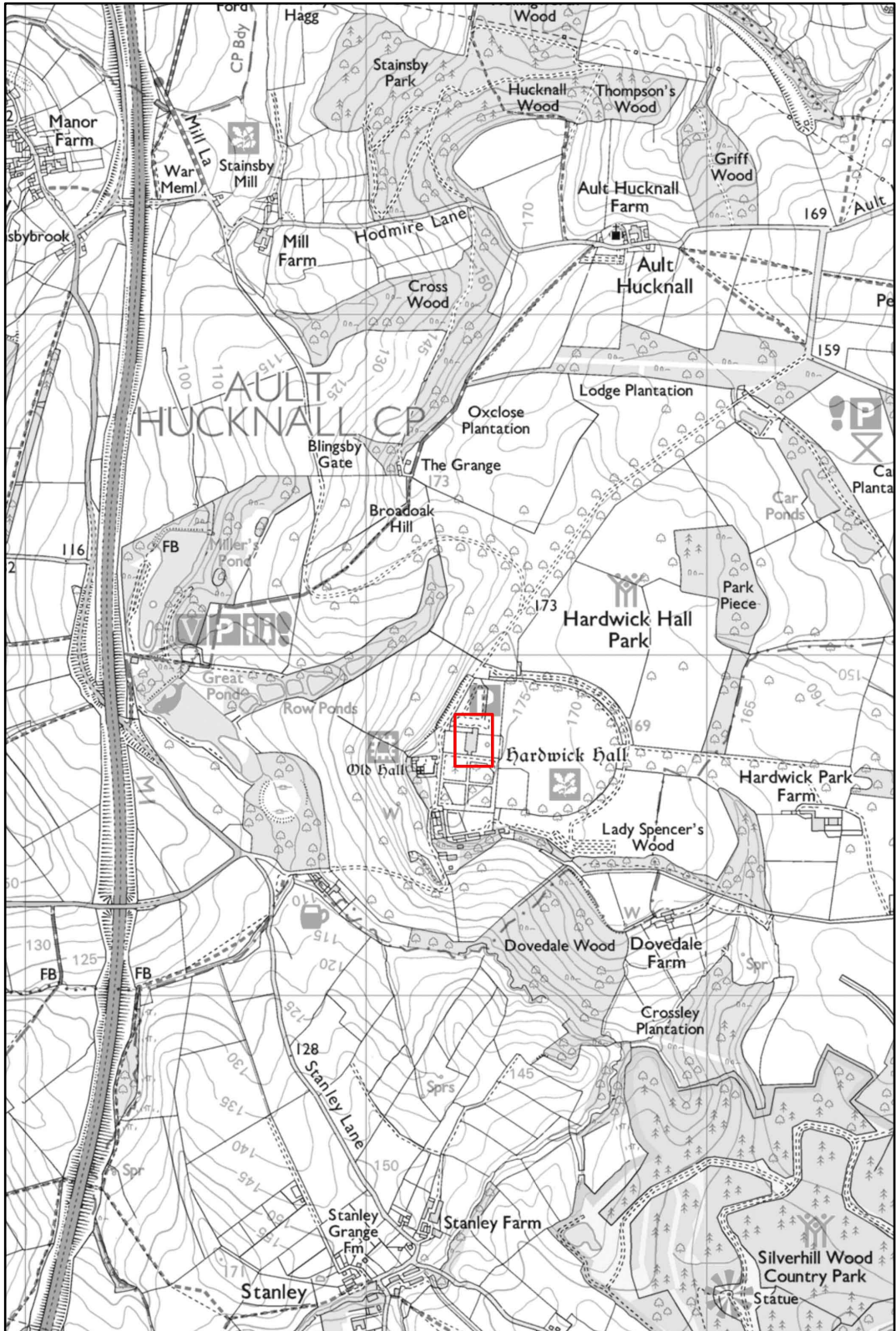


Figure I: Site location plan

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2 METHODOLOGY

STANDARDS

The project has been undertaken in accordance with best practice guidelines as set out by the Chartered Institute for Archaeologists (CIfA 2020a-c); and Historic England (2016).

DOCUMENTARY RESEARCH

A rapid overview of existing published documentary and archive research was undertaken to identify the history of the Loggia and to understand its historic context.

The following archaeological databases and archive repositories were consulted:

- NT archives and Derbyshire Record Office; and
- Historic England records (including the Heritage List for England, National Record of the Historic Environment and their historic building Red Boxes).

A historical summary has been prepared being derived from existing published works (Adshead & Taylor 2016) and contemporary building accounts (Durant & Riden 1984) – see **Section 4** below.

BUILDING RECORDING

The programme of archaeological recording has comprised of the two principal elements:

1. Historic Building Recording; and an
2. Structural Watching Brief.

The archaeological building recording has comprised of two stages:

- **Stage 1:** A record of the Loggia roof in its present condition in 2020, prior to the commencement of works, comprising a digital photographic record and descriptive survey of the areas to be affected by the proposed works.
- **Stage 2:** A programme of archaeological monitoring (Structural Watching Brief) during the repair programme making a record of fabric exposed during the course of the works, including a descriptive, measured and photographic record.

SITE RECORDING

Photography

- The exterior and interior areas of the West Loggia were recorded prior to the construction programme with digital photography. Metric ranging poles of an appropriate size were used as a scale, and details of each image were recorded on a pro-forma recording forms.
- All photography was undertaken using a 16.2MP Nikon D5100 with images saved as Tiff's. Metric scales of appropriate size were used wherever possible. The details of each image were recorded on pro-forma recording forms and a selection of the record photographs are reproduced as **Appendix I**.

Measured survey

- Existing architectural drawings exist for the site produced by Rodney Melville and Partners were used as a base for archaeological observation during the course of the works, along with the survey of new features that were exposed. Additional hand measurement was taken of individual timbers, 1:1 tracings were made of red lettering on the trusses and a plan of the roof timbers was prepared using photogrammetry (**Figures 8-11**).
- *Written Record*
- Site notes and observations were documented on pro-forma recording forms and site notebooks and are included as part of the fieldwork archive (see **Section 7**).

LIMITATIONS

The scope of this report has focused upon the exposed historic fabric and all accessible areas of the West Loggia have been examined as part of this watching brief. This was undertaken over multiple visits with differing levels of access dependent upon where repairs were being undertaken. Work during January-February 2020 was hampered due to cold and snowy weather.

The scope of the report is limited to:

1. Review of relevant archive and documentary material;
2. Detailed site survey comprising of measured drawing, photogrammetry and digital photography;
3. The preparation of this report.

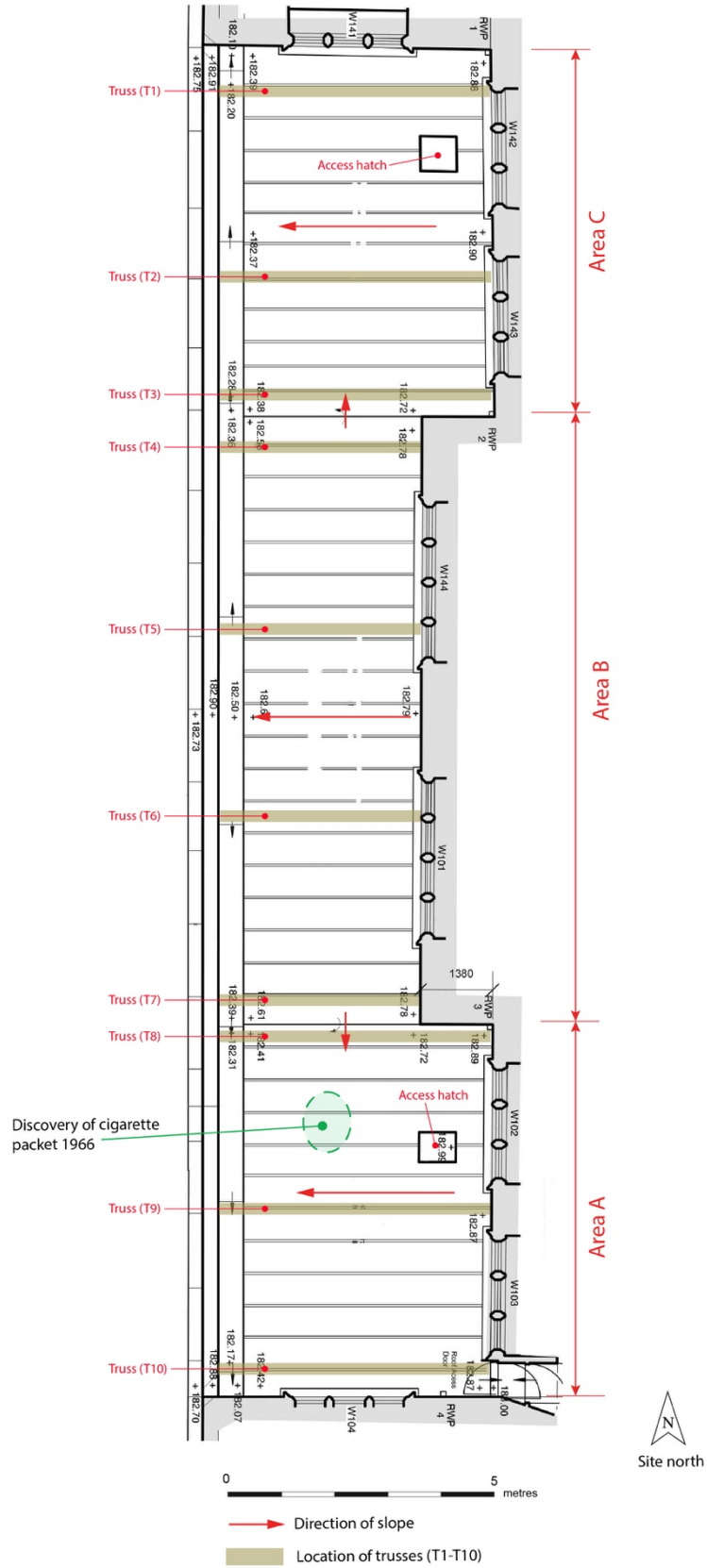


Figure 2: Layout of West Loggia roof (after Rodney Melville and Partners 2020)

3 SITE DETAILS

SITE LOCATION

Hardwick Hall is located 7km to the south of Bolsover (**Figure 1**), on a broad ridge that overlooks the M1 motorway, 1km to the west. The Hall is set within a large ornamental parkland. The building is orientated approximately north-south, with the principal garden elevation facing east to the rear (**Figure 3**).

