



**ODEON CINEMA  
(JOHN HALLE'S HALL)  
NEW CANAL  
SALISBURY  
WILTSHIRE**

**TREE-RING ANALYSIS OF TIMBERS**



**Alison Arnold and Robert Howard  
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**ODEON CINEMA, (JOHN HALLE'S HALL), NEW CANAL, SALISBURY, WILTSHIRE; TREE-RING  
ANALYSIS OF TIMBERS**

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**SUMMARY**

**Analysis by dendrochronology was undertaken on nine of the 10 samples taken from a series of first floor timbers to the front, or foyer, range of this building (one sample having too few rings for reliable dating). This analysis produced a single site chronology comprising only two samples, both from main, first floor or gallery, ceiling beams. This site chronology is 112 rings long overall, these 112 rings being dated as spanning the years 1348–1459. Interpretation of the sapwood on the samples indicates that both timbers are likely to have been felled at the same time, this felling taking place in 1459.**

**The remaining seven measured samples all remain undated.**

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## **Introduction**

John Halle was a wealthy and influential Salisbury wool merchant. He was possibly the son of Thomas Halle, who was a member of the Salisbury Corporation from 1436 to 1440. John Halle is recorded as being a member of the Salisbury Common Council in 1446. In 1448 he became an Alderman, and in 1449 Constable of New Street Ward. He was repeatedly elected Mayor of Salisbury, first in 1451, then in 1458, 1460, 1461 and 1465. He died on 18 October 1479.

John Halle's Hall stands in the centre of Salisbury on the south side of the road known as New Canal, a little distance south of the central market place, the hub of commercial life in medieval Salisbury (Fig 1a/b). It is believed that by 1455 he already owned property on the Ditch (New Canal) and in Carternstrete (Catherine Street) to the east.<sup>[4]</sup> Halle is believed to have bought the plot of land on which his hall now stands in 1467, and it was built over the period 1470–1483.

Nicholas Pevsner describes the building, saying that 'the principal survival is the hall, with a splendid open roof of six bays. Arched braces on figure brackets carry the collar-beams. The braces form pointed arches. Four tiers of delightfully cusped wind-braces also forming pointed arches. The hall is ashlar-faced. It has to the west only one small two-light window but to the east two large, straight-headed transomed four-light windows and one transomed two-light window. The lights are arched and cusped at the top as well as below the transoms. The small doorway cuts into the southern of the four-light windows, giving it an oddly limping shape. So on that side was the screens passage. Yet the room to the south of the hall has a ceiling with heavily moulded beams (probably re-set). The room to the north, the entrance hall of the cinema, must have been remodelled in the seventeenth century. It has a gallery round with flat cut-out balusters. Splendid stone fireplace with a frieze of quatrefoils in the hall. A good deal of original stained glass, shields-of-arms and scrollwork, well restored and supplemented by Willement (Dean Woodforde)'.

A plan of the building, showing the location of the sampled timbers is given in Figure 2.

## **Sampling**

Wiltshire Buildings Record as a group has been investigating historic buildings in Wiltshire and charting their evolution since 1979, the archive now containing over 20,000 records including reports, photographs, plans, drawings, newspaper articles etc. A series of informative and accessible books have also been published. Since 2013 an on-going dendrochronology project has been looking at early roof types in particular, this having considerably increased the understanding of their development.

As furtherance of this programme of tree-ring dating, a funding application was made to the Vernacular Architecture Group to continue to study key Wiltshire buildings with early or unusual carpentry, and relating them to other buildings in the County. Amongst those

selected was the former John Halle's Hall, on New Canal, Salisbury, currently operating as a picture house for the Odeon Cinema chain.

In this context it is hoped the Wiltshire Buildings Record would add interest and value to the VAG conference due to be held in Wiltshire in April 2025, the intention being to complete the dating project in advance in order that the results may be presented at that meeting.

Thus it was that sampling and analysis by dendrochronology of timbers to John Halle's Hall were commissioned by the Wiltshire Buildings Record, the work being funded with the aid of a generous grant from the Vernacular Architecture Group. It was hoped that tree-ring analysis might more accurately and reliably determine the date of the building, perhaps demonstrate something of its subsequent development, and perhaps demonstrate its relationship to other buildings in the locality.

