A BUILDING RECORD OF THE OUTER COURTYARD RANGE ROOFS OF SUDELEY CASTLE, NR. WINCHCOMBE, GLOUCESTERSHIRE

Report: GBRG26-305

Gloucestershire Building Recording Group
www.buildingarchaeology.org

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INTRODUCTION

Much of the special interest of timber buildings lies in how they differ in form and appearance from region to region, with buildings generally reflecting local tradition and locally derived building materials. Studies in Kent, Hampshire, Surrey and Shropshire have identified datable styles of building, but there has been little study or tree-ring dating in Gloucestershire, which also had a strong tradition of timber building.

Typically, few buildings survive before the 15th century, although there are marked regional variations in survival. Gloucestershire is particularly fortunate in its surviving examples of early medieval timber-framed buildings (before 1400). The 13th-century Blackfriars Dominican friary in Gloucester is the best preserved in Britain, and 26 Westgate Street is described as one of the finest timber-framed town houses of its kind. Early medieval buildings which retain significant early fabric are of particular interest in terms of shedding light on the development and innovative use of structural techniques and use of buildings.

The Gloucestershire Building Recording Group (GBRG)

The GBRG is a non-profit organisation founded in 1993 by a group of enthusiasts to advance the understanding of buildings in Gloucestershire. The GBRG has organised the systematic recording and accurate dating by tree-ring analysis of buildings in the county through two funded projects. The Gloucestershire Dendrochronology Project (which dated buildings in Gloucester, Tewkesbury and Newent), and ran from 2020 to 2022 (Moir 2023a). The Cotswolds Hidden Crucks Project (Bishop's Cleeve) ran from 2023 to 2024. Together with previously published tree-ring-dated buildings, this has resulted in summary date spans for 56 stylistic features informed by 211 tree-ring-dated, 37 stone-dated and 24 graffito-dated building phases in Gloucestershire to help in the stylistic dating of buildings (see **APPENDIX IV**). See the website www.buildingarchaeology.com for further details about the GBRG group and www.timber-framed.com for more information on the Gloucestershire Dendrochronology Project.

Methods

To ensure common nomenclature, the Council for British Archaeology (CBA) illustrated glossary of timber-framing terms has been used where possible (Alcock *et al.* 1996). Harris (1978) provides a useful introduction to the study of timber-framed buildings, while Brunskill (2000) details the study of vernacular architecture. All buildings are recorded using photography and a 'Tick-Box' sheet (available at www.buildingarchaeology.co.uk), which is used to summarise the most common and distinctive 'key features'. This information is entered into a purpose-built Building Archaeology Research Database (BARD), a resource then available for further analysis (Moir *et al.* 2012). The Search for Chamfer Stops (Moir and Parker 2020) provides additional information on chamfer stops and can be downloaded from the Gloucestershire Dendrochronology Project website at: www.timber-framed.com.

BUILDING RECORD

Sudeley Castle

Sudeley Castle is a grade I listed building (Historic England List No: 1154791). Although Sudeley Castle has origins as a Saxon house, its history really began with Ralph Boteler, who in 1441 became the Lord Admiral, and then Baron Sudeley and Lord Chamberlain of the King's Household. Ralph Boteler set about building a castle to reflect his new-found status and is reputed to have built the Portmare Tower, the Dungeon Tower, the Banqueting Hall, and the Tithe Barn. In 1547 Thomas Seymour married King Henry VIII's widow, Katherine Parr, and set about refurbishment of the Sudeley Estate. Stonemasons and carpenters built a completely new suite of apartments. Sudeley Castle remains the only private castle in England to have a queen buried within the grounds (**Photos 1 & 2**). Queen Mary granted the castle to Sir John Brydges in 1554, creating him Lord Chandos, and later the third Lord Chandos entertained Queen Elizabeth I three times at Sudeley. The castle was, however, bombarded by cannon in 1644 during the Civil War and ordered 'slighted' (documented to include the removal of the roofs) in 1649. After this, the castle was left in ruins for the next 180 years before being extensively restored in the 19th century. Due to this restoration, little of the earlier builds at Sudeley were thought to survive.[1]