ARRANGEMENT

The west front of Hardwick represents the principal façade overlooking a large grassed courtyard and the Old Hall beyond. In the centre of the elevation is a ground level portico, or colonnade with eight sandstone columns that support a flat roof, known as the West Loggia (**Figure 2**). There is a similar structure on the opposite side of the Hall and evidence within the extant stonework of the building indicates that the original intention was to continue these flat roof walkways around the complete circumference of the first floor level.

The West Loggia was accessed from a doorway in the south-east corner from the Drawing Room, or Lady Shrewsbury's Withdrawing Chamber, and would have been used for entertainment and as a place of exercise as indicated by the following historic reference:

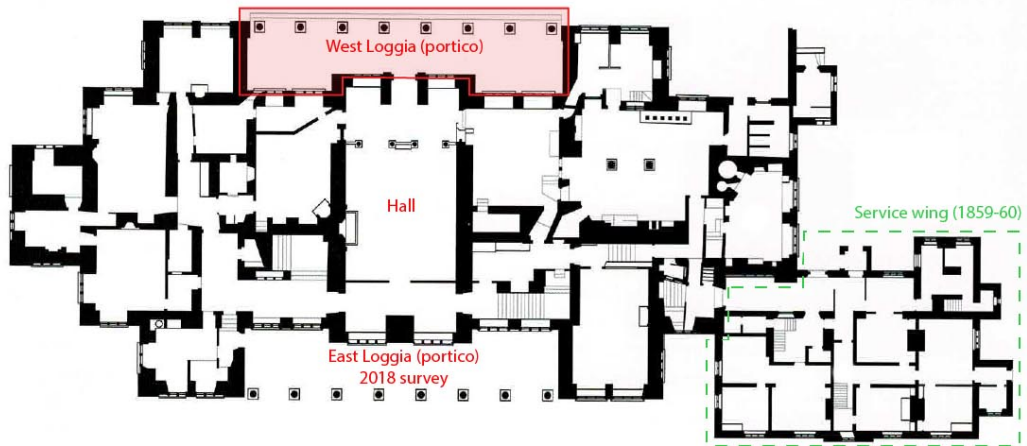
'Given my lady to...the Musicians that came from Court XI IIII. More given to them playing at my La:Chamber window vs' (Girouard 2009, note 60. Pg 485).

GEOLOGY

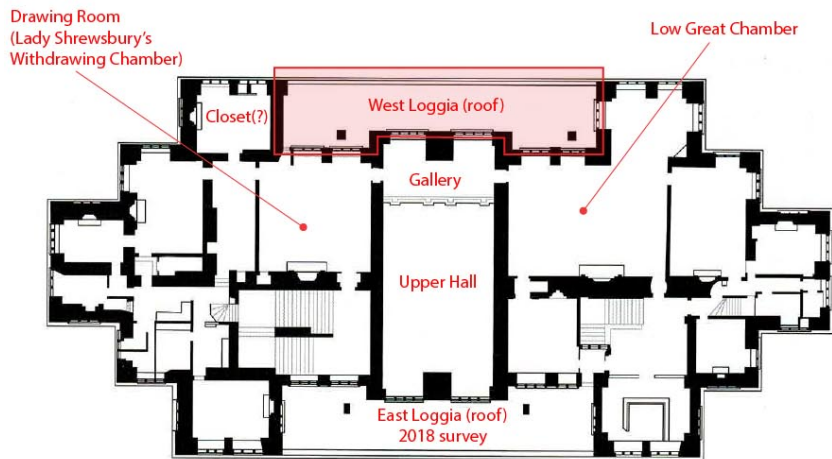
The underlying geology of the site is Cadeby Formation – Dolostone, a sedimentary bedrock formed approximately 252 to 272 million years ago during the Permian Period. There are no recorded superficial deposits (BGS (digital data), 2021).

DESIGNATIONS

Hardwick Hall is a Grade I Listed Building (NHLE: 1051617) and is set within a Grade I Registered Park and Garden (NHLE: 1000450).



Ground floor



First floor

Note: Room names derived from Bess's 1601 inventory.

Figure 3: Site Layout showing areas of recording

(after NT guidebook 2018)

4 UNDERSTANDING THE SITE – HISTORIC BASELINE

INTRODUCTION

This section of the report presents a summary history of the development of Hardwick Hall and provides an outline of the development of the building and previous archaeological investigations.

CONSTRUCTION AND DEVELOPMENT OF HARDWICK HALL (AFTER GIROUARD AND ADSHEAD/TAYLOR)

The New Hall at Hardwick is believed to have been built to a design by the architect Robert Smythson (Hartwell, et al, 430) who had a very distinct architectural style and was working locally at Worksop Manor and Wollaton Hall during the last quarter of the 16th Century. Interestingly, there is no direct record of Smythson being responsible for the building, but a payment was made to '*Mr Smythson, the surveyour, and his son*' in 1597 and one of his surviving unlabelled plans is so close in design to the ground plan at Hardwick that it is widely accepted that he was responsible for the architectural form of the building (Girouard 2009, Adshead & Taylor 2016).

The New Hall was named to demark it from the existing Hall on the site, which was part of the landholdings of Bess of Hardwick the Countess of Shrewsbury. Although alterations were underway in 1587 on the existing building, following the death of her husband the Earl of Shrewsbury in 1590, she embarked upon a new project to build a new 'prodigy' house immediately next door to the Old Hall.

Unlike many contemporary houses, the building accounts for the New Hardwick Hall still survive (Durant and Riden 1984) and which provide an almost unparalleled insight into the construction programme, which craftsmen were working on site and how much they were paid. In November 1590 the foundations were dug and laid and by March the following year scaffolding had been erected for the first-storey. Stone started to be quarried further down the hillside and by June the following year in 1592 work had progressed to the second-storey. The cornice around the building had started to be installed by the December of 1593, following by construction of the turrets in 1594. Walls in the gardens were being constructed, and internal plastering and panelling commenced following completion of external elements of the building. The Hall was completed and being occupied by Bess and her household by the end of 1599.

In the proceeding centuries the Cavendish family favoured Chatsworth as their principal Derbyshire residence, resulting in only a limited amount of internal changes and phases of remodelling, which has helped preserve much of the original form and appearance of the building.

THE LOGGIAS

Located on the west and east facades between the projecting towers are two ground level colonnades featuring eight Tuscan Doric banded columns (**Appendices 1.1, 1.2**) with flat roofs. These features are known as loggia's and were common in courtyard houses, but their use at Hardwick may represent the first time that they were utilised as architectural elements in a house without an uninterrupted courtyard plan (Hartwell et al, 430). The original scheme was to continue the projecting loggia's around the full extent of the ground floor between the towers to form a rectangular ground plan at first floor level, as evidenced by unsightly horizontal scars in the stonework and blocked access doorways at first floor level in the corner towers. Why the intended design changed is unclear, and the building accounts note the "*hewing 40 foot ashler to make up tow dores wher thw walks should hav bene*" (Adshead & Taylor 2016, 37).

The colonnade within the West Loggia (**Appendix 1.3**) has a central doorway with moulded architrave and pair of doors which is flanked on each side by three 3-light mullioned and transomed windows with ovolo mouldings. The East Loggia has the same layout as the west except that it lacks the central doorway, with access in the north-west corner via a small lobby between the Little Dining Chamber (now Paved Room) and the Upper Chapel. At roof level on each Loggia access is via narrow doorways directly onto the leads (**Appendix 1.5**).



