Discovery and Excavation in Scotland

Updated on 15/06/2007

LOCAL AUTHORITY:	Inverclyde
PROJECT TITLE/SITE NAME:	Newark Castle
PROJECT CODE:	NCROOF2008
PARISH:	Port Glasgow
NAME OF CONTRIBUTOR:	Sarah Hogg
NAME OF ORGANISATION:	Kirkdale Archaeology
TYPE(S) OF PROJECT:	Standing Building Survey
NMRS NO(S):	NS37SW 1.00
SITE/MONUMENT TYPE(S):	Castle
SIGNIFICANT FINDS:	The roof of the gatehouse, previously assumed to be date to the renovations of the 1590s, has been demonstrated to belong to an earlier phase of work.
NGR (2 letters, 8 or 10 figures)	NS 3281 7452
START DATE (this season)	30 May 2008
END DATE (this season)	14 July 2008
PREVIOUS WORK (incl. *DES* ref.)	NCROOF2007
MAIN (NARRATIVE) DESCRIPTION: (May include information from other fields)	As part of an ongoing programme of standing building recording at Newark Castle the roofs of the E and W bedchambers and the turrets of the N range; the roof of the gatehouse and the roof of the E range were archaeologically recorded through measured drawing and textual descriptions of features. The completion of the archaeological survey of the roofs has confirmed the generally excellent survival of late 16th-century roofs at Newark Castle. This survey has uncovered evidence of an earlier previously unrecognised phase of roof surviving over the gatehouse constructed between the late 15th-century and the late 16th-century before the roofs of the N Range and E Range. The N Range and E Range roofs were constructed using a high proportion of timbers reused from a previous roof structure. The roof of the E range contains the only evidence of reused timber not from a roof, that has been pit sawn to create collars in the current arrangement. Though it is likely that the E range roof is late 16th-century, based on its relationship with the masonry, it is possible that this roof belongs to a later phase. During the centuries following the construction of the roofs at the Castle it is likely that there were some small repairs to the roof but it is remarkable that the next phase of work widely visible at Newark Castle does not occur until the 20th-century. It is possible that the Ministry of Works was responsible for the replacement of all the dormer window roofs and the East, NE, NW and W Turret roofs in the early 20th-century however these may have been replaced in the mid to late 20th-century, possibly along with the major structural changes to the E bedchamber Roof and the subdivision of the upper floor of the E Range. Most of the sarking is 20th-century but late 16th-century sarking does survive in the W Turret roof, the Central Turret roof and of in the Central portion of the N Range roof.
PROPOSED FUTURE WORK:	
CAPTION(S) FOR ILLUSTRS:	
SPONSOR OR FUNDING BODY:	Historic Scotland
ADDRESS OF MAIN CONTRIBUTOR:	Kirkdale Archaeology, 4 Western Terrace, Murrayfield, Edinburgh, EH12 5QF

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EMAIL ADDRESS:	g_ewart@hotmail.com
ARCHIVE LOCATION (intended/deposited)	Archive to be deposited in NMRS

Newark Castle Roof 2008
Standing Building Survey

July – August 2008

Kirkdale Archaeology
on behalf of Historic Scotland

28 November 2008

Site Newark Castle, Port Glasgow

N.G.R NS 3281 7452

Project Description Archaeological Survey of the roofs above the E and W portion of the 2nd Floor of the North Range, the roof above the 2nd floor of the gatehouse, the roofs above the E, NE, Central, NW and W turrets and the loft roofs above the 2nd floor of the E range.

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1 INTRODUCTION

In July/August 2007 Kirkdale Archaeology was asked to undertake an archaeological survey of the central portion of the roof of the North Range of Newark Castle, Port Glasgow, under the terms of the PIC contract with Historic Scotland. A combination of poor weather, rotten timber, and horizontal thrust exerting undue pressure on the south wall head had resulted in the outward splay of the south wall and the deflection of the trusses. Rotten or removed sole pieces along the south wall head had left some trusses relying on the support of the ashlar post alone. A series of early 20th Century repairs addressing the movement of the roof was recorded indicating that the roof was failing as long as a century ago. The purpose of the archaeological survey was to create an extensive written, drawn and photographic record of the roof structure prior to any remedial works being carried out. The survey concluded that the central portion of the roof of the North range of Newark Castle was exceptional for its time. Purpose made timbers and timbers reused from a previous roof structure, possibly salvaged from an earlier roof at Newark Castle, .were identified. The survey produced evidence of the construction process of the roof, the ceiling architecture and the subdivision and relative status of the rooms below and therefore highlighted the historical value of further study of the roofs at Newark Castle.

In July/August 2008 Kirkdale Archaeology was invited to complete an archaeological survey of the remaining roofs at Newark Castle. Unlike the central portion of the roof of the North the Range, the remaining roofs are not undergoing structural failure. The purpose of this survey was to study the complete suite of roofs at Newark Castle and produce a base line survey of the timbers for the future management of the site.

Newark Castle is a beautifully proportioned U shaped palace. The North Range and East Wing of Newark Castle were built in 1597 by Patrick Maxwell to connect the Late 15th Century Gatehouse and Tower both of which were altered to match the elegant renaissance façade of the 1597 build. A relic survival of a corner tower of the original barmkin, preserved because of its conversion to a dovecot is also Late 15th Century. Following this roof survey an additional pre-1597 phase of alteration of the Gatehouse was discovered, discussed below in the relevant section. The evidence for any re-use of pre-1597 structures within the wall fabric of the North Range has not yet been fully researched. The possibility of residual structure within the North Range is discussed by Thorsten Hanke in his specialist comment (see Appendix 5).

The additional roofs of Newark Castle, not considered in the 2007 survey, include the stair loft roof over the East Wing, the Gatehouse roof, the East and the West Bedchamber roof which lie to either side of the main unit of the North Range roof, and five turret

roofs along the North façade of the North Range. The Tower roof is a 20th Century, concrete and RSJ construction and this was not considered in the 2008 survey.

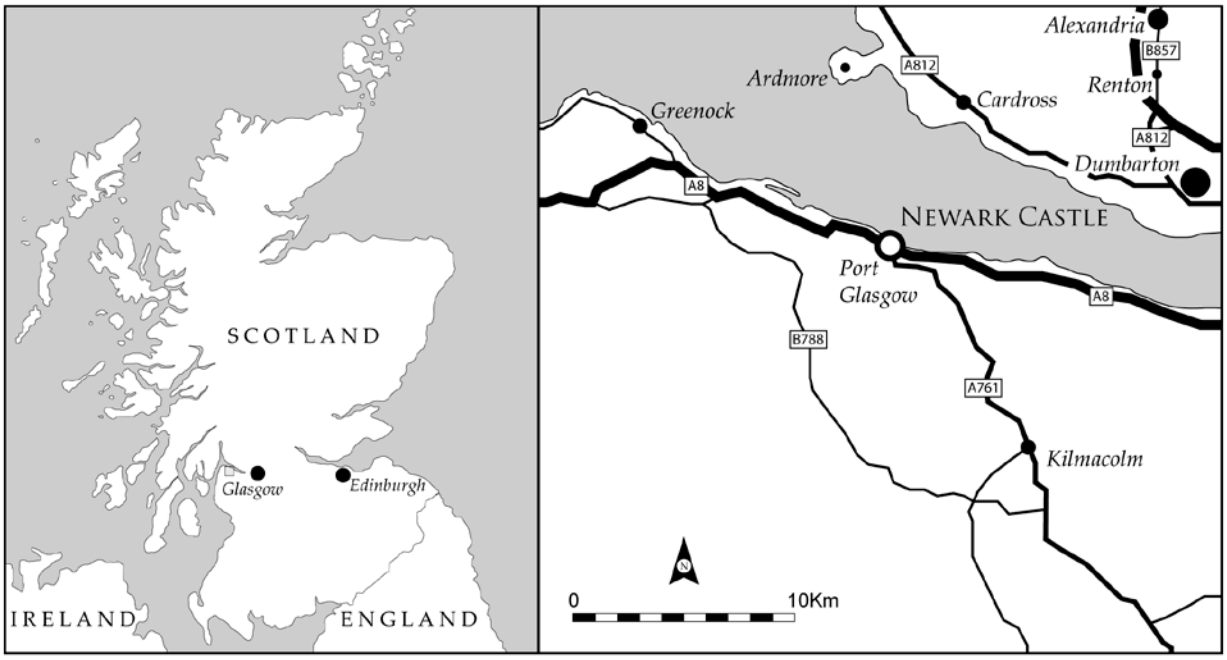


Figure 1: Location of Newark Castle

2 SURVEY METHODOLOGY

The 2007 survey methodology was designed to incorporate and build on the extensive survey data and numbering system already established by Historic Scotland to plan the remedial work to the roof. However the remaining roofs at Newark Castle had limited survey data, no established numbering system and in the case of the turrets and the East and West Bedchamber roof there was no common unit similar to a truss. It was therefore decided that the numbering system for the 2008 survey would consist of a running context list for each roof space with a number for each timber element and a description of features and relationships per timber (Appendix 1). The archaeological survey team consisted of two draughtsmen to make all the archaeological survey drawings, two data recorders to number the features, write descriptions and make a photo record and a timber specialist to advise the draughtsmen and data recorders on site and make a detailed study of the timber and construction techniques.

In 2007 a grid was established along the central portion of the North Range and in 2008 this was extended throughout the North range, the East Wing stair loft, the Gatehouse and into each of the five turrets ensuring that all the drawings can be located in relation to the master grid.

A plan, drawn from the perspective of a person looking up at the roof from below, of every roof space was made as well as a cross section of every turret, an elevation of the stair loft, gatehouse and east and west bedchamber roofs and a truss section of the stair loft and gatehouse roofs. This selection of drawings represents almost every timber in each of the roofs. The draughtsmen made use of portable scaffolding, plumb bobs, laser levels and an electronic distance measurer to create accurate measured drawings of each roof on the master grid. The drawings were then photocopied and the data recorders numbered up the photocopies and made records of each of the timbers, in particular recording dimensions, evidence of reuse, carpenter's marks, condition, tools marks and relationship with other timbers and the masonry. The timberwork was the focus of both the 2007 and the 2008 survey, therefore the masonry has not been systematically recorded, but masonry is discussed in roof records where it provides relevant information about the phasing or construction of the roof.

3 DESCRIPTION AND INTERPRETATION

3.1 Stair Loft Roof

The stair loft roof is above the second floor of the 1597 East Wing to the North of the Tower. The rooms below the stair loft have been subdivided to create male and female visitor toilets, a small kitchen for the use of the custodian and a small disused toilet above the kitchen. It is not known whether all of the subdivision is of one phase, some may predate the Historic Scotland Guardianship of the Castle. All of the subdivided rooms are plastered, obscuring the relationship between the divisions and the details of original features such as panelling and pockets for coombed ceiling timbers.

Originally the space below the stair loft roof was probably one large square room with a fireplace, dormer window and close stool in the east wall and a dormer window in the west wall and a coombed plank ceiling. To the north of this room was a smaller rectangular space, presently the kitchen, with a window and a close stool in the east wall. It may have been a similar arrangement to the room below at first floor level with wooden cupboards lining the north wall. If this is the case the relative status of the room is comparable to or superior to the central bedrooms of the north range. Above the kitchen is the small disused toilet and above this is an inaccessible loft roof, visible through a void in the north elevation of the stair loft; it has no floor, no lighting and no formal access.

Access to the 2nd floor of the east wing is via a turnpike stair from first floor level. The turnpike stair also provides the east access to the North Range. The stair continues up beyond second floor level. It may have provided access into the loft spaces above the east wing but the present door apertures at the top of the stair are 20th Century. The east door leads to the disused toilet above the kitchen and the south door leads to the stair loft roof.

The stair loft has a 20th Century sawn plank floor **Stair Loft.057** on 20th century joists **Stair Loft.059**-**Stair Loft.066** and modern lighting indicating that it was used for storage and services following the subdivision of the rooms below. The east and west elevation of the space are formed by the east and west pitch of the roof. The north wall is a red sandstone rubble build which is a continuation of a late 16th century internal wall and this has an incidental void just west of its west margin through into the inaccessible loft space to the north. The door to the turnpike stair is to the west of the west margin of the north wall and below the void and if not totally inserted it has certainly been altered since it has brick margins. There might have been better access between the stair loft roof and the inaccessible loft before the changes to the door and the subdivision of the rooms below. The north wall is the external grey sandstone rubble build north wall of

the tower complete with corbels and a blocked aperture, associated with a series pockets in the masonry above the corbel course, possibly one of the apertures seen around the top of the tower, blocked when the east wing was built. The pockets in the masonry might be from the removal of water spouts.

The stair loft roof consists of 8 trusses. Each truss comprises an east and a west rafter joined to each other at the top with a mortice and tenon joint pinned with a dowel, and a collar joined to the rafters with mortice and tenon joints pinned with dowels (with the exception of truss 8 which has had its collar removed to improve access). The trusses are marked with a roman numeral sequence incised into the north face of the rafters and the collar. This sequence is associated with the current roof arrangement.

The base of the west rafters of truss 3 and truss 4 is supported by trimmer **Stair Loft.032** above the west dormer window in the room below. The base of the east rafters of truss 3 and truss 4 is supported by trimmer **Stair Loft.033** above the east dormer window in the room below. The base of the east rafters of truss 6, truss 7 and truss 8 is supported by trimmer **Stair Loft.034** above the fireplace in the room below. The remaining rafters must continue to the east and west wall heads of the east wing and there may be corresponding sole pieces and ashlar posts obscured behind the plaster in the rooms below but this is not certain.

In addition to these basic components, truss 2 and truss 4 have short length of hand cut oak plank attached to the east and west rafters near the apex of the roof acting as an upper collar, the purpose of which is unknown.

The collar **Stair Loft.029** of truss 7 has two pit sawn and hand worked timbers **Stair Loft.044** and **Stair Loft.045** nailed to its N side and braced into pockets cut in the masonry of the N wall. These timbers are probably the remains of the pitch of a coombed ceiling. Three oak planks on the underside of the collar **Stair Loft.016** of truss 3, a small oak plank **Stair Loft.058** on the underside of rafter **Stair Loft.028** and a small oak plank **Stair Loft.043** on the underside of rafter **Stair Loft.022** are further residual evidence of this ceiling.

There are several 20th Century additions to the roof, including a stained green pine frame **Stair Loft.080** that probably housed a water tank, a number of sawn pine support timbers including **Stair Loft.067**- **Stair Loft.069**, **Stair Loft.082**, several loose planks **Stair Loft.081** laid on top of the collars, a modern air vent **Stair Loft.079** and much of the east and west dormer window roofs (with the exception of the trimmers and the ridge pieces which are original). All the trusses have a modern king post attached to the collar (with

the exception of truss 8 which has no collar), probably related to the 20th Century subdivision of the rooms below. The king posts probably rest on the dividing wall between the male and female toilets. The ridge piece **Stair Loft.047** and sarking **Stair Loft.046** is probably entirely 20th Century - the sarking contains some green stained pine boards similar to the water tank frame.

There is extensive evidence of reuse in the stair loft roof, some examples of which are only seen in this roof at Newark Castle. The pattern of reuse is significant as it is similar to the pattern noted in the central roof of the north range. All of the rafters that extend to rest on the wall head show no evidence of reuse and these were probably purpose cut for the roof (**Stair Loft.009**, **Stair Loft.010**, **Stair Loft.012**, **Stair Loft.013**, **Stair Loft.021**, **Stair Loft.022**, **Stair Loft.025**, **Stair Loft.028**, **Stair Loft.031**). All of the rafters that rest on trimmers show evidence of reuse including redundant sarking peg holes, redundant mortices, and carpenter's marks not part of the current system; these were most likely rafters in an earlier roof (**Stair Loft.015**, **Stair Loft.016**, **Stair Loft.018**, **Stair Loft.019**, **Stair Loft.024**, **Stair Loft.027**, **Stair Loft.030**). This is possibly because the main weight of the roof rests on the rafters extending to the wall head, so these timbers were purpose cut so that they contained no areas of weakness such as redundant mortices, or it could be because the earlier roof was smaller and the reused timbers were not long enough. All of the collars show evidence of reuse. Three of the collars were rafters in an earlier roof arrangement (**Stair Loft.011**, **Stair Loft.014**, **Stair Loft.023**) but the remaining four rafters are unique (**Stair Loft.017**, **Stair Loft.020**, **Stair Loft.026**, **Stair Loft.029**). These collars are pit sawn down one side, three of them have a series of regularly spaced notches cut into the upper face. At one time these might have been complete timbers, pit sawn to create collars for the current roof. These timbers do not appear to be from an earlier roof. They could be part of a floor, ceiling or partition arrangement. No similar timbers have been identified in the other roofs at Newark Castle.

Apart from the loose modern floor boards on top of the collars, there is no evidence that there was a floor on top of the collars and there are no window apertures related to an attic space. The only indication that there was access to this space is the fact that the turnpike stair continues beyond the 2nd floor landing of the east wing and the 2nd floor landing of the north range. Though the stair loft roof has some unique features, it shares construction patterns with the central roof of the north range and it is probable that the roof was built in the late 16th century along with the east wing and the north range.

The loft space to the north of the stair loft roof is not accessible. It might be possible to access this space in the future if a safe temporary floor can be established along with free standing lighting. A preliminary examination made from the void in the north wall of the stair loft roof, recorded five trusses, all with the original collar removed and

replaced with 20th century green stained collars at a higher level related to the creation of the now disused toilet below. The east and west elevation of the space are formed by the east and west pitch of the roof. The south wall is a sandstone rubble build which is a continuation of a late 16th century internal wall, shared with the stair loft roof. The north wall is a 20th century brick build with vents.

An attempt was made to feel for carpenter's marks on the north face of the nearest rafter (since the carpenter's mark sequence in the stair loft is generally in this position) but no carpenter's marks were detected. One of the east rafters (the second from the south) has a redundant slot and peg hole visible indicating reuse - this fits the known pattern since there is a window in the east wall in the kitchen below and this rafter must rest on a trimmer. The northernmost east rafter also appears to have some nail holes or peg or dowel holes on the underside but since access is not possible this was difficult to confirm and reuse is not certain. The inaccessible loft is probably a heavily altered late 16th century roof.

3.2 Gatehouse Roof

The gatehouse roof is above the 2nd floor of the 15th century gatehouse. The space is accessed via a turnpike stair, now entered from the north range first floor through a breach in the north wall of the gatehouse. Originally the turnpike stair continued up to a parapet but the wall head of the gatehouse was reduced to carry the current roof and the north and south walls were modified to create crow stepped gables. The 2nd floor is a rectangular room with a fireplace in the south gable, an east and a west window and a fossilised north window now looking into the west bedchamber of the north range. It also has a closet in the NW corner. The work to reduce the wall head produced quite rough masonry along the east and west wall heads and a large block of rough masonry which was once part of the turnpike stair in the NE corner of the room. The prominent rough masonry and the apparently crude quality of the gatehouse roof may indicate the altered status of this room following the reduction of the parapet.

Previously the alterations to the wall head were interpreted as a phase of work related to the erection of the north range in the late 16th century. However during the survey two features were identified providing evidence that the gatehouse roof was altered pre-1597. Firstly a trapped portion of the north crow step gable seen in the south wall of the west bedchamber indicating that the gatehouse had a crow step gable before the erection of the north range. Secondly that the gatehouse roof was built to incorporate the east and west windows. It is clear that the windows are inserted (possibly on the site of original narrower apertures) but unlike the inserted windows in the tower, which are conspicuous because they are constructed from the pink sandstone used to build the late

16th century north range, the gatehouse windows are constructed from grey sandstone, indicating that this is a pre 1597 alteration before the arrival of the pink sandstone.

The gatehouse roof consists of seven trusses. Each truss comprises an east and a west rafter joined to each other at the top with a mortice and tenon joint pinned with a dowel, and a collar joined to the rafters with mortice and tenon joints pinned with a dowel (with the exception of truss 1 from which the collar has been removed). With the exception of truss 2 and truss 5 all of the trusses have an east and west ashlar post and sole piece anchoring the base of the east and west rafter on to the wall head. The east rafter of truss 2 and the west rafter of truss 5 rest on a trimmer above the east and west dormer windows. The trusses are marked with a roman numeral sequence incised into the north face of the rafters and collars. The system starts at 'II' possibly indicating that the south truss of this roof has been replaced by the sawn pine frame on the south gable (it is also possible that there was an eighth north truss replaced by the sawn pine frame on the north gable). The system continues 'III', 'IIII' then 'IIV', 'VI' and 'V' with no visible carpenters marks on the seventh truss. The reasoning behind this odd sequence is not clear, especially since 'IIV' is not a roman numeral and was surely meant to be 'VII' which would make more sense as this would indicate a reversal of 'V' and 'VII'. There is no evidence of reuse on any of the timbers which is unusual since reused timbers form a significant proportion of every other original roof at Newark.

Four pieces of timber plank, **Gatehouse.072** attached to the underside of west rafter **Gatehouse.021**, one piece of timber, **Gatehouse.071**, attached to the underside of west rafter **Gatehouse.009**, and a series of nail holes on the underside of the collars and the underside of the rafters below the collars indicates that there was a coombed plank ceiling over the gatehouse. There is no evidence (such as window apertures or evidence of a floor) indicating that there was an attic space above the collars of the Gatehouse roof.

The remaining roof elements including the dormer window roofs, the sawn pine sarking supports joined to the sides of the rafters (probably to address warping of the rafters and provide a level for the sarking), two sawn pine frames supporting the sarking above the gable ends, the ridge piece and the sarking are all 20th century.

3.3 West Bedchamber Roof

The West Bedchamber roof is above the 2nd floor West Bedchamber of the Late 16th Century North Range. The West bedchamber was accessed via a gallery running along the south side of the central portion of the North Range when all the internal 2nd floor subdivisions were in place. The south wall of the West Bedchamber is late 16th Century North Range build but it incorporates the north gable of the 15th Century Gatehouse

with a fossilised window and a fragment of the Gatehouse crowstep gable. The west wall and north wall of the West Bedchamber are Late 16th Century North Range build. The east wall of the West Bedchamber, no longer in place, was most likely a timber partition. The fossilised window in the south wall is not blocked but it is possible that it was covered by panelling. There are two windows serving the West Bedchamber, one in the west wall and one in the north wall, a fireplace in the north wall and a door aperture to the West Turret in the northwest corner of the room. There is also a shallow rebate feature in the north wall but the purpose of this is unknown.

The West Bedchamber roof is a continuation of the central portion of the North Range Roof but it is also distinct and separate. The West Bedchamber Roof continues the south pitch and the attic floor level of the central portion of the North Range Roof but it is a unique construction with partial trusses, purlins and a change in pitch. There is no system of carpenters' marks related to the current roof structure, therefore identified carpenters' marks relate to a previous roof and are evidence of reuse.

The West Bedchamber Roof has three ridge pieces; **West Bedchamber.001** runs east-west along the north wall and it supports the rafters of the south pitch; **West Bedchamber.002** runs north-south between the wall head of the south gable and the north wall and it supports the rafters of the east pitch and the west pitch; **West Bedchamber.003** is inverted, it runs diagonally from the south wall head to the join between ridge piece **West Bedchamber.001** and **West Bedchamber.002** and it supports the base of the rafters of the south pitch and the east pitch where the roof pitch changes. **West Bedchamber.001** and **West Bedchamber.002** are probably Late 16th Century ridge pieces but both have evidence of reuse and they were probably rafters in a previous roof. **West Bedchamber.003** is a 20th Century replacement providing evidence of major repair work to the south east portion of the West Gallery Roof which incorporates several replacement rafters, replacement sarking and alteration to the base of the retained rafters in this area.

The south pitch has six rafters, two of which **West Bedchamber.004** and **West Bedchamber.006** appear to be Late 16th Century rafters; the former with no evidence of reuse, the latter with evidence of reuse (probably rafters in previous roof) and 20th Century alteration to the base. The remaining four rafters (**West Bedchamber.005**, **West Bedchamber.007**, **West Bedchamber.008** and **West Bedchamber.009**) are 20th Century replacements. **West Bedchamber.004** is the only rafter which rests directly on the south wall head, this is interesting because it follows the pattern of reuse discovered in the Central Portion of the North Range Roof and more recently discussed in the Stair Loft roof where timbers resting on the wall head appear to be purpose cut for the late 16th

Century roof with no evidence of reuse. Rafter **West Bedchamber.004** is also supported by an ashlar post **West Bedchamber.021** and probably a sole piece but this is obscured within the wall head.

The east pitch of the roof has five rafters, three of which **West Bedchamber.010**, **West Bedchamber.012** and **West Bedchamber.013** appear to be Late 16th Century rafters, the first with no visible evidence of reuse the others with evidence of reuse (probably rafters in a previous roof). The remaining two rafters **West Bedchamber.011** and **West Bedchamber.014** are 20th Century replacements. The east pitch of the roof has two purlins, **West Bedchamber.024** and **West Bedchamber.027** both of which appear to be Late 16th Century purlins, the former with no visible evidence of reuse, the latter with evidence of reuse (probably a rafter in a previous roof). The lower purlin **West Bedchamber.025** is dual purpose as it is also a floor joist for the attic floor above the West Bedchamber (see below). Both purlins are socketed into the north wall and to the south they sit in slots cut into upper and lower wall plates **West Bedchamber.031** and **West Bedchamber.030** built into the south gable.

The west pitch of the roof has six rafters, three of which **West Bedchamber.017**, **West Bedchamber.018** and **West Bedchamber.019** appear to be Late 16th Century rafters all with evidence of reuse (probably rafters in a previous roof). The remaining rafters **West Bedchamber.015**, **West Bedchamber.016** and **West Bedchamber.020** are probably 20th Century replacements. **West Bedchamber.019** is unusual because it does not follow the pattern of reuse discovered in the Central Portion of the North Range Roof and more recently discussed in the Stair Loft roof where timbers resting on the wall head appear to be purpose cut for the late 16th Century roof. Rafter **West Bedchamber.019** is also supported by an ashlar post **West Bedchamber.022** and probably a sole piece but this is obscured within the wall head. **West Bedchamber.017** and **West Bedchamber.018** are unsupported at the base finishing, as they do, just short of the dormer window below. There is no evidence suggesting that there was once a trimmer supporting these rafters (such as redundant joints on the adjacent rafters or on the base of **West Bedchamber.017** and **West Bedchamber.018**) other than the common use of trimmers supporting rafters in the central portion of the north range roof, the stair loft roof and the gatehouse roof.

The west pitch of the roof has two purlins, **West Bedchamber.028** and **West Bedchamber.029** both of which appear to be Late 16th Century purlins both with evidence of reuse (probably a rafters in a previous roof). Both purlins are socketed into the north wall and to the south they sit in slots cut into upper and lower wall plates **West Bedchamber.031** and **West Bedchamber.030** built into the south gable.

There is extensive evidence that there was an attic floor above the West Bedchamber, first and foremost three surviving joists **West Bedchamber.023**, **West Bedchamber.024** and **West Bedchamber.025**, each with a series of nails/nail holes along suggesting that these had floor boards nailed to them. **West Bedchamber.023** has no visible evidence of reuse, it is socketed into the north wall and joined to south rafter **West Bedchamber.004** with a mortice and tenon joint so appears to serve a dual function as a joist and a collar (though it does not prevent outward thrust as a complete collar does). **West Bedchamber.024** has evidence of reuse (probably a rafter in a previous roof). It is socketed into the north wall and to the south it rests in a slot cut into wall plate **West Bedchamber.031**. It serves a dual function as a purlin supporting the east pitch of the West Bedchamber roof. **West Bedchamber.025** has no visible evidence of reuse. It is socketed into the north wall and rests on wall plate **West Bedchamber.031**. It is possible that there was a fourth joist to the west of **West Bedchamber.025** though no definite sockets were identified in the rubble build of the north or south wall masonry. The west edge of the floor may have been held by purlin **West Bedchamber.029** but it was not possible to examine the top edge of this timber for nails/nail holes. Further evidence of the attic floor is timber **West Bedchamber.026** which is nailed along the south edge of joists **West Bedchamber.023**, **West Bedchamber.024** and **West Bedchamber.025**. The timber serves no structural function in the West Bedchamber roof and is most likely skirting for the attic floor. There is an equivalent timber in the East Bedchamber roof **East Bedchamber.058**. Finally there is a window aperture in the north wall serving the attic floor level. Access to this attic floor level was probably a continuation of the central portion of the North Range roof attic floor level to the east. However upper purlin **West Bedchamber.027** partially bars this point of access so it is possible that the attic space was accessed directly from the West Bedchamber.

Joists **West Bedchamber.024** and **West Bedchamber.025** also have a series of nail holes along their underside indicating that the timbers supported a plank ceiling above the West Bedchamber. Pockets in the masonry of the south wall corresponding to the joists, similar to masonry pockets seen in the central portion of the North Range and the East Bedchamber indicate that the ceiling was coombed. It is likely that the pockets held diagonal frame timbers of a coombed ceiling, two examples of which survive in situ in the Stair loft roof.

As well as the 20th Century repairs to the southeast corner of the West Bedchamber roof and the 20th Century replacement rafters identified above, the dormer roof over the west window, and all of the sarking is most likely 20th Century.

3.4 East Bedchamber Roof

The East Bedchamber roof is above the 2nd floor West Bedchamber of the Late 16th Century North Range. The East Bedchamber may have been accessed via a gallery running along the south side of the central portion of the North Range when all the internal 2nd floor subdivisions were in place or possibly accessed directly via the south door to the East Range turn pike stair. The south wall of the East Bedchamber is Late 16th Century North Range build but it has been heavily altered by 20th Century rebuild. The east wall and north wall of the East Bedchamber are Late 16th Century North Range build. The west wall of the East Bedchamber, no longer in place, was most likely a timber partition. There are two windows serving the West Bedchamber, one in the east wall and one in the north wall, a fireplace in the north wall and a door aperture to the East Turret in the northeast corner of the room.

As with the West Bedchamber Roof, the East Bedchamber Roof is a continuation of the central portion of the North Range Roof but it is also distinct and separate. The East Bedchamber Roof continues the south pitch and the attic floor level of the central portion of the North Range Roof but it is a unique construction with partial trusses, purlins and a change in pitch. The East Bedchamber Roof is heavily altered by 20th Century repairs, replacements and reinforcement related to the structural alterations to the south wall. It is possible that the roof was partially disassembled and reassembled during this work - small fragments of newspaper were discovered between a supposedly Late 16th Century mortice and tenon joint. There is no system of carpenters' marks related to the current roof structure, therefore identified carpenters' marks relate to a previous roof and are evidence of reuse.

The East Bedchamber Roof has three ridge pieces; **East Bedchamber.001** runs east-west along the north wall and it supports the rafters of the south pitch; **East Bedchamber.002** runs north-south between the wall head of the south gable and the north wall and it supports the rafters of the east pitch and the west pitch; **East Bedchamber.003** is inverted, it runs diagonally from the south wall head to the join between ridge piece **East Bedchamber.001** and **East Bedchamber.002** and it supports the base of the rafters of the south pitch and the east pitch where the roof pitch changes. **East Bedchamber.001** and **East Bedchamber.002** are probably late 16th Century ridge pieces but both have evidence of reuse and they were probably rafters in a previous roof. It appears that the east end of **East Bedchamber.001** has been replaced with a 20th Century machine sawn timber **East Bedchamber.041** supported by 20th Century upright posts **East Bedchamber.042** and **East Bedchamber.047**. **East Bedchamber.003** has no visible evidence of reuse and may have been purpose cut for the Late 16th Century roof.

The south pitch has six rafters, four of which **East Bedchamber.004**, **East Bedchamber.005**, **East Bedchamber.006** and **East Bedchamber.007** appear to be Late 16th Century rafters; the first with no evidence of reuse, the remaining three with evidence of reuse (probably rafters in a previous roof). The remaining two rafters (**East Bedchamber.008** and **East Bedchamber.009**) are 20th Century replacements. **East Bedchamber.004** is the only rafter which rests directly on the south wall head, this is interesting because it follows the pattern of reuse discovered in the Central Portion of the North Range Roof and more recently discussed in the Stair Loft roof where timbers resting on the wall head appear to be purpose cut for the late 16th Century roof with no evidence of reuse. Rafter **East Bedchamber.004** is also supported by an ashlar post **East Bedchamber.020** and a sole piece **East Bedchamber.055** on the wall head.

The west pitch of the roof has four rafters, three of which **East Bedchamber.010**, **East Bedchamber.011** and **East Bedchamber.013** appear to be Late 16th Century rafters, the latter with no visible evidence of reuse the others with evidence of reuse (probably rafters in a previous roof). The remaining rafter **East Bedchamber.012** is a 20th Century replacement. The east pitch of the roof has one purlin, **East Bedchamber.054** which appears to be Late 16th Century, with evidence of reuse (probably a rafter in a previous roof). The purlin is dual purpose as it is also a floor joist for the attic floor above the East Bedchamber (see below). The purlin is socketed into the north wall and to the south it now sockets into a 20th Century brick wall above the reduced late 16th Century wall head and it is supported along its length by an RSJ **East Bedchamber.046**. There is no visible evidence indicating that there was once an upper purlin but it is likely that this roof was once a mirror image of the West Bedchamber roof suggesting that the upper purlin was removed possibly during the 20th Century alterations.

The east pitch of the roof has five rafters, four of which **East Bedchamber.014/ East Bedchamber.015**, **East Bedchamber.016**, **West Bedchamber.017/ East Bedchamber.018** and **East Bedchamber.019** appear to be Late 16th Century rafters, one (**East Bedchamber.014/ East Bedchamber.015**) with clear evidence of reuse (probably a rafter in a previous roof) and alteration, another (**East Bedchamber.017/ East Bedchamber.018**) with possible evidence of reuse and alteration and two (**East Bedchamber.016** and **East Bedchamber.019**) with no evidence of reuse. The remaining rafter **West Bedchamber.040** is probably a 20th Century replacement.

East Bedchamber.014/ East Bedchamber.015 and **East Bedchamber.017/ East Bedchamber.018** both comprise an upper and a lower timber joined together (the join is obscured by 20th Century strengthening timbers). Both these composite rafters have a respective ashlar post (**East Bedchamber.021** and **East Bedchamber.022**) joined to the lower portion of the rafters with a mortice and tenon joint. It is not known whether this

is the original Late 16th Century arrangement or an early repair or part of the 20th Century repairs. If it is an early repair then it is not clear whether the upper or the lower portion of the rafter is the replaced portion. Dendrochronological dating of each timber might reveal the details.

East Bedchamber.016 is unsupported at the base finishing just short of the dormer window below. There is no visible evidence suggesting that there was once a trimmer supporting this rafters (such as redundant joints on the adjacent rafters or on the base of **West Bedchamber.016**) other than the common use of trimmers supporting rafters in the central portion of the north range roof, the stair loft roof and the gatehouse roof.

The east pitch of the roof has one purlin, **East Bedchamber.029** which appears to be late 16th Century with evidence of reuse (probably a rafter in a previous roof). The purlin is socketed into the north wall and to the south it now sockets into a 20th Century brick wall above the reduced late 16th Century wall head. There is no visible evidence indicating that there was once an upper purlin but it is likely that this roof was once a mirror image of the West Bedchamber roof suggesting that the upper purlin was removed possibly during the 20th Century alterations.

Despite extensive 20th Century alterations to the East Bedchamber roof, evidence survives indicating that there was an attic floor above the **East Bedchamber. Fi**rstly, three joists **East Bedchamber.023**, **East Bedchamber.025** and **East Bedchamber.054**, each with a series of nails/nail holes along the top suggesting that these had floor boards nailed to them. **East Bedchamber.023** and **East Bedchamber.025** both with evidence of reuse (probably rafters in a previous roof), are socketed into the north wall and supported to the south a planks **East Bedchamber.024** and **East Bedchamber.026** nailed to the late 16th Century rafters of the south pitch with large hand made iron nails. It is important to note that these timbers precarious since the sockets in the north wall are very shallow. These particular timbers should be supported since they are positioned above the public access to the 2nd floor of the north range. Joist **East Bedchamber.054** also with evidence of reuse (probably a rafter in a previous roof) appears to serve a dual function as a purlin for the west pitch of the roof.

It is possible that there were further joists to the east of **East Bedchamber.054** though no definite sockets were identified in the rubble build of the north wall and the south wall masonry no longer extends to this height. The west edge of the floor may have been held by purlin **East Bedchamber.029** but it was not possible to examine the top edge of this timber for nails/nail holes.

Further evidence of the attic floor is timber **East Bedchamber.058** which is nailed along the south edge of joists **East Bedchamber.023**, **East Bedchamber.025** and **East Bedchamber.054**. The timber serves no structural function in the East Bedchamber roof and is most likely skirting for the attic floor. There is an equivalent timber in the West Bedchamber roof **West Bedchamber.026**. Finally there is a window aperture in the north wall serving the attic floor level. Access to this attic floor level was probably a continuation of the central portion of the North Range roof attic floor level to the east. However there may have been primary access to the attic level via the East Range since the East Range turn pike stair continues up beyond second floor level.

There is less evidence for a coombed plank ceiling over the East Bedchamber than there is in the West Bedchamber, however three diagonal bracing timbers (**East Bedchamber.027**, **East Bedchamber.028**, and **East Bedchamber.048**) though certainly part of the 20th Century alterations may have been positioned so as to resemble original timbers removed during the alteration - possibly remnants of the frame of the coombed ceiling.

The 20th Century additions to the roof include a series of strengthening posts, beams and repairs between the east and west pitch of the roof **East Bedchamber.042**, **East Bedchamber.043**, **East Bedchamber.044**, **East Bedchamber.045**, **East Bedchamber.046**, **East Bedchamber.047**, **East Bedchamber.049**, **East Bedchamber.050**, **East Bedchamber.051**, **East Bedchamber.052** and **East Bedchamber.059**. The dormer window over the east window and all of the sarking over the east and west pitch is also 20th Century. The sarking over the south pitch may be a little older but it is not original.

3.5 West Turret Roof

The West Turret is at the west corner of the 2nd floor of the late 16th Century North Range north façade. It is a circular space, with one window looking northwest. The West Turret is accessed via a door aperture from the West Bedchamber.

The roof comprises a central turret cone and a dormer roof above the door aperture. The cone consists of a central upright post **West Turret.001** supported on a tie beam **West Turret.002** and made rigid by a radial timber **West Turret.003**. Eight rafters (**West Turret.004**-**West Turret.010** and **West Turret.020**) converge from the turret wall head to meet the top of the central post. The dormer roof consists of a ridge piece **West Turret.011** and four rafters (**West Turret.012**- **West Turret.015**). With the exception of two sarking boards in the dormer roof, the entire roof is a 20th Century replacement - all the timber is machine cut pine, stained dark brown with the exception of the central post which may be machine cut and hand cut oak. This work may have been carried out

by the Ministry of Works in the early 20th Century during a programme of repairs to the roof.

Two original sarking boards (see **West Turret.016**), hand cut with redundant sarking peg holes, were most likely reused during the construction of the replacement roof since the adjacent West Bedchamber roof also contains no original sarking it is unlikely that these boards remained in situ.

It is possible that the West Turret roof is a reconstruction of the roof it replaced since the construction technique is similar to that of the Central Turret Roof - the only original turret roof remaining at Newark Castle.

The lintel above the door aperture to the West Bedchamber is a hand sawn timber lintel cut with a curved edge on the interior to match the curve of the turret. The lintel has quite a lot of woodworm damage. This timber lintel was probably inserted to replace a cracked stone lintel. It may have been intended as a temporary solution since the stone lintels above the door apertures to all of the other turrets support a masonry panel above the door, missing from the West Turret. It may be unrelated to the replacement of the turret roof, possibly 19th Century.

3.6 North West Turret Roof

The Northwest Turret is at the northwest corner of the 2nd floor of the late 16th Century North Range north façade. It is a circular space, with one window looking northwest and a door aperture leading to a small square closet to the east. The Northwest Turret is accessed via a door aperture from the Northwest Bedchamber (the central portion of the North Range).

The roof comprises a central turret cone and a dormer roof above the door aperture. The cone consists of a central upright post **Northwest Turret.001** supported on a tie beam **Northwest Turret.002** and made rigid by a radial timber **Northwest Turret.003**. Eight rafters (**Northwest Turret.004**-**Northwest Turret.011**) converge from the turret wall head to meet the top of the central post. The dormer roof consists of a ridge piece **Northwest Turret.012** and four rafters (**Northwest Turret.013**- **Northwest Turret.016**). The entire roof, including all of the sarking (**Northwest Turret.017**) is a 20th Century replacement - all the timber is machine cut pine, stained dark brown with the exception of the central post which may be machine cut and hand cut oak. This work may have been carried out by the Ministry of Works in the early 20th Century during a programme of repairs to the roof.

The base of the Late 16th Century north rafter of truss 1 (**Northwest Turret.018**), of the central portion of the North Range Roof, is visible in situ sitting on the turret wall head. Turret cone rafter **Northwest Turret.004** and dormer rafters **Northwest Turret.013** and **Northwest Turret.015** have been nailed to it.

It is possible that the Northwest Turret roof is a reconstruction of the roof it replaced since the construction technique is similar to that of the Central Turret Roof - the only original turret roof remaining at Newark Castle.

3.7 Central Turret Roof

The Central Turret Roof is above the central turnpike stair turret of the North Range north façade, linking the 1st floor great hall to the second floor bedchambers and gallery. It is a circular space with an upper and lower window looking north and a blocked window, or perhaps a window that was never open, looking northeast. The roof comprises a central turret cone and a dormer roof above the door aperture.

The cone consists of a central upright post **Central Turret.001** supported on upper tie beam **Central Turret.002** and a lower tie beam **Central Turret.003** made rigid by radial timber **Central Turret.004**. Twelve rafters (**Northeast Turret.005**-**Northeast Turret.016**) converge from the turret circumference to meet the top of the central post. The dormer roof consists of a ridge piece **Central Turret.017** and four rafters (**Central Turret.018**-**Northeast Turret.021**). There is no system of carpenters' marks related to this roof arrangement.

The central post, upper tie beam are hand cut the lower tie beam and radial timber are handcut but also handsawn. There is no evidence of reuse on any of these timbers. Of the Twelve rafters one **Central Turret.012** is a 20th Century machine cut, stained pine replacement. Four, **Central Turret.005**, **Central Turret.010**, **Central Turret.015**, and **Central Turret.016** have no visible evidence of reuse and may be purpose cut for the late 16th Century roof. The remaining seven rafters **Central Turret.006**- **Central Turret.009**, **Central Turret.011**, **Central Turret.013** and **Central Turret.014** all have evidence of reuse, they were almost certainly rafters in a previous roof with redundant sarking peg holes, and mortices. Furthermore it is clear that these reused rafters were split lengthways (because some of the redundant mortices have no back) to create the narrow turret rafters approximately 40mm thick. The rafters were probably originally square in section so it is likely that each reused timber was split into three or four.

The ridge piece of the dormer roof above the door is hand cut and possibly hand sawn. To the south it rests on the south wallhead, in the centre it is nailed to the underside of the upper tie beam with large hand made iron nails, and to the north is supported by a

hand cut block of wood - **Central Turret.028** - nailed on to rafter **Central Turret.010** with large hand made iron nails. This is a strange series of joins but it may be a product of the construction technique rather than a later addition since similar, apparently original, crude joints are also seen in the East Bedchamber to hold floor joists. Of the dormer rafters three, **Central Turret.019**, **Central Turret.020** and **Central Turret.021** are handcut with no visible evidence of reuse. The remaining dormer rafter **Central Turret.018** is handcut with possible but not conclusive evidence of reuse in the form of at least six large iron nails serving no current purpose.

The sarking **Central Turret.027** is of at least two distinct phases. The earliest is handcut, with sarking pegs protruding. One almost complete segment of this survives between rafters **Central Turret.005** and **Central Turret.006**. Elsewhere individual boards of early sarking survive near the top of the turret cone. The remaining sarking is all machine cut with iron nails protruding, some boards are stained dark and some remain pale and these boards may belong to different phases but both are probably relatively recent. The dark boards were most likely applied following the replacement of rafter **Central Turret.012**.

The base of the north rafter of truss 9 (**Central Turret.022**) and 10 (**Central Turret.024**) in the central portion of the North Range roof and their respective sole pieces (**Central Turret.023** and **Central Turret.025**) are visible in situ sitting on the turret wall head.

The current stair banister is a 20th Century addition, there is an identical banister at the top of the East Range turnpike. However two holes in the turret wall just to the west of the current banister indicate that there was at least one earlier phase of banister at the top of the central turret stair.

3.8 North East Turret Roof

The Northeast Turret is at the northeast corner of the 2nd floor of the late 16th Century North Range north façade. It is a circular space, with one window looking northeast and a door aperture leading to a small square closet to the west. The Northeast Turret is accessed via a door aperture from the Northeast Bedchamber (the central portion of the North Range).

The roof comprises a central turret cone and a dormer roof above the door aperture. The cone consists of a central upright post **Northeast Turret.001** supported on a tie beam **Northeast Turret.002** and made rigid by a radial timber **Northeast Turret.003**. Eight rafters (**Northeast Turret.004**-**Northeast Turret.011**) converge from the turret wall head to meet the top of the central post. The dormer roof consists of a ridge piece **Northeast Turret.012** and four rafters (**Northeast Turret.013**- **Northeast Turret.017**).

The entire roof, including all of the sarking (**Northeast Turret.018**) is a 20th Century replacement - all the timber is machine cut pine, stained dark brown with the exception of the central post which may be machine cut and hand cut oak. This work may have been carried out by the Ministry of Works in the early 20th Century during a programme of repairs to the roof.

It is possible that the Northeast Turret roof is a reconstruction of the roof it replaced since the construction technique is similar to that of the Central Turret Roof - the only original turret roof remaining at Newark Castle.

3.9 East Turret Roof

The East Turret is at the east corner of the 2nd floor of the late 16th Century North Range north façade. It is a circular space, with one window (rebuilt in 2002) looking northeast. The West Turret is accessed via a door aperture from the West Bedchamber.

