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Summary

Seven timbers were sampled for tree-ring dating from the main range and three from the north wing at 8 Market Place, Shepton Mallet, Somerset. Of these, nine dated and produced a 160-ring master chronology, ***SHPTNMLT***, spanning the years AD 1518-1677. Precise felling dates of summer/autumn AD 1674, winter AD 1674/5, and spring AD 1675 were obtained for the main range, and a single felling date of spring AD 1678 for the north wing, suggests that the two ranges are virtually coeval, with the north range possibly being constructed a few years later than the main range. The resulting chronology is a useful addition to the small corpus of seventeenth-century tree-ring chronologies.

Keywords

Dendrochronology
Standing Building

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THE TREE-RING DATING OF 8 MARKET PLACE, SHEPTON MALLET, SOMERSET

Description of building

The building at 8 Market Place, Shepton Mallet, Somerset, is located to the south of the Market Place and St Peter and St Paul's church (ST 6194 4362; Fig 1). The building consists of two parts, the main part comprising a range of five bays running east-west and originally facing a courtyard to the south. To the north of this range is a wing of three bays. Both ranges are of two full stories above cellars, with habitable garrets or attics above. Although both ranges employ identical constructional details such as the cranked collars and other stonework and plaster details, there does not appear to have been any original internal communication between the main range and the wing. Therefore, it was thought that the two ranges were built originally as two independent units (Sampson 1994 unpubl).

The recent history of the building began in 1985 when it was purchased by the United Charities of Shepton Mallet who are the present administrators of Strode's Almshouses situated immediately to the east of the building. It was intended to convert the building into sheltered accommodation for the elderly, but before sufficient funds had been raised, the building had declined into disrepair through neglect and vandalism. Consequently, it was purchased by Mr Jon Maine with the intention of restoring the building. Over the years, a number of reports describing the building have been written, the first being by the Somerset and South Avon Vernacular Building Research Group (SSAVBRG, now SVBRG) who surveyed the building in 1991 (SSAVBRG 1991 unpubl). The trusses and beam notations included on these plans have been used throughout this present report. The building was again surveyed in 1994 by Jerry Sampson of Caroe and Partners to compile a structural history of the building for English Heritage (Sampson 1994).

Objectives of dating

The primary objective of the dendrochronology was to inform proposed grant-aided repair work, and through the determination of precise felling dates for the primary construction, to confirm the contemporaneity of the two principal ranges. The work to the building was commissioned by the English Heritage Scientific Dating Service following a request from Peter Beacham, Inspector of Historic Buildings, South-west Team.

Assessment

Both sections of the building were initially assessed for dendrochronological potential, prior to sampling. This was based on the availability of sufficient rings for dating purposes, the retention of sapwood, and the presence of sufficient timbers being accessible for safe sampling.

Here, there appeared to be sufficient rings present in most of the principal and subsidiary timbers. However, very little sapwood was either present, accessible, or in a sound enough condition to survive sampling. Much of the timberwork was still covered with primary plasterwork which would have resulted in an unacceptable degree of loss of historic fabric to remove simply to find sapwood. In addition, much of the building was unsafe, with a number of floors missing or weakened, both through water ingress or as a result of a fire which had damaged part of the north wing.

Because one of the objectives was to try and establish the relationship between two very closely-constructed ranges, precise dates were essential. Hence, only timbers with long ring sequences or complete sapwood were selected for sampling. Consequently, the sampling programme resulted in fewer samples being taken than would normally be the case (English Heritage 1998), particularily in relation to the north wing.

Methodology

Sampling of selected primary-phase timbers was carried out with a 16mm hollow coring bit. The dry samples were sanded on a linisher using 60 to 1200 grit abrasive paper, and were cleaned with compressed air, to allow the ring boundaries to be clearly distinguished. They were then measured under a x10/x30 microscope using a travelling stage electronically displaying displacement to a precision of 0.001mm, rounded to the nearest 0.01mm.

After measurement, the ring-width series for each sample was plotted as a graph of width against year on log-linear graph paper. The graphs of each of the samples in the phase under study are then compared visually at the positions indicated by the computer matching and, if found satisfactory and consistent, are averaged to form a mean curve for the site or phase. This mean curve and any unmatched individual sequences are compared against dated reference chronologies to obtain an absolute calendar date for each sequence.

Here this was accomplished by using a combination of both visual matching and a process of qualified statistical comparison by computer. The tree-ring curves were first matched visually, and then independently matched by computer. The ring-width series were compared on an IBM compatible 486SX computer for statistical cross-matching using a variant of the Belfast CROS program (Baillie and Pilcher 1973). A version of this and other programmes were written in BASIC by D Haddon-Reece, and latterly re-written in Microsoft Visual Basic by M R Allwright and P A Parker.