An initial examination of the building showed that all the timber framing seen to this front range was of oak. This examination also showed that while many of the timbers were derived from fairly fast-grown trees, producing beams which thus might not have sufficient numbers of rings for reliable dating (despite their good sizes), there were a sufficient number of timbers which did appear to be suitable for analysis.

Thus, from the suitable timbers available, a total of 10 samples was obtained by coring, the sample area being limited to those accessible at first floor level from the gallery to the front or foyer part of the present cinema. Although there appears to be a substantial amount of timber the remainder of the building, ie, to the rear or inner hall, this is all at considerable height, which would require a substantial scaffold tower to access. Given the present operating function of the building, this was deemed impractical at the present time.

Each sample obtained was given the tree-ring code SOD-E (for Salisbury 'Odeon), and numbered 01–10, the sampled timbers being identified on annotated photographs shown here as Figures 3a–d. Details of the samples are given in Table 1, including the timber sampled, the total number of rings each sample has, and how many of these, if any, are sapwood rings. The individual date span of each dated sample is also given. In this report the front of the building is deemed to face site north onto New Canal.

The Nottingham Tree-ring Dating Laboratory would firstly like to very much thank the staff and Manager of the Salisbury Odeon, Richard Bowes, for facilitating tree-ring analysis of this building, and for their help and cooperation on the day of sampling. The Laboratory would also like to thank the Wiltshire Buildings Record for supporting this programme of work, particularly Dorothy Treasure, for helping with access to the building, for their help on the day of sampling, and for providing the introductory paragraphs above. Finally, we would like to thank the Vernacular Architecture Group for their generous support for this project.

## Tree-ring dating

Tree-ring dating relies on a few simple, but quite fundamental, principles. Firstly, as is commonly known, trees (particularly oak trees, the timber most commonly used in building construction until the introduction of pine from the late eighteenth century onwards) grow by adding one, and only one, growth-ring to their circumference each, and every, year. The width of this annual growth-ring is largely, though not exclusively, determined by the weather conditions during the growth period (roughly March–September). In general, good conditions produce wider rings and poor conditions produce narrower rings. Thus, over the lifetime of a tree, the annual growth-rings display a climatically influenced pattern. Furthermore, and importantly, all trees growing in the same area at the same time will be influenced by the same growing conditions and the annual growth-rings of all of them will respond in a similar, though not identical, way.

Secondly, because the weather over a certain number of consecutive years (the statistically reliable minimum calculated as being 54 years) is unique, so too is the growth-ring pattern of the tree. The pattern of a shorter period of growth, 20, 30, or even 40 consecutive years, might conceivably be repeated two or even three times in the last one thousand years, and is considered less reliable. A short pattern might also be repeated at different time periods in different parts of the country because of differences in regional micro-climates. It is less likely, however, that such problems would occur with the pattern of a longer period of growth, that is, anything in excess of 45 years or so. In essence, a short period of growth, anything less than 45 rings, is not reliable, and the longer the period of time under comparison the better.

Tree-ring dating relies on obtaining the growth pattern of trees from sample timbers of unknown date by measuring the width of the annual growth-rings. This is done to a tolerance of 1/100 of a millimetre. The growth patterns of these samples of unknown date are then compared with a series of reference patterns or chronologies, the date of each ring of which is known. When the growth-ring sequence of a sample ‘cross-matches’ repeatedly at the same date span against a series of different reference chronologies the sample can be said to be dated. The degree of cross-matching, that is the measure of similarity between sample and reference, is denoted by a ‘*t*-value’; the higher the value the greater the similarity. The greater the similarity the greater is the probability that the patterns of samples and references have been produced by growing under the same conditions *at the same time*. The statistically accepted fully reliable minimum *t*-value is 3.5.

