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TREE-RING ANALYSIS OF TIMBERS FROM 91/3 CHURCH ROAD, CROYDON, GREATER LONDON

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Summary

The remains of an early crown-post truss, a rare survival in urban Croydon, were studied dendrochronologically. Previous study of the typology of this truss suggested a date ranging from the late fifteenth to sixteenth centuries. The timbers (all oak) were found to be made from fast-grown young trees, but two samples were dated. The tie beam sample (AD 1320-1377) had no sapwood on it, although careful study of the timber at the time of sampling suggests that there was sapwood on other, less accessible, parts of the beam. This suggests a felling period in the late-fourteenth or early-fifteenth century, which makes the likely construction date much earlier than previously envisaged. The central stud was made from a tree possibly felled even earlier than this (AD 1361-1393), so if this was not a re-used timber, it seems likely that the stud was part of the original construction of the truss.

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Introduction

This report details the dendrochronological investigation of the timbers at this site which were found during recent renovation work. It is part of a wider study of the building and its history, and as such, its findings may need to be amended in the light of other studies. Much of the background information contained in this section comes from a report by Walker (unpubl 1997) and from on-site discussion with Richard Bond (English Heritage) who requested the dendrochronological work.

The site forms one of a row of small shops in a street to the west of the present main Croydon shopping centre (NGR TQ 320656). The buildings appear from the street to be a mixture of Georgian, Victorian, and twentieth-century brick-fronted properties, although some long-jettied timber-framed buildings are evident at the street's east end. Evidence of crown-post trusses, set back from the present brick front wall, became apparent during the shop's recent renovations, and dendrochronological work was requested to try and date the earliest surviving parts of the building and hence establish whether the trusses represent a rare survival of a much earlier building than was previously apparent. The building has presented some difficulty in its interpretation because of the presence of a central stud, tenoned into the tie-beam. This appears to have no structural function, and could indicate either that the building was not originally floored, or that the first floor was partitioned along the length of the building (Walker unpubl 1997).

Parts of an early floor are trapped in the present wall to the adjoining property and it is not clear whether this is coeval with the truss or not. The architectural style of the timber work, with an edge-halved and bridled scarf joint in the rear west wall plate and a simple crown-post roof indicated a late-fifteenth or sixteenth-century building, with a later seventeenth-century rebuild (Walker unpubl 1997).

Methodology

The site was visited in March 1998, at which time the building was unoccupied, but being renovated. Inspection of the timbers and assessment of their suitability for dendrochronological study was impaired in some places by being covered with new plaster work, but many timbers were still accessible.

Core samples were obtained using a 15mm auger attached to an electric drill. The locations of the cores are shown in Figure 1. The cores were glued to wooden laths, labelled, and stored for subsequent analysis. The holes were plugged with softwood dowels glued into place using Evostick wood glue. The cores were prepared for measuring by sanding using an electric belt-sander with progressively finer grit papers down to 400 grit. Any further preparation necessary, eg where bands of narrow rings occurred, was done manually. The samples had their tree-ring sequences measured to an accuracy of 0.01 mm using a specially constructed system utilizing a binocular microscope with the sample mounted on a travelling stage with a linear transducer linked to an Atari desktop computer. The software used in measuring and subsequent analysis was written by Ian Tyers (pers comm 1992).

Ring sequences were plotted on translucent semi-log graph paper to allow visual comparisons to be made between sequences on a light table. This activity also acts as a measure of quality control in identifying any errors in the measurements. Statistical comparisons were made using Student's *t*-test (Baillie and Pilcher 1973; Munro 1984). Any internal site mean sequences produced are then compared with a number of reference chronologies (multi-site chronologies from a region) and dated individual site masters in an attempt to date them. The *t*-values quoted below were derived from the original CROS program (Baillie and Pilcher 1973) in which *t*-values in excess of 3.5 are taken to be indicative of acceptable matching positions provided that they are supported by satisfactory visual matches (Baillie 1982, 82-5). Any timbers not included in the site mean are tested against it to see if they crossmatch.

The dates thus obtained represent the time of formation of the rings available on each sample. Interpretation of these dates then has to be undertaken to relate these findings to the construction date of the phase under investigation. An important aspect of this interpretation is the estimate of the number of sapwood rings missing. In this instance, the sapwood estimates are based on those proposed by Miles (1997), with 95% of oaks from this area having 9 - 41 sapwood rings.

The dates derived for the felling of the trees used in construction do not necessarily relate directly to the date of construction of the floor or trusses. However, evidence suggests that, except in the re-use of timbers, construction in most historical periods took place within a very few years after felling (Salzman 1952; Hollstein 1965).

