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Tree-Ring Analysis of Timbers from Middleton Hall, Middleton, Warwickshire

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Summary

Analysis of samples from 104 oak and 11 pine timbers from Middleton Hall produced six site chronologies. The first, MIDHSQ01 (26 samples, 126 rings), spans AD 1593 to AD 1718. The second, MIDHSQ02 (26 samples, 257 rings) spans AD 1390 to AD 1646. Site chronologies MIDHSQ03 and MIDHSQ04 comprise six and two samples, of 78 and 84 rings, spanning AD 1636 - 1713, and AD 1579 - 1662, respectively. Two pine chronologies cannot currently be dated.

The earliest material, original timbers of the 'North-east building', was felled AD 1530 - 55, at the time of John Willoughby. This building was later re-roofed using timber felled AD 1711 - 36 (at the time of Sir Thomas Willoughby), along with re-used timber felled AD 1677 to AD 1702.

The next phase, the 'Tudor barn', is assigned to Sir Percival Willoughby, using timber felled in AD 1591.

This is followed by work on the 'de Freville building'. Although there are re-used earlier timbers here, others indicate a felling date of AD 1646. Such work at this time would have been undertaken by Sir Francis Willoughby II.

Evidence for the latest work is found in the Entry Hall, Main House range, and southern service range. The felling of timber here is spread over AD 1708 - 18. Such work is attributable to Sir Thomas Willoughby.

There is no evidence of any thirteenth- or fourteenth century material belonging to an early stone hall or an oratory.

Keywords

Dendrochronology
Standing Building

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Introduction

Middleton Hall, near Tamworth (SP 192 980, Fig 1), comprises an extensive collection of buildings, each of a different date and style, the whole set round a central courtyard with its entrance to the north. An outline plan of the site is given in Figure 2.

The manor originally belonged to the Marmion family, Lords of Tamworth Castle, in the twelfth and thirteenth centuries. When Phillip de Marmion died in AD 1291 the manor was left first to his widow, and then to his three daughters and co-heiresses, one of whom married Sir Alexander de Freville.

Sir Alexander took over Tamworth Castle and the manor, and in AD 1392 his descendant, Sir Baldwin de Freville, was given licence to build an oratory, or chapel, at Middleton Hall. On the basis of surviving architectural fragments it is believed that by this time the oldest part of the present building, a modest structure on the east side of the courtyard, was already in existence. This building, which could date from as early as the late-thirteenth century, may have served as a first-floor hall, or as a chamber block, attached to a now lost timber-framed hall.

The last of the de Frevilles, Baldwin, died in AD 1418, leaving Tamworth Castle to his daughter, the wife of Sir Thomas Ferrers, and a share in the manor of Middleton to his aunt, Margaret. Margaret first married Sir Hugh Willoughby in AD 1435, and secondly Sir Richard Bingham. It may have been Sir Richard who was responsible for expanding Middleton Hall, possibly constructing further buildings to the east and north sides of the courtyard.

Lady Margaret Bingham died in AD 1493, and the estate was inherited by Sir Henry Willoughby (a grandson from her first marriage), the Willoughby family by now also owning extensive estates in Nottinghamshire. However, despite their attachment to that county, the Willoughbys spent a considerable amount of time at Middleton, adding to and altering the site over successive generations. Sir Henry died in AD 1528, and the estate passed to his heir, John Willoughby. John died in AD 1550. An inventory of this date mentions 25 rooms including a hall, great chamber, gallery chamber, garden chamber, and chamber over the gates. In addition there was the chapel, the kitchens and service quarters, as well as an outer service courtyard with farm buildings.

The manor of Middleton was then inherited in AD 1558 by the first Sir Francis Willoughby, who was knighted by Queen Elizabeth I when she stayed there in AD 1566. Sir Francis later went on to build and, after AD 1587, live at Wollaton Hall in Nottingham, an expensive project which may have deterred further building at Middleton. It was not until after AD 1587, when Middleton was occupied by Sir Percival Willoughby, son-in-law of Sir Francis I, that any further work was undertaken at the Hall. It was possibly Sir Percival who constructed the timber-framed building across the moat later used as a barn. Sir Percival moved to Wollaton upon the death of his father-in-law in AD 1597, living there until his death in AD 1643.

Sir Percival's son, Sir Francis Willoughby II, moved in to Middleton Hall in AD

1610, and it is believed that he may have undertaken some remodelling of the site in the early-seventeenth century. This work may have been to the kitchen and service range on the south side of the courtyard in particular. In AD 1665 the estate was inherited by Sir Francis' son, also called Francis (III), grandson of Sir Percival. After his death, in AD 1672, it was inherited by his son, yet another Francis (IV). When he died in AD 1688 the site passed to his younger brother, Thomas Willoughby. Thomas was raised to the peerage in AD 1712 as Lord Middleton. It is believed that Sir Thomas was responsible for remodelling the Entry Hall in the northern range to accommodate the grand staircase now found there, and for building the present west range. Stylistically this west range is dated to the early-eighteenth century.

The last Willoughby to live at Middleton Hall was the fifth Lord, who died in AD 1800. The house was then leased out, the new occupants creating new rooms out of the old, and making alterations to the west range. Later tenants drained the moat and removed farm buildings from the outer courtyard. The house was finally sold in AD 1924 by the tenth Lord Middleton to pay death duties, the new owners demolishing buildings across the north range to allow greater access to the courtyard, which was also cleared of outbuildings at this time.

After the Second World War the house, by now falling into disrepair and dereliction, and surrounding land were bought by a commercial quarry company which began to extract gravel from the area. Then, in AD 1980, the Hall and 40 acres of ground, was leased to a Trust dedicated to restoring the buildings and using them as a conservation centre. Thanks to the steady efforts of a devoted and imaginative group of volunteers, the Hall has been magnificently, yet very carefully, restored, much of the existing fabric being sensitively conserved.

The existing buildings (see outline plan, Fig 2)

The Entry Hall of the north range (west end), and Main House (west range)

At the west end of the north range there is found a two-bay block (Fig 3) forming the large, double height, Entry Hall, beneath a hipped roof covering (Figs 4 and 12a). The roof is formed of two king post trusses with struts, and has double purlins to each of the four pitches. This Entry Hall block is semi-detached, and slightly set back, from the main portion of the building, the Main House, which comprises the greater proportion of the west range (front cover). This is the most substantial single element of Middleton Hall and forms the west facade of the site, presenting a typical two-storey early-Georgian front of eight bays, framed by giant fluted pilasters.

The roof of this Main House range (Figs 5 and 12b) comprises three large bays. These are formed by two frames to the north hip (frames 1 and 2), and five frames to the main roof and its dormers (frames 3 – 7). All frames consist of principal rafters with collars. There are double purlins to each pitch.

To the south, or right (as viewed looking at this range from the west) of this Main House range, is a later in-line three-bay addition, believed to date to the early-

nineteenth century. The bays here are smaller. This is probably a phase of construction undertaken by one of the early tenants of Middleton Hall. The roof here is slightly different from the rest of this range in that the three frames (frames 9 – 11) are of principal rafters with tiebeams and king post form (there are no collars), the trusses again supporting double purlins to each pitch. Diagonal struts rise from the feet of the king posts to the principal rafters. Unusually, there is a mixture of timber types in these three trusses, with only the king posts being of oak, everything else being of pine.

The Service, or south, range

Attached at the south end of the Main House, running east-west, and forming the southern range of the courtyard, is the supposed 'services range' of Middleton Hall (Fig 6). Internally the entry, at the east end of the range, contains a single room or hall with a substantial fireplace, the rooms to the west end containing further fireplaces and flues. The ground floor here contains storage rooms. There is no timber-framing to be seen in the walls of this range, and only a modest amount in the few surviving principal rafter and king post trusses, most of these found in the western bays. Like those of the southern end of the Main House range, these roof trusses again have diagonal struts from the feet of the king posts to the principal rafters. All these timbers are, however, of oak.

The 'Stone building'

Adjoining the east end of the service range, and forming the southern end of the east range, is what is believed to be an early-fourteenth century portion of two storeys. This is built of finely jointed dressed sandstone, the upper floor having been carried on an internal offset. This south-eastern range, usually referred to as the 'Stone building', is of some size, 28 ft north to south by 13 ft wide, and includes some twelfth-century stonework in the form of door and window openings. This is covered by an arch-braced collar-rafter roof with ashlars set on wall plates (Fig 7). There are two doorways at first-floor level in this section (that to the north now being blocked), indicating that there were further adjoining medieval buildings to the north and south.

The 'de Freville building', occasionally referred to as the kitchen and lodging block

To the north of this, and separated by a short gap, is a further building of the east range, this time fully timber-framed in square panels (Fig 8). It is believed that this may be the remains, or at least the site, of the chapel for which a licence was obtained by Sir Baldwin de Freville in about AD 1390. This structure, the 'de Freville building' has been extensively altered over the years, but remnants of a cusped wind-braced roof, stylistically dated to the late-fourteenth or early-fifteenth century, can be seen.

The 'North-east building'

To the north of this again, but now running east to west and forming the eastern section of the north range, is a further timber-framed building of close-set post-and-stud construction with mid-rails. This building is of two storeys, jettied to the north on scrolled plaster brackets, with, internally, long curved tension braces to the ground-floor framing, and short curved braces to the first. Stylistically this timber-framed building is dated to the sixteenth century. It was plastered externally in the seventeenth century and partially rebuilt in brick in the nineteenth century, before falling in to disrepair in the later twentieth century. The roof was replaced at some unknown time. Happily it has recently been restored in the most sympathetic fashion, most of the original timbers have been salvaged (Fig 9).

The 'Tudor barn', also known as the 'stables and lodging' block

Within the grounds of Middleton Hall are a number of other farm, ancillary, and out-buildings. Most of these appear to be of eighteenth or nineteenth-century date, and to contain very little timberwork. The exception to this is a substantial timber-framed barn, standing close-by but beyond the moat that surrounds the Hall (Fig 10). This is a twelve-bay structure of square panel framing with principal rafter with collar roof trusses set on main wall posts (Fig 11). This barn is believed to date to the late-sixteenth century, and is possibly the work of Sir Percival Willoughby who inherited in AD 1587. This building is generally known as the 'Tudor barn'.

Sampling

Sampling and analysis by tree-ring dating of timbers within component elements of Middleton Hall were commissioned by English Heritage. The purpose of this was to aid in the production of a conservation plan for this grade II* complex which is also on the Buildings at Risk register, priority category 'A'. It was hoped that tree-ring analysis would more reliably determine the date of the various elements and establish the sequential development of the site. It was hoped too that analysis would determine how much of the timber-work was original and how much of it was re-used or replaced, there being structural evidence for considerable alteration to some of the buildings.

From the oak timbers available a total of 104 core samples was obtained. Each sample was given the code MID-H, for Middleton Hall, and numbered 01 – 104. From the small amount of pine timber available, all of it in the supposedly later southern portion of the Main House range, a total of 11 core samples was obtained. This represents a sample from almost every available pine timber in this roof.

In many of the component buildings, the majority of sampled timbers appeared to be primary and integral with each other, being jointed and pegged. In some instances, however, this appeared not to be the case. This was particularly so with what is known as the 'de Freville building' in the east range, a building which is

known to have undergone substantial alteration and for which there is structural evidence of the re-use of timber. The roof of the 'North-east' or 'timber-framed building' also contains timber which appears re-used. Given the amount of restoration and alteration that has taken place over the centuries, it is possible that other timbers have been re-used in a way not to show any evidence of this.

A small number of timbers for which sampling might have been requested were not suitable for tree-ring analysis. This included two or three in the lower levels of the Entry Hall along the north side of the courtyard. It was suspected that these timbers might belong to the earlier structure on this site. Unfortunately these timbers appeared to be derived from fast grown trees and thus have too few rings, ie less than 54, for reliable analysis.

The positions of all these samples are marked on plans made by Stanley Jones, consulting architectural historian for Middleton Hall Trust, and provided by English Heritage, or on annotated photographs taken at the time of sampling. These are reproduced here as Figure 12a – k. Details of the samples are given in Table 1. In this Table, all timbers are identified following the form of the drawings provided with individual timbers being identified on a north – south or east – west basis as appropriate.

The Laboratory would like to take this opportunity to thank everyone involved with this programme of analysis, particularly Alan McDonald and others of Middleton Hall Trust. Members of the Trust were at all times most enthusiastic, helpful, and cooperative, and in particular showed generous hospitality. We would also like to thank Stanley Jones for allowing the use of his drawings and for his help in interpreting the site.

Analysis

Each of the 104 oak samples and the 11 pine samples was prepared by sanding and polishing. It was seen at this time that four oak samples, MID-H30, H31, H56, and H80, had less than 54 rings, ie, too few for reliable dating, and these were rejected from the analysis. The annual growth-ring widths of the remaining 100 oak samples were measured. The data of these measurements are given at the end of the report. In some cases, sample MID-H26 for example, two cores were required from the same timber to provide an optimum sample. In such cases, as will be seen in the data of this sample, the number of rings on the 'A' and 'B' reading is different.

The growth-ring widths of all 100 measured oak samples were compared with each other by the Litton/Zainodin grouping procedure (see appendix). At a minimum value of t=4.5, 11 different groups of cross-matching samples could be formed. The relative positions of the samples in each group are shown in the bar diagrams, Figures 13 – 23. It will be seen from these figures that there are two larger groups, each of 26 samples, and nine other groups of between two and six samples each, accounting for a further 25 samples. Twenty-three oak samples remain ungrouped.

The samples of each cross-matching group were combined at the indicated off-set positions to form site chronologies MIDHSQ01 – SQ11. Each site chronology was then compared with the remaining individual ungrouped samples. There was, however, no further reliable cross-matching. Each of the 11 site chronologies was then compared with a full range of reference chronologies for oak. This indicated cross-matches and dating for four site chronologies, MIDHSQ01, SQ02, SQ03, and SQ04. These four dated site chronologies can be combined to make a single site chronology of 329 rings spanning the years AD 1390 to AD 1718.

Each of the 23 measured but ungrouped oak samples was than compared individually with the full range of oak reference chronologies. There was, however, no reliable cross-matching and all these 23 individual samples must remain undated.

The analysis of the oak samples is summarised here:

Site chronology	Number of samples	Number of rings	Date span (where dated)
MIDHSQ01	26	126	AD 1593 – 1718
MIDHSQ02	26	257	AD 1390 – 1646
MIDHSQ03	6	78	AD 1636 – 1713
MIDHSQ04	2	84	AD 1579 – 1662
MIDHSQ05	4	156	undated
MIDHSQ06	3	153	undated
MIDHSQ07	2	108	undated
MIDHSQ08	2	102	undated
MIDHSQ09	2	99	undated
MIDHSQ10	2	89	undated
MIDHSQ11	2	58	undated
ungrouped	23	---	undated
unmeasured	4	---	undated

Interpretation

Analysis by dendrochronology of 104 oak samples, four of which were rejected, has produced 11 site chronologies, four of which, accounting for a total of 60

samples, can be dated. The first dated site chronology, MIDHSQ01, comprises 26 samples, its 126 rings spanning the years AD 1593 to AD 1718. The second dated site chronology, MIDHSQ02, also comprises 26 samples, its 257 rings spanning AD 1390 to AD 1646.

Site chronologies MIDHSQ03 and SQ04 are also dated. Site chronology MIDHSQ03 comprises 6 samples, its 78 rings dated as spanning AD 1636 – 1713, while MIDHSQ04 comprises 2 samples, its 84 rings dated as spanning AD 1579 – 1662. Interpretation of the sapwood, and the relative positions of the heartwood/sapwood boundaries on the 60 dated samples provides dates for a number of areas of Middleton Hall.

Entry Hall and Main House (west range)

It would appear that the roof of the Entry Hall at the west end of the north range, and the roof of the Main House, that is of the west range itself, are constructed of timber felled in AD 1708/09. Four dated samples, MID-H02, H06, H09, and H19, from the roof here retain complete sapwood, that is, they each have the last ring produced by the trees represented before they were felled. Given that this last complete sapwood ring is dated to AD 1709, AD 1709, AD 1708, and AD 1709 respectively, this is thus the felling date of the timbers represented.

The relative positions of the heartwood/sapwood boundaries of the other dated samples from the roofs of these two areas (MID-H01 – H25) indicates that they are part of a single, or very closely related, phase of felling, and that they too were probably felled in AD 1708/09. This may be seen from bar diagram Figure 24, where all the samples of the four dated site chronologies, MIDHSQ01 – HSQ04, are shown sorted by sample location. The relative position of the heartwood/sapwood boundaries of the samples from the Entry Hall and the Main House of the west range varies by only 12 years, from relative position 292 (AD 1682), on samples MID-H05 and H07, to relative position 304 (AD 1694), on sample MID-H20.

Service, or south, range

The timbers used in the roof trusses of the service range show a slightly wider spread of felling dates. Three dated samples from this roof, MID-H26, H27, and H36, also retain complete sapwood. On these samples, however, the last complete sapwood ring of each is different, being dated to AD 1718, AD 1710, and AD 1715 respectively, ie, the timbers represented were felled over at least an eight-year period.

The relative positions of the heartwood/sapwood boundaries of the dated samples from this roof also has a slightly greater variation than that seen in the Entry Hall and Main House range. In the service range roof the heartwood/sapwood boundaries vary by 15 years, from relative position 292 (AD 1682) on sample MID-H27, to relative position 307 (AD 1697) on sample MID-H36.

'North-east' or 'timber-framed building'

None of the timbers from the 'North-east', or 'timber-framed building', provided samples with complete sapwood, this having been removed by early episodes of defrassing, or exposure to the weather during periods of dereliction. It is thus not possible to give a precise felling date to any of the sampled timbers. Most of the samples do, however, retain the heartwood/sapwood boundary. From amongst the original timbers of the main body of the building, this varies by only seven years, the average date being AD 1515. Using a 95% confidence limit of 15 to 40 rings for the amount of sapwood the timbers might have had would give the dated original timbers an estimated felling date in the range AD 1530 – 55.

As expected, the roof of the 'North-east building' appears to be a later replacement. None of the timbers of the roof provide samples with complete sapwood, and once again it is not possible to provide at precise felling date. Some samples do, though, retain the heartwood/sapwood boundary. The average last heartwood/sapwood boundary date of the six dated samples is AD 1696. Using a 95% confidence limit of 15 to 40 rings for the amount of sapwood the timbers might have had would give them an estimated felling in the range AD 1711 – 36.

It is possible that some timbers with other felling dates were reused as part of this later roof. The felling date of one timber, the longitudinal beam in bay 1, represented by sample MID-H58, cannot be accurately determined because it does not have the heartwood/sapwood boundary. However, given that its last measured ring date is AD 1564, and allowing for a minimum of 15 sapwood rings, it is unlikely to have been felled before AD 1579.

A second timber here, a coving tie represented by sample MID-H62, also has no heartwood/sapwood boundary. The last measured ring date on this sample is AD 1653, suggesting that it is unlikely to have been felled before AD 1668, allowing for a minimum of 15 sapwood rings. However, without heartwood/sapwood boundaries it is not possible to determine when they were felled.

It is only with a third sample from this roof, a further coving tie, sample MID-H61, which does have the heartwood/sapwood boundary, that an estimated felling date range can be calculated. The heartwood/sapwood boundary ring on this sample is dated to AD 1662. Using the usual sapwood estimate of 15 – 40 rings would give an estimated felling date range of AD 1677 to AD 1702.

The 'de Freville building'

This building, which is known to have been extensively altered and is believed to contain much reused timber, also shows a slightly more complicated sequence of felling dates for its timbers.

One sample, MID-H65, represents a joist in the ground-floor ceiling. The heartwood/sapwood transition on this sample is dated to AD 1584. Using an allowance of 15 - 40 sapwood rings would give this timber an estimated felling

date in the range AD 1599 to AD 1624. A second timber, a cross-rail represented by sample MID-H72, has a heartwood/sapwood transition date of AD 1588. Using the same sapwood estimate as above, 15 – 40 rings, would give the timber an estimated felling date in the range AD 1603 – 28.

There is, however, a larger group of samples, MID-H69, H71, H73, and H74, which all have similar heartwood/sapwood transition dates. These vary by 15 years from relative position 212 (AD 1602) on sample MID-H69 to relative position 227 (AD 1617) on sample MID-H74. This particular sample, MID-H74, retains complete sapwood, the last ring, and thus the felling, being dated to AD 1646. It is thus likely that AD 1646 represents the felling date of a number of timbers in this building, whilst some of the other material with the earlier felling date ranges is reused, although there was no obvious signs of this seen on the timbers at the time of sampling.

The 'Tudor barn' or 'stables and lodging block'

Although a total of 16 core samples was obtained from this large and impressive building, only five of them have grouped and dated. One of the dated samples, MID-H92, retains complete sapwood, the last measured ring, and thus the felling, being dated to AD 1591. The relative positions of the heartwood/sapwood boundaries on the three other dated samples, where its exists, is similar, varying by 11 years from relative position 166 (AD 1556) on sample MID-H91 to relative position 177 (AD 1567) on sample MID-H95. Such similarity would suggest that all the dated timbers represent a single phase of felling dated to AD 1591.

The ‘Stone building’

Despite obtaining a good number of samples, a total of 13, from this roof, and all but one sample, the exception being MID-H80 which was not measured, having good numbers of rings, none of the samples from this roof has dated.

Conclusion

The earliest survival at Middleton Hall to be dated by tree ring analysis is thus the 'North-east' or 'timber-framed building', the original timbers here having an estimated felling date in the date range AD 1530 – 55. The most likely candidate for undertaking this work would appear to be John Willoughby, who occupied Middleton Hall from AD 1528 – 50. It is possible that this building contains some of the rooms mentioned in the inventory of AD 1550 made upon his death. Although it is just possible that the 'North-east building' was constructed during the time of the succeeding occupant, the first Sir Francis Willoughby, this is less likely because Sir Francis I did not fully inherit Middleton until AD 1558, which is just a little too late for the felling of the timbers. In any case Sir Francis I later incurred the expense of building Wollaton Hall in Nottingham.

The next phase of building appears to be represented, as suspected, by the 'timber-framed building' across the moat. The 'Tudor barn', or stables and lodging block, is built using timber felled in AD 1591. This work can be attributed to Sir Percival Willoughby, who occupied Middleton between AD 1587 and AD 1597, at which time he moved to Wollaton Hall in Nottingham.

A group of timbers in the much altered 'de Freville building' of the eastern range appears to indicate the next phase of felling to be detected by tree-ring analysis. Although there are three earlier re-used timbers here with felling dates in the early- and late-sixteenth century, and in the early-seventeenth century, there is a group which indicates a felling dated to AD 1646. Such a date would suggest work undertaken by Sir Francis Willoughby II, the son of Sir Percival, who inhabited Middleton Hall from AD 1610 until his death in AD 1665.

There is then a long gap between this mid-seventeenth century work and the next felling detected by dendrochronology. This is found in the roofs of the Entry Hall, the Main House of the west range, and work in the roof of the service range along the south side of the courtyard. From amongst these elements we have a series of timber fellings dated to between AD 1708 and AD 1718, the earlier work being to the north and west ranges, the later work to the south range. Such a span could be taken to indicate a substantial programme of rebuilding and renewal along this entire range of Middleton Hall at the time of Sir Thomas Willoughby, who succeeded to his inheritance in AD 1688.

The 'North-east building', originally built using timber felled AD 1530 – 55, was probably also re-roofed during the time of Sir Thomas. A group of timbers used in this roof have an estimated felling date in the range AD 1711 – 36. This re-roofing work included some timbers which may have been felled earlier and were reused. One certainly has an estimated felling date in the range AD 1677 to AD 1702. These dates, and their likely historical contexts, can be summarised below:

Building	Felling date / range	Historical context
'North-east' or 'timber-framed building'	AD 1530 – 55 (original timbers)	John Willoughby AD 1528 – 50
'Tudor barn'	AD 1591	Sir Percival Willoughby AD 1587 – 97
'de Freville building'	AD 1646 (original timbers) AD 1505 – 30 AD 1563 – 98 AD 1603 – 28 (re-used timbers)	Sir Francis Willoughby II AD 1610 – 65
Entry Hall and Main House Service range (south wing) 'North-east' or 'timber-framed building'	AD 1708 / 09 AD 1710, 1715, and 1718 AD 1711 – 36 After AD 1579 After AD 1668 AD 1677 – 1702 (re-used timbers in roof)	Sir Thomas Willoughby AD 1688 – 1729

The timbers

Judging by the *t*-values of the cross-matching between some samples, it is very likely that they represent timbers derived from the same tree, or from a small number of trees growing very close to each other. One notable group is samples MID-H44 – H48, the jetty joists of the 'North-east building'. Some of these samples cross-match each other with values ranging from *t*=15.0 to as high as *t*=17.7. Other timbers, probably also derived from a single tree, are represented by samples MID-H14 and H15, principal rafters of the same truss in the Main House range, and possibly by samples MID-H67 and H68, ceiling joists in the 'de Freville building'. Some of the grouped but undated samples, MID-H83, H86, and H87 from the roof of the 'stone building' for example, also probably represent single trees. A number of other samples probably represent trees growing in the same copse or stand of woodland.

It would appear, however, that a variety of different sources of timber may have been used, even when timbers were felled at about the same date. For example, the timbers used in the early eighteenth-century roof of the Main House range do not match at all with those used in the re-roofing of the 'North-east building', although this work is also dated to the early-eighteenth century. This would suggest that a different woodland was used for each of the two pieces of work.

Unfortunately there is no clear evidence as to where the timber used at Middleton Hall was originally grown. As may be seen from Tables 2 – 5, most of the reference chronologies providing the best cross-matches with the site chronologies have a wide distribution throughout central England. There may be a very slight tendency towards those from west of the Pennines, with reference chronologies from Cheshire, Staffordshire, and Gloucestershire being seen, but there are other reference chronologies from the east, Derbyshire, Leicestershire and Nottinghamshire, as well as some from further afield.

Of the 100 measured oak samples, 23 remain ungrouped and undated. All have sufficient rings for reliable analysis, though some do have lower numbers of rings, samples MID-H64 and MID-H59, for example, have 56 and 57 rings respectively. The longest undated sample is MID-H43, with 189 rings.

It is quite possible, as with sample MID-H70, for example, from the much altered 'de Freville building', that many ungrouped individuals represent single timbers, possibly reused, each with a different felling date, and from a different source to all, or many, of the other timbers. Single timbers are often more difficult to date. Some timbers do have problematic rings with bands of what appear to be irregular or disturbed growth. It is possibly features such as these that make some samples difficult to date. Many other samples, however, show no problems that might cause difficulty in cross-matching and dating.

The material from Middleton Hall can be used to produce long, well-replicated, site chronologies, covering the period AD 1390 to AD 1718. While Warwickshire already has a good complement of reference chronologies spanning the medieval and early post-medieval period, it does in fact have relatively few that run into the

eighteenth century. In this instance the material from Middleton Hall is particularly valuable in that it represents this later period particularly well. In due course it may help with the creation of a single, purely local, reference chronology anchored to the present day.

The pine timbers

In addition to the oak samples obtained from Middleton Hall, the opportunity was taken to acquire core samples from the small number of pine beams found here. In total 11 pine core samples were obtained, MID-H105 – H115. These pine timbers are to be found exclusively in the southern three bays of the Main House range, to the western side of the courtyard, where they are used as principal rafters, purlins, and as tiebeams in integral conjunction with oak kingposts. It is known from documentary sources that this southern extension to the Main House range was built in the early-nineteenth century.

The pine cores were prepared and measured in the same way as the oak material and the data from each compared with all the other pine samples in the normal way. This resulted in the production of two pine site chronologies, MIDHSQ12 and MIDHSQ13, the samples cross-matching with each other as shown in the bar diagrams, Figures 25 and 26. Despite comparison to a number of reference chronologies for pine there was no cross-matching and the pine site chronologies must, for the moment, remain undated. In due course, given the provision of further pine samples with the numbers of rings seen on those from Middleton Hall, reference chronologies for pine will become as widely established as those that now exist for oak, and the material from Middleton will perhaps be dated.