Figure 4: Engraving of the West Front by Thomas Allow, c.1837

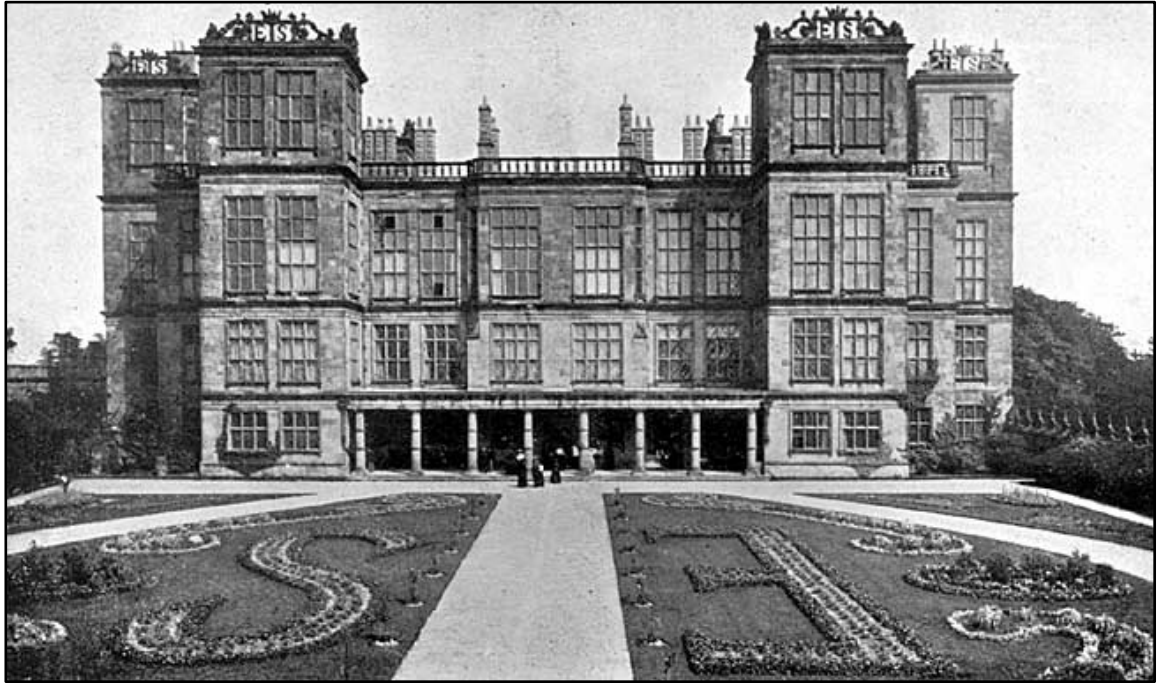


Figure 5: Early 20th Century photograph of the West Front

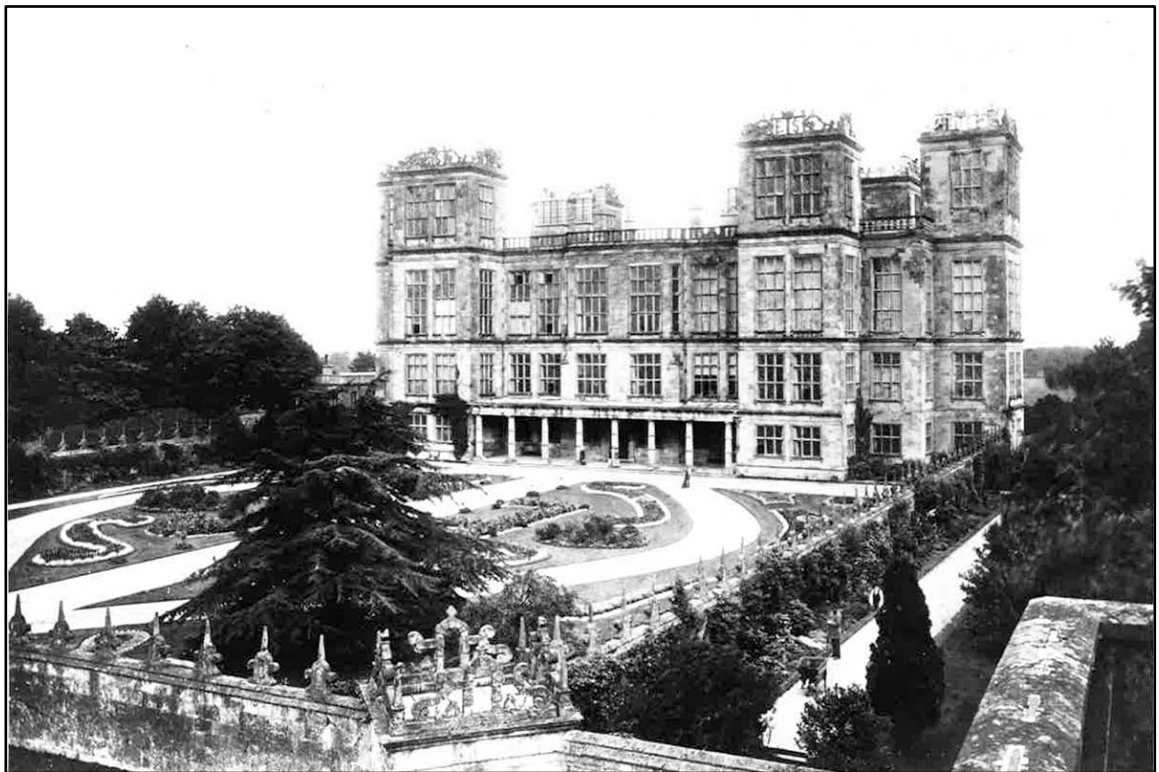


Figure 6: Early 20th Century photograph of the West Front taken from the Old Hall

The purpose of the loggias was similar to the flat leaded roofs (the leads) of the Hall and contemporary buildings elsewhere, in that they provided an elevated means to view the gardens and to take exercise with a certain degree of privacy away from other members of the household or servants. In addition, the upper roofs often provided a dramatic means of access to upper floor banqueting houses, or rooms, which at Hardwick were located in the top of the projecting towers.

BUILDING ACCOUNTS

A transcript and discussion of the building accounts for Hardwick Hall were published in 1984 by Durant and Riden. They are incredibly detailed and discuss payments made to the masons, carpenters, plumbers, plasterers and glaziers, thus providing a contemporary record of the stages of work and costs associated with building the Hall between 1591-98. Entries that are assumed to relate to the construction of the West Loggia are reproduced below (after Durant and Riden 1984):

Payments to masons (for hewing stone for 8 columns and cornice and for setting columns)

(168r) 17th May 1595 – *paid to William Gryffyne and James Adames for hewing one column 24s and so ar paid for threeye collumnes. 1-4-0*

(169r) 12th July 23rd – *paid to Gryffyne and Adames for hewing one cullumn at 24s and so the ar paid for 8 for the one sydde. 1-4-0*

(169v) 26th July 1595 – *paid to Malarye and Nayll...fopr hewing eight plinths that is under the baces*

Payments to carpenters (for constructing the roof – framing, raising (erecting) and boarding)

Note: the records of the payments for the sawings of 'lead bords' and 'joysts' cannot be attributed to the West Loggia, although the work was being undertaken between December 1591 and April 1593.

(276v) 20th September 1595 – *payd to Thomas Benbridg the carpenter...uppon a Reckoning of £10 that he to hav for framing Rering and bording of the tow walks in the new building. 2-10-0*

(277r) 21st February 1597 – *Payd to Thomas Benbridg the carpenter....in full payment of his bargain for tow walks one either syd of the new building. 7-8-0*

Payments to plasters (for plastering the ceiling of the colonnade)

Note: the records of the payments for the 'shutting' (plastering) of the ceiling of the colonnade cannot be attributed to the West Loggia.

The building accounts for the West Loggia detail that between the 17th May and 12th July 1595 payments were made to William Gryffyne, James Adames, who were masons, to carve (hew) the 8 Tuscan columns for the West Loggia (**Appendix I.1**). With a second payment to Malarye and Nayll for carving the plinths under the columns. The stone would have been quarried further down the hillside, and presumably once cut they would have been carved in the quarry before being transported up to the hall.

Payments were made to Thomas Benbridg(e) 'the carpenter' was contracted for a sum of £10 to '*frame, rering and board* the two walks (Loggias) on either side of the house. It appears he was initially paid £2 10s as an upfront payment, perhaps to purchase timber, followed by a final payment on the 21st February 1596 of £7 8s which was 2s short of the original value of the contract.

The carpentry undertaken by Thomas Benbridg(e) would have involved sawing and cutting the timber to the correct size and shape, cutting the joints and then fully assembling each roof in a framing yard away from the building. The principal structural members would have been numbered/marked (**Appendices I.51, I.52, I.57-I.59**) in a logical sequence as part of this process to allow the whole structure to be dismantled and transported to the hall for final assembly. Once the timbers were set in their correct positions, they would have been pegged and nailed (**Appendix I.53, I.54**). Finally, the upper sloping roof pitch would have then been boarded with pine boards (**Appendices I.15-I.17**) ready for the addition of sheets of lead as a final roof covering (**Appendices I.6-I.8**).

Note the payments for carving, framing and plastering for the East Loggia on the opposite side of the house all date to 1-2 months later, confirming that the West Loggia was constructed first.

PREVIOUS ARCHAEOLOGICAL SURVEY

There has been no previously archaeological survey or investigation of the roof structure that comprises the West Loggia at Hardwick. The East Loggia was surveyed by the JESSOP Consultancy in 2018 as part of conservation repairs and replacement of the leads.

5 DESCRIPTION

INTRODUCTION

The following section presents the results of the archaeological investigation of the historic fabric that comprises of the West Loggia roof at Hardwick Hall. Drawings of the layout of the roof structure are presented as **Figures 7-11**, and accompanying photographs included as **Appendix I**.

LAYOUT AND FORM OF THE WEST LOGGIA

The roof of the West Loggia can be sub-divided into three Areas (**A-C**) (see **Figure 2**). These are partially as a result of secondary modifications to the design of the roof undertaken in the 1960s intended to improve rainwater run-off, resulting in a raised central section - **Area B (Appendix I.6)**. The historic arrangement of the roof however, comprised of a single pitch from west to east (see **Figure 7**), resulting in a very shallow fall of 45cm over a distance of 4.8m (**Appendix I.8**).