Once a tree-ring sequence has been firmly dated in time, a felling date, or date range, is ascribed where possible. With samples which have sapwood complete to the underside of, or including bark, this process is relatively straight forward. Depending on the completeness of the final ring, ie if it has only the spring vessels or early wood formed, or the latewood or summer growth, a *precise felling date and season* can be given. If the sapwood is partially missing, or if only a heartwood/sapwood transition boundary survives, then an *estimated felling date range* can be given for each sample. The number of sapwood rings can be estimated by using a statistically derived sapwood estimate with a given confidence limit. An accepted sapwood estimate for British and Irish oaks is given as between 10 and 55 rings with a 95% confidence range (Hillam *et al* 1987), as used in the previous analysis. A recent review of the geographical distribution of dated sapwood data from historic building timbers has shown that a 95% range of 9-41 rings is more appropriate for the southern part of England (Miles 1997a).

It should be remembered that dendrochronology can only date when the tree died, not the date of construction for a building or artefact. The interpretation of a felling date relies on having a good number of precise felling dates rather than just one or two. Nevertheless, it was common practice to build timber-framed structures with green or unseasoned timber and construction usually took place within twelve months of felling (Miles 1997a).

Sampling strategy

Following a preliminary assessment, the building was sampled on the 17th of November 1999 and 27th of January 2000. Whilst many of the timbers had sufficient growth rings for successful cross-matching, there were not many accessible timbers retaining complete sapwood. As one of the objectives was to ascertain the relationship between the main range and the north wing, samples which did not produce a precise date would be of limited value. This is because felling date ranges would be too broad to identify closely-dated phases. Therefore, sampling primarily concentrated on those timbers retaining bark edge, supplemented with samples with long ring sequences from timbers retaining heartwood/sapwood boundaries.

Seven timbers were found in the main range. Both collars retained complete sapwood, as did a purlin and two first-floor ceiling joists. A principal rafter and a transverse beam also retained complete sapwood, but the sapwood was too fragile to survive coring intact, and the last 50 - 60 growth rings on the transverse beam were so narrow as to be unmeasurable.

The north wing had a much more limited selection of timbers, partially due to the roof space being inaccessible, and much of the rest of the structure being covered with plaster. Sampling was further restricted due to the north end of the wing having suffered a fire. Therefore, only the ground-floor ceiling structure at the south end of the wing was suitable for sampling in that the floor boards had been removed above, and the transverse beam below was clear of plaster. Of these timbers, only two joists had complete sapwood, and one transverse beam had virtually complete sapwood. During sampling however, the sapwood disintegrated on the transverse beam and one of the joists had rings so narrow as to be unmeasurable. Details of the samples taken and their locations can be seen in Table 1 and Figures 2 and 3.

Cross-matching and site chronology

Five of the timbers sampled produced fragmentary cores, with some requiring secondary cores to ensure sufficient overlap with other sections of the cores. The sample from the collar of truss 1 broke in half, and as the break was not clean, they were treated as two sequences: ***mpsm1a1*** and ***mpsm1a2***. On cross-matching individually with other samples, it was found that no rings were missing between the two segments so they were combined to form the timber composite ***mpsm1***.

The north principal rafter of truss 1 was cored twice to try and retain the sapwood intact, both cores, ***mpsm3a*** and ***mpsm3b***, did not retain all of the rings from the heartwood/sapwood interface. These were combined to form the timber composite ***mpsm3***. An estimated 2 - 6 rings of sapwood were lost.

A second floor joist was sampled twice, the first core ***mpsm5a*** lost half of its sapwood rings, so it was sampled again. However the second core broke into three sections: ***mpsm5b1***, ***mpsm5b2***, and ***mpsm5b3***, the last section having complete sapwood. Another second-floor joist was similarly sampled twice, each core having broken into two segments: ***mpsm6a1***, ***mpsm6a2***, ***mpsm6b1***, and ***mpsm6b2***. All of these segments, with the exception of ***mpsm5b1*** were matched together with other samples and were combined to form the timber composites ***mpsm5*** and ***mpsm6*** respectively.

From the north wing, two cores from a floor joist were similarly fragmented, with the segments ***mpsm13a1***, ***mpsm13a2***, ***mpsm13b1***, and ***mpsm13b*** all being combined to form the timber composite ***mpsm13***.

Details of the intra-timber and intra-site cross-matching of all the above sequences can be seen in Table 2. This demonstrates matches between individual sequences and a number of other different timbers. Visual cross-matching were invaluable for matching these short-ring sequences as the computer cross-matching routines were not designed for samples of lengths of 50 rings or less (Baillie and Pilcher 1973)

Once the individual short sequences had been combined into timber composites, all nine sequences were combined at the offsets shown in Table 3 to produce the 160-ring site master ***SHPTNMLT*** (Table 4). The level of *t*-values between the various samples suggest that the timbers all came from a similar woodland area and growing conditions.

Absolute dating

This site master was then compared with over 1000 dated reference chronologies from the British Isles and was found to date extremely strongly, spanning the years AD 1518 to 1677 (Table 5). Given the best matches were with chronologies from Hampshire and Oxfordshire as well Wales, the tree-ring dating would tend to confirm that the timber was obtained locally within Somerset/Wiltshire area.

Undated samples

The single undated timber, ***mpsm12*** had a substantial number of rings that were far too narrow to measure accurately, therefore this sample was discarded before the analysis stage. One short sequence, ***mpsm5b1***, contained only 26 rings including a narrow series of rings, which probably accounted for it failing to match conclusively with the other site sequences.