The outer courtyard of Sudeley Castle was visited on the 25th and 26th of February 2026 and a visual survey of the west, north and east range roofs was undertaken (**Photo 3**). A plan of the outer courtyard and the location of the west, north and east ranges are shown in **APPENDICES I** and **II**. See **APPENDIX III** for illustrations showing sections of roof trusses. Additionally, two 3D images of Kathrine Parr's tomb were constructed and are available to view from the following links: https://skfb.ly/pHp6E and https://skfb.ly/pHpo9.

Photo 1: Kathrine Parr's tomb with stained-glass window

Photo 2: Kathrine Parr's tomb

[1] This paragraph has been adapted from Sudeley Castle & Gardens by Nicholas Hurt, 1994

West Range (NGR: SP 0310 2768)

The west range roof consists of eleven timber trusses and eleven bays. It is gabled at the south end and hipped at its north end. There are two chimneys. The trusses contain slightly raking queen struts (**Photo 4**) with diminished principal rafters (**Photo 5**). A 3D image of one of the trusses is available to view from the following link: https://skfb.ly/pGZpL.

Photo 3: Sudeley Castle outer courtyard – south aspect

Photo 4: West range – raking queen-strut roof with clasped purlins

The roof has a ridge purlin (**Photo 6**). The purlins are in-line butted (tenoned) into the principal rafters and supported mainly by curved windbraces (**Photo 7**). However, the majority of windbraces show evidence of re-use, and there are a few windbraces that do not show evidence of re-use that are straight (**Photo 8**). Many original timbers show 80° saw marks, indicating they were pit sawn (**Photo 9**), while trestle saw marks are evident on some of the smoke-blackened re-used timbers. The rafters are set flatways and have a complex set of chiselled carpenter's marks at their apex (**Photos 10 & 11**). The trusses have simpler chiselled carpenter's marks (**Photo 12**).

Photo 5: West range – diminished principal rafter

Photo 6: West range – ridge purlin

Photo 7: West range – a re-used curved windbrace

Photo 8: West range – a straight windbrace

Photo 9: West range – pit saw marks

Photo 10: West range – complex chiselled carpenter's mark on rafter

Photo 11: West range – complex chiselled carpenter's mark on rafter

Photo 12: West range – chiselled carpenter's mark on truss

North Range (NGR: SP 0312 2769)
A small two-bay section of original roof survives at the west end of the north range roof. This roof consists of oak timbers with raking queen-strut trusses (**Photo 13**) and diminished principal rafters (**Photo 14**). The purlins are in-line butted (tenoned) into the principal rafters and are supported by almost straight windbraces (**Photo 13**), and there is no ridge purlin. A 3D image showing truss 1 and truss 2 is available to view from the following link: https://skfb.ly/pHxA9

The rafters are set flatways and have some 3cm long chiselled carpenter's marks at their apex (**Photo 15**). The bases of the raking queen struts show curved chiselled carpenter's marks (**Photo 16**). The timbers show 80° saw marks, indicating they were pit sawn. One of the chimneys in the north range has part of a stone mullion window embedded within it, which may have been re-used from Winchcombe Abbey. A 3D image showing the chimney is available to view from the following link: https://skfb.ly/pHxAF

The rest of the north range roof (trusses 3 to truss 10) has been replaced by a much later style of roof truss using pine timbers (**Photo 17**). A 3D image showing a later roof truss is available to view from the following link: https://skfb.ly/pGZDV. The use of cargo marks on some timbers indicates the pine is likely imported (**Photo 18**). The pine timbers also appear to have been machine cut. This all suggests this part of the roof is 19th century in date.