The roof comprises a central turret cone and a dormer roof above the door aperture. The cone consists of a central upright post **East Turret.001** supported on a tie beam **East Turret.002** and made rigid by a radial timber **East Turret.003**. Eight rafters (**East Turret.004**-**West Turret.011**) converge from the turret wall head to meet the top of the central post. The dormer roof consists of a ridge piece **East Turret.012** and four rafters (**East Turret.013**- **East Turret.015**). The entire roof, including all the sarking, is a 20th Century replacement - all the timber is machine cut pine, stained dark brown with the exception of the central post which may be machine cut and hand cut oak. This work may have been carried out by the Ministry of Works in the early 20th Century during a programme of repairs to the roof.

The base of the Late 16th Century east pitch rafter (**East Turret.016)** of the East Bedchamber is visible in situ sitting on the turret wall head. Dormer rafter **East Turret.013** and ridgepiece **East Turret.012** have been nailed to it. The top of an ashlar post **East Turret.017** joined to **East Turret.016** with a mortice and tenon joint is just visible from within the turret.

It is possible that the East Turret roof is a reconstruction of the roof it replaced since the construction technique is similar to that of the Central Turret Roof - the only original turret roof remaining at Newark Castle.

4 CONCLUSION

The completion of the archaeological survey, following the initial work carried out in 2007 has confirmed the generally excellent survival of late 16th Century roofs at Newark Castle. This survey has uncovered evidence of an earlier previously unrecognised phase of roof surviving over the gatehouse constructed between the late 15th Century and the late 16th Century before the roofs of the North Range and East Range. The North Range and East Range roofs were then constructed using a high proportion of timbers reused from a previous roof structure. The stair loft roof contains the only evidence of reused timber not from a roof, pit sawn to create collars in the current arrangement. Though it is likely that the stair loft roof is late 16th Century, base on its relationship with the masonry, it is possible that this roof belongs to a later phase. During the centuries following the construction of the roofs at the Castle it is likely that there were some small repairs to the roof but it is remarkable that the next phase of work widely visible at Newark Castle does not occur until the 20th Century. During the Early 20th Century the Ministry of Works carried out a number of repairs, replacements and strengthening. It is clear that they were aware of failure of the central portion of the North Range roof as they positioned tell tales along the south wall (removed 2007). It is possible that the Ministry of Works was responsible for the replacement of all the dormer window roofs and the East, Northeast, Northwest and West Turret Roofs however these may have been replaced in the mid –late 20th Century, possibly along with the major structural changes to the East Bedchamber Roof and the subdivision of the upper floor of the East Range. Most of the sarking is 20th Century but late 16th Century sarking does survive in the West Turret Roof, the Central Turret Roof and of course in the Central portion of the North Range Roof.

While the newly surveyed roofs at Newark are not undergoing structural failure as the central portion of the North Range Roof is, there are some structural concerns which should be addressed immediately (if these have not already been carried out). The attic floor joists in the East and West Bedchamber are held only by shallow pockets in the wall and could easily slip out of the sockets with light contact or slight movement of the roof. These should be supported to ensure that personnel and visitors are in no danger.

A1. APPENDIX 1: FEATURE DESCRIPTIONS

STAIR LOFT				
Feature Number.	**Type**	**Description**	**Interpretation**	**Suggested Date**
Stair Loft.001	Truss	Southernmost truss of the S part of the E range roof. It comprises rafters 009 and 010 and collar 011. It is also braced on the E rafter by 035 and on the W rafter by 036. Strut 070 supports the collar. The collar is definitely reused as it has a redundant mortice.	Probably a 1590's truss that utilized a recycled timber from an earlier roof. It has braces attached that serve to increase the structural rigidity.	1590's
Stair Loft.002	Truss	Second truss from the S in the S part of the E range roof. It comprises rafters 012, 013, collar 014 and a small upper collar 037. The lower collar is supported by modern strut 071. The collar is definitely reused as it has a redundant mortice.	Probably a 1590's truss that utilized a recycled timber from an earlier roof.	1590's
Stair Loft.003	Truss	Third truss from the S in the S part of the E range roof. It comprises rafters 015, 016 and collar 017. The collar is supported by modern strut 072. The collar is definitely reused as it has a series of redundant notches cut into its upper face. The W rafter is also reused as it has a series of sarking peg holes on its lower face.	Probably a 1590's truss that utilized a recycled timber from an earlier roof.	1590's
Stair Loft.004	Truss	Fourth truss from the S in the S part of the E range roof. It comprises rafters 018 and 019, lower collar 020 and small upper collar 038. The lower collar is supported by strut 073. All the main elements are reused. The rafters have redundant sarking peg holes in the underside and the collar has a series of redundant notches cut into its upper face.	Probably a 1590's truss that utilized a recycled timber from an earlier roof.	1590's
Stair Loft.095	Truss	Fifth truss from the S in the S part of the E range roof. It comprises rafters 021 and 022 and collar 023. The collar is supported by strut 074. The collar is definitely reused as it has a redundant mortice.	Probably a 1590's truss that utilized a recycled timber from an earlier roof.	1590's
Stair Loft.006	Truss	Sixth truss from the S in the S part of the E range roof. It comprises rafters 024 and 025 and collar 028. he collar is supported by modern strut 075. The E rafter is reused as it has a redundant mortice.	Probably a 1590's truss that utilized a recycled timber from an earlier roof.	1590's
Stair Loft.007	Truss	Seventh truss from the S in the S part of the E range roof. It comprises rafters 027 and 028 and collar 029. The collar is supported by modern strut 076 and also by braces 044 and 045 at the E end. The E rafter is reused as it has a redundant mortice. The collar is also reused as it has a series of notches cut into its upper face.	Probably a 1590's truss that utilized a recycled timber from an earlier roof.	1590's
Stair Loft.008	Truss	Eighth truss from the S in the S part of the E range roof (also the northernmost). It comprises rafters 030 and 031 and its	Probably a 1590's truss that utilized a recycled timber from an earlier roof.	1590's

		collar has been removed. W rafter 031 is supported by modern brace 056. The E rafter is reused as it has a series of redundant sarking peg holes on its underside.		
Stair Loft.009	Rafter	E rafter of truss 1. An oak timber with a roughly square cross section. Appears to be hand worked and split, 100mm thick by 120mm wide. It sits on the E wall head. Joins with W rafter 010 and collar 011 with mortice and tenon joints. The expected carpenters mark is not visible as brace 035 obscures much of the N side. The timber is in fairly good condition despite requiring a brace. No obvious signs of reuse.	As this timber has no obvious signs of reuse, it may have been purposely cut for this 1590s roof, however the sheer amount of reused wood in this roof would perhaps suggest otherwise.	1590's
Stair Loft.010	Rafter	W rafter of truss 1. An oak timber with roughly square cross section. Appears to be hand worked and split. 130mm thick by 130mm wide. It sits on the W wall head. Joins with the E rafter 009 and collar 010 with mortice and tenon joints. Expected carpenters mark is not visible as brace 036 obscures much of the N side. The timber is in fairly poor condition, especially its upper part which is rotted and required a brace. There are no obvious signs of reuse.	As this timber has no obvious signs of reuse, it may have been purposely cut for this 1590s roof, however the sheer amount of reused wood in this roof would perhaps suggest otherwise.	1590's
Stair Loft.011	Collar	Collar of truss 1. An oak timber with a roughly square cross section at its E and W ends. Appears to have been hand worked and split. It is 120mm thick by 130mm wide. It joins with rafters 009 and 010 with mortice and tenon joints. It has a roughly sawn 'I' mark in a central position. The timber is in poor condition and is deteriorating. It is supported by modern strut 070. The collar has a redundant mortice on its N face.	A reused timber that is now part of a probable 1590's roof arrangement. Probably a rafter in an earlier roof.	Pre 1590's reused in 1590's
Stair Loft.012	Rafter	E rafter of truss 2. A roughly rectangular cross section, oak timber, 160mm thick by 110mm wide. Hand cut and split. It sits on the W wall head. It is joined to W rafter 013 and collar 014 with mortice and tenon joints. It shows no obvious evidence of reuse. It has a chiseled carpenter's mark on its N side in the form of a 'II'. The timber is in good condition.	As this timber has no obvious signs of reuse, it may have been purposely cut for this 1590s roof, however the sheer amount of reused wood in this roof would perhaps suggest otherwise.	1590's
Stair Loft.013	Rafter	W rafter of truss 2. A rounded oak timber that may once have been roughly rectangular in cross section but is now rotten. Hand cut and split. Sits on the W wall head. Up to 150mm thick by 150mm wide. While is shows no obvious signs of reuse, it is in fairly poor condition. It has no evidence of a carpenter's mark but this is probably either due to extensive rotting or because it is hidden.	As this timber has no obvious signs of reuse, it may have been purposely cut for this 1590s roof, however the sheer amount of reused wood in this roof would perhaps suggest otherwise.	1590's
Stair Loft.014	Collar	Collar of truss 2. A roughly rectangular cross section, oak timber, 150mm wide by 140mm thick. Joined to rafters 012 and 013 by mortice and tenon joints. It has a redundant mortice on its N side and a series of sarking peg holes on its S side. It has a chiseled carpenters mark on its N side in the form of a 'II'	A reused timber in a 1590's roof. It is now a collar in the 2nd truss in a series but it was once a rafter in the 3rd truss of an earlier roof.	Pre 1590's reused in 1590's

		and a sawn mark on its underside in the form of a 'III'. Hand cut and split. It also has 3 pieces of timber (083) nailed to its underside. The collar is supported by modern strut 071.		
Stair Loft.015	Rafter	E rafter of truss 3. A roughly rectangular cross section, oak timber, 140mm thick by 130mm wide. Hand cut and split. It has been joined to rafter 016 and collar 017 with mortice and tenon joints. It sits on trimmer 033. It has a carpenter's mark in the form of a 'III' sawn into its N face. It also has a redundant mortice in the N face partially obscured by frame 080. It is in fairly good condition.	A reused timber that is now part of a probable 1590's roof arrangement.	Pre 1590's reused in 1590's
Stair Loft.016	Rafter	W rafter of truss 3. A rectangular cross section, oak timber, 140mm thick by 140mm wide. It is hand cut and split. It has a sawn carpenters mark in the form of a 'III' on its N face. It sits on trimmer 032. On its lower face it has a series of redundant sarking peg holes and on its S face it has a carpenter's mark in the form of a 'IIIIII'. The timber is in good condition.	A reused timber in a 1590's roof. It is now a rafter in the 3nd truss in a series but it was once a rafter in the 6rd truss of an earlier roof.	Pre 1590's reused in 1590's
Stair Loft.017	Collar	Collar of truss 3. An unusual oak timber. Rectangular cross section 90mm wide by 170mm high, supported by modern strut 072. The timber has nail holes on the underside. It S face, and upper and lower face have been hand worked while its N side has been pit sawn. Cut into its upper S edge there are a series of 10 notches of varying sizes but roughly 70mm by 40mm by 40mm deep and spaced circa 280mm apart. It has a sawn carpenters mark 'III' on its N side.	One of 4 similar reused timbers. While it is now a collar it was once part of another unknown structure, possibly not even a roof. Nail holes on the underside may have supported a ceiling in the current arrangement. At one time this may have been one half of a square section timber subsequently sawn in half to be reused as a collar.	Pre 1590's reused in 1590's
Stair Loft.018	Rafter	E rafter of truss 4. A roughly square section timber 130mm by 130mm. It is hand worked and split. It has a sawn carpenter's mark 'IIII' on its N face. It also has redundant sarking peg holes on its lower face. It is in good condition. The base sits on trimmer 033. It is joined to rafter 019 and collar 020 with mortice and tenon joints.	A reused timber that is now part of a probable 1590's roof arrangement. Probably a rafter in an earlier roof.	Pre 1590's reused in 1590's
Stair Loft.019	Rafter	W rafter of truss 4. A roughly square cross section oak timber. Hand worked and split, 160mm wide by 140mm thick. It has a sawn carpenter's mark on its N face 'IIII'. It has redundant sarking peg holes on its lower face. It is joined to rafter 018 and collar 020 with mortice and tenon joints. It sits on trimmer 032. It is in good condition.	A reused timber that is now part of a probable 1590's roof arrangement. Probably a rafter in an earlier roof.	Pre 1590's reused in 1590's
Stair Loft.020	Collar	Collar of truss 4. An unusual oak timber, good condition, 90mm wide by 170mm thick. Its S face, and upper and lower face are hand cut while its N face is pit sawn. Cut into its upper S edge are a series of circa 10 square notches of varying sizes but roughly 80mm by 70mm by 20mm deep, spaced circa 280mm apart. It has a sawn carpenters mark 'IIII' on its W face. Supported by modern strut 073. It has nail holes on its	One of 4 similar reused timbers. While it is now a collar it was once part of another unknown structure, possibly not even a roof. Nail holes on the underside may have supported a ceiling in the current arrangement. At one time this may have been one half of a square section timber subsequently sawn in half to be reused as a	Pre 1590's reused in 1590's

		underside.	collar.	
Stair Loft.021	Rafter	E rafter of truss 5. A roughly rectangular section oak rafter that significantly tapers with rot towards the top. Up to 130mm thick by 200mm wide but also as thin as 80mm by 80mm. Hand worked and split with no obvious signs of reuse or carpenter's marks. Joined to rafter 022 and collar 023 with mortice and tenon joints. It sits on the E wall head.	No obvious signs of reuse so it may have been purposely cut for a probably 1590's roof. The expected carpenters mark may have rotted away.	1590's
Stair Loft.022	Rafter	W rafter of truss 5. A roughly rectangular oak timber. Hand cut and split, in fairly good condition. The upper part is slightly more rounded. 170mm thick by 150mm wide. It has a sawn carpenters mark 'V' on its N face and no signs of reuse. Joined to rafter 021 and collar 023 with mortice and tenon joints. Sits on the W wall head. Has a small piece of wood (043) attached below the collar.	No obvious signs of reuse so it may have been purposely cut for a probable 1590's roof.	1590's
Stair Loft.023	Collar	Collar of truss 5. A slightly rounded but once square oak timber, 150mm wide by 120mm thick. Hand worked and split. It has a redundant mortice on the N face and sarking peg holes on the S face. It has a redundant sawn carpenters mark 'II' on its underside and a sawn 'V' on its N face. It has a series of nail holes on its underside. It is joined to rafters 021 and 022 with mortice and tenon joints. In fair condition with some rot.	A reused timber in a 1590's roof. It is now a collar in the 5th truss in a series but it was once a rafter in the 2nd truss of an earlier roof. Nail holes on the underside could have supported a ceiling in the current arrangement.	Pre 1590's reused in 1590's
Stair Loft.024	Rafter	E rafter of truss 6. Roughly square oak timber, hand cut and shaped. 120mm thick by 130mm wide. It has a redundant mortice hole on its S face. It has a sawn carpenters mark 'VI' on its N face. It sits on trimmer 024 and is joined with rafter 025 and collar 026 with mortice and tenon joints. The timber is in fairly good condition.	A reused timber that is now part of a probable 1590's roof arrangement.	Pre 1590's reused in 1590's
Stair Loft.025	Rafter	W rafter of truss 6. Roughly square section oak timber, 150mm wide by 150mm thick. No signs of reuse. It has a sawn carpenter's mark 'VI' on its N face. Hand cut and shaped. Rests on the W wall head and joins to rafter 024 and collar 026 with mortice and tenon joints. In good condition except for some rotting at the top.	No obvious signs of reuse so it may have been purposely cut for a probable 1590's roof.	1590's
Stair Loft.026	Collar	Collar of truss 6. An unusual oak timber, 80mm wide by 150mm thick. Its S face, and upper and lower face are hand cut but its N face is pit sawn. It has no obvious notches cut into it. Its N face has a sawn 'VI' cut into it. It has a series of nail holes on its underside. It is joined to rafters 024 and 025 with mortice and tenon joints.	One of 4 similar reused timbers. While it is now a collar it was once part of another unknown structure, possibly not even a roof. Nail holes on the underside may have supported a ceiling in the current arrangement. At one time this may have been one half of a square section timber subsequently sawn in half to be reused as a collar.	Pre 1590's reused in 1590's
Stair Loft.027	Rafter	E rafter of truss 7. Roughly square section oak timber, 130mm thick by 140mm wide. Hand worked and split. The timber	A reused timber that is now part of a probable 1590's roof arrangement. Probably a rafter in an earlier roof.	Pre 1590's reused in 1590's

		has a redundant mortice on its N face and sarking peg holes on the S side. It has a sawn carpenter's mark 'VII' on its N face. It is joined to rafter 028 and collar 029 with mortice and tenon joints. The timber is good condition.		
Stair Loft.028	Rafter	W rafter of truss 7. Roughly square section (slightly rounded) oak timber, 140mm thick by 160mm wide. Hand cut and split. No obvious signs of reuse. It has a cut/sawn 'VII' on its N face. The timber is in fairly good condition.	No obvious signs of reuse so it may have been purposely cut for a probable 1590's roof.	1590's
Stair Loft.029	Collar	Collar of truss 7. An unusual oak timber. Rectangular cross section, 80mm wide by 140mm thick. The S face, and lower and upper face are hand cut but the N face is pit sawn. Cut into the upper face is a series of notches, circa 70mm by 50mm by 20mm deep, spaced 280mm apart. It has a sawn carpenter's mark 'VII' on its N face. It has a series of nail holes on its underside. The collar is supported by modern strut 076. It is in good condition.	One of 4 similar reused timbers. While it is now a collar it was once part of another unknown structure, possibly not even a roof. Nail holes on the underside may have supported a ceiling in the current arrangement. At one time this may have been one half of a square section timber subsequently sawn in half to be reused as a collar.	Pre 1590's reused in 1590's
Stair Loft.030	Rafter	E rafter of truss 8. Rounded (possibly once square in section) oak timber. Hand cut and worked, 140mm wide by 140mm thick. It has redundant sarking peg holes on its lower face. It has a sawn carpenter's mark 'VIII' on its N face. It rests on trimmer 034 and joins with rafter 031 with a mortice and tenon joint. It has an empty mortice hole on its underside that once supported a collar in the current roof arrangement but the collar has been removed. The timber is in good condition.	A reused timber that is now part of a probable 1590's roof arrangement. Probably a rafter in an earlier roof.	Pre 1590's reused in 1590's
Stair Loft.031	Rafter	W rafter of truss 8. Roughly square section timber but it becomes more rounded towards the top. Hand worked 150mm thick by 170mm wide. It shows no obvious signs of reuse. It has a sawn carpenter's mark 'VIII' on its N face. It sits on the W wall head and joins to rafter 030 with a mortice and tenon joint. It has an empty mortice hole on its underside that once supported a collar in the current roof arrangement but the collar has been removed. The timber is in fairly good condition.	No obvious signs of reuse so it may have been purposely cut for a probable 1590's roof.	1590's
Stair Loft.032	Trimmer	Trimmer of rafters 016 and 019. Square cut oak timber, 1.95m long by 140mm wide by 140mm thick. It has been hand worked and split. It has a chamfer cut into its lower edge in a central position circa 700mm long. It has no obvious signs of reuse or carpenters marks. The trimmer is joined to rafters 013, 016, 019 and 022 by mortice and tenon joints. It supports the base of rafters 016 and 019 and in turn is supported by brace/strut 082. It is in good condition with little visible deterioration.	The purpose of this trimmer is to support 2 of the W rafters (016 and 019) over a gap in the wall for a W dormer window (in the room below). Although the timberwork of the dormer window is relatively recent, the aperture itself (and therefore the trimmer) probably dates from the 1590's.	1590's
Stair Loft.033	Trimmer	Trimmer of rafters 015 and 018. Square section oak timber,	The purpose of this trimmer is to support 2 of the E	1590's

		1.80m long by 140mm wide by 140mm thick. Hand cut and shaped with a chamfer on the lower edge in a central position circa 600mm long. No visible signs of reuse or carpenter's marks. The trimmer is joined to rafters 012, 015, 018 and 021 with mortice and tenon joints. It supports the base of rafters 015 and 018. It is in a fair condition but has some rot.	rafters (015 and 018) over a gap in the wall for an E dormer window (in the room below). Although the timberwork of the dormer window is relatively recent, the aperture itself (and therefore the trimmer) probably dates from the 1590's.	
Stair Loft.034	Trimmer	Trimmer of rafters 024, 027 and 030. Square section oak timber, 2.2m long by 140mm wide by 140mm thick. It has no visible signs of reuse or carpenters marks. It is joined to rafters 021, 024, 027 and 030 by mortice and tenon joints. It supports the base of rafters 024, 027 and 030. It is in fair condition but it has some scorch marks.	The purpose of this trimmer is to support 3 of the E rafters (024, 027 and 030) as they can not rest on the wall head at this point because of the flue for the fireplace in the room below. The trimmer probably dates from the 1590's.	1590's
Stair Loft.035	Brace	Bracing timber nailed on to the N side of 009. 80mm thick by 150mm wide. The N side is obviously machine sawn but the W side may be hand sawn. No obvious signs of reuse or carpenter's marks. It is in good condition.	While this timber may be reused from elsewhere the machine cut side indicates that it is a fairly recent repair of the past 100 years or so. Possibly the other half of 036 – this may have been one complete machine cut timber hand sawn on site for this purpose.	19th/20th Century
Stair Loft.036	Brace	Bracing timber nailed on to the N side of 010, 80mm thick by 130mm wide. The S side is machine sawn but the other side appears to be hand worked. No obvious signs of reuse or carpenter's marks. It is in good condition.	While this timber may be reused from elsewhere the machine cut side indicates that it is a fairly recent repair of the past 100 years or so. Possibly the other half of 035.	19th/20th Century
Stair Loft.037	Collar	Small upper collar on truss 1. A small piece of oak plank nailed to the N side of rafters 012 and 013 near the apex of the roof.	Acts as an upper collar but its purpose is unclear. Its age is unknown but it does not look modern.	Post 1590's
Stair Loft.038	Collar	Small upper collar of truss 4. A small oak plank nailed to the N side of rafters 018 and 019 near the apex.	Acts as an upper collar but its purpose is unclear. Its age is unknown but it does not look modern.	Post 1590's
Stair Loft.039	Spacer	Timber spacer between rafter 018 and dormer ridge piece 040. An oak plank, nailed to the S side of rafter 018 and in turn it has ridge piece 040 nailed to it. Hand worked oak plank, 130mm by 30mm by 710mm. It is in good condition.	Acts as a spacer to move ridge piece 040 to a central position over the E dormer window.	1590's
Stair Loft.040	Dormer Ridge Piece	Ridge piece of E dormer window. A hand shaped oak timber, 200mm by 60mm by unknown length. Possibly sawn at the end. Visible portion is in good condition. It shows no visible signs of reuse or carpenter's marks.	Original 1590's ridge piece of E dormer window. Much of the associated dormer roof has probably been replaced but it was not possible to examine it closely due to access.	1590's
Stair Loft.041	Spacer	Timber spacer between rafter 019 and dormer ridge piece 042. A large piece of oak timber that appears to be an off cut from another piece of timber. Hand cut and shaped, 100mm wide by 120mm thick by 870mm long. It has a notch cut out of its bottom edge which may be the remains of the mortice. No sign of carpenter's marks. Nailed to the S side of rafter 019 and in turn ridge piece 042 is nailed to it. It is in good condition with no rotting.	Part of the 1590's roof but it appear to be a reused timber from an earlier structure.	Pre 1590's reused in 1590's
Stair Loft.042	Dormer Ridge	Ridge piece of the W dormer window. A hand worked oak	Original 1590's ridge piece of the W dormer window. The	1590's

	Piece	plank, possibly sawn at one end. 50mm thick by 200mm, by 1.70m long. No visible signs of reuse or carpenter's marks. In good condition.	rest of the dormer roof timber has been replaced.	
Stair Loft.043	Ceiling	Small piece of timber on lower face of 022. 100mm by 450mm by 30mm oak plank nailed to 022.	Residual part of a ceiling.	1590's
Stair Loft.044	Ceiling	E brace at E end of collar 029. Pit sawn and hand worked oak timber. It is in fair condition with some rotting. It shows no obvious signs of reuse or carpenter's marks. It is nailed to the N face of collar 029 and braces against the N wall sitting in a pocket in the masonry. It has a series of nail holes in its lower face. 1.30m long by 80mm by 120mm.	While this may be a structural support for collar 029 it is perhaps more likely that it is part of a combed plank ceiling. Similar wall pockets are seen elsewhere in the E and W bedchambers and in the Gallery and this is one of only two in situ examples.	1590's
Stair Loft.045	Ceiling	W brace at E end of collar 029. Pit sawn and hand worked oak timber. It is in fair condition with some rotting. It shows no obvious signs of reuse or carpenter's marks. It is nailed to the N face of collar 029 and braces against the N wall sitting in a pocket in the masonry. It has a series of nail holes in its lower face. 1.20m long by 60mm by 140mm.	While this may be a structural support for collar 029 it is perhaps more likely that it is part of a combed plank ceiling. Similar wall pockets are seen elsewhere in the E and W bedchambers and in the Gallery. This along with 046 is the only in situ example of a pocket in use.	1590's
Stair Loft.046	Sarking	General number for the sarking of the stair loft roof. The majority of the sarking is sawn pine planks, stained brown. Some are unstained on the lower part of the E pitch and some are stained green at the top N end of the E pitch.	All the sarking is probably 20th Century, the green stained sarking is probably late 20th century repairs..	20th Century
Stair Loft.047	Ridge Piece.	Ridge piece of stair loft roof. Sawn pine plank.	20th Century ridge piece.	20th Century
Stair Loft.048	Sarking	General number for the sarking of the W dormer roof. A mixture of stained and unstained machine sawn pine planks.	A mixture of 20th Century with late 20th Century repairs.	20th Century
Stair Loft.049	Dormer Rafter	N diagonal support of the W dormer. Machine sawn and hand cut oak rafter that braces against trimmer 032 and rafter 022. 80mm by 70mm by 900mmwhich holds the sarking of the dormer. Hand working could suggest that the timber is reused. It has no visible carpenter's marks.	Probably an early 20th Century insertion, possibly reused.	20th Century
Stair Loft.050	Dormer rafter	S diagonal support of the W dormer. Machine sawn and hand cut oak rafter that braces against trimmer 032 and strut/brace 082. 60mm by 90mm by 900mmwhich holds the sarking of the dormer. Hand working could suggest that the timber is reused. It has no visible carpenter's marks.	Probably an early 20th Century replacement, possibly reused.	20th Century
Stair Loft.051	Dormer rafter	E rafter of the N pitch of the W dormer roof. Sawn (possibly by machine) and hand cut, possibly oak. Secured to ridge piece 042, sits on sarking 046. Supports sarking 048. 60mm by 70mm by unknown length.	Possible early 20th Century replacement.	20th Century
Stair Loft.052	Dormer rafter	W rafter of the N pitch of the W dormer roof. Machine cut pine rafter, secured to ridge piece 042, rests on the wall head. Supports sarking 048. circa 80mm by 80mm.	Possible late 20th Century replacement.	20th Century
Stair Loft.053	Dormer rafter	E rafter of the S pitch of the W dormer roof. Sawn (possibly by	Possible early 20th Century replacement.	20th Century.

		machine) and hand cut timber, possibly oak. Secured to ridge piece 042, sits on sarking 046, supports sarking 048. Circa 60mm by 60mm.		
Stair Loft.054	Dormer rafter	W rafter of the S pitch of the W dormer roof. Machine cut pine rafter, secured to ridge piece 042, rests on the wall head. Supports sarking 048. circa 80mm by 80mm.	Possible late 20th Century replacement.	20th Century
Stair Loft.055	Strut	Strut supporting sarking above trimmer 032. Machine cut pine, 130mm wide by 50mm thick by circa 600mm.	20th Century support.	20th Century
Stair Loft.056	Brace	Brace supporting rafter 031. Machine sawn pine plank nailed/screwed to the S side of 031. 50mm by 130mm by at least 2.20m long. Carries an electric light. Excellent condition.	While it carries a light its primary function muct be to support truss 8 which has no collar. Late 20th Century structural repair/alteration.	20th Century
Stair Loft.057	Floor	Modern floor boards.	20th Century floor boards.	20th century.
Stair Loft.058	Ceiling	A plank, possibly oak, is fixed to the underside of rafter 028 below collar 029. 70mm wide by 30mm thick by at least 1.30m long it has been hand cut and probably sawn (its inner face is very smooth).	This is probably a spacer from which a combed plank ceiling was suspended for the chamber below.	1590's
Stair Loft.059	Floor	Modern floor joists below 057 (N most).	20th Century floor joists.	20th century.
Stair Loft.060	Floor	Modern floor joists below 057	20th Century floor joists.	20th century.
Stair Loft.061	Floor	Modern floor joists below 057	20th Century floor joists.	20th century.
Stair Loft.062	Floor	Modern floor joists below 057	20th Century floor joists.	20th century.
Stair Loft.063	Floor	Modern floor joists below 057	20th Century floor joists.	20th century.
Stair Loft.064	Floor	Modern floor joists below 057	20th Century floor joists.	20th century.
Stair Loft.065	Floor	Modern floor joists below 057	20th Century floor joists.	20th century.
Stair Loft.066	Floor	Modern floor joists below 057 (S most).	20th Century floor joists.	20th century.
Stair Loft.067	Brace	Brace supporting 060 to rafter 027.	20th Century brace.	20th century.
Stair Loft.068	Brace	Brace supporting 061 to rafter 024.	20th Century brace.	20th century.
Stair Loft.069	Brace	Brace supporting 063 to rafter 018.	20th Century brace.	20th century.
Stair Loft.070	Strut/king post	Strut supporting 011.	20th Century strut.	20th century.
Stair Loft.071	Strut/king post	Strut supporting 014	20th Century strut.	20th century.
Stair Loft.072	Strut/king post	Strut supporting 017.	20th Century strut.	20th century.
Stair Loft.073	Strut/king post	Strut supporting 020.	20th Century strut.	20th century.
Stair Loft.074	Strut/king post	Strut supporting 023.	20th Century strut.	20th century.
Stair Loft.075	Strut/king post	Strut supporting 026.	20th Century strut.	20th century.
Stair Loft.076	Strut/king post	Strut supporting 029.	20th Century strut.	20th century.
Stair Loft.077	Fixture	Modern plank to carry services on 028 and 031.	20th Century plank.	20th century.

Stair Loft.078	Fixture	Modern plank to carry services on 011, 014, 017, 023, 026-029.	20th Century plank.	20th century.
Stair Loft.079	Fixture	Modern vent and brackets.	20th Century vent.	20th century.
Stair Loft.080	Fixture	Pine frame for (now removed) water tank	20th Century frame.	20th century.
Stair Loft.081	Fixture	Various random loose planks laid on top of the truss collars.	20th Century planks.	20th century.
Stair Loft.082	Brace	Timber brace supporting both sarking and the S part of trimmer 032. Machine cut pine plank, 90mm by 90mm by 800mm long.	Adds support for trimmer 032 as the trimmer is slightly off centre. Contemporary with the replaced dormer roof. Possibly early 20th Century.	20th century.
Stair Loft.083	Ceiling	3 small residual planks, possibly oak, on the underside of collar 016. Nailed to the collar. Westernmost is 215mm by 63mm by 25mm, central is 690mm by 75mm by 30mm, easternmost is 550mm by 75mm by 35mm.	Probably residual spacers which supported a coombed plank ceiling over the chamber below.	1590's

GATEHOUSE				
Feature Number.	**Type**	**Description**	**Interpretation**	**Suggested Date**
Gatehouse.001	Truss	This is the southernmost truss of the gatehouse roof. It comprises E and W rafters 008 and 009 and the respective ashlar posts 010 and 011 and sole pieces 012 and 013. The truss once had a collar but it is now missing. It was secured via mortises in the lower face of the rafters. The rafters have carpenter's marks on the N face. The carpenter's mark is 'II' The truss rests directly on the reduced gatehouse wall head. The rafters have nail holes below the level where the collar was once secured suggesting a combed plank ceiling as does timber 071 on the W rafter..	This truss must date to the time of the gatehouse remodeling or later. This is because it rests on the reduced wall-head of what was once a parapeted tower. It is the second in a series of trusses as it is marked with the roman numerals 'II'. The first truss might have been an earlier version of 054. The truss as lost its collar but is in otherwise good condition. The truss shows no signs of reuse and was therefore probably constructed with new timber following the gatehouse remodeling. (Another interpretation of the roman numeral system is that the trusses were placed incorrectly or that the roof was moved and rebuilt but this is unlikely). The dating evidence for the remodeling of the gatehouse can be found in the inserted wide windows in grey stone (the trimmers of the gatehouse roof are designed to work with these wide inserted windows) and the fossilized crowstep gable seen from the W bedchamber showing that the crowstep gable was earlier than the 1590's N range.	Post 1478 - pre 1590.
Gatehouse.002	Truss	This is the second truss from the S in the gatehouse roof. It comprises E and W rafters 014 and 015, a collar 016, a W ashlar post 018 and sole piece 019 and and an E trimmer 017 over the E window. The W rafter and collar have carpenter's marks on the N face. The carpenter's mark is a 'III' The truss rest directly on the reduced wall head on the W side and on the E side. Nail holes on the underside of the collar and on the underside of the rafters below the level of the collar indicate a combed plank ceiling.	This truss must date to the time of the gatehouse remodeling or later. This is because it rests on the reduced wall-head of what was once a parapeted tower. It is the second in a series of trusses as it is marked with the roman numerals 'III'. The first truss might have been an earlier version of 054. The truss shows no signs of reuse and was therefore probably constructed with new timber following the gatehouse remodeling. (Another interpretation of the roman numeral system is that the	Post 1478 - pre 1590.

			trusses were placed incorrectly or that the roof was moved and rebuilt but this is unlikely). The dating evidence for the remodeling of the gatehouse can be found in the inserted wide windows in grey stone (the trimmers of the gatehouse roof are designed to work with these wide inserted windows) and the fossilized crowstep gable seen from the W bedchamber showing that the crowstep gable was earlier than the 1590's N range.	
Gatehouse.003	Truss	This is the third truss from the S in the gatehouse roof. It comprises E and W rafters 020 and 021, collar 022, ashlar posts 023 and 024 and sole pieces 025 and 026. The truss has carpenter's marks on the N face of the rafters and collars, The carpenter's mark is a 'IIII'. The truss is in fairly good condition and rests directly on the wall head. Nail holes on the underside of the collar and on the underside of the rafters below the level of the collar, along with timbers 072 on the W rafter indicate a combed plank ceiling.	This truss must date to the time of the gatehouse remodeling or later. This is because it rests on the reduced wall-head of what was once a parapeted tower. It is the second in a series of trusses as it is marked with the roman numerals 'IIII'. The first truss might have been an earlier version of 054. The truss shows no signs of reuse and was therefore probably constructed with new timber following the gatehouse remodeling. (Another interpretation of the roman numeral system is that the trusses were placed incorrectly or that the roof was moved and rebuilt but this is unlikely). The dating evidence for the remodeling of the gatehouse can be found in the inserted wide windows in grey stone (the trimmers of the gatehouse roof are designed to work with these wide inserted windows) and the fossilized crowstep gable seen from the W bedchamber showing that the crowstep gable was earlier than the 1590's N range.	Post 1478 - pre 1590.
Gatehouse.004	Truss	This is the fourth truss from the S in the gatehouse roof. It comprises E and W rafters 027 and 028, collar 029, ashlar posts 030 and 031 and sole pieces 032 and 033. The truss has carpenters marks on the N face of the rafters. The carpenter's mark is 'IIV' The truss is in fairly good condition and rests directly on the wallhead. Nail holes on the underside of the collar and on the underside of the rafters below the level of the collar indicate a combed plank ceiling.	Truss must date from the remodeling of the gatehouse or later. The use of the carpenter's mark 'IIV' possibly indicates that this was intended to be the seventh in a series of trusses. The truss shows no evidence of reuse. As the carpenters marks on trusses 001-007 do not follow a logical sequence it is possible that they were assembled in the wrong order or that the roof has been taken down at some point and rebuilt incorrectly.	Post 1478 - pre 1590.
Gatehouse.005	Truss	This is the fifth truss from the S in the gatehouse roof. It comprises E and W rafters 034 and 035, collar 036, E ashlar post 037 and sole piece 038, and W trimmer 039. The truss has carpenter's marks on the N face of the rafters and the collar. The carpenter's mark is 'VI' Nail holes on the underside of the collar and on the underside of the rafters below the level of the collar indicate a combed plank ceiling.	This truss must date to the time of the gatehouse remodeling or later. This is because it rests on the reduced wall-head of what was once a parapeted tower. It is the second in a series of trusses as it is marked with the roman numerals 'VI'. The first truss might have been an earlier version of 054. The truss shows no signs of reuse and was therefore probably constructed with new timber following the gatehouse remodeling. (Another interpretation of the roman numeral system is that the trusses were placed incorrectly or that the roof was	Post 1478 - pre 1590.

			moved and rebuilt but this is unlikely). The dating evidence for the remodeling of the gatehouse can be found in the inserted wide windows in grey stone (the trimmers of the gatehouse roof are designed to work with these wide inserted windows) and the fossilized crowstep gable seen from the W bedchamber showing that the crowstep gable was earlier than the 1590's N range.	
Gatehouse.006	Truss	This is the sixth truss from the S in the gatehouse roof. It comprises E and W rafters 040 and 041, collar 042, ashlar posts 043 and 044 and sole pieces 045 and 046. The truss has carpenter's marks on the N face of the collar and the W rafter but not on the E rafter. The carpenter's mark is 'V'. Nail holes on the underside of the collar and on the underside of the rafters below the level of the collar indicate a combed plank ceiling.	Truss must date from the remodeling of the gatehouse or later. The use of the carpenter's mark 'V' possibly indicates that this was intended to be the fifth in a series of trusses. The truss shows no evidence of reuse. As the carpenters marks on trusses 001-007 do not follow a logical sequence it is possible that they were assembled in the wrong order or that the roof has been taken down at some point and rebuilt incorrectly.	Post 1478 - pre 1590.
Gatehouse.007	Truss	This is the N most truss in the gatehouse roof (seventh from the S). It comprises E and W rafters 047 and 048, collar 049, ashlar posts 050 and 051 and sole pieces 052 and 053. No carpenter's marks are visible. The truss is in fairly good condition and the E and W side of the truss rest directly on the reduced wallhead. Nail holes on the underside of the collar and on the underside of the rafters below the level of the collar indicate a combed plank ceiling.	Truss must date from the remodeling of the gatehouse or later. This is because it rests on the reduced wall-head of what was once a parapeted tower. The truss shows no signs of reuse and was therefore probably constructed with new timber following the gatehouse remodeling. The dating evidence for the remodeling of the gatehouse can be found in the inserted wide windows in grey stone (the trimmers of the gatehouse roof are designed to work with these wide inserted windows) and the fossilized crowstep gable seen from the W bedchamber showing that the crowstep gable was earlier than the 1590's N range.	Post 1478 - pre 1590.
Gatehouse.008	Rafter	E rafter of truss 001. *Dimensions:* circa 150mm by 150mm *Cutting method:* split/hand cut *Evidence of reuse:* none. *Carpenter's marks:* 'II' marked on N face circa 1.00m from apex. *Attached to:*ashlar post 010, sole piece 012 and W rafter 009 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* fairly good, slightly warped with some woodworm. *Other:* has a mortice on its underside that once secured a collar in the current roof. Nail holes on the underside below the level of the collar indicate a combed plank ceiling was attached.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.009	Rafter	W rafter of truss 001. *Dimensions:* circa 130mm thick by 150mm wide. *Cutting method:* Split/hand cut.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized	Post 1478 - pre 1590.

		Evidence of Reuse: none. *Carpenter's marks:* 'II' marked on N side circa 1.00m from the apex. *Attached to:* ashlar post 011, sole piece 013 and E rafter 008 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* fairly good but very warped and with some rot and woodworm. *Other:* has a mortice on its underside that once secured a collar in the current roof. Nail holes on the underside below the level of the collar indicate a combed plank ceiling was attached.	crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	
Gatehouse.010	Ashlar post	E ashlar post of truss 001. *Dimensions:* circa 880mm high by 110mm thick by 120mm wide. *Cutting method:* handcut and sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* sole piece 012 and rafter 008 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.011	Ashlar post	W ashlar post of truss 001. *Dimensions:* circa 1.10m high by 110mm thick by 120mm wide. *Cutting method:* handcut and sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* sole piece 013 and rafter 009 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* poor with rot on lower portion.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.012	Sole piece	E sole piece of truss 001. *Dimensions:* at least 600mm long by circa 130mm high by 160mm wide. *Cutting method:* hand cut and sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* ashlar post 010 and rafter 008 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.

Gatehouse.013	Sole piece	W sole piece of truss 001. *Dimensions:* at least 800mm long by circa 150mm high by 170mm wide. *Cutting method:* hand cut and sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* ashlar post 011 and rafter 009 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.014	Rafter	E rafter of truss 002. *Dimensions:* 120mm thick by 150mm wide. *Cutting method:* hand cut and split. *Evidence of Reuse:* none. *Carpenter's marks:* none visible. *Attached to:* trimmer 017, collar 016 and W rafter 015 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* fairly good condition with a little rot and warping. *Other:* nail holes on the underside below the level of the collar indicate a combed plan ceiling.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.015	Rafter	W rafter of truss 002. *Dimensions:* 150mm wide by 150mm thick. *Cutting method:* hand cut and split. *Evidence of Reuse:* none. *Carpenter's marks:* 'III' on the N face. *Attached to:* E rafter 014, collar 016, ashlar post 018 and sole piece 019 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* fairly good but some deterioration at the ends. *Other:* nail holes on the underside below the level of the collar indicate a combed plan ceiling.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.016	Collar	Collar of truss 002. *Dimensions:* unknown. *Cutting method:* hand cut and split. *Evidence of Reuse:* none. *Carpenter's marks:* 'III' cut into the N face. *Attached to:* E and W rafters 014 and 015 with mortice and tenon joints pinned with wooden dowels. *Material:* oak.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.

		Condition: fair condition with some rot.		
Gatehouse.017	Trimmer	E Trimmer of truss 002. *Dimensions:* 120mm thick by 160mm wide. *Cutting method:* hand cut and possibly sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* E rafter 014, (also rafters 008 and 020) with mortice and tenon joints pinned with wooden dowels and abutted by sarking support 061. *Material:* oak. *Condition:* good condition with little deterioration.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.018	Ashlar post	W ashlar post of truss 002. *Dimensions:* circa 130mm wide by 110mm thick by 1.14m long. *Cutting method:* possibly sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* W rafter 015 and sole piece 019 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good condition with little deterioration.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.019	Sole piece	W sole piece of truss 002. *Dimensions:* circa 1.00m long by 150mm wide by 70mm thick. *Cutting method:* possibly sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* *Material:* oak. *Condition:* good condition with little deterioration.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.020	Rafter	E rafter of truss 003. *Dimensions:* 150mm by 120mm. *Cutting method:* hand cut and split. *Evidence of Reuse:* none. *Carpenter's marks:* 'IIII' on the upper N face. *Attached to:* sole piece 025, ashlar post 023, collar 022 and rafter 021 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* in good condition with little warping or rotting. *Other:* nail holes on the underside below the level of the collar	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.

		indicate a combed plan ceiling.		
Gatehouse.021	Rafter	W rafter of truss 003. *Dimensions:* 150mm by 150mm. *Cutting method:* hand cut and split. *Evidence of Reuse:* none. *Carpenter's marks:* 'IIII' on upper N face. *Attached to:* rafter 020, collar 022, ashlar post 024 and sole piece 026. *Material:* oak. *Condition:* good with little rot and little warping. *Other:* nail holes on the underside below the level of the collar indicate a combed plan ceiling.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.022	Collar	Collar of truss 003. *Dimensions:* unknown. *Cutting method:* hand cut and split, possibly sawn. *Evidence of Reuse:* none. *Carpenter's marks:* 'IIII' cut into N face slightly W of centre. *Attached to:* rafters 020 and 021 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* fair condition with some rot. *Other:* nail holes on the underside indicate a plank ceiling.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.023	Ashlar post	E ashlar post of truss 003. *Dimensions:* 120mm wide by 130mm thick by 920mm high. *Cutting method:* hand cut and sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* E rafter 020 and sole piece 025 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good with no rot.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.024	Ashlar post.	W ashlar post of truss 003. *Dimensions:* 120mm wide by 130mm thick by 1.07m high. *Cutting method:* hand cut and sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* W rafter 021 and sole piece 026 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* fairly good with some rot at the base.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.025	Sole piece	E sole piece of truss 003.	Original roof timber. Roof must have been constructed	Post 1478 - pre

		Dimensions: 160mm wide by 120mm high by circa 700mm long. *Cutting method:* possibly hand sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* E rafter 020 and ashlar post 023 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good condition, no obvious rotting.	following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	1590.
Gatehouse.026	Sole piece	W sole piece of truss 003. *Dimensions:* 160mm wide by 100 mm high by circa 800mm long. *Cutting method:* probably hand sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* W rafter 021 and ashlar post 024 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good condition with no obvious rotting.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.027	Rafter	E rafter of truss 004. *Dimensions:* 160mm wide by 150mm thick. *Cutting method:* hand cut and split. *Evidence of Reuse:* none. *Carpenter's marks:* 'IIV' cut into upper N face. *Attached to:* W rafter 028, collar 029, ashlar post 030 and sole piece 032 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* fairly good with little warping or obvious rot. *Other:* nail holes on the underside below the level of the collar indicate a coombed plank ceiling.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.028	Rafter	W rafter of truss 004. *Dimensions:* 170mm wide by 170mm thick. *Cutting method:* hand cut and split. *Evidence of Reuse:* none. *Carpenter's marks:* 'IIV' cut into upper N face. *Attached to:* E rafter 027, collar 029, ashlar post 031 and sole piece 033 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* fairly good, little rot or warping. *Other:* nail holes on the underside below the level of the collar	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.

		indicate a coombed plank ceiling.		
Gatehouse.029	Collar	Collar of truss 004. *Dimensions:* unknown. *Cutting method:* possibly hand cut and split but timber is very rotten. *Evidence of Reuse:* none. *Carpenter's marks:* none – possibly obscured by rot. *Attached to:* E and W rafters 027 and 028 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* poor, very rotten. *Other:* nail holes on the underside indicate a plank ceiling.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.030	Ashlar post	E ashlar post of truss 004. *Dimensions:* 120mm wide by 130mm thick by 960mm high. *Cutting method:* sawn and possibly hand cut. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* E rafter 027 and sole piece 032 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good condition with little rotting.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.031	Ashlar post	W ashlar post of truss 004. *Dimensions:* 120mm wide by 120mm thick by 1.12m high. *Cutting method:* hand cut and sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* W rafter 028 and sole piece 033 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good condition with a little rot at the base.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.032	Sole piece	E sole piece of truss 004. *Dimensions:* 170mm wide by 180mm high by circa 800mm long. *Cutting method:* hand sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* E rafter 027 and ashlar post 030 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good with little rot.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.