Interpretation and discussion

Of the seven timbers sampled from the main range, five produced precise felling dates. One of these dated from the summer or autumn of AD 1674, three dated to the winter of AD 1674/5, and one dated to the spring AD 1675. Given this close clustering of felling dates, it is likely that the main range was constructed during AD 1675 or possibly into AD 1676. Two other timbers with incomplete or unmeasurable sapwood produced felling dates ranges of AD 1672-6 and AD 1673-8, both of which are consistent with this proposed construction period.

Only one timber from the north range produced a precise felling date. This, of the spring of 1678, suggests a construction period not before AD 1678, but might well be one or two years later, based evidence of other instances of varying felling dates (Miles 1997a). A felling date range of AD 1651-83 for a transverse beam is not inconsistent with this felling date.

All timbers sampled showed clear evidence for subsequent shrinkage, showing that the timbers were green at the time of conversion (Fig 4).

The tree-ring dating has therefore shown that 8 Market Place is a two-phased building, but probably only by a few years, and that it was likely that it had always been intended to follow on with the north wing once the main range had been completed (Fig 5). The lack of planned intercommunication however suggests that these two ranges were originally intended to be self-contained.

The latest felling date of spring AD 1675 for the main range, and spring AD 1678 for the north range, are consistent with the seventeenth-century date range previously proposed for the construction of this building (SSAVBRG 1991; Sampson 1994).

Recommendations

Given the lack of suitable samples with bark edge, especially from the north range, it is strongly suggested that further sampling be undertaken at the time of repair. This should help to confirm the single felling date from this range is does accurately relate to the construction date of this range.

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Table 1: Summary of tree-ring dating

Sample number & type	Timber and position	Dates AD spanning	H/S bdry	Sapwood complement	No of rings	Mean width mm	Std devn mm	Mean sens mm	Felling seasons and dates/date ranges (AD)
8 MARKET PLACE, SHEPTON MALLET									
Main Range									
mpsm1a1 c	Collar T1	1570-1655	1648	7	86	2.23	0.81	0.208	
mpsm1a2 c	ditto	1656-1674		+19C	19	1.17	0.34	0.186	
* ***mpsm1***	mean of ***mpsm1a1*** & ***mpsm1a2***	*1570-1674*	*1648*	*26C*	*105*	*2.04*	*0.85*	*0.203*	*Winter 1674/5*
* ***mpsm2*** c	Collar T2	1563-1674	1635	39C	112	1.41	0.90	0.208	Winter 1674/5
mpsm3a c	N principal rafter T1	1518-1650	1649	1 + 19 NM	133	1.67	0.65	0.225	
mpsm3b c	ditto	1541-1649	1649	H/S + 21 NM	109	1.50	0.41	0.208	
* ***mpsm3***	mean of ***mpsm3a*** & ***mpsm3b***	*1518-1650*	*1649*	*1 + 20 NM*	*133*	*1.68*	*0.64*	*0.219*	*1672-6* [1]
* ***mpsm4***	N purlin bay 1	1567-1673	1655	18½C	107	1.71	0.78	0.240	Summer/Autumn 1674
mpsm5a c	1st floor joist 4th from S between B6 & B7	1560-1659	1643	16	100	1.06	0.28	0.230	
mpsm5b1 c	ditto	-			26	1.25	1.17	0.223	
mpsm5b2 c	ditto	1584-1650	1642	8	67	0.70	0.22	0.267	
mpsm5b3 c	ditto	1652-1674		+23C	23	0.86	0.19	0.209	
* ***mpsm5***	mean of ***mpsm5a*** + ***mpsm5b2*** + ***mpsm5b3***	*1560-1674*	*1642*	*32C*	*115*	*0.92*	*0.22*	*0.216*	*Winter 1674/5*
mpsm6a1 c	1st floor joist 3rd from S between B7 & B8	1582-1644	1642	2	63	1.19	0.33	0.226	
mpsm6a2 c	ditto	1656-1674		+19¼C	19	1.09	0.22	0.203	
mpsm6b1 c	ditto	1547-1656	1643	13	110	1.09	0.37	0.255	
mpsm6b2 c	ditto	1656-1674		+19¼C	19	0.99	0.22	0.229	
* ***mpsm6***	mean of ***mpsm6a1 + 6a2 + 6b1 + 6b2***	*1547-1674*	*1643*	*31¼C*	*128*	*1.13*	*0.35*	*0.241*	*Spring 1675*
* ***mpsm7***	1st floor joist transverse beam B7	1519-1618		+55-60C NM	100	1.39	0.72	0.244	1673-8
North Wing									
* ***mpsm11*** c	Ground floor transverse beam T4	1536-1642	1642	H/S	107	1.48	0.58	0.200	1651-83
mpsm13a1 c	Ground floor joist 3rd from W, S of B9	1590-1653	1646	7	64	1.48	0.50	0.203	
mpsm13a2 c	ditto	1657-1677		+21¼C	21	0.67	0.11	0.153	
mpsm13b1 c	ditto	1595-1648	1646	2	54	1.44	0.36	0.193	
mpsm13b2 c	ditto	1650-1676		+27	27	0.67	0.12	0.156	
* ***mpsm13***	mean of ***mpsm13a1 + 13a2 + 13b1 + 13b2***	*1590-1677*	*1646*	*31¼C*	*88*	*1.24*	*0.51*	*0.169*	*Spring 1678*
* = ***SHPTNMLT*** Site Master		**1518-1677**			**160**	**1.54**	**0.58**	**0.170**	

[1] This sample retained complete sapwood, but between 2 and 6 rings were lost in coring.