Photo 13: North range – queen-strut roof with clasped purlins supported by straight windbraces

Photo 14: North range – diminished principal rafter

Photo 15: North range – chiselled carpenter's marks

Photo 16: North range – curved chiselled carpenter's marks

Photo 17: North range – later pine trusses

Photo 18: North range – cargo marks on later pine trusses

East Range (NGR: SP 0313 2767)

The east range contains sixteen trusses and sixteen bays. The timbers are oak and the roof trusses are of raking queen-strut construction. Two 3D images of the southern and northern ends of this roof are available to view from the following links: https://skfb.ly/pHxzL and https://skfb.ly/pHxzY. Some, but not all, of the trusses have diminished principal rafters (**Photos 19 & 20**). Many of the principal rafters show clear evidence for re-use in the form of empty mortises (**Photo 21**). The purlins are in-line butted (tenoned) into the principal rafters and supported mainly by curved windbraces, but as many of these windbraces are also re-used (**Photo 22**), it may be that this earlier curved style was copied for the non-re-used windbraces for consistency. The rafters are set flatways with few carpenter's marks.

The timbers have both chiselled and scribed carpenter's marks (**Photos 23 & 24**). The scribed carpenter's marks were generally found on re-used timbers, while chiselled carpenter's marks were found on both re-used and non-re-used timbers. The majority of timbers show 80° saw marks, indicating they were pit sawn. It was estimated that 60% of the timbers contained empty mortises, indicating that they have been re-used. The re-use of some timbers was reinforced by observations of odd timbers showing evidence of smoke blackening and 45° saw marks, indicating they were trestle sawn. One re-used timber was located that contained empty mortises for close studding, suggesting it originated from a timber wall-framed building.

Photo 20: East range – truss 4 with no diminished principal rafters

Photo 19: East range – truss 11 with diminished principal rafters

Photo 21: East range – truss 1 showing re-used principal rafter with empty mortises

Photo 22: East range – smoke-blackened re-used curved windbrace (left)

Photo 23: East range – a re-used timber showing 45º trestle saw marks and scribed carpenter's marks

Photo 24: East range – a non-re-used timber showing 90º pit saw marks and a curved chiselled carpenter's mark

DISCUSSION

Stylistic Dating Features in the West, North and East Ranges

Due to previous tree-ring dating projects in Gloucestershire (Moir 2022; 2023b) the common date ranges of many stylistic features in the county's buildings have been established (**see Appendix IV**). Recently the Gloucestershire Building Recording Group (GBRG) used stylistic dating of the west, north and east ranges of Sudeley Castle to estimate that construction occurred in the first half of the 16th century, some time between the 1500s and 1550s (GBRG 2025). However, the tree-ring dating of all three roofs has identified that they were likely constructed a few decades later, between 1569 and 1572 (Moir 2026).

This earlier-than-expected stylistic dating estimate was mainly due to the high occurrence of re-used timbers with earlier features. However, the use of diminished principals in the county was previously unknown after the 1550s until the tree-ring dating of these roofs.

The roofs were also previously identified as containing clasped purlins, whereas the roofs contain in-line butt purlins, which are tenoned to the principal rafters. The occurrence of both curved and straight windbraces is found throughout the range roofs, but this survey indicates that most curved windbraces are re-used. It also appears that some primary curved windbraces (particularly in the east range roof) may have copied the earlier curved style. Straight windbraces are rarely used before the 1570s and so this identifies a very early example of the use of straight windbraces.

In terms of carpentry, the 80–90º saw marks are here demonstrated to be a reliable indicator that the pit sawing of timbers comes into use after the 1540s. The occurrence of timbers with 45º saw marks is a useful feature for identifying re-used timbers in these roofs. A revised summary of the roofs' stylistic dating features is shown in **APPENDIX IV**, and this correctly estimates that the roof was likely constructed in the second half of the 16th century, some time between the 1550s and 1600s

CONCLUSIONS

Sudeley Castle is a grade I listed building which has a rich association with the monarchs of England. Previously, due to the documented slighting of the castle (to include the removal of the roofs) in 1649, little of the earlier builds were thought to survive. However, a survey of the range roofs of the outer courtyard in 2025 identified the survival of probably original oak trusses, which have now been tree-ring dated as felled between 1569 and 1572.

