Ancient Monuments Laboratory
Report 13/2000

TREE-RING ANALYSIS OF TIMBERS FROM CLUMPCLIFF FARM, METHLEY LANE, ROTHWELL, NEAR OULTON, WEST YORKSHIRE

R E Howard
Dr R R Laxton
Dr C D Litton

TREE-RING ANALYSIS OF TIMBERS FROM CLUMPCLIFF FARM, METHLEY LANE, ROTHWELL, NEAR OULTON, WEST YORKSHIRE

R E HOWARD
DR R R LAXTON
DR C D LITTON

Summary

Thirty-two samples from three buildings at Clumpcliff farm were analysed by tree-ring dating. This analysis produced three site chronologies. The first, consisting of twenty-one samples and having 162 rings, spans the period AD 1452 – AD 1613. The second site chronology consists of four samples and has 71 rings. These rings span the period AD 1619 – 89. The third site chronology consists of two samples with 86 rings, but this fails to date.

Interpretation of the sapwood on all the dated material indicates felling dates for timbers used in each of the buildings sampled as follows:

The aisled barn is constructed of timbers all felled in AD 1588.

The roof of the farmhouse is constructed of timber felled between AD 1611 and AD 1613. It is highly likely that the timber used for all the ceiling beams of the farmhouse, both moulded and unmoulded, was also felled at this time; one sample from an unmoulded timber, with complete sapwood, has a last measured ring date of AD 1613.

Four of the eight samples from the smaller semi-detached barn are from timbers that were felled in AD 1688 and AD 1689.

TREE-RING ANALYSIS OF TIMBERS FROM CLUMPCLIFF FARM, METHLEY LANE, ROTHWELL, NEAR OULTON, WEST YORKSHIRE

Introduction

Clumpcliff Farm lies about half a mile south of the A639 Leeds to Castleford trunk road, about a mile east of Oulton, in West Yorkshire (SE 370269; Fig 1). A plan identifying the farm buildings and showing their locations is given in Figure 2. The farm contains a house (A) which is believed to date predominantly from the seventeenth century but which incorporates the fragmentary remains of a now lost sixteenth-century building; the farmhouse is built of coursed local sandstone. The farm also contains a number of agricultural buildings, consisting mostly of stables (B), which are dated by a building plaque to AD 1708, two barns (C and E) and sheds (D). Many of these are of nineteenth- and twentieth-century date, being built of brick and roofed in corrugated iron sheeting.

Internally, the roof-space or attic of the farmhouse shows three timber-framed trusses of principal rafters joined near the apices with cambered collars, the principal rafters carrying double purlins. The trusses are joined by a ridge-plate. From midway between the upper and lower purlins on each principal rafter, queen-posts run down, presumably to tiebeams, though in each case the ties are hidden by the floor of the attic. It was believed that the roof timbers are of the seventeenth century phase of construction. A sketch illustrating the form of the truss is provided in Figure 3.

In the ceiling of the ground- and first-floor rooms of the house can be seen a series of main beams and large joists. A number of these are chamfered or have roll-mouldings on them; these may be of the primary phase of construction but this is not certain. Other ceiling beams without decoration are also extant and it is believed that these are possibly the work of a later phase, perhaps belonging to the seventeenth century or later.

A turret is built to the rear of the farmhouse, on the north side of the west end. This contains a chimney which is flush with the rear wall of the house and a blocked fireplace that is currently external to the house. These elements are part of the original sixteenth-century phase and would suggest that at one time there was a range here to which the current house was attached.

Of the barns on site, two in particular are of interest to this programme of investigation, one of them being timber-framed. The first and smaller barn is built semi-detached from the house where the north range or wing, mentioned above, may have been. Little timberwork is to be found in the walls of this barn but the roof trusses contain tiebeams, principal rafters, king-posts, struts, and carry single purlins. Many of these timbers show evidence of reuse by way of redundant mortises, peg holes, tenons, and lap-joints. The date of the timbers used here in the smaller barn is quite unknown. Given that many of them appear to be reused it is believed that they are possibly from the wing or range that once ran north from the farmhouse where the barn now stands.

The larger barn is a short distance north of the farmhouse. This is a five-bay aisled structure of six king-post trusses. Struts rise from the tiebeams to the principal rafters of each truss and there are braces from the aisle posts to the tiebeams and to the aisle plates. Each aisle post is set on a stone stylobate. A drawing showing an example of such a truss is provided in Figure 4.

There is a degree of uncertainty about the date of this barn; it may date to the seventeenth century though it could possibly be earlier. This belief is influenced by comparison of Clumpcliff with a similar barn at East Riddleston Hall, West Yorkshire, an eight-bay aisled structure, dated on stylistic grounds to *c* AD 1500. The timbers at Clumpcliff are slightly more slender and regular and the building is, therefore, likely to be a little later. The ridge timber plate at Clumpcliff is heavy, however, indicating a seventeenth-century date or earlier; ridge timbers progressed to narrow vertical planks in the eighteenth century.

Post-medieval aisled barns are not uncommon in Yorkshire but this one at Clumpcliff is difficult to explain. Aisled barns tend to be associated with the storage of grain and are, accordingly, more often found in areas of arable farming. To find an aisled barn in an area where farming was based on pasture is, therefore, surprising. It is

possible that the side-aisles were used for housing cattle rather than for storing corn. In later barns, the aisles are sometimes as wide as the nave with separate access from the outside. The barn has certainly been used as a multi-purpose building over the centuries and has undergone several changes since its original construction.

Sampling and analysis by tree-ring dating was commissioned by English Heritage. The purpose of this was to provide information on the historic development of the site prior to proposed renovation and repairs to the building. In particular the Laboratory was asked to establish the felling date of the timbers in the roof of the farmhouse and that of the decorated and plain beams in the ceilings. The Laboratory was also asked to date the timbers of the small semi-detached barn and the aisled barn. Thus, this programme of sampling was to concentrate on three buildings in particular, two buildings of one phase each (the two barns) and one building probably of two, but possibly of three, phases (the farmhouse roof and two sets of ceiling joists).

A number of people were involved in undertaking sampling at this site. The Laboratory would like to take this opportunity to thank Terry Hodgkinson and the staff of Magna Holdings, Architects, of Wakefield, for their help in arranging access to the site. The Laboratory would also like to thank Dr Ian Goodall and Simon Taylor, both of English Heritage, for supplying drawings and for their help in interpreting the site phasing.

Sampling

After discussion with Dr Ian Goodall and Simon Taylor on the probable phasing of the buildings and the timbers available, a total of thirty-two core samples was obtained. Each sample was given the code CCL-A (for Clumpcliff, site "A") and numbered 01 – 32.

Eight samples, CCL-A01 – 08, were obtained from the aisled barn, the positions of these being marked on the plan of Figure 5. Eight samples, CCL-A09 – 16, were obtained from the roof timbers of the house, the positions of these being marked on the plan of Figure 6. A further six samples, CCL-A17 – 22, were obtained from the supposed primary-phase moulded ceiling timbers of the ground and first floor of the farmhouse. Although there were more such timbers extant it was seen that a number of these had very wide growth-rings, making them unsuitable for tree-ring dating. Samples CCL-A23 and A24 were obtained from the two available timbers in the ceiling of the east room on the first floor of the farmhouse. These were the plain unmoulded timbers of the supposed second phase of construction of the house. The positions of all these samples are marked on the plans of Figure 7a/b. A total of eight samples, CCL-A25 – 32, was obtained from the smaller semi-detached barn, positions of samples being marked on the sketch plan, Figure 8.

In each of these figures the trusses and other timbers are numbered from north to south or from east to west. Details of the samples are given in Table 1.

Analysis

Each sample was prepared by sanding and polishing and the growth-ring widths of all thirty-two were measured; the data of these measurements are given at the end of the report. The growth-ring widths of all the samples were compared with each other by the Litton/Zainodin grouping procedure (see appendix). At a minimum t-value of 4.5 three groups of samples formed. The twenty-one samples of the first group, from the aisled barn and the farmhouse, cross-matched with each other at relative positions as shown in the bar diagram Figure 9. In this bar diagram the samples are shown by group according to their location: aisled barn, farmhouse roof, or ceiling beams. The growth-ring widths of these twenty-one samples were combined at these relative off-set positions to form CCLASQ01, a site chronology of 162 rings. Site chronology CCLASQ01 was compared with a series of relevant reference chronologies for oak, giving it a first ring date of AD 1452 and a last measured ring date of AD 1613. Evidence for this dating is given in the *t*-values of Table 2.

The four samples of the second group, all from the small barn, cross-matched with each other at relative positions as shown in the bar diagram Figure 10. The growth-ring widths of these four samples were combined at these

relative off-set positions to form CCLASQ02, a site chronology of 71 rings. Site chronology CCLASQ02 was compared with a series of relevant reference chronologies for oak, giving it a first ring date of AD 1619 and a last measured ring date of AD 1689. Evidence for this dating is given in the *t*-values of Table 3.

The two samples of the third and final group to form by the grouping procedure, again from the small barn, cross-matched with each other at relative positions as shown in the bar diagram Figure 11. The growth-ring widths of these two samples were combined at these relative off-set positions to form CCLASQ03, a site chronology of 86 rings. Site chronology CCLASQ03 was compared with a series of relevant reference chronologies for oak, but there was no satisfactory cross-matching at any position.

Each of the three site chronologies thus created, CCLASQ01, 02, and 03, were compared with each other but there was no further satisfactory cross-matching. Each of the three site chronologies was then compared with the five remaining ungrouped samples. This indicated a cross-match only between site chronology CCLASQ01 and samples CCL-A03 and CCL-A17. Maximum values of t=3.6 and t=4.4 are found when the first rings of the samples are at minus 56 years and plus 18 years respectively relative to site chronology CCLASQ01.

To check this relative cross-matching the two samples, CCL-A03 and CCL-A17, were compared individually with a full range of relevant reference chronologies. This indicated satisfactory cross-matches for both, giving CCL-A03 a first ring date of AD 1396 and a last ring date of AD 1553, and CCL-A17 a first ring date of AD 1470 and a last ring date of 1589. Evidence for this dating is given in the *t*-values of Tables 4 and 5. It will be seen that these dates are consistent with the relative cross-matching positions of the samples with site chronology CCLASQ01, the first ring date of which is AD 1452.

However, despite the confirmation of the relative cross-matching between CCLASQ01 and the two samples, the two were not combined to make a new site chronology. Doing so would not alter the overall dating and interpretation of the site and combining them might detract from the integrity and value of CCLASQ01 as a future reference chronology for this area.

Interpretation

Analysis has produced two dated site chronologies. The first site chronology, CCLASQ01, has twenty-one samples and includes material from the aisled barn and the farmhouse. The second dated site chronology, CCLASQ02, has four samples, all from the small barn. A third site chronology, CCLASQ03, with two samples from the small barn, remains undated.

One sample from the aisled barn, CCL-A08, retains complete sapwood with a last measured ring date of AD 1588. The relative positions of the heartwood/sapwood boundaries on the other samples from the aisled barn are consistent with this being the felling date for all the dated timbers used here.

Three samples from timbers of the roof of the farmhouse also retain complete sapwood. Two of these, CCL-A10 and A12, both have last measured ring dates of AD 1611 while a third, CCL-A15, has a last measured ring date of AD 1613. The relative positions of the heartwood/sapwood boundaries on the other samples from the roof are consistent with this being the felling date for all the other timbers here.