Gatehouse.033	Sole piece	W sole piece of truss 004. *Dimensions:* 160mm wide by 90mm high by 800mm long. *Cutting method:* hand sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* W rafter 028 and ashlar post 031 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good with little rotting.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.034	Rafter	E rafter of truss 005. *Dimensions:* 150mm wide by 150mm thick. *Cutting method:* hand cut and split. *Evidence of Reuse:* none. *Carpenter's marks:* 'VI' cut into the upper N face. *Attached to:* W rafter 035, collar 036, ashlar post 037 and sole piece 038 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good, little rot. *Other:* nail holes on the underside below the level of the collar indicate a coombed plank ceiling.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.035	Rafter	W rafter of truss 005. *Dimensions:* 140mm wide by 140mm thick. *Cutting method:* hand cut and split. *Evidence of Reuse:* notch cut into bottom edge. *Carpenter's marks:* 'VI' cut into upper N face. *Attached to:* E rafter 034, collar 036 and trimmer 039 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good but with some rotting and warping. *Other:* nail holes on the underside below the level of the collar indicate a coombed plank ceiling.	Probably original roof timber, however the notch in the bottom could indicate reuse. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.036	Collar	Collar of truss 005. *Dimensions:* unknown. *Cutting method:* hand cut and sawn. *Evidence of Reuse:* none. *Carpenter's marks:* 'VI' on N face. *Attached to:* E and W rafters 034 and 035 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* Good with some rotting. *Other:* nail holes on the underside indicate a plank ceiling.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.

Gatehouse.037	Ashlar post	E ashlar post of truss 005. *Dimensions:* 120mm wide by 100mm thick by 950mm high. *Cutting method:* hand cut and sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* E rafter 034 and sole piece 038 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good, no visible rot.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.038	Sole piece	E sole piece of truss 005. *Dimensions:* 150mm wide by 90mm high by 830mm long. *Cutting method:* sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* E rafter 034 and ashlar post 037 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good, no rot.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.039	Trimmer	W trimmer of truss 005. *Dimensions:* 150mm by 150mm. *Cutting method:* hand cut and sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* W rafter 035 and adjacent rafters 028 and 041 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good, with some rotting.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.040	Rafter	E rafter of truss 006. *Dimensions:* 160mm by 160mm. *Cutting method:* hand cut and split. *Evidence of Reuse:* none. *Carpenter's marks:* none visible, possibly due to rot. *Attached to:* E rafter 041, collar 042, ashlar post 043 and sole piece 045. *Material:* oak. *Condition:* good but rotting at the top. *Other:* nail holes on the underside below the level of the collar indicate a coombed plank ceiling.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.041	Rafter	W rafter of truss 006. *Dimensions:* 150mm by 150mm.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet.	Post 1478 - pre 1590.

		Cutting method: hand cut and split. *Evidence of Reuse:* none. *Carpenter's marks:* 'V' cut into upper N face. *Attached to:* E rafter 040, collar 042, ashlar post 044 and sole piece 046 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* fairly good with some rotting. *Other:* nail holes on the underside below the level of the collar indicate a coombed plank ceiling.	Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	
Gatehouse.042	Collar	Collar of truss 006. *Dimensions:* unknown. *Cutting method:* hand cut and sawn. *Evidence of Reuse:* none. *Carpenter's marks:* 'V' cut into N face. *Attached to:* E and W rafters 040 and 041 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good with some rotting of the upper parts. *Other:* nail holes on the underside indicate a plank ceiling.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.043	Ashlar post	E ashlar post of truss 006. *Dimensions:* 120mm wide by 100mm thick by 870mm high. *Cutting method:* hand cut and sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* E rafter 040 and sole piece 045 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good with little rotting.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.044	Ashlar post	W ashlar post of truss 006. *Dimensions:* 120mm wide by 120mm thick by 1.08m high. *Cutting method:* hand cut and sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* W rafter 041 and sole piece 046 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good with little rotting.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.045	Sole piece	E sole piece of truss 006. *Dimensions:* 170mm wide by 120mm high by 800mm long. *Cutting method:* sawn.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized	Post 1478 - pre 1590.

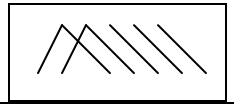
		Evidence of Reuse: none. *Carpenter's marks:* none. *Attached to:* E rafter 040 and ashlar post 043 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good with little rotting.	crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	
Gatehouse.046	Sole piece	W sole piece. *Dimensions:* 150mm wide by 110mm high by 1.00m long. *Cutting method:* sawn. *Evidence of Reuse:* a peg hole is visible in the S face. *Carpenter's marks:* none. *Attached to:* W rafter 041 and ashlar post 044 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* fairly good with some rotting.	Probably an original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.047	Rafter	E rafter of truss 007. *Dimensions:* unknown. *Cutting method:* hand cut and split. *Evidence of Reuse:* none. *Carpenter's marks:* none visible. *Attached to:* W rafter 048, collar 049, ashlar post 050 and sole piece 052 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* good condition, little rot and little warping. *Other:* nail holes on the underside below the level of the collar indicate a coombed plank ceiling.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.048	Rafter	W rafter if truss 007. *Dimensions:* 130mm wide by 150mm thick. *Cutting method:* hand cut and split. *Evidence of Reuse:* none. *Carpenter's marks:* none visible. *Attached to:* E rafter 047, collar 049, ashlar post 051 and sole piece 053 with mortice and tenon joints pinned with dowels. *Material:* oak. *Condition:* good but with some rot near the top. *Other:* nail holes on the underside below the level of the collar indicate a coombed plank ceiling.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.049	Collar	Collar of truss 007. *Dimensions:* unknown. *Cutting method:* Hand cut, possibly sawn in places.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized	Post 1478 - pre 1590.

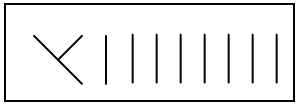
		Evidence of Reuse: none. *Carpenter's marks:* none visible. *Attached to:* E and W rafters 047 and 048 with mortice and tenon joints pinned with dowels. *Material:* oak. *Condition:* fairly good but slightly warped and rotted. *Other:* nail holes on the underside indicate a plank ceiling.	crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	
Gatehouse.050	Ashlar post	E ashlar post of truss 007. *Dimensions:* unknown. *Cutting method:* hand cut and sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* E rafter 047 and sole piece 052 with mortice and tenon joints pinned with dowels. *Material:* oak. *Condition:* good with little rot.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.051	Ashlar post	W ashlar post of truss 007. *Dimensions:* 130mm wide by 100mm thick by 1.10m high. *Cutting method:* hand cut and sawn. *Evidence of Reuse:* none. *Carpenter's marks:* none. *Attached to:* W rafter 048 and sole piece 053 with mortice and tenon joints pinned with dowels. *Material:* oak. *Condition:* good with little rot.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.052	Sole piece	E sole piece of truss 007. *Dimensions:* unknown. *Cutting method:* hand cut, possibly sawn in places. *Evidence of Reuse: none.* *Carpenter's marks:* none. *Attached to:* E rafter 047 and ashlar post 050 with mortice and tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* fairly good with some rot.	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.
Gatehouse.053	Sole piece	W sole piece of truss 007. *Dimensions:* 150mm wide by 170mm high by 900mm long. *Cutting method:* sawn. *Evidence of Reuse: none.* *Carpenter's marks:* none. *Attached to:* W rafter 048 and ashlar post 051 with mortice and	Original roof timber. Roof must have been constructed following the reduction of the gatehouse parapet. Evidence from the inserted windows and the fossilized crowstep gable indicate this was earlier than the construction of the N range in the 1590's.	Post 1478 - pre 1590.

		tenon joints pinned with wooden dowels. *Material:* oak. *Condition:* poor with much rot.		
Gatehouse.054	Sarking support.	A small 'A' frame at the S end of the gatehouse roof sitting in a slight recess on the S gable wall head. Inaccessible at the time of recording. But appears to be a simple A frame construction of pine plank (probably machine sawn) 'rafters' and a 'collar' nailed together. On the N side of the W rafter is a brace 074. Excellent condition.	20th Century roof element, possibly replacing an original truss.	20th Century.
Gatehouse.055	Sarking support	A small A frame at the S end of the gatehouse roof sitting in a slight recess on the N gable wall head. Inaccessible at the time of recording. But appears to be a simple 'A' frame construction of pine plank (probably machine sawn) 'rafters' and a 'collar' nailed together. On the N side of the W rafter is a brace 074. Excellent condition.	20th Century roof element, possibly replacing an original truss.	20th Century.
Gatehouse.056	Ridge piece	Modern ridge piece. A pine plank that sits at the apex of the gatehouse roof. It sits on top of trusses 001-007 and 054-055. It separates the E and W pitches of sarking 057. Excellent condition.	Modern 20th Century ridge piece.	20th Century.
Gatehouse.057	Sarking	General number for the sarking across the gatehouse roof. Modern machine cut planks. Secured to the rafters of trusses 001-007, 054 and 055. Excellent condition.	20th Century sarking supporting the slates on the gatehouse roof.	20th Century
Gatehouse.058	Brace	One of a series 058-060, 062-066, 068-070 of modern pine braces attached to the side of the original rafters with nails. The braces vary in size but all are machine cut pine planks. Attached to the S side of rafter 008.	Modern braces to bolster the roof and support sarking.	20th Century
Gatehouse.059	Brace	One of a series 058-060, 062-066, 068-070 of modern pine braces attached to the side of the original rafters with nails. The braces vary in size but all are machine cut pine planks. Attached to the N side of rafter 008.	Modern braces to bolster the roof and support sarking.	20th Century
Gatehouse.060	Brace	One of a series 058-060, 062-066, 068-070 of modern pine braces attached to the side of the original rafters with nails. The braces vary in size but all are machine cut pine planks. Attached to the N side of rafter 009.	Modern braces to bolster the roof and support sarking.	20th Century
Gatehouse.061	Brace	Support beneath trimmer 017 in the E window recess. This is a sawn and hand cut oak timber 1.2m long by 150mm by 70mm. It rests on the wall head and braces trimmer 017 over the E window recess.	This differs from the other pine braces, it looks older and might be an original feature of the roof.	Post 1478 - pre 1590.
Gatehouse.062	Brace	One of a series 058-060, 062-066, 068-070 of modern pine braces attached to the side of the original rafters with nails. The braces vary in size but all are machine cut pine planks. Attached to the N side of rafter 015.	Modern braces to bolster the roof and support sarking.	20th Century

Gatehouse.063	Brace	One of a series 058-060, 062-066, 068-070 of modern pine braces attached to the side of the original rafters with nails. The braces vary in size but all are machine cut pine planks. Attached to the S side of rafter 020.	Modern braces to bolster the roof and support sarking.	20th Century
Gatehouse.064	Brace	One of a series 058-060, 062-066, 068-070 of modern pine braces attached to the side of the original rafters with nails. The braces vary in size but all are machine cut pine planks. Attached to the N side of rafter 021.	Modern braces to bolster the roof and support sarking.	20th Century
Gatehouse.065	Brace	One of a series 058-060, 062-066, 068-070 of modern pine braces attached to the side of the original rafters with nails. The braces vary in size but all are machine cut pine planks. Attached to the S side of rafter 028.	Modern braces to bolster the roof and support sarking.	20th Century
Gatehouse.066	Brace	One of a series 058-060, 062-066, 068-070 of modern pine braces attached to the side of the original rafters with nails. The braces vary in size but all are machine cut pine planks. Attached to the N side of rafter 028.	Modern braces to bolster the roof and support sarking.	20th Century
Gatehouse.067	Brace	Support beneath trimmer 039 in the W window recess. This is a sawn and hand cut oak timber. It rests on the wall head and braces trimmer 039 over the E window recess.	This differs from the other pine braces, it looks older and might be an original feature of the roof.	Post 1478 - pre 1590.
Gatehouse.068	Brace	One of a series 058-060, 062-066, 068-070 of modern pine braces attached to the side of the original rafters with nails. The braces vary in size but all are machine cut pine planks. Attached to the N side of rafter 040.	Modern braces to bolster the roof and support sarking.	20th Century
Gatehouse.069	Brace	One of a series 058-060, 062-066, 068-070 of modern pine braces attached to the side of the original rafters with nails. The braces vary in size but all are machine cut pine planks. Attached to the S side of rafter 041.	Modern braces to bolster the roof and support sarking.	20th Century
Gatehouse.070	Brace	One of a series 058-060, 062-066, 068-070 of modern pine braces attached to the side of the original rafters with nails. The braces vary in size but all are machine cut pine planks. Attached to the N side of rafter 041.	Modern braces to bolster the roof and support sarking.	20th Century
Gatehouse.071	Ceiling	Strip of timber on the underside of W rafter 009 of truss 001. A small piece of timber, possibly pine, tongue and groove plank.	Possibly part of a now removed combed plank ceiling over the gatehouse. This timber might have carried the ceiling planks.	Post 1478 - pre 1590 or later.
Gatehouse.072	Ceiling	Four pieces of timber plank on the underside of W rafter 021 of truss 003. Three planks of varying sizes, all probably pine and a smaller strip of timber attached to the lower of the planks.	Possibly part of a now removed combed plank ceiling over the gatehouse. This timber might have carried the ceiling planks. The small piece of timber attached to the lower plank could be a lath or similar or the remains of a plank ceiling.	Post 1478 - pre 1590 or later.
Gatehouse.073	Fixture	Rectangular plank of wood nailed to the N face of the E rafter of truss 004 near the apex.	Serves no apparent structural purpose. Purpose unknown.	20th Century
Gatehouse.074	Brace	Plank of timber attached to the N face of the W 'rafter' of	This plank must be later than the 20th Century sarking	20th Century

		sarking support 054. It is roughly the same size as the W 'rafter' but it is a much darker colour.	support. Possibly a reused piece of timber.	

EAST BEDCHAMBER				
Feature Number.	**Type**	**Description**	**Interpretation**	**Suggested Date**
East Bedchamber.001	Ridge piece	E-W ridge piece sitting against the N wall of the bedchamber. Circa 4.00m long by 170mm by 150mm. It supports rafters 004-007. The ridge piece is not supported by any original timbers and may have just been braced against the wall by the rafters (but originally it was probably similar to the W bedchamber E-W ridge piece, extending to and supported at the W end by the collar of gallery truss 18 and supported at the E end by N-S ridge piece 002).. It has various additional timbers 041-047 attached to it. The ridge piece has copious nail holes on the underside that may have supported sarking at one time indicating that the timber is reused. The timber is in fair condition with some rot.	Sarking nail holes on the underside suggest that this was a rafter in an earlier roof but was reused as a ridge piece in the current roof in the 1590's.	Pre 1590's reused in 1590's
East Bedchamber.002	Ridge piece	N-S ridge piece, supporting rafters 010-012, 014, 016 and 017. This is an oak timber, circa greater than 3.00m long by 150mm by 150mm. It is supported at its N end by the N wall and at its S end by a 20th Century vertical pine timber 042 and by 20th Century ridge piece extension 041. It has a carpenters mark on its W face (see representation below). It also has a redundant mortice on the underside. 	In its current position it is part of the 1590's N range roof. However the mortice on the underside suggests that it has been recycled from an earlier roof arrangement.	
East Bedchamber.003	Ridge piece	NE-SW diagonal ridge piece. Oak timber, in fair condition with some warping and deterioration. No evidence of reuse. Hand cut and split with no visible carpenters marks. Circa 6.00m long by 140mm by 140mm.	No evidence of reuse. Original 1590's ridge piece.	1590's.
East Bedchamber.004	Rafter	W most rafter in the S pitch of the E bedchamber roof. Oak timber, circa 120mm thick by 140mm wide, hand worked and split. Rests on the S wall head via ashlar post 020 and sole piece 055 which it is attached to with mortice and tenon joints. To the N it is supported by ridge piece 001. Fairly poor condition with lots of rot towards the top. No visible evidence of reuse and no visible carpenter's marks.	No evidence of reuse. Original 1590's ridge piece.	1590's.
East	Rafter	S rafter immediately E of 004. Oak timber, Circa 170mm thick	Probably reused. The sarking peg holes suggest that this	Pre 1590's

Bedchamber.005		by 170mm wide, hand worked and split. The beam presumably rest on diagonal ridge piece 004 but the join is obscured behind the S wall. To the N it rests on ridge piece 001. The rafter has sarking peg holes on the underside. It is in very good condition with no visible rot.	timber was a rafter in an earlier roof arrangement.	reused in 1590's.
East Bedchamber.006	Rafter	S rafter immediately to the E of 005. Oak timber, hand worked and split, circa 160mm by 150mm. It rests on diagonal ridge piece 003 and E-W ridge piece 001. It has a redundant mortice on the E face and a carpenter's mark on the underside 'IIIII'. It is in a fair condition but has quite a lot of rot.	The redundant mortice and carpenter's mark indicate that this timber has been reused from an earlier roof.	Pre 1590's reused in 1590's.
East Bedchamber.007	Rafter	S rafter immediately to the E of 006. Oak timber, hand worked and split, circa 120mm thick by 150mm wide. It rests on diagonal ridge piece 003 and E-W ridge piece 001. It has a sawn carpenter's mark on its E face (see representation below) and a redundant mortice on its underside. It is in fairly good condition with little rot. 	The redundant mortice and carpenter's mark indicate that this timber has been reused from an earlier roof.	Pre 1590's reused in 1590's.
East Bedchamber.008	Rafter	S rafter immediately to the E of 007. Modern machine sawn pine rafter, stained dark. It rests on diagonal ridge piece 003 and on the E-W ridge piece extension 041.	Modern rafter to strengthen the roof. Similar to 009.	20th Century
East Bedchamber.009	Rafter	E most S rafter. Modern machine sawn pine rafter, stained dark. It sits on diagonal ridge piece 003 and on the E-W ridge piece extension 041.	Modern rafter to strengthen the roof. Similar to 009.	20th Century
East Bedchamber.010	Rafter	N most W rafter. Oak timber, hand cut and split, circa 2.00m long by 150mm by 150mm. It sits on diagonal ridge piece 003 and N-S ridge piece 002. It has a redundant mortice on its underside. It has no visible carpenter's marks. It is in good condition but has some rot on the underside.	The redundant mortice suggests that this is a reused timber from an earlier roof reused in the 1590's.	Pre 1590's reused in the 1590's.
East Bedchamber.011	Rafter	W rafter to the S of 010. Oak timber hand cut and split, circa 3.20m long by 150mm by 150mm. It sits on ridge piece 002 and on purlin/joist 054. There is a peg hole visible towards the bottom of the E face and an associated redundant mortice can be seen on the S face. It is in good condition but has some rot at the edges.	The redundant mortice and peg hole suggest that this is a reused timber from an earlier roof reused in the 1590's	Pre 1590's reused in the 1590's.
East Bedchamber.012	Rafter	W rafter to the S of 011. Modern pine timber, machine cut, circa 2.9m long by 120mm by 120mm, stained dark. It sits on ridge piece 002 and purlin/joist 054.	Modern replacement rafter.	20th Century

East Bedchamber.013	Rafter	S most W rafter. Partially visible behind the modern brick wall which forms the upper part of the S elevation of the E bedchamber. Inaccessible.	Technically a rafter in the inaccessible N attic of the E range.	Unknown
East Bedchamber.014	Rafter	N most E rafter. This is the top of a rafter in two parts, it is joined to the lower section of the rafter (015). Oak timber, hand worked circa 130mm by 150mm wide. It has 2 redundant mortises on the underside. It has no visible carpenter's marks. The join with lower section 015 is strengthened with timbers 050 and 051. 014 sits on ridge piece 002 and lower rafter 015 and is supported by purlin 029. Good condition but has some rot at the edges.	Redundant mortises indicate this is a reused timber. Reused in the 1590's. The fact that this rafter is in two parts suggests that it has been altered/repaired possibly as late as the 20th century with a reused timber at the base. However this is not certain. The rafter may always have been in two parts with both the upper and lower timbers reused from elsewhere. Although this014 and 015 were interpreted as the N most E rafter 040 is probably the N most rafter rather than just the sarking support it was first interpreted as.	Unknown
East Bedchamber.015	Rafter	N most E rafter. This is the bottom of a rafter in two parts, it is joined to the upper section of the rafter (014). Oak timber, circa 150mm thick by 110mm wide probably hand worked but it is sandwiched between strengthening timbers 050 and 051 so much of it is obscured. It rests on the E wall head and is supported by ashlar post 021. Good condition with no visible rot.	As 015 is too short to be a full rafter it was probably reused from elsewhere and used to repair the base of rafter 014 which may have been rotten possibly as late as the 20th Century. The join was subsequently reinforced with 050 and 051. However this is not certain. The rafter may always have been in two parts with both the upper and lower timbers reused from elsewhere. Although this014 and 015 were interpreted as the N most E rafter 040 is probably the N most rafter rather than just the sarking support it was first interpreted as.	Unknown
East Bedchamber.016	Rafter	E rafter immediately to the S of 016. This is the central rafter in the E pitch of the roof over the E bedchamber. Hand worked and split, circa 120mm thick by 150mm wide. It sits against ridge piece 002 and is supported by purlin 029. It has no visible evidence of reuse or carpenter's marks but it does have possible scorching on its underside though this may just be rot.	Original 1590's roof timber.	1590's
East Bedchamber.017	Rafter	E rafter immediately to the S of 016. Similar to 014 and 015 this is a rafter in two parts. 017 is the upper part, hand worked and possibly sawn on the underside, circa 150mm thick by 160mm wide. It sits on ridge piece 002, lower rafter 018 and is supported by purlin 029. It also has a strengthening timber 049 on the N face over the join between 017 and 018. It has no visible evidence of reuse and no visible carpenter's marks. It is in fairly good condition.	The two part rafter suggests that the base of the rafter may have been repaired with 018. this is not certain. The rafter may always have been in two parts with both the upper and lower timbers reused from elsewhere.	Unknown
East Bedchamber.018	Rafter	E rafter immediately to the S of 016. Similar to 014 and 015 this is a rafter in two parts. 018 is the lower part, hand	The two part rafter suggests that the base of the rafter may have been repaired with 018. this is not certain. The	Unknown

		worked, circa 160mm thick by 130mm wide. It sits on ridge piece 002, ashlar post 022 and probably extends to the wall head. It also has a strengthening timber 049 on the N face over the join between 017 and 018. It has no visible evidence of reuse and no visible carpenter's marks. It is in fairly good condition.	rafter may always have been in two parts with both the upper and lower timbers reused from elsewhere.	
East Bedchamber.019	Rafter	S most E rafter. Oak timber, hand worked, mostly obscured by a 20th century brick wall.	Along with rafter 013 this forms the N most truss in the inaccessible N roof space of the E range.	Unknown.
East Bedchamber.020	Ashlar post	Ashlar post supporting rafter 004. Oak timber, hand worked, circa 850mm high, 130mm wide by 140mm thick. It sits on the S wallhead and it is joined to rafter 004 and sole piece 055 with mortice and tenon joints pinned with dowels. It has no visible evidence of reuse and no visible carpenter's marks. It is in good condition with little deterioration.	Original 1590's ashlar post supporting rafter 004.	1590's
East Bedchamber.021	Ashlar post	Ashlar post supporting rafter 014/015. Oak timber circa 380mm high by 30mm wide by 120mm thick. It sits on the wall head of the corner of the E window embrasure and the NE turret. It has no visible evidence of reuse and no visible carpenter's marks. It is in fairly good condition with some deterioration,	Possibly a 1590's ashlar post supporting rafter lower section 015, however the development of rafter 014/015 is uncertain and 021 may either be original or original and altered or totally replaced. It is certainly unusually short for an ashlar post (compared to the unaltered ashlar posts in the gallery).	Unknown
East Bedchamber.022	Ashlar post	Ashlar post supporting rafter 017/018. Oak timber, barely visible. Sits on the wall head to the E of the E window behind the E wall face.	Possibly a 1590's ashlar post supporting rafter lower section 018, however the development of rafter 017/018 is uncertain and 022 may either be original or original and altered or totally replaced.	Unknown
East Bedchamber.023	Joist	N-S joist, W most of 2 at the E end of the E bedchamber roof. Oak timber, hand worked and split, circa 2.20m long by 120mm by 120mm. The joist sits in a shallow socket/pocket in the N wall and on a timber support 024 to the S. It has a redundant peg hole on the underside and also a redundant mortice on the underside. It has no obvious carpenter's marks. It is in fair condition with some rot and deterioration. The timber is loose and poorly supported by the pocket in the N wall to the extent that it is dangerous.	This timber serves no structural purpose in the roof and must be a joist for an attic floor level over the E bedchamber. Though it could be later than the roof, since it is not tied into any roof elements, the presence of an apparently original gun loop in the N wall at attic level indicates that there was always an attic level above the E bedchamber in the N range. The timber itself is probably reused from an earlier roof as indicated by the redundant mortice.	Pre 1590's reused in 1590's
East Bedchamber.024	Bracket	E-W timber supporting the S end of joist 023. A plank of wood, possibly oak, 750mm long by 150mm wide by 20mm thick. Nailed to rafters 004 and 005 with large hand made nails. Good condition.	Possibly reused as it is an irregular shape. Probably original 1590's roof element (see also 023)	Pre 1590's reused in 1590's
East Bedchamber.025	Joist	N-S joist, E most of 2 at the E end of the E bedchamber roof. Oak timber, hand worked and split, circa 2.20m long by 120mm by 120mm. The joist sits in a shallow socket/pocket in the N wall and on a timber support 026 to the S. It has a redundant peg hole on the underside. It has no obvious carpenter's marks. It is in fair condition with some rot and	This timber serves no structural purpose in the roof and must be a joist for an attic floor level over the E bedchamber. Though it could be later than the roof, since it is not tied into any roof elements, the presence of an apparently original gun loop in the N wall at attic level indicates that there was always an attic level above the E	1590's

		deterioration. The timber is loose and poorly supported by the pocket in the N wall to the extent that it is dangerous.	bedchamber in the N range. The redundant peg hole on the underside may have held a fixture in the 1590's or later roof which is now missing so this is not sufficient evidence to indicate reuse.	
East Bedchamber.026	Bracket	E-W timber supporting the S end of joist 025. A plank of wood, possibly oak, 1.00m long by 150mm wide by 70mm thick. Nailed to rafters 005 and 006 with large hand made nails. Good condition, no rot.	Possibly reused as it is an irregular shape. Probably original 1590's roof element (see also 025)	Pre 1590's reused in 1590's
East Bedchamber.027	Brace	N support timber of purlin 029. A modern pine support. It sits in a socket/pocket in the N wall and diagonally braces the N end of 029.	Modern support timber. May replace and earlier version.	20th Century
East Bedchamber.028	Brace	S support timber of purlin 029. A reused timber that sits on the reduced and probably rebuilt wall head of the S elevation. Oak timber, hand cut and possibly sawn, circa 100mm wide by 100mm thick by approximately 1.5m long. It has a redundant mortice in its underside. It is in good condition with little rot.	It is possible that this is a 1590's support timber reused from an earlier roof, however due to the fact that it rest on a modern reduced and possibly rebuilt wall head, it was probably placed in its current position some time in the 20th Century.	Unknown
East Bedchamber.029	Purlin	E purlin. Oak timber, hand worked and split supporting the E pitch rafters. It sockets into the N wall of the bedchamber and into the modern brick wall to the S. It is supported by braces 027 and 028 which are nailed to 029. It is in good condition with little rot. It has no visible carpenter's marks. Its underside is covered with sarking peg holes.	The sarking peg holes indicate that this is a reused timber that was a rafter in an earlier roof reused as a purlin in the 1590's roof.	Pre 1590's reused in 1590's
East Bedchamber.030	Dormer Ridge Piece	Ridge piece above the E dormer window. Pine plank, stained dark brown. It looks contemporary with the dormer window sarking timbers which are probably 20th Century, possibly Ministry of Works The E end rest on the apex of the dormer masonry and W end is supported by a slot cut through the E pitch sarking.	Modern replacement dormer ridge piece.	20th Century
East Bedchamber.031	Dormer Rafter	NW dormer frame timber. W most of the N pitch rafters of the dormer window roof. Presumably a pine plank that has been stained dark brown. It is nailed to brace 049 at its base and the top is nailed to ridge piece 030. It supports the sarking of the dormer window roof. It looks fresh and is in very good condition.	Modern replacement dormer rafter. Appears to be contemporary with the dormer window sarking.	20th Century
East Bedchamber.032	Dormer Rafter	SW dormer frame timber. W most of the S pitch rafters of the dormer window roof. Presumably a pine plank that has been stained dark brown. It is nailed to brace 049 at its base and the top is nailed to ridge piece 030. It supports the sarking of the dormer window roof. It looks fresh and is in very good condition.	Modern replacement dormer rafter. Appears to be contemporary with the dormer window sarking.	20th Century
East Bedchamber.033	Dormer Rafter	N dormer frame timber. Central of the N pitch rafters of the dormer window roof. Presumably a pine plank that has been	Modern replacement dormer rafter. Appears to be contemporary with the dormer window sarking.	20th Century

		stained dark brown. It is nailed to brace 050 at its base and the top is nailed to ridge piece 030. It supports the sarking of the dormer window roof. It looks fresh and is in very good condition.		
East Bedchamber.034	Dormer Rafter	S dormer frame timber. Central of the S pitch rafters of the dormer window roof. Presumably a pine plank that has been stained dark brown. It is nailed to brace 049 at its base and the top is nailed to ridge piece 030. It supports the sarking of the dormer window roof. It looks fresh and is in very good condition.	Modern replacement dormer rafter. Appears to be contemporary with the dormer window sarking.	20th Century
East Bedchamber.035	Dormer Rafter	NE dormer frame timber. E most of the N pitch rafters of the dormer window roof. Presumably a pine plank that has been stained dark brown. It probably rests on the stone lintel of the window and the top is nailed to ridge piece 030. It supports the sarking of the dormer window roof. It looks fresh and is in very good condition.	Modern replacement dormer rafter. Appears to be contemporary with the dormer window sarking.	20th Century
East Bedchamber.036	Dormer Rafter	SE dormer frame timber. E most of the S pitch rafters of the dormer window roof. Presumably a pine plank that has been stained dark brown. It probably rests on the stone lintel of the window and the top is nailed to ridge piece 030. It supports the sarking of the dormer window roof. It looks fresh and is in very good condition.	Modern replacement dormer rafter. Appears to be contemporary with the dormer window sarking.	20th Century
East Bedchamber.037	Ashlar post	Upright post under sarking support 040, possibly an ashlar post. Oak timber, hand cut circa 1.00m high by 100mm by 100mm. It sits on the wall head above and to the E of the lintel of the door to the E turret. It supports rafter 040.	While this could be a feature of the 1590's roof it sits on masonry that looks like rebuild. The timber may have been reused following repairs to the masonry.	Unknown
East Bedchamber.038	Brace	One of two diagonal timbers visible from the E bedchamber that form part of the dormer roof above the E turret.	Modern roof timber in rebuilt turret roof.	20th Century
East Bedchamber.039	Brace	One of two diagonal timbers visible from the E bedchamber that form part of the dormer roof above the E turret.	Modern roof timber in rebuilt turret roof.	20th Century
East Bedchamber.040	Rafter	Southernmost rafter of the E pitch of the E bedchamber roof (originally interpreted as a sarking support only because it is in two parts and is narrower than a standard rafter). Oak timber, hand worked, that appears to be around half the width of a standard rafter. It sits on top of post 037. The upper part of the rafter has been replaced/strengthened with 056.	Probably and original part of the 1590's roof that has been reused from elsewhere to replace/simulate a rafter. The upper part 056 is probably 20th Century.	Unknown
East Bedchamber.041	Ridge Piece	A modern sawn pine, stained dark brown, it is supported by posts 042 and 047. In turn it supports the E end of 001, rafters 008 and 009 and reinforcement 056. It also supports the N end of ridge piece 002. It runs E-W along the N wall to the E of ridge piece 001.	In the W bedchamber the equivalent of ridge piece 001 extends the full length of the bedchamber, so 041 may be an extension or replacement of the E end of 001 in the E bed chamber roof. This is a modern timber and may be Ministry of Work strengthening or part of more recent work.	20th Century

East Bedchamber.042	Post	One of 2 modern, machine sawn, stained pine posts. It sits on modern beam 045 and supports ridge piece extension 041	Modern 20th Century strengthening of the roof.	20th Century
East Bedchamber.043	Post	One of 2 modern, machine sawn, stained pine posts. It sits on modern beam 045 and supports ridge piece extension 002	Modern 20th Century strengthening of the roof.	20th Century
East Bedchamber.044	Post	Modern machine cut pine, upright post. It sits on the modern rebuilt S wall head and it supports ridge piece 002. It also has an L-shaped iron bracket on its N face to hold beam 045.	Modern 20th Century strengthening of the roof.	20th Century
East Bedchamber.045	Beam	Modern beam, possibly pine, machine cut, sits on the sill of a gun loop in the N wall and on an L-shaped iron bracket attached to 044. It supports upright posts 042 and 043.	Modern 20th Century strengthening of the roof.	20th Century
East Bedchamber.046	Beam	RSJ, painted green, that runs N-S under 054. It sits in a socket in the N wall and sits on the rebuilt wall head of the S wall. It supports purlin/joist 054 which in turn has to carry the extra load of upright post 047.	Modern 20th Century strengthening of purlin/joist 054 so that it can hold modern upright post 047.	20th Century
East Bedchamber.047	Post	Modern machine sawn, stained pine, upright post. It is supported by the N end of purlin/joist 054 (in turn supported by RSJ 046) and it supports N-S ridge piece extension 041.	Modern 20th Century strengthening of the roof.	20th Century
East Bedchamber.048	Brace	An old oak timber that sits in the modern rebuild of the S wall. 140mm wide by 150mm thick by circa 2.00m long. Nailed to purlin 054. It braces the NE-SW diagonal ridge piece 003 and purlin/joist 054. It is in fair condition with some warping and deterioration.	Possibly an original 1590's roof element but it could have been moved to its current position quite recently since the S wall head has probably been rebuilt.	Unknown
East Bedchamber.049	Support	Modern sawn timber repair/strengthening timber, possibly pine, on the N face of rafter 017/018.	Modern strengthening of the roof, possibly directly related to the join between 017 and 018. Contemporary with replaced dormer window roof.	20th Century
East Bedchamber.050	Support	Modern sawn timber repair/strengthening timber, possibly pine, on the S face of rafter 014/015.	Modern strengthening of the roof, possibly directly related to the join between 014 and 015. Contemporary with replaced dormer window roof.	20th Century
East Bedchamber.051	Support	Modern sawn timber repair/strengthening timber, possibly pine, on the N face of rafter 014/015.	Modern strengthening of the roof, possibly directly related to the join between 014 and 015. Contemporary with replaced dormer window roof.	20th Century
East Bedchamber.052	Sarking support	Modern machine sawn, stained pine timber that forms an auxiliary rafter just to the S of rafter 016. It sits on purlin 029 and ridge piece 002.	Modern reinforcement of E roof pitch.	20th Century
East Bedchamber.053	Sarking	General number for the sarking over the E bedchamber roof. No original boards were identified, all the boards appear to be modern replacements.	Modern replacement sarking, probably 20th Century.	20th Century
East Bedchamber.054	Purlin/joist	Oak timber, running N-S at the corner of the W and S roof pitches. Hand worked and split. No visible carpenter's marks. It has two redundant mortises on its upper face. It is supported by modern RSJ 046 which in turn allows it to support modern upright post 047. It is in fairly good	The redundant mortises suggest that this is a reused timber from an earlier roof reused in the 1590's roof.	Pre 1590's reuse in 1590's

		condition but has some rotting and warping. It acts as both a purlin at the change in pitch between the W and S roof pitches but is also an attic floor joist along with 023 and 025.		
East Bedchamber.055	Sole piece	Sole piece joined to rafter 004 and ashlar post 020 with mortice and tenon joints pinned with dowels. Oak timber, hand worked, 160mm wide by 150mm high by 500mm long. No visible carpenter's marks and no visible evidence of reuse. Good condition with little rot.	1590's roof timber.	1590's.
East Bedchamber.056	Rafter	Pine plank that replaces the upper half of rafter 040, the N most rafter of the E pitch of the E bedchamber roof. Modern machine cut pine, stained dark, joined to lower section 040 with a notch and nails. Very good condition.	Modern repair/replacement rafter at the top of rafter 040.	20th Century.
East Bedchamber.057	Brace	Modern machine cut pine timber that braces diagonal ridge piece 003 against the N wall using the gun loop as a socket. It is attached to ridge piece 003 with nails.	Modern 20th Century strengthening of the roof.	20th Century
East Bedchamber.058	Edging	E-W horizontal timber forming the S edge of the attic floor level. Supported by floor joists 023 and 025. handcut, roughly square in section, 150mm wide by 140mm deep. The W edge also rests on the collar of gallery truss 18 and the E edge rest on purlin/joist 054. Sawn carpenter's mark on N face towards E end, at least seven lines 'IIIIIII'. Sawn through redundant mortice at it's E end, 60mm wide by 90mm deep surviving to a length of 130mm where the end is cut off. Old newspaper fragments found between 058 and 003 – possibly indicate a 20th Century date.	The redundant mortice suggests that this is a reused timber from an earlier roof reused in the 1590's roof. The newspaper may be from repairs to the roof in the 20th Century. The timber serves no structural function in the roof and appears to be the edging/skirting of the attic floor level. There is an equivalent timber in the W bedchamber roof.	Pre 1590's reused in 1590's
East Bedchamber.059	Support	Modern sawn timber repair/strengthening timber, possibly pine, on the N face of rafter 014/015.	Modern strengthening of the roof.	20th Century

WEST BEDCHAMBER				
Feature Number.	**Type**	**Description**	**Interpretation**	**Suggested Date**
West Bedchamber.001	Ridge piece	E-W ridge piece sitting against the N wall of the W bedchamber, supporting the top of the S rafters 004-009. hand cut, circa 140mm square. Supported at the E end by the upper collar of gallery truss 1, and slotted around the S rafter of gallery truss 1. Supported at the W end by ridge piece 002. The timber has a redundant angled mortice in its lower face, circa 60mm wide by 160mm long. It also has a carpenter's mark on its S face '///////' partially obscured by rafter 005. Also a small slot near the W end in the lower face and a protruding dowel near the E end in the S face. Traces of	Reused timber. Angled mortice suggests that this may have been a rafter in a previous roof with a collar attached via a tenon in the mortice. Reused in 1590's roof.	Pre 1590's reuse in 1590's

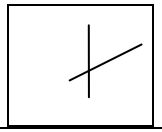
		white finish may be a preservative or mortar. Fair condition.		
West Bedchamber.002	Ridge piece	N-S ridge piece supporting the top of the E and W rafters of the W bedchamber roof. To the N it is supported by a pocket in the N wall masonry (from ground level pocket appears built in but close inspection was not possible). To the S it sits on top of what appears to be a modern block of wood 052 on the S gable wall head. Hand cut, circa 140mm wide by 110mm deep. Timber has one redundant angled mortice slot in its underside with associated dowel hole visible in the slot. It has no visible carpenter's marks. Traces of white finish may be a preservative or mortar. Fair condition.	Reused timber. Angled mortice suggests that this may have been a rafter in a previous roof with a collar attached via a tenon in the mortice. Reused in 1590's roof. Timber might have been moved during 20th Century repair work but was probably replaced in its original position in the N wall pocket with additional support from block of wood 052.	Pre 1590's reuse in 1590's
West Bedchamber.003	Ridge piece	Diagonal NW-SE ridge piece supporting the base of the E rafters where the W bedchamber roof changes pitch. Machine sawn timber, well finished with beveled edges, circa 180mm square. The base is slotted around E rafter 014 but continues SE to partially rest on the wall head. The top is supported on top of the join between ridge pieces 001 and 002. Excellent condition.	Probably a 20th Century repair to this area of the roof. This indicates that all the S rafters and E rafters have been altered at the base to join the new ridge piece 003 tightly.	20th Century
West Bedchamber.004	Rafter	E most S rafter, hand cut, circa 120mm square. Appears to have some round wood and may be a squared off whole trunk. It tapers towards the top. At the base it continues towards the wall head (the base probably sits on a sole piece concealed within the wall if it has not rotted away). It is supported by ashlar post 021 at the base, joined with a mortice and tenon joint pinned with a dowel. At the top it is supported by ridge piece 001. It has some woodworm damage and a woodworm test sheet attached. It is joined to N-S attic floor joist 023 with a mortice and tenon joint pinned with a dowel. It has no visible evidence of reuse and it has no visible carpenter's marks. No nails, dowels or mortice and tenon are visible at the joins with 001 and 003. Fair condition.	Probably original 1590's rafter, no visible evidence of reuse.	1590's
West Bedchamber.005	Rafter	S rafter. Machine cut, circa 120mm square. At the base it is cut to fit around E rafter 014 and it is also partially supported on top of the panel of masonry above the wall head (masonry panel is probably 20th Century). At the top the rafter is supported by ridge piece 001 – it is slotted to rest on top of the ridge piece. No nails, dowels or mortice and tenon are visible at the joins with 001 and 014. Excellent condition.	Probably a 20th Century repair, most likely inserted at the same time as 003 and 014, 007-009 and 011 which represent localized repair to this corner of the roof while retaining some original features.	20th Century
West Bedchamber.006	Rafter	S rafter. Hand cut, circa 140mm square. At the base it is joined to ridge piece 003, it appears to be cut to sit on the corner of 003, no nails are visible. At the top of is supported by ridge piece 001. The timber has two redundant angled mortice holes in its W face with corresponding dowel holes in	Reused timber. Angled mortises suggest that this may have been a rafter in a previous roof with a lower collar and upper collar attached via a tenon in the mortises and peg sarking attached to the top. Reused in 1590's roof. It is likely that 20th Century repair work in this area of the	Pre 1590's reused in 1590's altered in 20th C

		its underside. The lower on is circa 140mm long by 60mm wide, the upper one is circa 120mm long by 60mm wide. The E face of the timber is covered with sarking peg holes. It has no visible carpenter's marks. No nails dowels or mortice and tenon are visible at the joins with 001 and 003. Fair condition.	roof has led to alteration of the base of this rafter to make is fit securely on to replacement ridge piece 003.	
West Bedchamber.007	Rafter	S rafter. Machine cut, circa 120mm square. Supported at the base by ridge piece 003. At the top it has a slot cut into it so that it fits over ridge piece 001. No nails dowels or mortice and tenon are visible at the joins with 001 and 003. Excellent condition.	Probably a 20th Century replacement, related to repair work in this area of the roof incorporating replacement timbers 003, 005, 007, 008, 009, 011 and 014.	20th Century
West Bedchamber.008	Rafter	S rafter. Machine cut, circa 120mm square. Supported at the base by ridge piece 003. At the top it has a slot cut into it so that it fits over ridge piece 001. No nails dowels or mortice and tenon are visible at the joins with 001 and 003. Excellent condition.	Probably a 20th Century replacement, related to repair work in this area of the roof incorporating replacement timbers 003, 005, 007, 008, 009, 011 and 014.	20th Century
West Bedchamber.009	Rafter	W most S rafter. Very short, little more than a stub. Machine cut, circa 120mm square. Supported at the base by ridge piece 003. At the top it has a slot cut into it so that it fits over ridge piece 001. No nails dowels or mortice and tenon are visible at the joins with 001 and 003. Excellent condition.	Probably a 20th Century replacement, related to repair work in this area of the roof incorporating replacement timbers 003, 005, 007, 008, 009, 011 and 014.	20th Century
West Bedchamber.010	Rafter	N most E rafter (equivalent to 009). Very short, little more than a stub. Hand cut, circa 120mm square. At the base it is supported by 003. At the top it has a slot cut into it so that it fits over ridge piece 002. The timber has no visible evidence of reuse and no visible carpenter's marks. No nails dowels or mortice and tenon are visible at the joins with 002 and 003. Fair condition but the timber has some cracks in it.	No visible evidence of reuse. Possibly original 1590's roof timber. The base of this timber has possibly been altered to fit tightly with replacement ridge piece 003, which is probably a 20th Century replacement.	1590's
West Bedchamber.011	Rafter	E rafter. Machine cut, circa 120mm square. Supported at the base by ridge piece 003. At the top it has a slot cut into it so that it fits over ridge piece 002. No nails dowels or mortice and tenon are visible at the joins with 002 and 003. Excellent condition.	Probably a 20th Century replacement, related to repair work in this area of the roof incorporating replacement timbers 003, 005, 007, 008, 009, 011 and 014.	20th Century
West Bedchamber.012	Rafter	E rafter. Hand cut, circa 140mm wide by 120mm deep. At the base it sits on ridge piece 003, and at the top it has a slot cut into it so that it fits around ridge piece 002. It has one redundant angled mortice, in the underside, near the top, with associated dowel hole through it. The mortice is circa 60mm wide by 130mm long. It has no visible carpenter's marks. No nails dowels or mortice and tenon are visible at the joins with 002 and 003. Fair condition but it has some large cracks at the top.	Reused timber from an earlier roof arrangement. Reused in 1590's roof. This timber was probably a rafter with a collar in a previous roof. The base of the rafter was probably altered in the 20th Century to fit tightly with machine cut replacement ridge piece 003.	Pre 1590's reused in 1590's altered in 20th C
West Bedchamber.013	Rafter	E rafter. Hand cut, circa 140mm wide by 120mm deep. At the base it is joined to ridge piece 003. At the top it has a slot cut	Reused timber from an earlier roof arrangement. Reused in 1590's roof. This timber was probably a rafter with an	Pre 1590's reused in 1590's

		into it so that it rests on 002. The timber has two redundant angled mortises with associated dowel holes in the underside, one is near the base and one is near the top. Both are circa 60mm wide by 140mm long. The timber also has a flattened iron nail in its W face near the base and a bored hole approximately 25mm diameter near the top. It has no visible carpenter's marks. No nails dowels or mortice and tenon are visible at the joins with 002 and 003. The timber is in quite poor condition with some large cracks in it, especially near the top.	upper and lower collar in a previous roof. The base of the rafter was probably altered in the 20th Century to fit tightly with machine cut replacement ridge piece 003.	altered in 20th C
West Bedchamber.014	Rafter	S most E rafter. Machine cut, circa 120mm deep but width unknown. Built over the E edge of the gable. At the base it is built into a masonry panel which is probably 20th Century. The underside of the timber appears to have some white staining, possibly preservative or mortar. No nails dowels or mortice and tenon are visible at the joins with 002 and 003. Excellent condition.	Probably a 20th Century replacement, related to repair work in this area of the roof incorporating replacement timbers 003, 005, 007, 008, 009, 011 and 014.	20th Century
West Bedchamber.015	Rafter	N most W rafter. Machine cut down one side with roundwood on the remaining faces, circa 100mm wide by up to 180mm deep. Stained dark brown. The base of the timber is supported by upright post 042. The timber has two notches cut into it so that it fits over purlins 028 and 029 and at the top the timber has a slot cut into it so that it fits over ridge piece 002. Very good condition.	Replacement rafter, possibly related to the replacement of the W turret roof. Probably 20th Century but may be a different programme of work from the high quality square rafter and ridge piece replacements in the SE corner of the W bedchamber roof.	20th Century
West Bedchamber.016	Rafter	W rafter. Machine cut down one side with round wood on the remaining faces, circa 100mm wide by 180mm deep. Stained dark brown. The base of the timber is supported by upright post 041. The timber has two notches cut into it so that it fits over purlins 028 and 029 and at the top the timber has a slot cut into it so that it fits over ridge piece 002. The base of 016 continues down to meet the W turret wall head (but the base might actually be a separate piece of machine cut timber with no roundwood extending the rafter to the wall head). Very good condition.	Replacement rafter, possibly related to the replacement of the W turret roof. Probably 20th Century but may be a different programme of work from the high quality square rafter and ridge piece replacements in the SE corner of the W bedchamber roof.	20th century.
West Bedchamber.017	Rafter	W rafter. Hand cut, circa 140mm wide by 110mm deep. The rafter is supported by purlins 028 and 029 and at the top it rests on ridge piece 002. The rafter ends just above the rebuilt dormer window roof so appears unsupported. There is no evidence to suggest a missing trimmer for rafters 017 and 018 other than the common use of trimmers for dormer rafters in the main gallery. The timber has two redundant angled mortises and associated dowel holes in its underside. One is near the top and one is near the base. Both are circa 60mm	Reused timber from earlier roof arrangement. Reused in the 1590's. Probably a rafter with an upper and lower collar in a previous roof. Timber may have been altered at the base to fit in with the rebuilt dormer window roof.	Pre 1590's reused in 1590's

		wide by 140mm long. It has no visible carpenter's marks. Fair condition but has some cracks.		
West Bedchamber.018	Rafter	W rafter. Hand cut, circa 140mm wide by 120mm deep. The rafter is supported by purlins 028 and 029 and at the top it rests on ridge piece 002. The rafter ends just above the rebuilt dormer window roof so appears unsupported. There is no evidence to suggest a missing trimmer for rafters 017 and 018 other than the common use of trimmers for dormer rafters in the main gallery. The timber has two redundant angled mortises and associated dowel holes in its underside. One is near the top and one is near the base. Both are circa 60mm wide by 140mm long. It has no visible carpenter's marks. Fair condition. The timber narrows on its S side between trimmers 028 and 029, this may be due to woodworm damage or may be the natural shape of the timber.	Reused timber from earlier roof arrangement. Reused in the 1590's. Probably a rafter with an upper and lower collar in a previous roof. Timber may have been altered at the base to fit in with the rebuilt dormer window roof.	Pre 1590's reused in 1590's
West Bedchamber.019	Rafter	W rafter. Hand cut, circa 160mm wide by 130mm deep. Supported at the base by ashlar post 022 and the rafter probably continues to the wall head where is may join with a sole piece concealed within the wall. Also supported by purlins 028 and 029. At the top the timber sits on ridge piece 002. The timber has one redundant angled mortice in its underside. The mortice is circa 60mm wide by 160mm long. The rafter has some iron nails, possibly hand made, circa 3mm diameter in its underside near the base, the purpose of which is unknown. The timber is in poor condition with some large cracks near the base and some woodworm damage or rot near the top.	Reused timber from an earlier roof arrangement. Reused in 1590's roof. The timber was probably a rafter with a collar in a previous roof.	Pre 1590's reused in 1590's
West Bedchamber.020	Rafter	S most W rafter. Machine cut, stained dark brown, 70mm wide by 130mm deep. (This rafter appears to obscure a rafter to the S, possibly original). It is built over the W edge of the S gable. At the base 020 rests on the W wall head. At the top the timber stops circa 250mm short of the ridge piece.	Probably a 20th Century replacement.	20th century.
West Bedchamber.021	Ashlar post	Ashlar post supporting S rafter 004. Hand cut, circa 900mm long, by 130mm wide by 110mm deep. The base sits on the S wall head and may be attached to a sole piece concealed behind it. The ashlar post is surrounded by a panel of masonry which is probably 20th Century rebuild. At the top the ashlar post is joined to rafter 004 with a mortice and tenon joint pinned with a dowel. The timber has a large crack down the N face possibly masking a series of nail holes. No visible evidence of reuse and no visible carpenter's marks. Fair condition.	Original 1590's ashlar post.	1590's
West	Ashlar post	Ashlar post supporting W rafter 019. hand cut circa 650mm	Original 1590's ashlar post.	1590's