The west, north and east ranges were heated by central chimneys. Stylistically, all the roofs' timbers are similar in form and so likely to be of similar date. The roofs consist of raking queen-strut trusses, and are particularly late example of the use of diminished principal rafters. While the primary timbers are generally straight, the east range roof particularly incorporates a large proportion of re-used curved windbraces, and some of the primary timbered windbraces appear to copy this curved style.

The re-used timbers are typically identifiable by having 45º trestle saw marks, evidence of smoke blackening and scribed carpenter's marks. The primary timbers can be distinguished form re-used timbers by having 80–90º saw marks, no evidence of smoke blackening and chiselled carpenter's marks. Whether this large source of building timber for re-use came from demolished buildings on the Castle Estate or, following the dissolution of Winchcombe Abbey in 1539, were repurposed from the demolished abbey buildings, is unclear. However, the re-use of a stone mullion in one of the chimneys might be significant.

ACKNOWLEDGEMENTS

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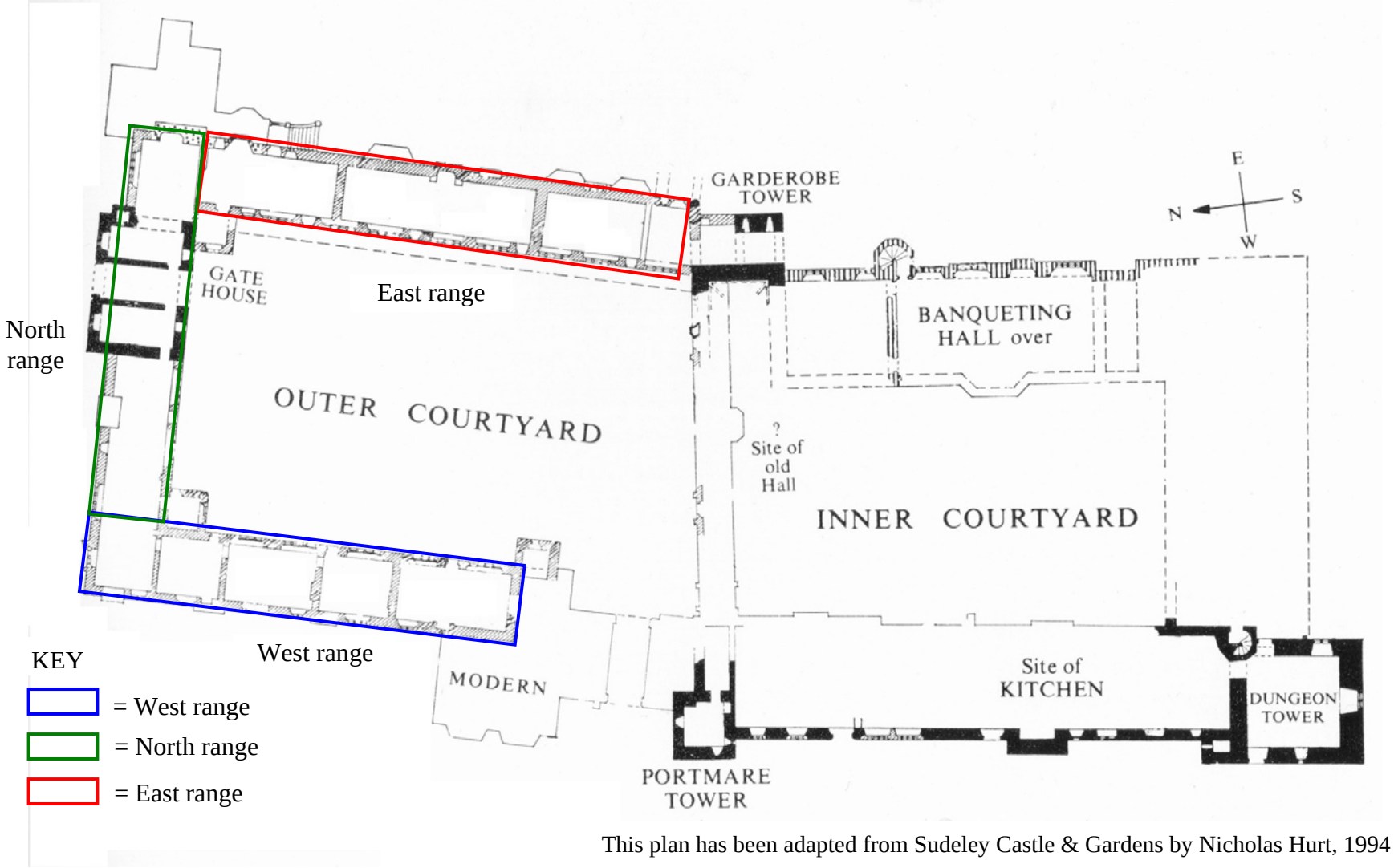
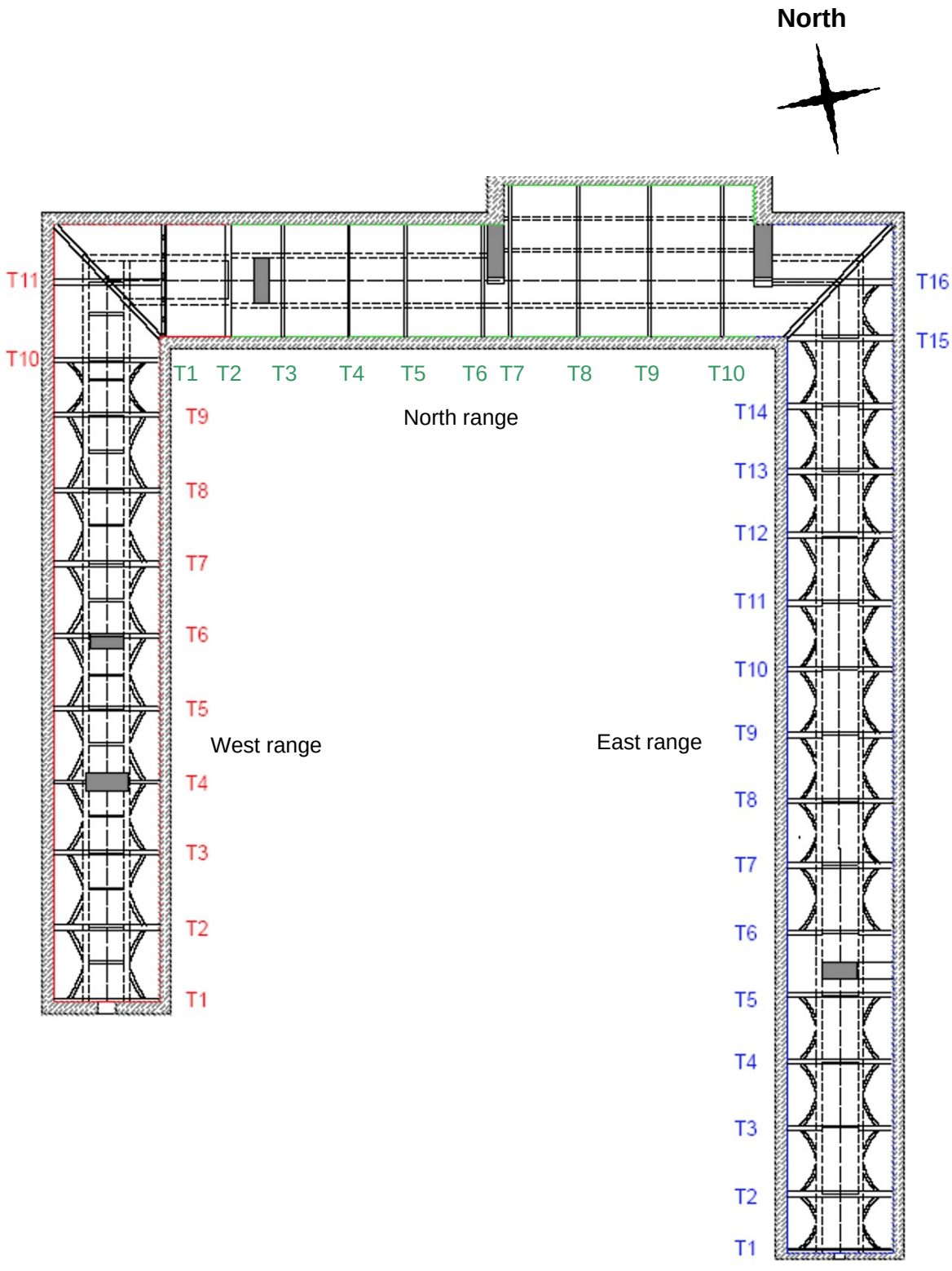
APPENDIX I: Plan of Sudeley Castle