The roof was accessed via a doorway in the south-east corner (**Appendix I.5**). The colonnade at ground level (**Appendices I.2-I.4**) below was only partially surveyed within this scheme of archaeological investigations which concentrated upon recording the physical structure of the roof timbers.

PHASED DEVELOPMENT

There appears to be five main phases of construction and alteration within the historic fabric that comprises the West Loggia.

Phase 1: 1595-98

The original construction of the West Loggia and roof. This began with the construction of the main block of the hall. The colonnade and entablature were then built, followed by the insertion of the roof timbers which has previously been cut and laid out off site in a framing yard. The pine boards and lead were then applied and the ceiling of the colonnade below was plastered.

Phase 2: 1950

Alterations during this phase appear to have concentrated upon the ceiling of the colonnade. A group of ceiling joists within Area A have been replaced in softwood and set on a new north-south alignment. A small group of lower ceiling joists having the date 1950 written on them in pencil (**Appendices I.35, I.36**). It is also probable that more substantial structural repairs were undertaken during this period in **Area C**, where iron straps and vertical tie rods and threaded bolts or pins in

Area A were introduced to strengthen a number of the trusses (**Appendices 1.39, 1.40, 1.48**). It is suggested that following these repairs expanded mesh was applied to the whole of the underside of the ceiling before replastering (**Appendices 1.32, 1.33**).

Phase 3: 1966

This phase comprised of a comprehensive programme of repairs across the whole roof. This entailed the partial replacement of historic timbers (mainly rafters) with softwood. Sections of the softwood boards were replaced along with all of the lead sheeting, the base of the downpipes, flashing and a new gutter along the eastern side of the roof (**Appendices 1.6-1.15**) were installed. The central section of the roof was re-modelled and raised with a shallow step (**Appendix 1.6**) and two access inspection hatches were created (**Appendix 1.11**).

Phase 4: 1970s-2020

Minor patch repairs were undertaken to the lead sheet (**Appendices 1.13-1.14**).

Phase 5: 2020-2021

The current phase of repair and restoration of the West Loggia roof by the National Trust.

DESCRIPTION OF FABRIC

The Roof Covering

The roof of the West Loggia comprises of flat sheets of lead, with timber rolls that are laid over softwood boards. The timber boards were butt jointed and varied in length (**Appendices 1.16, 1.17**). All were softwood, most likely pine and either measuring 2.5cm x 17cm (Phase 3 - 1960s) up to 5.33m long, or slightly wider at 3cm x 28-29cm (Phase 1- 1590s) up to 5.52m in length. Approximately 40% of the boards were replaced, mainly along a 1-1.5m strip against the west elevation of the Hall and the south end of **Area A** (**Appendices 1.15-1.17**). Alterations had also occurred along the edge of the parapet where a new softwood box gutter had been inserted, presumably replacing an earlier one. Two forms of nails were noted, with those of the wider boards being handmade.

On the underside of a number of the wider softwood boards lettering was noted applied in red paint, or with a red ink – **T S 2** (**Appendix 1.18**), **T S 14** (**Appendix 1.19**) and **T S 18**. Whether this denoted a particular craftsman, or related to the construction of the roof is however unclear but appears to be associated with phase 1 work.

The dimensions of the lead over each section of the roof are as follows:

Area A: 12x sheets orientated west-east that measure 4.79m in length, with widths varying from 47cm to 60cm.

Area B: 19x sheets orientated west-east that measure 3.46m in length, with widths varying from 56cm to 60cm. There is an 20cm step down to **Areas A** and **C**.

Area C: 12x sheets orientated west-east that measure 4.82m in length, with widths varying from 45cm to 60cm.

Set within the eastern sections of **Areas A** and **C** are two lead covered access hatches measuring 57cm x 70cm (**Area A**) (**Appendix I.11**) and 52cm x 69cm (**Area C**) and date to Phase 3, evidenced by a cigarette packed left in the roof void dated – 21 March 1966 with a name, but the letters are unreadable (**Appendices I.33, I.34**).

A number of lead repairs in the form of irregular shaped patches (**Appendices I.13-1.14**) had been soldered onto the upper face of the lead, mainly within the central part of **Area C** and which are ascribed to Phase 4.

In the corners of each area of the roof, square sectioned lead gutters directed rainwater from the main roof of the house, down onto the roof of the West Loggia. The base of the downpipes are angled (**Appendices I.5, I.8, I.9**) and appear to have been remodelled in Phase 3.

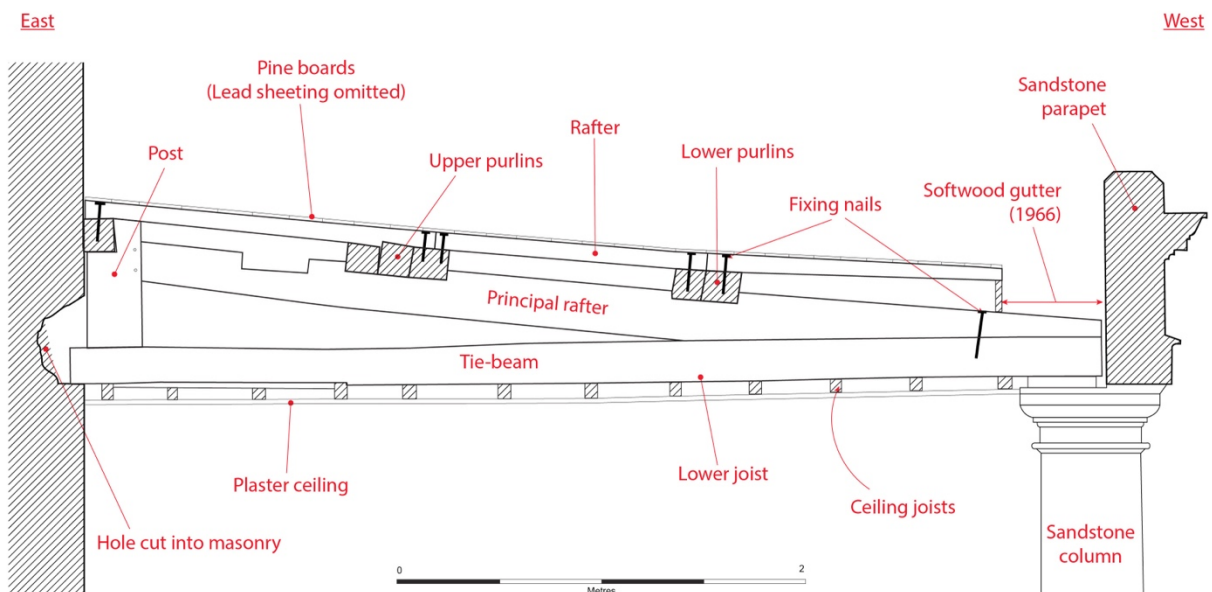


Figure 7: Cross section through the West Loggia roof (T9).

The Timber Frame

The roof has a simple mono-pitch design supported on ten half trusses all formed from seasoned oak. The spacing of the trusses is unequal, but six of them sit directly above the columns of the colonnade (**Appendix I.1**). The trusses have a short post against the wall face of the hall measuring c20cm x 10cm x 0.5m in height (**Appendix I.38**), with a tie-beam and principal rafter all secured in position with oak pegs. It has been discovered that at least seven of the ten trusses have painted letters **B, C, D, E, F, G** and **K** (**Appendices I.57-I.59**) on the north face of each post, presumably intended to help reference the order and position of each truss.

The tie-beams of each truss are set within the wall fabric and measure c.18cm x 23cm, some being supported on narrow timber packers. Between the posts of each tie-beam are upper and lower purlins that support the rafters and ceiling joists below. Many of these purlins display evidence for reuse and their dimensions vary between 12cm x 17cm to 15cm x 15cm. The rafters vary in size from c.5.5 cm x 10cm to 7cm x 10cm with lengths of either 1.49m or 3.16m dependent upon whether they span two or just one of the purlins. Each rafter is notched and nailed from above, whilst the ceiling beams are tenoned, and set within a horizontal groove in the lower purlin and nailed against a central timber running north-south between each tie-beam. The lower purlins have carpentry assembly marks in the form of Roman numerals formed with a flat chisel (**Appendices I.25, I.50, I.51, I.55**). The sequence is interrupted but does follow a logical pattern from north to south along the length of the roof.

Both the rafters and ceiling joists are orientated west-east (**Appendix I.31**), although southern end of the ceiling joists has been replaced in 1950 with softwood timbers measuring 6cm x 8cm on a north-south alignment (**Appendix I.47**). The earlier ceiling joists measure 5.5cm x 7cm.

Spanning between each column are three large beams that support the ashlar entablature and masonry walling above that forms the parapet. These beams are set on square timber pads above each column (**Appendix I.11**). It is interesting to note that set between a number of the beams have iron straps which are locked in position with square nuts, presumably introduced as part of the Phase 2 repairs.

Within the roof occasional timbers contain features such as redundant mortices (**Appendices I.24, I.29**), rows of nails, or pegs (**Appendix I.27**) which suggest that when the roof was built the carpenters were recycling structural timbers from elsewhere.