Of the four samples from the moulded ceiling beams that have been dated, CCL-A18 – 21, three retain some sapwood, though none is complete, and the fourth has the heartwood/sapwood boundary. The average last heartwood ring date on these four samples is AD 1584. The usual 95% confidence limit for the amount of sapwood on mature oaks from this part of England is in the range 15 to 40 rings. This would give these timbers an estimated felling date in the range AD 1599 – 1624. Given that they appear integral to the construction of the farmhouse it is, however, likely that the timbers used for these beams were also felled at the same time as those used in the roof, ie no later than AD 1613. Such a date is in the middle part of the estimated felling date range.

This interpretation is perhaps all the more likely when one considers that one of the plain, unmoulded, ceiling timbers from the farmhouse also has a last, complete sapwood, ring date of AD 1613. The other plain ceiling timber has a heartwood/sapwood transition date of AD 1584, and a last measured, incomplete, sapwood ring date of AD 1604. It appears likely that this timber too was felled no later than AD 1613.

Two samples from the smaller barn, CCL-A25 and A28, retain complete sapwood with last measured ring dates of AD 1688 and AD 1689 respectively. The relative positions of the heartwood/sapwood boundaries on the other two dated samples in this group appear to be consistent with a single felling at this time.

Conclusion

Analysis by dendrochronology has now been able to provide some certainty to this otherwise uncertainly dated site. The aisled barn, dating to AD 1588, appears to be slightly earlier than the upper limit of the stylistic date range, being not seventeenth century as possibly expected, but later sixteenth century. However, it is not as early as it might have been, *c* AD 1500, by stylistic comparison with the similar barn at Riddleston Hall.

The farmhouse, on the other hand, is found to be of the date expected, though perhaps very slightly earlier. Tree-ring dating has shown that the roof of the farmhouse and all the ceiling joists, both moulded and unmoulded, appear to be of the one date, almost certainly no later than AD 1613. It can be seen, therefore, that the aisled barn is older than the farmhouse, this possibly having implications as far as the presence of an earlier farmhouse is concerned.

There is no evidence that the timbers of the smaller semi-detached barn are reused from a sixteenth- or early-seventeenth century building, which once stood on this site. The dated timbers, reused here, were felled in AD 1688 and AD 1689 and are thus much younger than expected. It might be pointed out, however, that only four of the eight samples obtained from this barn have dated. Two other samples, CCL-A27 and A32, although undated, represent a single felling, and another two samples from this barn could be from trees each with different felling dates. It is thus possible that these undated timbers do represent an undated older phase, though there is an equal chance that they are more recent still.

Several of the samples from the roof timbers and the ceiling beams of the farmhouse cross-match with each other with moderate to high *t*-values. Values in excess of t=5.0, 6.0, and 7.0, are commonly found, with some values being in excess of t=9.0 and 10.0. A value of t=14.3 is found between samples CCL-A12, from the roof, and CCL-A19, from a moulded ceiling beam, and a value of t=12.2 between CCL-A19 and CCL-A23, an unmoulded ceiling beam. These high values suggest that the trees represented were growing very close to each other, probably in the same stand or patch of woodland. It is indeed possible that some timbers are taken from the same tree.

There are cross-matches with more moderate *t*-values between samples from the farmhouse in general and the aisled barn. This would suggest that the trees used for the two buildings were growing close to each other, but were probably not in the same stand or copse.

Only three of the thirty-two samples remain ungrouped and only five samples are undated. As will be seen from Table 1, the three ungrouped samples have no more than 55 rings, making them only just about suitable for dendrochronological analysis.

Bibliography

Baillie, M G L, and Pilcher, J R, 1982 unpubl A master tree-ring chronology for England, unpubl computer file *MGB-EOI,* Queens Univ, Belfast

Fletcher, J, 1978 unpubl computer file *MC10—H,* deceased

Howard, R E, Laxton, R R, Litton, C D, and Simpson, W G, 1992 List 44 no 7 - Nottingham University Tree-Ring Dating Laboratory Results: General list, *Vernacular Architect,* **23**, 51 – 6

Howard, R E, Laxton, R R, Litton, C D, and Simpson, W G, 1994 List 57 nos 7, 8, 10a, 11b - Nottingham University Tree-Ring Dating Laboratory Results: General list, *Vernacular Architect,* **25**, 36 – 40

Howard, R E, Laxton, R R, Litton, C D, and Simpson, W G, 1995 List 60 no 9 - Nottingham University Tree-Ring Dating Laboratory Results: General list, *Vernacular Architect,* **26**, 47 – 53

Howard, R E, Laxton, R R, Litton, C D, and Simpson, W G, 1995 unpubl computer file *NUNAPSQ01,* Nottingham University Tree-Ring Dating Laboratory

Howard, R E, Laxton, R R, Litton, C D, and Simpson, W G, 1996 List 65 no 8 - Nottingham University Tree-Ring Dating Laboratory Results: General list, *Vernacular Architect,* **27**, 78 – 81

Howard, R E, Laxton, R R, and Litton, C D, 1997 List 75 no 8 - Nottingham University Tree-Ring Dating Laboratory Results: General list, *Vernacular Architect,* **28**, 124 – 29

Howard, R E, Laxton, R R, and Litton, C D, 1998 unpubl computer file *ELTASQ01* - Nottingham University Tree-Ring Dating Laboratory

Laxton, R R, Litton, C D, and Simpson, W G, 1984 List 12 no 20 - Nottingham University Tree-Ring Dating Laboratory Results: General list, *Vernacular Architect,* **15**, 65 – 8

Laxton, R R, and Litton, C D, 1988 An East Midlands master tree-ring chronology and its use for dating vernacular buildings, University of Nottingham, Dept of Classical and Archaeol Studies, Monograph Series, **III**

Siebenlist-Kerner, V, 1978 *Chronology, 1341-1636, for hillside oaks from Western England and Wales,* in Dendrochronology in Europe (ed J M Fletcher), BAR Int Ser, **51**, 295-301

Table 1: Details of samples from Clumpcliff Farm, Oulton, West Yorkshire

Sample number	Sample location	Total rings	*Sapwood rings	First measured ring date	Last heartwood ring date	Last measured ring date
	Aisled barn					
CCL-A01	East aisle rafter, truss 2	87	h/s	AD 1479	1565	1565
CCL-A02	West aisle rafter, truss 2	96	9	AD 1478	1564	1573
CCL-A03	Tiebeam, truss 3	158	3	AD 1396	1550	1553
CCL-A04	West arcade plate, truss 3 – 4	102	1	AD 1470	1570	1571
CCL-A05	East arcade post, truss 4	94	7	AD 1481	1567	1574
CCL-A06	West arcade post, truss 4	108	6	AD 1467	1568	1574
CCL-A07	South brace to west arcade post, truss 4	78	5	AD 1495	1567	1572
CCL-A08	East arcade plate, truss 5 – 6	137	22C	AD 1452	1566	1586
	Farmhouse roof					
CCL-A09	Collar, truss 1	84	9	AD 1504	1578	1587
CCL-A10	South principal rafter, truss 1	122	34C	AD 1490	1577	1611
CCL-A11	South purlin, truss 1 – 2	79	no h/s	AD 1499	------	1577
CCL-A12	North principal rafter, truss 2	130	42C	AD 1482	1569	1611
CCL-A13	North principal rafter, truss 3	136	9	AD 1460	1586	1595
CCL-A14	South principal rafter, truss 3	106	1	AD 1480	1584	1585
CCL-A15	North queen strut, truss 3	103	30C	AD 1511	1583	1613
CCL-A16	North purlin, truss 3 – west gable	106	3	AD 1482	1584	1587

Table 1: Continued

Sample number	Sample location	Total rings	*Sapwood rings	First measured ring date	Last heartwood ring date	Last measured ring date
	Ceiling beams					
CCL-A17	Main central north – south bridging beam	120	h/s	AD 1470	1589	1589
CCL-A18	South-east beam	104	5	AD 1491	1589	1594
CCL-A19	North-east beam	93	25	AD 1512	1579	1604
CCL-A20	North-west beam	98	3	AD 1491	1585	1588
CCL-A21	Main downstairs room, central beam	101	h/s	AD 1486	1586	1586
CCL-A22	Main downstairs room, rear beam	54	no h/s	------	------	------
CCL-A23	East upstairs room, window beam	120	37C	AD 1494	1576	1613
CCL-A24	East upstairs room, central beam	111	20	AD 1494	1584	1604
	Small barn					
CCL-A25	Tiebeam, truss 1	56	20C	AD 1633	1668	1688
CCL-A26	West principal rafter, truss 1	65	11	AD 1621	1674	1685
CCL-A27	West purlin, truss 1 – 2	86	2	------	------	------
CCL-A28	West common rafter 1, bay 2	71	33C	AD 1619	1656	1689
CCL-A29	East principal rafter, truss 2	56	26	AD 1629	1658	1684
CCL-A30	Tiebeam, truss 3	54	h/s	------	------	------
CCL-A31	East principal rafter, truss 3	55	h/s	------	------	------
CCL-A32	East purlin, truss 3 – 4	71	h/s	------	------	------

*h/s = the heartwood/sapwood boundary is the last ring on the sample
C = complete sapwood is retained on sample, last measured ring date is felling date of timber

Results of the cross-matching of site chronologies and samples with relevant reference chronologies

Table 2: Site chronology CCLASQ01when first ring date is AD 1452 and last ring date is AD 1613

Reference chronology	Span of chronology	t-value	
East Midlands	AD 882 – 1981	7.4	(Laxton and Litton 1988)
England	AD 401 – 1981	7.9	(Baillie and Pilcher 1982 unpubl)
MC10---H	AD 1386 – 1585	5.1	(Fletcher 1978)
Hill Top Farm, Heathcote, Derbys	AD 1425 – 1578	6.2	(Howard *et al* 1992)
White House, Blyth, Notts	AD 1453 – 1595	6.4	(Howard *et al* 1994)
Manor House, Sutton in Ashfield, Notts	AD 1441 – 1656	6.4	(Howard *et al* 1996)
NUNASQ01	AD 1478 – 1657	9.0	(Howard *et al* 1995 unpubl)
21 Church St, Mansfield, Notts	AD 1439 – 1584	7.0	(Howard *et al* 1994)

Table 3: Site chronology CCLASQ02 when first ring date is AD 1619 and last ring date is AD 1689

East Midlands	AD 882 – 1981	6.1	(Laxton and Litton 1988)
England	AD 401 – 1981	5.3	(Baillie and Pilcher 1982 unpubl)
St Hughes Choir, Lincoln Cathedral	AD 1575 – 1724	5.6	(Laxton and Litton 1988)
Rufford Mill, Notts	AD 1571 – 1744	7.2	(Laxton *et al* 1984)
Brewhouse Yard, Nottm	AD 1544 – 1701	5.9	(Howard *et al* 1994)
Ridge Farm, Elton, Notts	AD 1595 – 1702	6.3	(Howard *et al* 1998 unpubl)

Table 4: Sample CCL-A03 when first ring date is AD 1396 and last ring date is AD 1553