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Table 1: Details of samples from Middleton Hall, Middleton, Warwickshire

Sample number	Sample location	Total rings	*Sapwood rings	First measured ring date	Last heartwood ring date	Last measured ring date
	Entry Hall – west end of north range					
MID-H01	King-post, truss 1	78	8	------	------	------
MID-H02	Lower (south) purlin, west hip end	89	21C	AD 1621	AD 1688	AD 1709
MID-H03	South principal rafter, truss 1	68	h/s	AD 1618	AD 1685	AD 1685
MID-H04	South lower purlin, south-west valley	65	14C	------	------	------
MID-H05	King-post, truss 2	56	h/s	AD 1627	AD 1682	AD 1682
MID-H06	Lower (south) purlin, east hip end	88	25C	AD 1622	AD 1684	AD 1709
MID-H07	South principal rafter, truss 2	86	h/s	AD 1597	AD 1682	AD 1682
MID-H08	South lower purlin, truss 1 – 2	58	no h/s	AD 1609	------	AD 1666
	Main House (west) range					
MID-H09	North lower purlin, truss 1 – 2	89	16C	AD 1620	AD 1692	AD 1708
MID-H10	North principal rafter, truss 2	70	h/s	AD 1619	AD 1688	AD 1688
MID-H11	South principal rafter, truss 2	83	3	AD 1611	AD 1690	AD 1693
MID-H12	South upper purlin, truss 2 – 3	61	h/s	AD 1630	AD 1690	AD 1690
MID-H13	West lower purlin, truss 4 – 5	75	14	AD 1632	AD 1692	AD 1706
MID-H14	East principal rafter, truss 5	101	h/s	AD 1593	AD 1693	AD 1693
MID-H15	West principal rafter, truss 5	88	2	AD 1608	AD 1693	AD 1695
MID-H16	West lower purlin, truss 5 – 6	96	12	AD 1608	AD 1691	AD 1703
MID-H17	South lower purlin, truss 6 – 8	73	11	AD 1630	AD 1691	AD 1702
MID-H18	North principal rafter, truss 7	68	no h/s	AD 1612	------	AD 1679

Table 1: continued

Sample number	Sample location	Total rings	*Sapwood rings	First measured ring date	Last heartwood ring date	Last measured ring date
	Main House (west) range					
MID-H19	South principal rafter, truss 7	99	20C	AD 1611	AD 1689	AD 1709
MID-H20	West valley rafter, truss 7	77	h/s	AD 1618	AD 1694	AD 1694
MID-H21	South principal rafter, truss 8	99	17	AD 1607	AD 1688	AD 1705
MID-H22	King post, truss 10	85	no h/s	------	------	------
MID-H23	King post truss 11	97	10	------	------	------
MID-H24	North ashlar, truss 2	66	no h/s	------	------	------
MID-H25	West ashlar, truss 3	64	3	------	------	------
	Service range (south range)					
MID-H26	North purlin, truss 2 – 3	93	25C	AD 1626	AD 1693	AD 1718
MID-H27	South purlin, truss 2 – 3	102	28C	AD 1609	AD 1682	AD 1710
MID-H28	Tiebeam, truss 2	89	14	AD 1621	AD 1695	AD 1709
MID-H29	King post, truss 2	60	22C	------	------	------
MID-H30	North principal rafter, truss 2	nm	---	------	------	------
MID-H31	South principal rafter, truss 2	nm	---	------	------	------
MID-H32	North purlin, truss 2 – 3	71	h/s	------	------	------
MID-H33	South purlin, truss 2 – 3	93	3	AD 1595	AD 1684	AD 1687
MID-H34	North principal rafter, truss 3	88	no h/s	AD 1601	------	AD 1688
MID-H35	South principal rafter, truss 3	86	h/s	AD 1608	AD 1693	AD 1693
MID-H36	Tiebeam, truss 3	80	18C	AD 1636	AD 1697	AD 1715

Table 1: continued

Sample number	Sample location	Total rings	*Sapwood rings	First measured ring date	Last heartwood ring date	Last measured ring date
	'North-east building' - original timbers					
MID-H37	Main north wall post, truss 1	87	h/s	AD 1426	AD 1512	AD 1512
MID-H38	Main north wall post, truss 2	90	no h/s	AD 1417	------	AD 1506
MID-H39	Upper story post, truss 2	97	no h/s	AD 1407	------	AD 1503
MID-H40	Main north wall post, truss 3	91	h/s	AD 1424	AD 1514	AD 1514
MID-H41	Upper story post, truss 3	107	2	AD 1415	AD 1519	AD 1521
MID-H42	Jetty joist 2 (from west)	71	no h/s	------	------	------
MID-H43	Jetty joist 3	189	8	------	------	------
MID-H44	Jetty joist 9	87	no h/s	AD 1390	------	AD 1476
MID-H45	Jetty joist 15	92	h/s	AD 1421	AD 1512	AD 1512
MID-H46	Jetty joist 18	97	no h/s	AD 1406	------	AD 1502
MID-H47	Jetty joist 20	89	no h/s	AD 1410	------	AD 1498
MID-H48	Jetty joist 21	100	h/s	AD 1420	AD 1519	AD 1519
MID-H49	Jetty joist 22	67	h/s	------	------	------
	'North-east building' - later roof					
MID-H50	North purlin truss 1 – 2	55	10	AD 1655	AD 1699	AD 1709
MID-H51	South purlin, truss 2 – 3	79	h/s	------	------	------
MID-H52	Tiebeam, truss 3	58	8	AD 1636	AD 1685	AD 1693
MID-H53	South principal rafter, truss 2	54	6	AD 1660	AD 1707	AD 1713
MID-H54	North principal rafter, truss 3	55	5	AD 1647	AD 1696	AD 1701

Table 1: continued

Sample number	Sample location	Total rings	*Sapwood rings	First measured ring date	Last heartwood ring date	Last measured ring date
	'North-east building' - later roof					
MID-H55	South principal rafter, truss 3	56	11	AD 1650	AD 1694	AD 1705
MID-H56	North principal rafter, truss 2	nm	---	------	------	------
MID-H57	North principal rafter, truss 1	54	10	AD 1652	AD 1695	AD 1705
	'North-east building' reused roof timbers					
MID-H58	Main north-south beam, bay 1	96	no h/s	AD 1469	------	AD 1564
MID-H59	North coving tie 5, (from east) bay 1	57	3	------	------	------
MID-H60	North coving tie 8, bay 1	57	4	------	------	------
MID-H61	North coving tie 3, bay 4	78	h/s	AD 1585	AD 1662	AD 1662
MID-H62	North coving tie 4, bay 4	75	no h/s	AD 1579	------	AD 1653
	'de Freville building'					
MID-H63	East-west ground floor ceiling beam	82	no h/s	------	------	------
MID-H64	Joist 2 (from east)	56	7	------	------	------
MID-H65	Joist 6	143	h/s	AD 1442	AD 1584	AD 1584
MID-H66	Joist 7	163	no h/s	AD 1408	------	AD 1570
MID-H67	Joist 9	144	no h/s	AD 1479	------	AD 1622

Table 1: continued

Sample number	Sample location	Total rings	*Sapwood rings	First measured ring date	Last heartwood ring date	Last measured ring date
	'de Freville building'					
MID-H68	Joist 14 (from east)	147	no h/s	AD 1475	------	AD 1621
MID-H69	South wall post ground floor	74	h/s	AD 1529	AD 1602	AD 1602
MID-H70	North cross-rail in west wall	135	11	------	------	------
MID-H71	Main north stud post in east wall	150	h/s	AD 1463	AD 1612	AD 1612
MID-H72	Southern cross-rail in west wall	80	3	AD 1512	AD 1588	AD 1591
MID-H73	Main north stud post in west wall	92	4	AD 1528	AD 1615	AD 1619
MID-H74	Tiebeam, west wall	145	29C	AD 1502	AD 1617	AD 1646
MID-H75	Wall plate/top beam, south wall	79	no h/s	------	------	------
MID-H76	Main stud post in south wall	113	35C	------	------	------
	Stone building, south end, east range					
MID-H77	East ashlar, frame 2	84	h/s	------	------	------
MID-H78	West ashlar, frame 2	64	h/s	------	------	------
MID-H79	East ashlar, frame 4	75	no h/s	------	------	------
MID-H80	East ashlar, frame 5	nm	---	------	------	------
MID-H81	West ashlar, frame 6	89	h/s	------	------	------
MID-H82	East ashlar, frame 7	85	no h/s	------	------	------
MID-H83	East ashlar, frame 8	93	h/s	------	------	------
MID-H84	West brace, frame 8	60	h/s	------	------	------
MID-H85	West ashlar, frame 8	61	h/s	------	------	------

Table 1: continued

Sample number	Sample location	Total rings	*Sapwood rings	First measured ring date	Last heartwood ring date	Last measured Ring date
	Stone building - south end east range					
MID-H86	East ashlar, frame 12	116	8	------	------	------
MID-H87	East brace, frame 15	134	no h/s	------	------	------
MID-H88	East brace, frame 16	89	h/s	------	------	------
MID-H89	East ashlar, frame 16	65	no h/s	------	------	------
	‘Tudor barn’ (stables block)					
MID-H90	North door jamb, bay 6	83	h/s	------	------	------
MID-H91	Main stud post truss 7	94	h/s	AD 1463	AD 1556	AD 1556
MID-H92	South west corner post, porch	156	24C	AD 1436	AD 1567	AD 1591
MID-H93	West wall plate, truss 5 – 6	62	12	------	------	------
MID-H94	East wall post, truss 6	114	no h/s	AD 1440	------	AD 1553
MID-H95	Tiebeam, truss 4	113	h/s	AD 1455	AD 1567	AD 1567
MID-H96	West door jamb, truss 5	88	h/s	------	------	------
MID-H97	King post, truss 5	102	no h/s	AD 1439	------	AD 1540
MID-H98	Main stud/window jamb, bay 8	125	h/s	AD 1438	AD 1562	AD 1562
MID-H99	Floor joist 2, bay 5	57	h/s	------	------	------
MID-H100	West wall plate, truss 6 – 7	86	3	------	------	------
MID-H101	West wall plate, truss 8 – 9	65	h/s	------	------	------
MID-H102	West principal rafter, truss 6	108	11	------	------	------
MID-H103	Stud to passage wall, bay 5	56	h/s	------	------	------
MID-H104	West common rafter 1, bay 5	73	10	------	------	------

Table 1: continued

Sample number	Sample location	Total rings	*Sapwood rings	First measured ring date	Last heartwood ring date	Last measured ring date
	Pine timbers – Main House range					
MID-H105	East principal rafter, truss 9	59	h/s	------	------	------
MID-H106	West principal rafter, truss 9	38	no h/s	------	------	------
MID-H107	East principal rafter, truss 10	62	no h/s	------	------	------
MID-H108	East lower purlin, truss 9 – 10	108	h/s	------	------	------
MID-H109	West upper purlin, truss 9 – 10	198	h/s	------	------	------
MID-H110	West lower purlin, truss 9 – 10	174	h/s	------	------	------
MID-H111	West upper purlin, truss 10 – south end	142	h/s	------	------	------
MID-H112	West lower purlin, truss 10 – south end	205	h/s	------	------	------
MID-H113	Lower purlin, south end hip	104	no h/s	------	------	------
MID-H114	East principal rafter, truss 11	82	h/s	------	------	------
MID-H115	West principal rafter, truss 11	66	no h/s	------	------	------

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

Table 2: Results of the cross-matching of site chronology MIDHSQ01 and relevant reference chronologies when first ring date is AD 1593 and last ring date is AD 1718

Reference chronology	Span of chronology	*t*-value	
Combermere Abbey, Cheshire	AD 1363 – 1564	9.1	(Howard *et al* 2003b)
Brewhouse Yard Museum, Nottm	AD 1544 – 1701	8.2	(Howard *et al* 1994)
Bolsover Castle Riding School, Derbys	AD 1494 – 1744	8.3	(Arnold *et al* 2005)
Hulme Hall, Allostock, Cheshire	AD 1574 – 1689	8.2	(Arnold *et al* 2003)
East Midlands	AD 882 – 1981	8.1	(Laxton and Litton 1988)
The Wheatsheaf, Cropwell Bishop, Notts	AD 1604 – 1703	8.0	(Howard *et a*l 1995 unpubl)
Home Farm, Foremark, Derbys	AD 1605 – 1752	7.5	(Howard *et al* 1992)
England	AD 401 – 1981	7.4	(Baillie and Pilcher 1982 unpubl)

Table 3: Results of the cross-matching of site chronology MIDHSQ02 and relevant reference chronologies when first ring date is AD 1390 and last ring date is AD 1646

Reference chronology	Span of chronology	*t*-value	
East Midlands	AD 882 – 1981	10.8	(Laxton and Litton 1988)
England	AD 401 – 1981	9.7	(Baillie and Pilcher 1982 unpubl)
England, London	AD 413 – 1728	9.0	(Tyers and Groves 1999 unpubl)
Sinai Park, Burton on Trent, Staffs	AD 1227 – 1750	9.0	(Tyers 1997)
MC10---H	AD 1386 – 1585	8.7	(Fletcher 1978 unpubl)
1 Soar Lane, Sutton Bonnigton, Notts	AD 1552 – 1651	8.7	(Howard *et al* 1993)
Ford Green Hall, Stoke on Trent, Staffs	AD 1436 – 1623	8.2	(Howard *et al* 1992)
26 Westgate Street, Gloucester	AD 1399 – 1622	8.2	(Howard *et al* 1998)

Table 4: Results of the cross-matching of site chronology MIDHSQ03 and relevant reference chronologies when first ring date is AD 1636 and last ring date is AD 1713

Reference chronology	Span of chronology	*t*-value	
Angel Choir, Lincoln Cathedral	AD 1596 – 1703	7.0	(Howard *et al* 1985)
East Midlands	AD 882 – 1981	6.5	(Laxton and Litton 1988)
Wheelwright's Shop, Chatham Docks, Kent	AD 1615 – 1780	6.0	(Bridge 1998)
Ragnall House (barn), Ragnall, Notts	AD 1607 – 1717	5.8	(Howard *et al* 1997)
Kibworth Harcourt Mill, Leics	AD 1582 – 1773	5.4	(Arnold *et al* 2004a)
Southwell Minster, Notts	AD 1573 – 1716	5.3	(Howard *et al* 1996)
Claydon House, Bucks	AD 1613 – 1756	5.0	(Tyers 1995)
Bolsover Castle Riding School, Derbys	AD 1494 – 1744	4.7	(Howard *et al* 2005)

Table 5: Results of the cross-matching of site chronology MIDHSQ04 and relevant reference chronologies when first ring date is AD 1579 and last ring date is AD 1662

Reference chronology	Span of chronology	*t*-value	
Fell Close, Healeyfield, Conset, Co Durham	AD 1496 – 1651	7.2	(Arnold *et al* 2004b)
Staircase House, Stockport	AD 1489 – 1656	6.8	(Howard *et al* 2003a)
Sinai House, Burton-on-Trent, Staffs	AD 1529 – 1616	6.5	(Howard *et al* 1999)
1 Soar Lane, Sutton Bonnigton, Notts	AD 1552 – 1651	5.9	(Howard *et al* 1993)
Combermere Abbey, Cheshire	AD 1363 – 1564	5.7	(Howard *et al* 2003b)
Bolsover Castle Riding School, Derbys	AD 1494 – 1744	5.5	(Howard *et al* 2005)
Brewhouse Yard Museum, Nottm	AD 1544 – 1701	5.3	(Howard *et al* 1994)
East Midlands	AD 882 – 1981	4.3	(Laxton and Litton 1988)

Figure 1: Location of Middleton Hall (circled)

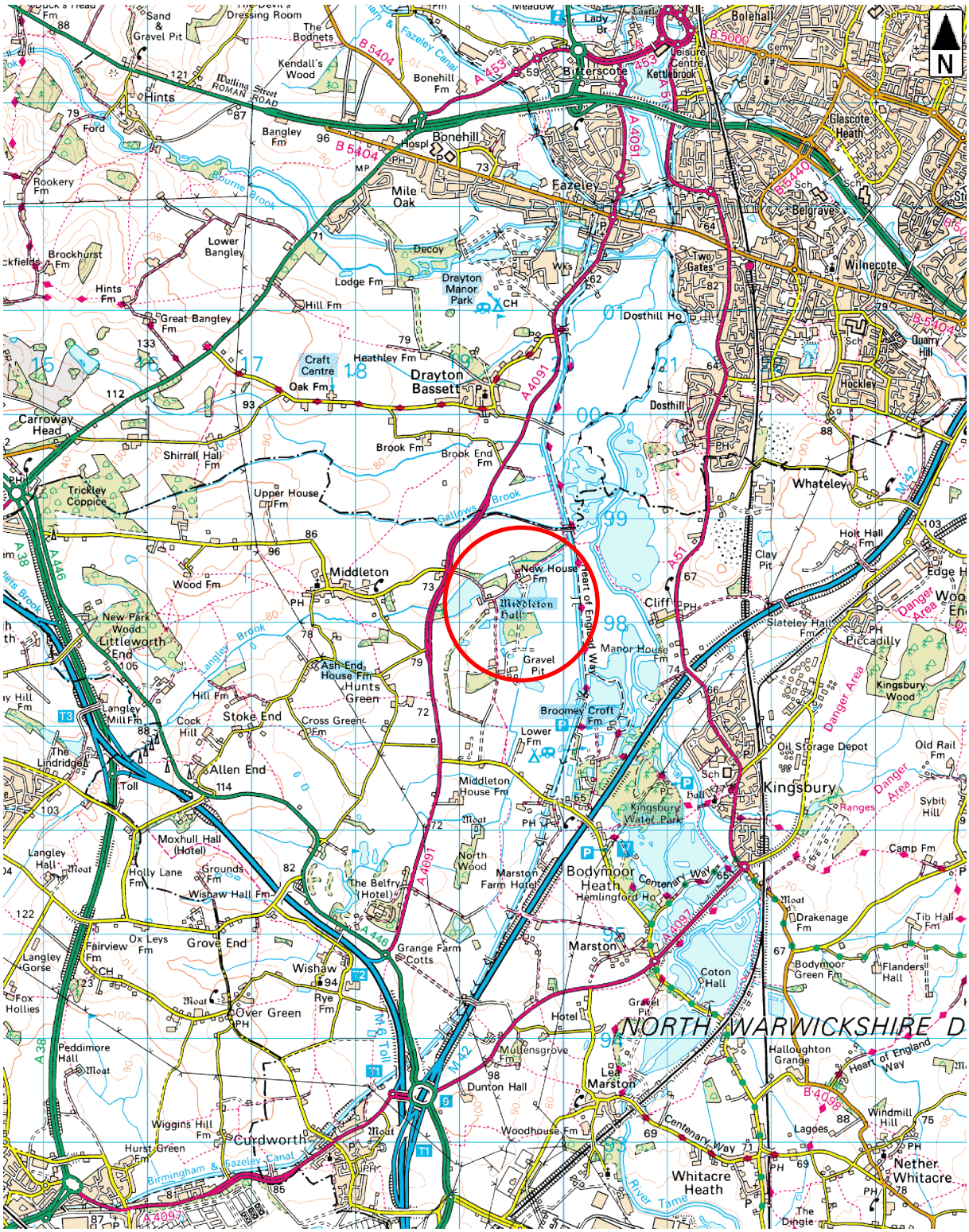

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Figure 2: Middleton Hall, simple plan to show arrangement of the main buildings around the courtyard (after Stanley Jones)

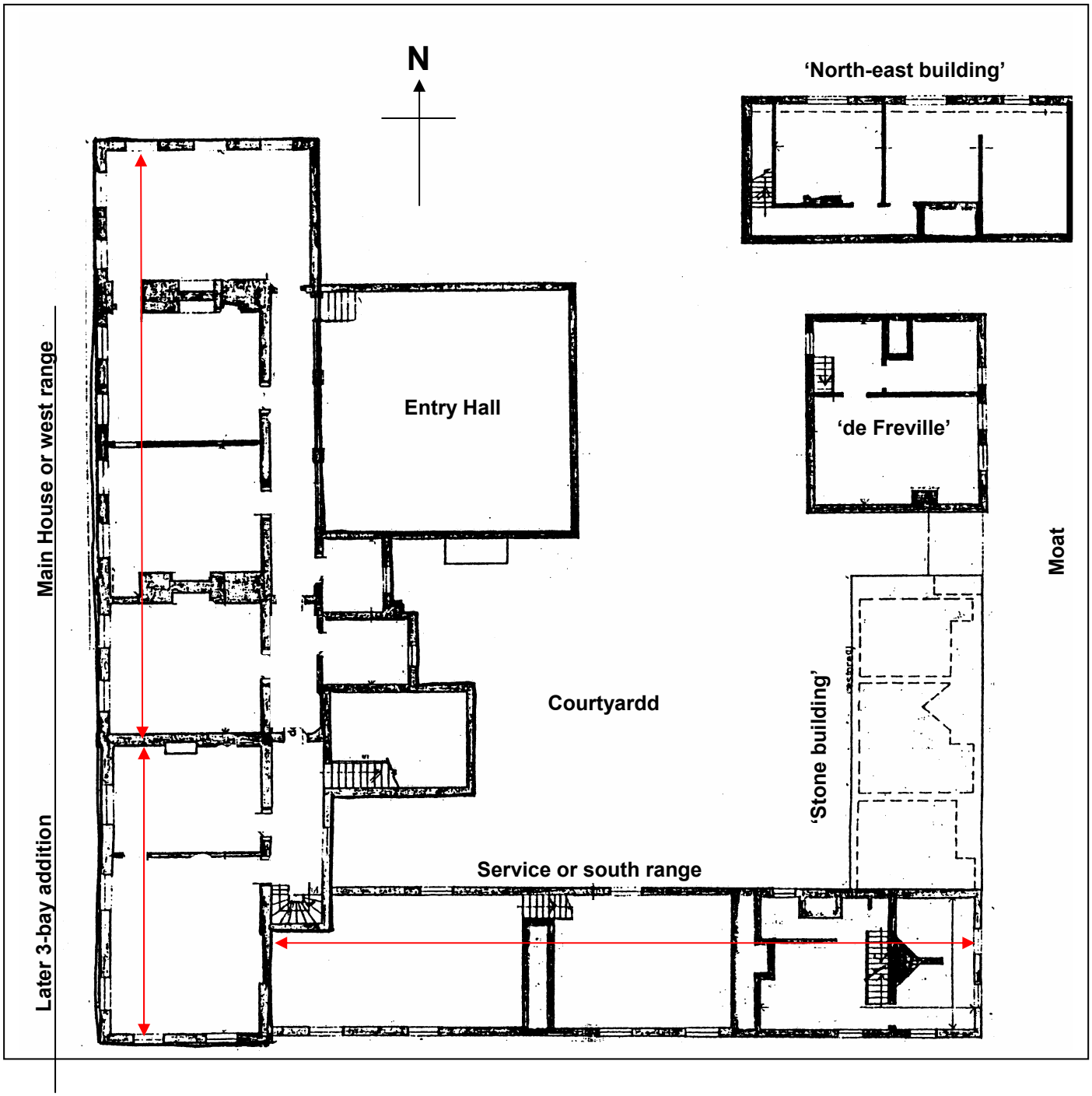


Figure 3: The Entry Hall, set back to left, and northern end of the Main House, or west range

Figure 4: View of the double height Entry Hall and its hipped roof.

Figure 5: Main House or west range roof; southern trusses of mixed oak and pine timbers (left), and truss 1 of the north-most bay, oak only (right)

Figure 6: View from the south-east of the South or service range (left) and its roof form (right)

Figure 7: View of the ‘Stone building’, with its first-floor frame now lost (left), and its arch-braced common rafter roof covering (right)

Figure 8: The ‘de Freville building’ set between the north end of the ‘Stone building’ to right, and the ‘North-east building’ to left

Figure 9: The 'North-east building' exterior view from the north-east (above) and view of the replaced roof looking from west to east (below)

Figure 10: The ‘Tudor barn’ from the south-west

Figure 11: Middleton Hall, views of two typical trusses from the 'Tudor barn'

Figure 12a: Schematic plan of Entry Hall roof to show sampled timbers (after Stanley Jones)

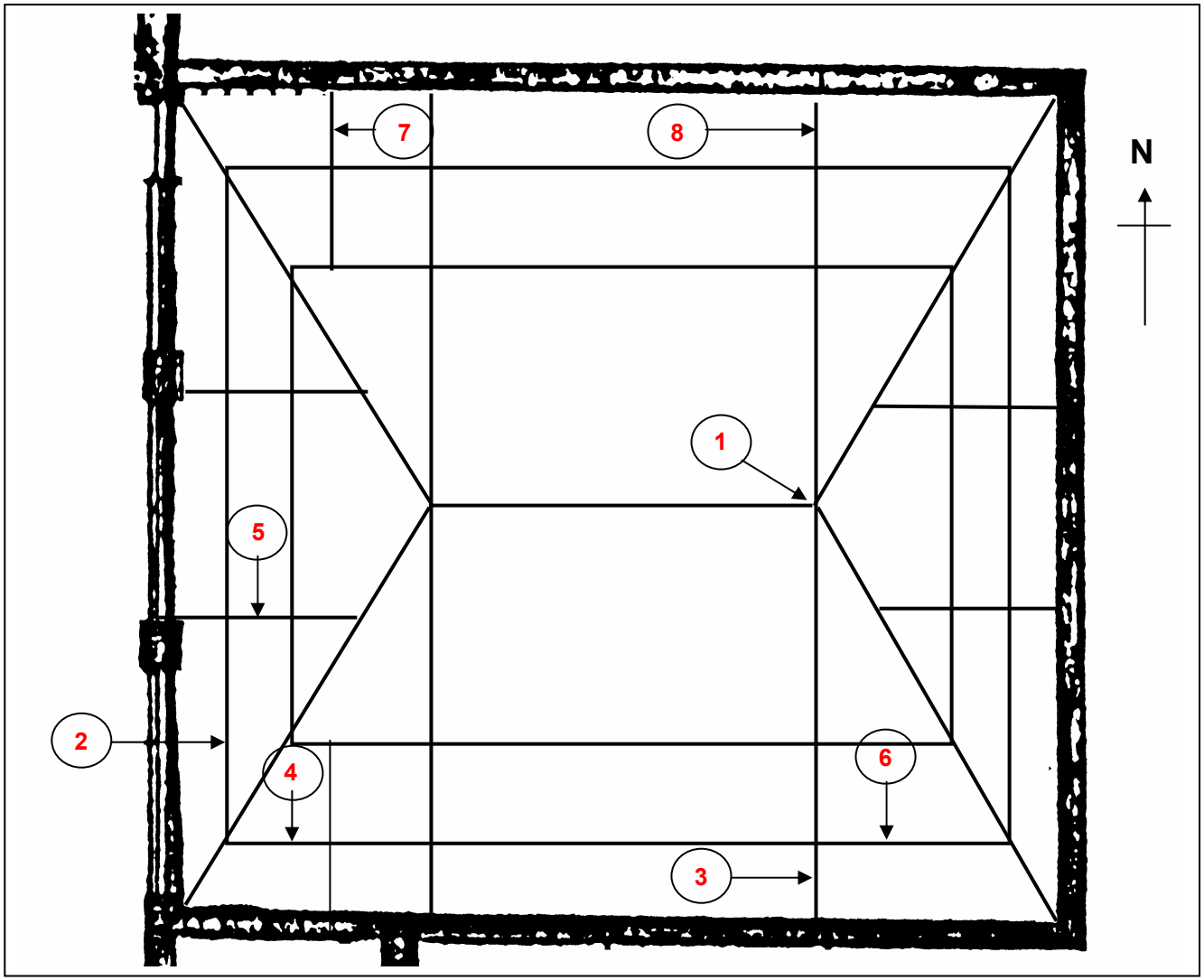


Figure 12b: Main House or west range roof plan to show sampled oak timbers (based on first-floor plan) (after Stanley Jones)