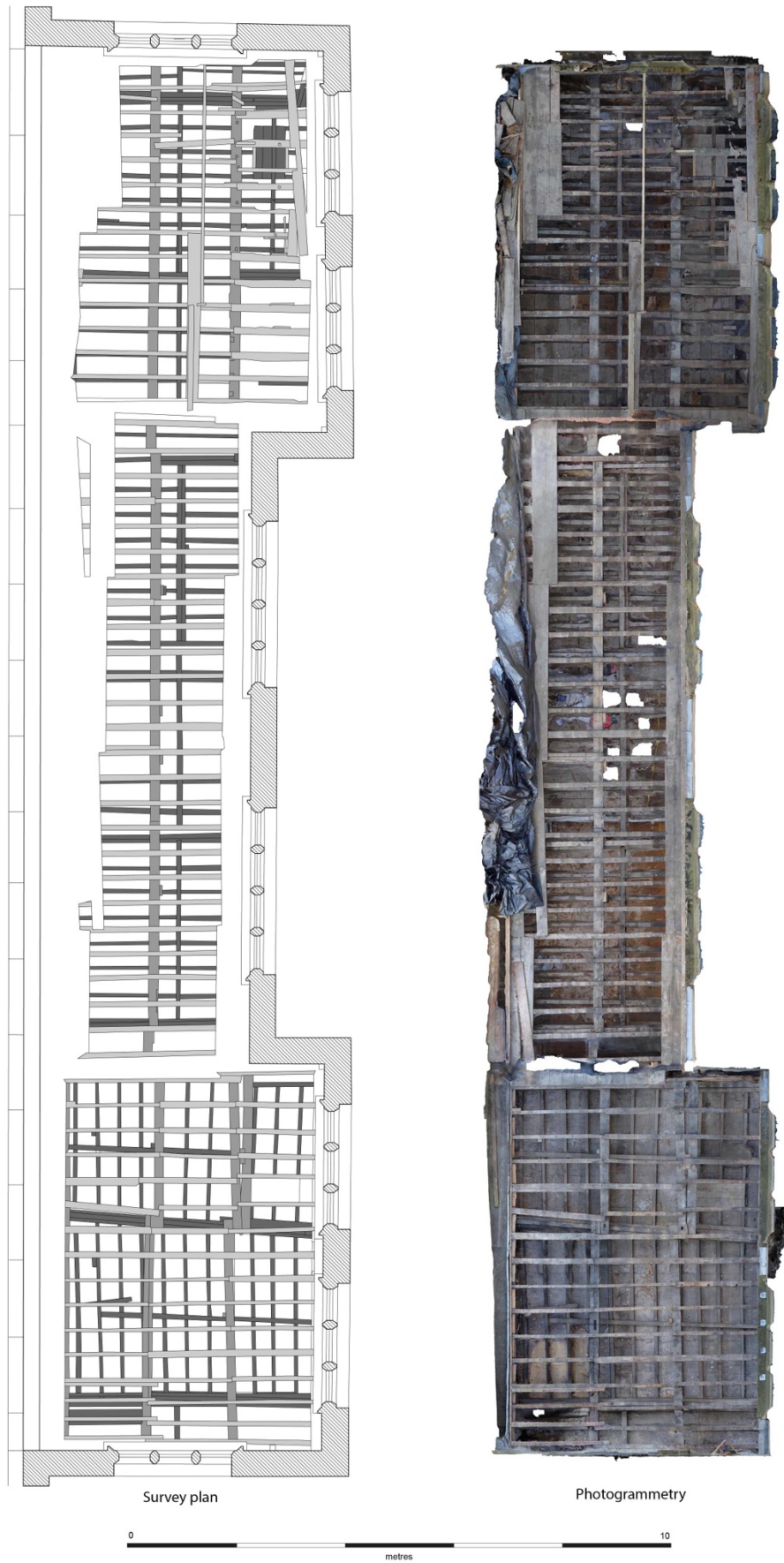


Figure 8: Survey plan of roof timbers and photogrammetric image following archaeological recording

At the east end of the **T9** is a curious feature in the form of a large hole within the wall fabric in the south part of the roof (**Appendices 1.28, 1.38**). This hole is crudely cut and appears to be a secondary insertion, resulting in the re-orientation of the truss at an angle. The reason for this hole is unclear, but it did contain a cut off lead pipe and may represent the installation of a water supply to this part of the hall, either for a sink or water closet.

Two further features of note are built within the masonry walling of the north and south towers at either end of the Loggia. Immediately below the level of the leads are offset stone ledges c.10-15cm wide, that project forward from the wall face of the masonry walling (**Appendix 1.37**). These features are created by slightly corbelling out the upper courses of stone to form a ledge and were constructed as part of the original phase of construction of the external walls. Each offset follows the angle of the rafters, but at a distance of 1.2m from the west elevation of the Hall (**Appendix 1.20**) the offset becomes horizontal and retains traces of a thick, cut back, lead flashing. This horizontal section of the offset correlates with the projecting central bays of the windows overlooking the gallery. It is suggested therefore that the original intention may have been to have a short flat section of roof below the windows of the Low Great Chamber and Lady Shrewsbury's Withdrawing Chamber, but when the timberwork for the roof was actually installed the design was changed to have a single sloping pitch the full length of the Loggia.

The south-east corner of the roof has evidence for repair due to water ingress, with timbers being replaced in softwood (**Appendix 1.42**). There are large bolts with threaded square heads (**Appendices 1.40, 1.46**), along with an iron peg with a cotter pin (**Appendix 1.39**). Further repairs using iron rods and straps were noted in the north-east section of **Area C**.

As part of the repairs undertaken in Phase 3 the central section of the roof (**Area B**) was raised by 20cm (**Appendices 1.6-1.8**). This involved the construction of a softwood super structure that sat above the existing rafters being nailed together with round wire headed nails.

MASONS MARKS AND GRAFFITI

Although beyond the scope of this watching brief during the survey of the exposed sections of roof, the opportunity was taken to examine the adjacent walls and windows. This has resulted in a new survey of the exposed masons' marks and graffiti within this central part of the house, the results of which are reported upon in a separate document (TJC 2021).