East Midlands	AD 882 – 1981	4.8	(Laxton and Litton 1988)
England	AD 401 – 1981	4.1	(Baillie and Pilcher 1982 unpubl)
MC10---H	AD 1386 – 1585	4.0	(Fletcher 1978)
Wales and West Midlands	AD 1341 – 1636	4.7	(Siebenlist-Kerner 1978)
Lowdham Old Hall, Notts	AD 1422 – 1527	5.2	(Howard *et al* 1997)
White's Farm, South Leverton, Notts	AD 1399 – 1506	5.1	(Howard *et al* 1994)
Hodsock Priory, Notts	AD 1397 – 1567	5.6	(Howard *et al* 1995)

Table 5: Sample CCL-A17 when first ring date is AD 1470 and last ring date is AD 1589

East Midlands	AD 882 – 1981	6.9	(Laxton and Litton 1988)
England	AD 401 – 1981	6.2	(Baillie and Pilcher 1982 unpubl)
MC10---H	AD 1386 – 1585	5.6	(Fletcher 1978)
Wales and West Midlands	AD 1341 – 1636	6.3	(Siebenlist-Kerner 1978)
Hill Top Farm, Heathcote, Derbys	AD 1425 – 1578	5.1	(Howard *et al* 1992)

Figure 1: Map to show general location of Clumpcliff Farm –

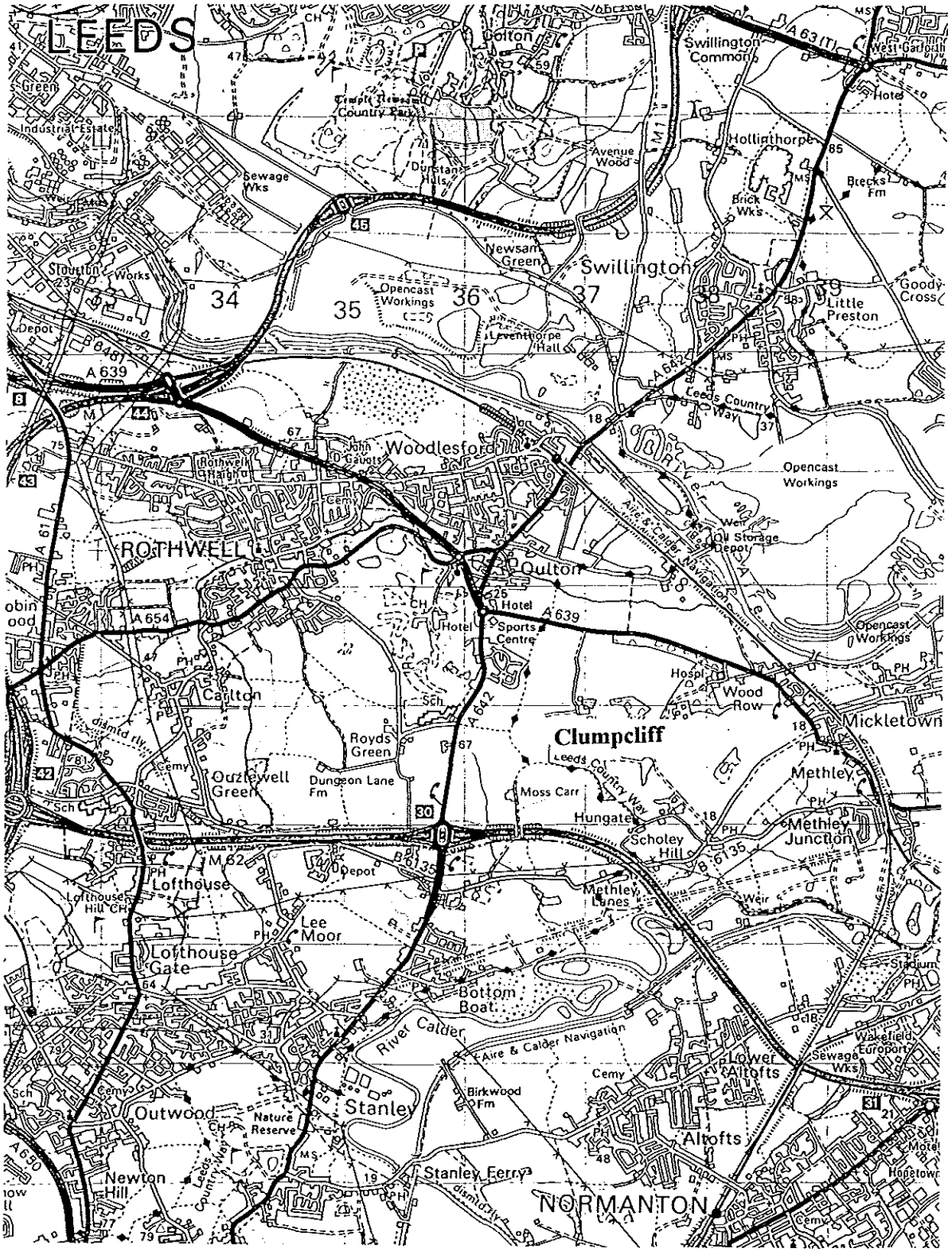


Figure 2: Plan to show buildings at Clumpcliff Farm –

A: Farmhouse
B: Stables
C: Aisled Barn
D: Sheds
E: Detached barn

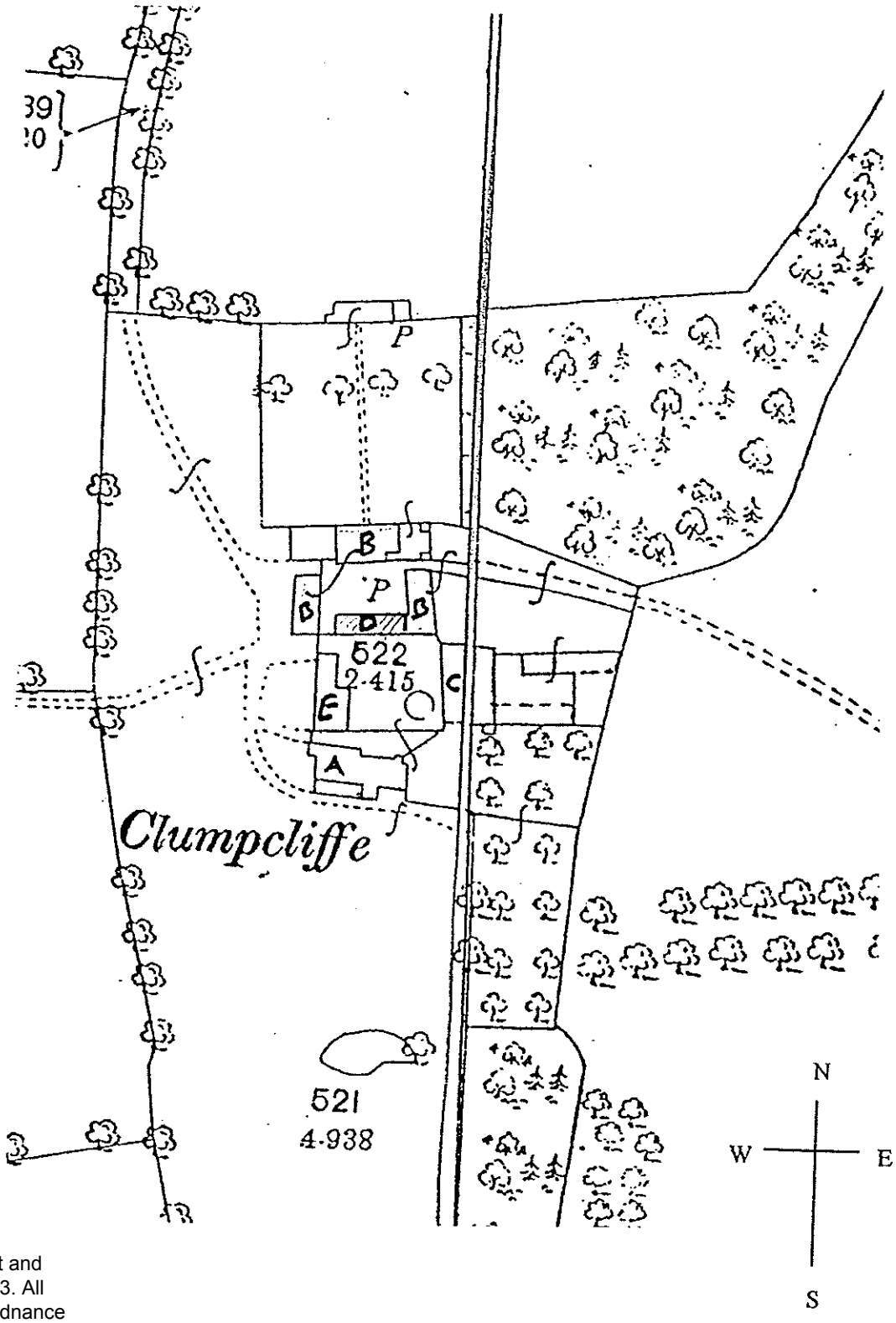


Figure 3: Sketch illustration of a truss from the roof of the farmhouse

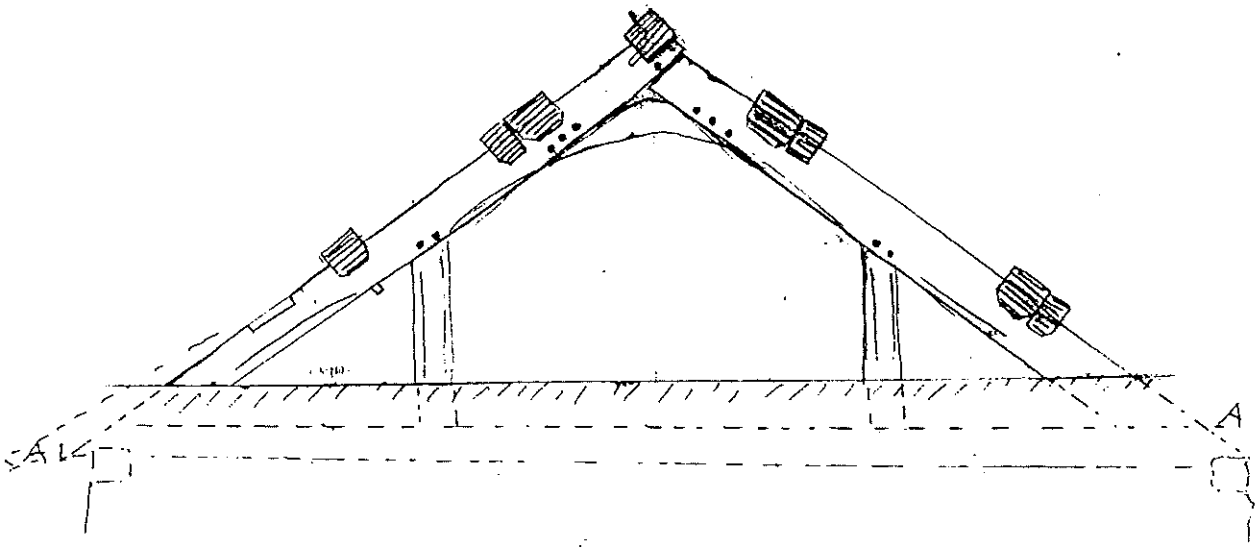


Figure 4: Illustrative example of a truss from the aisled barn

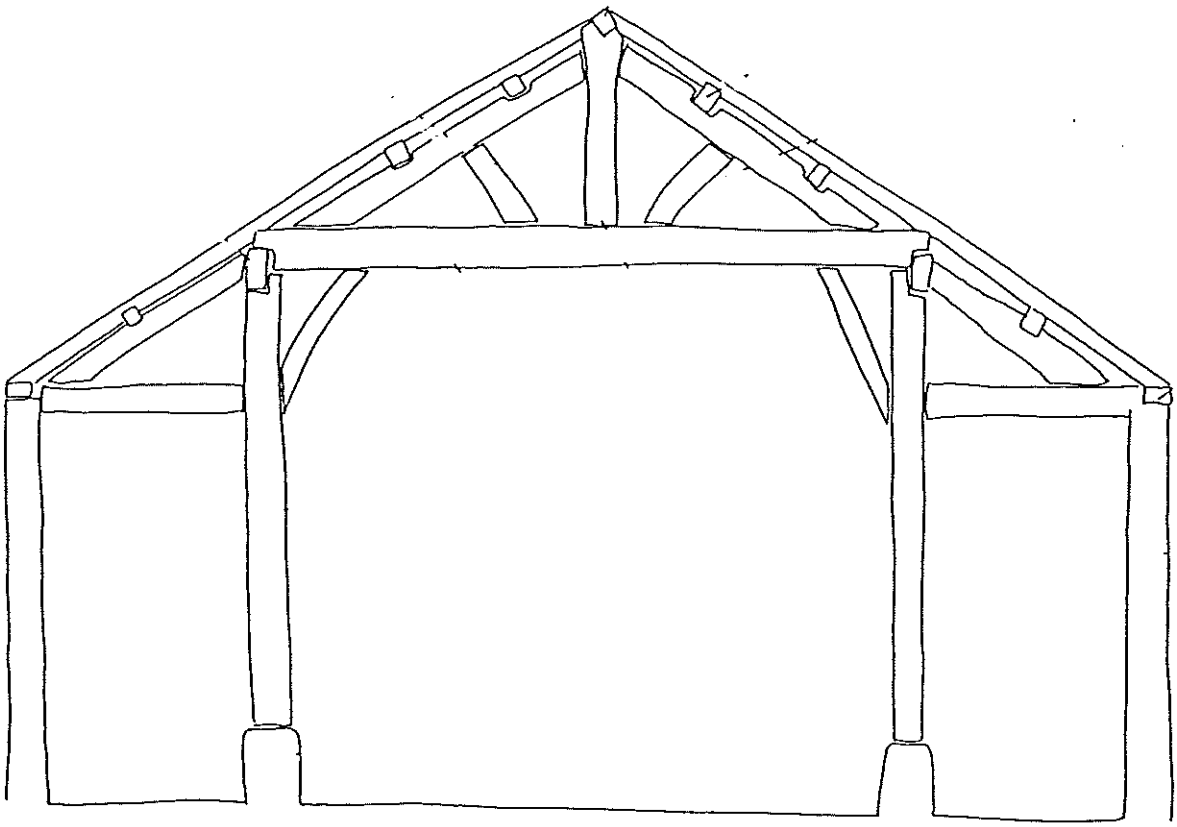


Figure 5: Plan of the trusses in the aisled barn to show sample locations

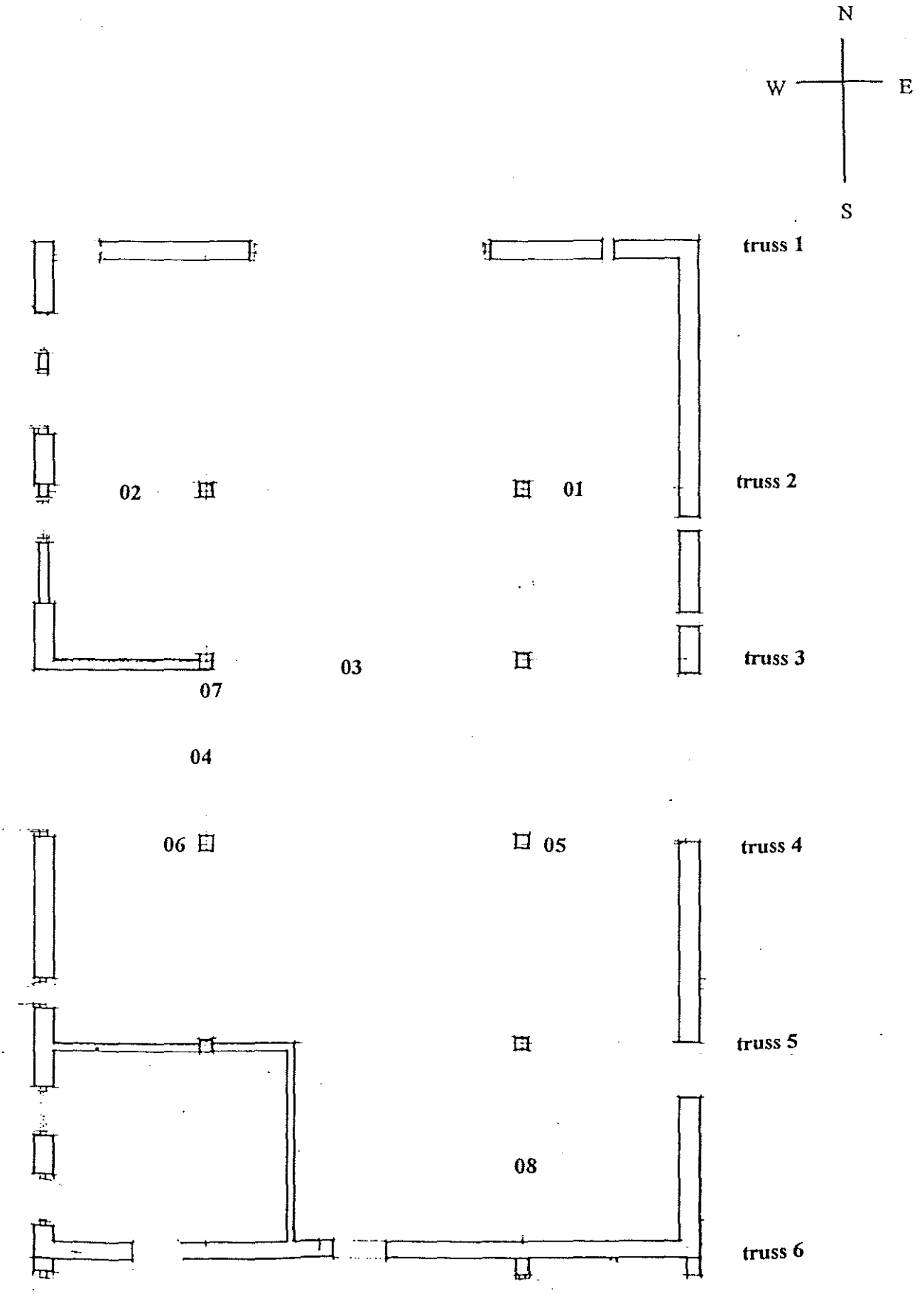


Figure 6: Plan of the trusses in the roof of the farmhouse to show sample locations

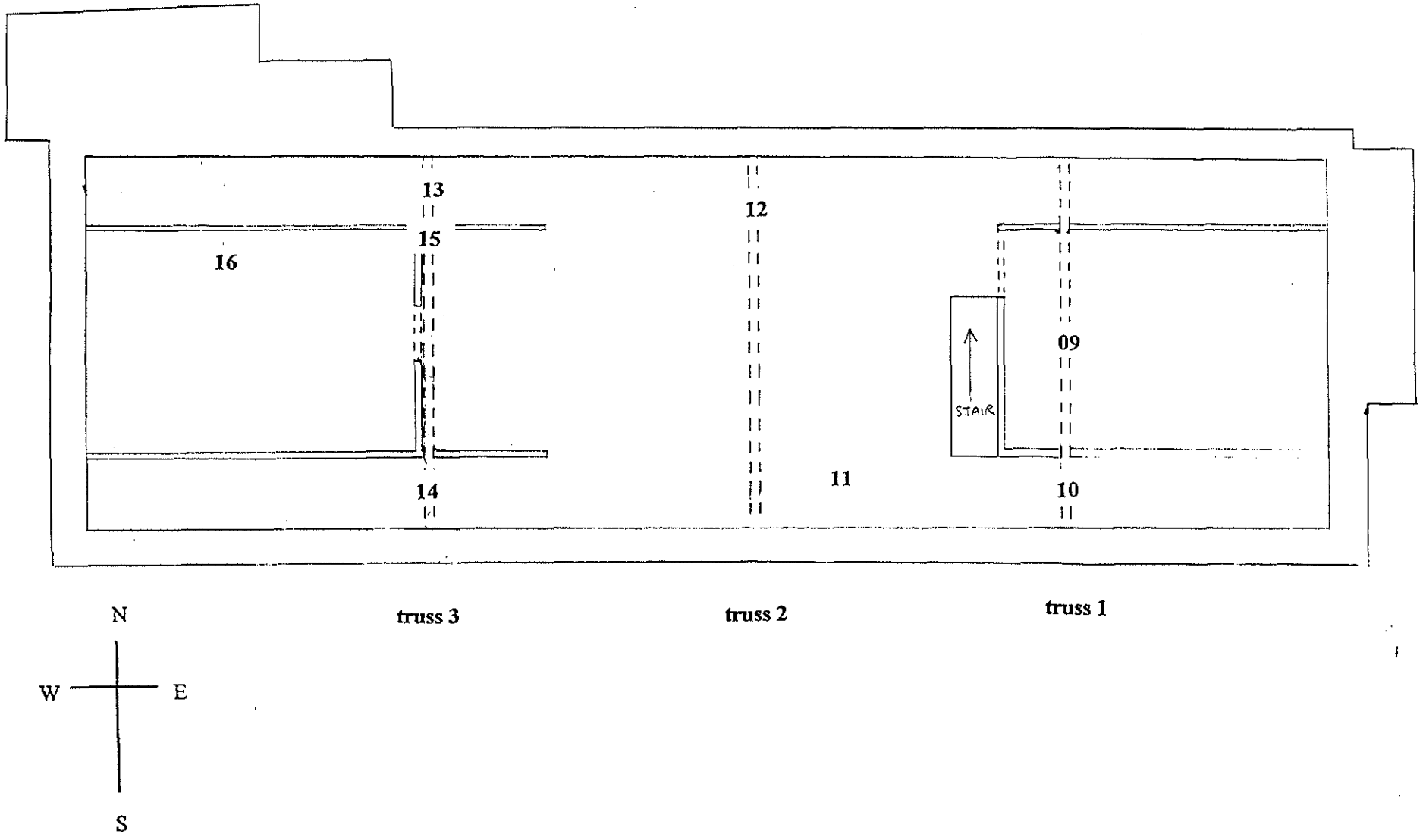


Figure 7a: Plan of the ceiling timbers of the first floor of the farmhouse to show sample locations