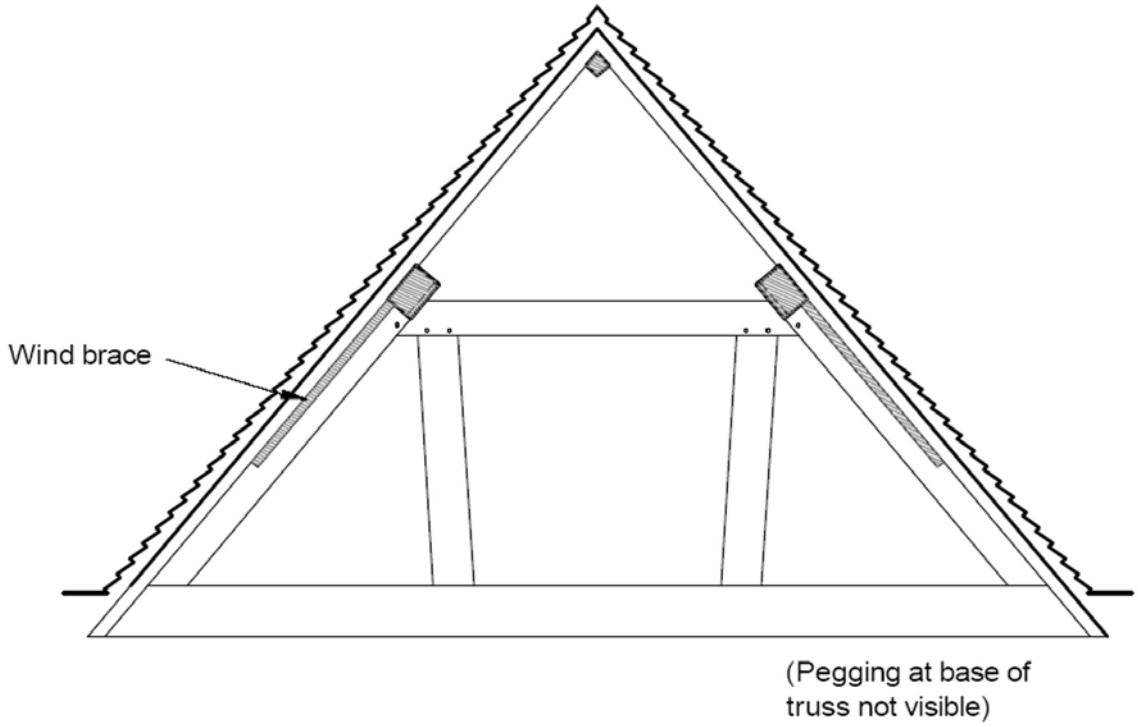
This plan has been adapted from Sudeley Castle & Gardens by Nicholas Hurt, 1994