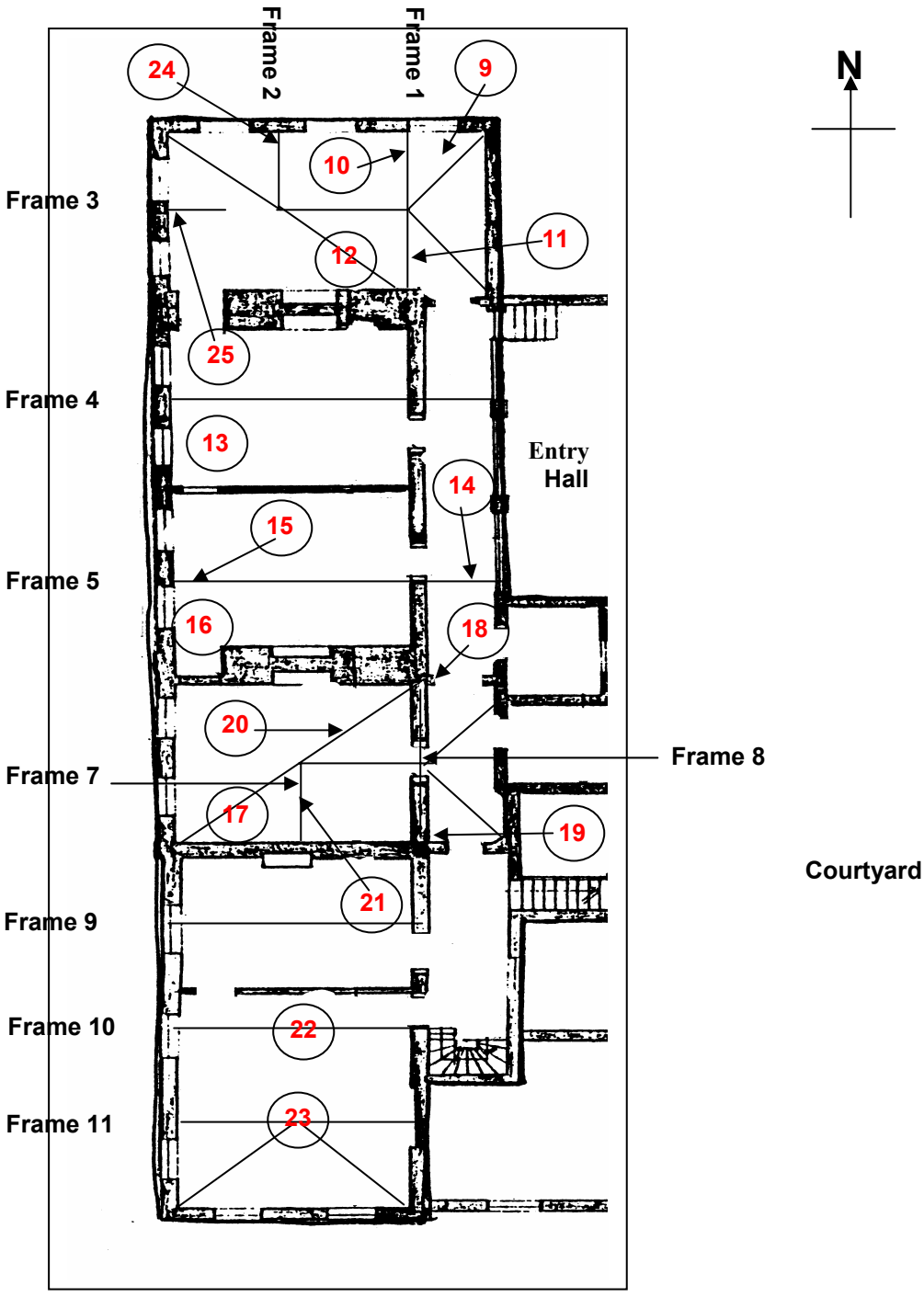


Figure 12c: Service or south range to show approximate position of sampled timbers (after Stanley Jones)

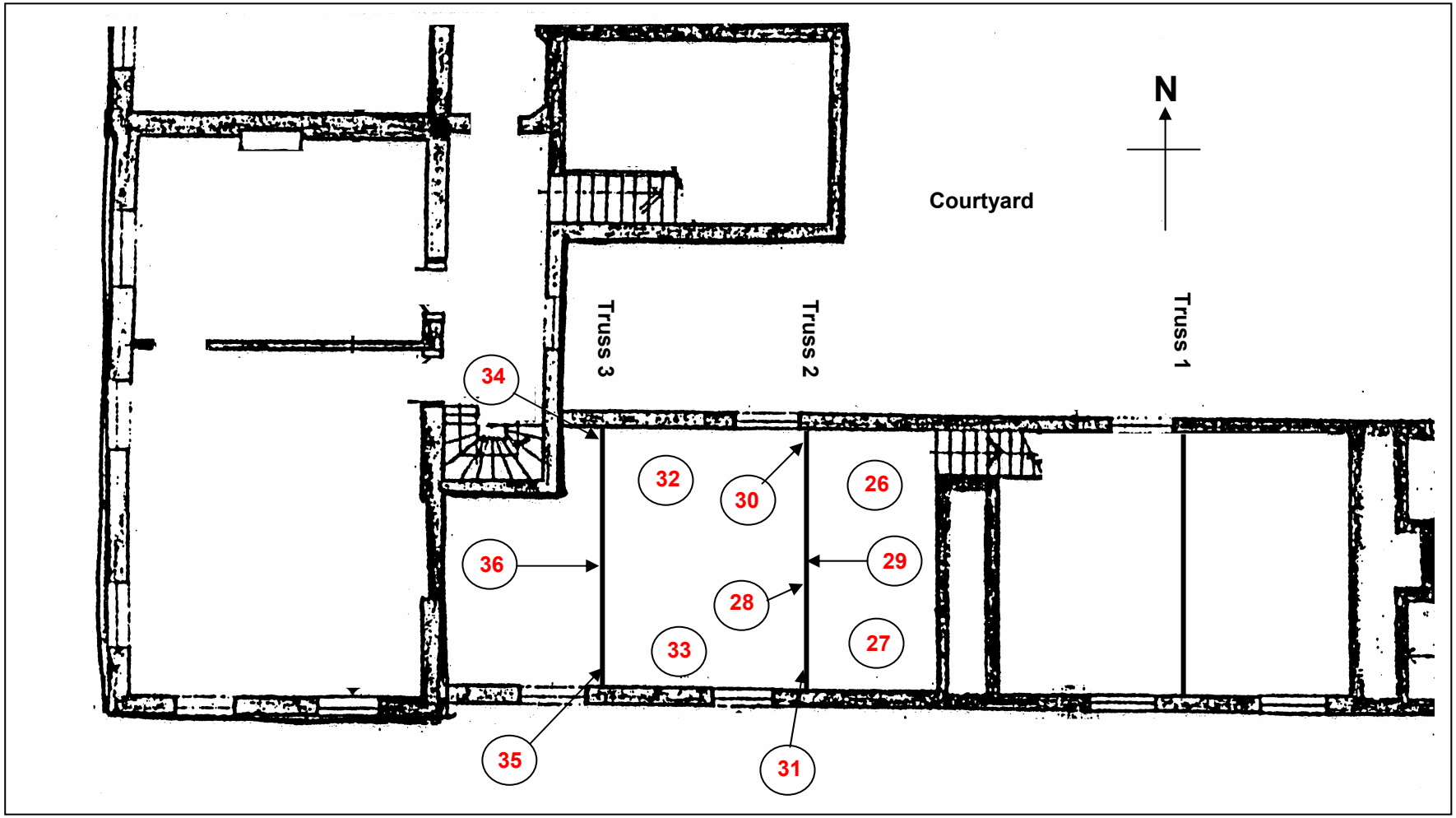


Figure 12d: The 'North-east' building to show sampled primary timbers
(based on internal, or south, elevation of north wall)
(after Stanley Jones)

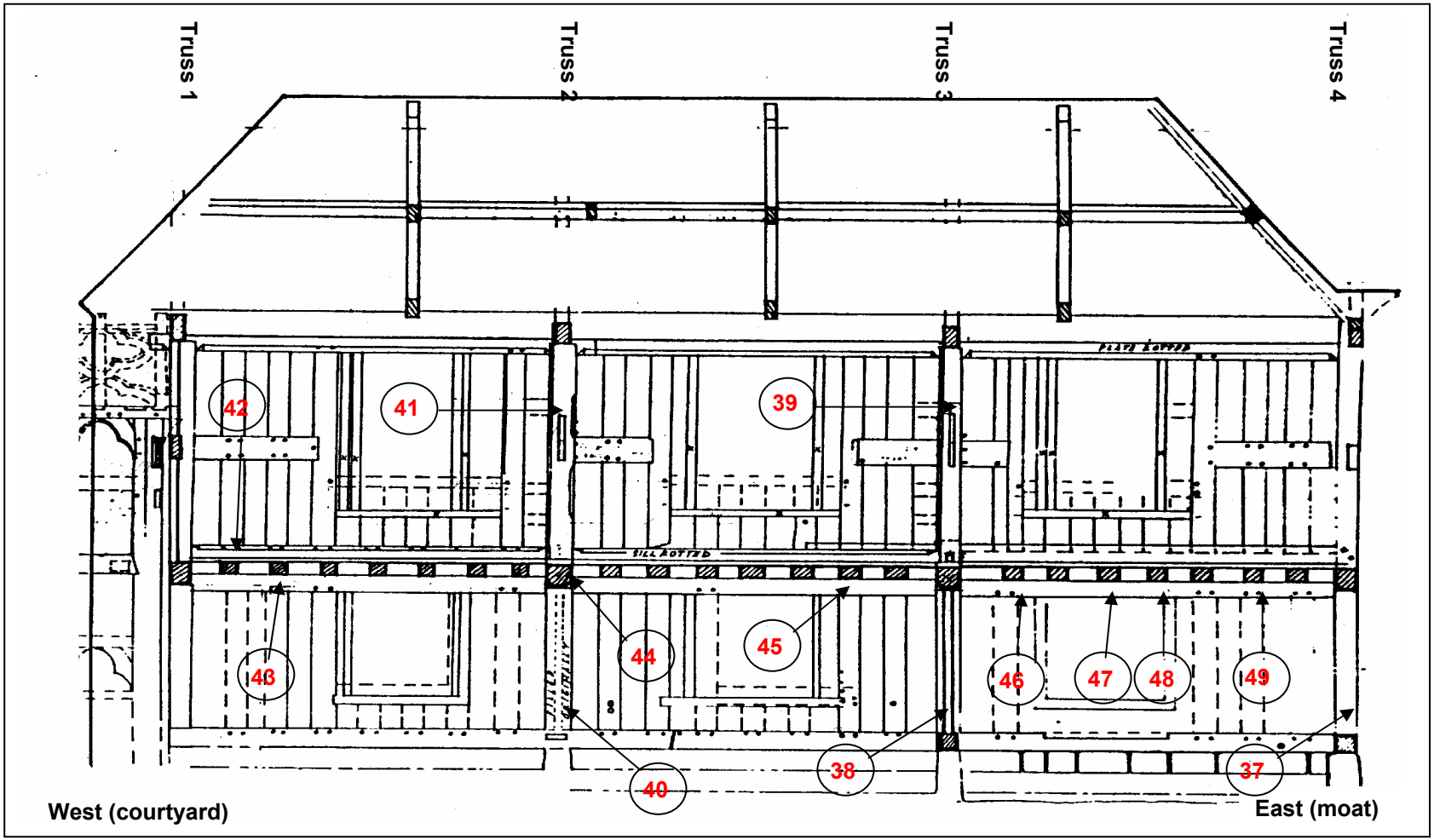


Figure 12e: The 'North-east building' to show later roof timbers sampled (viewed from the south looking north, above, and north looking south, below) (after Stanley Jones)

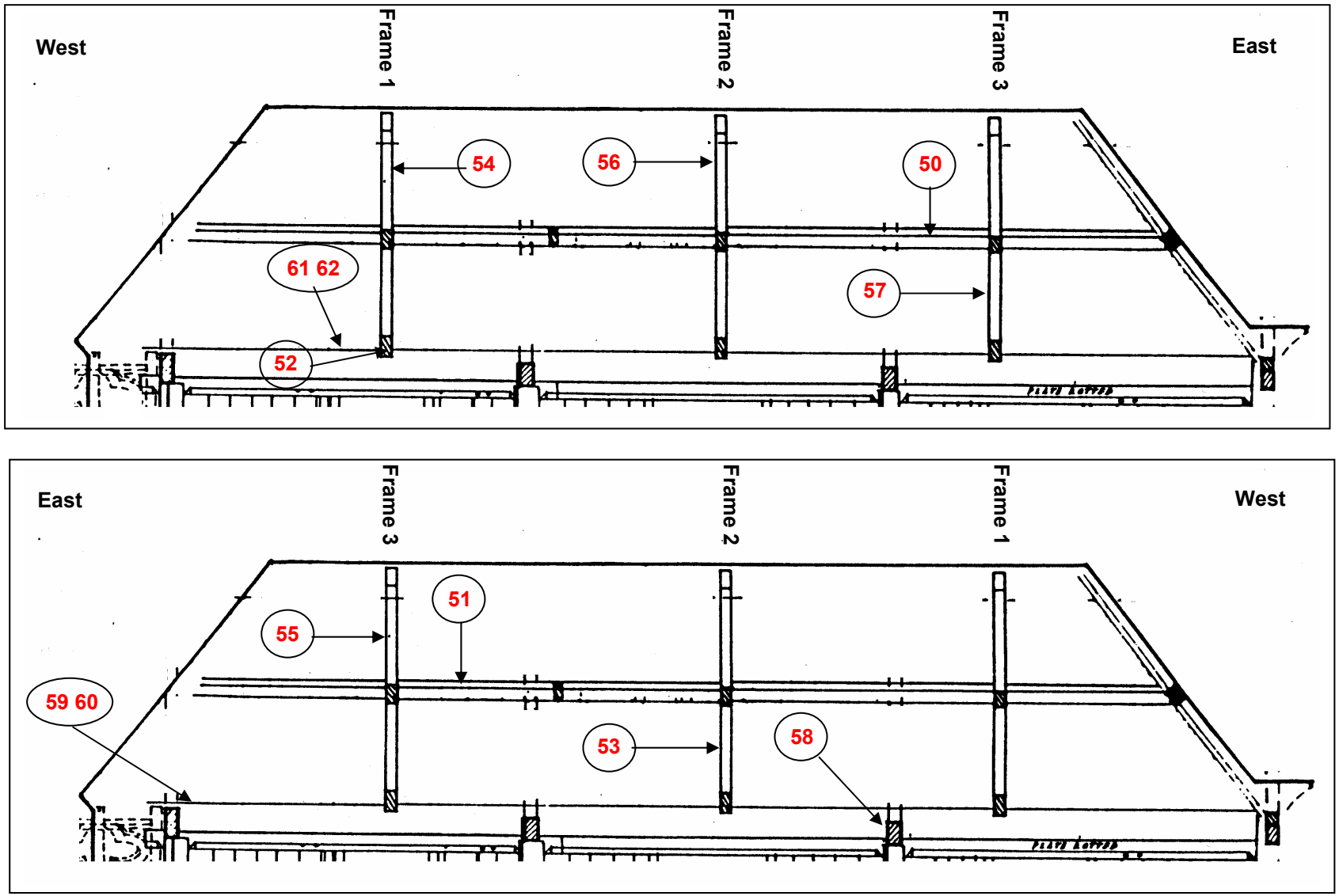


Figure 12f: The 'de Freville building', plan at first-floor level to show sampled timbers (after Stanley Jones)

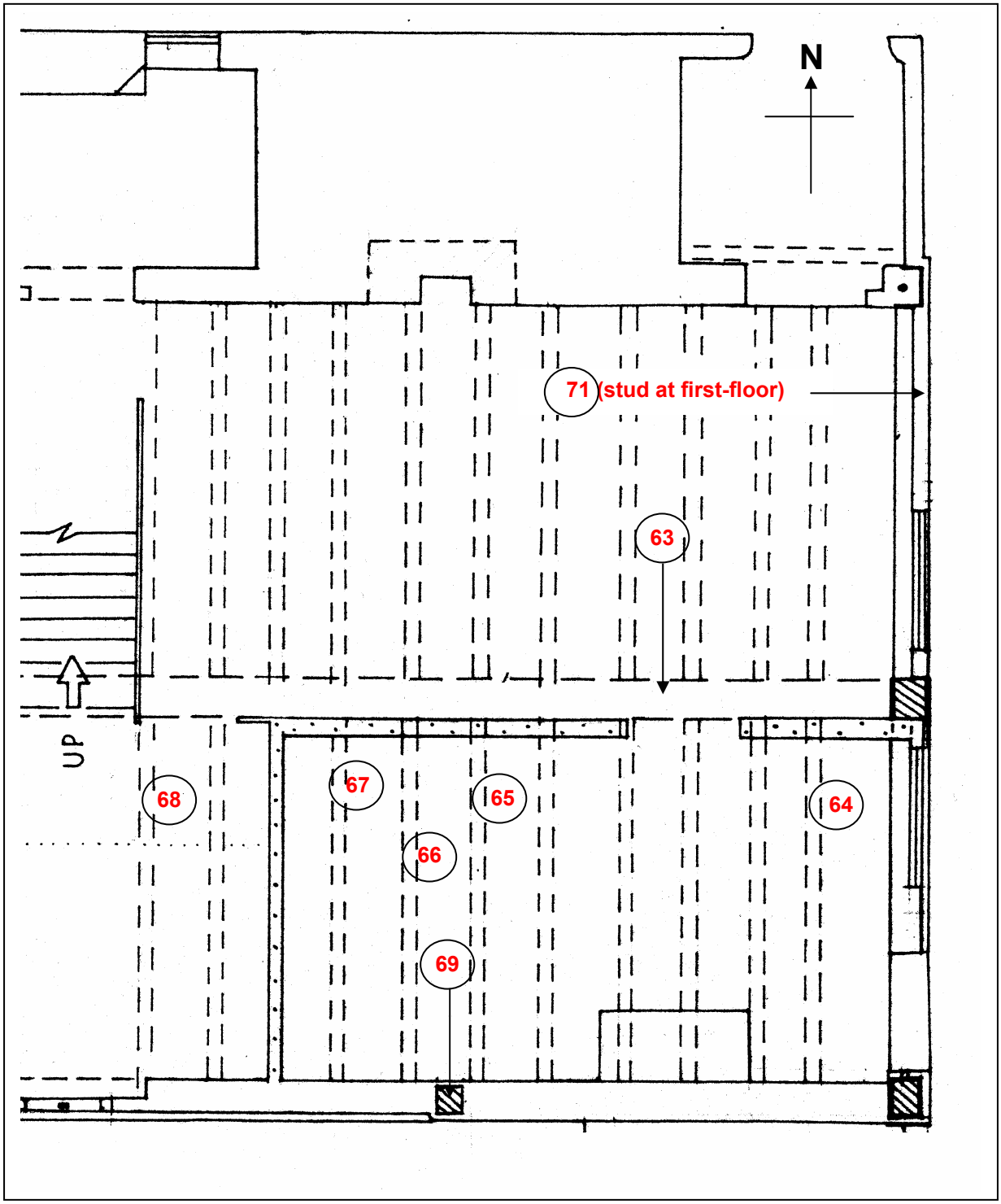


Figure 12g: The 'de Freville building' showing sampled timbers of the west gable to the courtyard (viewed from the west looking east) (after Stanley Jones)

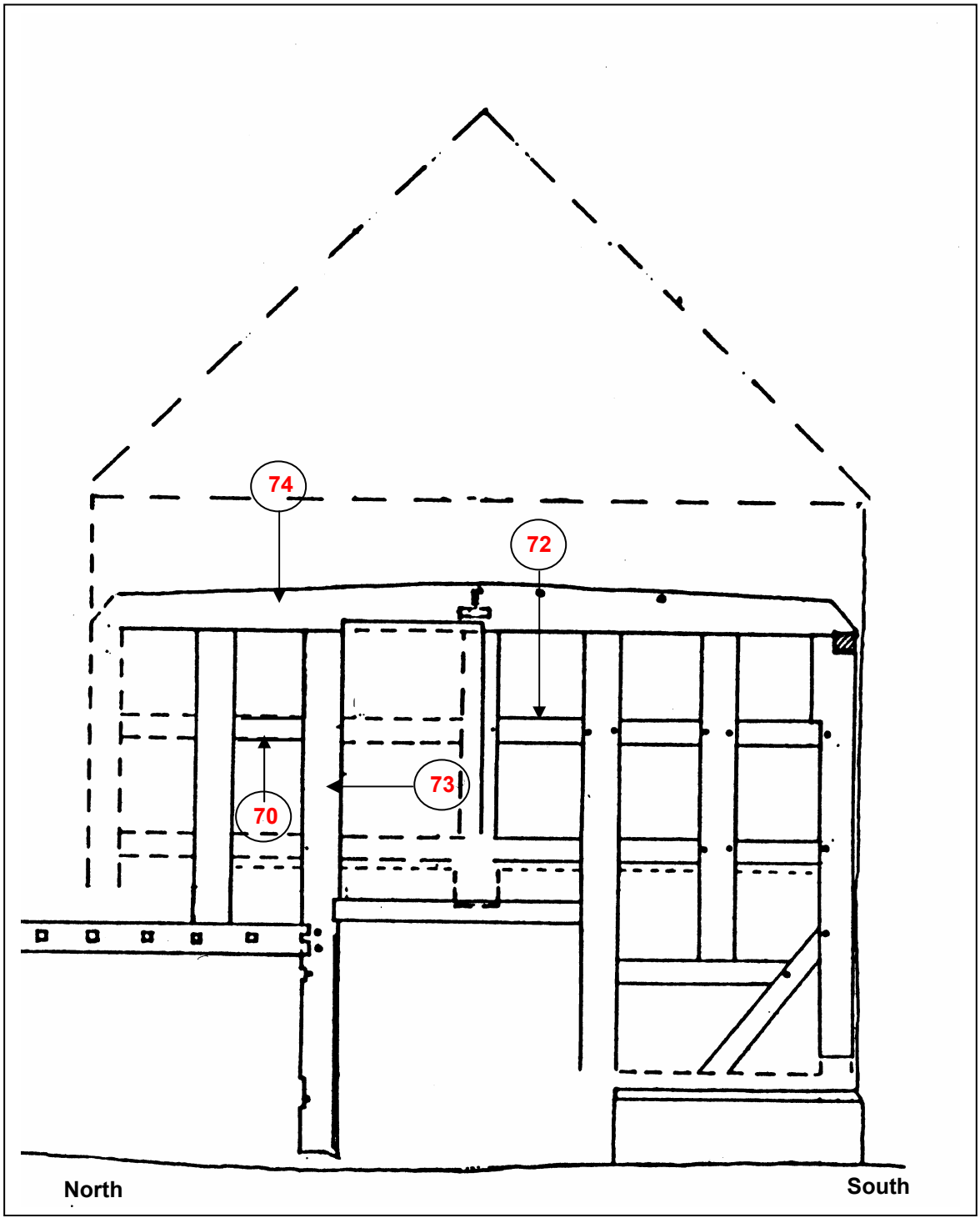


Figure 12h: ‘de Freville building’, south wall, north (internal) face to show sampled timbers

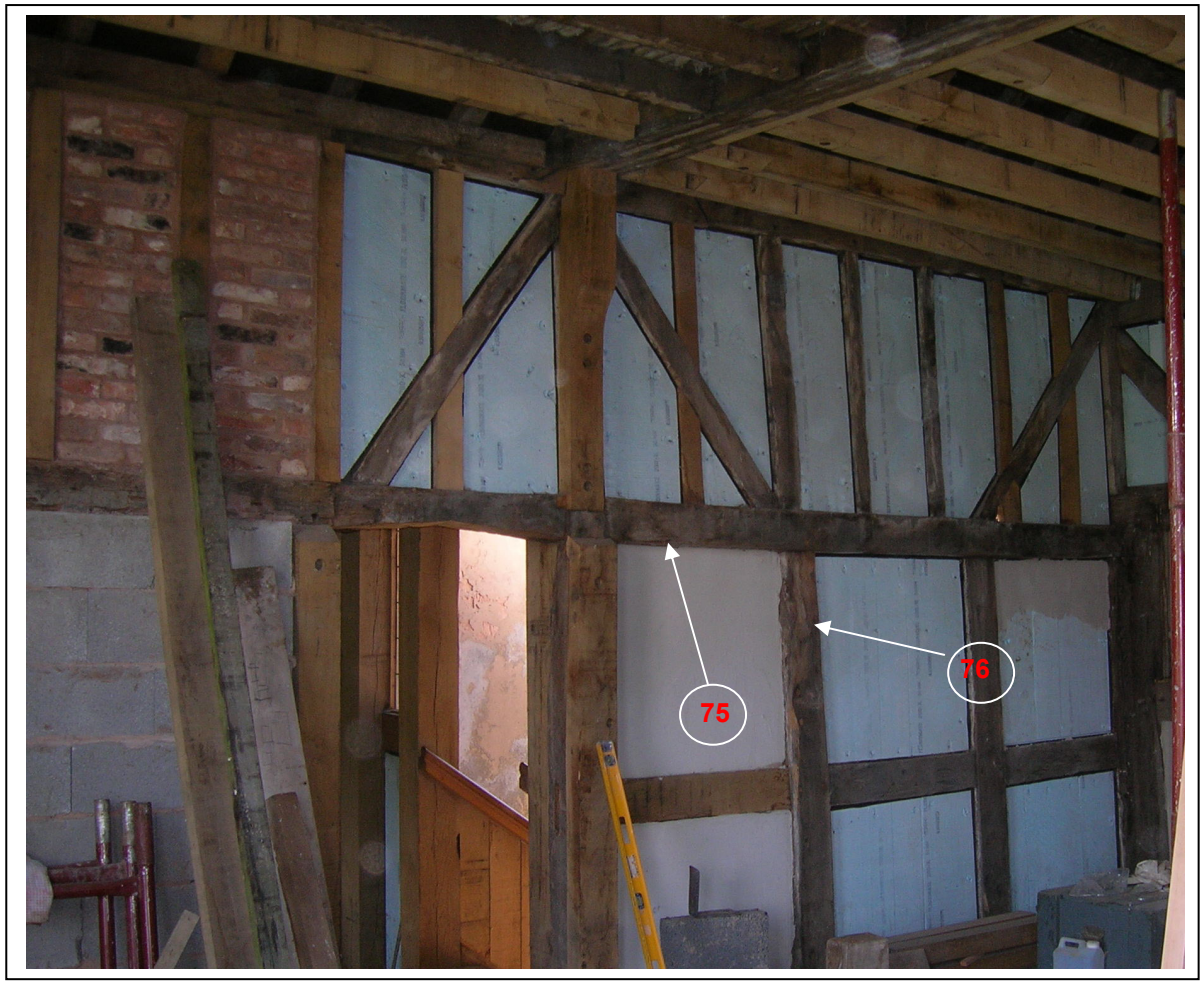


Figure 12i: The 'Stone building' to show approximate position of sampled timbers (based on first-floor plan) (after Stanley Jones