Results

A number of the smaller timbers in the upper part of the southernmost truss shown in Figure 1 and the other remaining truss were judged to have too few rings to be worth coring. This judgement was reinforced by the low numbers of rings found in those timbers which were sampled. All the timbers were of oak (*Quercus spp.*) and further details of the samples are shown below in Table 1. Comparisons between the individual series failed to give any acceptable crossmatches between the individual series. Each series over 50 years in length was then compared with a range of regional and site reference chronologies. The results for the only two series to give consistent crossmatches are shown in Table 2.

Table 1: List of samples taken from the southern truss at 91/3 Church Street, Croydon

h/s = heartwood-sapwood boundary.

Sample No	Origin of core	Total No of years	Average growth rate (mm yr^{-1})	Sapwood details	Date of sequence AD	Felling date of timber AD
CCR01	Floor beam	69	2.67	h/s	unknown	-
CCR02	Floor joist	50	2.02	h/s	unknown	-
CCR03	Floor joist	38	2.22	h/s	unknown	-
CCR04	Arch brace	57	1.92	1	unknown	-
CCR05	Lower central stud	88	1.23	1	1266 - 1353	1361 - 1393
CCR06	Post	43	3.33	none	unknown	-
CCR07	Tie beam	58	2.44	none	1320 - 1377	after 1386
CCR08	Crown post	33	2.53	none	unknown	-

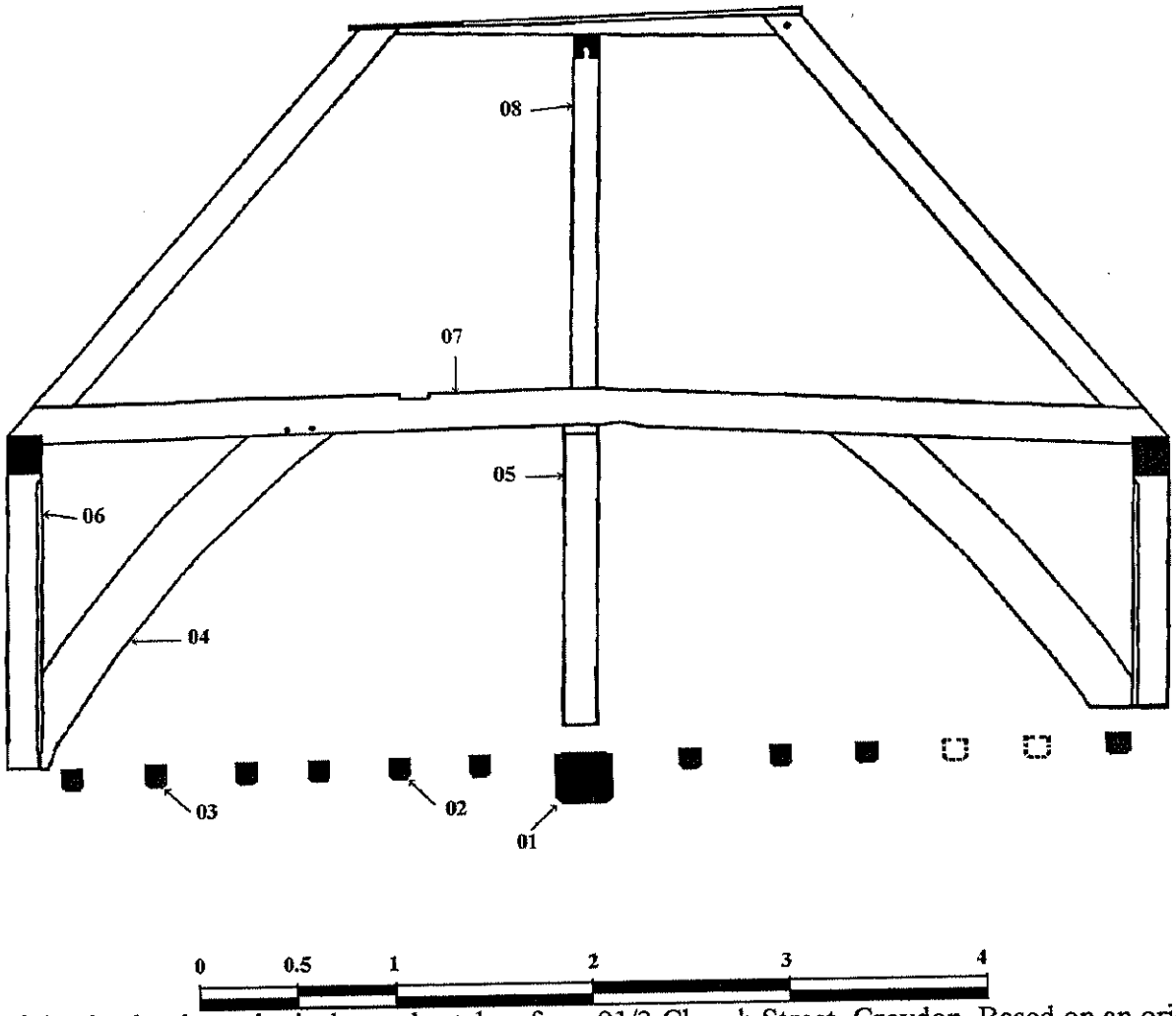

Figure 1: Location of the dendrochronological samples taken from 91/3 Church Street, Croydon. Based on an original drawing by John Walker (1997)

Cores CCR05 and CCR08 passed within 5 years of the pith. The trees used in the old framing were young trees, generally under one hundred years old, exhibiting fast growth rates.