Bedchamber.022		long by 130mm wide by unknown depth. Base sits on the W wall head and may be attached to a sole piece concealed behind. The ashlar post is surrounded by a masonry panel which may be 20th Century. The join with rafter 019 is not visible. No visible evidence of reuse and no visible carpenter's marks. Fair condition.		
West Bedchamber.023	Joist/collar	N-S horizontal timber which may act as both a joist and a collar. Hand cut, circa 160mm wide by 150mm deep. Socketed into the N wall (socket could be built or cut into the masonry – modern pointing obscures the detail). Joined to rafter 004 with a mortice and tenon joint pinned with a dowel. The timber has a series of nails along the top face possibly for attic floor boards. The timber has one dowel hole in the W face near the S end and a possible dowel hole in the underside near the S end though the latter could be a knot. It has no visible carpenter's marks. Fair condition.	Possibly a dual function timber, half joist, half collar. Possibly reused but the now redundant dowel holes could have been for a feature in the 1590's roof/floor. Part of a 1590's roof arrangement and also a joist for the attic floor. A small window in the N wall of the W bedchamber serving attic level is evidence for a 1590's attic above the W bedchamber.	1590's
West Bedchamber.024	Joist	N-S joist for attic floor. Hand cut, circa 140mm wide by 110mm deep. Socketed into the N wall (socket could be built or cut into the masonry – modern pointing obscures the detail). S end rests in a slot of wall plate/collar 031 built into the S gable. The timber also supports the W end of edging 026. It has some nails and nail holes along its underside which possibly held a ceiling over the W bedchamber. The timber has a redundant angled mortice and associated dowel hole in its underside. It has no visible carpenter's marks. It has some white staining at its N end which may be preservative or mortar. The timber is in quite poor condition, the S end of the timber has bad wood worm damage.	Reused timber from an earlier roof arrangement. Reused in the 1590's roof. In the 1590's roof the timber was is a joist for an attic floor level above the W bed chamber and possible held a ceiling. A small original window in the N wall serving the attic level is evidence for a 1590's attic. Serves no structural function in the roof.	Pre 1590's reused in 1590's.
West Bedchamber.025	Joist	N-S joist for attic floor. Hand cut, circa 150mm wide by 130mm deep. Socketed into the N wall (socket could be built or cut into the masonry – modern pointing obscures the detail). S end rests on wall plate/collar 031 built into the S gable. The timber has some nails along its underside which may have held a ceiling above the W bedchamber. The timber has some staining at its N end which may be preservative or mortar. Fair condition.	No evidence of reuse. Possibly original 1590's floor joist for attic floor above the W bedchamber and may also have held a ceiling. A small original window in the N wall serving the attic level is evidence for a 1590's attic. Serves no structural function in the roof.	1590's
West Bedchamber.026	Edging.	Horizontal timber forming the S edge of the attic floor. Hand cut circa 140mm wide by 120mm deep. It rests on top of the lower collar of gallery truss 1, collar/joist 023 and joist 024. It has three pockets cut into its N face, each with a large hand made iron nail to attach it to 024, 023 and the lower collar of gallery truss 1. It has sarking peg holes in its underside and a redundant mortice and associated dowel hole in its upper	Reused timber from an earlier roof arrangement. Reused in 1590's. Timber was probably a rafter with a collar in a previous roof. Now the timber appears to form the edging or skirting for an attic floor. The E bedchamber has an equivalent edging timber in a similar position. Serves no structural function in the roof.	Pre 1590's reused in 1590's

		face (inaccessible). It has a carpenter's mark in the E end of the N face (see below for representation). Fair condition but with some large cracks in the underside. 		
West Bedchamber.027	Purlin	Upper E purlin. Hand cut, circa 150mm wide by 120mm deep. Socketed into the N wall (socket could be built or cut into the masonry – modern pointing obscures the detail). To the S the timber sits in a slot cut into upper wall plate/collar 030 built into the S gable. The timber has redundant sarking peg holes on the underside and a dowel hole visible in the W face which indicates the existence of a redundant mortice on the upper face. It has no visible carpenter's marks. At the N end the timber has traces of white staining which might be preservative or mortar. Fair condition.	Reused timber from earlier roof arrangement. Reused in 1590's. Timber was probably a rafter in a previous roof. Currently a purlin which helps to support the E rafters 010-014 and ridge piece 003. It does however create an access problem at attic floor level if access was continuous from the gallery to the W bedchamber as it bars the access point, possibly indicating the existence of stair or ladder access from the W bedchamber.	Pre 1590's reused in 1590's
West Bedchamber.028	Purlin	Upper W purlin. Hand cut, circa 140mm wide by 100mm deep. Socketed into the N wall (socket could be built or cut into the masonry – modern pointing obscures the detail). To the S the timber sits in a slot cut into upper wall plate/collar 030 built into the S gable. It has sarking peg holes on its underside and 2 large bored holes circa 25mm diameter. A dowel hole visible in the E face indicates the presence of a redundant mortice on the upper face. It has one degraded wooden fixture nailed to the centre of the E face for unknown purpose. It has no visible carpenter's marks. White staining at the N end may be preservative or mortar. Fair condition but has some large cracks along the underside.	Reused timber from earlier roof arrangement. Reused in 1590's. Probably a rafter in a previous roof. Currently a purlin supporting the W rafters 015-020. 2 bored holes might have been for a fixture related to the 1590's attic space – possible ladder attachment?	Pre 1590's reused in 1590's
West Bedchamber.029	Purlin	Lower W purlin. Hand cut, circa 140mm wide by 110mm deep. Has round wood at the S end. Socketed into the N wall, socket appears to be built into the masonry. To the S it sits in a slot cut into the lower wall plate/collar 031 built into the S gable. It has a redundant angled mortice in its lower face with associated dowel hole in its E face. The mortice is circa 60mm wide by 140mm long. It has no visible carpenter's marks. White staining at the N end may be preservative or mortar. Fair condition.	Reused timber from earlier roof arrangement. Reused in 1590's. Currently a purlin supporting the W rafters 015-020. Probably a rafter with a collar in a previous roof. This section of the timber (it was probably longer pre 1590's) is probably from near the top of the previous roof since the roundwood suggests that the timber is narrowing.	Pre 1590's reused in 1590's
West Bedchamber.030	Wall plate/collar	Upper wall plate built into the S gable, could also be considered the upper collar or a truss with rafters 014 and 020. Hand cut, circa 120mm high. It supports the upper E and W purlins 027 and 028 which sit in rough slots cut into 030. It	No visible evidence of reuse. Probably original 1590's timber. May have been altered at E end during replacement of E rafter 014.	1590's

		is possible that the W end of 030 is still joined to and original rafter obscured behind replacement rafter 020. It is likely that the E end of 030 has been altered to fit with replacement rafter 014. Some white staining on the underside of the timber may be preservative of mortar. No visible evidence of reuse and no visible carpenter's marks. Good condition.		
West Bedchamber.031	Wall plate/collar	Lower wall plate built into the S gable, could also be considered the lower collar or a truss with rafters 014 and 020. Hand cut, circa 120mm high. It supports the W purlin 029 and joist 025 and E purlin/joist 024. 024 and 029 sit in rough slots cut into 031. It is possible that the W end of 031 is still joined to and original rafter obscured behind replacement rafter 020. It is likely that the E end of 031 has been altered to fit with replacement rafter 014. Some white staining on the underside of the timber may be preservative of mortar. No visible evidence of reuse and no visible carpenter's marks. Good condition.	No visible evidence of reuse. Probably original 1590's timber. May have been altered at E end during replacement of E rafter 014.	1590's
West Bedchamber.032	Dormer ridge piece	Ridge piece of the W dormer window roof. Machine cut, stained dark brown, circa 140mm deep by 40mmm wide. It has a slot cut in E end so that it sits over purlin 029. W end sits against the masonry panel above the window. Provides support for dormer rafters 035-038. Very good condition.	The whole dormer window roof was possibly rebuilt in the 20th Century.	20th Century
West Bedchamber.033	Dormer rafter	NE dormer rafter. Machine sawn but it also has some roundwood, circa 100mm by 100mm. The base is joined to rafter 016 and the top is joined to rafter 017. No nails are visible but it probably is nailed to 016 and 017. Very good condition.	The whole dormer window roof was possibly rebuilt in the 20th Century.	20th Century
West Bedchamber.034	Dormer rafter	SE dormer rafter. Machine sawn but it also has some roundwood, circa 80mm by 80mm. The base is joined to rafter 019 with two iron nails and the top is joined to rafter 018 - no nails are visible but it probably is nailed to 018. Very good condition.	The whole dormer window roof was possibly rebuilt in the 20th Century.	20th Century
West Bedchamber.035	Dormer rafter	N dormer rafter. Machine cut down two sides with tool marks and roundwood on the other visible faces, circa 120mm wide by 110mm deep. Sits on the N window reveal wall head and is joined to ridge piece 032 at the top. Very good condition.	The whole dormer window roof was possibly rebuilt in the 20th Century.	20th Century
West Bedchamber.036	Dormer rafter	S dormer rafter. Machine cut down two sides with tool marks and roundwood on the other visible faces, circa 110mm wide by 70mm deep. Sits on the S reveal wall head and is joined to ridge piece 032 at the top. Very good condition.	The whole dormer window roof was possibly rebuilt in the 20th Century.	20th Century
West Bedchamber.037	Dormer rafter	NW dormer rafter. Machine cut down two sides with roundwood on the remaining visible faces, circa 120mm deep by 110mm wide. It sits on secondary wooden lintel 039 and it	The whole dormer window roof was possibly rebuilt in the 20th Century.	20th Century

		is joined to ridge piece 032 at the top. Very good condition.		
West Bedchamber.038	Dormer rafter	SW dormer rafter. Machine cut down two sides with roundwood on the remaining visible faces, circa 110mm deep by 110mm wide. It sits on secondary wooden lintel 039 and it is joined to ridge piece 032 at the top. Very good condition.	The whole dormer window roof was possibly rebuilt in the 20th Century.	20th Century
West Bedchamber.039	Lintel	Secondary wooden lintel sitting directly on top of the original stone window lintel, Machine cut, circa 120mm deep by unknown width. Lintel forms the base of a triangle with dormer rafters 037 and 038. Very good condition.	Probably inserted at the same time as 037 and 038 in the 20th Century to provide support for the dormer window frame. Similar timbers are seen above the dormer windows in the gallery but none are so substantial that they look like a lintel.	20th Century
West Bedchamber.040	Lintel	Wooden lintel above the door to the W turret. Hand sawn timber, 80mm high by between 150mm and 300mm wide because it has a curving back edge to match the curve of the turret wall. The lintel supports posts 041 and 042. It has quite a lot of woodworm damage across the top. Fair condition.	This wooden lintel probably replaces a stone lintel since all the other turrets have surviving stone lintels. Also this turret is missing a panel of masonry above the door but there is no evidence that masonry was ever built on top of this wooden lintel. The lintel supports what is likely to be a 20th Century rebuilt turret roof but the lintel itself could be earlier	19th – 20th Century
West Bedchamber.041	Post	SW upright post supporting the dormer roof above the door aperture to the W turret. Machine cut, 110mm square. Slotted around the base of rafter 016. It acts as a similar but modern version of an ashlar post. Very good condition.	Modern timber, probably part of the 20th Century rebuilt of the W turret roof. Rafter 016 is also a replacement. It is likely that in the 1590's roof there would have been a rafter ashlar and sole piece in this position surrounded by a masonry panel.	20th Century
West Bedchamber.042	Post	NE upright post supporting the dormer roof above the door aperture to the W turret. Machine cut down two sides with roundwood on the other faces, 80mm by 100mm. The post is slotted around the base of rafter 015. The rafter stops short because otherwise it would continue into the interior of the turret, so the base is totally supported by 042. It sits directly on top of wooden lintel 040. It is in fairly good condition with a little woodworm damage at the bottom.	Probably part of the 20th Century rebuild of the turret roof. There may have been a similar arrangement, or perhaps a trimmer in the 1590's because no rafter in this position would meet the turret wall head at the base, it would enter the interior of the turret. This turret appears to be in a unique position as this is not an issue with any other turret.	20th Century
West Bedchamber.043	Dormer rafter	See W turret.014	See W turret.014	20th Century
West Bedchamber.044	Dormer rafter	See W turret.015	See W turret.015	20th Century
West Bedchamber.045	Blocking	Irregular block of timber between the sarking of the dormer roof in the W turret 047 and the sarking in the W bedchamber roof. The block is machine cut, stained dark, circa 300mm long by 80mm wide by 160mm deep.	Part of the scrappy work of the dormer roof in the W turret. Probably 20th Century. So scrappy that it was surely never meant to be seen. Its possible that lintel 040 was only meant to be temporary and a sandstone replacement with a masonry panel above to cover up the woodwork was intended but never completed.	20th Century
West Bedchamber.046	Sarking support	Sloping timber between rafters 015 and 016 supporting the edge of the sarking above the break in the sarking for the W turret dormer. Machine cut, circa 80mm wide by 40mm deep,	20th Century sarking support.	20th Century

		stained dark brown.		
West Bedchamber.047	Sarking	Edge of sarking protruding from the W turret dormer roof. See also W turret.016.	See W turret.016	1590's-20th Century
West Bedchamber.048	Sarking support	Sarking support attached to the base of rafter 004. Machine cut, circa 40mm wide by 120mm deep, stained dark brown. Timber sits upright on the wall head and is nailed to the E side of the base of 004.	20th Century support, probably added along with the most recent sarking. The timber would not normally be seen when the masonry panels between the ashlar posts on the S side of the gallery are in place. It may give additional support to the base of the rafter (many of the rafters along the S side of the gallery were badly rotten at the bottom and had similar timbers added to give additional support and –it is assumed- to attach the sarking to.	20th Century
West Bedchamber.049	Fixture	Horizontal plyboard resting loose on the S wall head between rafters 004 and 005.	Probably 21st century, possibly left by the MCU during scaffolding or during the removal of the masonry panels between the ashlar post s of the S wall in 2007.	21st Century
West Bedchamber.050	Fixture	Irregular rotten fragment of timber attached to the centre of purlin 028 with iron nails, possibly hand made (inaccessible). The timber looks hand cut but it is so damaged that its is difficult to tell. Circa 200mm long by 60mm wide by 60mm deep.	Possibly an early feature related to the attic space. Probably not part of a ceiling since there is no consistent pattern of nails on the rafters in the attic space above the W bedchamber. Nothing similar seen elsewhere in the other roofs. Purpose unknown,	Unknown
West Bedchamber.051	Sarking	General number for the sarking of the W bedchamber roof. No original sarking remains, all is machine cut with nails protruding. There could be two phases of sarking – 200mm wide boards, stained dark with a smooth finish, over most of the roof and the W dormer window, then 240mm wide boards lighter in colour with a rougher finish on the NW side of the roof.	Is probably all 20th Century. May be two phases of work. The 240mm boards might relate to the replacement of the turret roof.	20th Century
West Bedchamber.052	Support	Block of wood, resting on the S gable wall head under ridge piece 002. Inaccessible.	Probably a 20th Centruy block of wood used to support the ridge piece during alteration and rebuilt of the SE corner of the W Bedchamber roof.	20th Century
West Bedchamber.053	Rafter.	Short rafter at the extreme E end of the W bedchamber roof on top of protruding N wall masonry above ridge piece **West Bedchamber.001**.	Not closely examined due to access at the time of recording the W Bed chamber roof Timber provides additional support at the transition between the W bedchamber roof and the central gallery roof.	Unknown

WEST TURRET				
Feature Number.	**Type**	**Description**	**Interpretation**	**Suggested Date**
West Turret.001	Central post	Central upright post of the turret frame. Machine sawn and had cut down one side, post, unsure whether the timber is	Modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the	20th Century

		pine or oak. 100mm by 100mm thick, stained dark brown. Post is slotted and nailed to diameter cross piece 002, also nailed to radial cross piece 003 and slotted and nailed to ridge piece 011. At the top the post is attached to all 8 turret frame pieces 004-010 and 020, the join is not visible. No visible evidence of reuse and no visible carpenters marks. Very good condition.	early 20th Century. It is not clear why one side of the post is hand cut, it definitely looks modern. All the turrets, except the central turret, have a similar central upright post, hand cut and machine sawn. Maybe they were machine sawn then split on site.	
West Turret.002	Diameter cross piece	Turret diameter cross piece, resting on the turret wall head, aligned NE-SW and joined in the centre with a slot and nails to central upright post 001. To the NE is is joined to turret rafter 005 and to the SW it is joined to turret rafter 009 (join is not visible, the rafters are probably nailed to 002). It is machine cut pine, stained dark, 70mm wide by 120mm deep.	Modern timber. The purpose of the timber is to make the turret cone rigid by preventing lateral movement. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
West Turret.003	Radial cross piece	Turret radial cross piece, aligned NW-SE resting on diameter cross piece 002 and nailed to the side of central upright post 001 and turret rafter 007. Machine cut pine, stained dark brown, 50mm wide by 80mm deep. No visible evidence of reuse and no visible carpenter's marks.	Modern timber. The purpose of the timber is to make the turret cone rigid by preventing lateral movement. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
West Turret.004	Turret rafter	004-010 and 020 are eight turret rafters forming the cone of the turret roof. 004-009 rest on the turret wall head, 010 is tapered at the base and nailed to the W face of rafter **W bedchamber.016**. 020 is much shorter than 004-010 and it rests on the dormer ridge piece 011 above the turret dormer roof. All the rafters converge at the top to meet central upright post 001 at the top. All the rafters are machine cut, stained dark brown and generally 100mm wide by 40mm deep.	004-010 and 020 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
West Turret.005	Turret rafter	004-010 and 020 are eight turret rafters forming the cone of the turret roof. 004-009 rest on the turret wall head, 010 is tapered at the base and nailed to the W face of rafter **W bedchamber.016**. 020 is much shorter than 004-010 and it rests on the dormer ridge piece 011 above the turret dormer roof. All the rafters converge at the top to meet central upright post 001 at the top. All the rafters are machine cut, stained dark brown and generally 100mm wide by 40mm deep.	004-010 and 020 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
West Turret.006	Turret rafter	004-010 and 020 are eight turret rafters forming the cone of the turret roof. 004-009 rest on the turret wall head, 010 is tapered at the base and nailed to the W face of rafter **W bedchamber.016**. 020 is much shorter than 004-010 and it rests on the dormer ridge piece 011 above the turret dormer roof. All the rafters converge at the top to meet central upright post 001 at the top. All the rafters are machine cut, stained dark brown and generally 100mm wide by 40mm deep.	004-010 and 020 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
West Turret.007	Turret rafter	004-010 and 020 are eight turret rafters forming the cone of the	004-010 and 020 are modern rafters. The turret roof was	20th Century

		turret roof. 004-009 rest on the turret wall head, 010 is tapered at the base and nailed to the W face of rafter **W bedchamber.016**. 020 is much shorter than 004-010 and it rests on the dormer ridge piece 011 above the turret dormer roof. All the rafters converge at the top to meet central upright post 001 at the top. All the rafters are machine cut, stained dark brown and generally 100mm wide by 40mm deep.	probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	
West Turret.008	Turret rafter	004-010 and 020 are eight turret rafters forming the cone of the turret roof. 004-009 rest on the turret wall head, 010 is tapered at the base and nailed to the W face of rafter **W bedchamber.016**. 020 is much shorter than 004-010 and it rests on the dormer ridge piece 011 above the turret dormer roof. All the rafters converge at the top to meet central upright post 001 at the top. All the rafters are machine cut, stained dark brown and generally 100mm wide by 40mm deep.	004-010 and 020 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
West Turret.009	Turret rafter	004-010 and 020 are eight turret rafters forming the cone of the turret roof. 004-009 rest on the turret wall head, 010 is tapered at the base and nailed to the W face of rafter **W bedchamber.016**. 020 is much shorter than 004-010 and it rests on the dormer ridge piece 011 above the turret dormer roof. All the rafters converge at the top to meet central upright post 001 at the top. All the rafters are machine cut, stained dark brown and generally 100mm wide by 40mm deep.	004-010 and 020 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. .	20th Century
West Turret.010	Turret rafter	004-010 and 020 are eight turret rafters forming the cone of the turret roof. 004-009 rest on the turret wall head, 010 is tapered at the base and nailed to the W face of rafter **W bedchamber.016**. 020 is much shorter than 004-010 and it rests on the dormer ridge piece 011 above the turret dormer roof. All the rafters converge at the top to meet central upright post 001 at the top. All the rafters are machine cut, stained dark brown and generally 100mm wide by 40mm deep.	004-010 and 020 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
West Turret.011	Dormer ridge piece	Ridge piece projecting from central turret upright post 001, forming apex of the dormer roof above the door aperture to the W bedchamber. It is machine cut or possibly sawn but has roundwood towards its SE end. The timber has some woodworm damage. Dormer rafters 012-015 are crudely attached to each side of 011. No clear visible evidence of reuse and no visible carpenter's marks. It is in fair condition.	Probably a modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. It is not clear why the dormer roof rafters include so much roundwood but it could just be down to the generally scrappy construction of the dormer roof. (Scrappy construction appears to be a feature of all the turret dormers and all the window dormers).	20th Century
West Turret.012	Dormer rafter	NW dormer rafter, crudely attached to ridge piece 011 at the top and tapered at the bottom where it is nailed to **W badchamber.016**. and turret rafter 010. It is machine cut or possibly sawn on two sides with round wood on the	Probably a modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. It is not clear why the dormer roof rafters include so much roundwood but it	20th Century

		remaining faces. Circa 100mm by up to 120mm. One of four dormer rafters in the W turret 012-015, all very similar pieces of timber. It has no visible evidence of reuse and no visible carpenters marks. Fair condition.	could just be down to the generally scrappy construction of the dormer roof. (Scrappy construction appears to be a feature of all the turret dormers and all the window dormers).	
West Turret.013	Dormer rafter	NE dormer rafter, crudely attached to ridge piece 011 at the top and at the bottom it rests on a rebuilt section of the turret wall head which seals wooden lintel 018. It is machine cut or possibly sawn on two sides with round wood on the remaining faces. Circa 80mm by up to 110mm. One of four dormer rafters in the W turret 012-015, all very similar pieces of timber. It has no visible evidence of reuse and no visible carpenters marks. It is quite rotten at the bottom so its in poor condition.	Probably a modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. It is not clear why the dormer roof rafters include so much roundwood but it could just be down to the generally scrappy construction of the dormer roof. (Scrappy construction appears to be a feature of all the turret dormers and all the window dormers).	20th Century
West Turret.014	Dormer rafter	SW dormer rafter, crudely attached to ridge piece 011 at the top and tapered at the bottom where it is nailed to the E face of dormer rafter 012. It is machine cut or possibly sawn on two sides with round wood on the remaining faces. This timber is particularly scrappy. Circa 80mm by up to 80mm. One of four dormer rafters in the W turret 012-015, all very similar pieces of timber. It has no visible evidence of reuse and no visible carpenters marks. Fair condition.	Probably a modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. It is not clear why the dormer roof rafters include so much roundwood but it could just be down to the generally scrappy construction of the dormer roof. (Scrappy construction appears to be a feature of all the turret dormers and all the window dormers).	20th Century
West Turret.015	Dormer rafter	SE dormer rafter, crudely attached to ridge piece 011 at the top and at the bottom it sits on a patch of rebuilt turret wallhead which seals wooden lintel 018. It is machine cut or possibly sawn on two sides with round wood on the remaining faces. This timber is particularly scrappy. Circa 80mm by up to 100mm. One of four dormer rafters in the W turret 012-015, all very similar pieces of timber. It has no visible evidence of reuse and no visible carpenters marks. Fair condition.	Probably a modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. It is not clear why the dormer roof rafters include so much roundwood but it could just be down to the generally scrappy construction of the dormer roof. (Scrappy construction appears to be a feature of all the turret dormers and all the window dormers).	20th Century
West Turret.016	Sarking	General number for the sarking of the W turret cone and dormer roof. The sarking is a mixture of mainly machine cut pine boards, stained dark with nails protruding; and sawn boards which have redundant sarking peg holes as well has nails protruding. The width of the boards varies between 200mm for the modern boards up to 340mm for one of the boards with sarking peg holes. There are also a number of smaller strips of pine filling some awkward gaps, all of which appear modern.	The dormer roof was probably rebuilt in the 20th Century but the work includes some reused sarking boards which may be original 1590's sarking.	1590's -20th Century.
West Turret.017	Post	Same as **W bedchamber.042**. Upright post sitting on top of wooden lintel 018 to the NE side of the door aperture leading to the W bedchamber. The post extends into the W bedchamber roof supporting rafter **W bedchamber.015** which has to stop short because of the turret roof. Machine cut down	Probably a modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century

		two sides with roundwood on the other faces, 80mm by 100mm. It has a little woodworm damage at the bottom but is in fairly good condition.		
West Turret.018	Lintel	Same as **W bedchamber.040**. Wooden lintel above the door to the W turret. Hand sawn timber, 80mm high by between 150mm and 300mm wide because it has a curving back edge to match the curve of the turret wall. The lintel supports posts 041 and 042. It has quite a lot of woodworm damage across the top. Fair condition.	This wooden lintel probably replaces a stone lintel since all the other turrets have surviving stone lintels. Also this turret is missing a panel of masonry above the door but there is no evidence that masonry was ever built on top of this wooden lintel. The lintel supports what is likely to be a 20th Century rebuilt turret roof but the lintel itself could be earlier	19th – 20th Century
West Turret.019	Post	Same as **W bedchamber.041**. Upright post sitting on top of wooden lintel 018 to the SW side of the door aperture leading to the W bedchamber. The post is machine cut pine, 100mm by 100mm. It has a slot cut into the top so that it fits around and supports rafter **W beadchamber.016**. It acts as a similar but modern version of an ashlar post. Very good condition.	Probably a modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
West Turret.020	Turret rafter	004-010 and 020 are eight turret rafters forming the cone of the turret roof. 004-009 rest on the turret wall head, 010 is tapered at the base and nailed to the W face of rafter **W bedchamber.016**. 020 is much shorter than 004-010 and it rests on the dormer ridge piece 011 above the turret dormer roof. All the rafters converge at the top to meet central upright post 001 at the top. All the rafters are machine cut, stained dark brown and generally 100mm wide by 40mm deep.	004-010 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century

NORTHWEST TURRET				
Feature Number.	**Type**	**Description**	**Interpretation**	**Suggested Date**
Northwest Turret.001	Central post	Central upright post of the turret roof. Machine cut on two sides, hand cut on one side and possibly hand cut on the remaining side, unsure whether the timber is pine or oak, 100mm by 100mm. At the base the timber is slotted and nailed to diameter cross piece 002 and radial cross piece 003 is nailed to its SW face. At the top the post is joined to turret rafters 004-011 but the join is not visible. The timber has a little woodworm damage but is in good condition otherwise. The dormer ridge piece 012 is slotted and nailed to 001 near the top.	Modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. It is not clear why two faces of the post are hand cut, it definitely looks modern. All the turrets, except the central turret, have a similar central upright post, hand cut and machine sawn. Maybe they were machine sawn then split on site.	20th Century
Northwest Turret.002	Diameter cross piece	Turret diameter cross piece, resting on the turret wall head, aligned NE-SW and joined in the centre with a slot and nails to central post 001. To the NE it is joined to turret rafter 005 and to the SW it is joined to turret rafter 009. It is machine cut pine,	Modern timber. The purpose of the timber is to make the turret cone rigid by preventing lateral movement. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early	20th Century

		70mm wide by 120mm deep. It has one nail and one nail hole in the SW half of its lower face, possibly from a removed fixture.	20th Century.	
Northwest Turret.003	Radial cross piece	Turret radial cross piece, aligned NW-SE, resting on diameter cross piece and nailed to the side of central upright post 001 and turret rafter 007. Machine cut pine, stained dark brown, 50mm wide by 60mm high. Timber has a little bit of woodworm damage but is in good condition otherwise.	Modern timber. The purpose of the timber is to make the turret cone rigid by preventing lateral movement. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
Northwest Turret.004	Turret rafter	004-011 are eight rafters forming the frame of the turret cone. 005-010 rest on the turret wall head. 004 is tapered at the base and nailed to the N rafter of gallery truss 1 018. 011 is much shorter than 004-010 and it rests on top of ridge piece 012. All the rafters converge at the top to meet central post 001. All the rafters are machine cut, generally 50mm deep by 110mm wide, all stained dark brown, and also all of them have a white stain which may be preservative with the exception of 005 which looks more like 001 as it has been hand cut down one side. No visible evidence of reuse and no visible carpenter's marks. Very good condition.	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
Northwest Turret.095	Turret rafter	004-011 are eight rafters forming the frame of the turret cone. 005-010 rest on the turret wall head. 004 is tapered at the base and nailed to the N rafter of gallery truss 1 018. 011 is much shorter than 004-010 and it rests on top of ridge piece 012. All the rafters converge at the top to meet central post 001. All the rafters are machine cut, generally 50mm deep by 110mm wide, all stained dark brown, and also all of them have a white stain which may be preservative with the exception of 005 which looks more like 001 as it has been hand cut down one side. No visible evidence of reuse and no visible carpenter's marks. Very good condition.	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
Northwest Turret.006	Turret rafter	004-011 are eight rafters forming the frame of the turret cone. 005-010 rest on the turret wall head. 004 is tapered at the base and nailed to the N rafter of gallery truss 1 018. 011 is much shorter than 004-010 and it rests on top of ridge piece 012. All the rafters converge at the top to meet central post 001. All the rafters are machine cut, generally 50mm deep by 110mm wide, all stained dark brown, and also all of them have a white stain which may be preservative with the exception of 005 which looks more like 001 as it has been hand cut down one side. No visible evidence of reuse and no visible carpenter's marks. Very good condition.	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
Northwest Turret.007	Turret rafter	004-011 are eight rafters forming the frame of the turret cone. 005-010 rest on the turret wall head. 004 is tapered at the base and nailed to the N rafter of gallery truss 1 018. 011 is much	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century

		shorter than 004-010 and it rests on top of ridge piece 012. All the rafters converge at the top to meet central post 001. All the rafters are machine cut, generally 50mm deep by 110mm wide, all stained dark brown, and also all of them have a white stain which may be preservative with the exception of 005 which looks more like 001 as it has been hand cut down one side. No visible evidence of reuse and no visible carpenter's marks. Very good condition.		
Northwest Turret.008	Turret rafter	004-011 are eight rafters forming the frame of the turret cone. 005-010 rest on the turret wall head. 004 is tapered at the base and nailed to the N rafter of gallery truss 1 018. 011 is much shorter than 004-010 and it rests on top of ridge piece 012. All the rafters converge at the top to meet central post 001. All the rafters are machine cut, generally 50mm deep by 110mm wide, all stained dark brown, and also all of them have a white stain which may be preservative with the exception of 005 which looks more like 001 as it has been hand cut down one side. No visible evidence of reuse and no visible carpenter's marks. Very good condition.	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
Northwest Turret.009	Turret rafter	004-011 are eight rafters forming the frame of the turret cone. 005-010 rest on the turret wall head. 004 is tapered at the base and nailed to the N rafter of gallery truss 1 018. 011 is much shorter than 004-010 and it rests on top of ridge piece 012. All the rafters converge at the top to meet central post 001. All the rafters are machine cut, generally 50mm deep by 110mm wide, all stained dark brown, and also all of them have a white stain which may be preservative with the exception of 005 which looks more like 001 as it has been hand cut down one side. No visible evidence of reuse and no visible carpenter's marks. Very good condition.	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
Northwest Turret.010	Turret rafter	004-011 are eight rafters forming the frame of the turret cone. 005-010 rest on the turret wall head. 004 is tapered at the base and nailed to the N rafter of gallery truss 1 018. 011 is much shorter than 004-010 and it rests on top of ridge piece 012. All the rafters converge at the top to meet central post 001. All the rafters are machine cut, generally 50mm deep by 110mm wide, all stained dark brown, and also all of them have a white stain which may be preservative with the exception of 005 which looks more like 001 as it has been hand cut down one side. No visible evidence of reuse and no visible carpenter's marks. Very good condition.	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
Northwest Turret.011	Turret rafter	004-011 are eight rafters forming the frame of the turret cone. 005-010 rest on the turret wall head. 004 is tapered at the base	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the	20th Century

		and nailed to the N rafter of gallery truss 1 018. 011 is much shorter than 004-010 and it rests on top of ridge piece 012. All the rafters converge at the top to meet central post 001. All the rafters are machine cut, generally 50mm deep by 110mm wide, all stained dark brown, and also all of them have a white stain which may be preservative with the exception of 005 which looks more like 001 as it has been hand cut down one side. No visible evidence of reuse and no visible carpenter's marks. Very good condition.	Ministry of Works in the early 20th Century.	
Northwest Turret.012	Dormer ridge piece	Ridge piece, projecting SE from central upright post 001 forming the apex of the dormer roof in the NW turret. It is machine cut or sawn along one edge but has roundwood on the remaining faces. It has no visible evidence of reuse and no visible carpenters marks. Good condition.	Probably a modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. It is not clear why the dormer roof rafters include so much roundwood but it could just be down to the generally scrappy construction of the dormer roof. (Scrappy construction appears to be a feature of all the turret dormers and all the window dormers).	20th Century
Northwest Turret.013	Dormer rafter	NE rafter of the dormer roof in the NW turret. It is crudely attached to ridge piece 012 at the top and the bottom the timber is tapered and nailed to the base of the N rafter of gallery truss 1 018. It is machine cut but has some roundwood along one edge. It has some white staining that might be preservative and it might have been stained dark brown. Circa 60mm deep by up to 130mm wide. No visible evidence of reuse and no visible carpenter's marks. Good condition.	Probably a modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. It is not clear why the dormer roof rafters include so much roundwood but it could just be down to the generally scrappy construction of the dormer roof. (Scrappy construction appears to be a feature of all the turret dormers and all the window dormers).	20th Century
Northwest Turret.014	Dormer rafter	SW rafter of the dormer roof in the NW turret. It is crudely attached to ridge piece 012 at the top and the bottom the timber rests on the wall head. It is machine cut down two sides with roundwood on the remaining faces. It is stained dark brown and it also has some white staining that might be preservative. Circa 80mm deep by up to 100mm wide. No visible evidence of reuse and no visible carpenter's marks. Good condition.	Probably a modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. It is not clear why the dormer roof rafters include so much roundwood but it could just be down to the generally scrappy construction of the dormer roof. (Scrappy construction appears to be a feature of all the turret dormers and all the window dormers).	20th Century
Northwest Turret.015	Dormer rafter	Second NE rafter of the dormer roof in the NW turret. It is crudely attached to ridge piece 012 at the top and the bottom the timber is tapered and nailed to the base of the N rafter of gallery truss 1 018. It serves no structural purpose since the ridge piece 012 and sarking 017 are supported by masonry at this point (the masonry is probably 20th Century rebuild). It is machine cut, 800wide by 40mm deep. It is stained brown and also has some white staining that might be preservative. No visible evidence of reuse and no visible carpenter's marks. Good condition.	Probably a modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. It is not clear why the dormer roof rafters include so much roundwood but it could just be down to the generally scrappy construction of the dormer roof. (Scrappy construction appears to be a feature of all the turret dormers and all the window dormers).	20th Century
Northwest	Dormer rafter	Second SW rafter of the dormer roof in the NW turret. It is	Probably a modern timber. The turret roof was	20th Century

Turret.016		crudely attached to ridge piece 012 at the top and the bottom the timber rests on the wall head. It is machine cut down two sides with roundwood on the remaining faces. 80mm deep by up to 100mm wide. Near the base in the roundwood edge there are two large Fe nails serving no current purpose. These could indicated reuse of the timber or the removal of a fixture. No visible carpenter's marks. Fair condition with a little woodworm damage..	probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. It is not clear why the dormer roof rafters include so much roundwood but it could just be down to the generally scrappy construction of the dormer roof. (Scrappy construction appears to be a feature of all the turret dormers and all the window dormers).	
Northwest Turret.017	Sarking	General number for the sarking of the turret cone and the dormer roof. The sarking is mainly machine cut boards, 200mm wide, stained dark brown with nails protruding. However there are some wider boards up to 260mm which may have sawn, also stained dark brown but they also have white stain which may be a preservative, with nails protruding. No visible evidence of reuse. Good condition.	20th Century sarking, possibly 2 phases.	20th Century
Northwest Turret.018	Rafter	Base of the N rafter of gallery truss 1. Hand cut, oak sitting on the wall head. 004, 013 and 015 have been nailed to it. Two pieces of slate have been placed between the upper edge of the rafter and sarking 017.	Original 1590's gallery roof rafter in situ. 20th Century turret roof rafters have been nailed to it. (From recording in 2007 it is known that the timber shows no evidence of reuse).	1590's

CENTRAL TURRET				
Feature Number.	**Type**	**Description**	**Interpretation**	**Suggested Date**
Central Turret.001	Central post	Central upright post of the turret cone. Hand cut, circa 160mm square. The post sits on top of upper diameter cross piece 002 but the join is not visible. At the top the turret rafters 005-016 converge to meet 001 but again the join is not visible. It appears to be in good condition but the timber in inaccessible. No visible evidence of reuse and no visible carpenters marks.	Probably the original 1590's central upright post of the central turret. The timber was probably cut for this specific purpose as it supports all the turret rafters at the top of the cone.	1590's
Central Turret.002	Diameter cross piece	Upper diameter cross piece, aligned E-W. Hand cut, circa 110mm square. It has some roundwood on the N face and so appears to be a split trunk. It supports central upright post 001 but the join is not visible. It is joined to turret rafters 007 and 013 with mortice and tenon joints. It has no visible evidence of reuse and no visible carpenter's marks. It is in fair condition but it has a lot of woodworm on its E side.	Probably the original 1590's upper diameter cross piece. The purpose of the timber is to make the turret cone rigid by preventing lateral movement.	1590's
Central Turret.003	Diameter cross piece	Lower diameter cross piece, aligned E-W. Hand cut and hand sawn, 130mm wide by 80mm deep. Traces of white stain, possibly preservative. It sits on the turret wall head and it is joined to the base of turret rafters 007 and 013 but the join is not visible. The N face of the timber is joined to radial cross piece	Could be a later addition to the turret roof to improve rigidity by preventing lateral movement since the dimensions are unlike those of the upper diameter cross piece and also the timber is sawn as well as hand cut. However since there are no other original turret	Unknown