However, rather than attempt to date each sample individually it is usual to first compare all the samples from a single building, or phase of a building, with one another, and attempt to cross-match each one with all the others from the same phase or building. When samples from the same phase do cross-match with each other they are combined at their matching positions to form what is known as a ‘site chronology’. As with any set of data, this has the effect of reducing the anomalies of any one individual (brought about in the case of tree-rings by some non-climatic influence) and enhances the overall climatic signal. As stated above, it is the climate that gives the growth pattern its distinctive pattern. The greater the number of

samples in a site chronology the greater is the climatic signal of the group and the weaker is the non-climatic input of any one individual.

Furthermore, combining samples in this way to make a site chronology usually has the effect of increasing the time-span that is under comparison. As also mentioned above, the longer the period of growth under consideration, the greater the certainty of the cross-match. Any site chronology with less than about 55 rings is generally too short for reliable dating.

Having obtained a date for the site chronology as a whole, the date spans of the constituent individual samples can then be found, and from this the felling date of the trees represented may be calculated. Where a sample retains complete sapwood, that is, it has the last or outermost ring produced by the tree before it was cut, the last measured ring date is the felling date of the tree.

Where the sapwood is not complete it is necessary to estimate the likely felling date of the tree. Such an estimate can be made with a high degree of reliability because oak trees generally have between 15 to 40 sapwood rings. For example, if a sample with, say, 12 sapwood rings has a last sapwood ring date of 1400 (and therefore a heartwood/sapwood boundary ring date of 1388), it is 95% certain that the tree represented was felled sometime between 1403 (1400+3 sapwood rings (12+3=15)) and 1428 (1400+28 sapwood rings (12+28=40)).

## **Analysis**

Each of the 10 samples obtained from the timbers available from the first floor gallery to the front of the building Farmhouse was prepared by sanding and polishing to clearly show the individual annual growth rings. It was seen at this time that one sample, SOD-E04, had too few rings for reliable analysis (less than 40), and it was rejected from this programme of analysis. The growth ring widths of the remaining nine samples were, however, measured.

These measured data were then compared with each other as described in the notes above. This comparative process indicated that a single group comprising only two cross-matching samples could be formed, these two cross-matching with each other at relative positions as shown in the bar diagram, Figure 4.

The measured data of the two cross-matching samples were combined at their indicated offset positions to form SODESQ01, a site chronology with an overall length of 112 rings. This site chronology was then satisfactorily dated by repeated and consistent cross-matching with a high number of relevant reference chronologies for oak as spanning the years 1348 to 1459. The evidence for this dating is given in the *t*-values of Table 2.

Site chronology SODESQ01 was then compared with the seven remaining measured but ungrouped samples. There was, however, no further satisfactory cross-matching. The seven

remaining ungrouped samples were, therefore, compared individually with the full corpus of reference data for oak. There was again no further satisfactory cross-matching, and seven measured samples must, therefore, remain undated

### **Interpretation**

One of the dated samples, SOD-E09, in site chronology SODESQ01, retains complete sapwood. This means that it has the last full growth ring produced by the tree represented before it was cut (this denoted by upper case 'C' in Table 1 and the bar diagram). This last full growth ring, and thus the felling of the tree, is dated 1459.

The other dated sample, SOD-E10, of site chronology SODESQ01 retains 20 sapwood rings, the relative position and date of the heartwood/sapwood boundary being similar to that on sample SOD-E09. This would suggest that both timbers originally had similar, if not identical, numbers of sapwood rings, this in turn suggesting that the tree represented by sample SOD-E10 was also felled in, or about, 1459 as well.

### **Conclusion**

The analysis undertaken here, showing that two ceiling beams were felled in 1459, unfortunately, is not entirely conclusive as to the date of the building now seen on New Canal. From earlier surveys of the building, and from the sampled timbers available to this programme of tree-ring analysis, there appears to be little evidence that the forward part of the building relates either to the supposed construction of John Halle's Hall, traditionally believed to have been undertaken in 1470, or to any later alterations or additions, believed to have been made in the earlier sixteenth century, although it is possible that these two older timbers were reused during the subsequent phases of work.

#### *Woodland sources*

As may perhaps be seen from Table 2, although site chronology SODESQ01 has been compared with reference material from all parts of England, there is something of a slight trend for it to match best with other reference sites in the south and west of England rather than anywhere else. While the woodland source(s) of the timbers used at these other sites are themselves not known, the matching seen here would suggest that the timbers used at John Halle's Hall came from a similar, and probably local, regional source.