Key: *: = sample included in relevant site-master; c = core; = pith included in sample, = pith within 5 rings of centre, = pith within 10 rings of centre; ¼C, ½C, C = bark edge present, partial or complete ring: ¼C = spring (ring not measured), ½C = summer/autumn felling, C = winter felling (ring measured); H/S bdry = heartwood/sapwood boundary - last heartwood ring date; std devn = standard deviation; mean sens = mean sensitivity. Sapwood estimate of 9-41 rings used (Miles 1997a)

Table 2: Matrix of *t*-values and overlaps for components of individual sequences

Sample: ***(mpsm)***	***1a2***	***2***	***3a***	***3b***	***4***	***5a***	***5b2***	***5b3***	***6a1***	***6a2***	***6b1***	***6b2***	***7***	***11***	***13a1***	***13a2***	***13b1***	***13b2***
Last ring date AD:	1674	1674	1650	1649	1673	1659	1650	1674	1644	1674	1656	1674	1618	1642	1653	1677	1648	1676
1a2	0.00 / 0	5.36 / 86	5.23 / 81	5.88 / 80	5.74 / 86	4.33 / 86	2.12 / 67	0.21 / 67	4.44 / 63	0.00 / 0	3.18 / 86	0.00 / 0	5.44 / 49	3.03 / 73	3.26 / 64	0.00 / 0	4.01 / 54	0.00 / 6
	1a2	2.35 / 19	0.00 / 0	0.00 / 0	1.07 / 18	0.00 / 0	0.00 / 0	0.67 / 19	0.00 / 0	1.28 / 19	0.00 / 0	1.64 / 19	0.00 / 0	0.00 / 0	0.00 / 0	1.46 / 18	0.00 / 0	0.09 / 19
		2	6.27 / 88	6.44 / 87	5.12 / 107	4.08 / 97	4.14 / 67	2.81 / 23	6.89 / 63	3.80 / 19	6.73 / 94	4.75 / 19	5.35 / 56	6.07 / 80	4.48 / 64	0.87 / 18	4.01 / 54	0.33 / 25
			3a	21.35 / 109	7.08 / 84	5.69 / 91	3.86 / 67	0.00 / 0	6.30 / 63	0.00 / 0	6.83 / 104	0.00 / 0	5.77 / 100	9.39 / 107	2.12 / 61	0.00 / 0	1.61 / 54	0.00 / 0
				3b	7.35 / 83	6.50 / 90	3.94 / 66	0.00 / 0	6.58 / 63	0.00 / 0	7.57 / 103	0.00 / 0	5.30 / 78	10.60 / 102	2.90 / 60	0.00 / 0	2.35 / 54	0.00 / 0
					4	5.05 / 93	2.56 / 67	1.37 / 22	6.45 / 63	0.64 / 18	5.73 / 90	0.96 / 18	4.81 / 52	8.11 / 76	4.28 / 64	0.00 / 17	2.57 / 54	0.00 / 24
						5a	8.20 / 67	0.12 / 8	7.35 / 63	0.75 / 63	8.36 / 97	0.00 / 97	5.29 / 59	4.99 / 83	3.95 / 64	0.00 / 0	2.00 / 54	0.00 / 10
	5b2	0.00 / 0	4.90 / 61	0.00 / 0	6.58 / 67	0.00 / 0	0.91 / 35	2.35 / 59	4.30 / 61	0.00 / 0	2.81 / 54	0.00 / 0						
		5b3	0.00 / 0	5.11 / 19	0.00 / 5	4.75 / 19	0.00 / 0	0.00 / 0	0.00 / 0	0.22 / 18	0.00 / 0	0.42 / 23						
			6a1	0.00 / 0	19.36 / 63	0.00 / 0	3.57 / 37	6.48 / 61	4.53 / 55	0.00 / 0	3.13 / 50	0.00 / 0						
				6a2	0.00 / 0	12.86 / 19	0.00 / 0	0.00 / 0	0.00 / 0	0.65 / 18	0.00 / 0	0.00 / 19						
					6b1	0.00 / 0	4.85 / 72	6.66 / 96	4.53 / 64	0.00 / 0	2.98 / 54	0.15 / 7						
						6b2	0.00 / 0	0.00 / 0	0.00 / 0	0.64 / 18	0.00 / 0	0.00 / 19						
							7	4.25 / 83	0.80 / 29	0.00 / 0	1.70 / 24	0.00 / 0						
								11	3.22 / 53	0.00 / 0	1.77 / 48	0.00 / 0						
									13a1	0.00 / 0	11.01 / 54	0.00 / 3						
										13a2	0.00 / 0	2.75 / 20						
											13b1	0.00 / 0						