		004 (it is probably a mortice and tenon joint, no nails or dowels are visible). Modern central banister post is slotted around the N face of the timber and appears to be wedged in place as no nails are visible. It has no visible evidence of reuse and no visible carpenter's marks.	roofs in the castle for comparison it could also be original.	
Central Turret.004	Radial cross piece	Radial cross piece, aligned N-S. Hand cut and sawn, circa 60mm deep by 130mm wide. The S end of the timber is joined to diameter cross piece 003 (the join is probably mortice and tenon, no nails or dowels are visible). The N end of end of the timber is joined to turret rafter 010, the joint is not visible but 004 appear to extend under 010 suggesting that the joint is a mortice and tenon with the tenon of 010 slotting down into a mortice in 004. No visible evidence of reuse and no visible carpenter's marks. Good condition.	Similar to 003 in that the dimensions of the timber and the fact that it is hand cut and sawn might suggest that it is an addition to the original turret roof. However the possible mortice and tenon joint with turret rafter 010 could indicate that it is original (unless of course 010 is a replacement which is possible – see 010).	Unknown
Central Turret.005	Turret rafter	1 of 12 turret rafters. Hand cut, circa 120mm wide by 30mm deep. At the base it is joined at an angle to dormer rafter 019, join is not visible - no nails or dowels are visible. All the turret rafters converge at the top to meet central post 001. It has no visible evidence of reused and no visible carpenter's marks. It is in very poor condition along the edges, possibly due to rot or woodworm.	Possibly original 1590's rafter. Slightly narrower than the other rafters by about 20-30mm. No obvious reason why this timber is in such poor condition compared to the other rafters.	1590's
Central Turret.006	Turret rafter	1 of 12 turret rafters. Hand cut, circa 150mm wide by 40mm deep. At the base it is joined at an angle to dormer frame timber 021, join is not visible - no nails or dowels are visible. At the top all the rafters converge to meet central post 001. The underside of the rafter has redundant sarking peg holes in it. No visible carpenter's marks. Fair condition.	Reused timber. It must have been a rafter in an earlier roof arrangement. The sarking peg holes show that it was probably a rafter in a previous roof and sat the other way round. The rafter has been split to create a thinner piece of wood for the current turret roof. Originally the rafter was likely to be square in section so it may have been split into 3 or 4 thinner planks.	Pre 1590's reused in 1590's
Central Turret.007	Turret rafter	1 of 12 turret rafters. Hand cut, circa 160mm wide by 40mm deep. At the base it might join to the base of lower tie beam 003 but the join is not visible. At the top all the rafters converge to meet central post 001. Upper diameter cross piece 002 is joined to the rafter with a slot (not a mortice) in the edge of the rafter and a tenon on the cross piece. The underside of the rafter has redundant sarking peg holes in it. No visible carpenter's marks. Fair condition.	Reused timber. It must have been a rafter in an earlier roof arrangement. The sarking peg holes show that it was probably a rafter in a previous roof and sat the other way round. The rafter has been split to create a thinner piece of wood for the current turret roof. Originally the rafter was likely to be square in section so it may have been split into 3 or 4 thinner planks.	Pre 1590's reused in 1590's
Central Turret.008	Turret rafter	1 of 12 turret rafters. Hand cut, circa 140mm wide by 40mm deep. At the base the rafter sits on the turret wall head. At the top all the rafters converge to meet central post 001. The rafter has a redundant angled mortice, circa 800mm up from the base. The mortice is circa 50mm wide by 140mm long. There is no back to the mortice so that the sarking is visible through the mortice. A dowel hole and part of a dowel are visible in the sides of the	Reused timber. It was probably a rafter in a previous roof arrangement with a redundant mortice for a collar. The fact that the mortice has no back indicates that the rafter has been split to form thinner planks of timber for the current turret roof. Originally the rafter was likely to be square in section so it might have been split into 3 or 4 thinner planks.	Pre 1590's reused in 1590's

		mortice. No visible carpenter's marks. Fair condition.		
Central Turret.009	Turret rafter	1 of 12 turret rafters. Hand cut, circa 150mm wide by 40mm deep. At the base the rafter sits on the turret wall head. At the top all the rafters converge to meet central post 001. The rafter has a redundant angled mortice, circa 1.00mm up from the base. The mortice is circa 50mm wide by 140mm long. There is no back to the mortice so that the sarking is visible through the mortice. There might be a dowel just visible near the base of the mortice. No visible carpenter's marks. Fair condition.	Reused timber. It was probably a rafter in a previous roof arrangement with a redundant mortice for a collar. The fact that the mortice has no back indicates that the rafter has been split to form thinner planks of timber for the current turret roof. Originally the rafter was likely to be square in section so it might have been split into 3 or 4 thinner planks.	Pre 1590's reused in 1590's
Central Turret.010	Turret rafter	1 of 12 turret rafters. Hand cut, circa 130mm wide by 30mm deep. At the base the rafter sits on top of tie beam 003 (the join is not visible). At the top all the rafters converge to meet central post 001. Just above the upper diameter cross piece 002 there is a block of wood 028 nailed to the face of 010 to support the N-S ridge piece of the turret dormer roof above the door to the gallery. No visible evidence of reuse and no visible carpenter's marks. Fair condition.	Possibly an original 1590's turret rafter	1590's
Central Turret.011	Turret rafter	1 of 12 turret rafters. Hand cut, circa 130mm wide by 30mm deep. At the base the rafter sits on the turret wall head. At the top all the rafters converge to meet central post 001. The rafter has a redundant angled mortice, circa 1.20mm up from the base. The mortice is circa 50mm wide by 130mm long. A dowel hole and a dowel is visible in the mortice. No visible carpenter's marks. Fair condition.	Reused timber. It was probably a rafter in a previous roof arrangement with a mortice for a collar beam. Originally the rafter was likely to be square in section so it might have been split into 3 or 4 thinner planks.	Pre 1590's reused in 1590's
Central Turret.012	Turret rafter	1 of 12 turret rafters. Machine cut, stained dark brown, circa 130mm wide by 40mm deep. At the base it sits on the turret wall head. At the top all the rafters converge to meet central post 001.	Modern replacement rafter. Probably replaced along with the most recent sarking. Probably 20th Century.	20th Century
Central Turret.013	Turret rafter	1 of 12 turret rafters. Hand cut, circa 140mm wide by 30mm deep. At the base it appears to sit on top of lower tie beam 003 but the join is not visible. At the top all the rafters converge to meet central post 001. Upper diameter cross piece 002 is joined to the rafter with a slot (not a mortice) in the edge of the rafter and a tenon on the cross piece. The underside of the rafter has redundant sarking peg holes in it and possibly a dowel hole. No visible carpenter's marks. Fair condition.	Reused timber. It must have been a rafter in an earlier roof arrangement. The sarking peg holes show that it was probably a rafter in a previous roof and sat the other way round. The rafter has been split to create a thinner piece of wood for the current turret roof. Originally the rafter was likely to be square in section so it may have been split into 3 or 4 thinner planks.	Pre 1590's reused in 1590's
Central Turret.014	Turret rafter	1 of 12 turret rafters. Hand cut, circa 140mm wide by 40mm deep. At the base is joined at an angle to dormer rafter 020 (the join is not visible, no nails or dowels are visible). At the top all the rafters converge to meet central post 001. The rafter has a redundant angled mortice at its base. The mortice is circa 50mm wide by 160mm long. A dowel hole is visible in the sides of the mortice. No visible carpenter's marks. Fair condition.	Reused timber. It was probably a rafter in a previous roof arrangement with a mortice for a collar beam. Originally the rafter was likely to be square in section so it might have been split into 3 or 4 thinner planks.	Pre 1590's reused in 1590's
Central	Turret rafter	1 of 12 turret rafters. Hand cut, circa 140mm wide by 30mm deep.	Possibly an original 1590's turret rafter	1590's

Turret.015		At the base is joined at an angle to dormer rafter 018 (the join is not visible, no nails or dowels are visible). At the top all the rafters converge to meet central post 001. No visible evidence of reuse and no visible carpenter's marks. Poor condition with rot in the middle.		
Central Turret.016	Turret rafter	1 of 12 turret rafters. Hand cut, circa 120mm wide by up to 60mm deep. This is the shortest rafter in the roof. It sits on top of dormer ridge piece 017 (the join is not visible). At the top all the rafters converge to meet central post 001. No visible evidence of reuse and no visible carpenter's marks. Fair condition.	Possibly an original 1590's turret rafter	1590's
Central Turret.017	Ridge piece	Ridge piece of the turret dormer roof above the door leading to the gallery. Hand cut and possibly sawn, circa 130mm wide by circa 60mm deep. To the S the ridge piece appears to rest on the wall head of the masonry above the door. In the centre the ridge piece is nailed from below to upper diameter cross piece 002 with large hand made nails. To the N the ridge piece is supported by block of wood 028 nailed to rafter 010. The ridge piece supports dormer rafters 018 and 019 and turret rafter 016. No visible evidence of reuse and no visible carpenter's marks. Good condition.	The ridge piece incorporates a variety of joins including hand made iron nails and the wooden support block 028. It is possibly an early addition to the original 1590's turret roof but it could also be original and the variety of joins simply a product of the construction technique. Similar crude joints, apparently original to the roof are seen in the joists of the E bedchamber.	Unknown
Central Turret.018	Dormer rafter	NW dormer rafter. Hand cut, circa 140mm wide by 40mm deep. At the base it is joined to the SW dormer rafter 020 and at the top it is joined to ridge piece 017 (the joins do not have visible nails or dowels). The underside of the timber has at least 6 iron nails in it serving no current purpose. No visible carpenter's marks, fair condition.	Possibly a reused timber. Dormer rafter, may support original turret dormer however the turret dormer could be an early addition to the turret roof – see also 017.	Unknown
Central Turret.019	Dormer rafter	NE dormer rafter. Hand cut, circa 140mm wide by 40mm deep. At the base it is joined to the SE dormer rafter 021 and at the top it is joined to ridge piece 017 (the joins do not have visible nails or dowels). No visible evidence of reuse and no visible carpenter's marks. Fair condition.	Possibly an original timber. Dormer rafter, may support original turret dormer however the turret dormer could be an early addition to the turret roof – see also 017.	Unknown
Central Turret.020	Dormer rafter	SW dormer rafter. Hand cut, circa 100mm deep, width is obscured by masonry. The dormer rafter runs SE-NW along the top of the masonry above the door. It continues to the SE beyond view into a void above the dormer roof. No visible evidence of reuse and no visible carpenter's marks, fair condition but with quite a lot of woodworm damage at the base.	Possibly an original timber. Dormer rafter, may support original turret dormer however the turret dormer could be an early addition to the turret roof – see also 017.	Unknown
Central Turret.021	Dormer rafter	SE dormer rafter. Hand cut , irregular shaped timber, circa 110mm square with 2 bevels cut into the lower edge so that it sits over the wall head masonry and over 024. The timber runs diagonally down from SW to NE. The timber supports turret rafter 006 and dormer rafter 019. No visible evidence of reuse and no visible carpenter's marks, fair condition.	Possibly an original timber. Dormer rafter, may support original turret dormer however the turret dormer could be an early addition to the turret roof – see also 017. The bevels show that the timber was altered to fit	Unknown

			around existing masonry but since the turret roofs must have been constructed following the construction of the main gallery roof it could still be original 1590's. However the current masonry does not line up with the bevels suggesting that the wall above the door has been rebuilt at the top. This is likely as it looks like it has been rebuilt on the gallery side.	
Central Turret.022	Rafter	Base of N rafter of gallery truss 9 sitting on the turret wall head.	No structural role in the central turret roof. Original 1590's rafter.	1590's
Central Turret.023	Sole piece	Sole piece of gallery truss 9 sitting on the turret wall head attached to 022 with mortice and tenon joint.	No structural role in the central turret roof. Original 1590's sole piece.	1590's
Central Turret.024	Rafter	Base of N rafter of gallery truss 10 sitting on the turret wall head.	No structural role in the central turret roof. Original 1590's rafter.	1590's
Central Turret.025	Sole piece	Sole piece of gallery truss 10 sitting on the turret wall head attached to 022 with mortice and tenon joint.	No structural role in the central turret roof. Original 1590's sole piece.	1590's
Central Turret.026	Bannister	Central post of stair banister. Octagonal post on a concrete plinth. Wedged in place against the lower diameter cross piece 003. No tool marks visible, possibly hand crafter by a joiner for this exact space. There is a similar stair banister at the top of the spiral stair leading to the stair loft roof. Varnished with a clear finish.	20th Century banister. Two holes in the turret wall just to the W of the current banister indicate that there was an earlier banister at the top of this stair. (There may have been two earlier phases of bannister as the two holes have very different dimensions).	20th Century
Central Turret.027	Sarking	General number for the sarking of the central turret. At least two phases of sarking. Earliest is hand cut, circa 260mm wide with sarking pegs protruding. One almost complete segment of this survives between turret rafters 005 and 006, elsewhere individual boards survive near the turret cone. The remaining sarking is machine sawn, circa 200mm wide with iron nails protruding. Some of the boards are stained dark and some remain natural and these boards may belong to different phases of repair work but both are probably relatively recent. The dark boards were probably added at the same time as replacement rafter 012.	Mixed sarking. Some original boards with at least one phase of modern replacement boards.	1590's-20th Century
Central Turret.028	Fixture	Short block of wood attached to the S face of turret rafter 010. Hand cut, circa 130mm wide by 250mm long by up to 40mm deep. Nailed on to 010 with five handmade iron nails. The block of wood supports the N end of ridge piece 017.	This could be original and a function of the construction technique of the turret roof. No other original turret roofs survive for comparison. The block holds the ridge piece 017 which was probably put in place after the construction of the main turret cone.	Unknown

NORTHEAST TURRET				
Feature Number.	**Type**	**Description**	**Interpretation**	**Suggested Date**
Northeast Turret.001	Central post	Central turret upright post of the turret cone. Machine cut on two faces and hand cut on the other two faces with a hand cut bevel down its N corner. 100mm by 100mm. Very similar to the central post in the W, NW and E turret. At the base the post is slotted and nailed to diameter cross piece 002. At the top it meets the turret rafters 004-011 but the join is not visible. The ridge piece for the turret dormer roof 012 is slotted and nailed to 001 near the top. No visible evidence of reuse and no visible carpenter's marks. Good condition.	Modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. It is not clear why two faces of the post are hand cut, it definitely looks modern. All the turrets, except the central turret, have a similar central upright post, hand cut and machine sawn. Maybe they were machine sawn then split on site.	20th Century
Northeast Turret.002	Diameter cross piece	Turret diameter cross piece resting on the turret wall head, aligned NW-SE. Joined in the centre with a slot and nails to upright post 001. To the SE it is joined to turret rafter 005 and to the NW it is joined to turret rafter 009. The timber is machine cut pine 110mm high by 60mm wide, possibly stained dark brown. It has two relatively modern rusty nails sticking out of its SW face for an unknown purpose or removed fixture. No visible evidence of reuse and no visible carpenter's marks. Good condition.	Modern timber. The purpose of the timber is to make the turret cone rigid by preventing lateral movement. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
Northeast Turret.003	Radial cross piece	Turret radial cross piece sitting on diameter cross piece 002 and nailed to the side of turret rafter 007. Aligned NE-SW, machine cut pine, stained dark brown, 50mm wide by 60mm high. Good condition but with a little woodworm damage.	Modern timber. The purpose of the timber is to make the turret cone rigid by preventing lateral movement. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
Northeast Turret.004	Turret rafter	004-011 are eight turret cone rafters. 004-010 rest of the turret wall head. 011 is much shorter than 001 and 010 and it sits on top of ridge piece 012. All the rafters converge at the top to meet central post 001. 004, 006, 007, 008, 010 and 011 are generally 40mm deep by 110mm wide but 005 and 009 are 80 mm square and look different from the other rafters. All the rafters are machine cut stained dark brown and have white staining which may be preservative or resin or mould. Good condition.	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
Northeast Turret.095	Turret rafter	004-011 are eight turret cone rafters. 004-010 rest of the turret wall head. 011 is much shorter than 001 and 010 and it sits on top of ridge piece 012. All the rafters converge at the top to meet central post 001. 004, 006, 007, 008, 010 and 011 are generally 40mm deep by 110mm wide but 005 and 009 are 80 mm square and look different from the other rafters. All the rafters are machine cut stained dark brown and have white staining which may be preservative or resin or mould. Good condition.	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century

Northeast Turret.006	Turret rafter	004-011 are eight turret cone rafters. 004-010 rest of the turret wall head. 011 is much shorter than 001 and 010 and it sits on top of ridge piece 012. All the rafters converge at the top to meet central post 001. 004, 006, 007, 008, 010 and 011 are generally 40mm deep by 110mm wide but 005 and 009 are 80 mm square and look different from the other rafters. All the rafters are machine cut stained dark brown and have white staining which may be preservative or resin or mould. Good condition.	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. .	20th Century
Northeast Turret.007	Turret rafter	004-011 are eight turret cone rafters. 004-010 rest of the turret wall head. 011 is much shorter than 001 and 010 and it sits on top of ridge piece 012. All the rafters converge at the top to meet central post 001. 004, 006, 007, 008, 010 and 011 are generally 40mm deep by 110mm wide but 005 and 009 are 80 mm square and look different from the other rafters. All the rafters are machine cut stained dark brown and have white staining which may be preservative or resin or mould. Good condition.	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. .	20th Century
Northeast Turret.008	Turret rafter	004-011 are eight turret cone rafters. 004-010 rest of the turret wall head. 011 is much shorter than 001 and 010 and it sits on top of ridge piece 012. All the rafters converge at the top to meet central post 001. 004, 006, 007, 008, 010 and 011 are generally 40mm deep by 110mm wide but 005 and 009 are 80 mm square and look different from the other rafters. All the rafters are machine cut stained dark brown and have white staining which may be preservative or resin or mould. Good condition.	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. Century.	20th Century
Northeast Turret.009	Turret rafter	004-011 are eight turret cone rafters. 004-010 rest of the turret wall head. 011 is much shorter than 001 and 010 and it sits on top of ridge piece 012. All the rafters converge at the top to meet central post 001. 004, 006, 007, 008, 010 and 011 are generally 40mm deep by 110mm wide but 005 and 009 are 80 mm square and look different from the other rafters. All the rafters are machine cut stained dark brown and have white staining which may be preservative or resin or mould. Good condition.	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
Northeast Turret.010	Turret rafter	004-011 are eight turret cone rafters. 004-010 rest of the turret wall head. 011 is much shorter than 001 and 010 and it sits on top of ridge piece 012. All the rafters converge at the top to meet central post 001. 004, 006, 007, 008, 010 and 011 are generally 40mm deep by 110mm wide but 005 and 009 are 80 mm square and look different from the other rafters. All the rafters are machine cut stained dark brown and have white staining which may be preservative or resin or mould. Good condition.	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
Northeast Turret.011	Turret rafter	004-011 are eight turret cone rafters. 004-010 rest of the turret wall head. 011 is much shorter than 001 and 010 and it sits on top of ridge piece 012. All the rafters converge at the top to meet	004-011 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. .	20th Century

		central post 001. 004, 006, 007, 008, 010 and 011 are generally 40mm deep by 110mm wide but 005 and 009 are 80 mm square and look different from the other rafters. All the rafters are machine cut stained dark brown and have white staining which may be preservative or resin or mould. Good condition.		
Northeast Turret.012	Dormer ridge piece	Ridge piece projecting SW from central post 001 forming the apex of a dormer roof above the closet aperture and the doorway to the NE bedchamber. Machine cut, stained dark brown. It is crudely attached to dormer rafters 013-016. Good condition.	Modern timber. The roof was probably rebuilt in the 20th Century, possibly by the MoW.	20th Century
Northeast Turret.013	Dormer rafter	NE rafter of the turret dormer roof. Irregular scrappy timber with machine cut faces and a rough irregular face. At the top at is crudely attached to ridge piece 012. At the bottom it is tapered and crudely attached to turret rafter 004. It is stained dark brown and has traces of white stain which may be preservative. Good condition.	Modern timber. Timber is likely to be for symmetry rather than structural soundness as it is so poorly attached.	20th Century
Northeast Turret.014	Dormer rafter	NW dormer rafter. Machine cut, stained dark brown, 50mm wide by 100mm deep. Timber is crudely attached to ridge piece 012 at the top and at the base it is tapered and nailed to turret rafter 010 but it also sits on the turret wall head. Good condition.	Modern timber. Roof was probably rebuilt in the 20th Century, possibly by the MoW.	20th Century
Northeast Turret.015	Dormer rafter	SE dormer rafter. Machine cut, stained dark brown, 50mm deep by 120mm wide. At the top the timber is crudely attached to ridge piece 012 and at the base it may be attached to turret rafter 004 or it may just rest or be lightly bonded with pointing into the masonry of the S wall closet aperture. Good condition.	Modern timber. Roof was probably rebuilt in the 20th Century, possibly by the MoW.	20th Century
Northeast Turret.016	Dormer rafter	SW dormer rafter. Machine cut, stained dark brown, 50mm wide by 120mm deep. At the top the timber rests on the masonry above the closet door aperture and does not connect with the ridge piece at all. At the base the timber is tapered and nailed to dormer extension rafter 017.	Modern timber. Roof was probably rebuilt in the 20th Century, possibly by the MoW.	20th Century
Northeast Turret.017	Dormer rafter	Additional W rafter of the turret dormer to extend the dormer roof across the doorway to the gallery. The timber is machine cut, stained dark brown, 50mm wide by 170mm deep. At the top it rests on the masonry above the door aperture. At the base it rests on the turret wall head. Good condition.	Modern timber. Roof was probably rebuilt in the 20th Century, possibly by the MoW.	20th Century
Northeast Turret.018	Sarking	General number for all the sarking in the NE turret cone and the turret dormer. Mixture of machine cut boards, stained dark brown and machine cut or sawn boards, with lighter brown stain and white staining, possibly preservative. The machine cut dark brown sarking is generally 200mm wide and the lighter stained boards are generally up to 260mm wide. All the sarking boards have nails protruding. Also near the turret cone there are some sawn or hand cut timbers lying vertically, width unknown. No visible evidence of reuse.	Some of the sarking boards could be reclaimed timber but there is no clear evidence of reuse. The turret roof was probably rebuilt in the 20th Century, all the sarking could be 20th Century.	20th Century

EAST TURRET				
Feature Number.	**Type**	**Description**	**Interpretation**	**Suggested Date**
East Turret.001	Central post	Central upright post of the turret cone. Machine cut on two faces and hand cut on two faces with a hand cut bevel down the N corner. 100mm square. Very similar to the central post in the W, NW and NE turrets. At the base it is slotted and nailed to diameter cross piece 002. At the top the turret rafters 004-011 converge to meet it. No visible evidence of reuse and no visible carpenter's marks. Good condition.	Modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century. It is not clear why two faces of the post are hand cut, it definitely looks modern. All the turrets, except the central turret, have a similar central upright post, hand cut and machine sawn. Maybe they were machine sawn then split on site.	20th Century
East Turret.002	Diameter cross piece	Turret diameter cross piece, resting on the turret wall head, aligned NW-SE. Joined in the centre to turret central post 001. To the SE it is joined to turret rafter 009. Where it sits on the wall head the wall head has been rebuilt by HS along with a window dated 2002. The timber has splashes of pink mortar on it which shows that the roof remained in place during the work. The timber is machine cut, stained dark brown, 70mm wide by 120mm high.	Modern timber. The purpose of the timber is to make the turret cone rigid by preventing lateral movement. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
East Turret.003	Radial cross piece	Turret radial cross piece, sitting on diameter cross piece 002 and nailed to the side of turret frame timber 007. Aligned NW-SE. Machine cut pine, stained dark brown, 60mm wide by 80mm high. Good condition but with a little woodworm damage.	Modern timber. The purpose of the timber is to make the turret cone rigid by preventing lateral movement. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
East Turret.004	Turret rafter	004-011 are eight turret rafters. 004-010 sit on the turret wall head, 011 is much shorter and sits on the dormer ridge piece 012. The turret wall head under 005-008 was rebuilt in 2002 by HS, splashes of pink mortar on 005 indicate that the roof remained in place during this work. The timbers are machine cut, and stained dark brown, generally around 40mm deep by 120mm wide except for 005 and 009 which are 80mm deep by 100 mm wide. 004, 008 and 010 have a little woodworm damage. All the timbers converge at the top to meet central post 001.	004-010 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
East Turret.095	Turret rafter	004-011 are eight turret rafters. 004-010 sit on the turret wall head, 011 is much shorter and sits on the dormer ridge piece 012. The turret wall head under 005-008 was rebuilt in 2002 by HS, splashes of pink mortar on 005 indicate that the roof remained in place during this work. The timbers are machine cut, and stained dark brown, generally around 40mm deep by 120mm wide except for 005 and 009 which are 80mm deep by 100 mm wide. 004, 008 and 010 have a little woodworm damage. All the timbers converge at the top to meet central post 001.	004-010 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
East Turret.006	Turret rafter	004-011 are eight turret rafters. 004-010 sit on the turret wall head, 011 is much shorter and sits on the dormer ridge piece 012. The turret wall head under 005-008 was rebuilt in 2002 by HS, splashes of pink mortar	004-010 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th	20th Century

		on 005 indicate that the roof remained in place during this work. The timbers are machine cut, and stained dark brown, generally around 40mm deep by 120mm wide except for 005 and 009 which are 80mm deep by 100 mm wide. 004, 008 and 010 have a little woodworm damage. All the timbers converge at the top to meet central post 001.	Century.	
East Turret.007	Turret rafter	004-011 are eight turret rafters. 004-010 sit on the turret wall head, 011 is much shorter and sits on the dormer ridge piece 012. The turret wall head under 005-008 was rebuilt in 2002 by HS, splashes of pink mortar on 005 indicate that the roof remained in place during this work. The timbers are machine cut, and stained dark brown, generally around 40mm deep by 120mm wide except for 005 and 009 which are 80mm deep by 100 mm wide. 004, 008 and 010 have a little woodworm damage. All the timbers converge at the top to meet central post 001.	004-010 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
East Turret.008	Turret rafter	004-011 are eight turret rafters. 004-010 sit on the turret wall head, 011 is much shorter and sits on the dormer ridge piece 012. The turret wall head under 005-008 was rebuilt in 2002 by HS, splashes of pink mortar on 005 indicate that the roof remained in place during this work. The timbers are machine cut, and stained dark brown, generally around 40mm deep by 120mm wide except for 005 and 009 which are 80mm deep by 100 mm wide. 004, 008 and 010 have a little woodworm damage. All the timbers converge at the top to meet central post 001.	004-010 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
East Turret.009	Turret rafter	004-011 are eight turret rafters. 004-010 sit on the turret wall head, 011 is much shorter and sits on the dormer ridge piece 012. The turret wall head under 005-008 was rebuilt in 2002 by HS, splashes of pink mortar on 005 indicate that the roof remained in place during this work. The timbers are machine cut, and stained dark brown, generally around 40mm deep by 120mm wide except for 005 and 009 which are 80mm deep by 100 mm wide. 004, 008 and 010 have a little woodworm damage. All the timbers converge at the top to meet central post 001.	004-010 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
East Turret.010	Turret rafter	004-011 are eight turret rafters. 004-010 sit on the turret wall head, 011 is much shorter and sits on the dormer ridge piece 012. The turret wall head under 005-008 was rebuilt in 2002 by HS, splashes of pink mortar on 005 indicate that the roof remained in place during this work. The timbers are machine cut, and stained dark brown, generally around 40mm deep by 120mm wide except for 005 and 009 which are 80mm deep by 100 mm wide. 004, 008 and 010 have a little woodworm damage. All the timbers converge at the top to meet central post 001.	004-010 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century
East Turret.011	Turret rafter	004-011 are eight turret rafters. 004-010 sit on the turret wall head, 011 is much shorter and sits on the dormer ridge piece 012. The turret wall head under 005-008 was rebuilt in 2002 by HS, splashes of pink mortar on 005 indicate that the roof remained in place during this work. The timbers are machine cut, and stained dark brown, generally around 40mm deep by 120mm wide except for 005 and 009 which are 80mm	004-010 are modern rafters. The turret roof was probably rebuilt in the 20th Century, possibly by the Ministry of Works in the early 20th Century.	20th Century

		deep by 100 mm wide. 004, 008 and 010 have a little woodworm damage. All the timbers converge at the top to meet central post 001.		
East Turret.012	Ridge piece	Ridge piece of the turret dormer above the door aperture to the E bedchamber. Machine cut, stained dark brown circa 40mm wide by 120mm high. Projects SW from central post 001, it is slotted and nailed to 001. To the SW it is tapered to sit on the base of the E bedchamber rafter 016. It is crudely attached to dormer frame timbers 013 and 014. Good condition.	Modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the MoW.	20th Century
East Turret.013	Dormer rafter	NE turret dormer rafter. More like a plank than a rafter, machine cut, stained dark brown, 200mm wide by 20mm deep. Crudely joined to ridge piece 012 at the top and crudely nailed to E bed chamber rafter 016 at the bottom. Fair condition with some woodworm damage at the bottom.	Modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the MoW. Odd timber to use as a rafter as it is more like a piece of sarking. Choice of timber reflects the poor quality of the dormer roofs in all turrets.	20th Century
East Turret.014	Dormer rafter	NW dormer rafter. Hand sawn, stained dark brown, 80mm square. Crudely joined to ridge piece 012 at the top and nailed to dormer rafter 015 at the base. Good condition.	Modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the MoW.	20th Century
East Turret.015	Dormer rafter	SW dormer rafter. Machine cut, stained dark brown, 60mm wide by 160mm deep. At the top it is nailed to the side of **E bedchamber.6.051** which in turn is nailed to the side of E bedchamber rafter 016. At the bottom it sits on the turret wall head. Good condition but it has a little woodworm damage.	Modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the MoW.	20th Century
East Turret.016	Rafter	Same as **E bedchamber.6.015**. Base of E bed chamber rafter **E bedchamber.6.015** sitting on the turret wall head. Dormer rafter 013 and ridge piece 012 are nailed to the rafter. Also visible is the top of ashlar post 017 joined to 016 with a mortice and tenon joint pinned with a dowel. Fair condition but with some cracks.	1590's roof timber, in original position with 20th Century roof elements incorporating the rafter into the current turret roof.	1590's
East Turret.017	Ashlar	Same as **E bedchamber.021** Top of an ashlar post, just visible from within the turret, hand cut oak, joined to E bedchamber rafter 016 with a mortice and tenon joint, pinned with a dowel. Circa 130mm square. Fair condition but it has some large cracks in it.	1590's ashlar post.	1590's
East Turret.018	Sarking	General number for the sarking in the E turret cone and the dormer roof. Mixture of widths of machine cut boards, stained mid brown, circa 200mm wide up to 280mm wide. At the top the boards are aligned vertically. The boards have nails protruding. There is no evidence of reuse. Good condition but some of the sarking has a little woodworm damage.	Modern timber. The turret roof was probably rebuilt in the 20th Century, possibly by the MoW.	20th Century

A2. APPENDIX 2: LIST OF PHOTOGRAPHS

Gatehouse		
Photo	**Description**	**Date**
001	Carpenters mark on truss **Gatehouse.003**	14/7/08
002	Carpenters mark on truss **Gatehouse.002**	14/7/08
003	Rafter, ashlar post and sole piece of truss **Gatehouse.004**	14/7/08
004	Trimmer **Gatehouse.017** of E window.	14/7/08
005	Trimmer **Gatehouse.039** of E window.	14/7/08
006	E Rafter of truss **Gatehouse.001** showing mortice for missing collar.	14/7/08
007	E Rafter of truss **Gatehouse.001** showing mortice for missing collar.	14/7/08
008	W rafter of truss **Gatehouse.001**, **Gatehouse.002** and **Gatehouse.001** showing residual ceiling **Gatehouse.072**.	14/7/08
009	Underside of the collar of truss **Gatehouse.005** showing nail holes for the ceiling.	14/7/08
010	Modern S truss **Gatehouse.054**	14/7/08
011	General shot of gatehouse roof from NW corner.	14/7/08
012	General shot of gatehouse roof from NW corner.	14/7/08
013	General shot of gatehouse roof from SE corner.	14/7/08
014	General shot of gatehouse roof from SE corner.	14/7/08
015	General shot showing the block of reduced gatehouse masonry in the NE corner.	14/7/08
016	General shot of the E wallhead.	14/7/08
017	General shot of the W wallhead	14/7/08
018	W window and N window.	14/7/08

West Bedchamber		
Photo	**Description**	**Date**
019	General shot of the W end of the roof.	14/7/08
020	General shot of the W end of the roof.	14/7/08
021	General shot of the E end of the roof.	14/7/08
022	General shot of the E end of the roof.	14/7/08
023	General shot showing **West Bedchamber.030** and	14/7/08

	West Bedchamber.031.	
024	Shot showing the base of ridgepiece **West Bedchamber.003** and rafter **West Bedchamber.014** both of which are replacements.	14/7/08
025	Shot showing the base of ridgepiece **West Bedchamber.003** and rafter **West Bedchamber.014** both of which are replacements.	14/7/08
026	General shot along the top of the joists for the attic floor.	14/7/08
027	General shot along the top of the joists for the attic floor.	14/7/08
028	Attempted shot to show carpenters marks and mortice on ridgepiece **West Bedchamber.001**.	14/7/08
029	Example of sarking peg holes in the underside of edging **West Bedchamber.026**.	14/7/08
030	Example of sarking peg holes in the underside of edging **West Bedchamber.026**.	14/7/08
031	Example of redundant mortice and dowel holes in the underside **West Bedchamber.025**.	14/7/08
032	W side of roof showing evidence of reuse of purlins and rafters.	14/7/08
033	W side of roof showing evidence of reuse of purlins and rafters.	14/7/08
034	Replaced dormer roof above the W window.	14/7/08
035	Example of pockets in masonry below **West Bedchamber.024** and **West Bedchamber.025** for combed ceiling.	14/7/08

West Turret		
Photo	**Description**	**Date**
036	Reused sarking boards with sarking peg holes.	14/7/08
037	Reused sarking boards with sarking peg holes.	14/7/08
038	General shot of main turret cone.	14/7/08
039	General shot of main turret cone.	14/7/08
040	General shot of dormer roof over the door.	14/7/08
041	General shot of dormer roof over the door.	14/7/08

NorthWest Turret		
Photo	**Description**	**Date**
042	Shot showing the N rafter of Gallery Truss 1.	14/7/08
043	General shots of the main turret cone.	14/7/08
044	General shots of the main turret cone.	14/7/08
045	General shots of the main turret cone.	14/7/08
046	General shot of the dormer roof.	14/7/08

Central Turret		
Photo	**Description**	**Date**
047	Base of Gallery Truss 10, N rafter in E wall of turret.	14/7/08
048	Base of Gallery Truss 9, N rafter in W wall of turret.	14/7/08
049	General shot of reused rafters showing mortices.	14/7/08
050	Example of sarking peg holes on the underside of a rafter.	14/7/08
051	Sarking pegs protruding through the current sarking.	14/7/08
052	Detail of sarking pegs.	14/7/08
053	General shot of the main turret cone.	14/7/08
054	General shot of the main turret cone.	14/7/08
055	General shot of the main turret cone.	14/7/08
056	General shot showing most elements of the turret roof.	14/7/08
057	General shot showing most elements of the turret roof.	14/7/08
058	General shot showing most elements of the turret roof.	14/7/08
059	General shot showing most elements of the turret roof.	14/7/08

North East Turret		
Photo	**Description**	**Date**
060	N rafter of Gallery Truss 17 on W side of the turret also showing rebuild.	14/7/08
061	General shot of the dormer roof.	14/7/08
062	General shot of the main turret cone.	14/7/08
063	General shot of the main turret cone.	
064	General shot of the main turret cone.	

East Turret		
Photo	**Description**	**Date**
065	General shot of the dormer roof.	14/7/08
066	General shot of the main turret cone.	14/7/08
067	General shot of the main turret cone.	14/7/08

East Bedchamber		
Photo	**Description**	**Date**
068	Replaced dormer roof above E window.	14/7/08
069	General shot of the E side of the roof.	14/7/08
070	General shot of the E side of the roof.	14/7/08
071	General shot of the W side of the roof.	14/7/08
072	General shot of the W side of the roof.	14/7/08
073	General shot of the S side of the roof.	14/7/08
074	General shot of the S side of the roof.	14/7/08
075	Timber braces **East Bedchamber.026** and **East Bedchamber.024**.	14/7/08
076	Purlin **East Bedchamber.029** and braces **East Bedchamber.027** and **East Bedchamber.028**	14/7/08
077	Purlin **East Bedchamber.029** and braces **East Bedchamber.027** and **East Bedchamber.028**	14/7/08
078	Ridgepiece **East Bedchamber.002** showing redundant mortice.	14/7/08
079	Modern timbers **East Bedchamber.044** and **East Bedchamber.045**.	14/7/08
080	Modern S concrete wall.	14/7/08

081	Rafter **East Bedchamber.006** carpenters mark.	14/7/08
082	Rafter **East Bedchamber.006** carpenters mark.	14/7/08
083	Rafter **East Bedchamber.007** carpenters mark.	14/7/08
084	Rafter **East Bedchamber.007** carpenters mark.	14/7/08
085	Edging **East Bedchamber.058** carpenters mark.	14/7/08
086	Purlin/joist **East Bedchamber.054** supported by girder **East Bedchamber.046**.	14/7/08
087	Additional modern rafter **East Bedchamber.012**.	14/7/08
088	General shot looking along the level of the attic floor over joists **East Bedchamber.023**, **East Bedchamber.025**, and **East Bedchamber.058**.	14/7/08
089	General shot looking along the level of the attic floor over joists **East Bedchamber.023**, **East Bedchamber.025**, and **East Bedchamber.058**.	14/7/08
090	General shot showing reuse of attic level N gunloop as a joist pocket for modern timbers.	14/7/08
091	General shot showing reuse of attic level N gunloop as a joist pocket for modern timbers.	14/7/08
092	Sarking peg holes on the underside of purlin **East Bedchamber.029**.	14/7/08
093	Sarking peg holes on the underside of purlin **East Bedchamber.029**.	14/7/08

Stair Loft		
Photo	**Description**	**Date**
094	Shot of carpenters marks on E rafters **Stair Loft.015** and **Stair Loft.016**.	14/7/08
095	Shot of carpenters marks on E rafters **Stair Loft.015** and **Stair Loft.016**.	14/7/08
096	Pine frame **Stair Loft.080** for (now removed) water tank.	14/7/08
097	Collars **Stair Loft.011** and **Stair Loft.014**.	14/7/08
098	Collars **Stair Loft.011** and **Stair Loft.014**.	14/7/08
099	Deteriorated top part of E rafter **Stair Loft.021**.	14/7/08
100	Modern vent **Stair Loft.079** and loose boards.	14/7/08
101	Pit sawn marks on collar **Stair Loft.017**.	14/7/08
102	Pit sawn marks on collar **Stair Loft.017**.	14/7/08
103	Chiseled carpenters mark on collar **Stair Loft.014**.	14/7/08

104	Chiseled carpenters mark on collar **Stair Loft.014**.	14/7/08
105	Sawn carpenters mark on collar **Stair Loft.023**.	14/7/08
106	Small upper collar **Stair Loft.037**.	14/7/08
107	E end of collar **Stair Loft.029** showing series of notches.	14/7/08
108	E end of collar **Stair Loft.029** showing series of notches.	14/7/08
109	General shot of E pitch sarking.	14/7/08
110	General shot of E pitch sarking.	14/7/08
111	N wall of tower showing corbels and joist pockets and blocked aperture.	14/7/08
112	Struts/king posts **Stair Loft.070- Stair Loft.073**.	14/7/08
113	General shot of the floor boards.	14/7/08
114	Trimmer **Stair Loft.032** above W dormer window.	14/7/08
115	Trimmer **Stair Loft.032** above W dormer window.	14/7/08
116	Ridge piece **Stair Loft.042** and spacer **Stair Loft.043** above E dormer window.	14/7/08
117	Sarking peg holes on the underside of collar **Stair Loft.016**.	14/7/08
118	Planks **Stair Loft.083** on the underside of collar **Stair Loft.014**.	14/7/08
119	Planks **Stair Loft.083** on the underside of collar **Stair Loft.014**.	14/7/08
120	Carpenters mark on underside of collar **Stair Loft.014**, partially obscured by **Stair Loft.083**.	14/7/08
121	Notch series on collar **Stair Loft.020**.	14/7/08
122	Trimmer **Stair Loft.033** above E window.	14/7/08
123	Trimmer **Stair Loft.034** above E fireplace (fireplace is in the men's toilet below).	14/7/08
124	Braces **Stair Loft.044** and **Stair Loft.045** for combed ceiling.	14/7/08
125	Braces **Stair Loft.044** and **Stair Loft.045** for combed ceiling.	14/7/08
126	Brace **Stair Loft.056** supporting rafter **Stair Loft.031**.	14/7/08
127	General shot of the E pitch.	14/7/08
128	General shot of the W pitch.	14/7/08

129	Braces **Stair Loft.035** and **Stair Loft.036**.	14/7/08
130	General shot of E pitch.	14/7/08
131	General shot of W pitch.	14/7/08
132	E pitch of inaccessible roof above the kitchen.	14/7/08
133	W pitch of inaccessible roof above the kitchen.	14/7/08
134	Floor of inaccessible roof above the kitchen.	14/7/08
135	Brick wall with girder in inaccessible roof above the kitchen.	14/7/08

A3. APPENDIX 3: LIST OF DRAWINGS

Drawing	Description	Scale
001	Underside plan of gatehouse roof.	1:20
002	S facing elevation of gatehouse roof.	1:20
003	E facing elevation of gatehouse roof.	1:20
004	Underside plan of NW turret.	1:20
005	NE facing elevation of NW turret.	1:20
006	Underside plan of central stair turret.	1:20
007	E facing elevation of central stair turret.	1:20
008	Underside plan of E turret.	1:20
009	S facing elevation of E turret.	1:20
010	Underside plan of W turret.	1:20
011	SW facing elevation of W turret.	1:20
012	Underside plan of NE turret.	1:20
013	NW facing elevation of NE turret.	1:20
014	Underside plan of E gallery.	1:20
015	W facing elevation of E gallery.	1:20
016	Underside plan of W gallery.	1:20
017	E facing elevation of W gallery.	1:20
018	Grid masterplan	1:50
019	E facing elevation of stair loft	1:20
020	Underside plan of stair loft.	1:20
021	Floor plan showing N and E turrets.	1:20
022	N facing section of truss 7 in the stair loft roof.	1:20
023	N facing section through the W bedchamber roof.	1:20
024	N facing section through the E bedchamber roof.	1:20
025	3D View of Gatehouse	-
026	3D View of Stair Loft	-
027	Plan of Roof	-

A4. APPENDIX 4: ILLUSTRATIONS

NB all the plans of the undersides of roofs are drawn as viewed from below, therefore East and West are flipped. On the printed version of this document some of the feature numbers can be hard to discern. For greater clarity the original TIFF and/or AutoCAD files can be viewed on the accompanying CD.