#### *Undated samples*

Seven of the nine samples measured (an unusually high proportion) remain both ungrouped and undated. Although one or two might show some slight distortion, there appear to be no particular problems with the annual growth rings of any of these samples, and the reason for

the lack of dating is totally unknown. It is, however, a common feature of most programmes of tree-ring dating to find that some samples, for no apparent reason, will not cross-match with other samples from the same site, or date individually against the reference chronologies.

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**Table 1:** Details of tree-ring samples from John Halle's Hall (the Odeon Cinema) New Canal, Salisbury, Wiltshire

| Sample number | Sample location                                   | Total rings | Sapwood rings* | First measured ring date (AD) | Heart/sap boundary (AD) | Last measured ring date (AD) |
|---------------|---------------------------------------------------|-------------|----------------|-------------------------------|-------------------------|------------------------------|
| SOD-E01       | East main wall post, truss 2                      | 100         | h/s            | -----                         | -----                   | -----                        |
| SOD-E02       | North brace to east main wall post, truss 2       | 102         | 25             | -----                         | -----                   | -----                        |
| SOD-E03       | Mid-rail to north of east main wall post, truss 2 | 45          | 3              | -----                         | -----                   | -----                        |
| SOD-E04       | South brace to east main wall post, truss 2       | nm          | ---            | -----                         | -----                   | -----                        |
| SOD-E05       | West main wall post, truss 2                      | 75          | h/s            | -----                         | -----                   | -----                        |
| SOD-E06       | South brace to west main wall post, truss 2       | 54          | no h/s         | -----                         | -----                   | -----                        |
| SOD-E07       | West main wall post, truss 3                      | 76          | h/s            | -----                         | -----                   | -----                        |
| SOD-E08       | East main wall post, truss 3                      | 81          | no h/s         | -----                         | -----                   | -----                        |
| SOD-E09       | Main ceiling beam on line of truss 2              | 112         | 26C            | 1348                          | 1433                    | 1459                         |
| SOD-E10       | Main ceiling beam on line of truss 3              | 100         | 20             | 1352                          | 1431                    | 1451                         |

\*C = Complete sapwood is retained on the sample, the last measured ring date is the felling date of the timber

h/s = heartwood/sapwood boundary, i.e., only the sapwood rings are missing

nm = sample not measured

**Table 2:** Results of the cross-matching of site chronology SODESQ01 and the reference chronologies when the first ring date is 1348 and the last ring date is 1459