Table 3: Matrix of *t*-values and overlaps for components of ***SHPTNMLT***

Sample:	***mpsm2***	***mpsm3***	***mpsm4***	***mpsm5***	***mpsm6***	***mpsm7***	***mpsm11***	***mpsm13***
Last ring date AD:	1674	1650	1673	1674	1674	1618	1642	1677
mpsm1	5.98 105	5.71 81	5.43 104	3.79 105	4.18 105	5.44 49	3.03 73	4.32 85
	mpsm2	6.47 88	5.12 107	5.48 112	8.03 112	5.35 56	6.07 80	3.97 85
		mpsm3	7.46 84	6.25 91	7.72 104	5.65 100	9.87 107	2.34 61
			mpsm4	5.00 107	5.86 107	4.81 52	8.11 76	3.04 84
				mpsm5	9.75 115	4.62 59	4.91 83	3.21 85
					mpsm6	5.28 72	7.35 96	4.31 85
						mpsm7	4.25 83	1.30 29
							mpsm11	2.55 53

Table 4: Ring-width data for site master curve ***SHPTNMLT***, dated AD 1518-1677, 8 Market Place, Shepton Mallet - mean of samples ***mpsm1 - mpsm7 + mpsm11 + mpsm13***
160 rings, starting date AD 1518

ring widths (0.01mm)										*number of samples in master*									
295	359	204	275	259	193	243	222	254	237	1	2	2	2	2	2	2	2	2	2
241	205	126	257	230	209	192	310	243	227	2	2	2	2	2	2	2	2	3	3
242	324	283	285	196	209	230	215	157	150	3	3	3	3	3	3	3	3	3	4
206	216	152	185	150	140	176	176	118	133	4	4	4	4	4	4	4	4	4	4
133	131	110	107	168	158	223	176	116	135	4	4	5	5	5	6	6	6	6	7
154	263	204	247	191	208	241	230	178	182	7	7	8	8	8	8	8	8	8	8
162	176	217	173	169	152	179	220	179	167	8	8	8	8	8	8	8	8	8	8
175	218	121	156	154	155	162	152	139	119	8	8	9	9	9	9	9	9	9	9
129	134	125	134	141	123	144	104	174	147	9	9	9	9	9	9	9	9	9	9
162	120	138	119	102	146	91	95	95	113	9	9	9	9	9	9	9	9	9	9
117	104	104	129	119	139	108	162	144	133	9	8	8	8	8	8	8	8	8	8
137	130	129	99	121	125	95	102	88	124	8	8	8	8	8	8	8	8	8	8
157	111	145	126	127	115	102	115	135	85	8	8	8	8	8	7	7	7	7	7
107	96	117	100	91	97	91	106	105	112	7	7	7	6	6	6	6	6	6	6
89	93	91	96	129	93	106	94	104	115	6	6	6	6	6	6	6	6	6	6
98	78	89	75	114	86	93	68	64	68	6	6	6	6	6	6	5	1	1	1

Table 5: Dating of ***SHPTNMLT*** against reference chronologies at AD 1677.

Reference chronology	Spanning	Overlap	t-value
YATTON 2 *(Tyers and Wilson 1999)*	1564-1691	114	6.39
DORE2 *(Tyers and Boswijk 1998)*	1363-1612	95	6.55
NEWDIG2 *(Bridge 1998)*	1492-1639	122	6.55
SARUMBP7 *(Miles and Worthington 2000)*	1562-1661	100	7.15
♣ HERGEST4 *(Miles and Worthington 1997)*	1451-1665	148	7.15
*§ NUFF *(Haddon-Reece et al 1989)*	1404-1627	110	7.28
*§ NEWING *(Haddon-Reece et al 1987)*	1540-1678	138	7.28
WHTOWER6 *(Miles and Worthington 1997)*	1517-1616	99	7.34
*♣ BEWDLEY *(Fletcher 1980)*	1430-1600	83	7.57
WALES97 *(Miles 1997b)*	404-1981	160	7.74
OXON93 *(Haddon-Reece et al 1993)*	632-1987	160	7.91
LONDON *(Tyers pers com)*	413-1728	160	7.70
MASTERAL *(Haddon-Reece and Miles 1993)*	404-1987	160	9.16
STNSTJN4 *(Miles and Worthington 1998)*	1480-1646	129	9.46
THEVYNE3 *(Miles and Worthington 1997)*	1543-1653	111	10.85