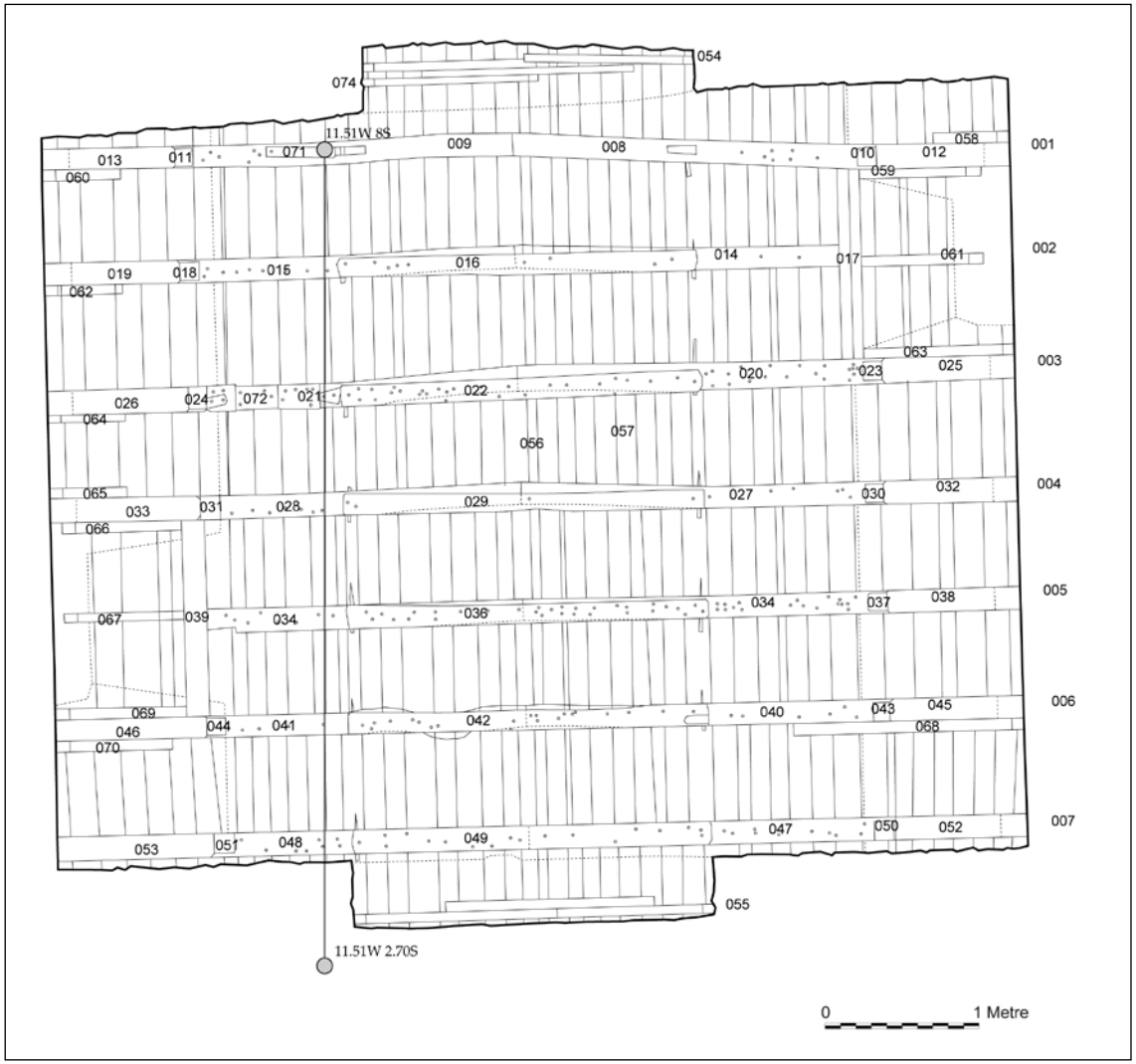


Figure 2: Underside Plan of Gatehouse Roof (N to bottom of page)

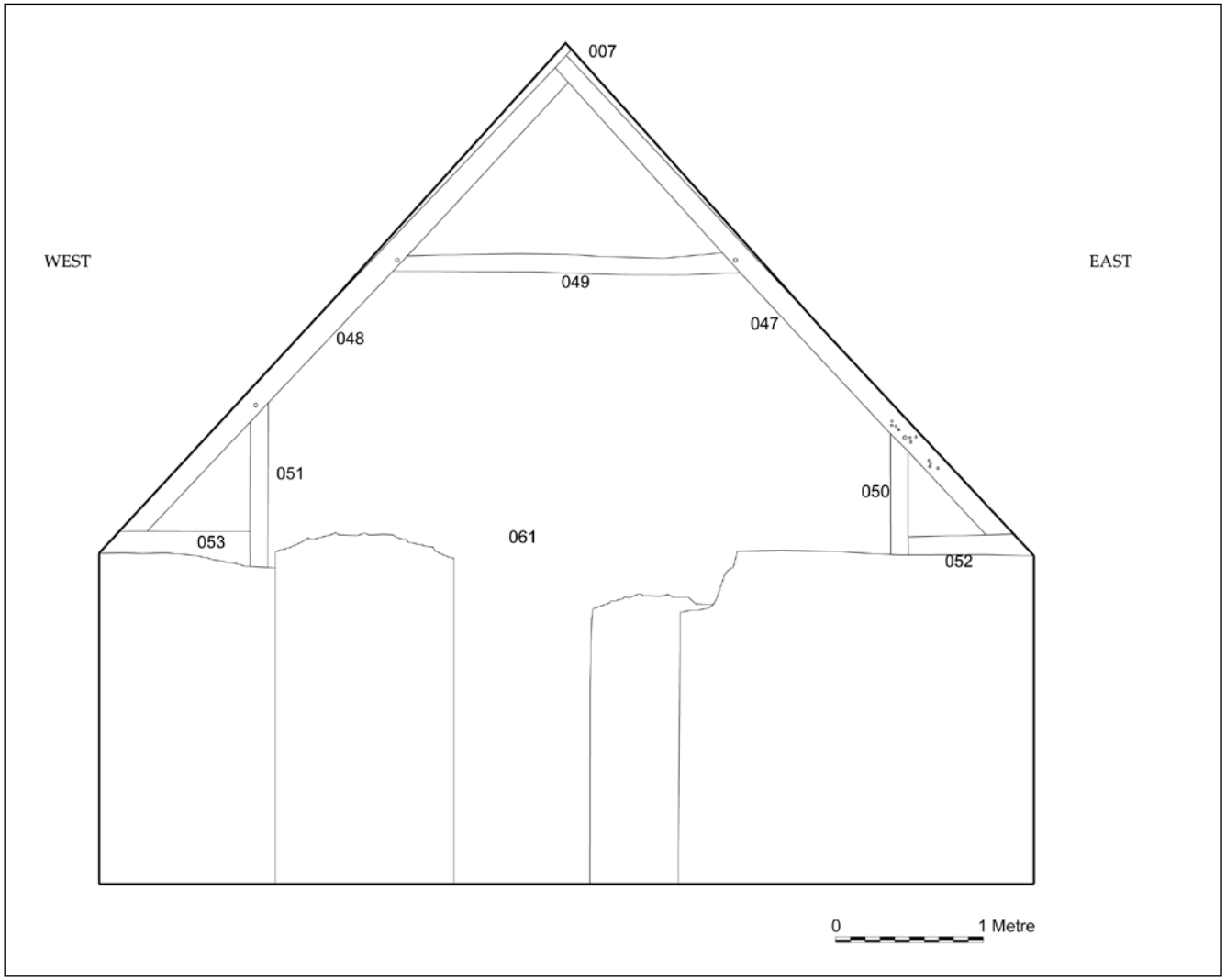


Figure 3: S Facing Elevation of Gatehouse Roof

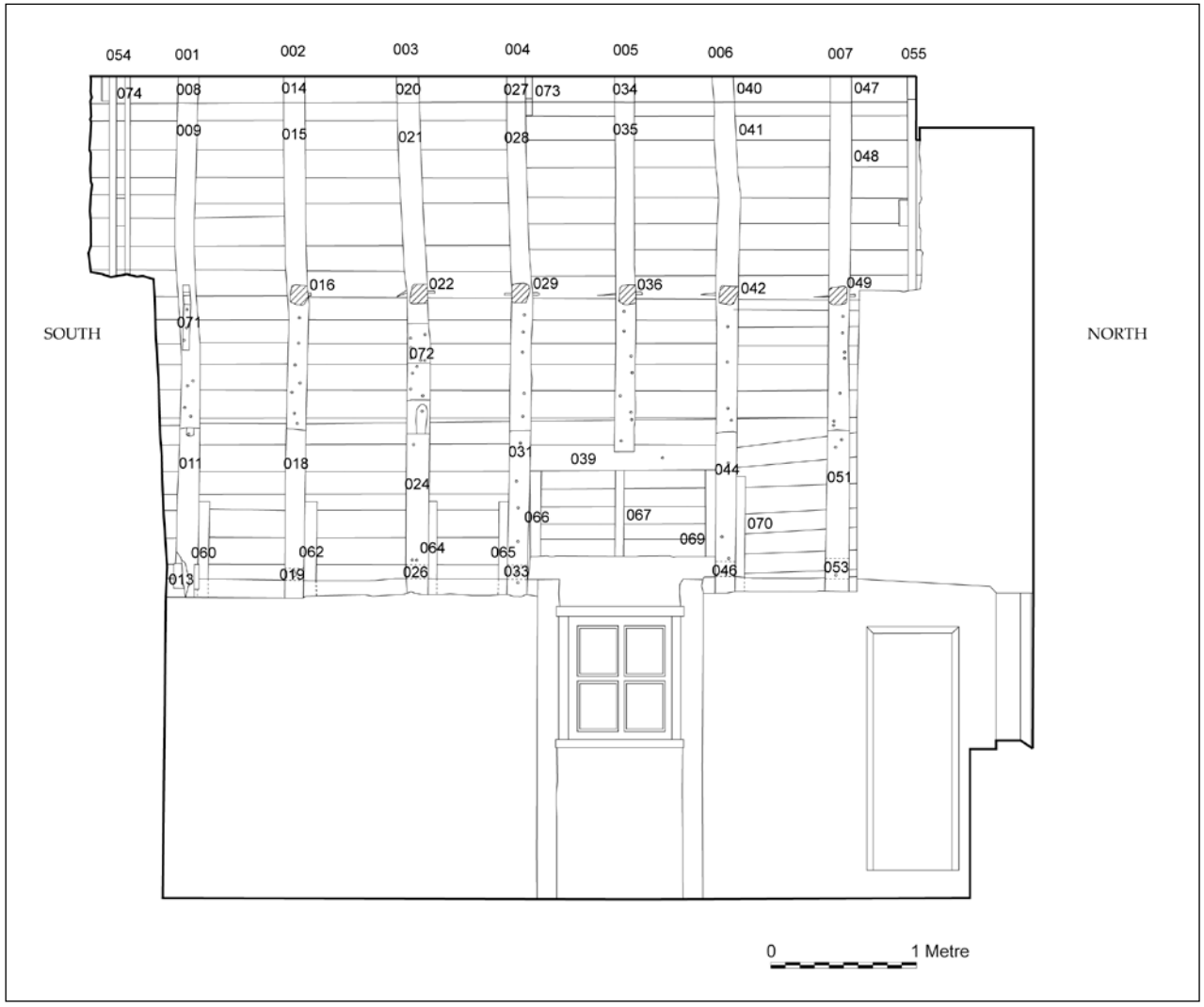


Figure 4: E Facing Elevation of Gatehouse Roof

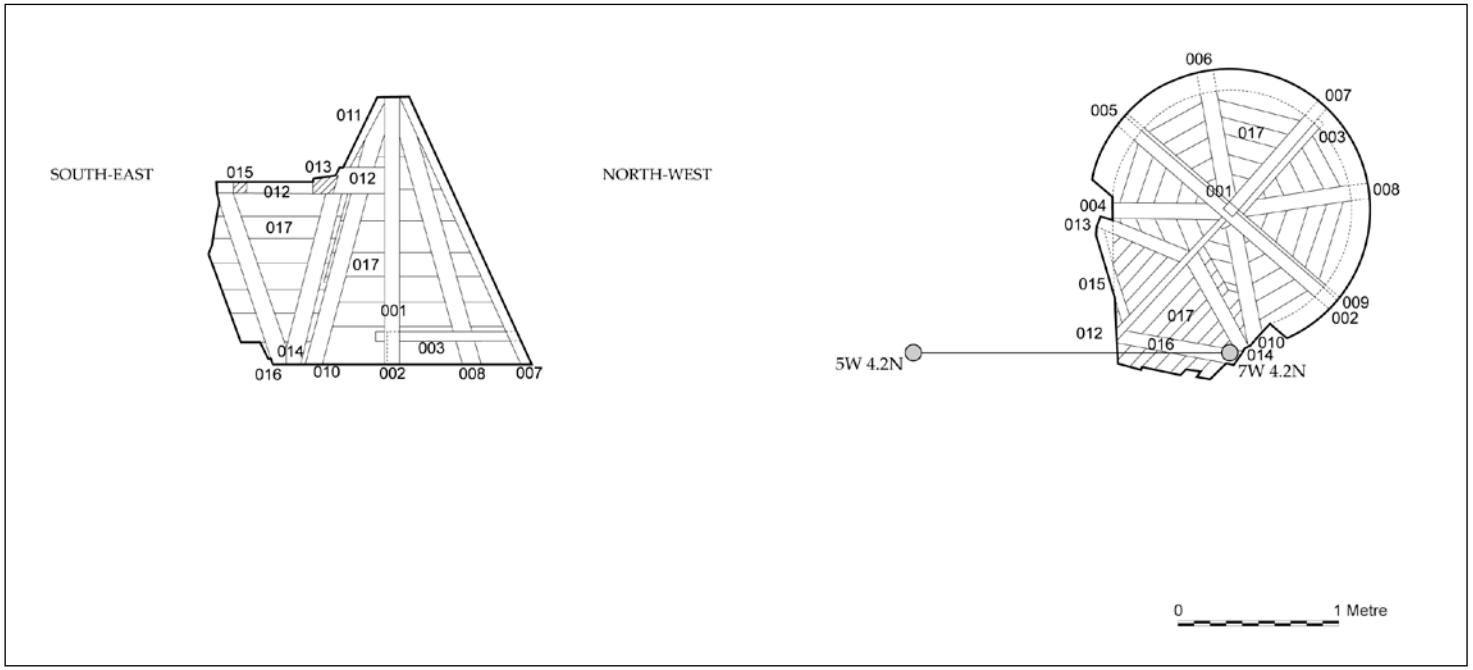


Figure 5: NE Facing Elevation & Underside Plan of NW Turret

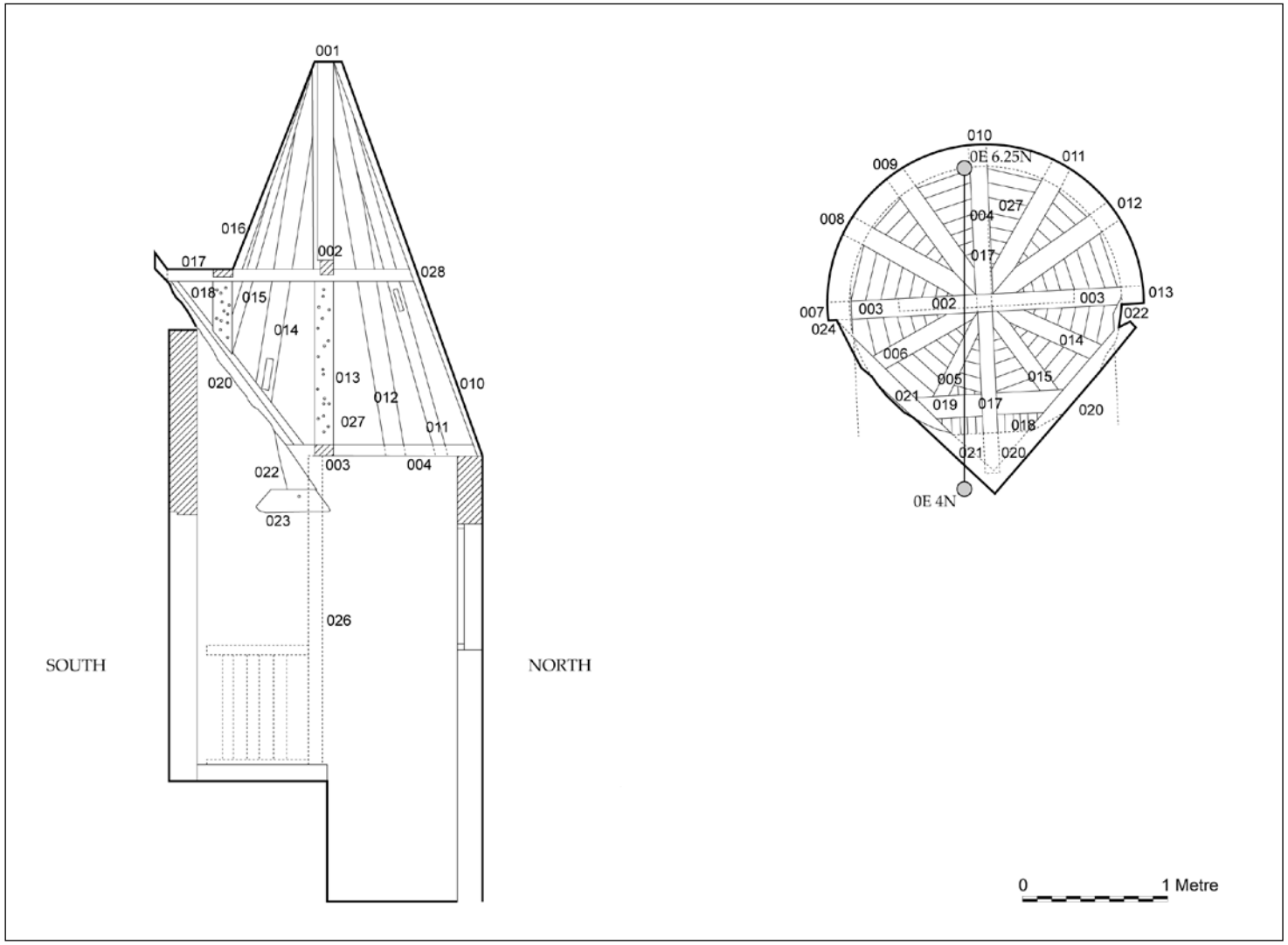


Figure 6: E Facing Elevation & Underside Plan of Central Turret

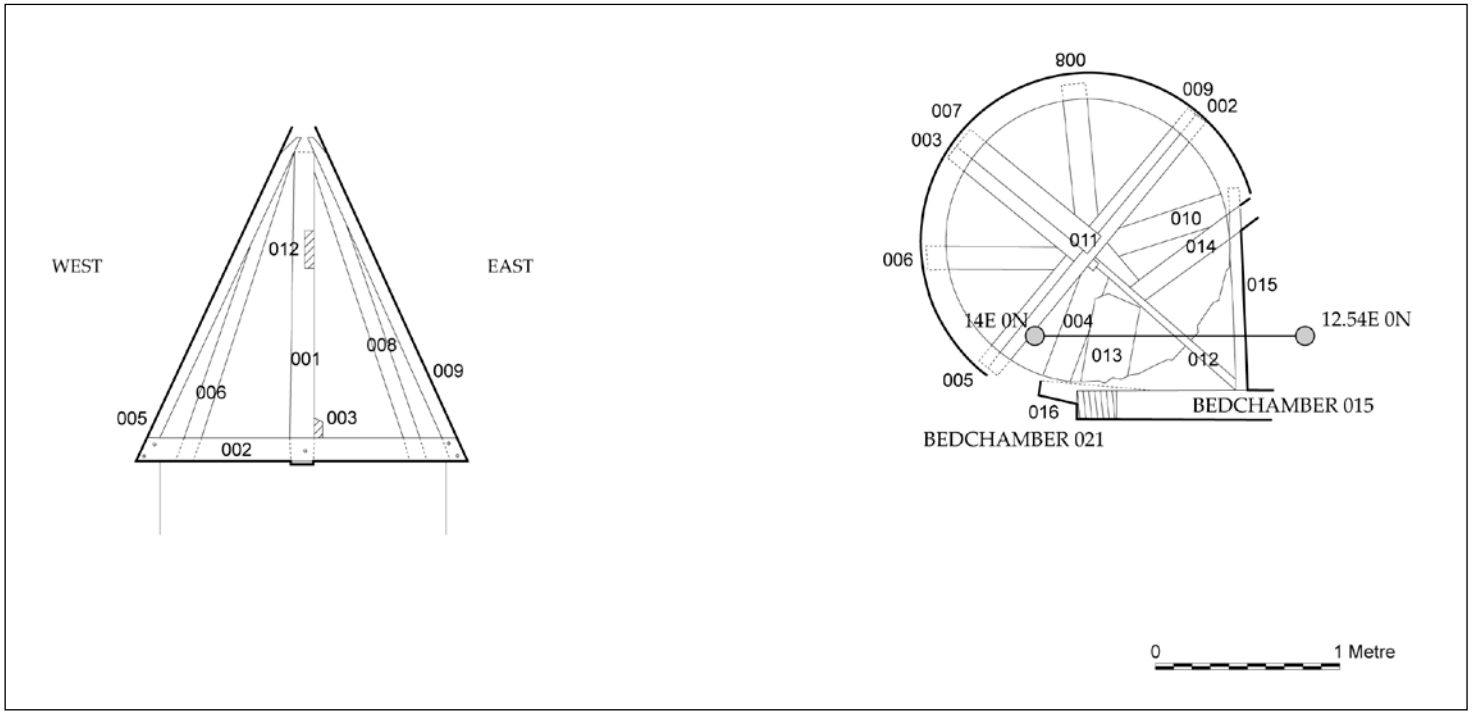


Figure 7: S Facing Elevation & Underside Plan of E Turret

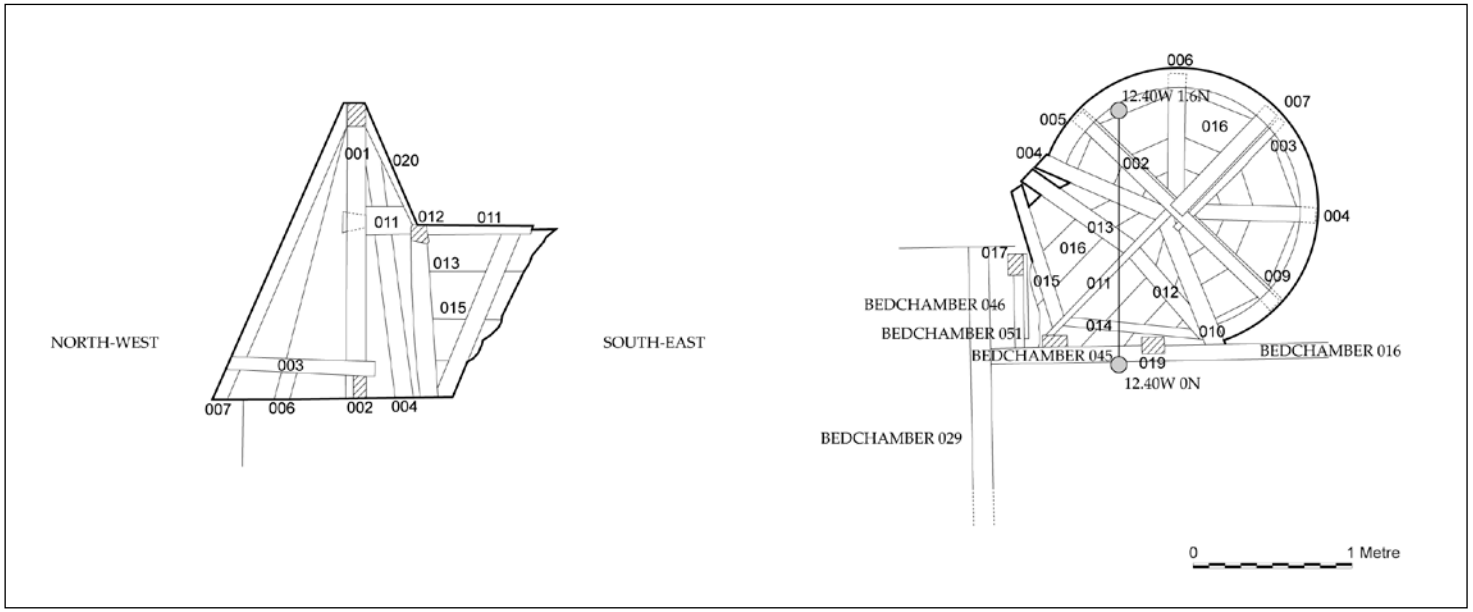


Figure 8: SW Facing Elevation & Underside Plan of W Turret

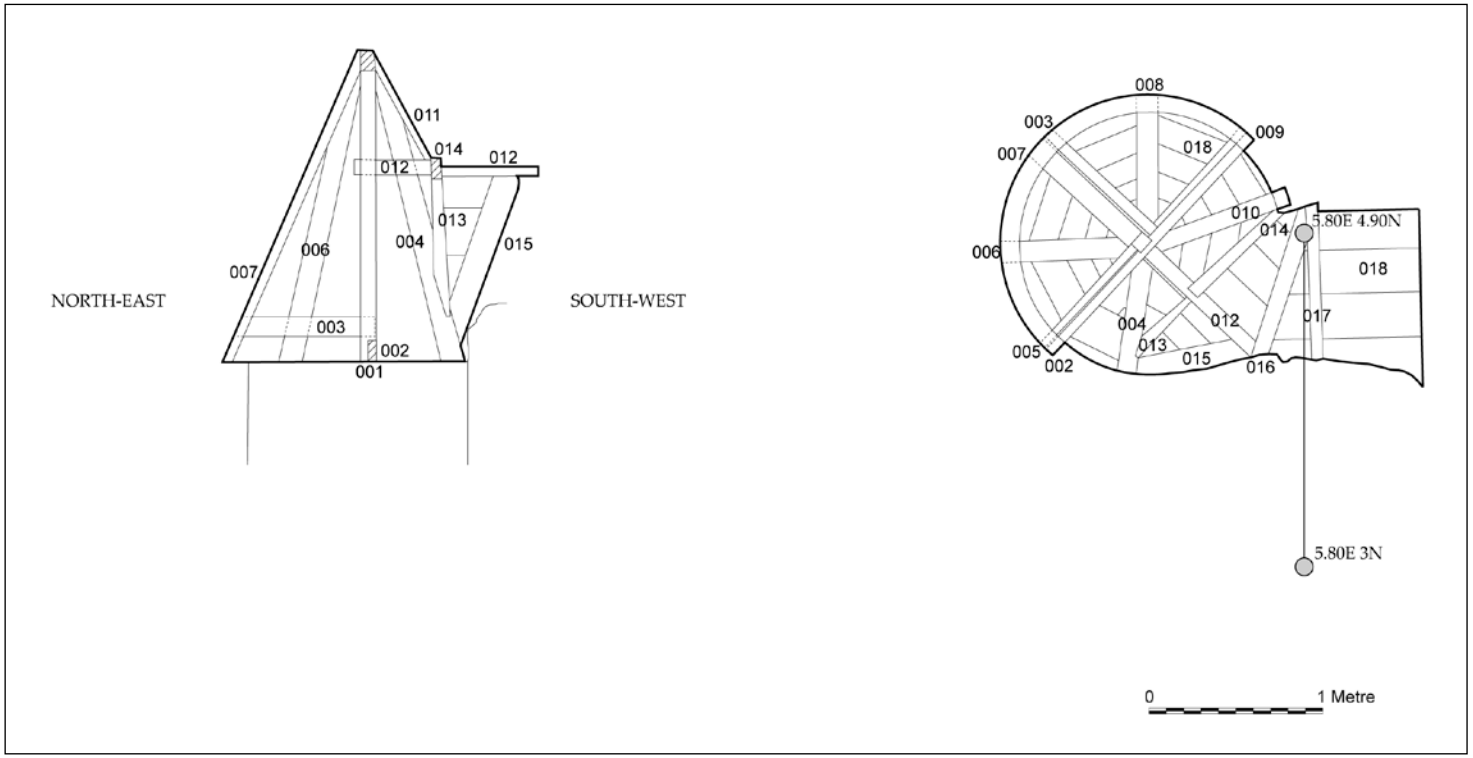


Figure 9: NW Facing Elevation & Underside Plan of NE Turret

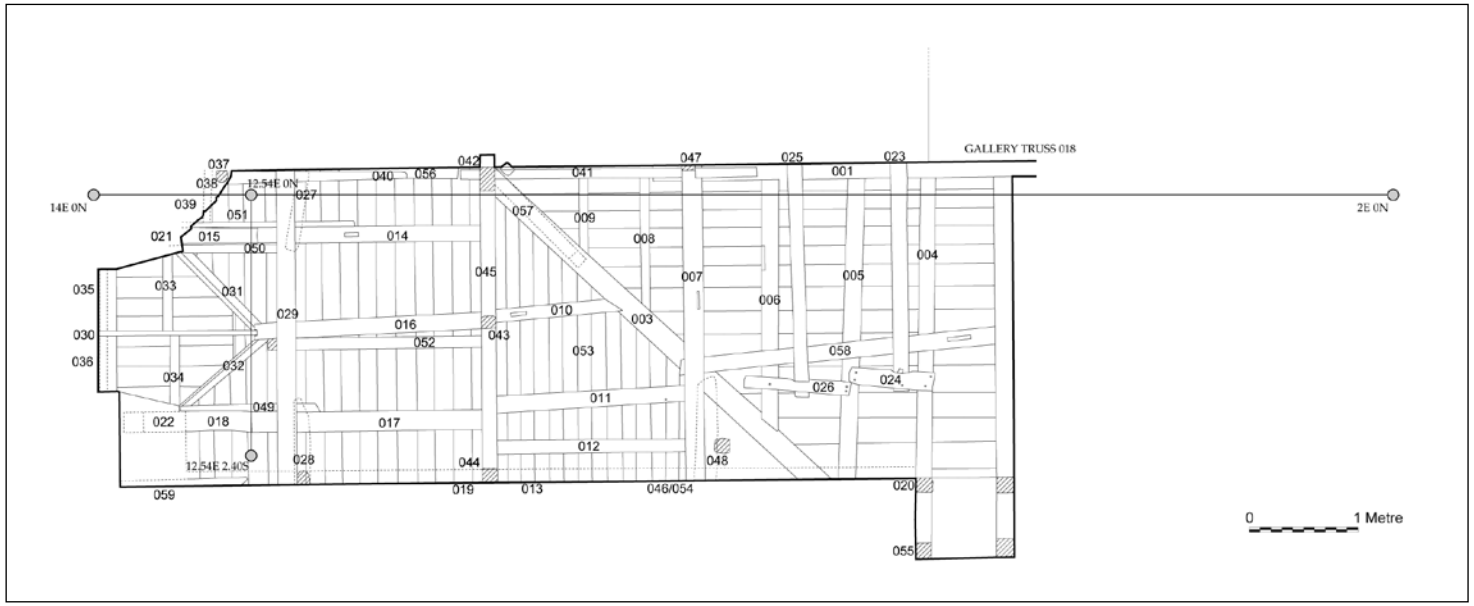


Figure 10: Underside Plan of East Bedchamber Roof (N to top of page)

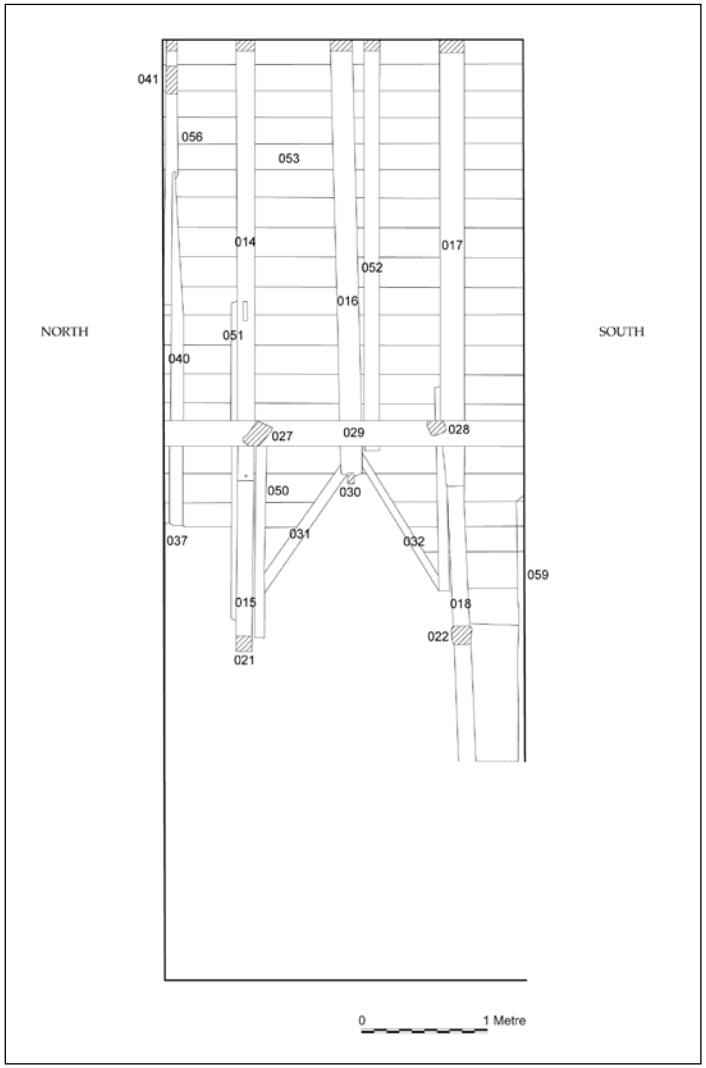


Figure 11: W Facing Elevation of East Bedchamber Roof

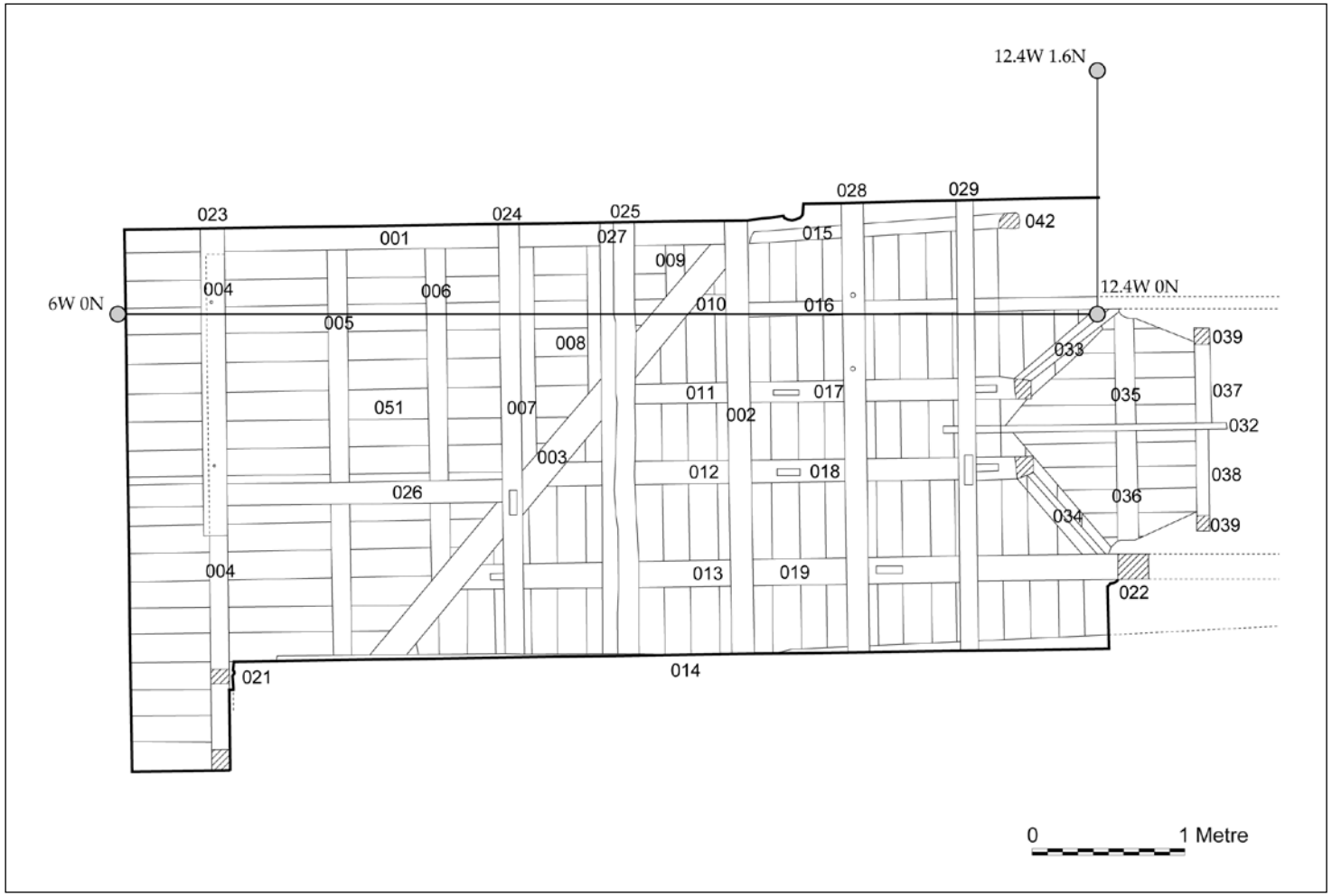


Figure 12: Underside Plan of West Bedchamber Roof (N to top of page)

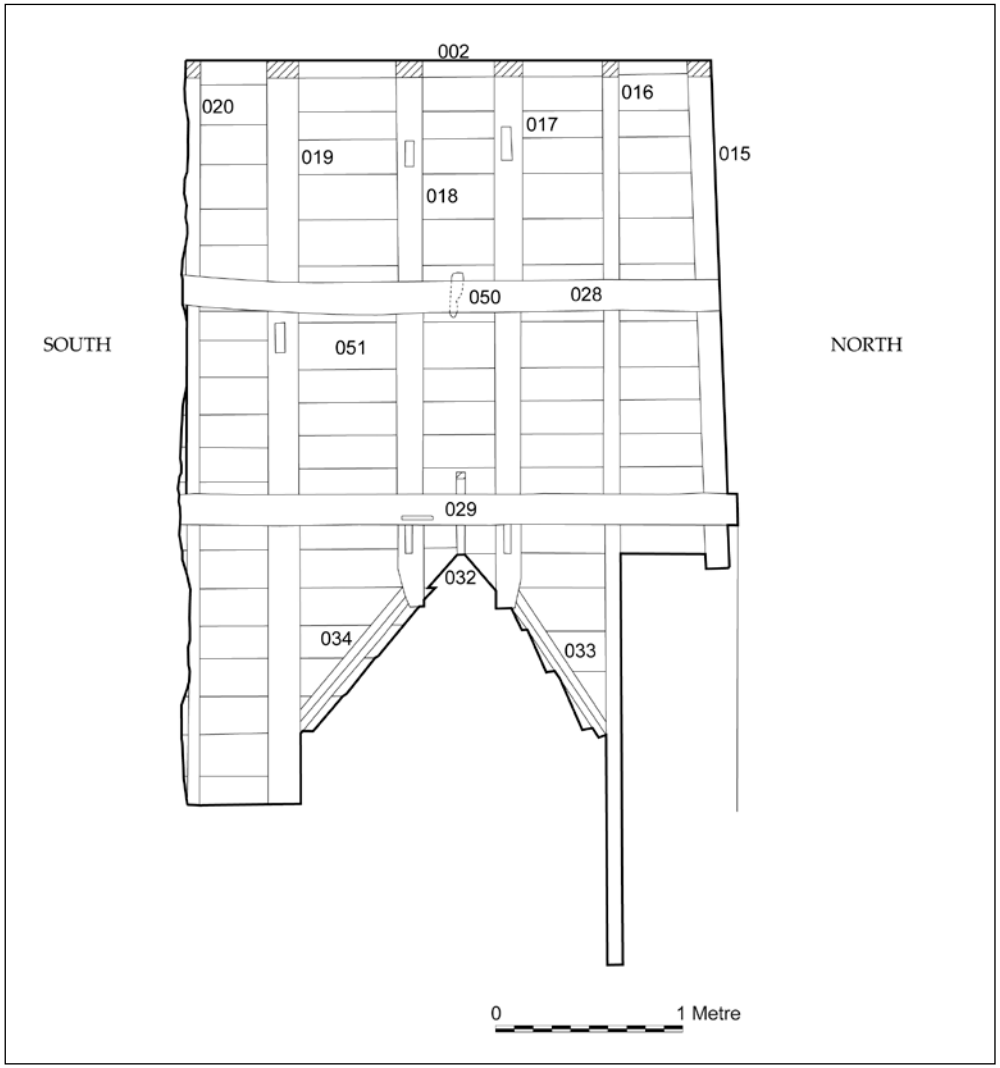


Figure 13: E Facing Elevation of West Bedchamber Roof

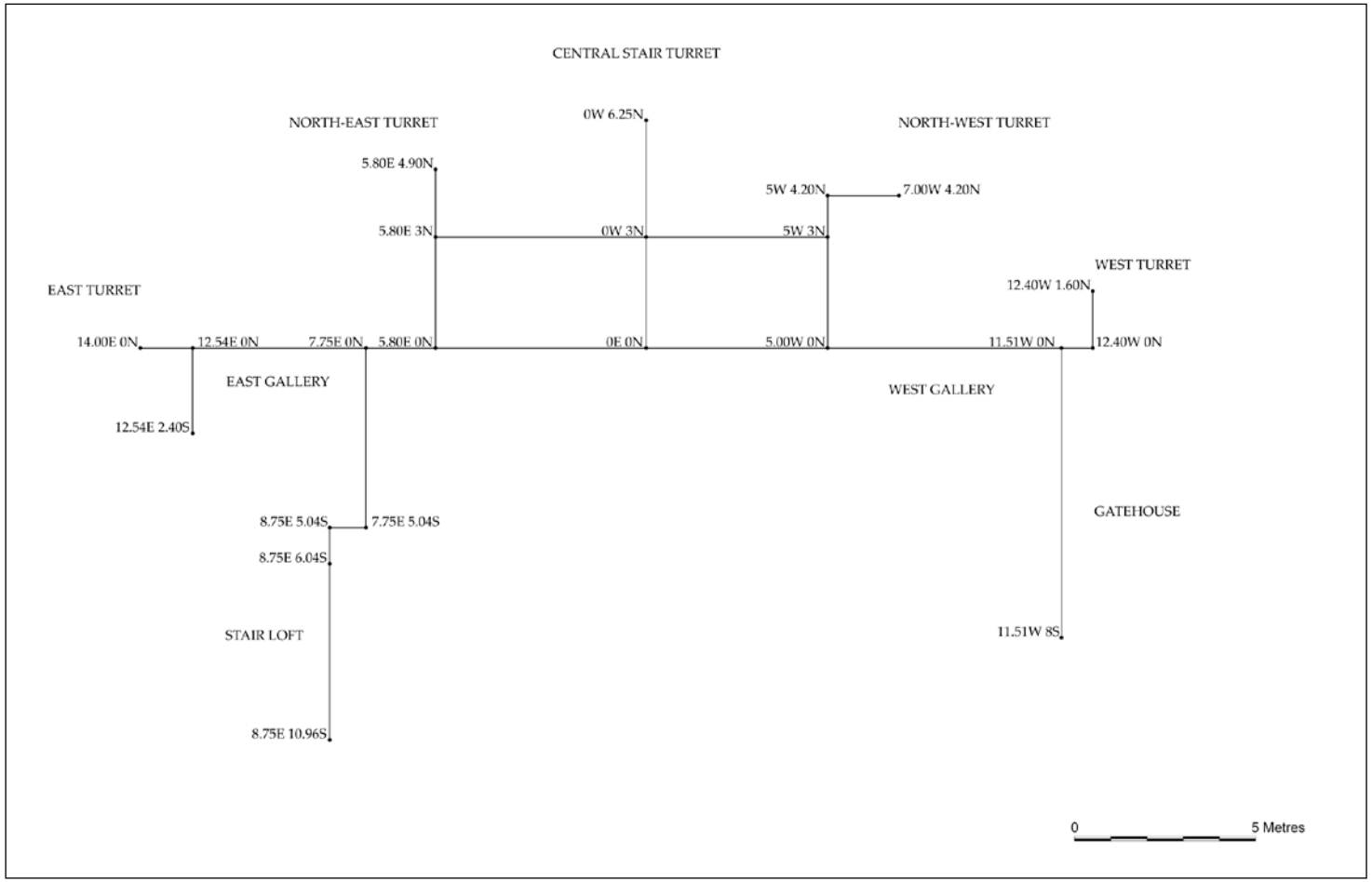


Figure 14: Grid Master Plan

NB East & West are reversed as the grid (and roof plans) were drawn as viewed from below. North to top of page.