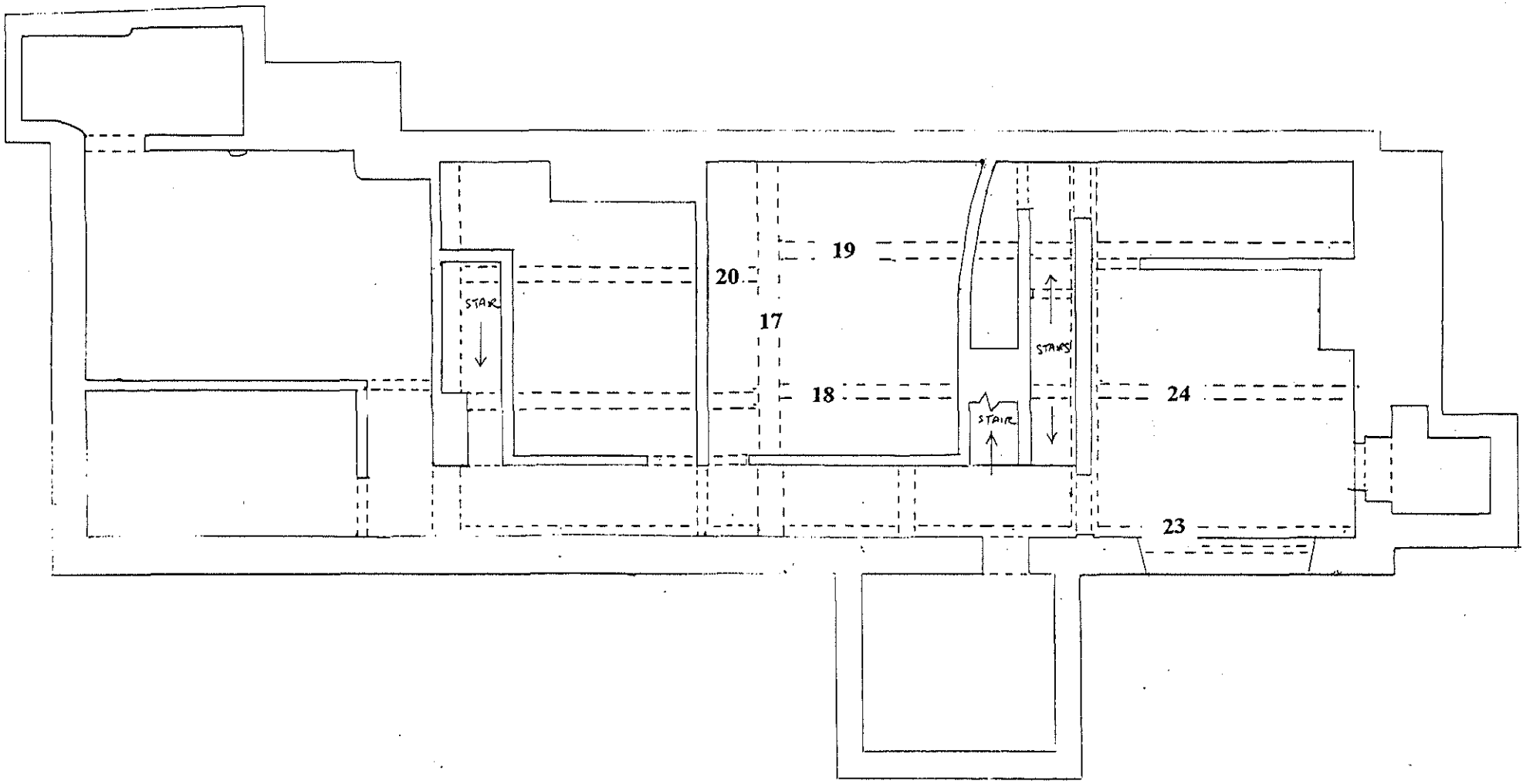


Figure 7b: Plan of the ceiling timbers of the ground floor of the farmhouse to show sample locations

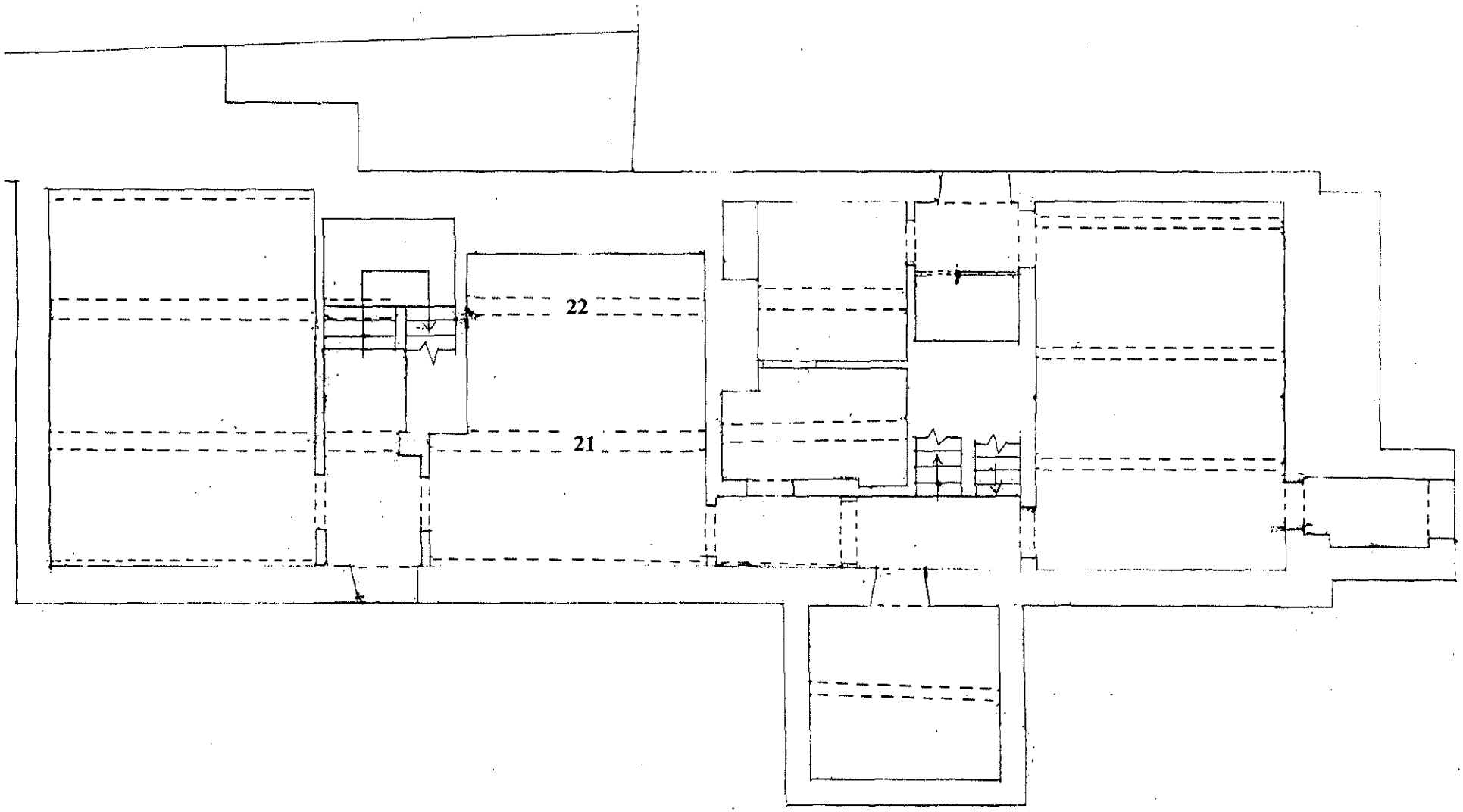
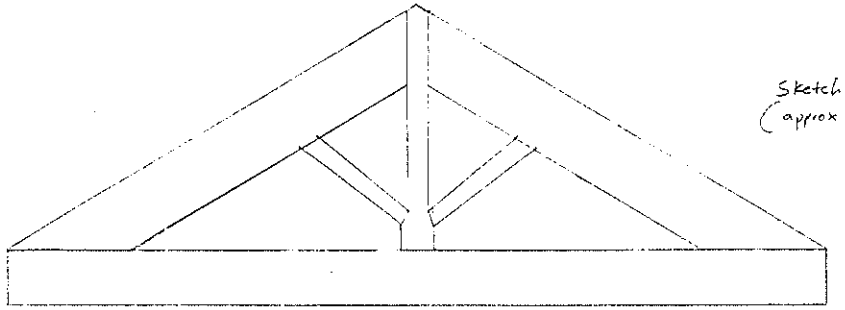
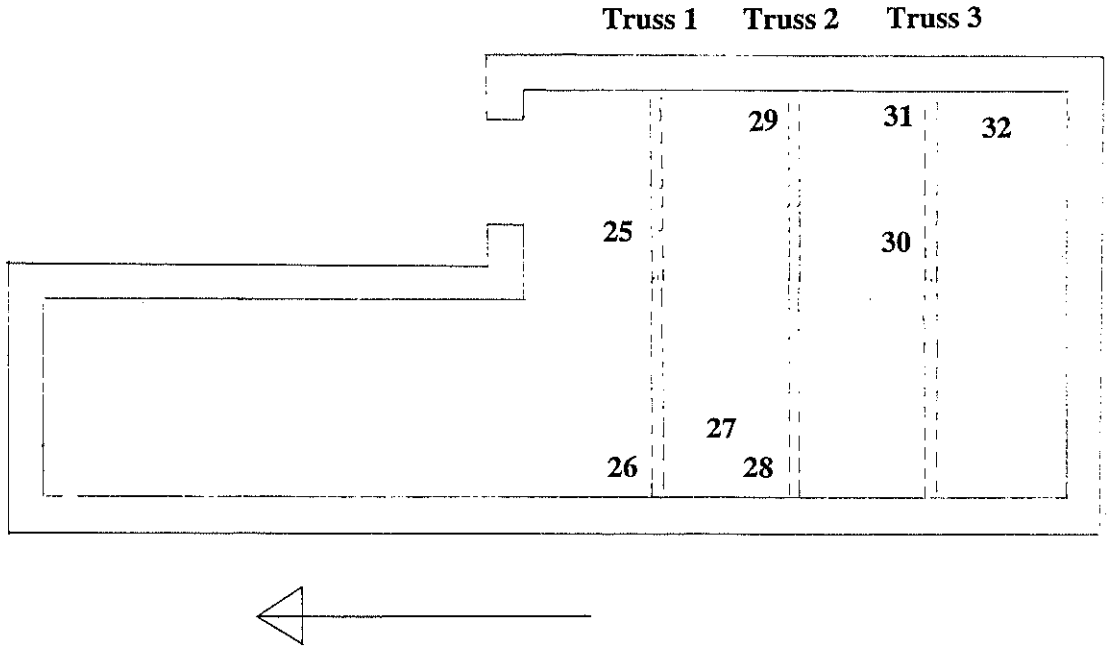


Figure 8: Plan of the trusses in the detached barn to show sample locations and central roof truss