* Component of MASTERAL
§ Component of OXON93
♣ Component of WALES97

Chronologies shown in **bold** are composite chronologies

Figure 1: Location plan of 8 Market Place, Shepton Mallet

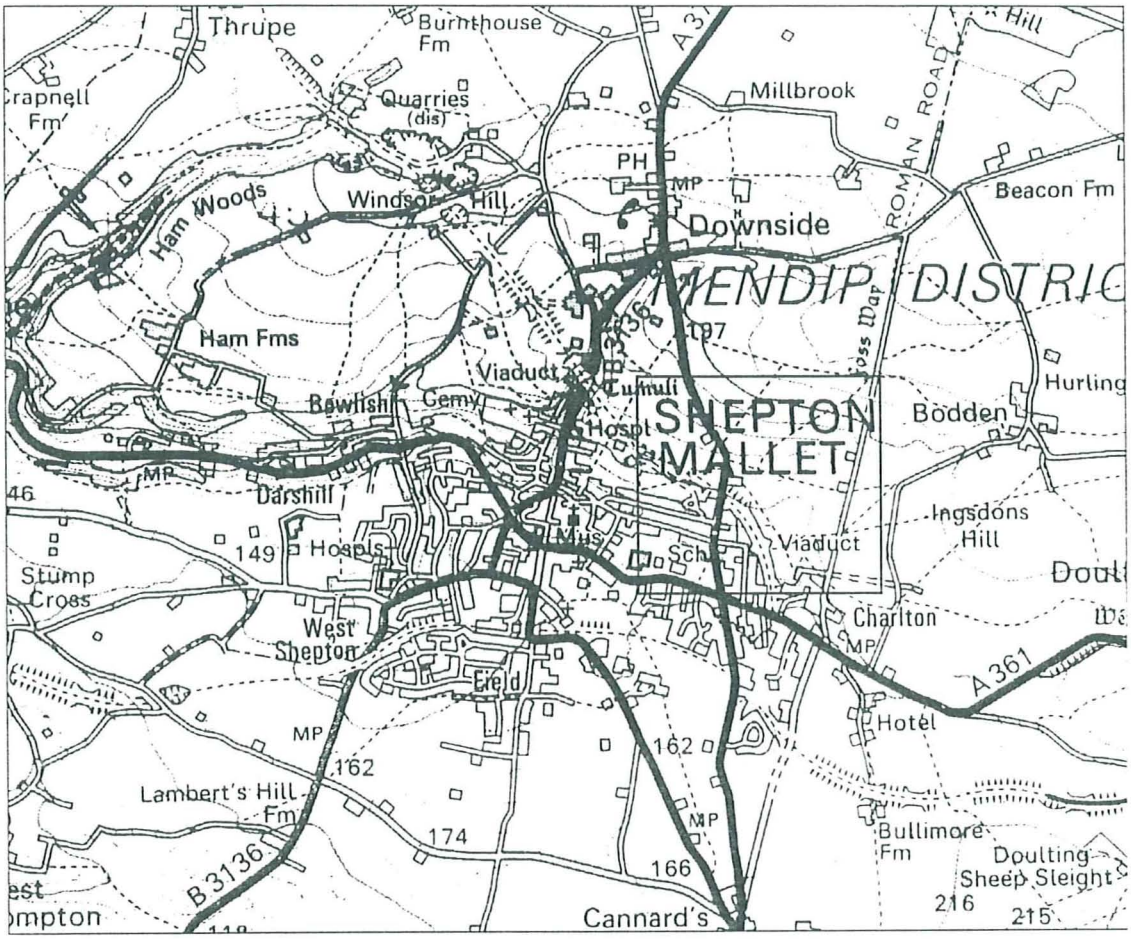

Figure 3: Second-floor plan showing locations of samples (*after SSAVBRG 1991*)