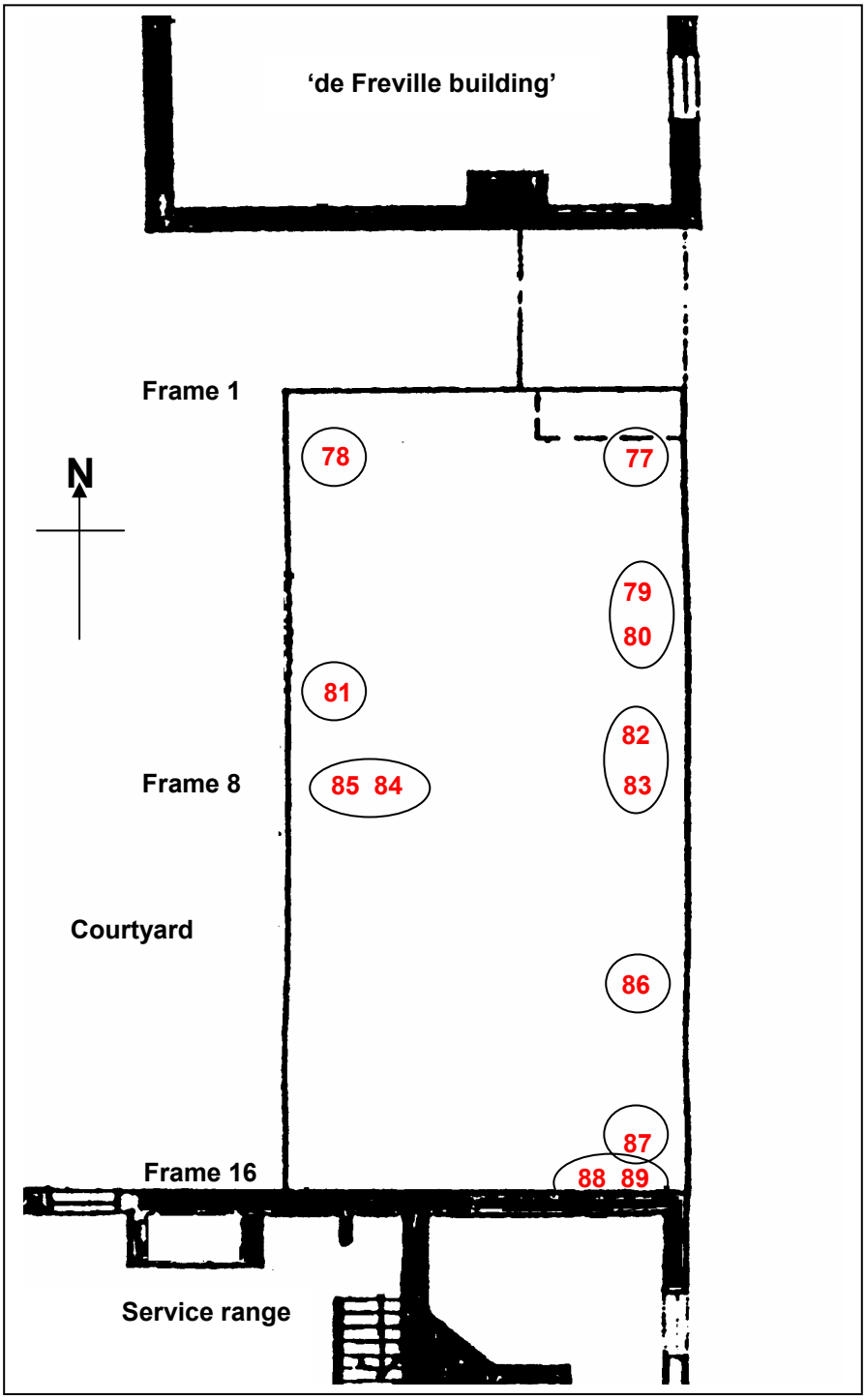


Figure 12j: Schematic plan of the 'Tudor barn' to show approximate position of sampled timbers

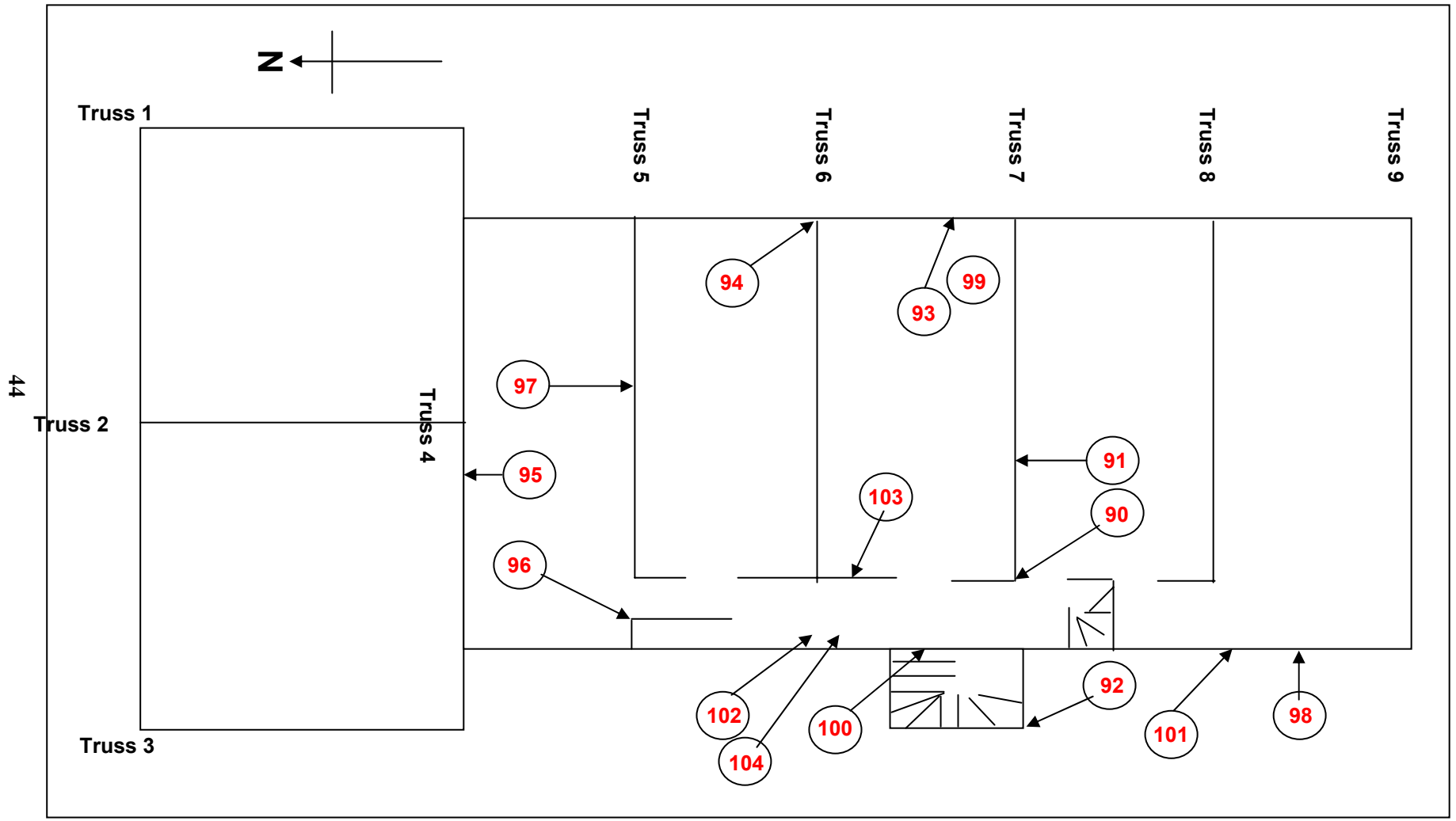


Figure 12k: Main House or west range, roof plan of southern three bays to show pine timbers sampled (based on first-floor plan) (after Stanley Jones)

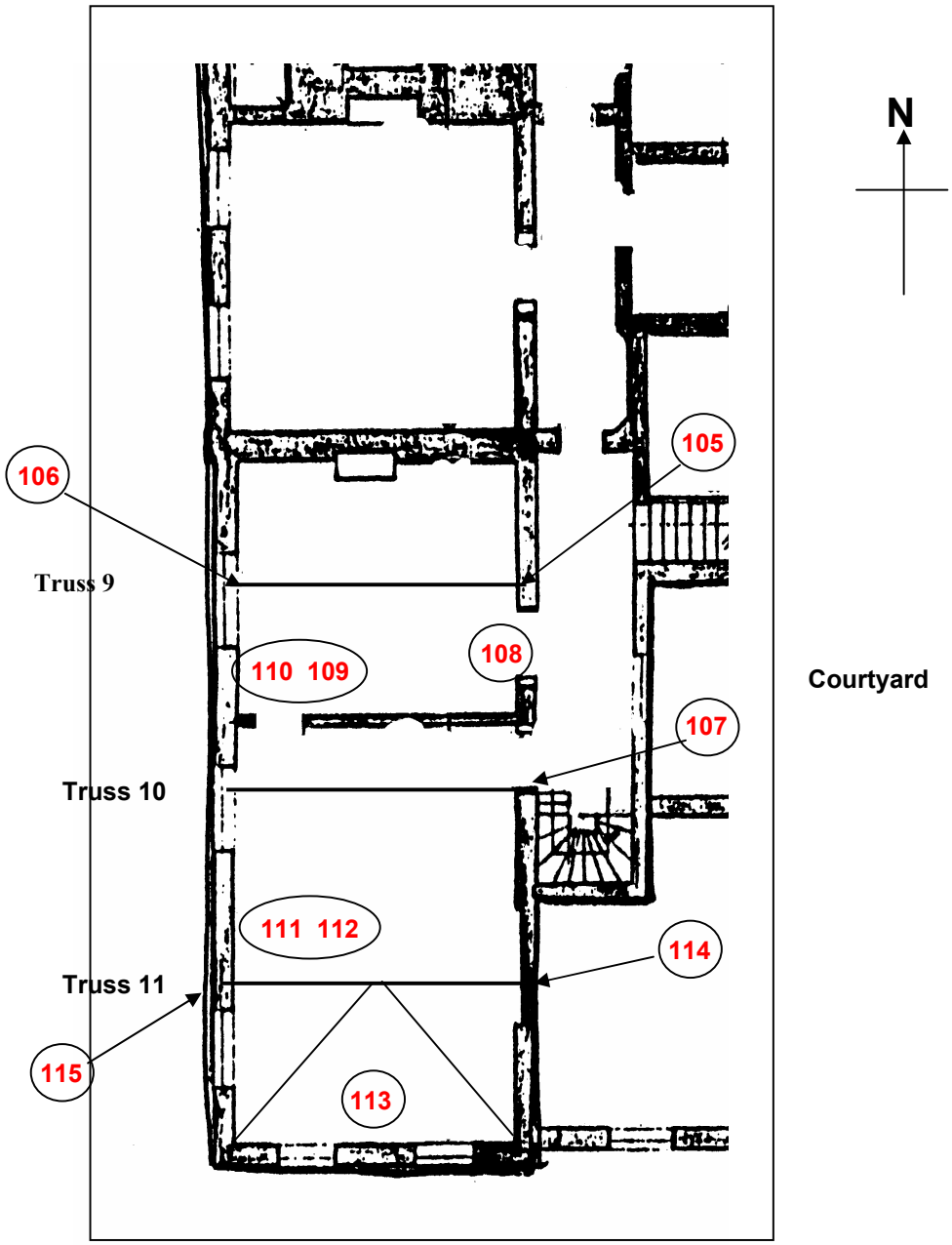
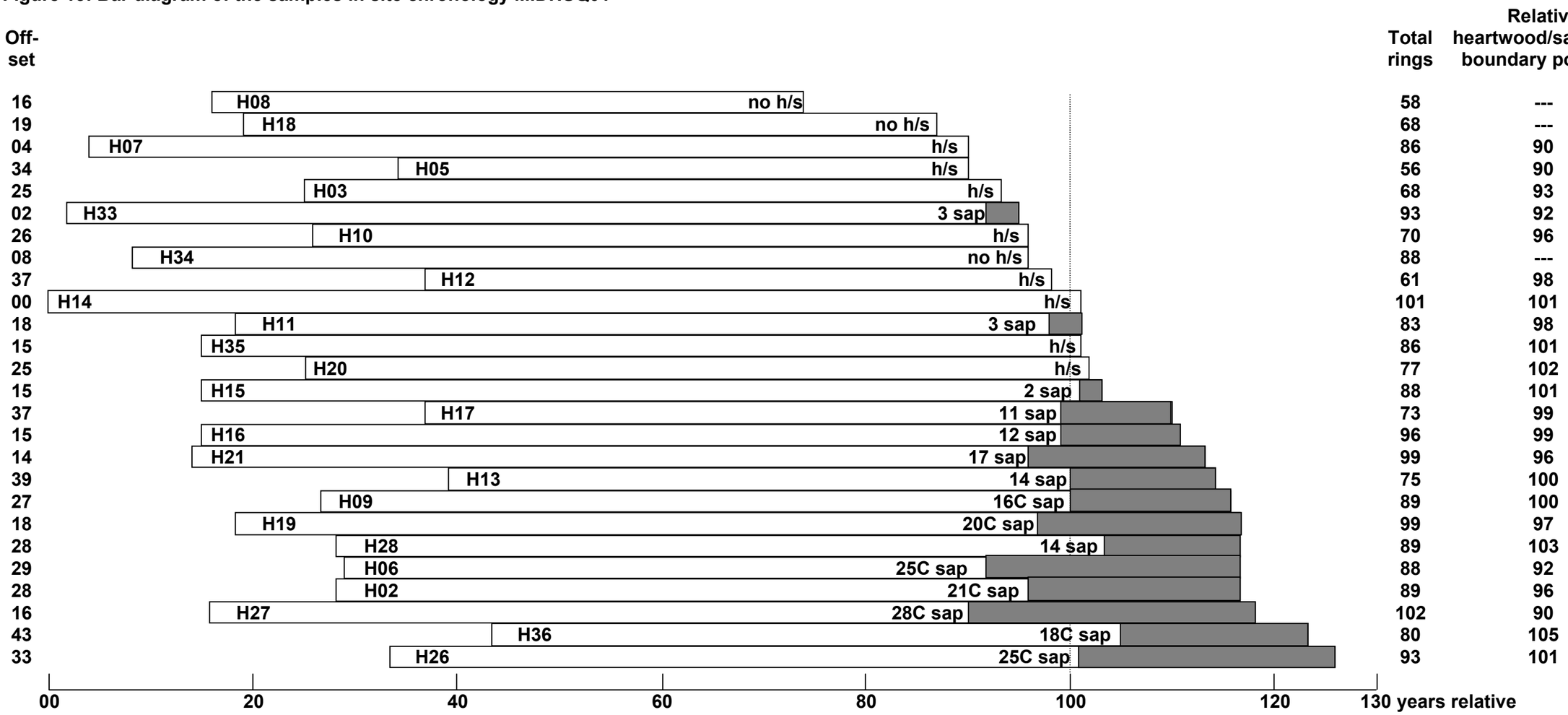
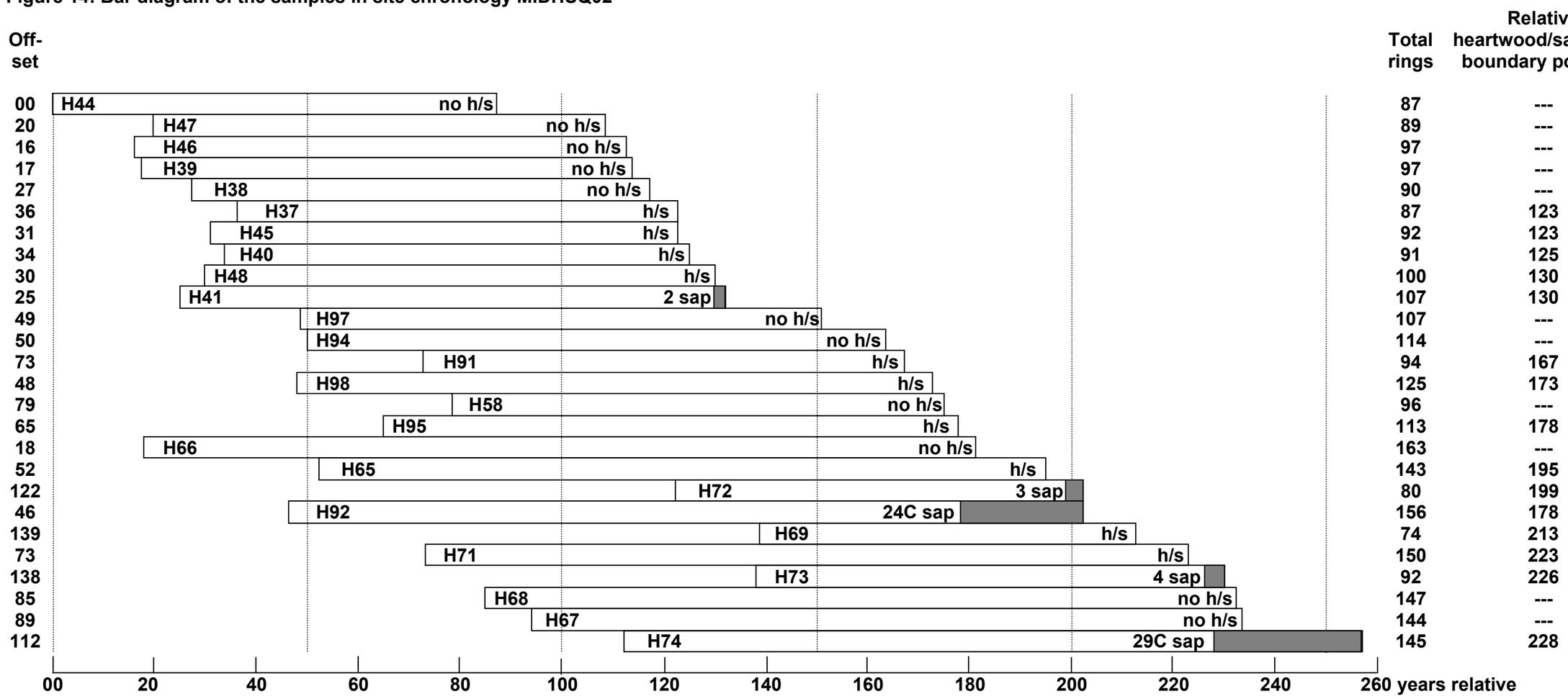


Figure 13: Bar diagram of the samples in site chronology MIDHSQ01



white bars = heartwood rings, shaded area = sapwood rings
h/s = heartwood/sapwood boundary is last ring on sample
C = complete sapwood retained on sample, the last measured ring date is the felling date of the timber

Figure 14: Bar diagram of the samples in site chronology MIDHSQ02



white bars = heartwood rings, shaded area = sapwood rings
h/s = heartwood/sapwood boundary is last ring on sample
C = complete sapwood retained on sample, the last measured ring date is the felling date of the timber

Figure 15: Bar diagram of the samples in site chronology MIDHSQ03

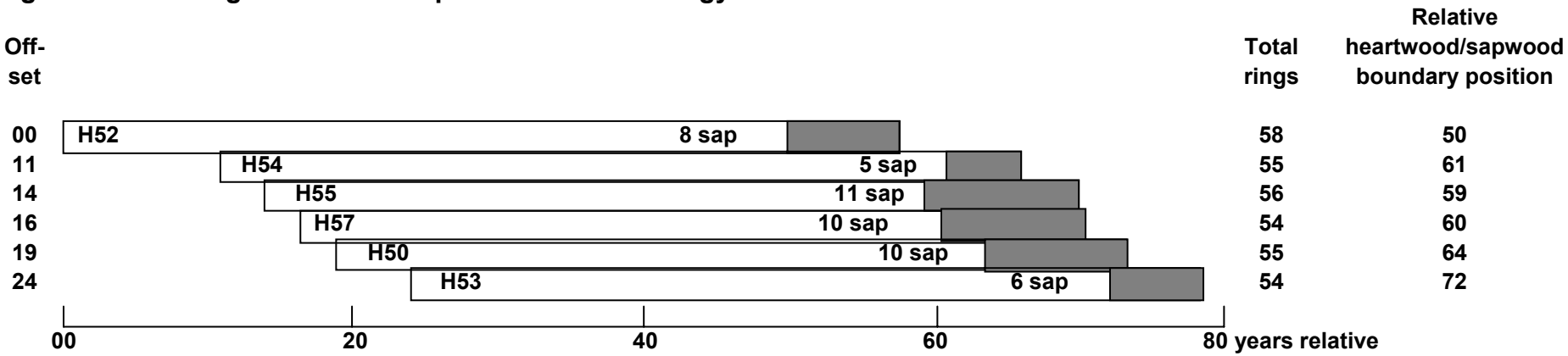
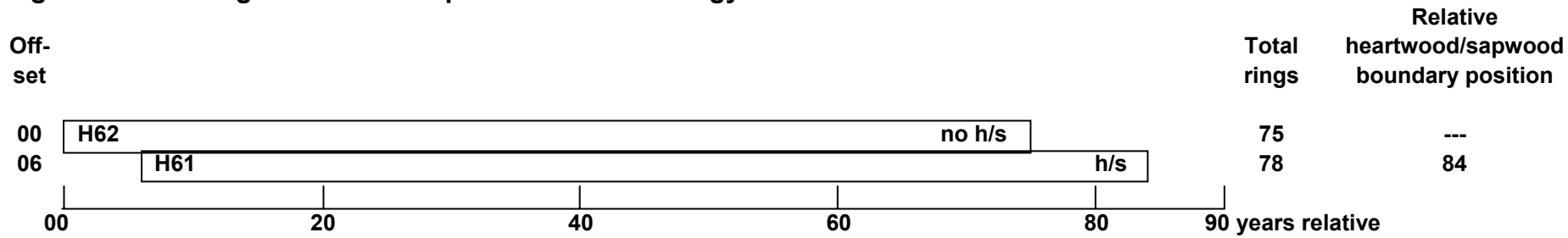


Figure 16: Bar diagram of the samples in site chronology MIDHSQ04



white bars = heartwood rings, shaded area = sapwood rings
h/s = heartwood/sapwood boundary

Figure 17: Bar diagram of the samples in site chronology MIDHSQ05

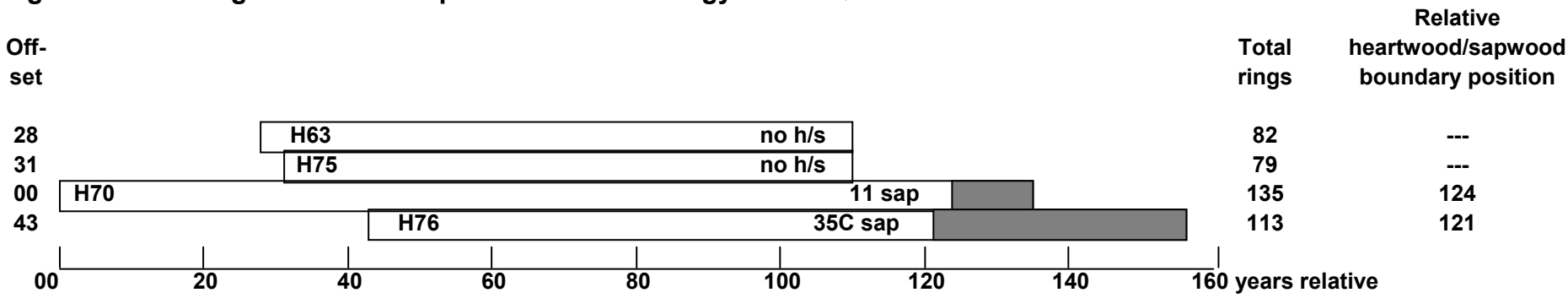
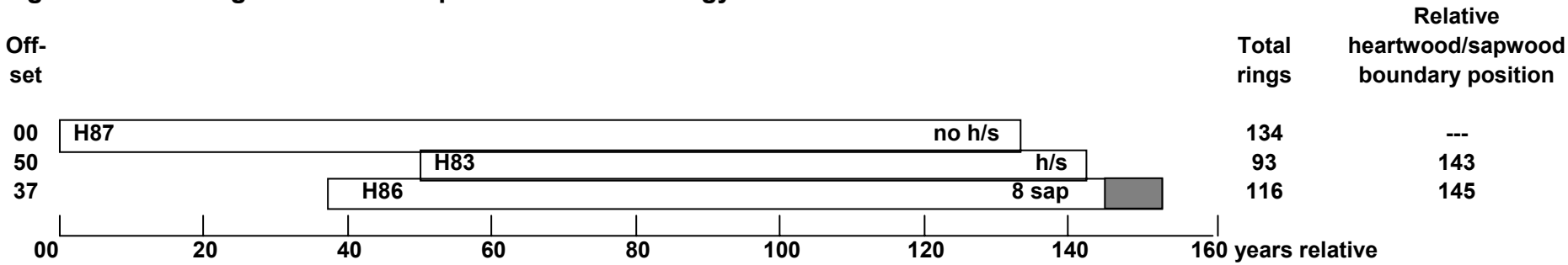


Figure 18: Bar diagram of the samples in site chronology MIDHSQ06



white bars = heartwood rings, shaded area = sapwood rings
h/s = heartwood/sapwood boundary
C = complete sapwood retained on sample

Figure 19: Bar diagram of the samples in site chronology MIDHSQ07

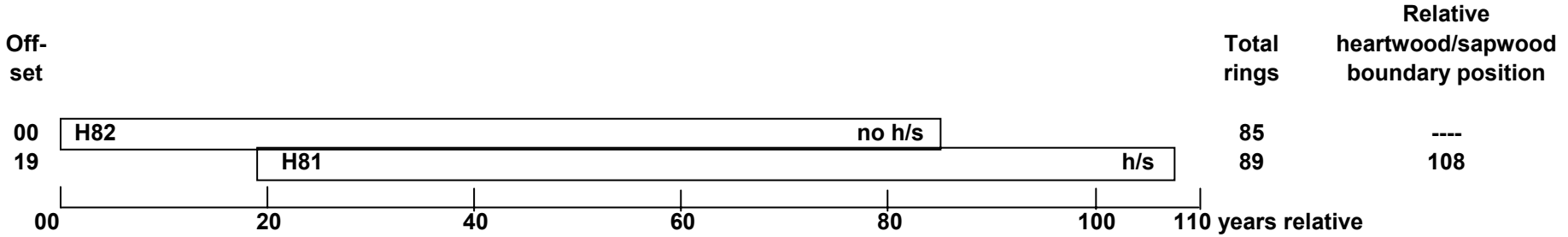
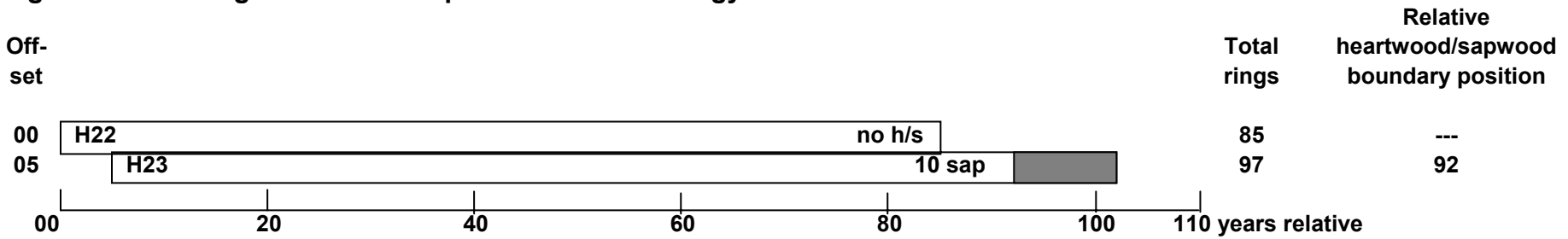


Figure 20: Bar diagram of the samples in site chronology MIDHSQ08



white bars = heartwood rings, shaded area = sapwood rings
h/s = heartwood/sapwood boundary