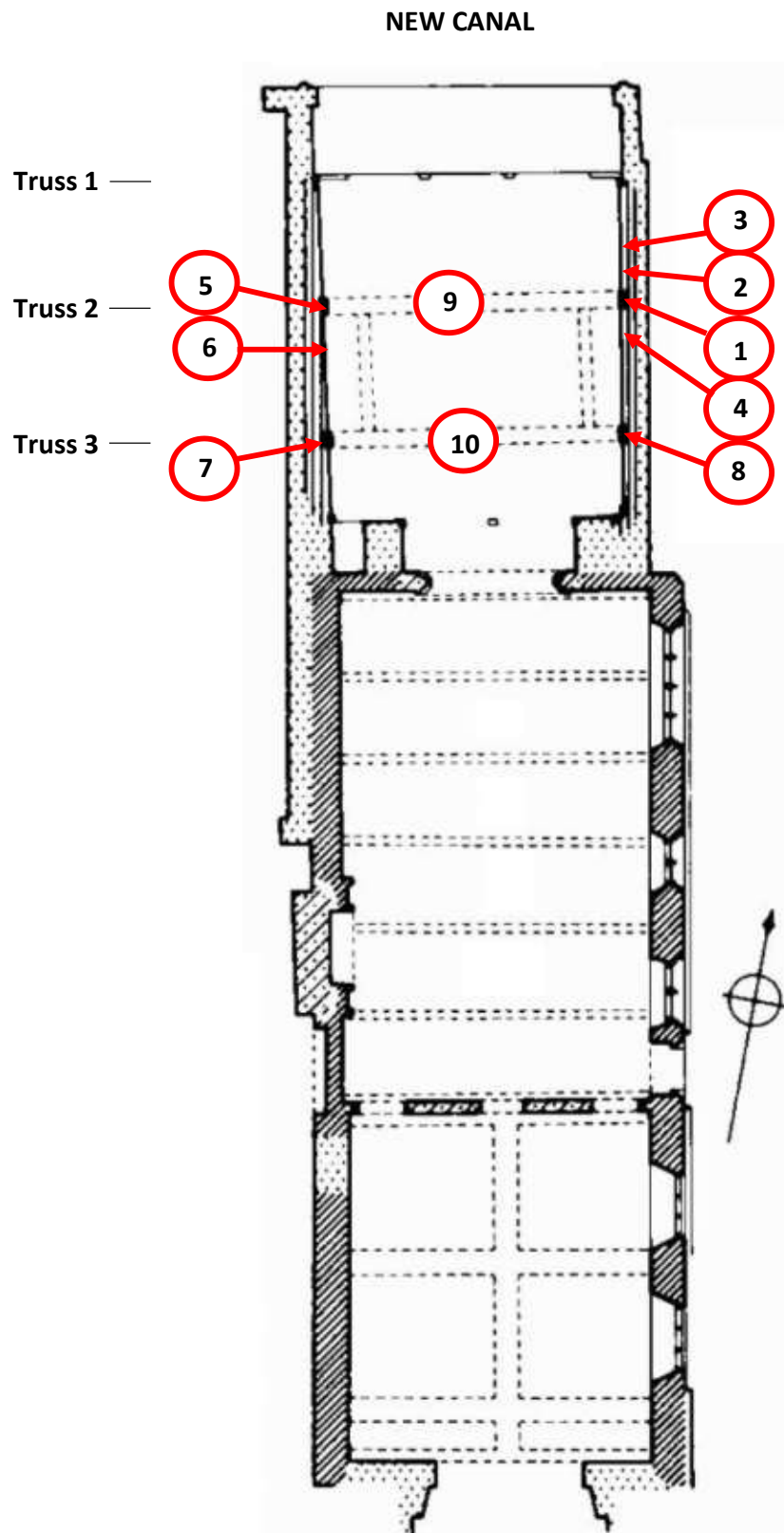
| Reference chronology                           | <i>t</i> -value |                                     |
|------------------------------------------------|-----------------|-------------------------------------|
|                                                |                 |                                     |
| Kings Farm, Livery Road, Winterslow, Wiltshire | 7.1             | ( Arnold <i>et al</i> forthcoming ) |
| Round Tower, Windsor Castle, Berkshire         | 6.1             | ( Miles and Haddon-Reece 2003 )     |
| Reigate Priory, Surrey                         | 5.9             | ( Bridge 2003 )                     |
| New House Farm, Moccas, Herefordshire          | 5.7             | ( Arnold and Howard 2013 unpubl )   |
| Milgate House, Bearstead, Maidstone, Kent      | 5.7             | ( Arnold and Howard 2019 unpubl )   |
| Warren Farm, Charterhouse, Priddy, Somerset    | 5.5             | ( Arnold and Howard 2011 )          |
| Mottisfont Abbey, Hampshire                    | 5.3             | ( Miles 1996 )                      |
| Westwood Manor, Lower Westwood, Wiltshire      | 5.3             | ( Arnold and Howard 2021 unpubl )   |

Site chronology SODESQ01 is a composite of the data of the two cross-matching samples as seen in the bar diagram, Figure 4, below. This composite data set produces an ‘average’ tree-ring pattern, where the possible erratic variations of any one individual sample are reduced and the overall climatic signal of the group is enhanced. This ‘average’ site chronology is then compared with several hundred reference patterns covering every part of Britain for all time periods, cross-matching with a number of these only at the date span indicated. The Table gives only a small selection of the very best matches as represented by ‘*t*-values’ (ie, degrees of similarity). It may be noticed from this that the resultant *t*-values are well in excess of the *t*=3.5 value usually taken as the minimum acceptable level for satisfactory dating.