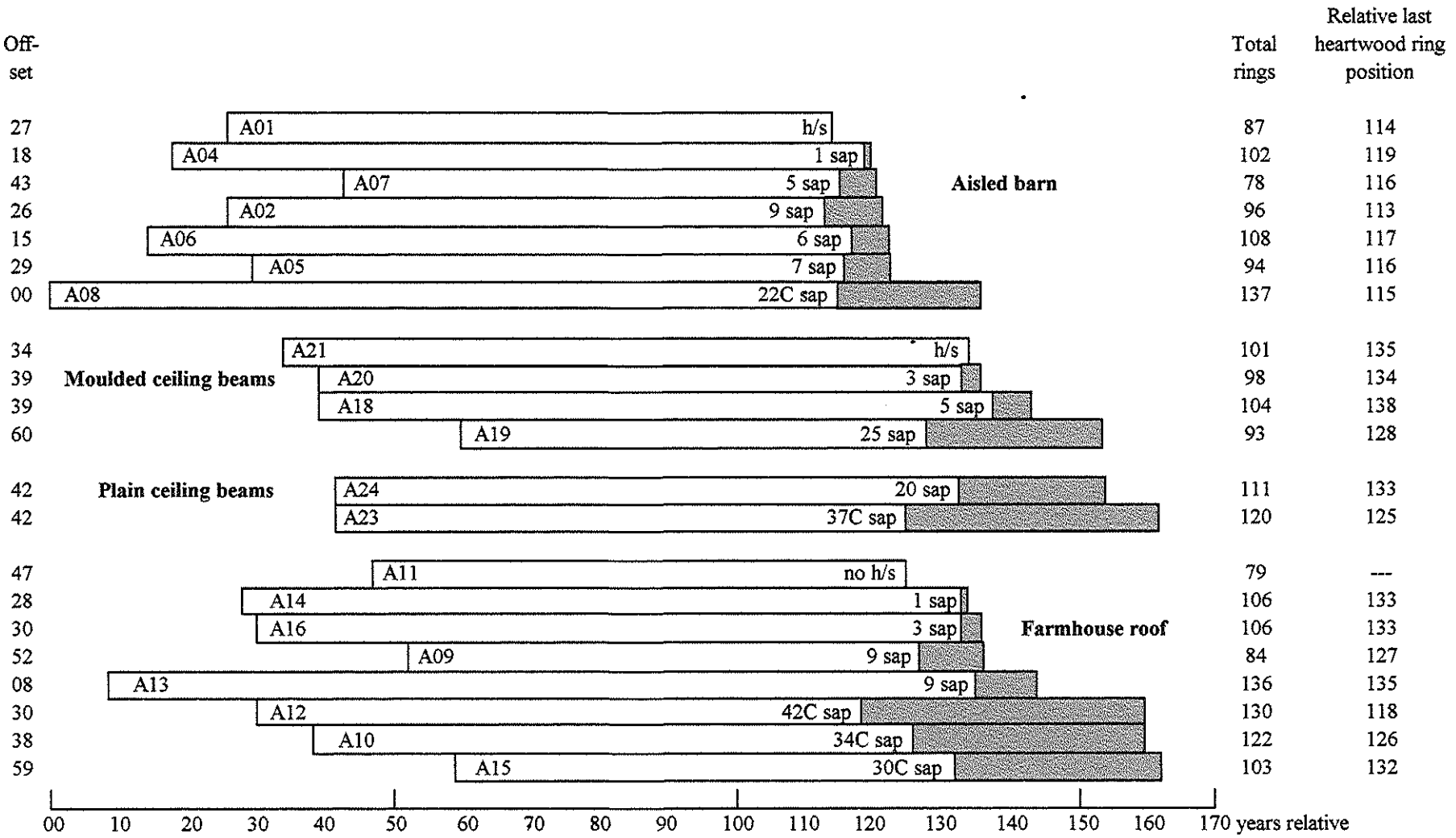
Sketch of central roof truss
(approx 1:50. DO NOT SCALE)

Clumpcliffe, Methley Lane,
Rothwell, Wilerks.
Animal range to South of farmhouse



Sketch plan of 1st floor showing
approximate location of beams
NGR 370 269 NBR No. [ZCC]
(Approximately 1:100, DO NOT SCALE)

Figure 9: Bar diagram of samples in site chronology CCLASQ01



White bars = heartwood rings, shaded area = sapwood rings
h/s = heartwood/sapwood boundary is last ring on sample
C = complete sapwood retained on sample

Figure 10: Bar diagram of samples in site chronology CCLASQ02

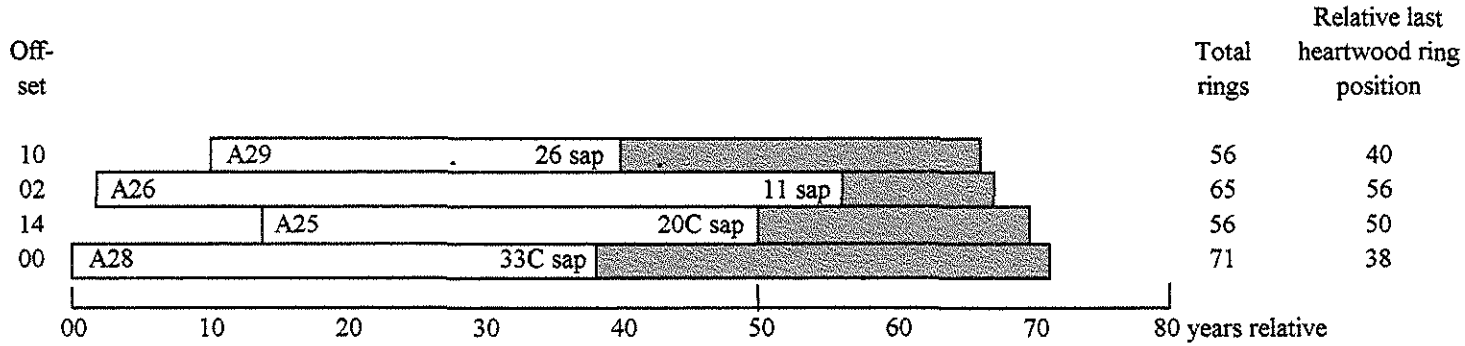
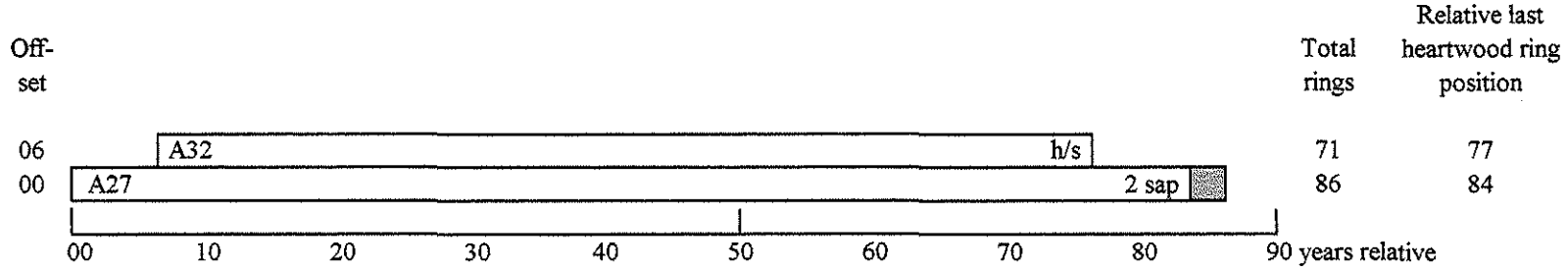


Figure 11: Bar diagram of samples in site chronology CCLASQ03



White bars = heartwood rings, shaded area = sapwood rings
h/s = heartwood/sapwood boundary is last ring on sample
C = complete sapwood retained on sample

CCL-A04B 102
365 287 309 374 397 409 267 355 356 469 533 475 357 434 437 289 383 276 173 161
164 161 179 151 154 265 362 212 187 209 243 192 215 218 255 198 191 144 132 167
170 174 124 139 144 127 161 95 103 126 135 171 184 203 135 100 143 196 134 127
103 98 86 92 97 115 125 120 91 99 99 127 86 186 167 172 103 68 87 94
121 170 88 112 108 145 90 103 90 140 154 168 166 133 108 142 85 72 112 144
168 188
CCL-A05A 94
381 349 515 366 295 375 530 344 381 521 260 329 353 242 288 276 264 213 295 144
241 324 198 198 268 296 216 227 221 238 168 216 147 191 178 202 195 170 131 141
157 174 115 119 110 156 120 133 108 126 143 86 108 121 179 146 116 77 103 105
156 133 104 92 178 86 58 93 94 157 86 92 75 117 134 65 72 96 144 107
108 93 118 84 70 106 123 86 100 87 108 76 75 128
CCL-A05B 94
401 329 495 368 294 357 527 335 371 532 272 324 362 243 295 273 262 208 299 140
252 305 206 199 268 295 213 237 214 238 163 220 162 202 198 199 199 172 144 130
155 174 116 116 112 160 108 126 101 116 150 84 109 127 177 145 109 100 86 111
152 133 104 92 161 103 57 84 107 139 106 91 79 104 137 69 64 97 148 103
109 91 126 66 72 114 119 88 99 86 104 82 71 106
CCL-A06A 108
396 412 499 507 427 469 403 438 448 387 338 333 421 390 310 334 423 469 319 321
372 296 308 216 134 193 300 248 239 233 232 275 268 165 239 220 233 318 320 240
197 218 306 283 228 188 143 248 232 192 198 210 183 196 236 217 199 235 141 208
149 202 139 144 158 111 152 151 200 230 150 150 144 140 175 157 161 145 223 166
84 94 113 149 181 125 113 144 176 90 90 115 145 149 171 125 137 106 69 74
105 96 98 120 119 94 119 149
CCL-A06B 108
394 417 515 474 451 459 406 461 483 403 309 340 426 391 317 334 416 479 340 314
365 310 325 210 129 196 288 243 257 231 244 289 271 146 233 231 239 303 302 250
202 215 303 277 223 182 136 240 217 196 218 200 193 188 236 196 202 228 153 201
159 212 148 149 169 102 136 152 197 236 148 139 133 156 168 149 161 150 220 162
94 89 104 143 172 131 99 151 169 92 96 116 149 147 181 129 144 112 59 76
102 96 105 119 129 96 110 154
CCL-A07A 78
404 404 155 192 266 333 181 291 227 269 224 244 283 228 217 233 203 193 199 232
145 197 161 161 186 195 200 203 257 204 174 226 215 228 202 146 170 180 184 208
258 251 207 164 173 145 143 219 234 258 257 148 94 122 173 216 263 187 206 171
150 130 150 140 256 220 228 272 212 225 171 180 225 230 192 261 211 223
CCL-A07B 78
402 396 192 187 250 331 165 245 232 271 238 226 263 211 197 208 192 185 186 231
152 188 174 173 186 195 200 200 227 167 160 230 207 235 182 147 169 181 184 209
259 245 164 189 126 139 144 216 234 258 241 167 99 135 164 213 251 194 195 177
145 140 151 131 206 223 227 235 214 205 174 189 231 228 191 258 198 192
CCL-A08A 137
226 192 185 156 242 204 136 230 264 355 514 376 356 326 368 445 315 360 358 334
219 245 268 414 229 223 316 345 351 421 255 298 269 265 356 410 341 335 298 234
199 189 179 277 344 251 149 221 259 182 219 185 202 192 148 158 132 175 146 146
178 141 180 158 179 152 144 154 154 159 150 126 135 73 123 124 131 120 92 150
89 71 95 165 161 97 75 87 97 113 136 135 119 145 86 83 77 95 148 182
144 132 117 137 80 96 112 166 161 143 132 105 119 113 72 46 50 59 77 58
51 66 82 85 67 63 97 107 127 89 86 125 168 138 191 138 132