Figure 21: Bar diagram of the samples in site chronology MIDHSQ09

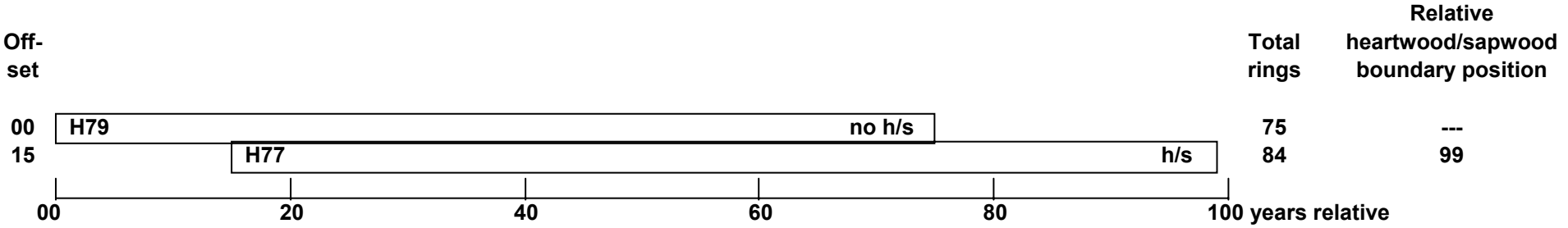
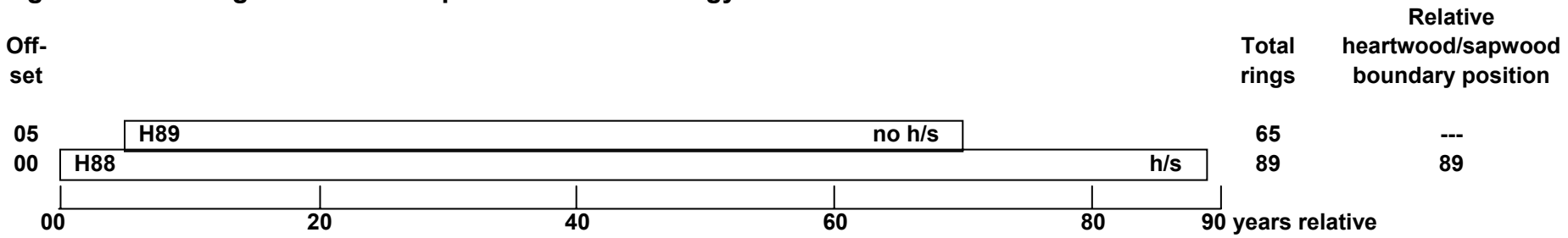
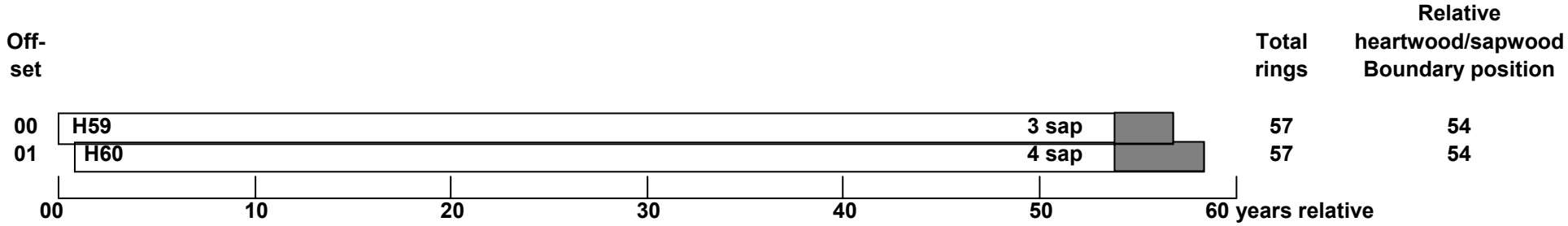


Figure 22: Bar diagram of the samples in site chronology MIDHSQ10



white bars = heartwood rings
h/s = heartwood/sapwood boundary

Figure 23: Bar diagram of the samples in site chronology MIDHSQ11



white bars = heartwood rings, shaded area = sapwood rings

Figure 24: Bar diagram of all the dated samples, sorted by sampling location in last measured ring position

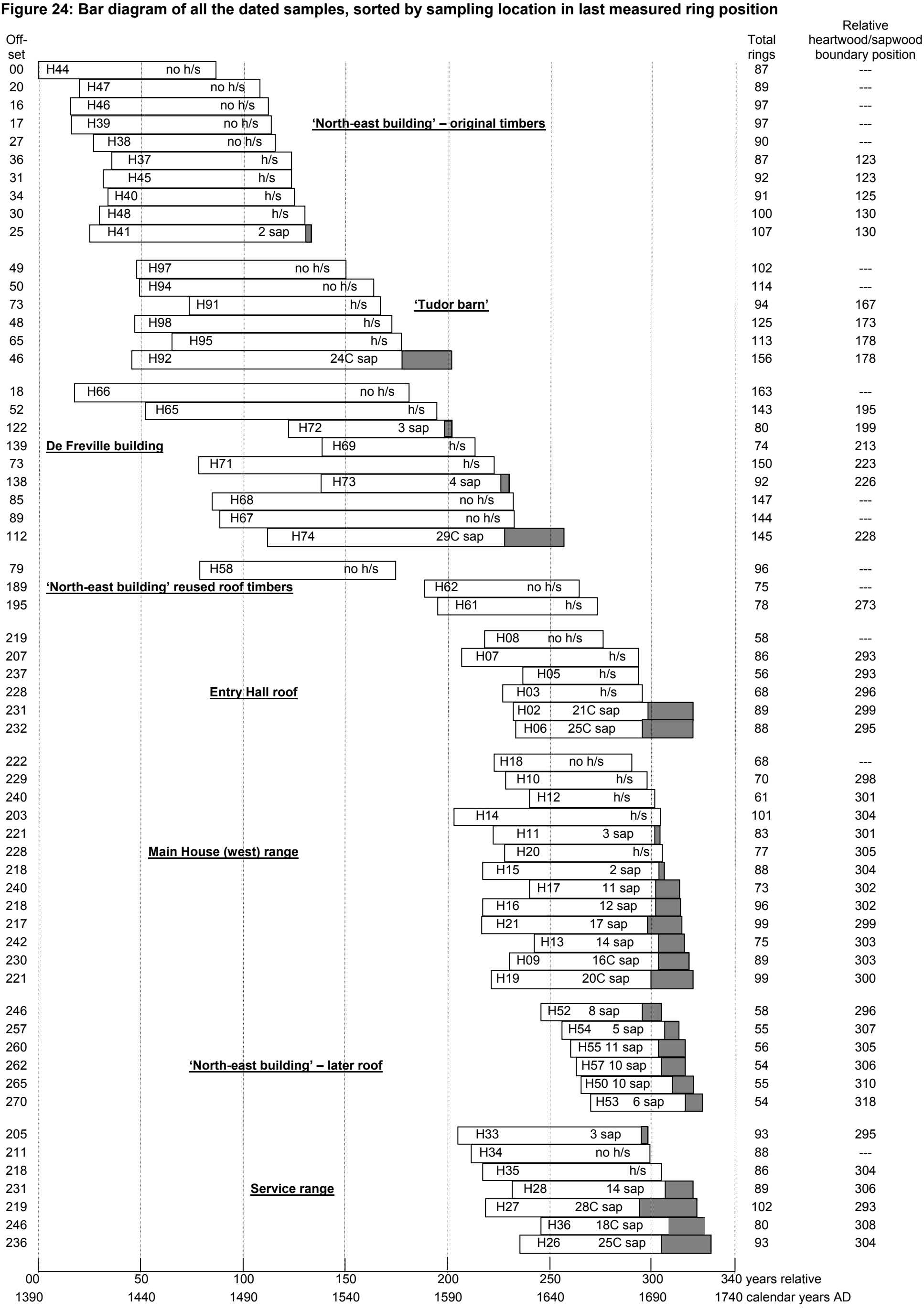


Figure 25: Bar diagram of the samples in site chronology MIDHSQ12 (pine chronology)

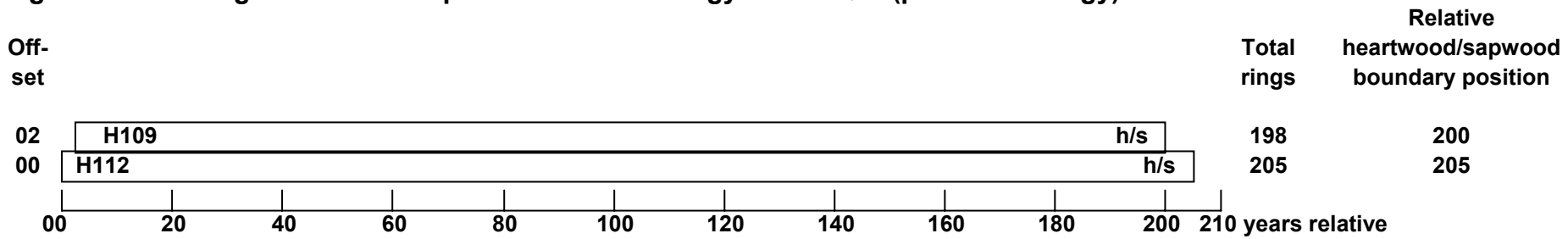
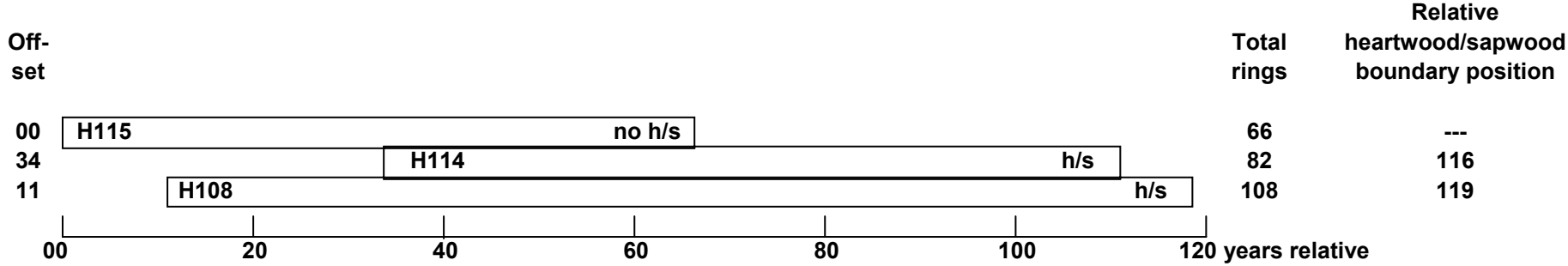


Figure 26: Bar diagram of the samples in site chronology MIDHSQ13 (pine chronology)



Data of measured oak samples - measurements in 0.01 mm units

MID-H01A 78
419 622 751 490 514 161 101 93 90 201 267 341 216 253 293 216 279 257 182 333
315 400 219 236 281 224 368 322 391 283 310 401 500 437 389 400 424 260 372 350
271 385 323 240 287 196 280 214 171 196 302 224 248 235 235 275 223 251 162 304
226 225 244 179 216 162 187 169 133 262 249 195 138 126 119 101 138 122

MID-H01B 78
429 613 738 483 516 186 89 101 89 206 257 348 205 263 281 219 284 245 173 353
325 389 228 227 296 234 363 334 369 317 288 393 508 433 385 405 424 262 373 350
246 423 307 225 303 194 257 207 184 204 303 212 282 205 254 274 210 270 162 289
232 210 239 181 227 157 207 182 117 255 255 197 133 126 126 97 151 139

MID-H02A 89
395 328 273 241 326 419 433 352 354 204 349 351 339 197 239 311 303 262 344 308
310 274 241 323 222 245 185 229 140 151 139 147 156 203 264 189 163 201 193 214
231 184 165 192 131 173 155 175 131 128 139 132 140 120 138 201 284 189 210 239
188 245 215 118 111 98 104 118 127 122 134 99 118 99 130 131 123 163 96 117
117 103 114 108 55 41 53 64 70

MID-H02B 89
410 358 287 220 341 445 440 329 343 212 348 364 349 207 228 324 307 274 344 290
302 285 241 320 219 239 178 242 144 137 170 134 153 204 271 182 170 205 210 196
241 175 156 190 131 172 152 185 130 128 133 133 152 108 130 201 288 194 202 239
188 263 198 121 129 105 93 119 128 113 133 93 116 100 132 134 143 143 90 125
104 91 122 116 64 45 55 62 74

MID-H03A 68
440 425 428 513 420 326 151 172 281 317 417 465 282 341 419 335 187 204 125 161
286 292 361 367 305 251 142 203 251 171 215 154 100 97 82 80 98 158 142 118
100 114 165 149 151 128 137 99 130 119 159 200 142 136 106 128 62 86 52 90
109 135 143 136 137 106 78 64

MID-H03B 68
424 425 445 502 401 345 164 180 278 379 363 470 276 345 405 328 196 186 129 151
284 285 367 374 298 269 170 200 252 168 221 159 100 95 82 78 107 147 155 115
96 121 165 143 145 144 91 105 139 124 171 174 136 144 133 118 92 91 63 96
100 138 139 116 135 114 51 52

MID-H04A 65
345 339 348 321 304 232 261 284 288 230 296 369 326 262 226 255 231 147 166 123
118 171 175 142 137 212 273 293 260 193 224 230 224 278 289 253 243 283 258 202
249 210 273 241 263 223 177 193 170 209 171 225 239 230 217 201 158 177 195 182
225 138 155 145 181

MID-H04B 65
261 342 360 310 290 246 270 279 284 239 287 371 319 274 222 261 210 152 151 126
129 170 159 154 129 217 274 270 262 190 232 234 232 259 289 273 250 271 262 210
245 202 271 241 257 220 181 183 170 209 176 228 230 231 216 221 159 182 183 183
226 130 144 154 170

MID-H05A 56
412 484 540 356 415 419 368 221 202 180 203 375 329 335 325 291 257 207 259 356
269 354 208 160 163 152 163 215 269 234 266 273 201 226 225 207 191 178 183 226

272 218 211 233 245 218 142 134 89 81 140 176 182 169 167 227

MID-H05B 56
438 474 510 367 339 421 372 232 197 153 194 377 327 320 317 292 246 209 267 351
247 350 226 182 148 154 163 220 271 248 286 270 199 223 201 204 172 185 169 224
237 225 206 237 232 206 174 115 104 89 133 170 187 174 156 224

MID-H06A 88
341 318 156 170 258 310 374 443 366 332 394 300 144 126 177 276 422 323 347 343
331 321 255 313 441 298 314 214 186 143 139 141 197 264 149 150 161 178 234 167
157 259 147 183 173 117 171 139 83 151 127 124 109 109 98 100 94 90 127 114
114 114 68 61 151 151 128 100 114 107 96 88 103 100 86 102 127 44 39 34
 29 42 41 39 37 35 38 35

MID-H06B 88
333 316 158 167 246 321 376 444 362 335 390 316 138 122 179 273 423 327 346 347
324 333 237 314 443 304 309 226 206 120 143 160 191 281 142 138 164 169 250 162
155 255 155 185 171 126 164 131 96 143 118 129 112 102 98 104 90 94 123 122
112 105 79 61 150 154 125 105 116 102 105 79 107 98 86 111 116 45 44 32
 27 39 48 39 37 31 34 39

MID-H07A 86
222 145 170 189 288 433 425 429 394 493 598 473 441 409 425 361 468 419 348 312
221 378 316 412 452 392 389 216 229 328 333 330 348 260 259 379 288 122 89 73
 87 115 103 139 163 165 136 142 174 217 177 219 142 108 93 82 112 174 285 187
138 160 183 239 193 171 148 130 164 204 214 245 216 177 227 196 153 108 102 74
117 141 142 176 133 206

MID-H07B 86
195 137 147 182 268 331 380 438 416 539 575 509 437 396 452 359 468 415 354 287
230 408 317 395 455 390 357 233 233 319 313 347 368 240 269 396 266 135 96 81
 86 117 112 136 151 163 144 135 175 229 206 222 141 103 90 91 122 182 283 185
115 173 162 260 200 186 139 152 156 207 210 229 208 190 237 171 146 102 105 79
114 154 131 160 145 225

MID-H08A 58
325 264 229 156 319 189 160 213 319 334 347 383 567 528 506 299 244 361 436 425
526 355 364 367 362 189 96 85 134 319 280 293 328 288 173 142 157 256 207 331
239 159 128 116 110 183 313 227 223 232 221 234 180 169 198 123 106 160

MID-H08B 58
342 216 188 162 305 209 145 230 274 373 339 364 583 535 511 305 247 395 435 433
519 343 368 372 348 190 92 89 152 300 269 326 322 288 198 130 168 287 209 320
238 158 132 126 122 181 289 234 211 229 211 212 215 183 171 129 106 181

MID-H09A 89
421 305 267 214 144 182 232 202 173 201 153 194 211 238 164 148 192 236 292 223
241 256 199 261 214 328 338 308 309 239 197 166 158 236 234 281 267 173 181 199
184 133 86 80 86 85 106 98 116 205 176 166 175 144 90 87 119 139 198 195
140 173 160 145 105 108 117 120 141 137 106 83 83 81 106 90 103 112 110 120
 71 95 118 111 144 108 87 88 115

MID-H09B 89
418 299 264 212 148 180 226 211 178 200 160 203 204 233 170 154 201 240 280 223
241 231 201 273 208 341 338 308 292 257 180 177 153 233 250 269 278 163 184 197
186 134 94 74 80 91 107 90 116 201 183 177 176 125 91 88 113 138 192 199

135 176 167 133 99 112 130 107 140 133 98 92 75 87 107 96 108 113 112 115
 63 97 101 129 139 101 89 86 127

MID-H10A 70
147 155 160 100 93 74 105 100 163 135 132 148 154 192 178 145 81 72 114 173
160 210 233 160 167 119 140 212 204 160 158 121 151 134 168 229 246 287 173 172
261 284 149 96 64 69 55 65 91 154 259 289 447 257 205 118 168 211 305 305
286 309 341 234 184 209 179 190 178 175

MID-H10B 70
160 140 161 112 74 88 93 105 166 149 117 143 158 197 175 136 71 82 115 177
159 226 216 167 155 127 133 210 198 155 173 128 154 135 168 233 254 271 180 160
266 271 144 103 68 69 69 52 92 149 253 286 448 266 200 124 163 234 287 314
292 311 344 227 184 212 189 181 181 180

MID-H11A 83
157 208 192 216 200 225 263 361 370 314 269 163 118 73 71 78 137 147 184 190
203 282 243 151 104 80 93 245 175 201 274 157 233 143 170 182 179 190 197 190
209 111 137 243 339 356 239 240 259 290 177 83 72 70 70 89 157 275 380 460
458 341 249 151 189 297 387 426 354 236 276 365 261 269 238 220 251 306 192 173
165 89 144

MID-H11B 83
152 209 191 243 205 232 251 368 351 318 275 161 107 88 64 84 115 138 177 213
206 280 249 148 104 73 99 242 172 210 261 166 226 142 173 188 173 190 206 179
219 101 135 249 342 360 242 229 266 292 162 98 76 68 70 80 155 280 375 468
437 340 263 141 195 273 380 425 357 230 283 363 238 282 249 232 240 317 193 158
128 87 142

MID-H12A 61
420 433 520 385 297 361 289 282 425 268 333 372 320 214 167 144 207 278 219 270
175 148 120 128 192 344 340 156 187 166 191 90 81 76 83 96 138 133 126 179
246 324 263 167 120 143 234 323 241 168 147 163 159 161 169 133 213 251 285 216
217

MID-H12B 61
381 442 480 398 297 356 274 318 396 256 332 386 338 212 174 136 205 261 240 256
180 148 123 111 203 317 341 178 178 166 182 99 63 80 82 109 125 136 114 182
233 315 296 162 120 118 230 319 249 170 126 170 164 153 163 132 246 257 288 219
220

MID-H13A 75
313 310 190 238 254 316 321 192 226 326 238 273 214 330 336 257 279 211 170 190
166 241 303 306 269 194 260 308 205 165 233 142 146 214 318 299 281 333 398 255
188 155 150 186 209 253 227 205 164 280 191 173 198 208 239 155 215 186 148 165
118 209 214 222 264 274 235 195 138 186 188 239 222 147 135

MID-H13B 75
305 296 185 214 312 302 346 186 233 326 235 268 237 327 334 254 289 210 150 189
159 246 287 316 261 191 281 284 219 154 214 156 131 206 310 296 295 335 407 261
203 133 172 166 230 248 222 203 197 282 187 189 207 204 250 170 208 184 155 156
117 215 207 215 264 270 247 200 149 185 198 219 237 144 144

MID-H14A 101
 83 63 44 35 25 38 53 77 60 80 202 172 221 289 284 225 246 221 226 166
156 74 54 77 150 194 244 246 288 210 161 124 82 113 122 106 135 115 85 122

121 102 136 131 117 162 107 104 142 170 91 97 77 93 83 167 158 87 50 56
 57 108 134 121 117 73 65 99 60 64 51 38 42 54 75 97 91 124 124 145
 87 56 57 82 156 196 204 232 228 442 149 150 135 308 236 242 246 227 165 126
203

MID-H14B 101
 78 45 75 34 26 42 81 77 66 64 139 147 194 289 277 220 271 243 221 183
144 74 57 86 166 184 236 249 274 213 163 121 89 103 131 93 124 150 90 124
147 105 125 147 118 183 107 104 162 162 94 116 59 94 100 146 157 83 54 57
 65 92 138 129 96 92 60 104 58 65 57 36 30 55 81 101 92 125 114 147
 98 47 53 82 165 220 204 233 226 473 163 135 151 286 254 222 250 225 164 151
209

MID-H15A 88
234 345 284 237 183 184 84 92 130 223 317 288 302 317 256 213 125 63 83 130
118 112 118 111 157 157 129 165 209 159 251 109 124 189 204 125 108 61 103 139
140 151 90 50 55 66 95 150 151 114 156 143 160 119 107 84 44 52 59 62
 98 99 115 124 139 126 106 78 131 200 184 259 257 252 235 132 153 179 288 215
154 187 231 158 113 148 221 280

MID-H15B 88
258 337 290 235 179 174 81 90 125 239 311 291 301 315 252 205 122 67 77 135
108 116 120 107 155 160 137 164 206 171 239 115 115 192 190 135 107 63 97 146
136 150 86 57 55 64 95 149 149 116 163 129 177 132 85 77 47 54 53 69
 95 111 99 127 146 132 89 75 120 215 199 250 267 247 238 138 146 172 298 200
171 195 242 150 119 137 225 271

MID-H16A 96
294 355 290 219 238 194 109 122 183 222 285 241 304 295 263 210 204 127 148 194
187 240 144 83 125 107 89 101 102 135 130 81 139 172 134 144 122 187 285 175
148 154 122 97 92 151 182 195 200 159 134 142 149 96 140 86 69 94 161 183
212 194 222 154 128 97 66 86 96 131 138 124 119 138 113 107 145 106 195 138
173 153 125 114 108 190 188 197 144 162 119 85 102 123 132 131

MID-H16B 96
261 355 282 211 228 204 111 129 171 220 281 250 312 294 257 226 195 113 162 198
187 239 149 84 121 112 83 97 103 138 133 69 152 162 137 147 116 195 288 182
159 163 117 97 91 143 193 220 223 161 161 124 143 108 123 94 69 107 153 176
194 211 238 150 117 101 61 88 112 126 129 132 104 156 113 103 136 118 196 137
164 148 123 129 85 198 165 233 150 137 126 88 86 97 131 129

MID-H17A 73
276 420 468 417 332 311 484 412 380 212 341 357 292 315 211 410 473 317 364 317
228 204 153 228 352 368 315 235 205 242 213 168 126 114 101 141 313 325 373 363
276 356 376 212 178 146 227 267 246 269 272 242 247 197 196 173 213 184 163 164
160 171 138 201 219 192 197 178 119 136 136 144 182

MID-H17B 73
297 447 467 411 334 306 500 405 382 217 345 347 295 311 213 425 421 362 346 305
235 209 151 229 343 362 311 233 200 224 225 174 129 109 103 145 327 320 378 357
248 359 384 222 190 148 212 260 230 253 272 247 233 184 226 190 214 189 187 158
156 164 145 204 217 206 192 165 155 125 123 143 180

MID-H18A 68
526 723 638 482 396 402 486 458 366 334 328 320 256 200 246 218 214 229 168 172
174 146 97 135 124 118 128 79 104 129 123 100 104 109 137 121 125 121 110 102

104 146 179 218 203 136 178 230 239 215 121 139 181 179 190 185 191 195 185 213
152 128 95 124 118 153 168 133

MID-H18B 68
500 707 707 498 382 425 479 441 386 386 348 349 239 203 239 232 209 237 163 173
176 146 94 140 125 119 124 83 109 126 120 95 95 108 134 113 119 113 102 90
109 153 174 225 196 149 171 229 247 210 126 158 175 185 195 201 191 195 189 214
161 130 90 132 118 158 172 135

MID-H19A 99
252 249 284 272 237 271 310 345 299 283 257 249 204 166 118 124 162 184 206 177
153 195 222 169 178 191 161 215 110 147 236 198 153 121 199 227 232 176 198 150
106 98 151 261 279 311 143 133 145 105 85 78 78 74 113 125 127 118 159 153
120 131 106 83 99 145 172 178 162 119 120 132 108 133 102 171 194 156 145 108
 61 61 107 121 143 136 200 165 116 99 135 106 101 135 115 91 118 105 100

MID-H19B 99
264 257 294 262 224 251 323 349 294 310 253 247 200 165 114 139 143 185 218 155
157 209 215 168 173 187 156 222 112 138 237 195 157 119 201 225 230 176 189 153
118 92 145 262 282 305 146 149 138 96 98 75 78 76 109 116 129 131 155 146
121 137 97 80 100 142 170 187 150 122 135 132 109 134 116 168 187 138 138 116
 53 77 91 128 142 142 167 195 122 121 141 89 107 126 105 90 97 113 108

MID-H20A 77
228 280 313 279 286 224 229 210 246 276 231 256 223 117 142 107 93 109 77 120
163 74 160 233 157 113 112 121 147 141 153 177 128 110 85 110 136 188 184 165
213 168 201 121 132 95 74 80 132 134 146 250 283 199 145 80 72 101 103 126
143 170 132 160 197 141 144 142 178 146 143 119 73 86 85 194 216

MID-H20B 77
238 316 289 261 267 222 222 192 190 263 229 283 197 143 151 115 85 113 80 124
165 84 160 219 155 137 111 137 149 152 136 182 130 105 80 115 126 186 180 146
191 167 202 131 129 85 77 82 126 147 159 247 271 207 144 79 70 99 112 124
143 172 126 174 183 153 151 125 166 133 139 127 74 77 92 184 199

MID-H21A 99
297 442 555 430 386 300 255 203 137 147 176 234 243 304 316 300 252 152 100 93
104 107 118 114 114 124 144 124 124 120 154 218 119 160 167 175 170 151 134 203
205 232 187 158 108 78 97 103 174 182 134 145 123 158 137 111 94 78 105 94
130 152 164 117 185 169 102 88 64 46 82 119 131 145 132 158 93 84 91 145
113 140 155 196 132 125 117 181 194 194 175 185 149 156 116 140 70 131 155

MID-H21B 99
318 452 565 418 387 295 263 199 136 147 179 226 232 312 308 299 249 149 101 106
104 104 120 117 104 121 144 116 130 136 148 221 120 164 163 176 161 151 136 208
196 244 184 155 103 81 95 105 179 177 149 145 110 163 121 96 96 73 94 111
116 145 163 121 191 158 96 93 48 57 84 117 129 139 138 159 96 83 83 137
116 143 157 185 130 113 118 173 190 201 173 173 155 157 114 129 92 125 145

MID-H22A 85
106 181 146 137 133 163 172 135 152 171 130 276 243 215 257 126 182 263 265 142
248 223 238 201 235 255 272 208 167 194 206 348 217 143 210 253 180 208 157 150
163 120 101 163 164 107 106 86 78 43 38 43 53 64 88 68 88 93 56 79
 66 96 50 48 65 56 59 40 49 54 44 25 24 28 30 40 42 45 52 65
 53 50 59 48 60

MID-H22B 85
97 176 153 126 143 164 163 140 163 190 124 280 241 213 251 123 178 245 270 147
243 239 234 200 229 225 275 216 155 194 214 347 215 137 204 263 188 213 143 146
169 122 100 160 161 113 105 82 83 48 35 41 56 64 85 61 86 100 45 81
72 94 57 45 69 58 55 42 57 47 41 29 27 29 35 37 37 46 60 54
55 57 47 47 64