APPENDIX II: Plan of Outer Courtyard roofs

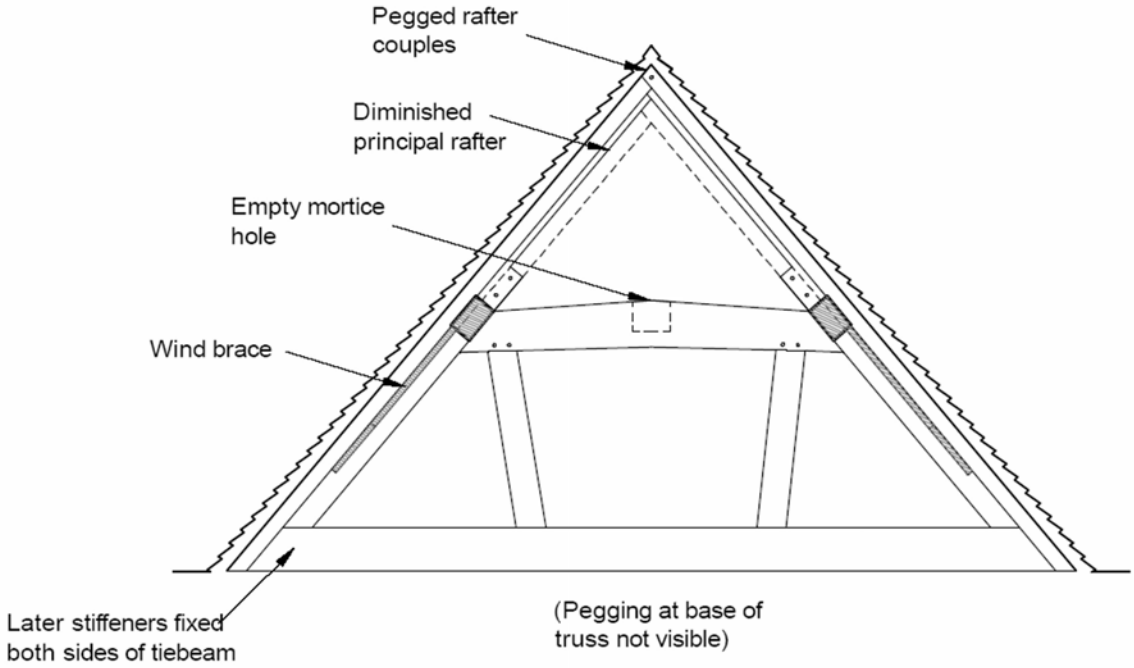


This plan has been adapted from the one drawn by M Joy 2026

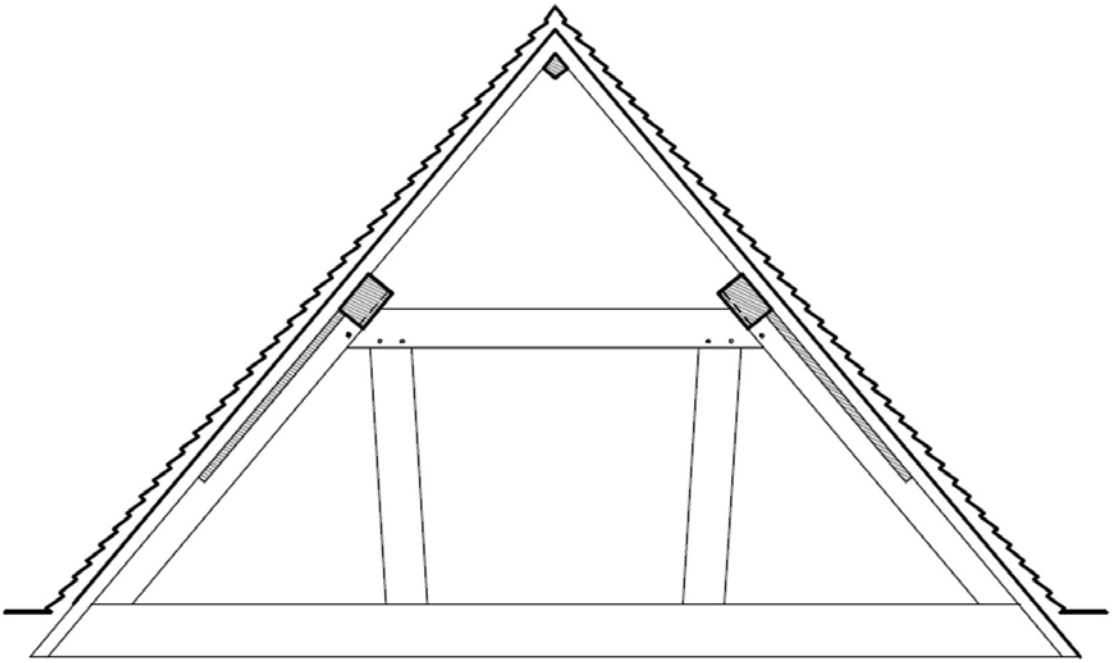
APPENDIX III: Sections of Outer Courtyard roof trusses