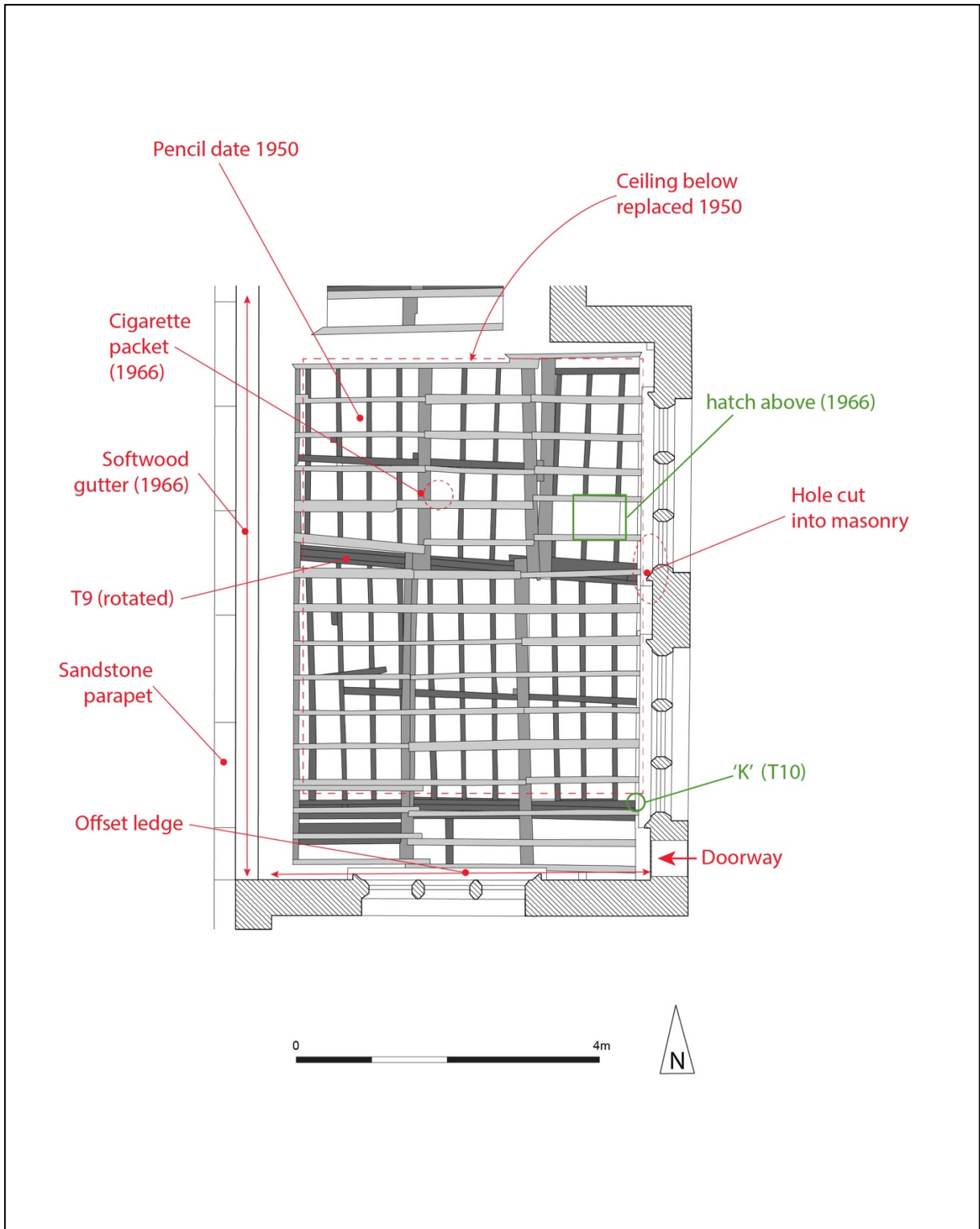


Figure 9: Plan of south section of roof – Area A

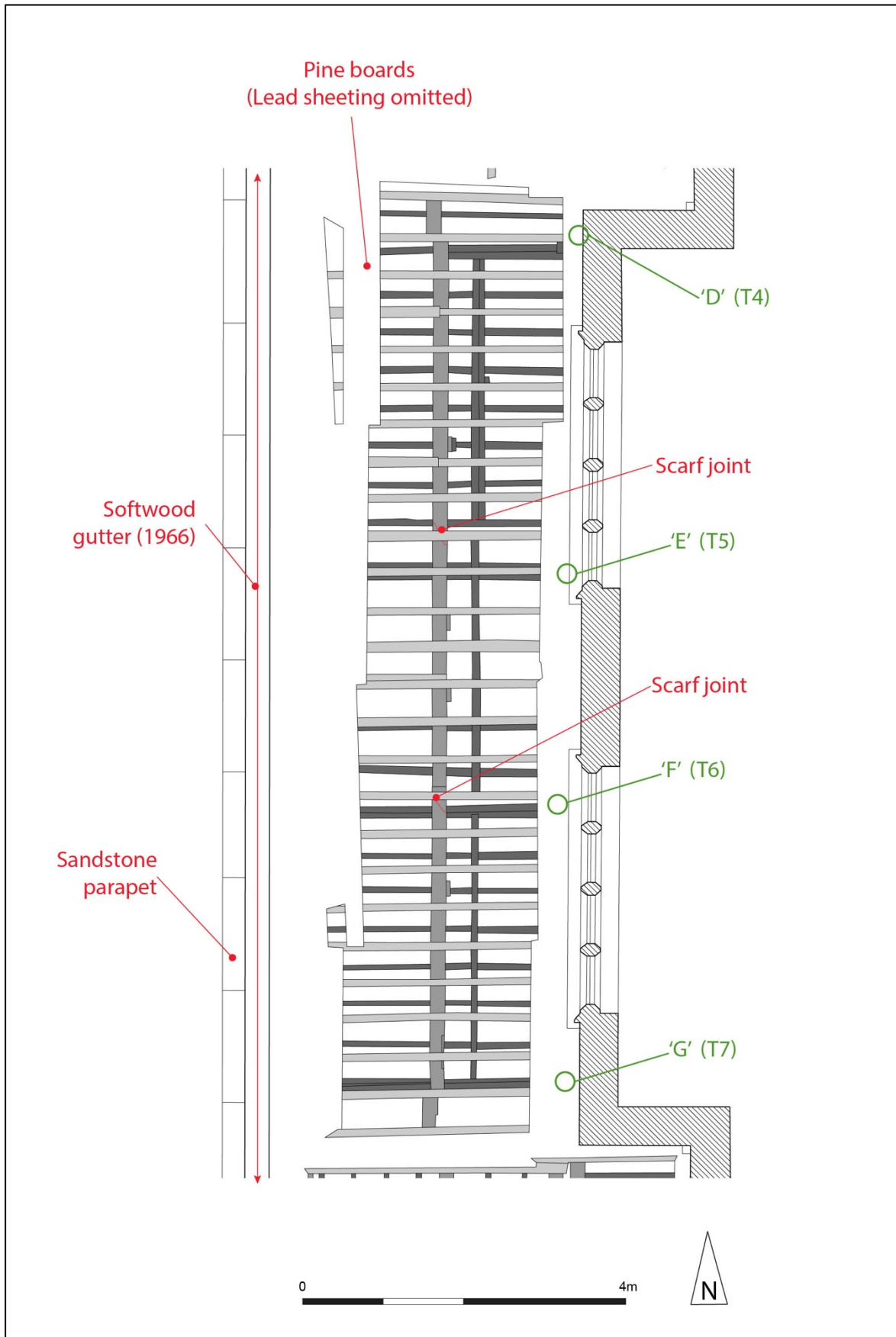


Figure 10: Plan of south section of roof – Area B.

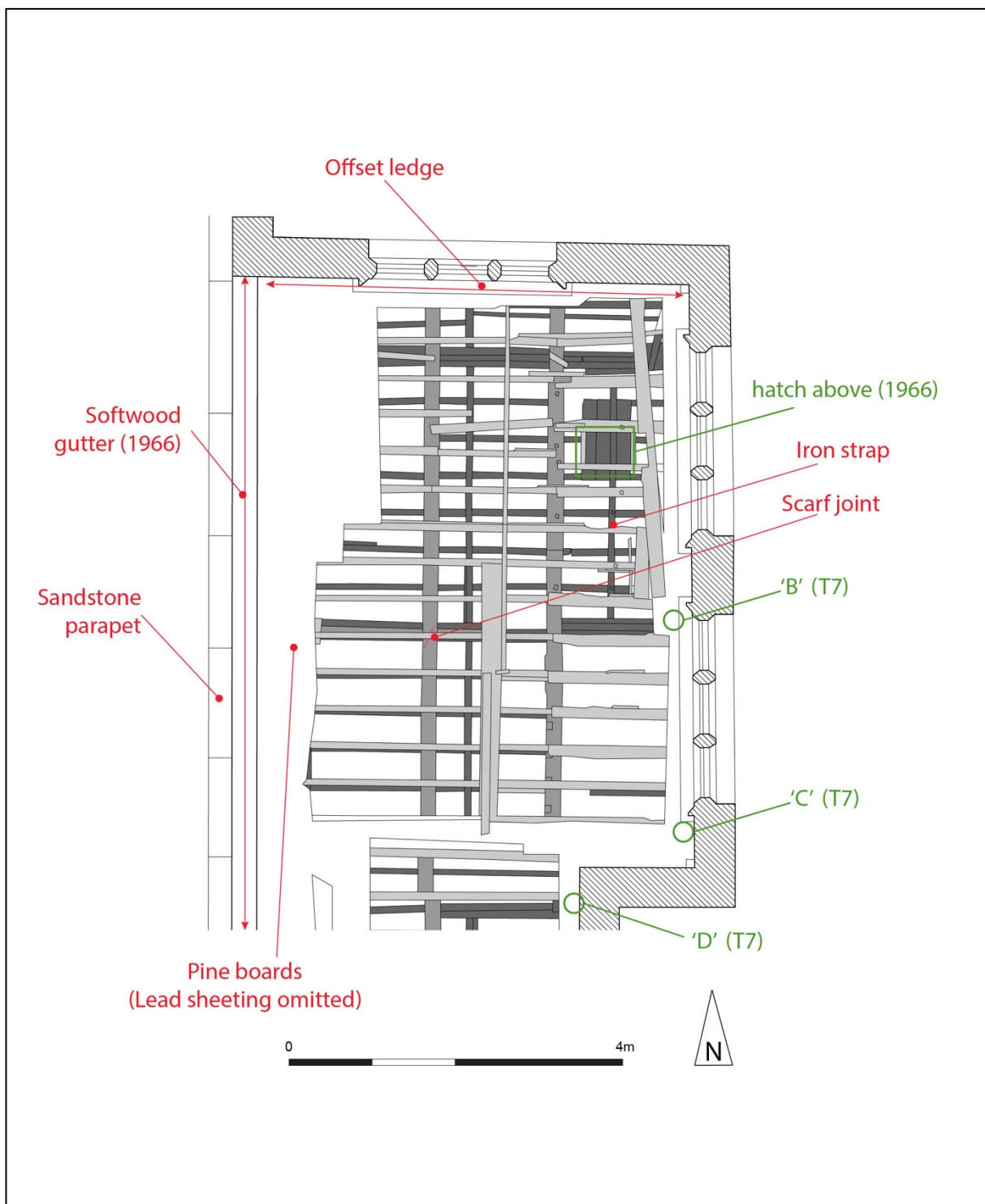


Figure 11: Plan of north section of roof – Area C

6 CONCLUSION

SUMMARY OF PHASED DEVELOPMENT

The watching brief has confirmed that since the initial period of construction of the Loggia roof in 1595, it has been repaired in three stages during the mid-late 20th Century. Evidence for this is in the form of written dates in pencil and chalk '1950' on at least four of the ceiling joists (**Appendix I.35**), all of which are softwood replacements that support an expanded wire mesh that forms the ceiling above the colonnade. Then a second phase of work occurred in 1966 which included replacing many of the ceiling boards and the leads as noted by a newspaper and a dated cigarette packet '21 March 1966' (**Appendix I.34**). The third phase of repairs comprised patching the lead.

Further localised alterations were noted in the form of a large hole at the east end of **T9** within the wall fabric of the west elevation of the Hall (**Appendices I.28, I.38**). This hole is crudely cut and appears to be a secondary insertion, resulting in the re-setting of the truss. The reason for this hole is unclear, but it did contain a cut off lead pipe and may represent the installation of a water supply to this part of the hall, either for a sink or water closet.

COMPARISON OF THE WEST AND EAST LOGGIA ROOFS

The two surveys that have now been completed of the West and East Loggias at Hardwick have provided new evidence for the sequence of construction and has allowed cross-referencing with the contemporary building accounts to provide a historical context. The same group of craftsmen, including stone masons, carpenters and plasterers worked on both structures between 1595 and 1597. What is interesting however, is that whilst the structures are essentially identical in their architectural form, excluding roof alterations from the 1960s, their internal structure is very different and may indicate that their intended appearance when construction of the external walls commenced has changed. An example of this is that associated with the East Loggia are a series of large recessed sockets built within the masonry walling most likely intended for supporting large timber beams, however when the East Loggia roof was built these sockets were not used. In addition, there are no such sockets within the walling of the West Loggia.