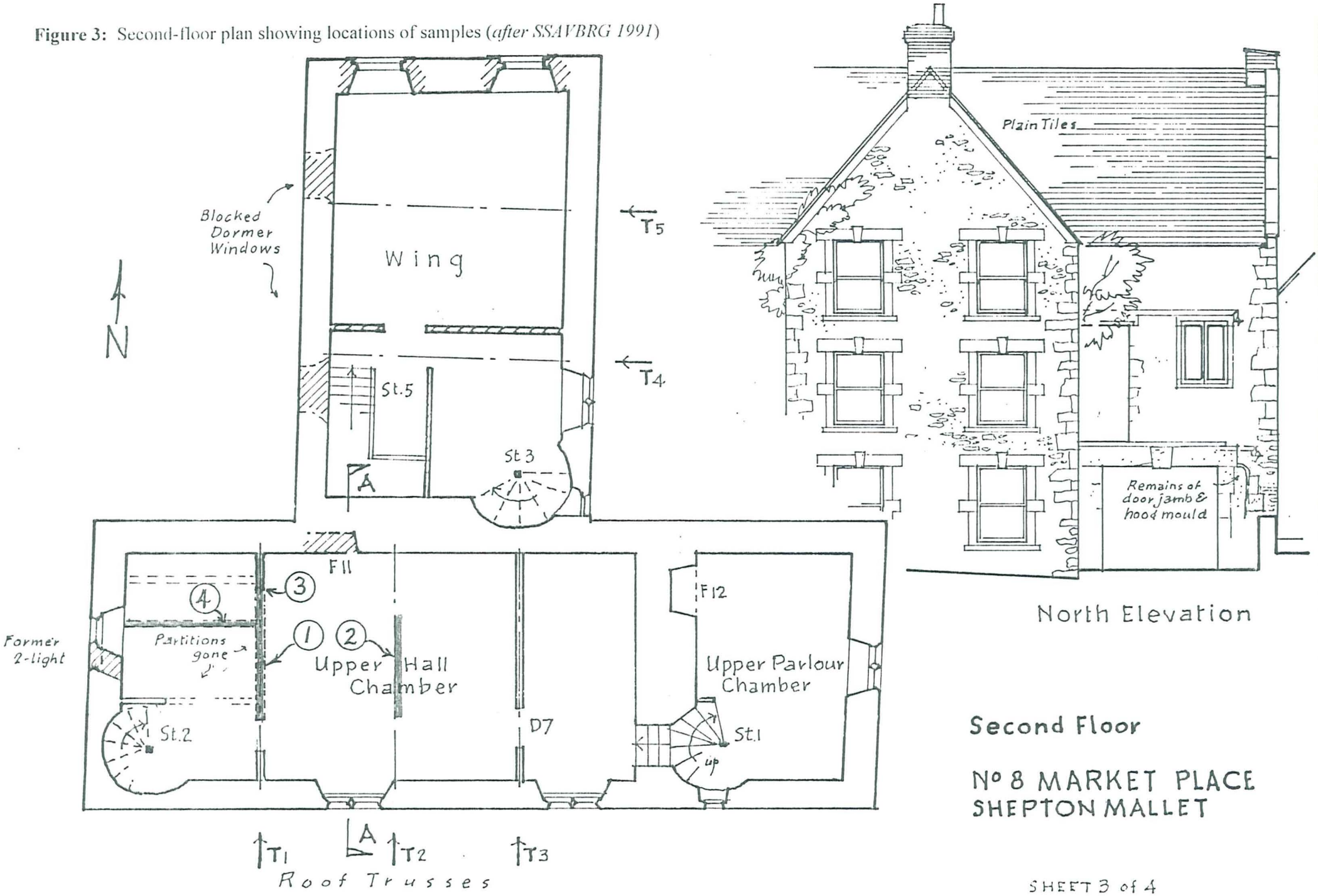

Figure 2: First-floor plan showing locations of samples (*after SSAVBRG 1991*)