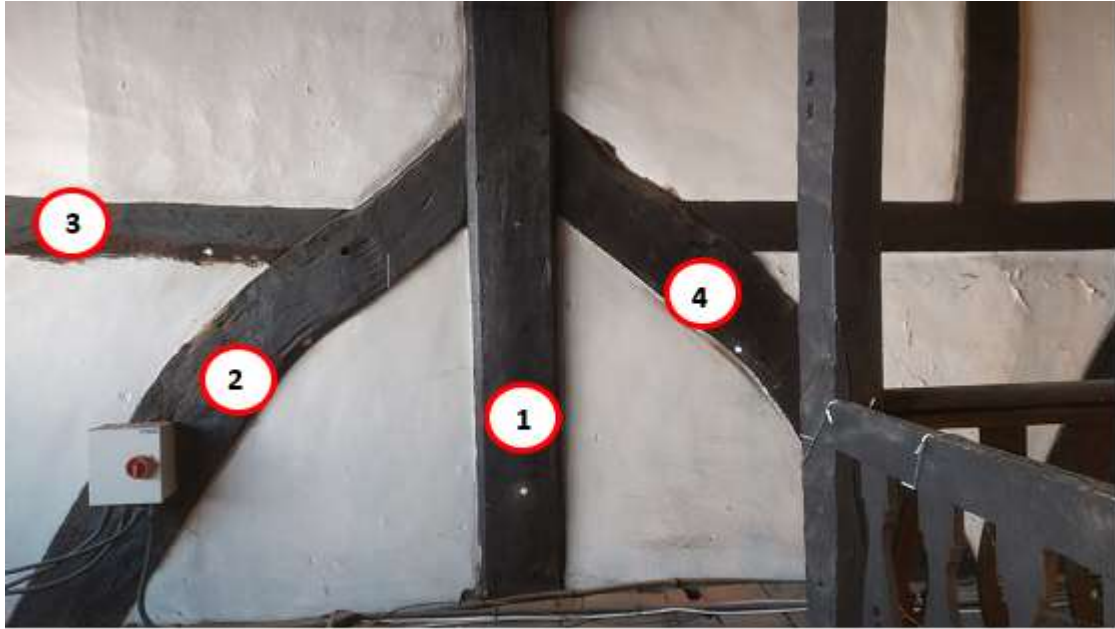
Also of note is that although site chronology SODESQ01 has been compared with reference material from all parts of England, there is a distinct and clear trend for it to match best with other reference sites in south and southwestern England. The matching seen here would suggest that the two timbers used as the main ceiling beams came from a similar, and probably local, regional source.



**Figure 1a/b:** Maps to show location of Salisbury (top) and the Odeon Cinema (bottom)



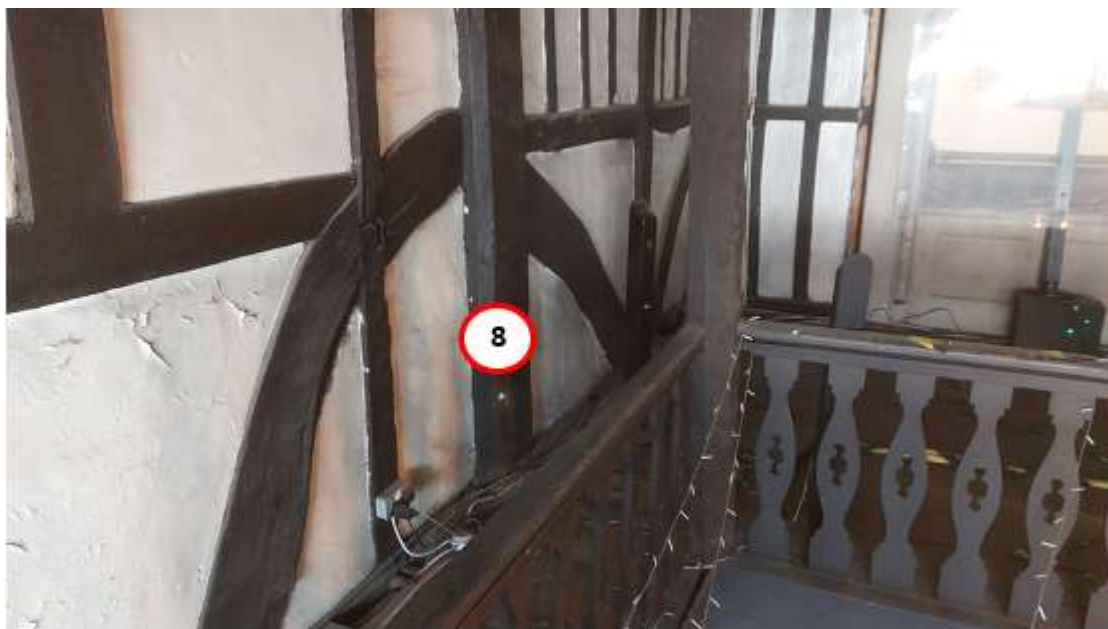
**Figure 2:** Plan at ground floor level to show positions of sampled timbers (after RCHME survey, <https://www.british-history.ac.uk/rchme/salisbury/pp95-107>) (see Table 1 and Figs 3a–d)