MID-H23A 97
185 178 154 129 118 95 160 158 136 156 92 119 175 235 123 190 213 187 200 226
257 293 251 208 231 226 238 299 192 191 238 147 199 148 209 220 188 119 175 187
127 157 160 135 82 84 75 70 93 113 93 121 128 61 94 79 97 100 98 95
96 94 63 89 85 67 54 48 46 52 61 48 56 59 72 68 76 94 82 66
67 58 66 52 53 48 39 48 37 33 40 55 35 40 31 33 40

MID-H23B 97
155 163 144 136 128 101 174 169 116 172 101 121 178 243 103 174 213 198 200 206
258 289 258 212 220 222 239 292 199 192 236 150 190 160 201 224 183 134 181 175
140 151 174 131 82 79 72 74 93 105 91 126 120 71 93 81 90 104 100 95
100 91 65 90 85 68 50 52 47 49 57 53 53 56 77 70 74 90 81 75
57 64 62 51 57 42 40 46 32 46 37 52 39 45 32 32 40

MID-H24A 66
199 181 136 189 115 94 108 204 217 251 278 257 217 162 123 144 216 210 192 115
128 309 191 204 147 118 144 153 73 111 159 116 164 128 147 143 150 99 94 185
224 319 363 216 164 128 97 97 136 129 172 199 125 100 227 202 238 227 137 112
138 87 69 76 86 138

MID-H24B 66
175 182 140 195 116 90 106 265 219 222 301 232 209 166 124 168 188 227 193 129
169 252 197 202 150 114 145 156 102 94 159 117 165 138 137 162 143 99 107 144
232 323 373 209 158 121 96 98 127 140 196 180 135 93 215 195 238 228 136 123
126 84 70 73 70 147

MID-H25A 64
314 237 442 411 361 473 337 357 356 322 252 187 169 214 285 254 267 301 257 256
180 175 174 261 168 232 268 219 227 194 184 199 190 195 176 185 244 270 194 195
150 150 156 199 207 178 176 163 138 184 156 132 123 149 159 142 120 115 132 108
115 112 113 145

MID-H25B 64
334 239 435 399 328 482 315 369 327 286 286 182 162 222 295 256 257 307 254 256
191 158 189 256 174 218 269 214 230 194 200 207 186 221 165 176 234 229 180 174
160 161 159 179 203 169 184 161 152 168 154 146 119 145 148 140 127 109 108 125
129 94 131 163

MID-H26A 93
274 430 454 435 352 372 400 380 302 249 259 143 367 433 422 608 270 217 214 296
285 226 354 251 182 212 219 182 248 292 267 103 51 60 89 172 258 137 300 183
305 197 265 233 238 259 239 200 135 101 158 207 220 332 264 143 184 136 98 67
151 171 186 137 82 109 76 156 82 65 58 66 54 48 44 51 50 69 124 68
71 94 109 109 83 152 184 181 143 137 180 48 507

MID-H26B 91
252 442 443 497 353 297 369 386 336 236 256 142 341 386 409 599 246 193 196 314
273 230 355 253 172 213 207 191 244 298 257 108 53 53 91 167 260 145 301 183

308 195 252 251 225 257 232 208 130 103 162 197 233 339 261 154 179 140 89 75
149 166 182 135 85 117 66 152 83 66 63 63 55 43 47 41 52 73 126 68
 75 85 101 106 95 150 193 179 144 130 178

MID-H27A 102
315 410 380 226 376 262 223 249 331 324 324 353 306 265 226 120 135 181 227 308
348 229 141 149 129 123 79 90 151 146 175 196 232 117 80 100 151 151 113 171
104 77 97 96 94 130 161 168 73 77 54 52 73 88 62 88 57 113 79 91
103 126 118 99 72 48 58 82 106 130 142 153 99 112 66 58 53 96 92 105
 88 65 60 60 70 47 42 52 46 48 31 35 38 32 43 51 38 47 54 61
 48 70

MID-H27B 102
290 423 372 222 383 267 217 261 284 331 317 347 324 259 233 106 115 175 262 314
332 240 142 143 122 122 85 98 134 142 171 200 239 92 91 99 146 147 122 178
 87 92 99 98 73 134 176 170 79 89 55 71 65 102 55 81 71 111 81 93
101 126 120 100 72 65 48 78 100 137 151 160 103 115 68 63 48 101 102 103
103 48 80 57 66 52 50 40 49 46 30 35 45 29 36 57 45 40 54 63
 46 57

MID-H28A 89
288 280 339 213 148 264 157 115 116 158 251 383 314 235 273 282 327 465 402 376
421 358 296 200 242 334 359 421 417 259 255 238 262 359 392 433 247 307 397 402
199 178 164 163 122 150 184 234 218 259 253 252 186 122 142 131 156 193 184 160
158 138 131 105 101 148 161 178 168 174 119 89 146 185 165 187 162 150 122 119
126 118 92 127 108 82 94 120 130

MID-H28B 89
300 290 282 207 142 252 173 100 118 166 252 354 336 219 258 284 330 432 390 371
426 361 267 183 273 328 355 417 418 252 273 225 273 355 397 420 270 294 378 419
208 177 170 159 130 138 189 244 222 263 234 265 192 117 135 146 164 189 181 168
164 133 133 104 108 144 161 183 172 164 121 83 133 179 168 194 148 153 121 131
121 115 107 119 117 77 97 136 145

MID-H29A 60
347 440 531 562 614 446 406 371 224 244 258 308 271 330 379 332 289 270 164 156
170 271 249 221 235 185 246 171 200 120 155 150 165 177 169 204 142 138 120 119
125 126 138 113 86 75 71 71 83 72 74 68 59 117 79 90 82 103 85 119

MID-H29B 60
274 416 521 515 579 453 422 377 231 236 268 282 273 346 373 336 263 280 160 165
178 269 250 235 188 153 247 192 184 125 162 155 175 167 169 211 163 150 116 108
137 129 141 102 90 70 70 79 77 66 66 86 72 102 78 92 121 93 92 116

MID-H32A 71
476 468 388 492 342 430 346 300 359 370 316 367 337 343 395 321 243 255 228 242
272 178 239 303 216 228 179 192 261 227 219 179 140 191 126 149 201 191 227 156
125 125 127 131 137 123 174 150 186 179 237 265 229 197 175 154 183 158 145 251
214 221 128 69 50 58 62 64 73 60 104

MID-H32B 71
455 472 402 458 329 432 335 363 305 344 346 366 330 304 380 320 246 230 227 243
263 188 237 315 205 205 175 202 287 226 222 176 144 193 138 144 194 190 229 163
123 122 132 126 144 117 165 142 180 181 237 254 228 182 196 155 195 156 140 248
200 223 131 69 59 49 65 72 68 66 108

MID-H33A 93
260 292 224 166 223 338 427 394 486 509 450 554 530 514 508 376 427 329 380 363
350 300 284 363 373 455 466 471 416 240 247 291 290 287 363 227 178 152 180 100
142 92 133 155 144 156 200 62 41 35 40 60 45 72 77 55 32 64 58 94
128 83 58 75 75 96 104 88 75 56 66 81 78 86 88 85 65 67 50 39
41 39 65 82 79 133 92 111 83 48 47 67 62

MID-H33B 93
252 307 210 162 232 344 407 421 505 521 458 531 526 527 463 390 410 335 333 361
373 311 298 355 364 468 471 463 410 255 232 301 295 279 379 238 176 171 190 106
149 106 129 176 131 155 195 69 38 39 31 64 42 70 78 48 44 61 61 85
126 74 66 56 71 114 110 91 76 60 67 83 78 84 88 76 59 68 61 42
34 35 66 75 81 126 89 117 79 56 50 57 68

MID-H34A 88
184 217 278 357 446 582 318 259 250 259 214 157 209 145 96 135 156 135 140 126
138 171 168 102 90 113 123 118 144 111 104 144 142 147 103 121 116 98 155 159
165 114 139 109 172 194 118 127 83 74 55 71 80 104 149 109 85 87 80 86
72 54 79 76 108 107 120 171 138 155 114 129 97 150 98 99 114 122 101 96
95 108 99 115 84 131 152 156

MID-H34B 88
191 223 270 384 445 570 308 263 241 258 230 159 194 150 106 127 157 151 122 137
141 165 171 105 87 113 131 110 146 110 98 148 138 139 129 129 104 89 163 169
165 123 135 114 157 197 121 130 72 76 66 68 77 103 147 109 79 94 80 89
73 55 66 83 110 108 122 167 139 149 109 132 95 149 101 92 116 127 109 86
100 110 103 111 74 151 158 125

MID-H35A 86
325 363 318 322 155 209 151 137 201 211 170 153 163 164 193 226 170 132 230 211
236 336 190 265 273 300 189 271 211 140 171 197 233 218 216 192 184 213 251 153
165 123 95 91 114 95 151 194 135 118 111 97 116 120 75 79 115 153 158 163
265 151 228 157 172 138 200 159 104 141 112 154 103 116 124 103 82 79 164 165
106 79 58 66 75 122

MID-H35B 86
350 356 288 313 157 215 151 146 215 186 195 149 158 156 212 224 170 138 178 265
223 325 178 291 270 314 184 226 213 149 169 214 245 212 215 193 188 217 244 158
171 115 90 90 98 113 150 191 134 125 98 102 117 123 73 81 111 141 170 154
265 148 234 149 175 155 197 147 110 132 128 151 112 108 111 109 89 77 169 166
99 79 54 71 76 136

MID-H36A 80
200 271 463 264 381 344 309 246 177 246 302 280 317 335 203 180 155 199 278 335
323 210 195 203 242 157 136 120 108 98 128 155 184 212 236 210 208 118 80 132
142 188 193 175 195 172 160 128 132 130 132 133 157 162 176 112 88 124 161 152
168 174 167 148 118 131 125 108 145 139 112 129 138 143 156 154 139 98 132 101

MID-H36B 80
195 267 490 263 376 329 368 244 175 235 298 281 327 333 208 174 158 192 277 343
321 210 192 198 254 155 146 107 99 104 110 141 149 210 206 217 197 120 80 136
140 191 202 192 199 153 156 133 136 122 130 133 149 169 161 108 86 120 167 147
168 193 160 151 117 133 117 110 144 144 118 143 128 125 152 140 152 163 136 105

MID-H37A 87
490 630 653 510 877 735 696 540 480 362 376 288 394 433 409 416 258 477 466 295

282 305 299 422 254 345 322 219 273 249 273 262 243 225 223 208 233 277 155 181
187 208 199 212 197 177 181 198 134 143 150 155 147 207 190 152 192 168 154 97
104 154 157 136 175 108 127 161 148 171 219 157 136 141 138 110 127 150 219 188
147 177 162 214 188 202 270

MID-H37B 87
515 620 707 495 906 753 698 514 479 369 389 267 402 439 410 441 264 493 466 311
297 302 307 423 251 351 353 230 253 246 277 259 257 228 211 223 241 271 148 197
185 214 195 192 249 158 186 186 132 145 154 151 147 205 188 159 179 177 161 95
 89 163 149 133 181 112 131 158 155 148 224 151 124 179 121 128 107 149 187 207
141 209 156 207 194 226 290

MID-H38A 90
717 849 385 809 664 417 527 446 573 511 590 707 515 725 635 534 454 487 305 235
275 418 431 439 336 217 388 372 315 297 296 299 339 226 329 293 189 214 200 223
219 158 258 200 203 207 230 120 181 158 154 166 205 195 167 154 133 134 127 148
141 124 180 160 132 174 131 141 66 99 169 138 116 124 98 149 125 153 154 157
124 119 134 84 115 100 171 114 150 176

MID-H38B 90
662 840 416 807 682 431 477 455 622 529 574 692 512 742 611 538 459 501 292 224
284 419 427 446 346 231 383 366 331 294 285 304 330 205 337 290 201 207 216 212
216 158 259 181 212 218 225 123 178 156 174 150 198 183 179 156 134 141 109 151
140 128 175 164 138 174 139 131 76 99 161 139 112 133 99 143 151 143 141 151
143 113 133 115 89 109 139 141 171 182

MID-H39A 97
140 163 201 158 162 222 209 230 235 201 136 239 232 286 199 362 338 272 287 207
224 275 201 456 367 352 221 228 216 201 209 316 200 249 191 188 246 228 225 120
127 133 163 251 234 203 141 180 147 129 127 109 76 149 163 211 176 148 122 123
143 183 216 189 146 168 121 99 164 182 173 313 293 176 179 175 196 190 166 146
209 193 165 245 121 116 136 143 201 289 234 218 214 112 99 99 134

MID-H39B 97
123 152 205 154 160 211 204 225 253 236 173 225 232 270 192 311 361 279 269 207
263 259 203 437 358 353 220 242 198 151 201 299 210 250 189 187 267 230 203 121
131 131 176 261 227 198 157 184 135 130 135 105 70 137 183 178 194 139 131 118
161 170 198 189 143 166 103 118 148 182 150 309 300 170 191 171 188 176 172 146
213 177 182 250 116 127 126 146 212 276 230 227 199 118 94 113 125

MID-H40A 91
517 706 563 582 633 489 761 554 646 469 453 330 293 254 306 314 299 362 249 445
440 348 295 328 407 385 285 389 459 320 377 300 342 404 286 299 250 233 276 292
163 228 196 223 245 291 241 191 183 170 197 191 187 188 174 228 179 173 196 162
155 112 117 162 173 163 177 100 113 131 138 164 187 116 114 113 88 104 104 112
164 144 124 130 132 101 124 145 148 143 140

MID-H40B 91
526 700 580 592 636 471 736 549 651 463 481 320 300 255 303 316 299 366 243 457
439 356 289 323 394 404 294 386 445 325 367 303 357 392 279 290 262 242 261 288
169 225 199 213 255 279 241 207 175 175 203 178 194 171 180 226 177 170 203 162
163 102 124 149 164 178 174 110 104 132 145 160 181 133 117 106 88 99 117 104
158 149 137 138 112 106 130 139 150 144 146

MID-H41A 107
208 259 214 433 229 283 322 258 323 212 245 214 191 223 199 286 254 236 190 228

293 182 132 222 190 168 224 169 178 173 145 153 229 328 258 216 235 246 202 240
208 179 243 254 234 304 279 288 276 229 207 294 294 297 236 188 166 182 194 148
250 267 182 214 172 172 283 218 197 292 237 193 224 191 148 153 164 147 158 168
150 243 150 155 203 189 217 168 149 227 216 294 151 127 263 253 270 247 192 184
138 182 164 184 244 180 162

MID-H41B 107
243 238 218 443 244 282 319 259 326 210 205 227 210 262 241 276 208 268 170 223
294 202 145 224 158 168 180 176 186 210 196 129 225 328 282 253 221 245 204 276
196 173 207 264 232 283 304 282 251 198 223 290 290 315 231 193 166 194 206 148
214 300 170 215 193 188 303 163 252 267 230 221 236 155 161 172 165 139 155 156
202 231 142 138 193 182 202 178 157 205 175 272 196 130 273 235 249 232 183 166
156 175 164 179 245 225 208

MID-H42A 71
510 536 603 466 527 464 387 372 540 505 496 389 507 380 446 576 506 517 620 574
460 395 323 363 302 321 367 304 252 272 300 349 375 256 256 285 264 207 228 201
268 276 152 140 202 211 149 248 150 154 180 143 225 203 158 212 185 179 148 162
144 154 146 170 214 138 155 179 151 105 162

MID-H42B 71
491 543 578 484 500 429 399 360 517 485 491 448 454 370 441 541 514 502 611 561
444 396 320 353 308 337 392 295 202 263 282 377 321 295 254 283 271 213 202 201
303 254 153 141 195 196 167 250 137 153 203 157 231 203 143 207 194 185 120 159
138 152 134 173 222 140 160 172 135 128 180

MID-H43A 189
155 149 154 178 183 222 204 180 295 275 444 383 243 258 247 240 192 202 206 266
225 303 232 190 250 255 219 242 168 188 197 203 206 236 179 197 175 128 157 196
192 182 172 138 120 153 143 125 117 104 142 143 120 151 161 171 156 128 114 128
111 124 141 133 137 99 99 114 109 107 95 84 104 102 102 122 139 81 119 144
167 149 114 103 137 104 101 79 97 76 57 66 61 74 47 56 83 90 82 81
 68 59 44 69 75 68 88 83 64 53 75 70 61 69 60 58 71 57 45 73
 69 61 54 67 73 57 59 55 53 65 59 63 59 72 59 59 60 51 46 68
 61 66 48 52 54 50 31 48 39 37 34 29 36 35 39 44 38 60 41 37
 32 28 33 40 50 26 30 33 55 36 45 41 47 46 41 57 38 41 33 42
 43 55 45 32 36 62 48 75 90

MID-H43B 189
158 143 156 177 183 219 204 191 285 287 455 381 245 257 248 222 198 203 213 254
242 282 236 203 245 255 223 239 165 179 216 191 216 231 182 190 167 137 165 185
190 178 176 141 120 154 143 130 119 101 144 149 118 149 165 172 150 132 114 130
114 128 137 125 140 101 95 120 110 104 98 79 104 100 113 117 140 88 106 147
169 145 120 103 134 107 107 88 86 82 52 78 65 61 52 59 67 93 75 79
 68 57 55 65 86 75 75 80 77 61 67 81 57 66 70 64 61 69 51 55
 78 59 49 75 72 55 48 48 68 65 63 56 62 73 60 72 53 50 55 46
 60 71 44 56 54 45 31 55 42 34 26 34 36 44 31 44 44 64 39 35
 29 32 34 40 50 29 28 33 54 29 45 40 48 42 43 54 34 37 41 43
 44 50 45 41 34 50 52 78 92

MID-H44A 87
241 378 318 170 460 300 463 468 548 543 608 441 429 375 414 317 411 108 140 317
290 281 347 243 257 312 150 136 329 249 250 282 248 292 256 202 145 121 157 222
230 221 278 135 162 192 170 154 156 118 223 242 200 197 126 123 123 167 170 202
197 216 186 160 128 150 77 90 120 146 123 147 117 164 124 135 134 173 197 133
125 110 105 103 62 188 224

MID-H44B 87
268 365 324 161 473 285 469 464 548 538 597 408 453 404 394 333 363 144 139 284
273 291 348 238 234 315 156 146 340 249 236 268 260 266 252 187 147 126 155 223
228 213 279 152 156 198 176 135 170 98 238 241 185 200 135 118 128 160 178 202
203 216 192 149 79 167 95 80 142 144 132 132 134 161 112 141 143 168 183 146
120 115 106 94 67 179 207

MID-H45A 92
224 184 297 267 202 117 95 130 159 236 197 266 123 170 157 127 103 129 67 143
186 169 205 157 111 87 180 178 200 212 210 158 173 118 82 86 73 87 96 98
144 130 221 149 156 149 149 183 174 156 148 77 75 70 112 143 99 151 231 141
157 78 100 143 125 173 196 212 204 123 84 109 144 171 167 336 220 214 148 124
107 161 202 275 213 143 111 108 139 211 173 255

MID-H45B 92
232 204 283 284 183 120 100 127 166 232 192 272 117 176 149 135 113 115 79 128
164 168 204 129 116 76 160 179 204 215 202 160 165 101 93 86 86 96 101 102
136 138 218 158 147 147 158 190 166 154 120 93 77 82 120 133 103 151 233 139
167 71 90 147 117 183 198 213 192 123 92 107 139 168 169 328 234 221 146 111
108 167 203 274 205 149 106 95 146 213 178 236

MID-H46A 97
492 171 214 344 347 340 505 315 281 330 115 126 298 253 244 246 243 365 297 205
116 93 119 207 282 216 265 135 199 163 151 126 133 93 183 222 172 216 127 101
 85 155 178 253 213 244 206 170 162 94 77 81 134 140 109 149 144 187 122 127
134 160 182 169 121 110 108 82 73 165 193 113 150 273 193 161 86 117 122 164
183 245 234 174 108 103 115 122 212 234 396 193 149 131 116 119 205

MID-H46B 97
474 186 192 339 352 326 493 334 287 343 119 123 299 249 256 243 251 346 293 230
 93 104 135 179 277 210 263 136 206 166 153 132 126 95 200 228 176 214 131 88
 98 164 164 243 241 236 219 171 142 105 69 84 121 130 125 137 146 178 121 140
128 135 186 176 124 100 108 78 92 157 177 108 165 270 184 162 90 113 134 147
183 228 242 191 104 102 117 125 214 227 409 173 150 136 120 127 206

MID-H47A 89
399 317 384 306 260 316 121 146 294 234 266 277 210 305 299 208 120 89 107 215
254 199 268 112 164 138 123 103 110 85 144 190 149 192 118 96 100 171 220 236
150 198 166 143 153 99 79 83 102 133 129 152 120 182 114 130 140 115 181 190
133 117 76 103 86 215 198 126 166 211 139 155 76 96 127 152 160 185 192 145
 98 90 114 148 219 197 260 198 252

MID-H47B 89
332 324 378 314 271 304 131 119 312 245 210 273 227 307 290 196 108 96 123 196
267 199 277 109 149 142 122 108 112 88 154 198 156 199 114 93 101 165 209 228
183 228 178 151 155 102 81 82 107 121 135 150 114 179 112 142 132 126 185 196
122 116 91 92 84 219 197 135 169 226 132 147 72 101 136 149 157 190 196 138
109 83 122 134 218 199 261 202 246

MID-H48A 100
176 248 243 192 209 126 106 79 93 172 169 168 227 141 136 128 117 102 112 92
174 187 162 166 117 98 96 141 168 212 170 201 172 146 161 110 85 88 125 115
114 171 120 170 107 127 119 114 189 165 123 138 92 113 99 204 225 145 177 231
183 183 106 144 144 179 173 211 199 151 95 100 130 102 207 228 305 208 178 136
117 129 168 163 197 177 151 125 77 157 191 191 218 153 148 93 78 89 153 245

MID-H48B 100
234 252 236 206 198 140 99 68 96 169 179 163 227 120 142 156 118 91 119 81
173 184 161 168 116 99 89 138 175 202 166 196 188 139 136 133 94 86 117 121
 97 176 131 180 116 128 129 125 193 168 126 124 101 110 93 200 217 133 187 217
186 180 90 132 137 173 177 205 201 164 91 93 138 103 215 227 285 208 170 164
 99 133 169 159 188 182 141 128 81 154 204 196 204 149 152 98 74 103 141 236

MID-H49A 67
131 119 122 129 149 141 154 131 165 185 192 179 190 174 164 187 162 155 179 146
141 143 149 139 160 130 136 141 130 136 120 101 130 137 131 116 112 108 125 123
112 146 126 146 158 134 112 124 140 152 140 169 159 117 112 149 123 172 176 148
195 142 94 107 79 88 105

MID-H49B 67
134 116 122 125 159 144 149 131 164 187 201 174 203 172 157 186 173 148 174 150
148 139 153 148 158 129 136 145 130 142 131 106 127 133 143 106 118 102 121 122
120 148 127 146 157 126 108 124 138 149 146 172 153 121 124 133 131 171 177 149
178 132 89 103 84 89 107

MID-H50A 55
195 84 106 222 204 146 158 194 278 238 225 240 401 561 548 562 475 455 436 278
176 311 470 455 475 540 464 444 248 298 234 408 419 441 449 400 423 280 157 263
286 417 364 300 181 192 207 260 271 364 341 328 300 290 300

MID-H50B 55
211 89 98 191 174 126 126 207 280 275 247 258 421 559 535 603 455 431 404 266
165 297 462 443 491 551 455 460 251 333 223 414 409 447 449 382 439 291 181 247
275 408 379 295 170 164 188 265 289 347 330 320 300 289 299

MID-H51A 79
162 169 166 162 199 181 215 222 189 177 200 168 181 230 203 238 246 171 170 202
172 168 166 178 214 168 190 162 188 148 167 188 160 214 164 156 172 135 158 154
133 129 82 98 122 133 152 122 127 117 95 144 107 72 59 114 114 119 111 83
130 166 139 77 175 145 110 130 94 105 97 74 108 114 103 120 95 90 150

MID-H51B 77
160 167 163 162 190 193 210 187 190 177 199 159 177 198 176 219 234 169 172 209
140 146 151 159 176 173 185 178 178 193 199 181 188 247 174 177 184 132 167 175
121 128 84 95 130 160 155 144 134 163 122 155 120 67 74 106 110 145 105 100
142 195 144 122 192 188 151 137 119 118 108 95 120 91 127 142 129

MID-H52A 58
219 413 526 600 452 399 457 431 467 417 462 270 562 267 457 325 252 351 499 528
425 392 374 361 409 297 308 247 158 155 283 301 458 332 394 403 284 326 144 143
147 218 274 253 291 275 285 198 176 130 258 248 163 183 166 214 160 180

MID-H52B 58
275 331 517 612 435 394 443 392 468 441 440 285 551 271 459 322 251 352 502 535
416 382 356 368 397 302 306 264 164 162 269 314 435 372 378 397 280 316 153 146
134 221 247 259 290 274 261 212 170 138 254 237 184 173 178 219 164 182

MID-H53A 54
474 486 420 482 477 363 411 402 592 444 422 535 462 467 324 258 314 462 342 309
340 216 388 335 199 183 458 456 376 314 235 389 166 313 234 247 343 381 293 285
201 259 256 221 224 242 226 236 178 204 232 196 206 138

MID-H53B 54
464 485 422 483 479 375 400 384 587 433 430 488 431 445 345 260 312 441 341 302
323 240 380 318 225 184 464 438 408 388 238 418 164 298 189 236 329 380 306 269
185 286 275 210 226 251 223 219 189 206 241 200 209 149

MID-H55A 56
 65 62 81 153 198 300 386 430 388 420 518 441 499 431 437 377 381 352 651 419
295 322 252 304 148 100 195 396 373 546 603 434 549 208 166 94 277 299 334 330
170 213 90 239 238 290 384 341 203 134 101 152 210 172 271 129

MID-H55B 56
 70 65 94 140 188 298 391 433 383 426 508 430 505 445 420 393 389 367 653 448
297 337 248 315 151 101 197 407 373 543 602 439 549 197 177 95 279 296 321 323
166 206 108 232 236 280 391 326 209 132 92 152 195 179 258 117

MID-H57A 54
210 203 278 300 326 343 237 315 264 197 186 200 193 236 196 215 435 294 295 339
371 275 172 177 157 217 216 173 184 151 231 171 139 140 249 243 238 260 191 247
139 165 149 159 246 276 271 192 153 188 221 223 182 204

MID-H57B 54
203 200 287 299 331 201 287 288 239 202 170 214 213 228 197 208 427 294 290 347
365 256 194 189 159 232 206 166 184 145 216 165 152 131 243 249 241 236 216 265
140 159 145 152 243 277 266 203 158 203 215 211 183 198

MID-H58A 96
236 254 202 180 198 215 245 160 209 172 290 322 284 242 226 169 190 159 222 249
225 244 192 206 169 333 405 567 423 377 394 439 391 339 406 512 302 247 256 257
348 299 330 363 306 225 143 106 177 290 279 267 352 297 316 248 154 298 318 274
186 178 256 143 168 149 210 185 187 235 211 216 191 93 115 79 141 108 77 106
137 157 105 109 96 92 105 78 68 59 65 60 70 81 75 95

MID-H58B 96
206 245 191 173 208 264 219 165 217 176 290 315 280 243 241 162 194 157 215 256
221 248 196 205 174 336 384 577 417 388 375 457 388 358 397 507 278 207 254 253
363 293 352 364 329 231 143 118 173 294 284 296 361 309 308 244 166 301 318 285
185 185 244 148 166 157 202 192 185 227 219 202 199 93 115 81 153 99 81 104
131 155 114 97 96 95 100 68 70 55 72 66 72 77 62 90

MID-H59A 57
269 181 170 205 200 141 214 186 187 225 183 158 234 186 291 217 218 217 239 264
229 184 196 237 211 193 211 197 190 219 160 165 141 146 161 173 168 164 124 151
124 145 108 91 90 126 127 114 97 100 144 104 100 126 108 107 150