Crossmatching between the timbers was not significant, but timbers CCR05 and CCR07 did give acceptable significant matches against a number of reference sequences (Table 2). Details of these series are given, along with the ring-widths for the undated series, in Table 3.

Table 2: Dating of the individual series CCR05 and CCR07 from 91/3 Church Street, Croydon

	CCR05		CCR07	
	AD 1266 - 1353		AD 1320 - 1377	
Dated reference or site master chronology	***t*-value**	**overlap (yrs)**	***t*-value**	**overlap (yrs)**
London1175 (Tyers pers comm)	5.4	88	7.3	58
Kent (Laxton and Litton 1989)	3.4	88	6.2	58
Hants97 (Miles pers comm)	4.4	88	5.6	58
Charlton (Miles pers comm)	4.6	88	-	-
Newdigate1 (Bridge forthcoming)	4.0	88	5.1	58
Field Place Barn (Bridge unpubl)	-	-	5.1	58
Halstow (Bridge unpubl)	-	-	4.5	58
Eastbury (Tyers 1997)	-	-	4.5	58

Interpretation

That only two timbers dated is no surprise since the construction of the floor and truss used fast-grown timbers with wide rings. The crossmatching of the longest series, CCR05, suggested a date for the outermost ring of AD1353, a position which was confirmed visually but thought to be rather weak. The shorter series, CCR07, gave very good statistical and visual matching with the outer ring having been formed in AD1377. Matching between the two individual timbers was relatively poor, but they only have 34 rings in common. They were not therefore combined into a site chronology.

One of the questions which it was hoped that this investigation could answer was whether the central stud in this southernmost truss was inserted after the construction of the main truss, or whether it was contemporaneous with it. Whilst these results do not conclusively answer this problem, since the likely felling date for the stud is during a time earlier than, or the same as, that of the tie beam, it seems likely that the two were part of the same phase of building. Although the tie beam sample did not have evidence of any sapwood, less accessible parts of the beam were noted as having sapwood. Hence, the most likely felling period for this timber is likely to be in the last few years of the fourteenth century, or early in the fifteenth century.

Unfortunately this study does not help resolve the relative date of the floor timbers which are isolated in the present wall.

Whilst only two timbers have been dated, if they are representative of the time of construction of the trusses, they do suggest a date of construction as much as a century before the earliest date suggested on building typology alone. This is a significant difference and it emphasises the importance of this rare survival in the urban south London region.

Acknowledgements

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Table 3: Details of the oak ring-width series for the dated series CRR05 and CCR07 and the undated series found at 91/3 Church Street, Croydon

Year	ring widths (0. 01mm)									
CCR05										
AD 1266						271	195	223	200	165
	152	153	183	189	182	107	131	74	54	68
	72	102	122	150	192	215	126	120	129	156
	137	173	183	159	100	115	99	67	60	83
AD 1301	108	101	73	61	89	94	118	107	106	94
	166	110	75	108	105	94	127	133	105	95
	148	129	111	87	104	80	104	109	165	128
	77	76	96	110	116	128	111	105	110	180
	139	130	120	120	165	181	99	64	58	109
AD 1351	135	141	154							
CCR07										
AD1320										193
	164	189	243	236	222	206	330	363	305	243
	162	254	274	367	328	336	313	247	309	247
	268	278	241	277	420	283	260	231	235	239
AD1351	311	231	270	267	198	164	198	180	164	171
	191	206	229	244	261	222	220	248	246	250
	186	290	223	224	185	147	155			
CCR01										
1	415	365	419	414	363	377	476	340	364	358
	333	284	305	467	389	362	234	125	178	197
	246	269	208	234	242	246	349	265	306	243
	200	212	214	188	208	284	189	249	310	290
	204	186	215	199	326	303	273	337	253	190
51	140	206	198	246	129	249	270	195	236	307
	265	281	231	183	188	201	248	212	269	
CCR02										
1	289	361	504	353	463	494	530	274	362	244
	194	155	212	234	195	215	191	190	208	171
	133	201	235	231	148	167	156	147	200	175
	146	93	95	103	116	121	106	117	92	145
	133	158	170	109	114	119	113	112	137	184
CCR04										
1	366	391	360	387	293	310	259	214	142	182
	200	343	362	207	252	264	195	136	218	189
	182	198	273	312	231	163	174	179	209	181
	202	118	116	72	59	81	105	119	186	160
	125	115	93	184	157	149	126	115	114	136
51	162	107	131	122	155	172	213			