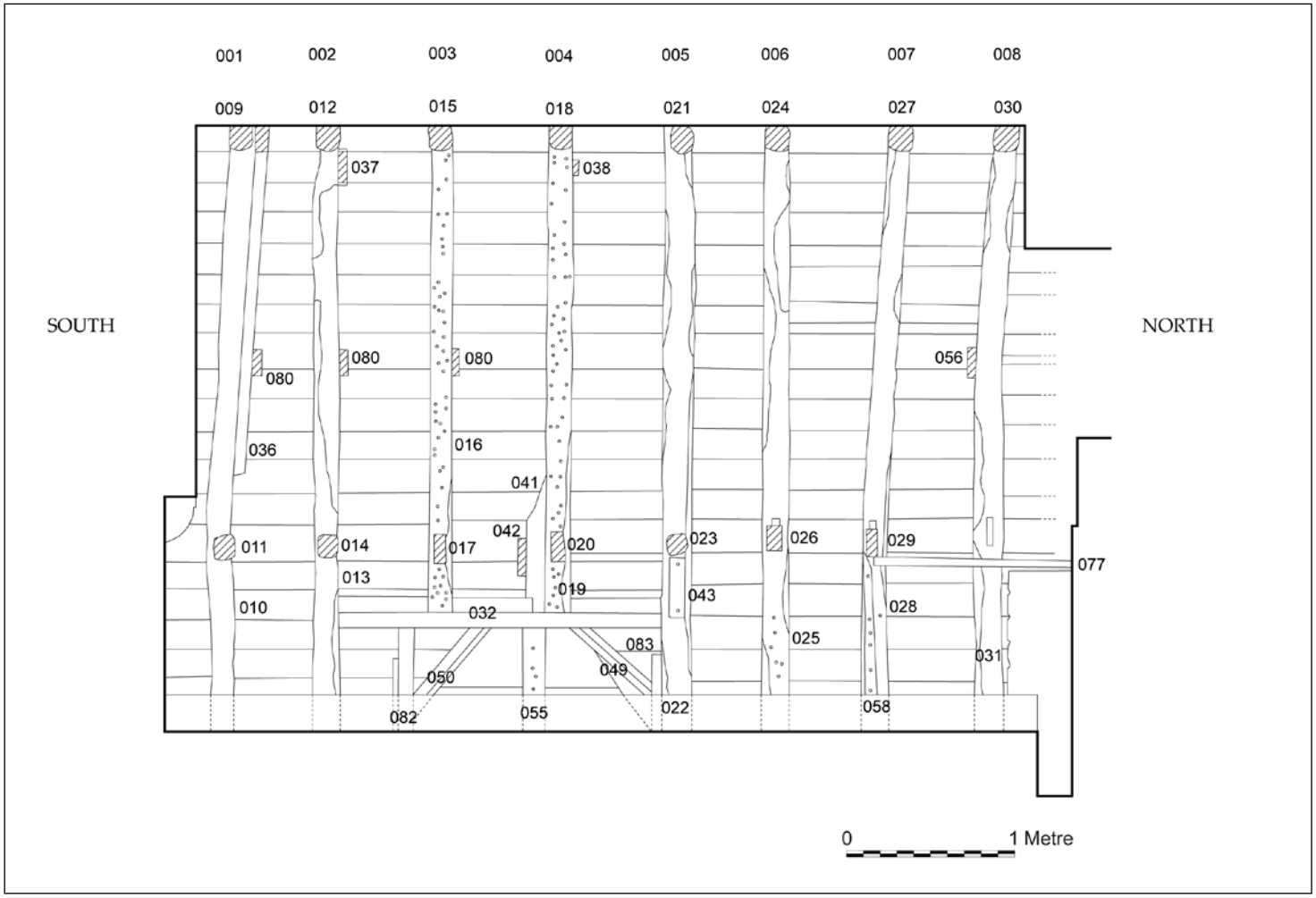


Figure 15: E Facing Elevation of Stair Loft

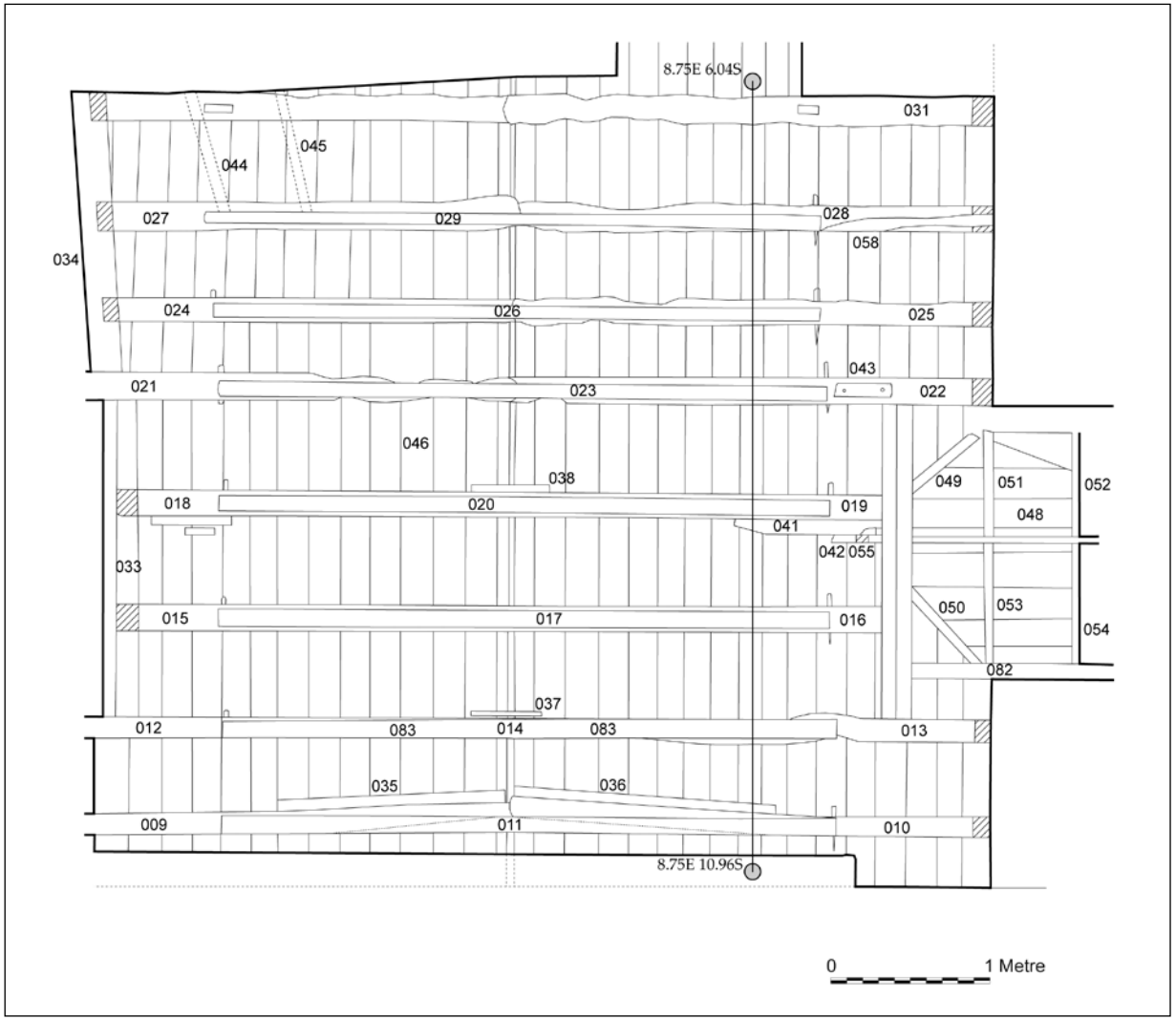


Figure 16: Underside Plan of Stair Loft (N to top of page)

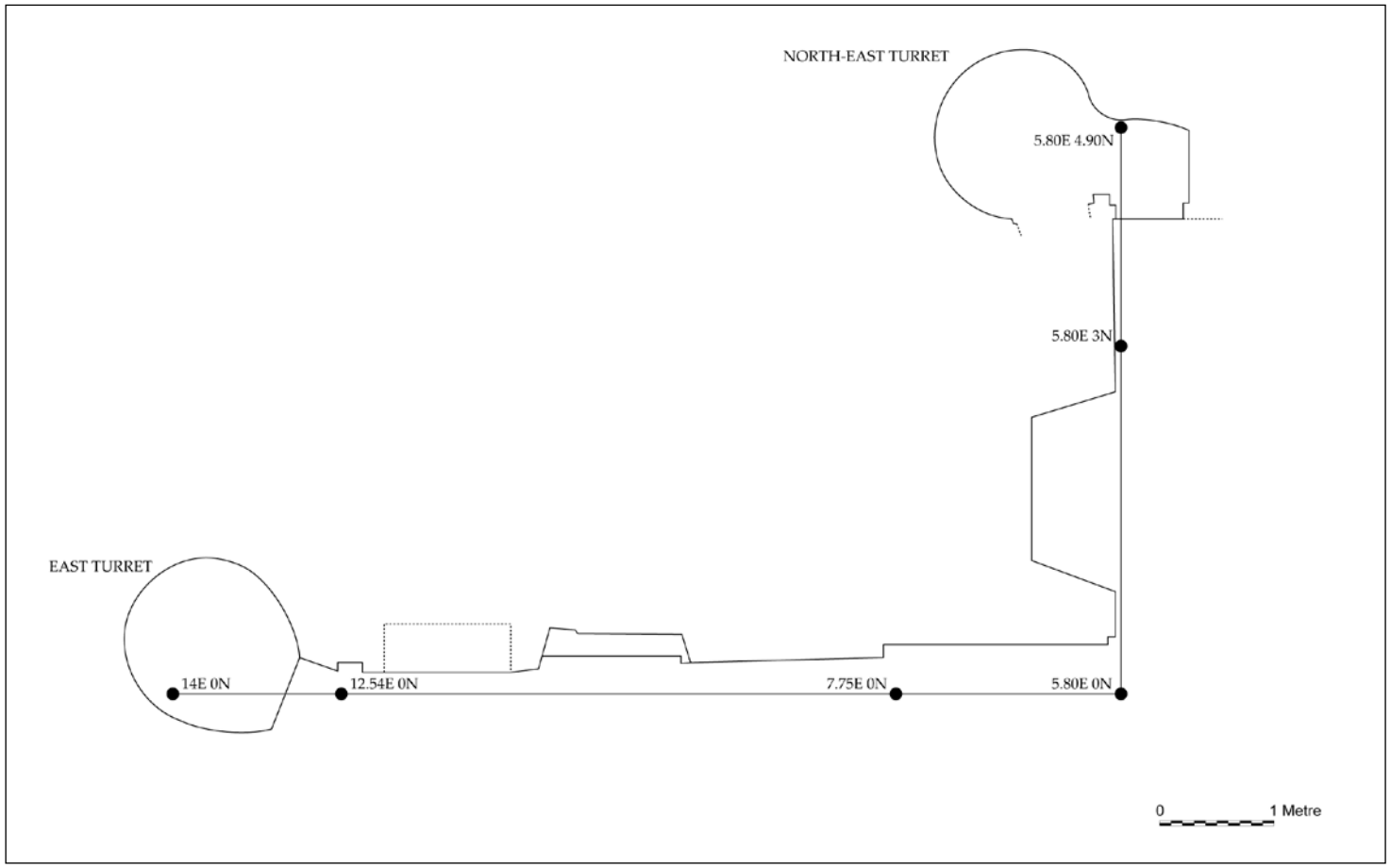


Figure 17: Plan Showing NE & E Turrets and grid points (drawn to fix the survey)

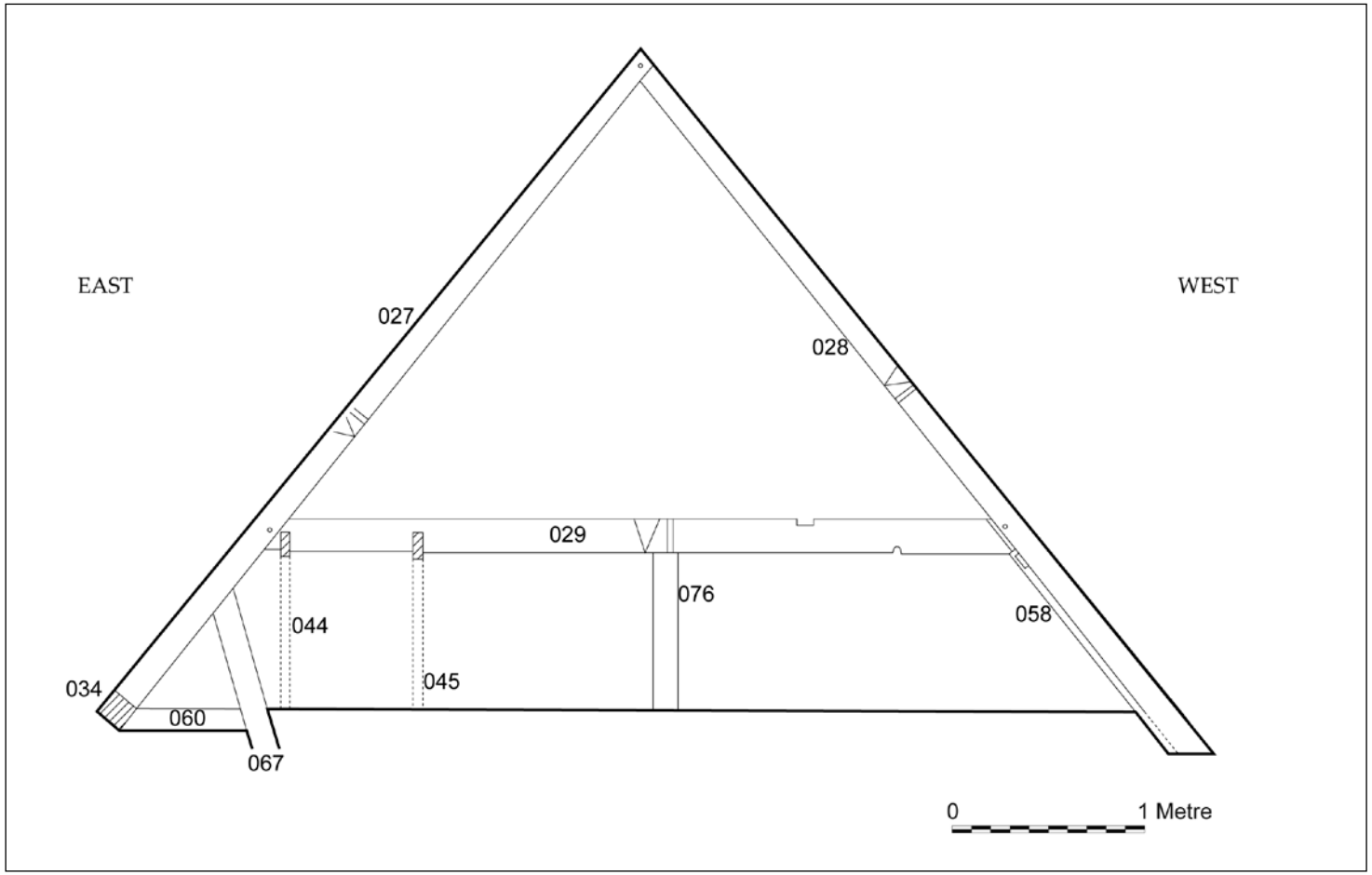


Figure 18: N Facing Section of Truss 7 in the Stair Loft

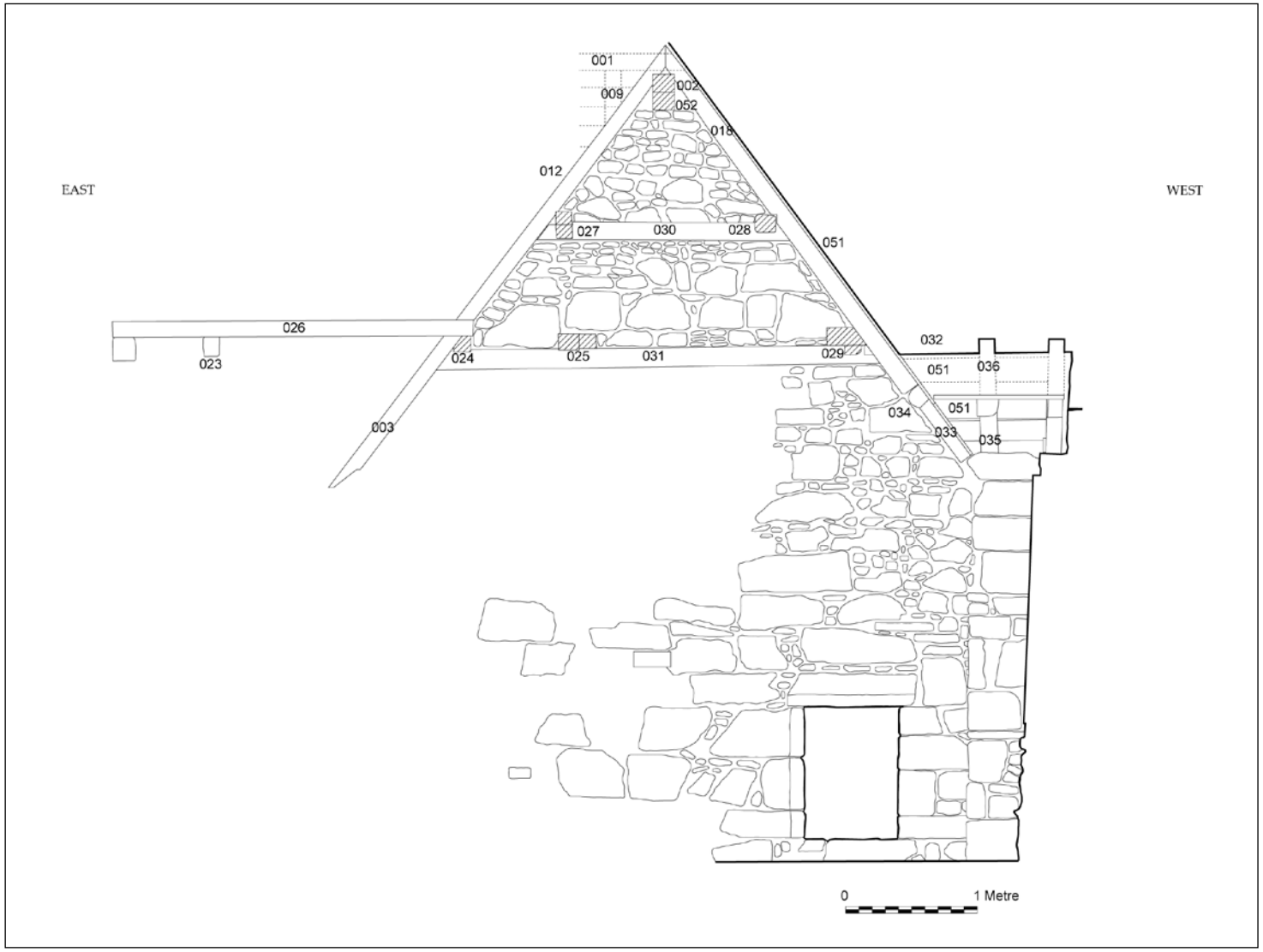


Figure 19: N Facing Section through the West Bedchamber Roof

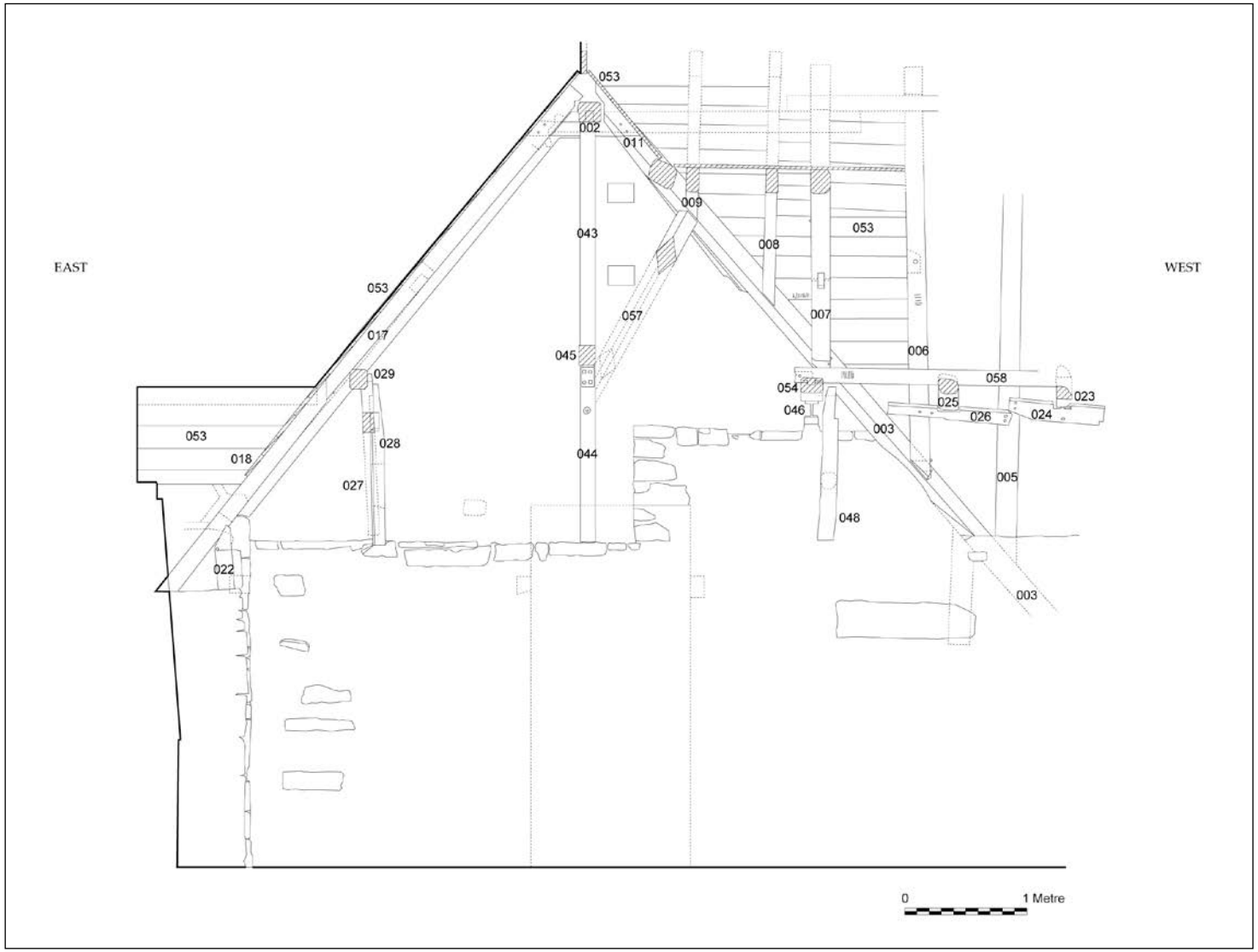


Figure 20: North Facing Section through the East Bedchamber Roof

Figure 21: 3D View of the Gatehouse Roof

Figure 22: 3D View of the Stair Loft Roof

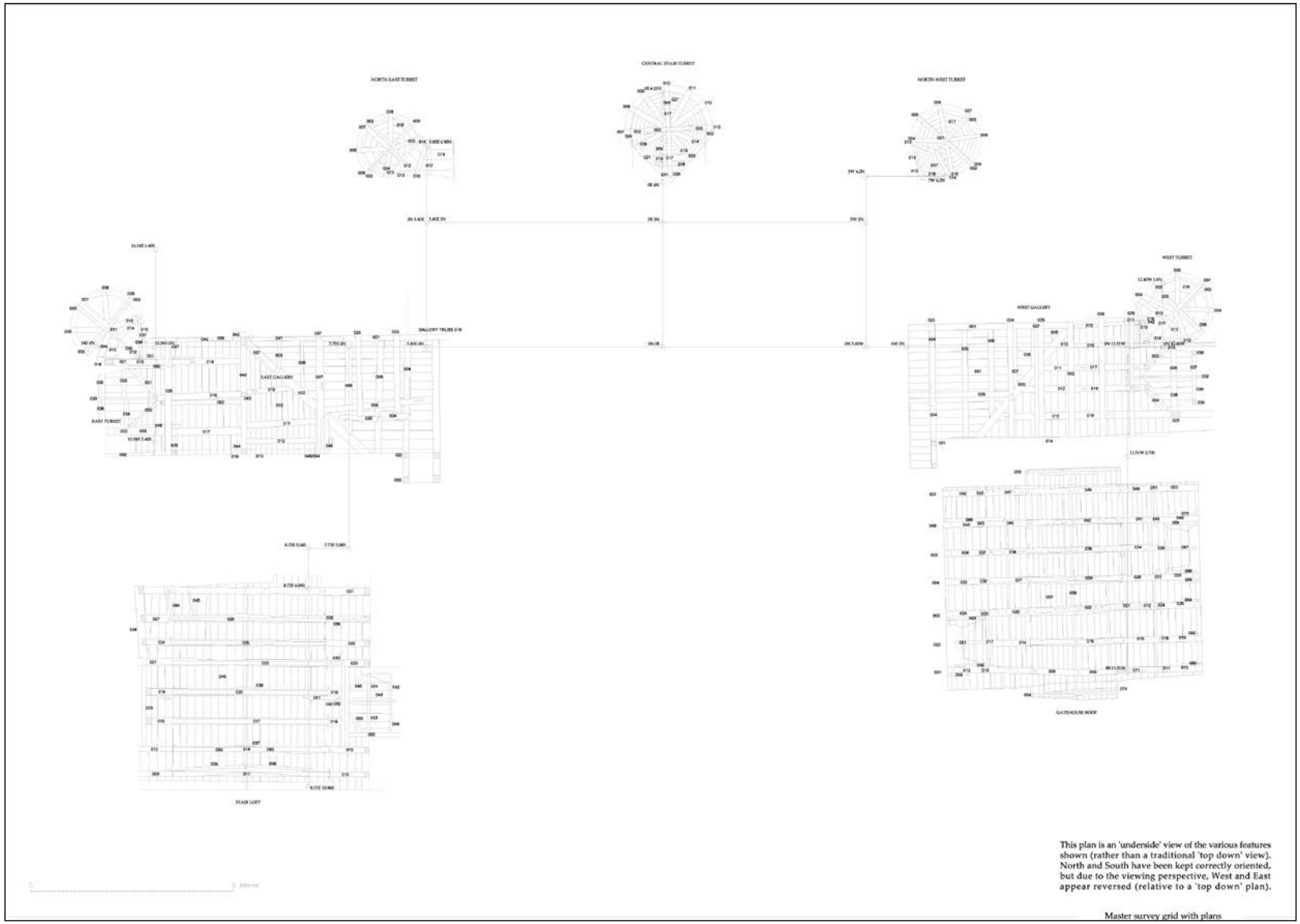
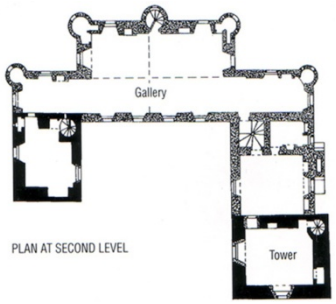


Figure 23: Plan of recorded roof structure as viewed from below (ie E & W are reversed)

A5. APPENDIX 5: SPECIALIST ANALYSIS OF THE ROOFS OF NEWARK CASTLE BY THORSTEN HANKE

1.0 Introduction

Newark Castle is a fine residential building that overlooks the Firth of Clyde some 20 miles west of Glasgow. Attractively blending medieval and Renaissance features,[1] Newark provides an excellent example of the 'Scottish Chateau', as Charles McKean has named these stately houses in which an emphasis on fortification had already given way to more light-hearted aspects of architecture.[2] Such buildings became popular in Scotland during and after the reign of James IV. Newark Castle shows the underlying architectural and social development of this time in a characteristic way. Its U-shaped floorplans, the generous and regular employment of large apertures, the application of proto-classical detailing around windows and doors, as well as the symmetrical lay-out of its northern elevation, are indicative of a lifestyle that can only be understood in the wider context of the European Renaissance.



Plates 1 and 2
Floorplan and south view of Newark Castle.

Newark Castle also displays a rich roof architecture. It comprises rafter single roofs of different typology, purlin roofs, circular turrets, flat roofs, remains of lean-to roofs, and, if we expand our attention to the adjacent dovecot, even solid stone structures. Thus Newark offers an excellent opportunity to observe almost all important early Scottish roof-types in great detail, and its analysis considerably affects our knowledge on historic Scottish roof-construction, as well as on early Scottish building trades.

[1] Erected from the late 15th century onwards, Newark Castle saw its most significant alteration between 1597 and 1599 when Sir Patrick Maxwell connected a tall rectangular tower and a gatehouse by a northern range. For additional details on the historical development, see Tabraham (1996), pp. 4-8.
[2] For the definition of the term 'Scottish Chateau', see McKean (2001), pp. v-vi.

The analysis of historic roofs often reveals data that makes it possible to determine the individual history of buildings with precision.[3] Of particular importance in this aspect is not only the application of dendrochronology but also the full archaeological investigation of roof-timbers and fixings, such as nails, pegs and screws. The inspection of these items provides far-reaching insights into the construction process and almost always discloses the tools used. Moreover, roof timbers often provide an important primary source for the understanding of historic trade patterns.[4] Early roofs are for these reasons a valuable source of the work conditions of craftsmen – a social group that hardly left any written records at all – and often indicative of the underlying economic conditions that inevitably impacted the evolution of architectural culture.

Large parts of Newark Castle had been erected in the transition period when Scottish architecture discarded late medieval, somehow native features in favour of more cosmopolitan Renaissance details. The roof covering the north range reflects this development and shows a rare structural composition characterised by the use of purlins within a predominately common rafter structure. Thus this roof, which is fully accessible, offers a glimpse into a time when Scottish architecture underwent significant alterations – it is, in fact, one of the earliest original roofs showing valley rafters.[5] It should be understood that the extant roofs at Newark Castle belong to different construction stages, ranging from the Middle Ages to the 20th century. Displaying a variety of tool- and assembly marks, the roofs are of great value for tracking down the construction history of Newark Castle. Most of them were erected between c.1500 and c.1600 and thus belong to the oldest extant original roof structures of Scotland.[6]

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[3] Two very important Scottish examples are Darnaway Castle and 64-74 High Street, Brechin, where the analysis of structural timber offered conclusive evidence on dating issues. For Darnaway Castle, see Stell/Baillie (1993); for Brechin, see Crone/Grieve/Moore/Peddyman (2004).

[4] In particular, this applies for Scotland where timber import was common from the late Middle Ages onwards. See for instance Balfour Paul (1900), p. 82.

[5] Geoffrey Stell has remarked on this problem, pointing out that early Scottish roof construction usually employed the walls of gables or towers to meet individual roof compartments. See Stell (1992), pp. 79-80.

[6] Few Scottish roofs have received full historical investigation. Apart from the open roof at the Great Hall at Darnaway Castle, these are the rafter single roofs at Alloa Tower and 64-74 High Street, Brechin. For Danaway, see Stell/Baillie (1993), pp. 163-79; for Alloa Tower, see Ruddock (1995); for Brechin, see Crone/Grieve/Moore/Peddyman (2004).

Of equal importantance is the fact that the roofs covering the West-, East and North Ranges display an almost full sequence of assembly marks; this provides valuable information on an important yet rarely discussed aspect of Scottish carpentry.[7] From a technical point of view, the roof at Newark suffers serious structural problems over the north range. Its in-depths analysis has offered valuable insights into its exact structural behaviour and provides the basic material to be used in the repair of this important roof structure. Similarly, the inspection of the remaining roofs, namely those over the Gatehouse and the Stairloft, has offered further insights into their physical condition and thus helped to identify potentially dangerous shortcomings.

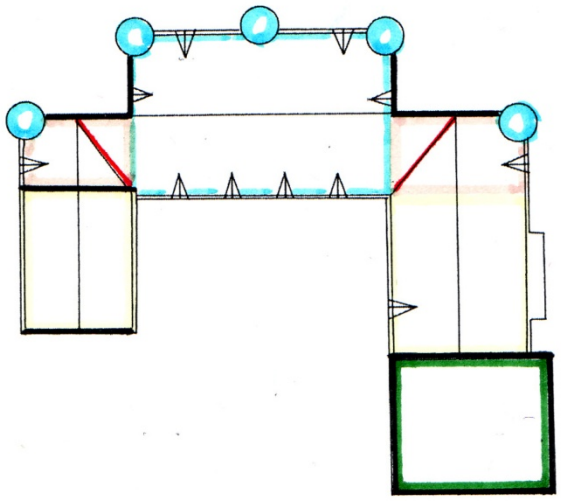

Plate 3
The typology of roofs at Newark Castle.

Key
Single collared rafter single roof
Double collared rafter single roof
Purlin roof
Flat roof
Cone-shaped roof
Raised gable-walls
Straight intersection lines

[7] For a discussion of assembly marks, see Hay (1976), p. 31, Crone/Grieve/Moore/Peddie (2004), p. 155 and figs. 3, 12, 13, Stell (2004), p. 21 and Hanke (2004), p. 35.

1.1 The Scottish rafter-single roof

Given the obvious popularity of rafter-single roofs in Scotland,[8] it is astonishing to learn how few of them have been subjected to systematic research. Indeed Scotland knows dozens, possibly even hundreds, of historically significant rafter-single roofs,[9] the majority of them dating from the 17th, 18th and 19th centuries, but few studies have so far been made on the construction and evolution of this type of roof carpentry.[10]

It is safe to state that the generic evolution of rafter-single roofs goes back far beyond the post-medieval period. The earliest extant specimens belong to ecclesiastical buildings dating from the 11th century, and Romanesque rafter-single roofs can be found in wide parts of Northwest Europe.[11] In Scotland, this typology may have a more recent history, but it can be traced back to the early erection stages of Glasgow Cathedral, dating from the later part of the 13th century.[12] Scissor-braced rafter-single trusses resembling those over the nave of Glasgow also feature at Ardchattan Priory in Argyllshire (C15),[13] while the A-shaped rafter-single roofs at Alloa Tower (probably C15), Bardowie Castle (1566), Guthrie Collegiate Church (1464) and Tullibardine Chapel (mid-C15), all of them located in Central Scotland, belong to a structurally more simple type.[14] The roofs mentioned above are, apart from a vanished 'ghost' roof at 68-74 High Street, Brechin (1470),[15] the only known Scottish rafter-single roofs dating from the Middle Ages.[16]

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[8] For the applied terminology, see Cordingley (1961), pp. 73–117.

[9] Systematic analysis of photos held in the archive of the RCAHMS yields overwhelming evidence for the predominance of rafter-single roofs in Scotland. A survey covering the counties of Lothian and Fife, for instance, has shown that more than 60% of the depicted roofs can be classified as rafter-single roofs. For the typology of roofs in Southeast Scotland, see Hanke, 2006, p. 148 and pp. 197-202.

[10] See in particular Oldrievie (1915/6), Ruddock (1995) and Crone/Grieve/Moore/Perry (2004).

[11] For early rafter-single roofs of England, see Hewett (1980) and Fletcher/Haslop (1969). For early rafter single roofs of Germany, see Ostendorf (1908), Binding (1991), Eißing (1996) and Schuller (2004). For Dutch rafter single roofs, see Janse (1989). For French rafter single-roofs, see Deneux (1927).

[12] For the roofs at Glasgow Cathedral, see in particular Oldrievie (1915/6).

[13] RCAHMS, Argyll, Vol. 2, Edinburgh 1975, pp. 108-9.

[14] For Alloa Tower, see Ruddock (1995); for Bardowie Castle, see Stell (2004), p. 21; for Guthrie Collegiate Church and Tullibardine Chapel, see Fawcett (2002), pp. 245-6.

[15] For this roof, see Crone/Grieve/Moore/Perry (2004), pp. 152-65.

[16] Stell has mentioned a late 15th century rafter-single roof at Inverquharity Castle. However, research into this roof is not published and this feature has to remain undiscussed. For Inverquharity Castle, see Stell (2004), p. 21.

Newark Castle, with its 16th century features, thus possesses some of the oldest and most valuable examples of Scottish rafter-single roofs, and it significantly enhances our knowledge on the techniques used by early Scottish carpenters. In particular, the location of Newark Castle adds valuable new information to our understanding of the early Scottish timber trade. All the published Scottish medieval A-shaped trusses – Alloa, Bardowie, Brechin, Guthrie and Tullibardine – have been erected in the eastern parts of the country. Thus, it could be argued that they represent an 'eastern' school of carpentry, a school that was possibly encouraged by the easy availability of pre-fabricated Baltic import timber.[17] However, Newark, with its location at the river Clyde and its vicinity to the forests of Western Scotland and Northern England,[18] shows that the tie-beam-less A-shaped rafter-single truss with extended ashlar post was not confined to Eastern and Central Scotland. Indeed it seems that this construction-system was applied in fairly large numbers, possibly all over the country.

Lynn Courtenay has demonstrated that the typical 'Scottish' rafter foot – a detail that must be understood as the distinguishing pattern of Scotland's medieval roofs,[19] was already known by late 12th and early 13th century Dutch and French carpenters.[20] Courtenay interprets this rigid triangle of rafter, sole-piece and extended ashlar-post as a device introduced in order to prevent horizontal movement at the base of the roof.[21] The trusses, functioning as a series of three-hinged frames, are effectively 'hooked' onto the wallhead. Each truss exerts vertical and horizontal thrust, with the close spacing of trusses resulting in the creation of a uniform load.

[17] The pre-fabrication of timber has been discussed in Hanke (2004) and Newland (2007).
[18] For the provenance of timber used in the North Range at Newark, see Crone (2008), p. 4.
[19] For a discussion of the 'Scottish' rafter foot, see in particular Ruddock (1995).
[20] Trusses with extended ashlar posts appear, for instance, in a late 12th century building in Dijon and in the abbey church of Kerkrade (12th century). See Courtenay (1999), pp. 108-11.
[21] Courtenay (1999), p. 107.

Such roofs resemble barrel vaults, and, as in the case of vaults, the lateral walls are prone to outward deflection unless the horizontal thrust is being neutralised either by the weight of the lateral walls or by the introduction of tension-absorbing devices. The experiments of medieval wrights were always aimed at the management of thrust and they did this with a limited choice of material, namely stone and timber. The emerging conflicts, forcing the wrights to balance the realities of physics with the artistic ambitions of patrons and architects, resulted in the development of complex structural arrangements, which peaked in the sophisticated buttress-architecture of Gothic cathedrals, as well as in the elaborate roofs over buildings such as Ely Cathedral, Westminster Hall or the Hôtel-Dieu Notre-Dame des Fontenilles in France. It goes beyond the scope of this paper to discuss in detail the global evolution of rafter-single roofs, but it may be said that, apart from cruck-roofs,[22] Scotland's indigenous roof architecture ultimately descends from the northwest-European common rafter tradition.

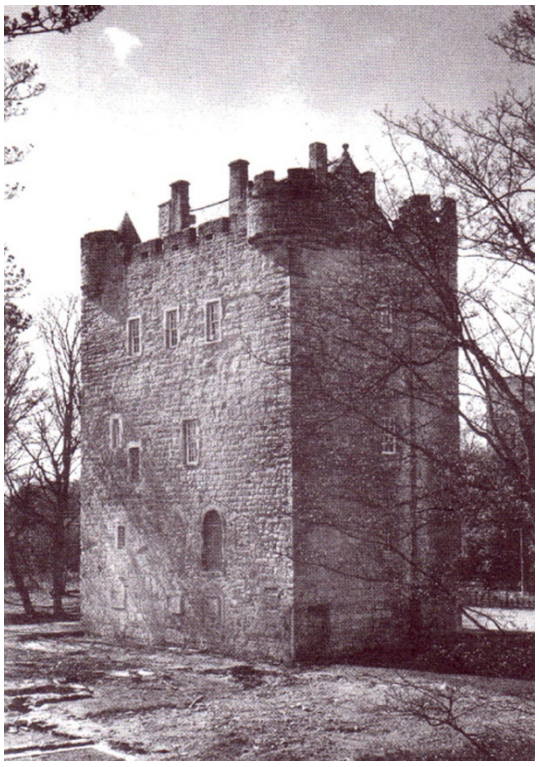
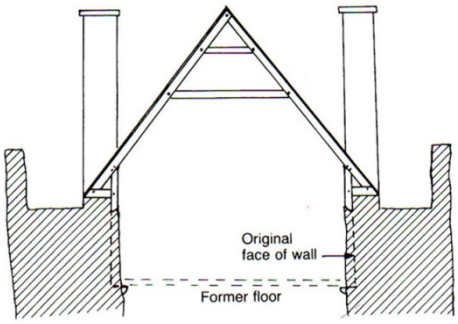


Plate 3
Alloa Tower (probably C15).
Wall and roof in medieval
Scottish architecture.



[22] For a provisional list of Scottish cruck-roofs, see Stell (1981), pp. 82-6.

It should also be emphasised that the geometry of the A-shaped truss is perfectly suited to reflect the particular characteristics of traditional Scottish stone architecture. Scottish towerhouses, with their solid and sparsely pierced lateral walls, hardly require a more complex roof structure than that provided by the A-shaped rafter-single truss. Being locked between the walls, the A-shaped roof remains in a fairly stable position as it is not 'sliding' on top of the wallhead. The conspicuous lack of wall-plates – another characteristic element of pre-18th century Scottish rafter single roofs – thus may offer an explanation for the extension of the ashlar-post.

Table 1
The Nature of Walls at Newark Castle

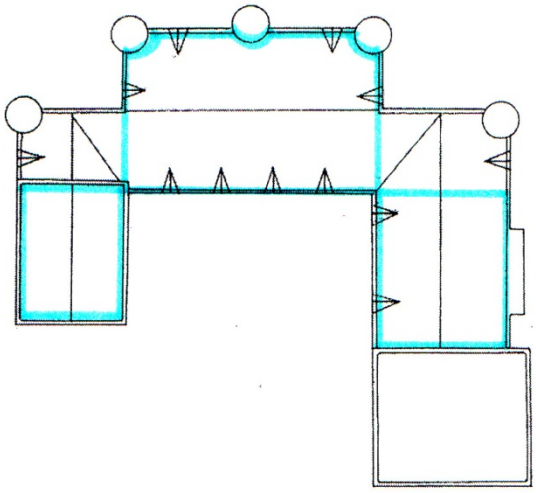
Building Part	Material of Wall	Thickness of Wall	Degree of Piercing[23]
Gatehouse, E-wall	Rubble masonry	ca. 90 cm	Solid
Gatehouse, W-wall	Rubble masonry	ca. 110 cm	Solid
Stairloft, E-wall	Rubble masonry	ca. 90 cm	Solid
Stairloft, W-wall	Rubble masonry	ca. 80 cm	Semi-diaphanous
North Range, N-Wall	Rubble masonry	ca. 110 cm	Semi-diaphanous
North Range, S-Wall	Rubble masonry	ca. 80 cm	Diaphanous

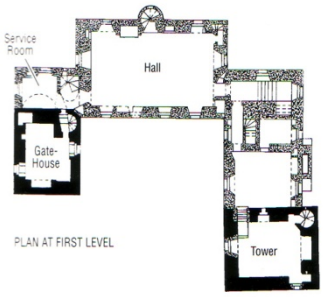
The trusses over both the Gatehouse and the Stairloft at Newark Castle underline this assessment in manifold aspects. Unlike the roof over the north range, both gatehouse and stairloft roofs do not appear to cause any kind of particular structural problem, and this is due to the solidness of the lateral walls which are pierced only by insignificantly sized windows.

[23] The structure of the wall is considered at wallhead-level. The proposed terminology (solid, semi-diaphanous and diaphanous) classifies the walls according to their ability to resist horizontal outward thrust. The terms are being used in a purely structural sense – it is by no means suggested that the north range of Newark Castle possess lateral walls comparable to those to be found at the cathedrals of Amiens or Reims. The term *solid* denotes heavy masonry structures without any significant openings. The term *semi-diaphanous* describes walls pierced by modest or fairly large windows or doors, whereas the term *diaphanous* points to buttressed lateral walls characterised by large glazed openings.

1.2 The rafter-single roofs at Newark Castle: the east-range and the west-range

Patrick Maxwell's late 16th century work homogenised the disparate medieval parts of the castle, and it transformed Newark into an elegant Renaissance mansion. Maxwell managed to create an ambitious residence that saw the Great Hall at the heart of its composition. Communicating vertically via a turret and a turnpike stair, and overlooking the Clyde and the courtyard, the hall is located at the Piano Nobile and commands maximal attention. It's carefully arranged classical windows extend beyond the eaves, thus contributing to a roof architecture that is further enlivened by the display of symmetrically arranged cone-roofed turrets. The mansion is covered by double-pitched roofs, which are now covered with slates over a double-layer of machine-sawn sarking-boards.[24]



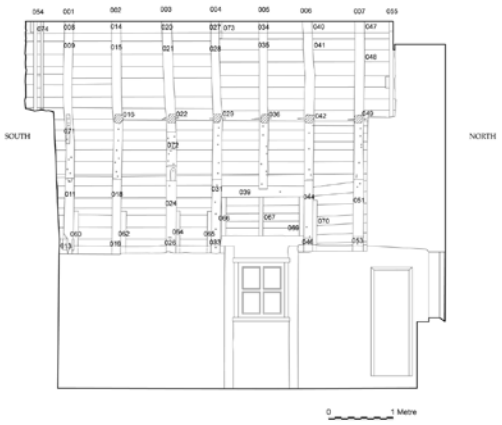


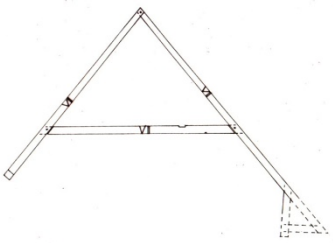
Plates 6 and 7
The rafter-single roofs over the Gatehouse, Stairloft and N-range.

[24] Emerton has pointed out that machine-sawn softwood boards gained popularity not before the latter half of the 18th century. However, split and adzed hardwood boards may have been used over higher ranking medieval buildings, hence possibly also at Newark Castle. See Emerton (2000), p. 14.

The roof-system predominately used by Patrick Maxwell (and also by a previous generation of builders at Newark) is the rafter-single roof. It features in its double-collared version over the Great Hall, and from here it merges somehow awkwardly with the purlin-roofs over the eastern and western parts of the Long Gallery. The Gatehouse and the southern part of the Stairloft are covered by single-collared rafter-single roofs; of these the Stairloft-roof is extending further south, terminating at the north-wall of the tower.

The roofs over the Gatehouse and the Stairloft show a similar structural composition and, for this reason, they should be discussed together. Spanning ca. 4.50 m (Gatehouse) and 5.74 m (Stairloft),[25] and employing rafters, collarbeam, ashlar-post and sole-piece, their structural composition comes closest to the trusses employed in the mid-15th century chapel at Tullibardine in Perthshire.[26] At Newark Castle the roof-members are tied together with mortice-and-tenon joints and secured by long wooden pegs, which are not flush with the rafter surface.[27] With the exception of some pit-sawn collarbeams used over the Stairloft, all original timbers show a square section and appear to have been produced from quickly grown oak trees; they have been adzed, often possessing bark at least two edges.





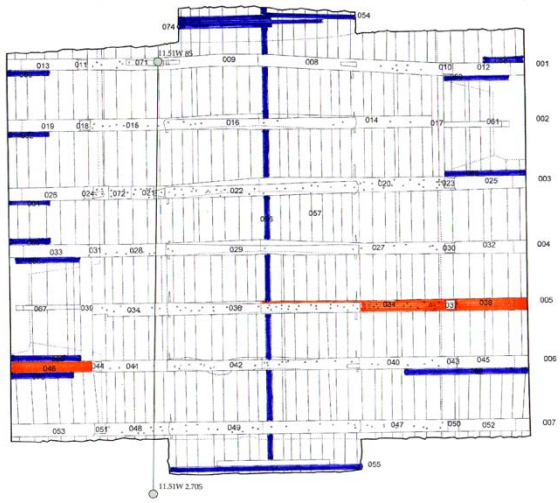
Plates 8 and 9
The rafter-single roofs over the Gatehouse (left) and the Stairloft (right).

[25] Measured between the inner surfaces of the lateral walls.
[26] For this roof, see Fawcett (2002), pp. 243-6.
[27] This is a detail typical for German medieval roofs. Post-medieval and early modern roofs, by contrast, usually show pegs that are flush with the surface. Scotland has not seen any kind of systematic research on this issue and it is still difficult to employ the typology of nails and pegs as a tool for dating.

The roofs rise in pitches of 48° (Gatehouse) and 51° (Stairloft), and their trusses are spaced at distances ranging from approximately 0.32 to 0.48 m over the Stairloft and 0.56 to 0.60 m at the Gatehouse.[28] Both roofs comprise windows whose width exceeds the rafter-spacing and, in both cases, the wrights have solved the conflict between window and rafter-foot by the introduction of short trimmers. These are tenenoned between the rafters – a pattern that was also employed at the N-range at Newark Castle and, apparently, at Alloa Tower in Stirlingshire.[29]

Unlike the medieval roofs used over the Collegiate Church at Guthrie (1464) and Bardowie Castle (1566), neither the roof over the Gatehouse nor that over the Stairloft comprises any curved braces and thus fails to provide any unequivocal evidence for its vanished ceiling architecture. Such bracing would be indicative of the existence of a false barrel vault, perhaps of a kind used in the late 16th century at Culross Palace.[30] However, both roofs – Gatehouse and Stairloft – display rather crudely shaped members, and it is difficult to imagine that these beams would not have been concealed by any kind of ceiling. The Gatehouse-roof shows nail-holes at the underside of the rafters as well as at the underside of the collarbeams. The fact that the rafters display the holes exclusively in the zone underneath the collarbeams should be interpreted as evidence for the former existence of a timber ceiling. The situation is less clear at the Stairloft, although some of the collarbeams show nailholes at their underside; for instance at trusses 2, 4, 6 and 7.[31]

[28] Measured between the lateral faces of the rafters.
[29] Trimmers also appear in the post-medieval roof at Brechin. However, it is impossible to say whether the 1480-version of the Brechin roof also employed trimmers. See Crone/Grieve/Moore/Peddyman (2004).
[30] See RCAHMS, FID/180/14.
[31] Much of the original timber used is in poor physical condition and it is difficult to identify holes and fixings.



Plates 10 and 11
The rafter-single roof over the Gatehouse

Reused original oak
Machine-sawn pine

While both roofs show the same structural composition as well as the same type of carpenter's marks,[32] they obviously are different in several other important aspects.

Not only do they rise in different slopes and show a different spacing of trusses, but they also differ in the choice of their material. Unlike the roof over the Gatehouse, which almost exclusively employs purpose-made material, the roof covering the Stairloft uses a significant amount of reused timber.

Plates 11 and 12
Overbuilt steps and external window at the northern Gatehouse-wall

[32] Both roofs show assembly marks in the shape of Roman numerals. With the exception of truss 2 of the Stairloft-roof, which displays chiselled marks, all numerals have been cut using a saw. With few exceptions the trusses are positioned according to their numbering. Although some of the members have been assembled the wrong way (for example 'IIIX' signifying '13' rather than 'IIIX', as it would be correct), both roofs show a remarkably consistent pattern of assembly marks, showing that both roofs had been assembled in one sequence. The numbering happens in both roofs from north to east, suggesting that the wrights were starting the assembling-process at the northern gable walls of Gatehouse and Tower.

These inconsistencies may be taken as evidence for the authorship of separate wrights, thus implicitly indicating different erection dates. Given that the Gatehouse was always considered older then the adjacent building-parts, this conclusion is hardly surprising. However, its roof cannot belong to the first construction stage. The arrangement of its trimmers clearly reflects the width of the windows; therefore the roof must be considered contemporary with the wallheads. A window in the northern Gatehouse-gable distinguishes the gable as contemporary with the roof, while the overbuilt steps, incorporated in the same wall, unequivocally prove its association with a separate construction stage. The alteration of the upper Gatehouse-wallheads must have happened between c. 1480 and 1598.[33] In order to define the alteration date, it would be crucial to assess the Gatehouse-roof by the use of dendrochronology. Firstly this attempt could clarify the exact chronology of building activities, and, secondly, it would help to assess a coat of arms which belongs to the western attic-window. Dendrochronological dating could possibly serve to identify the patron.

The observation of this roof (or, perhaps, it is better to say the observation of the roof and the related windows and walls) has thus demonstrated that Newark Castle cannot comprise only two construction periods as has been suggested in currant literature.[34] However, no forensic evidence clarifies the typology of the original Gatehouse-roof.