It is the timber framing that represents the most obvious difference between the two sides of the building. The West Loggia which was finished first is comprised of ten half trusses, which are jointed and pegged together and have painted letters on the north face of each end post to allow for their correct insertion above the columns. Above this purlins were secured followed by rafters and below lower joists to support the ceiling of the colonnade. The upper end of the rafters were fixed to a upper bearing timber tenoned above the post of each truss. In contrast the frame of the East Loggia

was supported by a series of large timber tie-beams or principal joists that appear to have been rotated into position and set within crudely cut sockets within the masonry walls. A series of purlins were then notched over the tie-beams, with a principal rafter nailed in position above. The rafters were then nailed in position, but set within irregular sockets cut into the ashlar masonry, apparently as an afterthought. This roof did however display a degree of structural order with assembly marks being recorded, but when compared to the West Loggia with its regular formed trusses, the style of carpentry is notably different. The variance may be related to the changes in design of the overall appearance of the ground floor, with the loggias being omitted from the corners of the Hall, even though doorways and sections of masonry prepared to support them.

RESEARCH QUESTIONS

The following general and detailed research questions were posed as part of the Written Scheme of Investigation that was prepared for this programme of archaeological recording (TJC 2020). They have been formed in consideration of the known archaeological potential of the building and the published research priorities in the East Midlands Regional Research Framework (Knight, *et al.* 2012):

1. Does any evidence survive for the Phase I roof structure above the East Loggia?
2. Has the roof been repaired or adapted since its construction in the 1590s?
3. What evidence is there of historic fixtures, fittings, or joinery techniques?
4. Is the form of construction comparable to the East Loggia?

All of these questions have been answered by this project, with perhaps the most significant being that the construction of the roofs above the West and East Loggia were different. They were only built a number of months apart, but the style of carpentry was notably different.

RECOMMENDATION(S)

As a result of this phase of archaeological recording and that previously undertaken in 2018 on the East Loggia there are the following recommendations:

1. Further analysis of the unfinished sections of the proposed corner Loggia's is undertaken in light of the results of the recent recording of the two Loggia's that were completed.
2. The results are submitted for publication in an appropriate archaeological/architectural journal.

7 ARCHIVE

ARCHIVE CONTENTS

The project archive contains:

- A Printed and bound copy of this report;
- A Printed copy of the Written Scheme of Investigation;
- Site survey notes and drawings A4/A3;
- Cigarette Packet dated 1966; and
- 121 digital prints of the Record Photographs, with registers and location plans.

LOCATION

The project archive will be deposited with the National Trust at Hardwick Hall and a copy of the report uploaded to OASIS, under the code: **thejesso1-404516**.

8 BIBLIOGRAPHY AND REFERENCES

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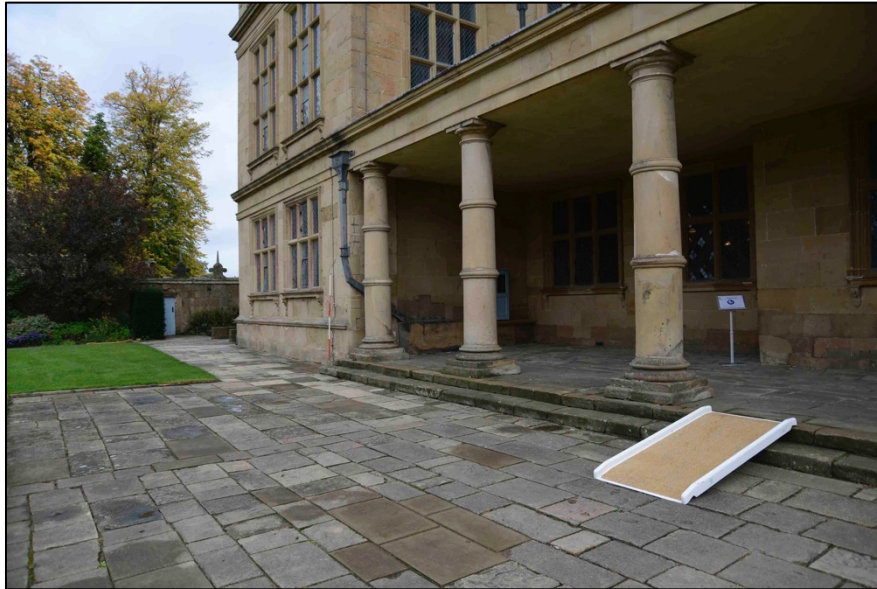
APPENDIX I:

RECORD PHOTOGRAPHY



Appendix I.1: View of West Loggia prior to repairs in October 2020, looking south-east

(Digital 5)



Appendix I.2: View of collonade prior to repairs in October 2020, looking north-east.

(Digital 2; 2m scale)



Appendix I.3: View of collonade prior to repairs in October 2020, looking north.

(Digital 3; 2m scale)



Appendix I.4: Detail of entablature above collonade prior to repairs in October 2020, looking south-east.

(Digital 1)



Appendix I.5: View of south-east door onto West Loggia roof prior to repairs in October 2020.

(Digital 10; 2m scale)



Appendix I.6: View of roof prior to repairs in October 2020, looking north-east.

(Digital 7; 2m scale)



Appendix I.7: View of roof prior to repairs in October 2020, looking north.

(Digital 25; 2m scale)



Appendix I.8: View of roof prior to repairs in October 2020, looking north-east.

(Digital 26; 10cm scale)



Appendix I.9: Detail of gutter outflow and flashing prior to repairs in October 2020, looking north-east.

(Digital 17; 1m scale)



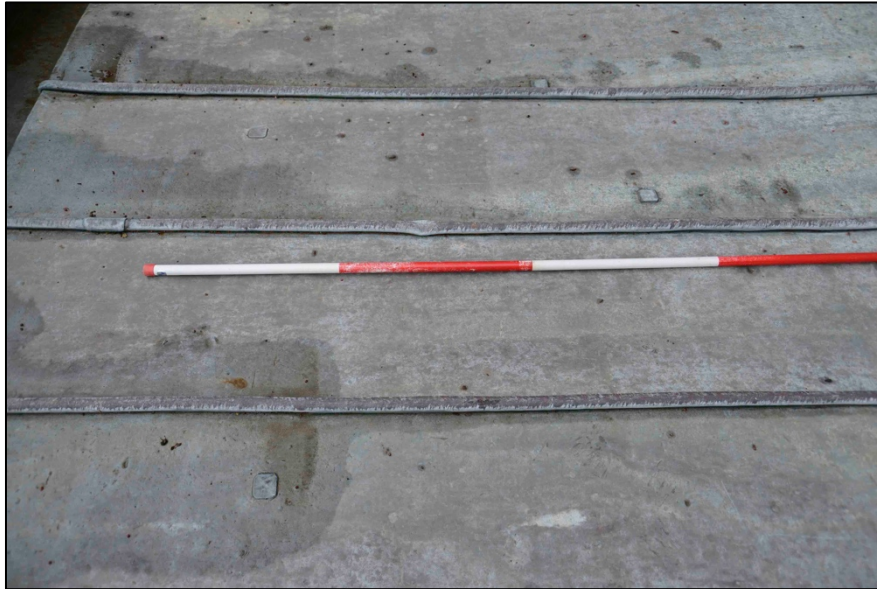
Appendix I.10: Detail of central section of west elevation (**Area B**), looking east.

(Digital 22; 2m scale)



Appendix I.11: Detail of secondary roof hatch in **Area A**.

(Digital 13; 1m scale)



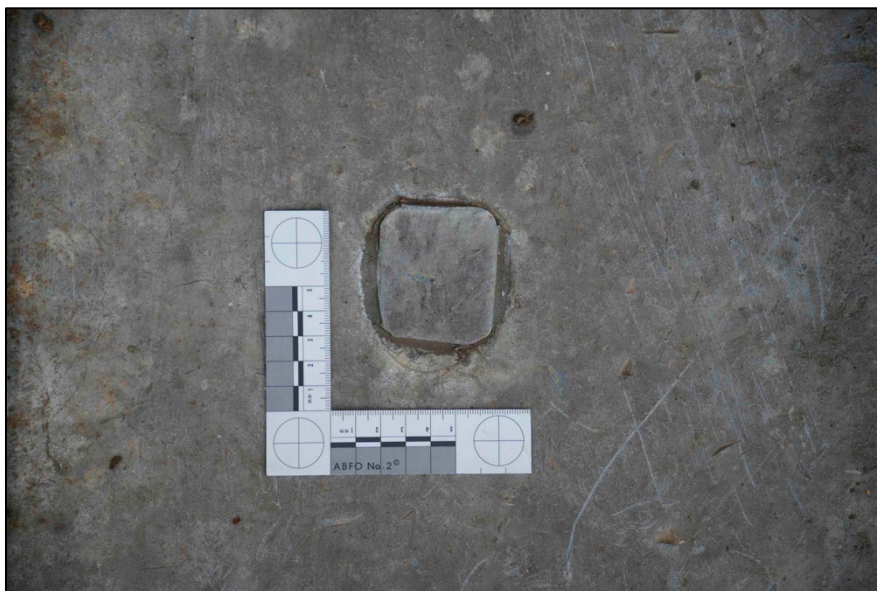
Appendix I.12: Detail of lead and patch repairs in central part of roof (**Area B**).