MID-H59B 57
202 196 169 210 202 132 210 188 192 209 203 167 286 189 285 214 218 231 245 247
222 205 189 245 205 200 221 207 208 207 161 164 140 144 163 173 177 178 127 143
130 137 113 95 94 119 122 133 84 109 136 98 114 116 111 113 138

MID-H60A 57
254 183 253 241 230 275 245 203 254 235 164 267 214 297 222 227 242 220 234 263
241 230 276 243 251 259 260 235 228 164 177 146 144 162 154 150 192 141 121 129
154 105 96 102 124 124 130 104 106 142 99 112 118 140 115 96 133

MID-H60B 57
247 181 258 243 242 224 252 213 238 238 187 256 209 295 230 249 233 222 238 258

242 227 265 260 231 265 252 238 237 162 187 132 146 160 157 156 177 121 142 124
146 116 92 92 131 133 117 111 87 153 121 107 101 150 130 116 155

MID-H61A 78
180 223 219 117 99 89 63 90 200 246 224 118 102 140 106 88 123 55 169 254
167 134 125 154 213 274 242 179 133 94 83 124 201 278 231 175 138 219 148 117
125 95 148 192 365 231 129 204 138 124 113 72 87 104 97 135 175 83 75 91
104 136 103 111 148 130 117 87 105 114 129 159 180 203 184 144 67 70

MID-H61B 78
174 235 227 119 103 91 63 85 208 246 211 126 102 134 101 94 117 69 163 248
160 137 120 157 207 293 221 182 126 113 89 119 202 282 219 167 132 234 160 118
119 106 142 191 367 233 145 197 146 126 97 78 96 101 95 140 174 83 78 85
107 122 112 109 152 129 120 96 101 110 139 154 187 210 180 146 67 61

MID-H62A 75
160 403 183 154 190 280 180 158 139 60 88 86 69 89 252 276 315 154 135 139
109 82 92 51 212 183 129 135 127 216 169 222 159 148 131 79 123 174 242 267
230 183 139 276 233 120 149 134 190 218 285 191 172 196 166 136 137 86 142 233
156 189 204 97 92 132 207 290 187 146 179 126 200 200 178

MID-H62B 75
166 399 185 157 185 284 182 172 147 59 90 83 54 93 242 285 320 122 123 146
113 73 105 58 204 196 141 132 121 194 173 214 160 148 129 81 116 181 250 263
234 181 130 273 245 126 144 130 192 220 291 182 167 204 143 166 132 94 132 240
162 195 199 96 95 145 191 296 179 143 176 137 201 219 181

MID-H63A 82
305 360 310 283 285 179 317 326 232 150 177 214 172 192 162 175 228 149 219 241
255 142 152 111 83 131 159 177 136 151 219 142 152 156 109 147 107 85 89 133
 88 135 145 162 191 118 127 111 110 103 105 109 110 135 139 94 126 131 126 108
164 128 104 137 109 151 147 155 131 131 117 111 95 167 130 116 141 106 114 112
103 126

MID-H63B 82
245 344 288 291 291 167 340 319 237 185 143 206 173 175 141 143 220 141 237 222
256 139 163 111 81 130 144 186 158 140 227 135 157 167 105 136 127 85 85 141
 77 130 156 157 202 108 124 110 106 111 117 103 100 154 134 92 134 129 137 116
164 127 100 142 113 137 152 168 131 127 116 116 81 188 127 110 135 97 106 102
109 113

MID-H64A 56
236 271 339 344 276 239 229 219 158 152 161 151 210 212 221 184 140 194 184 190
201 206 178 184 153 186 154 212 196 193 220 145 160 122 154 138 150 197 230 211
221 377 218 122 99 189 198 206 235 182 195 166 151 130 172 157

MID-H64B 56
230 272 329 343 273 231 224 231 173 155 139 147 202 232 199 166 157 171 195 196
177 198 145 225 134 192 172 201 181 183 204 155 177 118 135 130 160 183 264 211
201 379 217 110 101 199 199 180 188 173 199 163 165 123 157 178

MID-H65A 143
125 107 181 151 111 122 123 162 127 172 163 199 199 195 209 205 130 108 137 152
142 168 130 142 143 199 239 278 239 185 163 159 137 245 203 188 143 160 98 123
 78 144 140 74 66 84 84 88 86 63 56 54 52 57 54 50 56 60 48 44
 35 43 56 60 63 48 64 85 82 78 92 60 68 69 52 53 61 82 41 65

77 34 36 34 44 42 54 46 36 53 48 47 50 41 37 40 37 40 39 46
25 36 34 30 35 31 29 29 33 40 35 35 37 24 27 28 33 36 41 31
40 32 44 37 30 31 23 32 36 54 60 52 51 42 31 27 31 33 59 61
53 56 77

MID-H65B 143
94 120 163 143 97 114 125 158 131 175 166 189 199 198 213 200 135 106 141 161
145 165 137 132 142 200 239 246 238 184 167 160 137 240 204 212 128 164 105 145
78 150 136 72 75 83 81 83 89 68 65 64 46 52 68 52 49 66 51 48
35 40 59 54 63 47 61 93 72 81 94 59 72 72 56 54 55 81 42 72
66 42 41 40 42 46 57 54 37 48 45 51 53 40 32 46 47 36 31 41
31 37 31 30 31 30 29 28 29 44 29 33 36 32 36 34 37 34 42 43
35 45 40 34 24 23 28 52 46 62 58 44 37 35 28 31 33 57 62 58
50 71 63

MID-H66A 163
335 325 252 208 308 283 347 331 185 189 182 196 283 237 148 269 255 273 155 148
140 147 193 185 181 106 131 105 66 53 69 40 51 58 56 65 77 72 64 74
68 104 85 108 117 121 120 82 98 105 81 87 90 81 101 139 91 99 102 132
155 204 153 121 100 97 76 134 127 118 105 111 86 102 67 102 96 53 58 66
67 52 65 53 39 47 46 48 47 39 44 52 52 38 27 35 33 46 38 45
29 56 48 59 58 54 57 54 42 54 55 73 44 53 56 46 49 42 42 63
78 47 42 55 50 51 57 35 54 53 48 50 51 75 47 60 62 51 51 45
48 53 52 64 47 61 44 40 52 46 36 60 77 61 54 52 73 67 49 50
70 78 136

MID-H66B 163
391 320 240 223 315 291 362 376 177 187 173 209 284 226 126 252 259 260 153 157
132 155 191 176 183 110 126 105 71 50 56 30 46 56 65 58 80 77 59 78
75 106 80 107 122 120 122 83 98 109 79 85 88 83 95 139 98 97 97 130
147 217 154 117 101 95 79 129 126 115 95 117 78 110 67 97 94 54 58 71
57 57 64 52 43 46 40 46 40 45 46 54 43 34 22 43 41 37 46 37
38 57 55 54 55 52 55 56 44 56 58 73 42 55 53 48 52 48 41 65
70 53 39 52 47 56 54 38 49 59 46 48 58 72 46 62 56 48 52 47
47 50 56 66 48 60 45 42 47 49 39 63 74 66 53 61 71 64 37 63
54 96 125

MID-H67A 144
198 196 297 177 239 165 93 104 137 133 142 186 112 121 146 108 110 130 105 110
92 91 77 51 69 103 126 92 85 121 136 140 103 158 127 137 140 102 94 130
171 105 124 167 88 129 122 133 154 207 118 97 104 86 103 104 119 105 117 100
88 80 147 74 101 108 82 95 73 87 89 88 102 89 90 77 83 84 59 56
96 113 96 84 75 123 88 60 61 70 87 96 92 81 95 58 62 64 74 85
111 125 100 66 107 114 110 82 112 89 103 89 79 73 82 125 119 109 82 104
113 92 82 91 91 105 72 86 102 132 86 94 64 77 73 72 79 74 101 125
125 142 124 122

MID-H67B 144
227 207 306 181 238 175 97 106 130 122 144 175 124 115 142 116 110 133 120 103
94 92 69 60 73 96 127 109 75 120 145 135 107 172 133 136 134 115 98 127
184 100 128 161 104 126 117 132 158 205 111 91 110 86 102 101 119 117 106 94
69 76 155 78 98 102 92 85 76 94 87 90 110 89 90 79 75 81 54 70
88 120 98 82 79 124 90 61 53 76 85 100 101 73 92 62 72 62 76 93
107 136 86 81 94 124 113 94 108 100 110 75 77 77 104 121 106 120 83 90
112 104 82 96 92 109 80 81 117 134 84 89 71 74 84 75 77 78 92 130
121 151 126 123

MID-H68A 147
148 181 168 132 132 104 130 122 149 109 80 48 63 67 58 78 51 58 60 52
 60 63 65 61 83 74 55 54 55 88 110 112 76 95 117 109 115 120 116 110
116 107 83 94 134 65 105 107 93 78 74 69 95 90 84 78 89 74 98 76
101 73 101 92 85 93 146 54 73 79 79 81 63 65 66 79 87 84 77 72
 75 61 50 58 75 104 80 88 67 118 79 57 53 70 113 120 113 86 88 69
 55 45 66 87 109 96 74 74 88 108 97 104 97 79 78 76 76 77 81 88
 86 85 70 64 69 66 61 63 80 82 69 54 64 76 65 87 58 47 62 101
 75 64 77 89 89 89 125

MID-H68B 147
154 184 161 128 124 110 136 114 143 123 56 70 65 53 81 69 57 62 50 57
 67 58 66 72 67 90 51 51 68 74 117 102 87 91 113 111 104 131 107 101
107 98 90 90 133 71 86 123 87 89 70 73 92 93 87 77 72 85 97 90
 87 92 89 100 88 109 150 54 81 81 77 83 60 68 61 80 93 76 81 63
 80 64 51 58 76 100 86 85 61 92 81 51 63 72 108 118 121 84 92 67
 62 53 68 80 107 89 73 77 86 114 95 100 101 78 84 77 78 80 75 92
 91 80 71 60 76 62 74 73 79 82 64 69 70 80 64 72 58 47 63 67
 62 57 79 91 83 94 129

MID-H69A 74
215 160 185 186 140 142 183 230 234 191 196 228 204 101 147 172 237 204 196 195
242 254 290 225 230 244 305 230 176 153 247 209 256 262 221 287 183 98 107 128
182 170 173 200 211 135 134 146 229 126 167 194 142 178 200 235 187 214 193 169
176 92 112 110 117 164 174 185 142 114 92 107 105 100

MID-H69B 74
192 180 204 181 140 132 182 240 263 197 208 204 207 102 141 170 241 189 190 189
233 265 282 229 233 228 302 227 179 161 258 200 264 262 211 257 182 103 105 138
190 165 180 185 210 134 124 149 185 129 146 179 131 166 195 231 178 207 196 174
167 102 124 95 131 173 165 191 135 108 97 96 119 125

MID-H70A 135
145 120 126 158 151 127 95 120 123 98 118 130 129 107 94 118 141 154 159 163
189 152 149 109 176 131 185 133 128 243 176 176 123 103 128 241 178 148 128 194
 91 117 83 106 168 110 201 191 195 110 120 124 87 131 147 121 172 115 180 161
169 143 68 112 94 58 79 114 74 113 80 104 127 81 124 97 90 95 87 100
 86 97 88 89 128 124 100 95 133 124 97 114 88 135 107 98 102 113 93 84
 63 123 92 103 123 116 87 94 80 106 82 135 122 96 84 109 75 85 74 71
 71 59 85 102 56 82 90 64 75 64 73 77 76 64 73

MID-H70B 135
131 128 133 149 142 122 110 121 121 91 120 125 137 105 93 127 135 157 154 168
188 150 152 112 178 136 178 138 117 246 170 176 149 93 141 241 178 141 135 185
 91 112 96 103 151 112 187 223 220 114 112 124 90 139 145 122 169 112 186 163
158 160 67 112 96 66 87 108 86 84 77 90 135 88 122 92 100 100 79 111
 89 105 79 82 134 127 101 103 122 125 99 109 93 130 120 110 96 102 95 87
 67 119 86 93 117 96 97 106 86 111 78 127 135 91 81 105 72 81 73 59
 78 68 76 98 58 89 97 50 80 75 66 73 74 69 77

MID-H71A 150
151 86 110 75 75 88 159 113 108 128 86 95 174 118 111 157 225 160 129 130
198 202 168 145 159 112 71 61 43 62 52 86 75 123 125 92 86 94 50 69
 78 87 72 104 94 116 150 121 109 124 106 104 115 133 183 183 96 65 68 71
 71 66 63 107 106 122 95 81 138 112 114 127 178 201 243 215 245 350 288 115
170 103 108 127 118 170 154 195 207 154 163 126 110 96 90 79 138 132 143 119

118 174 116 102 100 149 156 132 125 115 136 93 111 127 112 111 156 148 134 118
130 207 187 132 123 121 131 126 137 174 125 219 186 178 176 155 163 141 161 141
159 154 122 143 125 110 94 123 96 140

MID-H71B 150
125 81 112 72 86 84 157 117 104 136 97 81 173 119 120 124 183 167 129 118
182 185 156 150 159 119 84 55 39 53 49 70 87 117 136 98 76 88 58 61
 82 77 83 99 103 153 157 119 111 127 104 96 117 140 183 179 111 60 60 71
 70 60 59 105 109 118 90 71 131 111 108 137 178 219 254 217 269 342 302 119
162 108 102 117 125 173 153 198 214 156 168 127 116 85 83 85 146 122 147 113
115 170 106 98 87 161 151 130 124 118 132 98 105 128 109 104 156 150 144 118
136 210 181 136 123 107 151 113 144 175 125 205 181 162 165 153 147 155 146 142
152 145 135 135 126 113 104 102 78 129

MID-H72A 80
345 418 446 423 337 300 318 382 261 244 296 246 269 345 343 275 247 234 222 301
225 235 235 296 279 236 264 227 254 294 157 150 171 157 174 173 180 291 160 218
189 153 203 151 154 132 170 177 236 200 194 170 242 154 97 122 176 220 201 152
171 158 125 135 109 122 113 118 161 152 101 122 156 121 92 132 90 117 111 130

MID-H72B 80
335 404 430 443 333 289 325 350 249 248 241 220 282 322 344 283 220 214 241 288
218 230 234 308 276 223 274 208 306 296 157 144 171 152 185 166 189 259 188 227
197 174 180 169 140 124 170 174 232 212 177 174 246 176 106 113 172 218 197 163
163 148 133 130 112 122 106 126 154 141 100 139 162 103 100 131 103 121 112 128

MID-H73A 92
406 391 345 453 286 247 271 288 169 225 356 255 320 222 120 235 151 227 187 199
276 259 299 233 181 243 178 130 139 104 130 197 156 166 176 164 215 142 99 148
197 174 165 197 158 142 126 222 140 198 162 171 187 172 173 204 249 216 220 228
236 206 162 190 113 192 210 201 218 186 162 150 117 110 76 88 78 54 52 45
 48 44 39 54 44 45 40 65 45 76 85 103

MID-H73B 92
400 370 406 360 317 288 240 266 190 267 388 234 291 269 104 232 156 219 193 197
280 264 260 232 190 244 179 139 121 98 140 212 140 161 179 162 213 129 95 146
199 179 169 198 166 126 128 213 152 227 172 162 195 177 178 184 250 218 216 227
255 210 176 176 108 199 212 183 225 169 164 147 112 105 74 85 80 49 45 53
 52 42 33 46 39 47 48 57 62 86 79 100

MID-H74A 145
 68 79 135 158 122 95 157 175 70 112 130 112 108 101 87 99 137 130 94 136
188 127 129 140 193 182 193 159 137 183 136 136 130 162 167 161 170 173 232 230
111 100 98 93 105 112 150 156 148 147 130 154 124 116 118 108 104 164 184 171
161 158 215 147 111 103 149 208 182 129 142 159 119 103 120 114 75 103 119 110
114 93 125 152 130 138 128 131 99 120 125 156 153 158 153 115 157 126 104 130
128 161 139 157 150 160 128 123 160 149 129 146 136 154 167 170 206 302 348 255
245 214 198 163 149 159 129 118 58 42 55 51 34 39 46 52 47 38 57 59
 60 50 41 51 47

MID-H74B 145
 66 81 138 150 133 89 163 151 92 122 131 122 94 105 91 93 143 129 82 145
189 120 133 138 197 178 193 166 139 172 145 152 120 159 166 146 178 176 253 224
108 99 104 82 108 118 140 153 154 147 152 137 124 106 120 109 130 154 187 173
159 172 205 145 113 104 149 207 170 142 144 159 122 120 122 112 87 83 115 110
100 96 138 144 136 125 133 123 105 122 126 148 154 160 153 126 141 124 114 128

131 145 158 166 154 170 118 140 148 161 120 138 144 143 170 171 197 306 333 258
239 213 197 172 150 155 123 118 59 48 59 47 34 37 39 48 51 40 63 59
 67 45 48 49 51

MID-H75A 79
179 181 194 146 227 182 208 199 251 172 176 168 172 216 139 199 182 237 131 144
122 81 135 141 108 120 118 135 116 103 104 75 127 92 73 80 116 89 110 117
128 138 91 153 125 120 145 142 144 125 164 152 93 121 129 145 132 165 132 149
152 106 150 155 152 115 141 101 107 93 178 144 117 126 104 103 110 103 165

MID-H75B 79
162 191 192 153 219 187 213 190 252 186 186 167 179 225 142 168 202 246 130 144
 90 70 131 140 108 120 120 133 126 106 110 77 129 91 76 83 108 87 110 120
142 129 103 135 125 136 143 135 133 123 184 141 92 121 135 140 111 167 131 152
144 112 145 155 148 123 127 95 103 92 167 148 123 124 101 113 103 110 150

MID-H76A 113
116 143 125 188 217 221 121 124 127 109 160 168 142 145 86 193 168 216 206 108
148 113 78 91 126 74 118 125 156 144 93 126 100 103 103 107 89 92 112 96
 69 92 101 95 119 114 111 115 122 99 134 136 124 117 119 100 74 63 153 84
102 117 84 107 92 86 111 98 114 108 74 104 84 77 87 90 67 86 77 90
108 86 85 107 78 84 69 72 71 65 62 63 66 64 71 62 65 56 71 54
 62 57 77 60 46 50 52 46 44 47 39 44 50

MID-H76B 113
128 161 145 175 199 209 112 125 124 108 165 162 123 144 118 207 144 211 194 132
141 123 76 91 120 83 118 118 146 139 75 122 111 96 108 94 93 98 107 96
 75 87 97 94 113 126 97 116 117 98 133 139 125 117 117 100 76 62 151 88
 98 112 86 107 89 94 102 94 122 101 85 102 86 76 91 87 70 86 77 94
104 84 92 107 73 88 77 64 64 70 51 61 73 58 76 67 56 67 58 71
 54 62 67 62 55 44 45 47 41 46 48 43 48

MID-H77A 84
 96 129 91 116 80 104 99 108 146 165 101 147 185 139 155 175 183 196 186 110
121 85 169 143 165 143 162 133 214 135 113 135 191 180 202 157 191 154 165 157
162 160 181 207 225 201 245 242 237 307 233 202 133 142 129 142 143 129 126 143
158 111 133 139 131 163 157 150 204 180 182 235 166 162 180 174 140 173 152 143
120 115 115 149

MID-H77B 84
 94 121 97 111 88 85 101 109 148 144 105 152 190 133 158 176 194 186 168 94
129 88 168 146 157 149 155 138 220 134 110 122 184 186 196 166 184 148 166 154
158 172 169 210 226 196 227 242 237 309 232 197 135 148 127 142 127 139 129 157
137 123 113 150 140 158 161 150 206 176 194 237 167 149 181 181 137 171 144 148
122 119 109 142

MID-H78A 64
 61 95 82 74 106 65 65 67 39 65 74 86 65 74 103 49 79 60 70 84
 63 67 76 56 65 37 56 79 74 61 108 117 125 121 119 91 95 94 81 86
 58 43 62 76 52 57 62 56 50 57 57 69 84 72 61 65 94 115 101 95
132 138 159 150

MID-H78B 64
 70 96 71 73 104 65 76 59 89 75 87 73 70 70 99 52 72 62 72 80
 68 60 81 57 63 35 55 74 80 67 92 117 127 124 120 95 92 89 85 88
 52 50 66 67 54 56 66 52 54 49 58 69 82 76 60 69 90 120 117 115

138 147 128 124

MID-H79A 75
 67 91 86 83 81 78 85 61 50 34 36 33 39 46 48 46 69 64 68 65
 78 90 84 88 84 84 127 94 90 92 121 97 108 101 84 119 83 101 96 93
 98 80 106 146 122 106 119 173 180 178 149 155 129 155 143 173 173 163 180 184
167 147 151 129 157 102 125 120 130 185 120 149 156 114 113

MID-H79B 75
 79 91 90 84 93 75 89 57 53 34 39 33 44 52 47 49 66 67 74 81
 87 97 81 100 88 82 125 99 99 92 113 91 117 106 70 127 71 117 90 90
109 83 110 141 127 109 110 165 171 194 141 172 134 151 140 191 184 161 174 175
179 136 145 140 151 112 145 101 135 183 132 154 144 118 117

MID-H81A 89
142 167 230 166 175 214 152 124 163 170 217 179 195 197 317 250 302 219 331 205
333 273 300 261 211 226 269 333 282 278 344 297 256 320 195 197 287 276 343 337
304 217 234 179 117 204 111 51 42 24 30 44 66 60 79 81 75 117 163 160
145 142 138 139 132 287 279 225 206 305 283 200 302 207 324 149 77 101 90 108
141 197 171 169 133 116 94 104 124

MID-H81B 89
142 163 218 179 169 201 170 124 168 162 212 188 211 216 340 234 295 225 337 213
308 279 281 244 211 214 272 313 275 276 342 299 253 329 194 202 273 279 342 341
299 227 224 176 117 206 105 53 31 39 26 46 64 68 73 84 70 122 141 137
147 146 144 136 131 281 280 222 204 308 268 204 293 216 337 144 94 90 102 107
157 191 162 178 151 108 88 105 116

MID-H82A 85
241 229 229 206 201 270 187 157 217 204 233 235 252 217 272 122 143 104 99 169
134 157 143 168 178 192 147 164 182 222 180 196 185 246 198 197 237 294 194 228
249 263 234 216 263 294 346 302 238 258 245 202 279 206 187 250 250 261 295 246
225 194 173 104 183 128 50 55 49 60 109 133 96 164 153 192 278 259 172 154
101 105 100 87 116

MID-H82B 85
194 260 227 216 212 250 189 184 201 200 239 243 247 204 233 151 128 93 111 186
125 158 155 169 166 179 145 174 166 232 177 196 182 248 203 186 228 302 197 233
241 253 245 248 248 287 361 293 239 267 239 202 275 209 186 256 240 272 266 258
226 191 165 104 198 122 62 49 51 58 109 127 94 160 158 181 243 257 159 157
 93 104 77 108 124

MID-H83A 93
162 145 184 159 122 101 160 181 169 109 121 135 172 168 150 122 127 200 165 143
137 171 243 243 207 201 174 151 74 108 92 82 63 89 108 125 106 70 84 98
124 132 122 124 130 105 99 69 98 89 110 119 132 131 153 162 119 111 111 138
129 129 153 83 89 108 123 98 130 124 114 98 53 76 111 64 66 68 90 103
 98 122 97 107 73 60 55 65 66 93 123 173 108

MID-H83B 93
156 151 174 164 128 101 153 181 176 110 108 138 176 168 157 114 132 193 172 150
143 172 233 236 211 210 165 148 79 104 93 83 66 92 107 111 107 78 84 91
125 120 121 117 130 98 107 73 87 96 115 116 134 126 157 170 113 114 107 137
133 125 137 83 84 113 129 102 127 117 117 92 60 75 109 77 58 67 85 103
108 119 96 110 67 56 61 61 74 83 133 167 140

MID-H84A 60
300 328 170 190 161 134 141 148 158 169 168 131 196 202 89 184 176 229 235 202
133 84 94 85 44 125 147 113 99 131 161 140 62 54 45 84 114 158 212 166
147 93 78 62 50 114 141 147 92 147 85 92 89 76 102 85 97 81 80 76

MID-H84B 60
287 339 169 207 175 128 133 157 155 177 178 128 216 201 94 197 184 232 260 210
139 82 94 85 56 121 145 113 97 127 159 140 68 53 51 77 118 155 198 165
143 92 87 67 49 116 141 136 102 149 81 96 83 85 103 91 94 76 89 70

MID-H85A 61
109 87 101 73 65 101 51 28 51 58 73 91 121 96 98 87 103 102 103 81
 99 107 106 102 118 94 83 74 56 79 59 59 76 68 68 80 75 103 88 68
 56 57 54 54 40 44 50 61 65 76 83 78 77 77 65 57 54 53 63 59
 75

MID-H85B 61
116 91 100 73 66 96 58 30 48 57 71 91 118 100 91 88 99 106 94 88
 93 104 109 94 127 88 86 63 67 80 51 58 72 76 69 77 77 105 86 67
 66 59 49 60 48 54 43 64 59 87 75 80 84 73 69 50 56 59 59 65
 68

MID-H86A 116
311 349 228 216 131 186 231 150 141 130 93 130 200 271 262 350 227 165 135 172
194 167 116 119 136 179 182 117 79 93 196 156 96 100 90 199 294 225 174 151
160 73 71 42 61 45 57 74 98 74 62 54 75 156 177 127 127 142 112 135
 79 79 83 125 118 157 182 205 170 178 94 72 106 112 114 118 64 59 88 84
 83 111 119 80 63 38 49 68 44 38 54 57 58 53 76 99 110 68 47 45
 43 72 96 145 149 90 105 98 88 66 64 73 84 79 72 55

MID-H86B 116
314 351 222 218 125 179 242 158 140 125 92 130 202 262 267 347 227 162 140 175
199 176 108 113 140 173 192 129 74 102 200 162 95 101 91 191 300 230 184 138
157 73 72 45 56 47 56 76 94 74 64 51 77 153 179 137 116 136 121 121
 71 71 94 125 122 155 187 191 162 177 100 81 109 107 119 120 65 55 88 76
 94 112 110 82 51 45 53 72 37 37 55 56 62 50 82 106 99 80 52 45
 44 64 92 138 150 96 111 94 90 66 58 77 86 78 74 64

MID-H87A 134
156 81 110 125 120 122 76 120 215 157 140 112 142 119 73 77 130 106 134 174
137 149 165 160 181 125 68 45 38 86 70 94 62 48 61 45 57 46 44 50
 64 40 118 127 110 67 36 43 55 66 71 78 142 113 50 43 62 71 52 26
 45 73 98 93 52 30 40 90 63 45 47 54 87 109 90 76 92 64 21 40
 23 44 32 34 67 52 53 40 45 45 67 98 65 82 86 66 71 37 45 55
 50 61 80 87 75 95 66 37 32 48 44 28 36 24 32 47 37 41 76 76
 63 40 33 33 74 34 34 47 58 74 79 110 118 118

MID-H87B 134
171 91 101 126 122 104 88 121 221 154 138 116 143 109 77 80 119 126 138 122
134 150 177 168 183 144 68 46 45 78 75 90 63 54 53 44 65 47 38 54
 55 33 118 124 105 71 40 45 47 72 66 74 138 122 44 46 66 70 49 43
 40 63 97 79 49 30 40 91 78 38 60 57 74 117 90 82 86 69 24 35
 19 52 34 32 62 59 58 37 36 54 65 92 74 71 98 68 75 36 27 56
 54 55 94 84 77 95 64 42 34 37 42 34 37 31 24 39 44 45 74 80
 57 42 36 40 61 41 38 50 57 68 87 102 118 119

MID-H88A 89
173 197 199 217 215 224 224 186 244 269 203 172 216 173 170 171 178 141 189 156
192 173 128 154 150 189 191 138 104 136 139 120 104 135 161 158 132 180 140 151
104 150 157 151 128 178 139 87 142 118 139 147 104 103 103 87 79 107 131 151
123 132 130 136 83 75 98 91 109 138 97 116 117 76 52 77 68 67 106 126
162 128 126 173 129 106 149 140 150