[33] Tabraham attributes the gatehouse to the late 15th century, pointing out that George Maxwell seems to have owned a castle at 'Newwerk and Finlanstone' in 1484. Recent dendrochronological research has established the date 1598 as the felling date for some of the timbers used over the central part of the North Range. For the early history of Newark Castle, see Tabraham (1996), p. 4; for the dendrochronological analysis of the North Range, see Crone (2008), pp. 3-4.
[34] Browne (1881), p. 502; Tabraham (1996), p. 2 and 25f; McKean (2001), p. 174.

Plates 13, 14 and 15
The rafter-single roof over the Stairloft employing pit-sawn collarbeams

Reused original oak
Machine-sawn pine

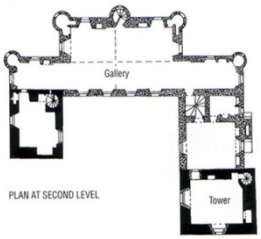
The question now arises whether anything similar has happened in the remaining building parts. With regard to the Stairloft-roof, it may be said that none of the details are evidential of rebuilding. The numbering of the trusses begins at the northern tower wall, with all trusses being arranged in consistent order and, presumably,[35] continuing up to the conjunction with the eastern bed-chamber. However, it can be said that almost all material employed in the original Stairloft-roof has been reused. Of particular interest are the collarbeams of trusses 3, 4, 6, and 7 which have been pit-sawn. Their rectangular section distinctively differs from the scantling of all other members used (in the Gatehouse as well as the North-Range) and it does not match the size of the mortices. These beams, showing a series of redundant notches at their upper faces, may have belonged to a half-timbered wall rather than a redundant roof.

[35] The northern part of the Stairloft roof has not been included in the analysis due to health and safety concerns. However, inspected from a distance through an open aperture, all trusses appear to show the structural composition identified over the southern part of the Stairloft.

Both roofs – Gatehouse and Stairloft – have seen further layers of work that should be attributed to the 20th century. While almost all Gatehouse-trusses have been stabilised by the introduction of additional bracing, the work in the Stairloft has led to the creation of a new floor as well as to the improvement of a dormer. The floorboards sit on an additional set of collar-beams. Vertical struts – which were presumably introduced in order to reduce the bending-moment of the joists – link this new feature into the ancient Stairloft roof. All modern material consists of machine-sawn pine cut to a rectangular section; thus it is easy to distinguish the 20th century elements from the original roof.

1.3 The rafter-single roof at the central part of the north-range

Forty years ago, M.R. Apted in his *The Painted Ceilings of Scotland* described an early 17th century Scottish domestic hall as "(…) a large, moderately-lit room with paved or boarded floor, plastered walls, stone fireplace and open timber ceiling consisting of exposed joists spanning the room at intervals of about two feet and supporting both ceiling and walking floor of the room above."[36] The domestic quarters at the north-range of Newark Castle fit into that pattern yet they expose details that markedly distinguish them from many of the features described by Apted. Unlike those in other Scottish buildings such as John Knox' House or Gladstone's Land,[37] in which the principal living-rooms appear as introverted structures, the domestic quarters at Newark Castle vividly communicate with the exterior. The great hall in the north-range is by no means moderately-lit, indeed it benefits from generously opened lateral walls which offer an abundance of daylight.



Plates 17 and 18
Floorplan of attic and s-view of the long gallery.

This characteristic feature is equally visible in the long gallery, which is situated above the great hall and connects the eastern and western extremities of the castle at attic level. Breaking the eaves and extending into the roof space, large apertures convey a remarkably relaxed spirit, signifying the attic as an inhabited space of a certain distinction. Fitted with fireplaces and closets and linked by a circular stair to the hall underneath, the attic provided room for both gallery and bedchambers and should be viewed as a fully developed apartment rather than as space intended for storage purpose.[38]

[36] Apted (1966), p. 27.
[37] For the decorated timber panelling of these buildings, see Apted (1966), p. 67 and p. 71.
[38] For a discussion of the use of space at Newark Castle, see Tabraham (1996), pp. 12-24.

Browne has convincingly attributed the n-range to Patrick Maxwell and regards it as a product of the last decade of the 16th century.[39] Thus its erection occurred in a time that witnessed the departure from conventional ways of Scottish building construction in many aspects,[40] for instance forcing the wrights to respond to the problems of roof-, wall- and ceiling construction in somewhat unprecedented ways.

Patrick Maxwell's roof over the north-range intriguingly reflects the progressiveness of Newark Castle. Having been concealed by a suspended, and, in all probability, decorated combed timber ceiling,[41] the roof clearly subscribes to the idea of the Scottish Renaissance space.[42] The long gallery originally comprised living quarters that may have resembled those at contemporary buildings such as Pinkie House and Prestongrange; it is a building living up to the highest of standards *en vogue* in the years around 1600.[43]

Plates 19 and 20
Remains of the original ceiling at rafter and trimmer.

[39] Browne employs the armorials carved into the dormer pediments as evidence for his dating suggestion. For the dating, see Browne (1881), p. 495; for the reliability of this method, see Stell (1977), p. 154.
[40] For the architectural language employed in the seats of the Scottish Renaissance nobility, see McKean (1995) and MacKechnie (1995).
[41] Toolmarks ascertainable at the underside of the southern rafters and their trimmers confirm the previous existence of a panelled decorative feature. Panelling of the supposed kind can be found for instance at St. Magdalen's Chapel, Edinburgh and Culross Palace – both buildings that were erected around 1600.
[42] For the decorated timber-panelling of Scottish Renaissance buildings, see Bath (2003) and Apted (1966).
[43] For the painted timber decoration at Prestongrange and Pinkie House, see Bath (2003), pp. 79-121.

The roof over the long gallery, however, is not yet fitted for the structural requirements of this ambitious architectural program. While it certainly shows a marked individuality,[44] the roof basically follows traditional Scottish design principles. Bridging an inner width of 6.72 m and rising in a pitch of 52°, it consists of 18 double-collared rafter single trusses which exclusively employ compression-transferring members. At Newark, this general disposition proved to be highly problematic.

The fragility the south-wall, which fails to provide sufficient counteraction for neutralising the horizontal roof thrust, causes fundamental difficulties. The large apertures form the very core of this problem, indicating that the architect was not yet aware of appropriate structural solutions.[45] The horizontal thrust, resulting from the geometry of the roof as well as wind pressure, exerts an undue pressure on the pierced south wall and forces the latter to splay. Consequently, the trusses heavily deflect and the structural stability of the roof entirely relies on the pegs fixing the joints between the rafters and collarbeams.[46] A previous generation of builders was aware of this problem, and seemingly responding to critical movement, they dismantled the entire roof and reinforced the lower set of collarbeams with iron tiebacks. This measure shows that the roof was failing already in earlier times.

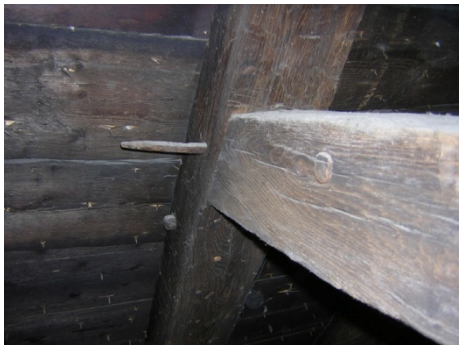


Plate 21
Conjunction of rafter and collarbeam.

Plate 22
Iron tieback.

[44] Trimmers also appear at buildings such as Alloa Tower; 339-343 High Street, Kirkcaldy and 68-74 High Street, Brechin. Their extensive use at Newark Castle, however, is unusual and clearly reflects Patrick Maxwell's exceptional window- and chimney architecture. For Alloa Tower and Kirkcaldy, see Ruddock (1995), for Brechin, see Crone/Grieve/Moore/Peddie (2004).
[45] The wright refrained from using tie-beams and hence failed to reduce the thrust caused by the roof. Equally important, he did not reinforce the south wall by means of abutment piers.
[46] Ruddock has described a similar problem with regards to 339-343 High Street, Kirkcaldy, arguing that free lateral movement resulted in the failure of this roof construction. See Ruddock (1995), pp. 303-4.

Some of the iron features are bolted using square nuts.[47] It is therefore likely that this measure took place no earlier than in the 19th century. It is reasonable to suggest that the overhaul coincided with the re-sarking of the long gallery and the construction of the roofs covering most of the turrets and all dormers.[48]

Thus the roof over the central part of the long gallery is indicative of two principal construction stages, which should be attributed to the late 16th and either the 19th or early 20th centuries.[49] With the exception of trusses 13 and 17 all trusses show their original arrangement,[50] consisting of rafters, collarbeams, ashlar-posts and solepieces. Trimmers link the rafters next but one in order to accommodate the trusses to the dormers and chimneystacks and a single layer of machine-sawn sarking-boards provides lengthwise stiffening.[51] This structural composition is typical of the roofs of late medieval and post-medieval Scotland and roofs showing this composition appear over the Gatehouse and the Stairloft as well. In particular the refraining from using purlins and wall-plates, as well as the consistent use of mortice-and-tenon joints, distinguishes the rafter-single roofs at Newark Castle as true representatives of early Scottish carpentry.[52]

Exceptional, however, are the following two aspects. Firstly, it is remarkable that the north-range shows an unusually extensive employment of trimmers. And secondly, it uses, in its eastern and western parts, even purlins – hence an architectural element that rarely appeared in post-medieval Scottish carpentry.[53]

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[47] Visible for instance at the southern rafter of truss no. 13.

[48] The building was 'in weather-tight condition' in 1881. However, this statement by Browne does not prove that the re-sarking of the north range was completed by that time. See Browne (1881), p. 504.

[49] Recent dendrochronological analysis has shown that some of the timbers used over the north-range have been felled in 1598. It is more difficult to date the dismantling and reassembling of the roof. In the mid-19th century the castle was in a ruinous condition but, around 1880, it seems to have been 'watertight', although there was still space for '(…) some much-needed renovation (…)'. Newark Castle went into public ownership in 1909 and the following years are, probably, the most likely date for the reassembling and reslating of the roof. For the dendrochronological analysis of the north-range, see Crone (2008), p. 3; for the 19th century condition of Newark Castle, see Barr (1845), p. 64 and Browne (1881), p. 504.

[50] The southern rafter and the lower collarbeam at truss no. 13 have been replaced using new material and the sole-piece and ashlar post at the northern rafter of truss no. 17 are missing. Some of the solepieces at the southern wall had been found in a state of decay and were subsequently removed. This, however, was not a deliberate alteration but reflected the poor condition of the fabric.

[51] Some of the sarking boards expose circular saw-kerbs and hence should be attributed to the 19th or 20th centuries. Other boards show dowel holes which appear in a similar form at the reused rafters.

[52] For Scottish rafter single roofs, see Hay (1976), Ruddock (1995), Crone/Grieve/Moore/Peddie (2004) and Hanke (2004).

[53] Analysis of the w- and e-part of the long gallery roof was not commissioned. However, it should be emphasised that these structures are an important part of the long gallery roof.

The usage of trimmers and purlins doubtlessly reflected the new developments in contemporary architecture.[54] It has to be stressed, however, that purlins were new only in respect to the Scottish rafter single roof – the open roofs at the Stewart courtyard castles, for instance, make prominent use of horizontally arranged timbers.[55] Thus the roof over the long gallery at Newark Castle adapts well-known technical solutions but accommodates it in new environments. It represents a unique technical solution created in a transitional period in which Scottish architecture aligned itself to 'European' standards.[56]

It is finally necessary to refer in a few words to the technical details and to the materials employed – not the least because this effort shows the value of high precision archaeological recording. Having established that the roof was assembled in the late 16th century, it is interesting to consider its exact erection process; and thus to attempt to promote an understanding of how post-medieval Scottish wrights used to work. Key to understanding this point is an observation of the material, an analysis of the carpenters' marks, a discussion of the tools used and the identification of discrepancies.

Knowing that the roof over the north-range was erected after the Reformation, it is surprising to learn that the wrights exclusively used the material oak. According to current knowledge, Newark Castle is unique in this aspect, since none of the research published in specialist literature mentions the use of oak in late 16th-century domestic architecture.[57]

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[54] Generous fenestration necessitated the extensive use of trimmers. Another modern element can be seen in the employment of valley- and hip rafters which create the conjunction of the roofs over the long gallery and the west- and east-ranges.

[55] For the structural composition of these roofs, see Hay (1976).

[56] European influence is visible in the proto-classical detailing of the windows and the entrance gate. However, it shall not be suggested that the wright took his inspiration from examples found in France or Italy. It is more reasonable to suggest that he was using Scottish methodology in order to solve a new, internationally inspired, architectural problem. It should be stressed that Scottish roof technology of the 15th century has achieved solutions that markedly differ from the architecture of contemporary continental Europe. Neither the plain rafter single roof, nor the merging of barrel vault and roof structure, as visible for instance at Corstorphine Parish Church, can be found in comparable abundance on the European continent. For the source of the proto-classical detailing at Newark Castle, see McKean (2001), p. 175; for the uniqueness of medieval Scottish roof architecture, see Hanke (2005), p. 2.

[57] The roof at 339-343 High Street, Kirkcaldy, erected around 1590, is made of conifers and the same is true for the second construction stage at 68-74 High Street, Brechin. For the predominant use of pine in post-medieval Scottish architecture, see Hay (1976), p. 32 and Smout (2005), pp. 84-88. For 339-343 High Street, Kirkcaldy, see Ruddock (1995), pp. 301-7; for 68-74 High Street, Brechin, see Crone/Grieve/Moore/Peddie (2004).

Two considerations may explain this abnormality. Firstly, it could be argued that the considerable width of the north-range necessitated the use of exceptional timber. And secondly, it could be said that easy availability of oak encouraged the builders to use this material.

While it is difficult to assess the first question,[58] it is easier to refer to the availability of oak in post-Reformation Scotland. Smout has pointed to the practice of using this material in the case of nautical architecture,[59] and the proximity of Newark Castle to the shipyards at the Clyde probably offered easy access to long and straight oak-logs. The inspection of the timber used, however, indicates that the bulk of the material was salvaged on building sites rather than taken from readymade stock. The majority of rafters and practically all of the lower collarbeams show redundant mortice-holes and hence consist of reused material. Indeed all of the second hand rafters and most of the collarbeams were formerly part of a similarly composed roof, while a small number of collarbeams belonged to a half-timbered wall, leaving only the remaining rafters purpose-made.[60]

In medieval and post medieval Scotland, it was a common practice to use equally scanted material for the construction of rafter single roofs. The scantling of the tailor-made rafters, extending to a cross-sectional area of roughly 0.15 by 0.15 m, was therefore dictated by the dimension of the reused material. However, the ratio employed was not chosen randomly but relied on the diameter of the trees available. While the reused rafters are split in the middle at least once, the tailor-made rafters were cut from single trees. This shows that the carpenters were using relatively young material.[61] The surface of all timbers indicates axing and nothing is evidential of pre-fabrication – the preparation of the Newark timber could indeed have happened everywhere in Scotland.

[58] The familiarity of post-medieval Scottish wrights with questions of structural engineering has not been subjected to scholarly research so far.
[59] Smout (2005), pp. 81-3.
[60] For a detailed discussion of the timber used, see the accompanying report by Kirkdale Archaeology.
[61] Ruddock refers in his study on Alloa Tower to Baillie's assumption that Scotland saw in the Middle Ages a regeneration of oak forests. It would be interesting to establish whether the timber used at Newark Castle belongs to such a population. For Baillie's suggestion, see Ruddock (1995), p. 297.

Not only do the redundant mortice- and peg-holes but also the nature of some of the carpenters' marks distinguish a large portion of the timber as recycled material. While the late 16th-century construction stage is characterised by the consistent use of Roman numerals, a part of the second-hand timber exposes an additional – yet redundant – layer of assembly marks.

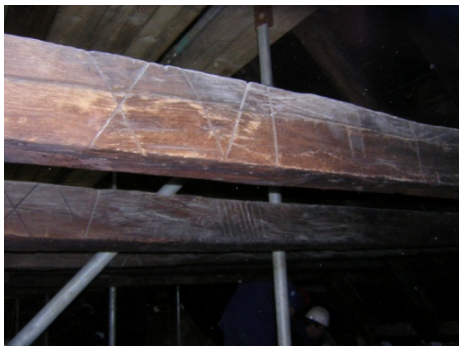

Plate 23
Carpenters' marks (layer 1 and 2).

Plate 24
Carpenters' marks (layer 3).

The marking of post-medieval Scottish roofs by means of Roman numerals has been observed in several cases.[62] This indication system enjoyed popularity among Scottish wrights from at least the mid-16th century onwards,[63] and therefore Newark Castle neatly fits into the formula of native building construction. While masons' marks often bear the character of a signature,[64] carpenters' marks have an entirely practical purpose in a sense that they aid the construction process. Early Scottish wrights would first cut the individual roof members roughly to length and subsequently mark them in order to indicate their exact position within the truss. The next step would be the shaping of the joints, followed by the full assemblage of the truss on ground and its hoisting into its final position within the roof. The marking of roof members prepared for the assembly process at the trimmer yard. Assembly marks are not required to indicate the position of trusses within rafter single roofs – this is not necessary because this type of roof usually comprises identical features.[65]

[62] Hay (1976), p. 31, Crone/Grieve/Moore/Peddie (2004), p. 155 and figs. 3, 12, 13 and Hanke (2004), p. 35.
[63] It is interesting to note that the same kind of indication system was used in early written documents. The compilers of *The Accounts of the Masters of Work*, for instance, were using Roman numerals as well.
[64] Davis (1954), p. 43.
[65] The trusses of Scotland's early rafter single roofs are often assembled in incorrect order. For the mentioned reasons, this does not necessarily indicate dismantling and subsequent re-erection. See also Hay (1976), pp. 31-2.

At Newark, however, all trusses appear in correct order; they had been assembled from west to east, and all rafters and collarbeams are identified by matching Roman numbers.[66] This set of marks clearly belongs to the late 16th century construction stage, and it was produced using a saw with a blade 0.3 cm wide. The characters extend over the entire width of the respective member, and hence subscribe to a typical pattern of post-medieval Scottish building construction.[67]

It is significant that the tailor-made members show only one set of marks, whereas the re-used features often expose a second one. This layer of redundant marks, consisting of a chiselled sequence of vertical strokes and arrows, presumably aided the assembly process of the reused roof. A third layer, finally, determines the exact position of some of the rafters and trimmers. The arrangement of these marks, which are part of the late 16th century campaign, is puzzling because only two of the ten trimmers are marked. The employed symbols – vertically arranged chiselled strokes and triangles – belong to a type that has not been discussed in any of the contributions on Scottish historic carpentry so far. The same goes for the redundant arrows visible on the second-hand timbers – Newark Castle here clearly offers a glimpse into a time of which is little known in terms of carpentry.[68]

[66] There are no assembly marks appearing on ashlar-posts and solepieces.
[67] The assembly marks visible in roofs erected from the 17th century onwards were almost always cut rather than chiselled.
[68] Ruddock's account on Alloa Tower, the discussion of the Brechin roof by Crone, Grieve, Moore and Peddie and Stell and Baillie's discussion of the open roof at Darnaway Castle are the only detailed studies addressing questions of medieval Scottish carpentry so far. See Stell/Baillie (1993); Ruddock (1995); Crone/Grieve/Moore/Peddie (2004).

1.4 The relation between the rafter-single roofs at the east-range and those over the central part of the north-range

Most of the published studies on Newark Castle tend to suggest that it was Patrick Maxwell who connected the Gatehouse and the Tower in the late 16th century and thus created the U-shaped mansion as we experience it today.[69] Browne, who was the first scholar to formulate this proposition, reached his conclusion on account of the existence of date stones. At least one of them, incorporated in the '(…) westmost dormer of the river front (…)', bears the date 1599, while another inscription, carved into the pediment over the main-entrance, refers to the year 1597.[70] The entrance-pediment also contains a monogram consisting of the letters PMC, obviously referring to Patrick Maxwell and his wife Margaret Crawford.[71] Given this strong evidence, there is good reason to assume that it was indeed Patrick Maxwell who commissioned the dormers, the windows and the main-entrance. Further to this, he should also be credited with the heightening of the tower, as its parapet windows closely match those in the south-front of the north-range. No doubt it was Patrick Maxwell who ennobled Newark Castle around 1600.

However, there are a number of less straightforward, even enigmatic features at Newark Castle and any hypothesis dwelling on the architectural history of Newark should take into account that elements such as doors, windows and dormers can be created independently. Their attribution to Maxwell does not necessarily prove that he was building the entire north-range – certainly Maxwell could have made use of buildings that already existed on site.[72]

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[69] Browne (1881); MacGibbon/Ross (1887-1892), Vol. 2; Inverclyde Initiative (1996), p. 1; McKean (2001), pp. 174-5.

[70] For the dating of the dormers, see MacGibbon/Ross (1887-1892), Vol. 2, p. 431; Browne (1881), p. 495 and Forrest (1973), pp. 685-6. For the entrance-inscription, see Tabraham (1996), pp. 6-7.

[71] The consulted secondary literature on Newark Castle does not specify the date of Patrick Maxwell's and Margaret Crawford's wedding. It is therefore difficult to establish whether the 1597 date-stone refers to the erection of the building or the date of Sir Patricks' and Lady Margaret's marriage. Both is possible.

[72] Tabraham refers to '(…) one of the corner turrets in Patrick Maxwell's new mansion (…), which obviously existed in 1584. See Tabraham (1996), p. 7. Most interesting is also that the north-range does not show a consistent pattern of walls. Indeed some of the walls are considerably thicker than others – a phenomenon which points to adaptation of existing structures rather than building from scratch. Intriguing is also the material which consists of somehow awkwardly mixed grey and red sandstone, with a concentration of red stone around the windows, turrets and dormers.

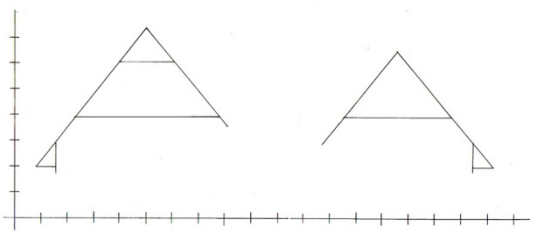
In order to establish whether the rafter single-roofs over the north-range and those over the east-range had both been constructed at the same time, it is very important to compare their characteristic details.

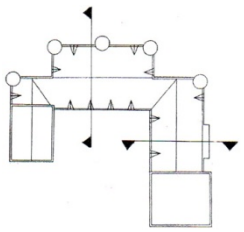
Table 2
Structural details of the rafter-single roofs at north-range and east-range.

Item	North-range[73]	East-range[74]
Typology	Double-collared rafter-single roof	Single-collared rafter single roof
Material	Type 1: reused oak Type 2: purpose-made oak	Reused oak
Span of roof	6.72 m	5.74 m
Pitch of roof	52°	51°
Number of phases	2	2
Erection- and alteration-date	1598; early C20	Unknown; C20
Dimension of rafters	0.16 / 0.15 (bottom), 0.15 / 0.13 (top)[75]	0.14 / 0.16 (bottom)
Dimension of collarbeams	0.10 / 0.15 (lower collar),[76] 0.14 / 0.14 (upper collar)	0.08 / 0.14
Dimension of ashlar-posts	0.13 / 0.13	Not accessible
Dimension of sole-pieces	0.14 / 0.14	Not accessible
Dimension of trimmers	0.14 / 0.14	0.14 / 0.14
Spacing of trusses	0.46 – 0.55	0.32 – 0.48
Type of assembly marks	Type 1: Sawn Roman numerals Type 2: Chiselled Roman numerals[77] Type 3: Scratched arrows and strokes	Type 1: Sawn Roman numerals Type 2: Chiselled Roman numerals[78]
Type of joints	Mortice-and-tenon Iron tie-backs (square nuts)	Mortice-and-tenon
Type of fasteners	Dowels (oak, diameter ca. 2 cm, not flush with surface)	Dowels (oak, diameter ca. 2 cm, not flush with surface)
Position of ashlar-posts	1.80 m above floor level	Ca. 1.84 m above floor level[79]
Position of collarbeams	3.86 m above floor level (lower collar); 5.96 m above floor level (upper collar)	3.91 above floor level

[73] The measurements refer to truss 6 and are given in metres.
[74] The measurements refer to truss 7 and are given in metres.
[75] The measurements were taken at the southern rafter.
[76] The height of 0.10 m is exceptionally slender. Most of the collarbeams show a more or less square section with a height averaging around 0.14 m.
[77] Chiselled marks appear only at a small number of trimmers.
[78] Chiselled marks appear only at truss 2.
[79] None of the ashlar-posts of the Stairloft-roof is accessible. The height of 1.84 m above floor level refers to an ashlar-post easily accessible from the turnpike-stair. This post is part of a truss belonging to the northern Stairloft roof, which has not been subjected to close observation. However, it is highly likely that the ashlar-posts belonging to the southern Stairloft-roof are more or less in the same position.

Table 2 shows that both roofs closely resemble each other. The only significant structural difference refers to the composition of the trusses – double-collared vs. single-collared – but this inconsistence is simply due to the bigger span of the north-range roof. All other details – the employment of trimmers, the scantling of the members, the positioning of ashlar-posts, the height of collar-beams, etc. are almost identical, and the same goes for the detailing of the joints as well as the carpenter's marks. The pitch, in both cases around 50°, is more or less the same and the trusses display a considerable homogeneity. The difference, however, is the spacing of the trusses. The east-range roof, dividing the room over the southern part of the Stairloft into seven intermediate fields measuring between 0.32 and 0.48 m, allows for comparatively little space between the trusses. The roof at the north-range is different in this aspect, creating compartments between 0.46 and 0.55 m wide. The rafter-single roofs over the central part of the north-range and the east range appear to be very similar but, still, both roofs deviate in the question of truss-spacing.





Plates 25 and 26
The rafter-single roofs over the north-range and the east-range.

We should, then, ask whether it was anything other than an arbitrary decision that encouraged these different solutions. It makes sense to suggest that the spacing of trusses in the north-range reflects the arrangement of windows in the southern elevation of the Great Hall. Over the north-range we have the trusses always appearing in a rhythm AABBAA, with BB positioned above the windows and tenoned into the trimmer.[80] The Stairloft roof, by contrast, fails to display the same straightforward relation between truss-arrangement and aperture. In this roof the rafter of truss 4 sits at the very edge of the aperture, whereas the rafter of truss 7 springs back some 35 cm. The dormer ridge-piece is nailed, via a spacer, to the rafter of truss 5, thus being arranged somehow eccentrically.

[80] See Appendix 1 of this study.

There is a strong indication that – unlike in the north-range roof – the relation between the aperture and the truss was not instrumental in the decision of how to space the trusses. Interestingly it would have been easily possible to achieve a similar truss/window-ratio by reducing the number of trusses, and it is telling that the carpenters were not doing this. In the east-range it is not the arrangement of apertures that is decisive for the rafter spacing but the position of the cross-walls. The trusses divide the entire wing in more or less equally sized intermediate fields some 0.40 m wide, and, importantly, this rhythm also extends to the roofs over the eastern part of the north-range.

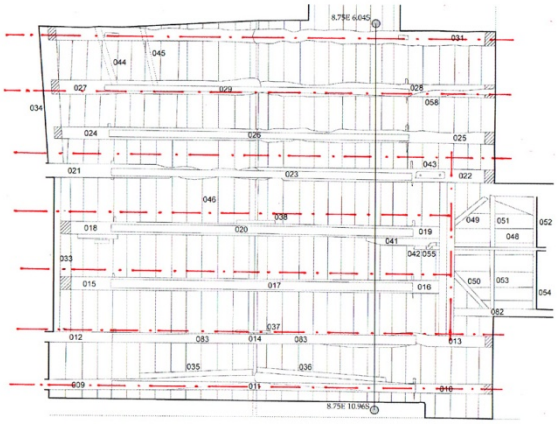


Plate 27 and 28
Newark Castle
S-elevation and NW-view

While this notable difference in the spacing of trusses does not necessarily prove that the east-range was erected separately, it nevertheless shows that its execution, compared to that of the north-range, does not reach the same degree of precision – something that may well contradict the idea that the entire L-shaped mansion dates from the time of Patrick Maxwell. The east-range indeed shows a number of awkward details that make little sense in the context of the extant architecture. Why does, for instance, the turnpike stair between the first and the second floor extend beyond the second-floor level? What is the reason for the conflict between the northernmost truss and the easternmost turret – which eventually lead to the shortening of both ashlar post and rafter,[81] and why do we have, in the eastern part of the north-range, an unsupported purlin floating meaningless above ceiling-level?

[81] See plate 33. A similar conflict occurs at the north-range where the northern rafter of truss 17 has been cut back in order to solve the conflict with the dormer. Normally such things happen during the process of construction on site in order to remove disturbing features. For the situation at the north-range, see Appendix 2 of this study.

These ‘oddities’ still do not justify the wholehearted suggestion that Patrick Maxwell was refurbishing and rearranging an existing building rather than building it entirely from scratch, but they clearly nourish doubt. It is certainly true that the two rafter-single roofs over the north-range and the east-range are structurally almost identical, and both structures, in a certain sense at least, response to Maxwell’s windows. However, this does not mean too much, as the trimmers could have been introduced in a separate step.[82] The comparison of the rafter-single roofs at Newark Castle to those at Tullibardine Chapel, Alloa Tower and 68-74 High Street Brechin shows that the wrights were adopting a typical roof-system rather than inventing individual solutions. Such roofs were employed over a period of at least 200 years, and it is impossible to judge from the structural composition whether such roofs were constructed in 1450, 1500, 1550 or 1600. It was only with the occurrence of dove-tailed collar-beams, iron nails, members of rectangular scantling and the introduction of wall-plates that the Scottish rafter-single roof reached a new stage of development during the 17th and 18th centuries.

The question whether the roofs over the north-range and the east-range belong to the same period can only be solved by the application of dendrochronological analysis. This effort would answer the question whether the L-shaped mansion attributed to Patrick Maxwell was indeed created from scratch.

[82] The roof at the north-range was entirely dismantled and anything similar could have happened over the east-range as well. Even the postponed insertion of turrets would not necessarily lead to visible construction breaks. Starting at the wall-head it should be possible to dismantle fractions of the wall stone-by-stone and thus to keep large parts of the existing fabric. The unfastened stones would be used for subsequent re-pointing and, if at all, they would leave hardly any visible scars.

1.5 The use of purlins and valley-rafters at Newark Castle

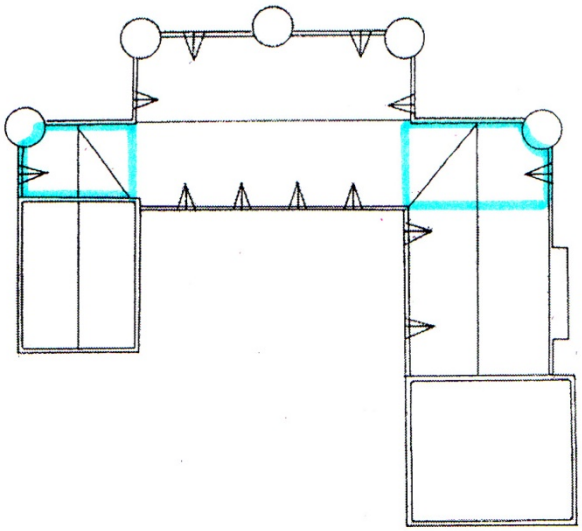
The modern appearance of Newark Castle, which is so impressively conveyed by Patrick Maxwell's architecture, is not only the result of the sophisticated design of the courtyard-elevations, but also due to the quality of the external roof lay-out. Maxwell's architect, unknown but most innovative, managed to repeat the U-shaped footprint of the building in the floor plan of the attic. Such an achievement may appear trivial nowadays, but, in the later 16th century, Scotland was still reluctant to employ valley- and hip-rafters,[83] thus often failing to create sophisticated corner-solutions above wallhead-level.

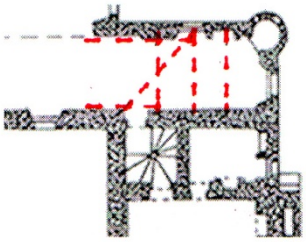
Plates 29 and 30
Newark Castle, S-elevation and NW-view.

Yet it should be emphasised that Newark Castle confines this progressive approach to the roof areas surrounding the courtyard. The remaining elevations are far more conventional, although the symmetrically arranged turrets lining the waterfront may well have been inspired by contemporary European architecture.[84] The open corners of the north-range, characterised by the gable-walls meeting halfway, are indeed not untypical of medieval Scottish castellated buildings.[85] Roofs erected over such spatial arrangements do not require the employment of hip-rafters and, consequently, rule out the application of the traditional rafter-single truss, set diagonally to a degree of 45°, as it was done some 150 yeas later in the spire of Lauder Parish Church.

[83] The original roofs over Stirling Palace, for instance, did not comprise any hip-rafters. For the lack of hip- and valley-rafters in the rafter-single roofs at Stirling Palace, see Hanke (2007), p. 16.
[84] McKean suggests the Porta Pia in Rome as the model for the windows. McKean (2001), pp. 174-5.

It was not before the later part of the 17th century that Scotland's architects were confident enough to create conjunctions characterised by the unbroken intersection of sloped roof areas.[86] Most of Scotland's pre-17th century buildings are covered with pitched roofs that are either sandwiched between their raised gable walls or conjunct with the extended walls of towers.[87] This roof-architecture tends to create individual units rather than complex composite-structures; indeed such roofs reflect the tradition of the Scottish Middle Ages more than the solutions promoted by the European Renaissance.





Plates 31 and 32
Newark Castle: The purlin roofs over the eastern and western bedchamber.

[85] See, for instance the southeast corners of Killochan Castle and Claypott's Castle. For these buildings,, see MacGibbon/Ross (1887-92), Vol. 2, p. 145 (Killochan) and 210 (Claypott's).
[86] For the separation of adjacent roofs in medieval Scottish architecture, see Stell (2004), p. 22.
[87] This, for instance, is still the case at Moray House, Edinburgh, dating from the second decade of the 17th century, and George Heriot's Hospital, Edinburgh (C17).

But it is not only the missing hip-rafter that casts a shadow of doubt on the real progressiveness of the roof design at Newark Castle. While the north-range around the courtyard undoubtedly achieves a truly modern image, it still operates within the constraints of traditional Scottish carpentry. The roof over the Great Hall is a plain rafter-single construction, regardless of the fact that it makes extensive use of longitudinal elements such as trimmers. It however fails to develop a system of principal rafters connected by purlins – something that doubtlessly would have happened in other parts of Renaissance Europe, and the absence of rafter-double features may be taken as an indication that the Newark carpenters were still acting in a process of experimentation.[88]

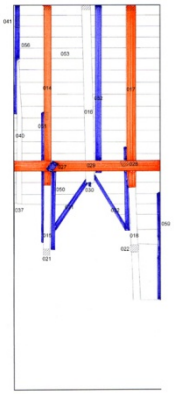
Newark Castle employs its purlins over the eastern and western extremities of the Long Gallery, and these compartments link the north-range with the remaining wings. The carpenters, requested to translate the premise of unobstructed internal accessibility into a sound structural solution,[89] opt for employing purlins as a substitute for the rafter-single trusses. All extant (original) rafters possess a fully developed rafter foot, which displays the familiar pattern of sole-piece, extended ashlar-post and rafter, demonstrating that the wrights were still thinking in terms of traditional Scottish craftsmanship; they did not appreciate that purlin roofs do not perform the way three-hinged frames do.

[88] This is not to say that Scottish medieval carpentry did not know the application of longitudinal members. Cruck-buildings as well as the medieval purlin roofs over the Great Halls at Stirling Castle and Edinburgh Castle, for instance, employ longitudinal members. However, rafter-single structures feature over the vast majority of buildings and purlin roofs are an exception rather than the rule. See Hanke (2007), pp. 11-2.

[89] Internal movement at attic-level is not yet possible over the quadrangle of Stirling Palace, for instance. For the lay-out of the attic at Stirling Palace, see Historic Scotland, Stirling Castle; Palace Phase IV, Information Drawings, All Prefixed, SP(00), Plan 2006.

Plates 33 and 34
Rafters and purlin at the eastern bedchamber.

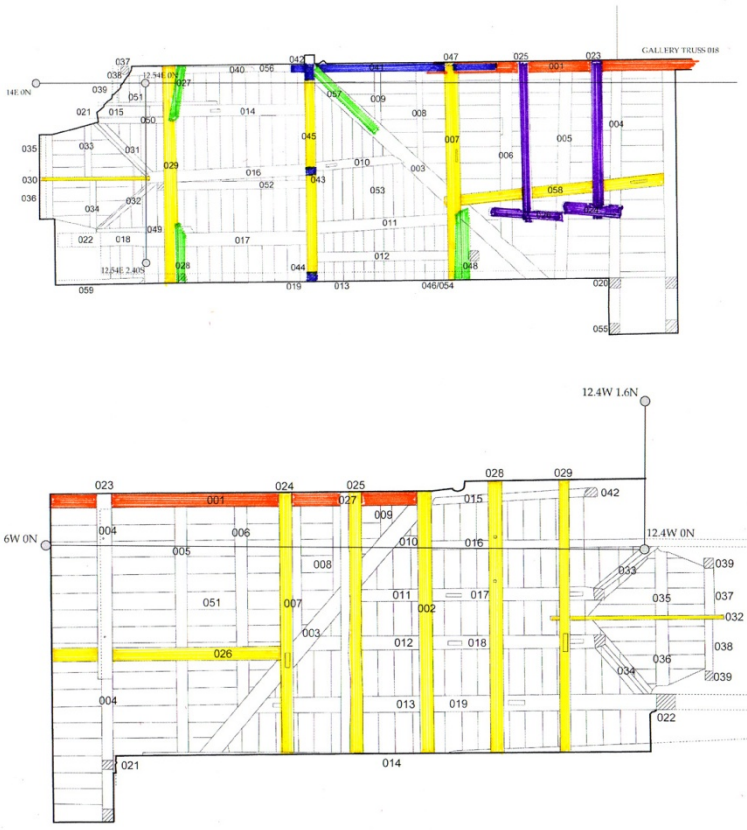
Reused original oak
Machine-sawn pine



The solution developed by the wrights led to the employment of centre-purlins and ridge-purlins over the bedchambers.[90] Supporting the rafters more or less at collarbeam-level, the purlins bridge the space between the northern and southern walls of the bedchambers, spanning some 2.90 m. Some, but not all of the purlins are strutted against the walls. They carry the common-rafters and the valley-rafters, with the latter establishing the intersection between the adjoining roof slopes. All purlins show an equal scantling and they possess square sections; the beams are obviously not purpose-made but produced from reused material.

The same goes for a third type of purlin, which bridges the gap between the bedchamber roof and the rafter-single roof over the central part of the north-range. These purlins – one of them exists at the western side of the Long Gallery and the other at its eastern side – had been introduced in order to reduce the bending moment of the collarbeam-less north-range rafters. Just as in the case of the purlins, the latter are made from reused material. All rafters are notched over the purlins and, at the apex, they not necessarily conjunct with their counter rafters.[91] The latter shows that the wrights understood a basic structural principle of purlin roofs.

[90] Two centre-purlins over the east-bedchamber and four over the west-bedchamber.
[91] It is only at the western bedchamber that the rafters meet at apex-level.



Plates 35, 36 and 37
Rafters and purlins at the eastern and western bedchamber.

Purlin
Wallplate
Original brace
C20 supporting timber
Ceiling-joists

The north-range roof at Newark Castle includes, apart from the purlins mentioned, a second type of longitudinal member, which clearly fulfils a different purpose and therefore should be termed differently. Functioning effectively as wall-plates, these members run parallel to the waterfront just underneath the apex. Their purpose is clear – the provision of seating for the upper part of the rafters, and their arrangement within the general structure of the roof is telling.

Resting on the outermost collar-beams of the north-range rafter-single roof, the wall-plates stretch out into both bedchamber-roofs, but only one of them, namely the western wallplate, does reach the apex.The eastern wallplate, by contrast, has to be supported by a separate wall-plate, which is in itself supported by vertical posts of fairly recent origin. While it is possible to understand the structural intention of the carpenters, one is wondering why they did not chose a timber long enough to reach the apex. The only possible explanation is that the Newark wrights had no longer timber at their disposal. The extensive use of salvaged timber points to the scarcity of timber in the vicinity of Newark in the years around 1600.[92]

[92] This is also indicated by the poor quality of the timber used. See Crone (2008), p. 1.

Plate 38
The use of corbels at the east-range.

.

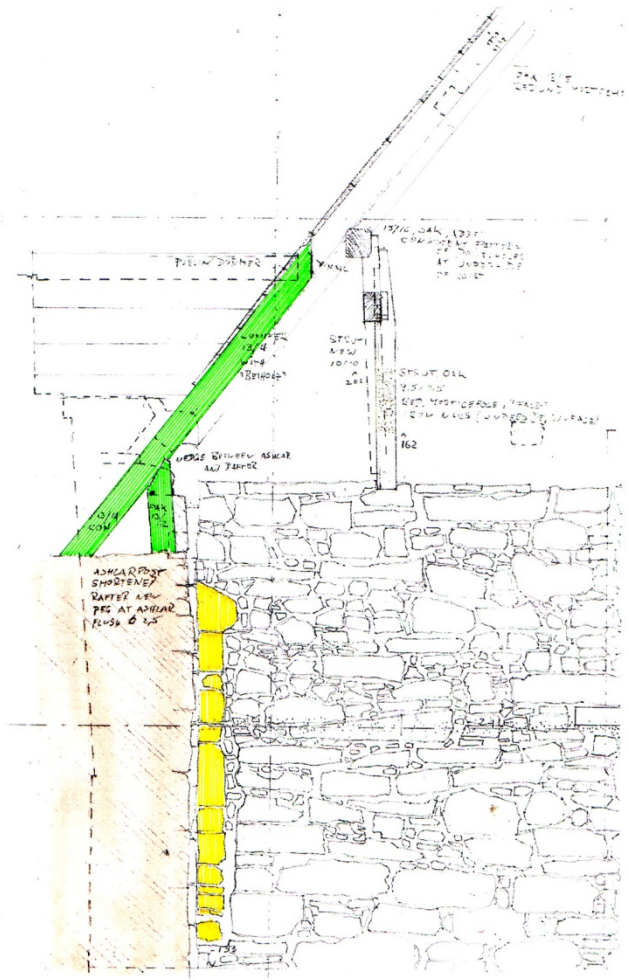
Some of the purlins at Newark share certain characteristics – in particular the assembly marks – with some of the salvaged timbers used over the central part of the north-range. They must have been taken from the same pool of material – proving that the rafter-single roofs over the central part of the north-range and the purlin roofs over the bedchambers have been erected at the same time. This is also true for those elements related to the architecture of the, now vanished, ceiling.[93] The felling-date of the remaining material is uncertain, with the exception of the some of the timber used in the west-gallery, which, in all likelihood, dates from the 20th century.[94]

[93] This applies in particular for the joists, which span the western part of the eastern bedchamber and function as a substructure for the combed ceiling. The joists sit on two supporting timbers which are crudely nailed to the rafters. The entire construction is primitive and no doubt it was concealed by a ceiling. The eastern valley-rafter, as well as one of the struts which braces one of the centre-purlin against the wall, bears marks that confirm the previous existence of a combed structure. For details related to the vanished ceiling-architecture over the central part of the north-range, see Hanke (2007b), p. 13.
[94] For instance the valley-rafter and the collar-beams incorporated into the Gatehouse-gable.

With the exception of a very small number of purlins, none of the timbers used over the east- and west-bedchambers displays any kind of assembly marks.[95] This emphasises the experimental character of the construction and suggests that all individual members were shaped on site rather than pre-fabricated in advance. The structural relation between walls and purlins is more than flimsy – it is even hazardous. Newark Castle knows several rooms where joists are supported by corbels that are firmly fixed into the wall.[96] None of this kind, however, exists at the Long Gallery. The centre- and ridge-purlins are braced somehow flimsily against the walls and they stick in shallow pockets no more than 5-10 cm deep. A substantial part of the purlins is supported by timber introduced in the 20th century, showing that the structure has caused serious problems already in the past.

Plate 39
Cross-section of the east-wall of the east-gallery.

Rafter / Ashlar-post
Turrett
Masonry (Type A)



[95] The marks visible on these beams are not related to the assembling-process of the 1598-roof but appear on reused material.
[96] For instance, at the first floor of the Gatehouse, the first floor of the Tower and the room adjacent to the Tower at first floor level.

It has been noted, in the previous chapter, that two of the common rafters in the eastern part of the Long Gallery have been cut off. The wall between the Stairloft and the eastern bedchamber, which, in all probability,[97] was erected by Patrick Maxwell, shows in fact two phases – obviously displaying a scar close to the eastern wall of the east-range. Is it then possible to interpret the poor execution of the bedchamber roofs as the insertion of a purlin-structure into an existing older structure? This would certainly explain the lack of sophisticated supporting structures. But, as already emphasised in the previous chapter, it would require a dendrochronological analysis to answer this question.

Among the remaining roofs of Newark Castle – those covering the turrets and those over the dormers – only the central turret shows a significant amount of original fabric. The material displays the same characteristics as the material already described and a part of the joints used over the central turret is fastened with the same hand-made iron nails that appear over the eastern bedchamber as well.[98] It is therefore reasonable to consider that the roof over the central turret emerged more or less contemporaneously with the remaining parts of the north-range roof. The roof over the Long Gallery, which comprises the structure covering the eastern and western bedchamber, the rafter-single roof over the central part as well as the roofs over the turrets, represents one phase. Maxwell's architect has created the roof over the L-shaped mansion as a composite-structure, which, for its time, is extraordinary progressive. Without further research it is, however, impossible to say whether the architect was incorporating the north-range roof into an existing structure over the east-range, possibly an older rafter-single roof comparable to that used over the Stairloft, or created everything from scratch.[99]

[97] Some of the struts definitely belong to the 1598-roof as they are part of the original composition. The employment of struts, of course, would be meaningless without the existence of a counteracting wall.
[98] These nails are used to nail planks, which function as support to some of the floor-joists, to the collarbeam-less rafters of the north-range roof.
[99] This research should focus on the observation of the walls with the intention to identify construction breaks. The central part of the north-range, for instance, comprises several walls that show a different thickness and there exists a scar between the north-wall of the western bedchamber and the west-wall of the central part of the attic. The systematic analysis of the wall-architecture could shed further light on these inconsistencies.