CCL-A08B 137
266 171 180 161 253 208 139 230 296 318 481 377 356 321 350 378 317 374 374 343
215 235 265 420 222 237 320 354 333 388 236 291 263 258 361 409 334 340 312 219
199 198 174 288 370 241 152 214 257 186 219 189 204 191 153 157 136 176 146 142
187 144 171 169 178 153 145 158 154 162 141 146 131 72 118 137 131 97 102 149
88 81 92 167 158 102 82 82 98 108 137 135 125 140 87 86 77 90 147 181
151 132 112 138 75 99 113 163 163 148 127 110 113 111 69 49 47 67 74 51
57 69 84 84 63 62 97 109 129 103 82 143 152 111 180 157 113
CCL-A09A 84
435 530 494 487 355 347 276 397 331 379 411 362 335 145 280 316 188 304 281 183
190 140 332 353 439 275 284 350 275 226 280 317 365 250 221 248 325 217 243 313
294 279 235 138 224 182 189 257 239 194 157 179 82 56 63 98 91 103 95 88
110 79 77 89 99 98 124 110 84 100 119 115 122 130 117 153 176 156 164 113
103 108 120 128
CCL-A09B 84
457 529 484 487 362 348 275 377 350 433 406 355 340 142 297 309 155 336 291 186
187 139 350 360 439 276 275 353 272 230 277 323 367 253 220 242 323 213 252 314
289 281 238 127 234 188 179 254 236 192 156 193 81 54 61 101 89 100 100 87
105 86 84 97 97 98 120 104 77 102 120 106 121 124 110 148 158 147 168 98
97 107 123 134
CCL-A10A 94
73 102 107 154 195 127 132 89 112 193 182 175 106 95 111 109 128 171 155 198
145 139 153 183 223 235 221 220 162 68 67 77 142 159 137 123 151 190 97 97
118 190 188 232 201 148 115 121 69 142 104 133 131 106 90 125 158 200 228 174
209 184 307 217 182 242 329 228 333 197 155 113 94 58 44 107 126 179 65 52
70 50 60 44 42 43 45 45 43 39 63 39 40 55
CCL-A10B 97
134 158 191 172 217 377 272 174 116 138 187 162 161 180 138 114 95 143 122 90
89 111 76 94 132 127 110 66 64 107 112 132 230 137 123 83 132 199 205 173
112 116 114 133 130 156 169 216 133 143 162 176 228 246 226 242 159 81 64 82
124 161 144 128 150 186 96 79 111 192 202 226 220 159 127 143 64 134 93 146
132 107 62 97 147 187 222 141 196 167 313 178 156 231 288 209 306
CCL-A11A 79
206 329 255 326 225 264 285 291 255 207 285 195 236 156 153 183 170 150 97 155
174 129 178 191 114 165 91 164 157 157 125 104 108 90 83 101 130 94 82 73
75 83 77 74 58 58 67 53 36 42 56 78 86 54 57 52 55 42 52 58
74 81 54 48 46 53 45 43 47 53 56 40 48 49 40 33 38 43 57
CCL-A11B 79
222 316 272 331 222 314 266 285 244 207 287 206 235 148 149 191 174 151 93 160
178 121 185 181 117 164 102 166 150 161 122 99 105 87 80 104 123 94 92 72
74 85 81 77 52 62 72 70 36 32 56 68 79 57 52 58 59 45 39 61
81 70 62 49 52 38 50 48 50 48 50 50 46 42 48 32 40 45 65
CCL-A12A 130
332 288 340 239 267 262 199 157 116 122 178 150 223 198 242 150 144 150 219 134
110 146 125 128 104 193 112 133 103 147 108 149 143 166 153 94 101 131 96 152
212 172 161 90 123 152 166 162 89 106 98 96 126 174 186 196 120 118 148 152
242 203 184 198 153 75 66 90 137 187 145 104 104 149 84 73 61 80 99 98
85 86 73 62 55 65 77 94 151 116 81 112 133 117 131 79 100 147 127 136
126 101 130 106 161 119 80 84 70 63 57 73 87 96 65 64 52 58 59 47
56 37 52 54 74 62 74 60 42 55

CCL-A12B 130
306 308 321 252 273 266 195 166 108 124 175 140 227 212 213 139 147 152 209 149
117 143 123 127 112 186 111 137 103 161 114 152 151 170 153 95 102 120 102 144
216 181 159 79 125 149 159 151 96 105 96 108 119 165 198 184 130 109 144 166
227 201 179 198 156 83 63 83 132 194 142 103 99 145 83 83 58 74 110 97
94 83 72 59 54 65 78 110 144 123 100 98 130 117 127 77 106 143 135 130
126 94 140 109 140 134 74 95 78 69 53 64 104 97 61 54 52 61 59 42
55 41 63 42 79 69 70 58 54 69
CCL-A13A 136
178 189 172 155 183 98 103 107 144 122 117 130 127 149 248 213 153 239 203 261
290 254 279 313 227 186 243 430 323 236 119 119 158 135 94 101 118 63 60 68
101 43 65 78 76 84 109 108 83 103 128 134 104 93 122 90 139 92 119 99
76 74 110 91 101 68 82 97 86 89 86 75 108 104 111 164 211 171 108 160
163 143 194 181 168 178 153 105 141 131 151 208 156 151 150 156 98 107 99 139
128 133 147 121 101 100 101 101 95 120 171 103 85 102 85 103 79 62 82 88
92 84 84 134 143 195 215 177 133 154 115 59 59 79 147 153
CCL-A13B 136
182 169 164 158 175 100 104 110 130 126 143 145 112 114 216 208 154 230 206 264
284 260 282 313 219 174 218 402 321 241 129 114 155 142 102 92 112 61 63 67
91 50 76 76 71 79 112 109 83 123 119 132 112 96 122 94 137 92 124 95
78 63 110 94 101 54 82 84 93 98 81 78 112 98 118 154 210 176 105 161
168 142 185 183 160 207 154 108 141 121 164 206 171 144 148 154 100 106 96 125
129 132 141 128 81 110 92 105 106 126 167 89 95 98 92 97 91 53 67 96
98 76 87 137 136 200 211 164 139 161 108 69 46 78 168 150
CCL-A14A 106
330 370 294 370 275 302 291 302 326 363 218 268 399 392 446 413 525 257 201 216
267 137 179 207 379 264 232 243 215 357 302 222 241 171 179 152 171 166 168 136
86 110 141 111 151 104 107 131 117 113 90 81 90 113 130 172 183 132 99 130
150 156 190 192 150 155 136 105 103 102 135 177 144 150 184 144 108 102 120 153
131 152 124 111 77 82 86 86 70 96 117 101 91 85 88 70 68 55 61 65
66 67 82 108 112 155
CCL-A14B 106
348 358 272 384 264 333 303 308 306 363 210 273 399 396 419 402 559 264 215 222
279 143 187 200 372 263 232 234 212 362 304 218 237 183 170 156 180 154 171 137
87 121 129 139 148 106 112 117 121 122 90 78 89 116 125 165 178 139 96 128
181 160 200 171 144 146 143 104 99 90 138 176 159 154 165 144 115 91 118 148
129 157 118 106 84 89 80 83 74 105 122 106 78 81 83 65 68 55 62 75
65 78 76 90 129 124
CCL-A15A 103
318 238 251 299 330 329 195 334 258 180 181 174 222 303 168 137 178 204 247 149
162 140 139 148 283 286 227 188 199 206 165 227 289 245 263 226 112 109 102 168
229 158 153 161 232 124 102 58 78 85 125 106 101 87 95 99 98 121 181 186
120 96 106 109 134 191 144 131 169 203 243 179 132 119 110 152 155 198 171 132
93 58 59 93 117 119 92 104 81 76 82 50 42 40 41 49 65 89 70 100
72 60 64
CCL-A15B 103
298 237 243 303 335 297 201 332 240 163 186 195 231 296 178 126 177 209 227 153
168 146 130 154 273 287 227 192 197 194 172 242 293 250 268 228 108 111 98 170
227 161 150 159 240 121 103 66 65 103 128 98 105 91 97 101 95 124 173 189
118 93 110 105 139 187 146 134 163 201 234 181 124 120 116 145 161 188 182 116
88 58 65 88 111 121 92 99 91 79 75 47 41 40 42 57 60 91 70 101
68 61 83

CCL-A16A 106
349 451 454 506 461 575 317 324 370 214 312 244 358 381 327 263 199 199 276 255
299 220 234 230 244 198 203 218 230 227 190 151 183 183 163 114 139 105 138 167
189 163 140 90 177 156 146 164 84 115 58 131 125 123 131 110 103 90 99 110
173 147 147 149 144 57 28 42 67 95 69 83 48 87 39 43 36 55 71 66
62 65 34 32 53 63 86 103 167 158 86 138 174 150 71 111 150 164 153 92
41 63 65 84 109 92
CCL-A16B 106
349 455 477 460 466 600 309 327 390 206 307 243 365 374 328 264 197 203 268 253
282 205 245 236 231 206 188 230 229 222 190 156 175 187 169 112 140 105 136 174
189 159 121 85 185 168 145 169 78 117 61 133 123 120 137 112 101 94 97 101
169 147 141 153 141 64 28 42 71 89 68 83 49 82 42 39 38 59 63 72
65 62 32 36 55 63 88 96 164 163 93 135 179 148 67 114 152 158 156 88
42 58 67 81 116 96
CCL-A17A 120
460 346 331 298 274 387 274 146 203 254 241 271 231 246 191 224 217 260 183 176
216 178 183 199 193 208 218 202 168 176 187 195 187 144 156 176 169 155 145 194
179 159 146 155 143 120 88 124 163 141 134 137 155 131 118 114 132 122 142 113
156 160 88 85 75 127 141 147 129 115 144 155 130 134 155 129 102 101 89 90
91 127 93 86 98 126 92 77 78 125 109 127 90 95 85 78 46 66 89 86
87 93 97 75 62 86 90 74 75 106 124 102 107 92 124 131 170 131 108 216
CCL-A17B 120
426 365 340 310 256 342 278 164 188 249 235 257 234 207 230 231 221 264 186 197
212 161 172 191 202 193 211 198 159 182 196 197 186 139 163 171 179 151 143 193
173 161 151 162 144 108 109 102 149 149 124 134 157 124 122 119 131 128 137 115
152 151 93 84 80 122 140 149 135 120 146 167 121 135 150 135 103 105 92 84
97 110 96 79 105 120 98 78 80 124 112 120 94 87 96 71 53 67 85 86
90 98 90 79 56 91 88 81 73 109 125 101 107 99 117 142 150 126 115 185
CCL-A18A 104
198 435 392 623 487 456 287 344 401 361 239 319 443 494 419 487 398 297 331 330
292 235 227 391 332 455 256 378 283 249 220 392 294 195 154 283 301 280 158 132
128 89 114 189 203 188 170 164 163 124 131 191 224 214 229 172 98 111 133 215
287 193 184 189 248 161 143 170 246 232 274 187 185 179 185 167 228 210 248 303
264 215 288 276 209 208 135 140 182 288 184 202 205 287 318 334 231 242 242 161
155 102 173 263
CCL-A18B 104
206 425 379 632 480 459 281 369 385 370 245 307 442 504 455 491 388 302 324 343
287 225 222 383 345 438 250 372 290 248 231 390 293 212 151 276 308 281 161 121
129 84 124 199 197 186 178 164 170 124 141 200 224 213 225 172 94 118 123 222
295 186 185 189 249 160 139 163 241 242 281 181 190 191 186 159 234 220 243 300
268 225 280 264 205 201 137 148 187 284 180 203 208 284 320 327 245 240 246 162
153 108 193 271
CCL-A19A 93
183 186 222 276 239 167 198 199 185 223 264 224 180 106 160 177 267 183 143 149
138 164 209 203 209 214 146 153 155 186 267 296 228 265 246 93 79 88 139 243
139 121 114 161 71 68 58 94 120 136 145 102 77 66 61 64 78 105 188 177
143 181 173 174 204 132 175 186 255 190 188 135 149 170 208 180 117 123 103 112
80 103 117 161 130 109 96 90 85 69 70 76 87
CCL-A19B 93
214 171 218 256 251 165 208 189 181 211 284 214 180 104 173 175 242 181 152 154
135 155 208 202 229 229 144 159 157 181 258 286 236 265 244 95 82 92 143 233
146 116 107 167 71 63 59 100 119 129 138 104 85 63 66 65 77 103 187 183
137 178 172 181 200 133 172 188 253 192 186 134 146 168 210 179 122 128 92 114
81 105 117 158 124 116 93 90 88 73 68 72 92