MID-H88B 89
164 186 194 219 208 220 230 193 241 272 202 184 211 183 173 154 165 151 181 166
181 180 129 155 132 184 205 133 108 139 140 111 110 127 158 165 127 189 134 151
116 147 155 151 131 172 159 82 133 123 146 135 118 93 95 98 81 110 130 150
125 132 120 150 71 71 95 90 108 127 109 116 123 73 47 74 65 73 102 137
182 117 135 164 112 106 146 158 171

MID-H89A 65
 76 133 120 136 127 228 215 195 192 190 199 287 108 151 123 143 130 64 131 86
111 146 121 69 117 150 93 78 121 90 156 96 140 115 119 105 117 151 142 146
149 124 83 106 78 104 165 109 130 88 63 58 60 61 48 39 43 46 55 41
 33 47 44 43 56

MID-H89B 65
 60 128 123 128 137 225 201 210 177 194 187 272 116 140 120 132 127 62 122 78
114 148 133 76 115 135 99 64 117 102 167 90 136 103 128 104 108 145 143 127
157 119 85 105 81 96 170 116 123 80 58 62 58 57 55 39 36 47 60 37
 33 49 44 42 56

MID-H90A 83
204 358 274 264 182 139 126 145 150 172 325 215 287 293 274 290 258 265 268 321
262 342 502 274 427 545 304 230 246 276 222 252 215 226 193 218 256 228 226 263
243 168 153 113 35 36 32 68 61 68 106 128 163 125 119 95 92 92 95 130
179 203 114 104 135 147 149 103 44 63 63 67 80 104 150 133 152 196 181 132
182 127 174

MID-H90B 83
207 362 282 260 177 144 116 145 146 177 315 229 288 283 273 301 263 254 245 297
267 354 500 285 423 547 307 233 279 239 236 222 211 233 203 212 242 232 228 265
237 148 135 128 37 39 28 59 59 72 107 131 158 115 136 107 85 93 99 129
189 185 119 105 141 147 146 103 53 55 65 64 87 109 148 124 151 200 171 131
191 118 165

MID-H91A 94
226 241 221 211 189 304 281 311 261 337 225 168 254 232 182 231 227 244 273 258
252 173 201 204 334 146 80 82 77 65 82 95 90 76 74 70 90 57 73 79
 78 83 45 52 35 39 43 49 62 63 63 59 41 77 70 96 57 35 45 45
 57 44 54 64 70 68 70 56 85 68 60 80 68 83 81 59 74 63 66 26
 34 26 29 52 27 59 50 51 73 71 75 69 90 95

MID-H91B 94
217 209 216 218 192 301 277 294 259 317 222 174 254 227 184 216 242 222 284 261
249 178 203 216 302 142 88 74 87 60 84 95 96 70 79 72 82 61 70 82
 83 95 39 53 46 42 46 50 67 76 74 65 53 75 71 92 56 39 38 49
 62 42 61 57 76 76 59 55 88 75 63 74 71 76 81 65 75 69 64 27
 33 27 27 49 32 57 55 46 76 71 69 63 93 103

MID-H92A 156
181 246 227 253 274 290 146 172 220 252 173 188 223 434 391 385 452 222 245 228

191 205 177 199 238 152 147 166 111 71 77 91 131 76 112 111 104 115 92 133
127 97 107 84 118 120 143 120 120 84 82 155 98 121 115 74 85 66 120 127
129 92 80 114 101 92 59 75 68 99 82 139 107 144 101 99 99 89 82 69
 61 72 76 83 58 72 62 63 53 52 85 86 74 79 60 102 64 66 60 72
 74 72 79 88 98 73 67 62 64 68 70 66 80 67 90 82 83 76 61 82
 42 59 70 101 89 77 109 91 75 88 81 95 75 85 92 88 92 89 86 79
 75 113 79 108 119 85 90 95 87 96 123 120 133 75 67 90

MID-H92B 156
191 246 234 253 274 292 169 224 215 242 182 185 238 425 384 395 453 234 262 229
176 212 168 193 240 146 138 171 99 83 66 91 114 91 110 110 105 123 90 129
121 105 103 89 118 128 150 125 123 96 73 155 97 123 113 74 87 63 117 126
134 93 84 106 100 92 62 77 67 101 79 136 106 142 99 100 95 98 78 71
 59 76 79 79 58 77 59 62 56 52 84 94 77 80 60 89 71 72 65 68
 79 60 80 81 102 69 66 55 66 75 63 67 76 68 83 75 89 78 62 77
 51 63 59 106 80 71 109 79 83 87 76 80 91 71 95 81 97 89 83 78
 71 108 89 101 112 95 85 91 116 93 120 111 132 71 74 72

MID-H93A 62
151 137 214 184 254 242 218 174 142 96 120 125 171 229 187 265 267 276 310 213
228 200 163 106 136 138 197 224 271 335 221 223 184 182 196 212 265 272 256 217
196 177 137 108 173 174 230 228 168 183 196 188 222 316 285 245 265 176 197 181
158 183

MID-H93B 62
166 137 216 178 248 260 227 168 148 84 115 135 155 238 179 273 276 274 297 228
211 205 164 111 123 155 188 232 270 328 214 231 182 171 208 208 289 289 258 205
193 181 139 101 171 176 232 231 172 184 203 168 248 282 285 237 280 169 205 167
182 209

MID-H94A 114
394 455 290 236 277 140 105 130 220 217 156 194 214 255 231 170 156 154 126 85
113 136 149 133 135 129 95 101 110 108 106 124 97 98 73 116 107 99 69 93
 77 109 90 146 117 68 79 120 94 89 92 73 112 98 92 97 141 178 120 121
146 117 128 142 174 149 156 125 125 134 123 130 156 114 149 124 127 128 297 351
265 347 312 199 168 172 290 374 299 287 249 281 325 216 281 403 178 302 286 440
288 120 90 114 111 166 160 92 107 160 152 158 106 144

MID-H94B 114
461 433 284 238 261 145 104 131 209 239 200 237 257 247 235 189 183 174 107 91
119 137 146 133 141 124 103 94 109 107 109 131 94 91 80 116 106 93 76 87
 73 93 92 117 113 63 92 120 95 103 81 80 95 96 86 110 141 188 124 121
144 114 126 139 176 149 156 124 124 129 125 138 156 114 137 140 119 114 306 349
264 349 310 185 193 180 279 366 309 294 248 291 330 205 300 400 187 299 291 436
283 126 91 113 126 161 161 88 114 138 155 146 108 144

MID-H95A 113
311 469 417 388 360 371 381 379 451 359 282 403 293 309 374 303 264 278 226 164
198 268 281 241 305 221 304 278 275 174 91 150 230 208 236 241 114 147 142 218
220 286 230 229 179 155 190 96 149 166 134 117 85 87 112 111 115 151 138 123
133 115 113 162 183 144 104 207 210 101 85 141 199 178 164 141 148 113 124 126
118 135 94 127 139 153 176 115 131 105 94 95 89 117 125 135 136 127 166 139
180 93 128 141 136 116 134 131 124 146 118 156 165

MID-H95B 113

326 458 425 381 356 361 394 407 446 344 291 387 285 312 391 290 251 267 259 154
178 266 274 239 310 235 313 290 265 160 94 151 237 209 238 249 128 155 132 231
233 285 228 229 174 171 178 108 152 163 113 125 85 91 100 116 123 153 163 113
131 127 105 163 182 151 115 169 195 98 88 146 182 184 160 144 155 96 121 130
 97 128 126 146 128 133 167 106 131 105 94 94 85 122 126 143 135 133 161 146
184 89 122 151 126 123 123 139 128 137 119 157 176

MID-H96A 88
201 146 206 220 134 185 151 130 196 178 199 256 275 202 213 272 335 295 336 309
285 319 332 363 375 409 276 416 251 271 327 270 298 179 169 190 179 196 181 181
132 182 137 124 218 190 181 103 67 70 60 57 55 63 73 93 92 78 75 73
 64 67 35 40 42 57 70 70 58 82 86 73 110 139 146 261 243 210 173 146
 82 71 57 79 151 165 275 271

MID-H96B 88
202 168 209 223 141 178 159 154 237 181 189 235 251 197 218 306 379 260 317 310
295 301 346 372 365 399 222 397 273 226 340 276 290 179 164 194 164 209 176 190
137 178 137 130 216 197 170 120 64 80 51 53 64 57 80 99 91 74 72 78
 52 64 49 34 37 58 69 65 68 73 101 75 104 126 148 272 235 208 177 142
 87 62 54 88 152 156 262 288

MID-H97A 102
168 209 202 202 94 148 174 108 136 138 222 201 182 190 164 104 143 171 147 139
158 135 126 165 171 115 71 70 108 145 141 95 124 132 116 89 125 173 120 127
152 136 174 169 176 108 66 78 106 128 150 153 96 86 89 97 111 111 110 80
103 94 57 79 68 93 94 100 90 97 89 76 88 117 75 59 63 65 54 44
 67 72 105 111 102 116 109 87 93 126 124 125 219 143 152 130 166 117 133 171
156 186

MID-H97B 102
179 189 202 200 109 140 162 99 129 148 208 205 176 195 163 107 139 180 134 133
153 136 134 169 186 97 75 69 130 136 144 103 111 143 111 91 115 169 131 133
132 135 169 144 143 105 64 78 96 128 133 155 105 81 90 86 113 113 111 83
 88 103 60 80 69 97 81 91 90 100 107 87 82 111 72 56 67 66 38 48
 71 69 81 127 92 124 114 77 100 119 119 137 216 135 142 129 177 123 146 176
145 200

MID-H98A 125
245 345 424 421 204 201 279 279 238 223 258 259 162 276 285 244 198 241 175 134
141 182 154 154 133 155 126 147 82 96 109 135 138 186 120 129 77 98 148 159
100 130 167 166 123 165 139 90 103 165 157 137 91 86 78 83 102 123 116 89
 80 84 73 91 74 88 88 61 74 67 62 78 69 89 109 73 64 52 58 82
 98 112 70 60 80 76 67 58 96 98 103 63 49 96 50 51 55 87 94 84
 81 58 63 49 26 33 33 37 42 38 29 53 37 44 30 31 28 38 38 43
 67 81 90 65 73

MID-H98B 125
311 345 450 418 217 190 267 269 210 222 279 245 166 276 278 258 189 234 178 126
139 183 154 153 134 158 126 144 86 90 116 132 132 172 129 137 77 102 137 145
100 136 172 168 113 164 146 78 102 169 160 139 84 90 71 82 106 124 108 93
 78 79 84 85 79 90 74 56 76 66 74 73 70 82 99 81 54 76 51 82
 88 121 71 69 71 79 67 63 94 97 98 64 49 91 51 56 54 85 97 86
 73 54 52 53 32 38 40 37 40 41 41 47 40 44 22 28 34 39 41 38
 54 75 77 77 80

MID-H99A 57

214 205 198 251 208 225 229 209 343 241 270 315 79 100 103 105 113 109 165 185
152 141 180 221 172 249 205 314 312 226 139 171 235 264 300 351 257 263 304 234
218 172 139 78 65 101 141 164 179 216 186 204 120 122 108 137 157

MID-H99B 57
229 198 202 253 211 224 235 207 369 260 260 313 65 107 102 107 111 115 167 135
147 156 178 219 137 188 215 310 364 211 150 158 243 272 320 344 236 275 296 250
221 185 139 74 72 95 141 154 192 214 185 206 115 137 111 136 172

MIDH100A 86
153 114 165 142 240 286 171 107 102 127 434 319 378 333 335 134 73 53 65 102
 91 149 161 198 216 192 187 176 169 202 200 186 185 138 144 105 196 238 225 200
323 250 203 266 272 273 276 260 261 284 241 207 202 260 318 252 206 229 211 165
175 106 107 142 155 266 132 261 170 209 187 219 220 259 267 280 225 188 187 173
192 170 240 191 173 282

MIDH100B 86
154 123 154 138 248 280 172 102 99 145 394 326 350 293 325 128 82 59 86 92
 96 163 157 188 207 158 181 200 164 200 185 185 186 145 155 112 205 201 209 199
290 222 198 255 270 263 290 254 274 277 241 215 205 257 325 241 206 226 209 176
177 96 118 151 149 255 150 259 177 204 200 203 201 258 257 284 209 206 211 178
192 171 239 183 206 269

MIDH101A 65
390 266 338 355 394 347 116 71 67 115 103 103 75 94 99 102 126 142 139 150
179 123 104 156 163 210 198 257 193 225 326 359 382 277 173 218 164 233 227 190
322 323 227 250 192 206 105 166 71 75 111 117 120 129 172 161 170 122 131 130
138 142 151 137 140

MIDH101B 65
404 272 336 356 422 344 104 62 70 126 103 96 78 93 96 113 119 140 161 173
174 133 94 175 170 203 204 260 185 263 289 356 392 283 179 182 170 234 262 230
318 320 228 253 205 204 167 102 61 94 105 121 105 138 179 162 175 125 126 118
141 136 160 153 165

MIDH102A 108
421 267 268 269 184 241 205 164 158 355 296 312 290 211 106 86 120 165 166 177
161 145 143 115 207 172 179 183 98 79 107 100 95 77 114 136 111 217 129 135
173 112 115 84 116 70 111 63 97 89 69 97 76 64 64 47 60 84 61 59
 35 65 43 55 40 33 55 49 42 56 51 44 37 32 34 51 45 42 38 52
 44 56 26 46 29 40 31 30 39 31 29 37 29 20 34 30 29 26 34 28
 37 29 37 37 22 36 27 34

MIDH102B 107
380 287 247 267 183 259 220 192 162 361 305 325 283 244 93 85 123 164 178 186
147 146 131 103 180 164 208 184 97 85 112 122 86 93 121 137 98 235 132 121
156 125 101 84 108 78 107 68 92 90 76 93 80 66 61 47 69 71 67 58
 46 54 54 48 47 38 49 50 41 57 68 45 39 35 32 49 46 39 42 54
 42 47 34 41 32 43 32 28 40 30 31 29 36 21 35 29 23 27 34 26
 43 34 30 36 24 40 44

MIDH103A 56
206 367 322 278 199 212 131 146 111 115 126 250 208 204 204 202 216 173 176 179
130 129 128 156 139 159 170 148 203 193 168 169 114 105 159 125 91 98 97 164
159 134 135 145 147 66 39 24 25 25 28 34 27 28 32 30

MIDH103B 56
228 372 303 273 200 209 139 137 110 111 111 217 266 226 240 189 219 168 168 174
132 117 131 150 147 155 178 140 203 195 166 156 117 108 152 116 86 102 105 160
158 132 131 157 147 59 36 23 25 26 32 35 24 29 34 30

MIDH104A 73
117 139 132 104 104 102 89 132 115 149 244 201 177 127 125 166 109 136 135 145
153 104 120 102 158 175 151 195 173 174 245 118 149 133 130 107 125 150 110 142
113 87 199 151 162 124 139 116 76 83 53 80 81 84 90 79 97 114 125 136
112 113 96 79 98 94 109 113 87 76 87 65 82

MIDH104B 73
153 117 137 113 108 97 87 123 127 151 246 189 171 129 131 158 112 139 136 137
145 104 126 100 160 173 153 194 177 171 242 125 143 131 128 110 122 152 118 147
 90 109 174 162 154 130 131 110 78 75 70 83 83 85 67 90 96 125 124 136
 93 129 101 74 103 104 97 116 91 106 78 81 89

Data of measured pine samples – measurements in 0.01 mm units

MIDH105A 59
618 660 667 606 608 506 475 547 498 396 327 488 478 469 538 435 360 438 374 462
600 462 294 223 138 148 234 241 213 261 241 269 214 241 201 206 188 203 193 170
175 184 197 162 195 157 174 134 135 148 139 110 101 154 136 145 151 166 163

MIDH105B 59
614 657 656 619 627 493 479 552 486 364 333 493 472 457 538 451 367 428 372 454
585 473 291 222 156 146 244 236 216 251 248 254 206 264 186 204 187 205 185 183
169 191 202 153 201 157 176 136 132 145 149 104 103 158 131 143 137 159 155

MIDH106A 38
626 461 621 629 581 742 549 482 504 550 490 387 316 415 552 465 412 389 319 394
270 381 532 402 288 251 307 263 290 316 309 317 322 306 266 293 217 264

MIDH106B 38
656 501 612 640 626 685 601 493 502 562 498 371 314 406 519 464 419 434 309 374
269 379 545 445 306 235 312 264 308 309 300 328 301 321 269 299 215 268

MIDH107A 62
457 461 555 573 502 316 380 309 338 280 234 299 355 314 249 281 242 242 223 234
359 306 201 235 228 189 264 240 197 185 183 204 160 145 108 111 137 111 99 132
126 132 133 108 120 97 101 84 120 114 97 85 90 83 87 85 99 101 106 120
127 112

MIDH107B 62
457 475 568 526 517 331 343 325 345 283 220 316 379 320 253 295 227 264 234 226
361 314 197 238 224 196 251 252 172 180 191 196 169 146 114 119 146 107 93 136
135 134 128 106 123 94 108 84 109 125 88 96 82 97 81 101 91 108 94 120
131 113

MIDH108A 108
241 142 280 279 299 263 249 211 259 263 315 310 307 255 284 220 323 344 316 278
262 231 251 234 241 263 196 183 212 216 230 182 201 243 253 196 192 186 179 203
217 215 221 206 126 129 153 155 179 168 198 244 265 245 210 188 217 197 202 198
181 186 177 198 192 193 181 180 188 237 147 192 167 168 167 189 135 130 140 157
157 145 146 136 109 74 90 101 107 121 129 152 101 106 105 119 149 114 124 118
111 119 127 133 149 104 110 75

MIDH108B 108
232 148 276 268 304 260 244 209 253 253 324 309 304 254 293 218 305 338 317 277
292 237 237 233 235 275 194 190 202 217 227 192 200 220 251 203 193 197 187 214
204 227 211 199 122 129 155 157 186 167 194 245 263 252 212 192 208 198 198 196
189 200 185 184 194 195 184 179 186 240 157 179 169 165 179 180 136 138 138 155
162 147 139 142 111 69 92 94 114 116 129 155 104 101 102 122 148 119 129 114
117 136 116 124 147 114 100 63

MIDH109A 198
151 224 210 168 178 181 160 115 188 137 27 85 126 147 142 146 138 139 121 174
180 198 170 126 124 104 163 116 88 34 72 109 109 132 135 150 155 174 153 132
168 167 150 112 124 124 109 92 105 120 110 118 124 145 170 129 173 113 151 164
148 121 90 80 94 99 93 100 76 99 115 93 105 92 100 75 97 103 88 79
92 104 109 112 93 127 111 106 85 87 103 101 106 102 107 118 92 78 91 105

86 92 75 88 79 90 87 99 98 83 70 99 74 99 88 83 89 99 73 61
63 56 81 55 76 68 70 61 57 74 71 59 59 57 61 52 54 46 48 55
50 47 65 44 39 41 43 48 34 27 35 29 40 37 35 43 40 38 33 32
26 34 31 37 38 42 42 37 37 40 45 48 36 40 28 34 28 31 42 42
36 33 33 45 38 40 42 25 28 35 35 25 33 31 31 38 39 39

MIDH109B 198
142 223 211 168 183 177 155 118 191 134 28 98 108 156 145 141 138 138 126 170
190 188 165 130 123 113 168 126 79 35 68 112 109 126 141 147 147 171 144 136
165 171 153 116 122 124 113 86 109 119 112 116 124 141 171 141 159 122 148 160
147 124 94 81 90 100 92 97 75 97 118 93 111 97 102 74 101 98 95 76
91 108 112 105 91 129 124 109 93 80 116 110 92 101 98 123 86 85 93 97
90 83 81 86 78 79 98 96 108 73 75 91 79 96 84 87 92 94 78 55
60 58 77 58 77 65 65 59 62 77 68 54 58 54 54 61 58 45 48 61
52 50 56 44 39 35 43 45 38 30 38 28 37 38 38 38 42 37 35 35
22 36 33 35 42 38 44 37 36 35 44 42 39 33 29 32 28 31 39 54
29 34 35 44 36 40 40 32 28 32 28 28 35 27 36 33 35 35

MIDH110A 174
171 182 214 229 128 152 132 141 153 227 157 167 107 101 58 128 133 119 175 117
198 169 195 237 198 210 148 150 177 204 195 168 167 175 154 177 209 178 215 227
180 176 171 119 128 166 154 177 141 156 152 125 192 166 127 150 141 171 125 122
125 114 113 148 130 113 156 114 146 135 115 134 91 108 113 102 125 95 98 94
76 82 85 72 102 65 82 71 74 76 70 63 85 77 70 73 64 64 60 73
80 60 68 62 56 67 84 75 86 68 75 74 89 79 77 71 71 78 86 86
89 101 114 106 102 88 104 68 80 75 82 79 77 74 76 70 76 81 72 71
81 79 91 60 53 72 58 72 71 66 76 66 65 60 50 54 50 46 50 53
56 51 69 71 78 73 76 79 59 57 58 65 55 66

MIDH110B 174
167 183 211 231 127 154 124 139 157 221 155 169 112 97 64 126 133 126 166 112
213 169 192 222 198 217 148 145 172 207 198 169 166 180 147 178 211 181 194 231
178 177 171 132 135 171 151 177 146 154 155 130 188 159 120 150 137 167 137 120
127 128 109 139 136 133 146 109 151 124 119 124 103 98 111 114 120 101 100 84
83 83 78 82 92 74 78 75 70 77 66 74 90 71 77 70 80 55 57 72
77 53 81 57 61 66 70 84 70 76 72 75 85 80 79 64 74 76 92 81
91 101 116 103 103 99 86 67 86 74 86 70 89 67 82 73 70 90 71 78
73 85 78 69 61 53 59 70 67 65 74 71 65 53 50 59 47 40 53 49
49 56 69 65 81 70 85 70 59 61 60 62 58 59

MIDH111A 142
208 253 178 191 143 129 77 153 169 172 226 153 185 196 197 195 181 229 167 180
186 231 237 183 208 182 192 203 217 179 213 261 201 232 153 166 102 191 177 195
179 202 177 157 200 170 146 144 177 204 163 135 136 136 147 159 134 158 145 118
169 143 169 154 152 121 162 163 181 186 145 82 93 100 100 80 121 110 121 124
94 104 76 73 124 81 103 90 109 69 73 93 84 87 76 82 67 85 81 82
75 96 113 103 88 91 90 90 97 129 134 159 134 103 99 113 120 117 70 93
73 83 56 56 64 66 48 54 58 18 47 29 31 33 36 40 42 45 52 57
55 40

MIDH111B 142
185 251 181 185 144 130 85 150 167 164 234 157 181 198 204 187 185 231 166 176
190 228 236 186 211 183 192 205 210 181 208 258 192 214 164 172 114 193 175 205
175 195 175 158 192 175 155 151 172 203 164 135 133 136 147 169 138 161 123 110
170 153 165 157 150 124 154 166 175 185 149 88 102 106 102 80 116 115 118 106
106 109 74 78 122 90 95 98 88 88 89 97 87 87 79 81 71 84 90 86

70 96 120 95 88 88 97 86 101 128 130 156 138 103 98 108 115 123 70 94
76 85 56 60 57 64 44 55 55 14 36 39 36 31 40 36 40 40 55 53
53 50

MIDH112A 205
190 179 140 200 181 147 169 140 103 112 138 118 33 111 114 95 111 105 106 124
86 138 130 131 139 116 118 83 136 108 66 26 45 55 35 62 77 80 89 89
82 82 81 72 73 66 77 85 84 69 73 47 64 63 61 89 92 92 90 86
103 102 91 67 63 53 53 92 82 75 80 71 82 64 68 57 56 47 54 55
43 53 68 58 61 48 47 74 70 70 60 48 55 84 66 90 68 79 71 61
82 72 82 76 65 69 73 71 70 75 90 59 60 60 49 78 67 75 66 53
70 42 44 50 60 49 60 65 54 54 61 69 56 58 51 39 47 51 39 54
55 49 50 58 58 63 74 53 42 56 52 34 45 43 54 51 49 54 54 42
52 54 38 44 42 47 53 45 49 40 52 45 55 53 62 51 48 49 41 47
55 46 38 38 36 45 53 50 45 40 42 36 28 27 44 32 32 36 37 42
44 39 31 31 41

MIDH112B 205
192 185 140 195 194 153 162 148 121 123 135 127 30 109 107 102 110 100 111 122
85 137 127 135 131 115 108 83 145 103 63 30 38 46 44 65 78 81 90 88
78 93 84 86 79 66 72 90 84 65 72 48 64 62 63 89 87 95 91 87
89 103 90 73 58 52 61 88 83 69 82 72 79 65 69 56 54 51 48 51
48 52 59 59 49 51 57 58 87 62 54 51 57 81 69 91 74 70 76 64
73 77 77 78 64 63 80 68 77 72 96 55 63 63 48 77 66 73 70 53
67 42 45 49 64 52 53 66 59 53 60 74 51 65 50 40 47 47 39 57
48 52 54 52 70 51 69 59 43 60 46 35 41 42 57 52 40 54 60 46
52 51 41 41 46 48 55 48 49 42 49 50 58 54 53 55 50 38 36 47
53 40 41 39 40 45 55 39 47 38 39 41 31 26 38 29 37 37 44 34
47 40 31 32 38

MIDH113A 104
253 155 150 145 131 132 123 137 121 137 114 196 177 160 180 157 134 128 123 127
144 133 133 102 125 160 129 113 135 141 90 83 89 97 91 112 112 117 124 144
155 133 114 103 120 118 102 110 98 81 77 68 81 67 86 90 110 100 84 73
94 62 85 83 78 60 99 112 97 104 89 82 103 106 81 97 118 114 132 103
107 89 108 85 82 80 103 103 92 94 106 96 71 79 63 61 62 65 52 63
46 43 54 63

MIDH113B 104
140 116 160 144 147 131 127 130 133 130 117 187 175 157 181 158 139 126 116 134
145 138 115 113 132 149 117 120 135 130 94 81 95 98 81 106 97 124 122 137
155 132 127 95 118 131 95 109 104 84 82 75 67 72 82 101 102 98 82 89
83 70 78 88 74 62 94 110 89 109 80 99 102 101 77 100 120 113 131 116
105 98 101 91 76 86 105 104 91 91 112 92 78 85 71 58 60 58 56 61
58 48 53 58

MIDH114A 82
237 274 295 171 193 208 173 210 154 177 192 194 181 177 200 151 244 235 217 253
196 139 182 193 151 213 172 170 216 224 210 213 150 193 167 177 150 157 166 132
162 174 160 168 173 144 193 124 179 163 156 147 139 112 101 105 100 117 103 118
97 82 56 74 57 77 77 117 106 88 105 93 83 108 118 122 101 102 122 121
122 134

MIDH114B 82
238 287 281 177 197 200 179 217 149 175 202 186 181 183 198 147 250 231 220 252
207 135 183 188 151 214 179 171 218 226 197 221 152 193 162 176 152 154 170 127

158 172 158 161 167 156 187 126 182 165 158 139 138 118 103 103 101 115 105 116
96 83 56 67 56 71 90 116 115 80 94 101 83 99 108 123 90 95 133 129
112 160

MIDH115A 66
382 326 363 359 289 305 255 278 241 182 172 238 106 243 202 253 296 270 228 342
306 353 320 281 239 264 253 271 304 305 327 289 288 218 264 286 316 204 229 250
197 236 185 184 174 169 156 157 195 155 195 186 211 231 177 134 148 152 144 202
189 185 255 240 205 222

MIDH115B 66
240 353 321 299 299 311 250 265 229 179 169 241 105 241 210 242 295 272 224 336
311 352 313 283 252 247 254 272 320 309 325 283 296 205 278 289 316 198 222 253
201 230 198 177 176 167 160 154 193 153 193 193 208 226 178 135 150 153 140 205
160 180 249 249 204 223