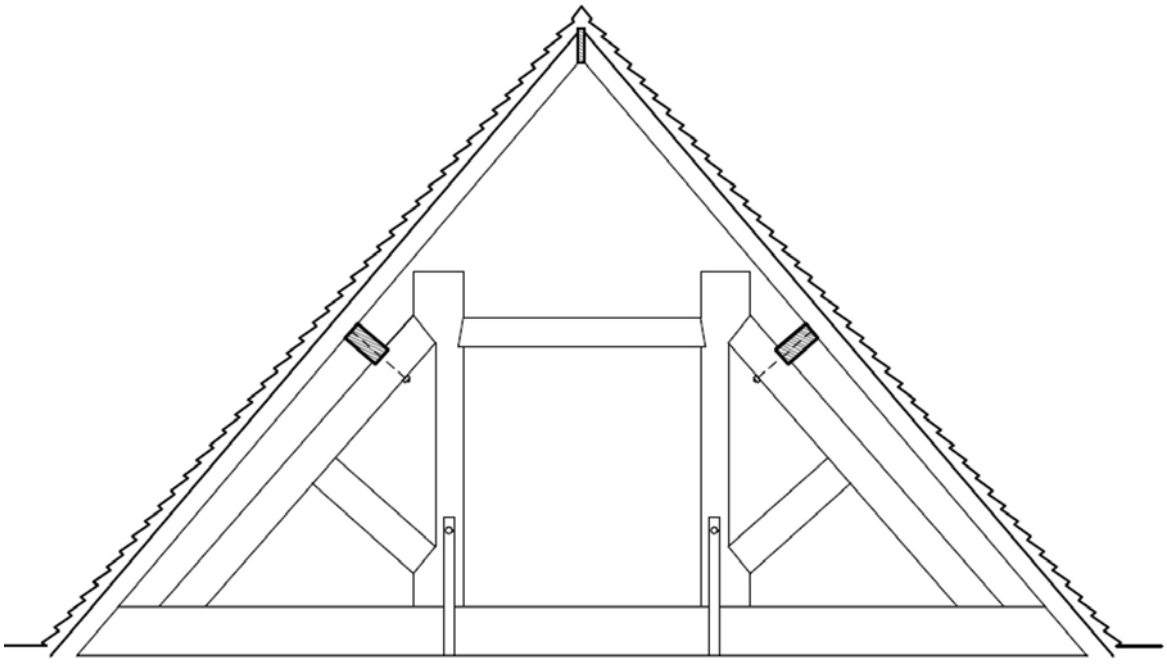
Section of a west range roof truss



Section of an east range roof truss



Section of a north range roof truss (trusses 1 & 2)



Section of the later north range roof trusses (trusses 3 & 6)

APPENDIX IV: Date spans for timber features in Gloucestershire

Features highlighted in white are present in all three range roofs. The stylistic date estimate is shown in blue.