CCL-A20A 98
228 186 330 301 393 460 295 175 133 121 97 150 248 226 302 269 288 189 173 194
197 121 95 142 156 215 177 203 143 82 71 148 214 296 135 114 143 228 228 144
111 65 94 115 247 269 198 104 135 107 80 161 210 200 268 114 58 74 57 126
185 133 114 201 190 100 76 57 114 106 170 144 141 82 62 83 93 95 169 156
120 74 89 74 132 115 76 66 88 186 133 135 92 66 102 150 178 169
CCL-A20B 98
208 188 329 298 399 461 296 194 123 122 93 141 224 236 292 292 302 182 182 190
190 131 87 154 170 219 175 212 149 90 87 146 214 301 133 108 152 213 225 141
105 65 102 126 256 266 184 95 126 112 95 160 208 178 251 134 65 71 57 127
165 143 121 185 177 100 77 63 108 98 159 142 135 79 65 79 98 90 162 161
128 79 79 80 133 111 75 76 82 181 146 121 95 67 103 161 172 177
CCL-A21A 101
471 400 428 419 399 272 251 284 327 415 450 331 308 343 369 245 326 287 300 297
345 295 292 330 284 289 201 205 245 254 268 157 243 184 211 204 205 238 201 161
220 237 225 198 151 160 84 155 156 150 187 266 167 259 237 139 165 193 161 184
151 81 136 85 174 213 190 219 199 194 151 156 149 180 148 180 117 172 135 98
132 123 124 90 104 68 71 99 139 142 153 105 114 161 213 150 100 120 108 151
197
CCL-A21B 101
413 403 406 421 427 271 247 286 306 412 438 325 309 318 373 237 317 315 332 314
336 308 317 323 300 290 223 213 248 265 262 165 249 221 218 209 206 223 200 162
214 235 238 209 160 154 84 150 172 150 199 268 164 263 229 147 151 210 159 179
146 84 135 87 179 214 190 218 191 185 153 153 155 175 150 185 112 173 142 94
126 130 124 84 109 68 76 93 137 157 140 109 113 169 211 172 95 97 107 147
196
CCL-A22A 54
315 430 501 277 391 348 313 329 285 398 306 279 405 323 438 349 300 243 216 200
191 257 185 233 249 257 378 223 218 280 190 288 187 154 186 168 287 231 254 302
418 256 411 283 316 308 312 432 337 347 295 217 195 194
CCL-A22B 54
328 422 511 266 401 347 308 318 338 351 295 276 423 333 444 336 277 253 191 198
195 267 195 225 240 260 382 205 222 268 196 281 198 166 194 157 273 253 254 296
421 284 423 301 315 318 317 394 334 330 279 208 172 195
CCL-A23A 120
348 503 298 215 165 235 155 127 236 250 270 173 192 253 215 200 158 167 118 127
179 221 250 102 180 168 197 180 305 263 235 134 209 235 263 186 140 152 128 143
171 250 260 269 216 188 188 215 213 287 307 256 219 116 108 94 199 235 155 108
157 185 104 79 80 141 192 196 186 159 111 97 77 117 94 125 190 152 136 132
136 158 175 130 156 143 216 186 151 108 99 81 133 128 99 117 122 96 93 143
235 202 142 98 82 81 78 59 55 55 82 66 88 84 90 66 80 52 31 64
CCL-A23B 120
306 515 297 213 172 234 160 129 244 241 270 174 192 244 231 195 156 157 125 128
177 205 262 103 176 163 192 191 312 262 219 128 209 228 270 192 151 144 132 151
168 241 268 272 222 184 190 216 217 282 296 255 220 113 96 105 196 244 154 111
157 190 109 83 78 135 193 181 193 155 113 91 86 116 96 122 190 158 135 130
145 157 177 130 154 138 200 193 147 110 101 83 136 125 99 121 118 97 93 149
222 212 144 99 76 69 90 62 49 48 85 61 86 87 90 61 77 49 32 70
CCL-A24A 111
507 544 542 396 341 389 477 218 253 272 243 301 288 306 172 214 147 138 122 100
132 118 98 99 113 116 89 146 119 89 114 99 120 114 112 101 74 92 88 89
79 92 88 106 133 109 113 94 105 95 110 93 88 62 61 55 59 57 43 45
54 63 40 47 51 70 52 69 78 96 92 76 71 73 80 158 188 145 101 98
89 94 130 85 52 78 74 93 67 70 38 52 70 84 90 99 61 51 51 67
75 92 102 105 126 88 92 66 69 54 83

CCL-A24B 111
521 546 556 403 346 388 490 221 259 213 255 308 270 317 167 185 150 149 127 90
134 110 103 91 123 125 96 143 126 112 130 91 133 111 123 92 70 89 80 83
90 102 87 107 125 111 119 92 107 95 109 103 83 65 61 64 55 52 43 51
50 64 47 46 55 69 55 65 84 97 91 65 73 74 72 165 202 143 98 91
96 93 125 87 52 75 77 88 68 71 33 55 70 80 84 109 55 54 45 67
82 91 110 105 130 83 95 67 66 48 87
CCL-A25A 56
298 249 191 209 363 398 399 247 331 197 158 129 225 246 179 241 198 210 207 157
152 194 313 239 138 162 263 297 154 194 213 125 131 205 185 198 207 234 161 177
161 139 183 96 199 164 89 119 133 166 106 78 68 134 112 120
CCL-A25B 56
259 266 207 191 358 369 365 260 322 199 157 115 205 272 175 272 211 210 202 162
143 201 302 235 131 144 269 315 158 202 211 113 121 181 187 209 208 219 170 167
148 148 175 98 204 133 104 120 111 172 97 78 77 129 134 124
CCL-A26A 65
388 429 356 239 296 407 459 448 526 326 271 304 272 235 141 168 255 344 386 317
374 188 210 181 253 293 261 260 217 134 127 116 184 300 389 314 152 172 224 136
146 189 192 158 140 215 268 191 299 274 163 196 125 134 100 92 166 283 214 193
252 311 204 155 188
CCL-A26B 65
424 402 367 249 318 396 452 488 512 326 281 293 271 235 144 163 265 334 390 328
393 175 215 189 246 297 266 259 216 128 127 118 186 321 378 291 138 178 218 166
138 182 183 164 146 214 262 191 267 277 165 193 134 127 84 100 158 297 196 199
274 312 229 158 186
CCL-A27A 86
417 519 393 332 494 310 352 309 358 289 312 258 276 243 307 291 245 225 254 295
280 324 275 306 242 232 276 356 272 202 204 275 251 268 247 280 238 296 214 263
193 208 149 115 106 173 191 188 222 132 129 196 227 136 133 63 46 47 46 45
42 63 63 94 70 64 82 96 96 78 115 130 101 136 132 132 203 131 174 73
37 52 47 58 97 108
CCL-A27B 86
421 511 394 342 500 306 361 314 348 284 309 265 284 237 308 304 255 231 269 276
285 329 261 307 254 246 279 351 266 218 210 270 262 262 252 278 243 305 209 267
186 205 152 112 107 179 205 187 232 148 126 185 208 131 137 59 42 47 49 39
51 59 67 106 67 69 77 127 94 72 107 131 105 144 128 135 201 135 168 70
30 44 53 67 92 111
CCL-A28A 71
575 390 336 357 258 177 240 245 454 341 434 223 247 281 295 224 240 157 199 362
205 261 316 138 111 118 110 173 98 183 129 106 91 90 85 107 163 170 76 87
106 117 78 87 97 92 128 102 98 92 109 116 103 146 96 100 66 50 116 96
114 101 126 93 83 131 110 102 143 73 109
CCL-A28B 71
565 382 348 352 264 169 249 249 455 360 440 221 266 288 283 228 239 161 206 356
199 255 280 130 121 105 113 171 94 196 131 112 85 87 70 110 169 172 70 84
107 138 76 84 97 85 139 102 93 85 108 118 94 134 101 92 69 50 113 104
119 93 117 99 80 142 92 95 146 87 123
CCL-A29A 56
451 210 238 288 269 227 227 162 211 356 212 261 289 150 102 112 110 159 91 188
119 99 91 79 82 106 168 173 64 78 108 135 74 101 91 92 141 97 101 82
114 116 103 133 94 85 74 67 113 96 105 103 118 94 84 136
CCL-A29B 56
448 207 242 286 263 223 240 162 215 353 212 248 282 143 109 121 102 170 91 186
125 104 86 98 82 107 168 173 68 91 116 130 76 95 90 93 138 105 99 87
106 114 102 133 92 94 80 54 119 92 108 110 110 95 78 147

CCL-A30A 54
430 425 446 197 261 473 268 264 289 286 113 144 171 338 434 421 484 219 281 482
441 390 351 346 266 167 153 122 115 150 246 242 101 172 135 173 163 182 142 187
151 163 172 111 200 322 251 245 187 175 158 181 212 302
CCL-A30B 54
431 425 499 238 273 476 139 238 288 285 153 153 172 353 453 383 431 183 267 481
425 388 331 349 285 165 149 126 121 139 247 259 96 169 140 179 159 180 146 196
157 161 170 116 218 314 251 239 158 168 149 188 243 263
CCL-A31A 55
453 604 467 473 423 392 464 444 447 535 595 500 492 395 464 416 446 523 573 424
337 476 454 426 205 217 329 385 464 367 428 260 327 316 330 399 439 394 368 338
234 312 254 460 314 335 255 283 227 229 286 321 220 296 279
CCL-A31B 55
414 571 559 454 436 413 510 444 438 615 537 523 451 408 439 428 428 502 563 423
326 478 461 432 219 229 323 400 461 383 413 306 270 304 356 416 436 388 366 336
228 315 255 456 330 349 243 286 226 238 270 324 222 329 230
CCL-A32A 71
507 510 667 334 358 389 317 291 428 387 344 280 276 329 281 288 339 313 355 343
340 354 319 273 219 297 329 357 361 360 323 365 263 378 295 235 182 144 188 287
242 303 383 272 260 309 239 154 204 101 46 55 45 32 36 43 59 87 56 49
62 86 78 64 106 93 100 131 131 111 177
CCL-A32B 71
517 506 662 332 361 392 320 298 513 380 336 270 296 305 295 281 338 305 338 330
359 360 319 270 224 298 342 332 374 367 315 370 277 371 299 239 184 141 193 295
251 290 394 297 253 308 226 158 223 94 56 51 47 37 36 53 55 84 58 55
62 83 83 61 104 99 89 132 133 116 169