**Figure 3a:** Annotated photographs to help identify sampled timbers; truss 2 looking east (see Table 1 and Fig 2)



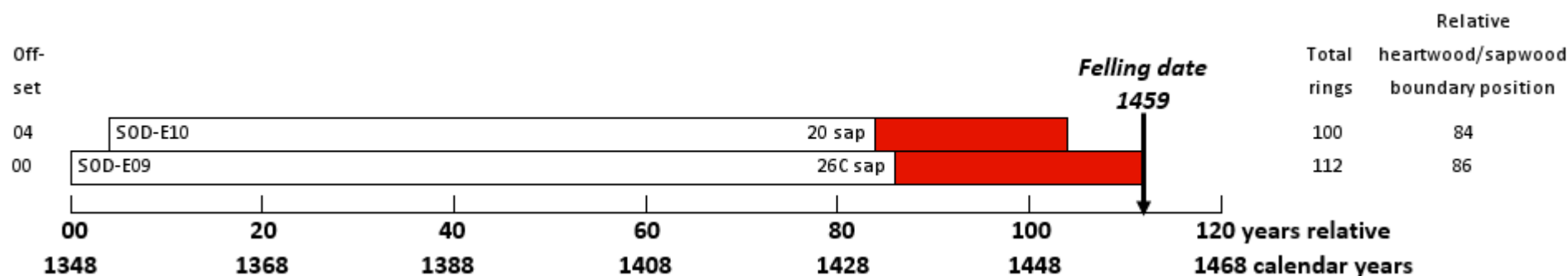
**Figure 3b:** Annotated photographs to help identify sampled timbers; truss 2, with truss 3 beyond, looking west (see Table 1 and Fig 2)

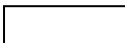


**Figure 3c:** Annotated photographs to help identify sampled timbers; truss 3 looking south-east (see Table 1 and Fig 2)



**Figure 3d:** Annotated photographs to help identify sampled timbers; the main ceiling beams, looking south (see Table 1 and Fig 2)



blank bars  = heartwood rings; filled bars  = sapwood rings

C = Complete sapwood is remained on the sample, the last measured ring date is the felling date of the timber

**Figure 4:** Bar diagram of the samples in site chronology SODESQ01

The two constituent samples of site chronology SODESQ01 are shown here in the form of 'bars' at positions where the pattern of their growth rings cross-match with each other, the similarity being caused by the trees used for the beams sharing common periods of growth which overlap with each other, and having grown in the same general area as each other. The data of the measured rings widths of the samples have been combined to form a 'site chronology' which has then been dated by comparison with the 'reference' chronologies (see Table 2).

One of the samples, SOD-E09, retains complete sapwood, this meaning that it has the last ring produced by the source tree before it was felled. This last growth ring, and thus the felling of the tree, is dated 1459. It is very likely that the tree represented by sample SOD-E10 was felled at the same time.