(Digital 27; 2m scale)



Appendix I.13: Detail of patch repair in lead.

(Digital 19; 5cm scale)



Appendix I.14: Detail of patch repair in lead.

(Digital 20; 5cm scale)



Appendix I.15: Detail of exposed boards in **Area A**; note narrow replacements, looking north.

(Digital 85; 1m scale)



Appendix I.16: View of exposed 'original' boards in central section of roof (**Area B**), looking north.

(Digital 110; 2m scale)



Appendix I.17: View looking south along exposed boards below leads.

(Digital 112; 2m scale)



Appendix I.18: Detail of underside of 'original' pine board; note red letters T S 2.

(Digital 49; 5cm scale)



Appendix I.19: Detail of underside of 'original' pine board; note red letters T S 14.

(Digital 50; 5cm scale)



Appendix I.20: Detail of rafters and south wall of **Area A**; note stone offset at a different angle to the rafters.

(Digital 54; 1m scale)



Appendix I.21: Detail of central section of roof (Area B) following removal of boards, looking south.

(Digital 114; 2m scale)



Appendix I.22: Detail of **Area A** following removal of boards, looking south.

(Digital 52; 2m scale)



Appendix I.23: Detail of **Area A** following removal of boards, looking north.

(Digital 53; 2m scale)



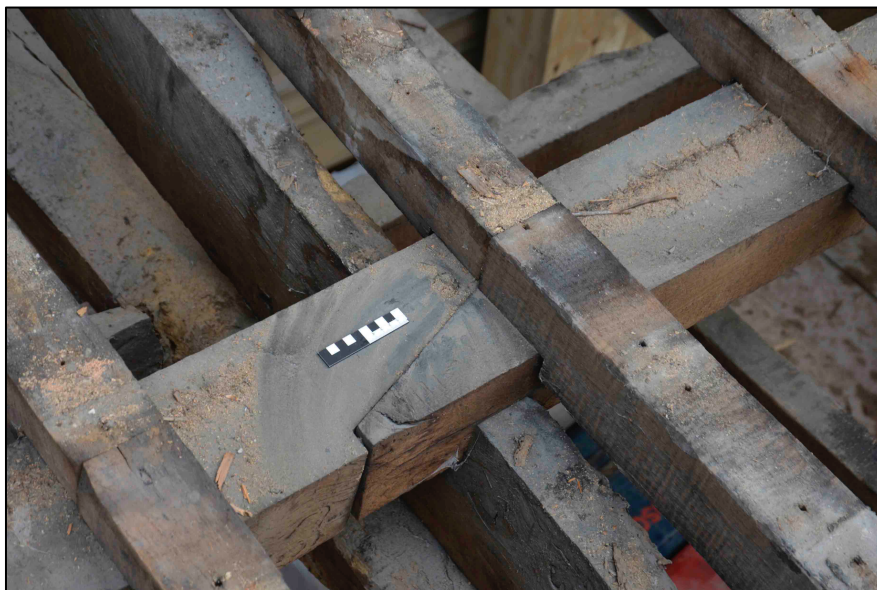
Appendix I.24: Detail of **Area B** following removal of boards, looking north; note reused prulin and patched hole in plaster ceiling below.

(Digital 58; 10cm scale)



Appendix I.25: Detail of scarfed purlin with peg fixing.

(Digital 116)



Appendix I.26: Detail of scarfed purlin set into notch in truss below.

(Digital 117; 10cm scale)



Appendix I.27: Detail of reused rafter with redundant square peg and chisel cut assembly mark.

(Digital 59; 10cm scale)



Appendix I.28: Detail of timber construction along the west wall of the Hall in **Area A**; note inset hole in masonry within roof void.

(Digital 41; 10cm scale)



Appendix I.29: Detail of timber construction along the west wall of the Hall in **Area A**; note rafters notched over timber bearer.

(Digital 44; 10cm scale)



Appendix I.30: General view looking south across **Areas B** and **C** with partial removal of boards.

(Digital 118)



Appendix I.31: General view looking south of lower ceiling joists following removal of plaster



Appendix I.32: Detail of roof void in **Area A**, looking south.

(Digital 69)

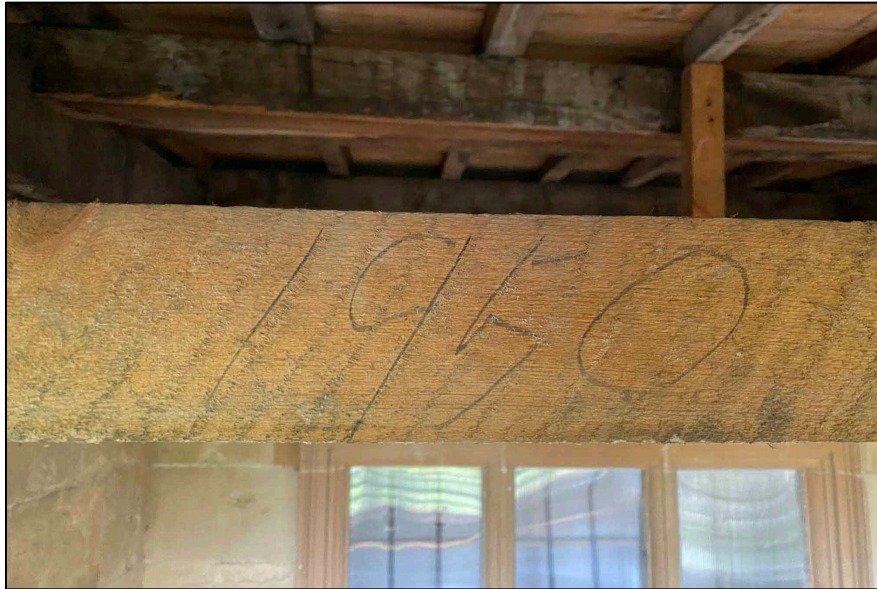


Appendix I.33: Detail of cigarette packet left within the roof void of **Area A**; note expanded mesh for plasterwork below.

(Digital 45)



Appendix I.34: Detail of cigarette packet in roof void in **Area A** with date – MARCH 21 1966.



Appendix I.35: Detail of pencil date on lower ceiling joists in **Area A** - 1950.



Appendix I.36: Detail of pencil date on lower ceiling joists in **Area A** - 1950.

(Digital 106; 5cm scale)



Appendix I.37: Detail of south-east corner of **Area A** within ceiling void; note stone offset.

(Digital 81)



Appendix I.38: Detail of post at east end of T9; note inserted hole in walling.

(Digital 64; 10cm scale)



Appendix I.39: Detail of iron peg with cotter pin on T9.

(Digital 75; 5cm scales)



Appendix I.40: Detail of bolted repair on T10.

(Digital 73; 10cm scale)



Appendix I.41: Detail of red painted marks (letters?) on south face of tie beam on T8.

(Digital 70; 10cm scale)



Appendix I.42: Detail of south-west corner of **Area A**; note stone pier and replaced rafters.

(Digital 83)



Appendix I.43: Detail of rough coursed walling (not ashlar) within ceiling void of **Area C**; note inserted iron rods.

(Digital 33)



Appendix I.44: Detail of iron strap against T1 in **Area C**.

(Digital 35)



Appendix I.45: Detail of junction of timber beams and truss above column; note bolted fixing.

(Digital 99; 5cm scale)



Appendix I.46: Detail of tie beam tenoned into entablature beam above column; note bolted fixings.

(Digital 101; 5cm scale)



Appendix I.47: Detail of secondary ceiling beam inserted into masonry of Hall at south end of **Area B**; note rough tooling above and ashlar below.

(Digital 104)



Appendix I.48: Detail of wrought iron strap within **Area C**; note horizontal slot for tenon of lower ceiling joist.

(Digital 86; 5cm scale)



Appendix I.49: Detail of horizontal slot and tenon of lower ceiling joist in **Area C**; note scored incision layout cuts.

(Digital 89; 5cm scale)



Appendix I.50: Detail of tenon of lower ceiling joist in **Area C**.

(Digital 96; 5cm scale)



Appendix I.51: Detail of chisel cut assembly marks (VIII) on lower timber bearer against west wall of Hall in **Area C**.

(Digital 98; 5cm scale)



Appendix I.52: Detail of chisel cut assembly marks (IX) on lower timber bearer against west wall of Hall in **Area C**.

(Digital 108; 5cm scale)



Appendix I.53: Detail of pegs and scarfed timber bearer beam against west wall of Hall in **Area A**.

(Digital 42; 10cm scale)



Appendix I.54: Detail of three parallel upper purlins in **Area A**; note reused timbers.

(Digital 77; 10cm scale)



Appendix I.55: Detail of pegged and scarfed upper purlin in **Area B**; note chisel cut assembly numerals (VII).

(Digital 119; 65cm scale)



Appendix I.56: Detail of inserted hole within west wall of **Area A**; note internal relieving arch of window below and cut back lead pipe.

(Digital 65; 10cm scale)



Appendix I.57: Detail of red painted letter 'B' on north face of post and principal joist of T2.

(Digital 91)



Appendix I.58: Detail of red painted letter 'D' on north face of post and principal joist of T4.

(Digital 93)



Appendix I.59: Detail of red painted letter 'K' on north face of post and principal joist of T10.

(Digital 84; 10cm scale)