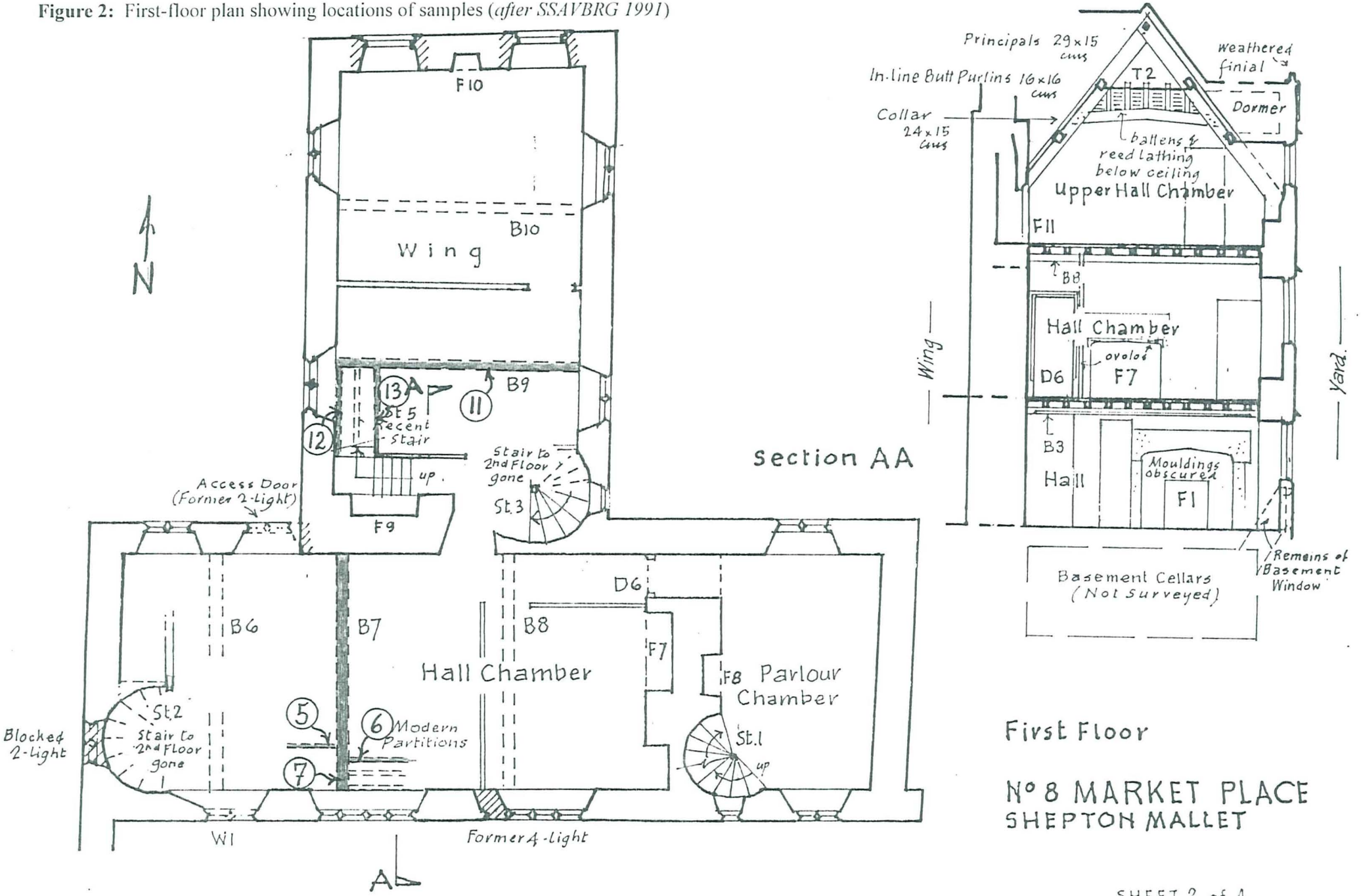

Figure 4: Sections of timbers sampled (scale 1:8)

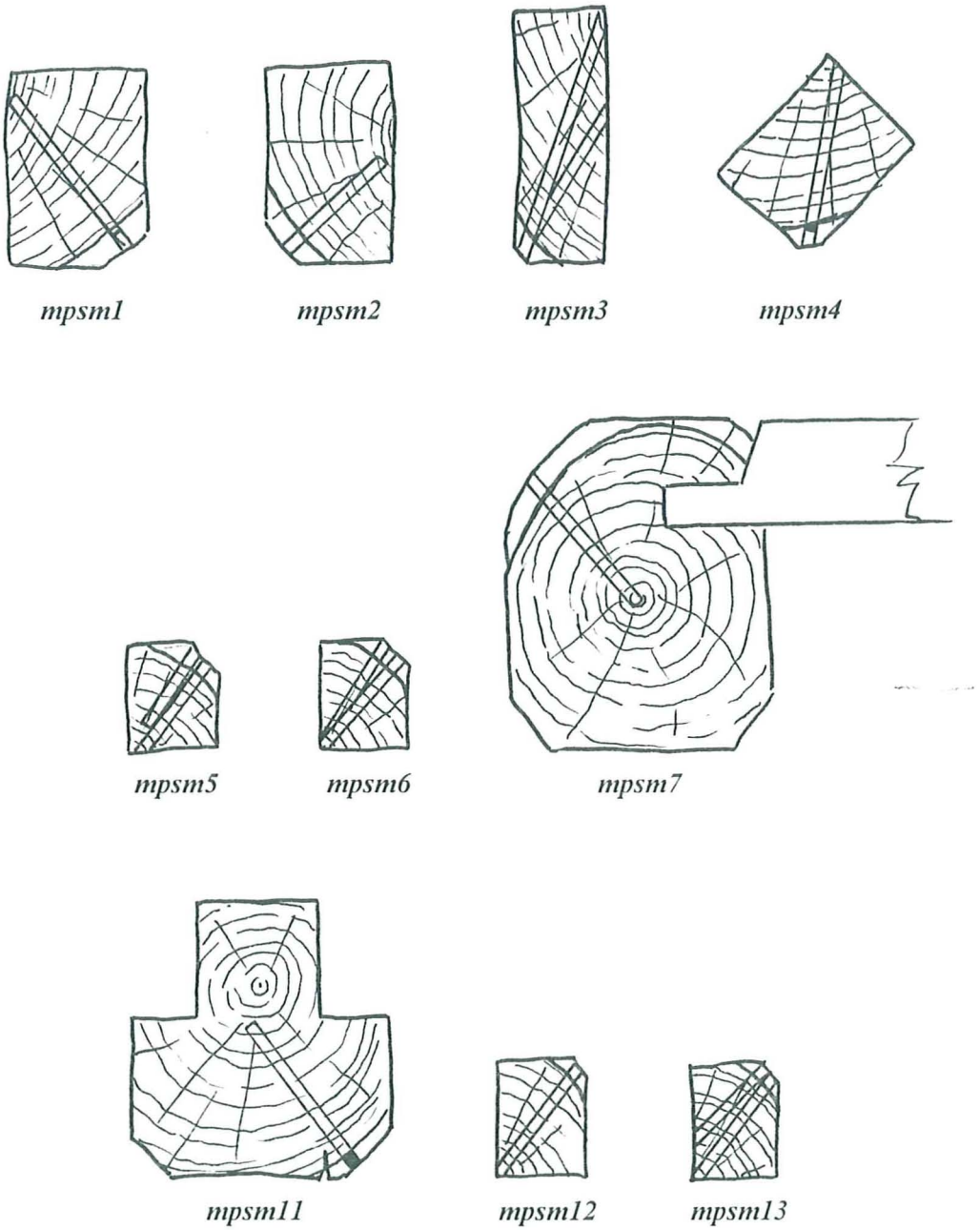

Figure 5: Dated samples in chronological position