The Cruck-Building at Corrimony, Inverness-shire

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As it stands today, the cruck-building at Corrimony[1] presents little of external interest and consists simply of rubble walls with plain openings, and a hipped roof of corrugated iron. The walling, which is no more than 8 feet in height and 2 feet in thickness, is bonded in mud-mortar and pointed with lime, and to judge from the existing openings, does not appear to be earlier than the nineteenth century. It has evidently been reconstructed as a barn, and as recently as 1972 it was in the process of being converted into a modern byre. Only the rough stone footings, and a drainage trench along the NW wall, could conceivably be older: these features may be associated with the remarkable range of cruck-frames still preserved within its walls and the later roof structure. The following study of the cruck-trusses in association with the drawings and photographs (Pls. IV, V, VI, VII) shows the workmanship to be of an unusually high quality and casts some interesting light on the possible general form of the building for which they once afforded a framework.[2]

The internal length of the building is 65 feet and is divided transversely into six approximately equal bays by five cruck-frames which span widths varying from 18 feet 8 inches to 19 feet. A hip-cruck formerly spanned the end bays, of which only the NE one survives. The base of each cruck is set within the enclosing walls, and in most instances stops short of the footings which average 2 feet 6 inches in thickness and are no more than a few courses in height. The crucks have evidently been taken down and re-erected (the two nearest the SW end having been placed in the opposite direction from the rest), presumably when the enclosing walls were built.

Each cruck-frame is composed of a pair of self-blades, slightly curved in section. They do not meet at the apex, their upper extremities being spaced apart and bridged by a curved yoke. A collar, crossing the two limbs at about the upper third, and short projecting members—spurs—some 3 feet lower down, complete the main components of the cruck. In profile each truss resembles a parabolic curve and acts structurally as a rigid frame, which was probably reinforced originally by a system of cross-bracing. The frames as they now stand have an effective clear span of 18 feet 6 inches, and average 14 feet 3 inches in their overall heights. The lower ends of the blades, however, appear to have been shortened as much as 15 inches in certain cases, and the overall height of the frames may formerly have been in the region of 15 feet.[3]

The blades are notably flat in sectional area[4] and contrary to usual cruck-practice, the shallow section is in line with the critical bending stress. The curvature of the blades (expressed as a chord from the extremities) is about 10½ inches and is slightly elbowed at about spur level. It then straightens out with a slight taper towards the top, in some instances tending almost to the reflex at the collar point, an impression accentuated by a notch cut on the back of the blade immediately above the collar joint. What is truly remarkable, however, is that the blades do not appear to have been selected from a tree of natural curvature, but rather have been shaped from straight trunks of Scots fir. The work has been executed with an adze, used with the utmost precision to obtain squared edges and an immaculately dressed surface on the sides and soffit. The base of each blade, including the hip-blade, has been pierced through the flat section with a circular hole, drilled at right angles to the curve and therefore slanting slightly upwards to the back face. In most cases the hole survives at heights from the base varying from 15 inches to as little as 1 inch. The blades are gently tapered towards the top, and terminate with the butt ends neatly bevelled off. In addition, the uppermost 18 inches or so of the blades are more sharply tapered on the back to form a flat area contiguous with the yoke member beneath.

Unlike the cruck-blades, the yokes have been carefully selected from branches of the tree exactly following the grain, in order to provide a sound structural link between the two main members. With the exception of cruck V, where the yoke is knee-shaped and of slightly lighter section, the yokes, aided by their natural form, are pared and shaped to a rounded profile. They are thicker in section at the crown, where the carpenter evidently recognised the need for it to be the strongest, and are tapered towards their extremities. The back surface (extrados) of the extremities has been dressed meticulously flat in order to correspond with the adjacent surface of the blade, with which it overlaps in lengths ranging from 18 inches to 36 inches and forms a neat scarfed joint. The two members are fixed together by five stout pegs (excepting cruck IV which has six) which are disposed domino-fashion to take full advantage of the available bearing area and to minimise any splitting. They are not the normal dowels of uniform thickness used for mortice-and-tenon joints, but are larger and wedge-shaped over their length, and are roughly squared or octagonal in section, with knob-like heads to avoid splintering when being hammered home. Passing loosely through the first member, they have been forcibly driven through the second, and the protruding ends are hammered flat. virtually forming a rivet. This locking effect is further improved by the technique of driving the outer pairs of pegs through in the opposite direction from the centre one, the former being driven in from the underside of the yoke. The crown of each yoke is pierced with a vertical mortice, cut to receive a stout wedge driven in from above, with the long dimension in line with the yoke. Two wedges (crucks II and III) remain *in situ*. An auger appears to have been used as a first stage in cutting the mortice, of which the shoulders in some cases retain the turning marks. In the case of cruck II a peg has subsequently been driven through the SE side of the wedge, evidently as a

tightening device. The yokes are also pierced with a peg-hole at right angles to the curve and about 3 inches above the butt end of the cruck-blade. They evidently carried three-horizontal members: a ridge-tree secured by the wedge-mortice, and on either side, a ridge purlin, held in position by a peg and the angle formed between the butt end of the blade and the back of the yoke.

The other important transverse member is the collar, the ends of which are extravagantly half-lapped through the blade sections thereby reducing the structural strength of both members by half. The ends project beyond the outer face of the crucks by about 16 inches to provide support for roof purlins. The flat rectangular section of the collars corresponds with that of the blades with which they are neatly jointed on the outer face. The joint between the two members is secured by a dowel-pin through the side and by another driven slant-wise through the back of the blade into the continuous portion of the collar. The projecting ends are neatly bevelled off, and the bearing surface is normally pierced with two peg-holes (but occasionally three or four) for the purpose of securing the horizontal members. A shallow notch cut in the backs of the blades 6 inches above the collars allowed a closer junction with the purlins which were probably of rectangular section. A dowel-hole of about $1\frac{1}{8}$ inch diameter also occurs on the sides of each collar near the centre.

About 3 feet lower than the collars, spurs, or short projecting pieces, are notched into one side of the blades. They project rather more than the collars and as well as being set flush in the side of the blade with a pinned dovetail joint, they are tapered longitudinally in order to attain further a tight lock. The spurs which survive have at least two vertical peg-holes spaced along their length and in one or two instances the holes are doubled up to provide a group of three or four. Compared with the collars, the holes tend to be spaced wider apart along their lengths, conceivably because there were two lighter longitudinal members at this level, set in parallel. Two of the spurs retain small levelling chocks pegged on to the top surface. A significant point about the spurs is that notwithstanding their considerably cantilevered ends, they stop appreciably short of a vertical line extended upwards from the base of the back of the blades.

On the face of the cruck-blade on which the spur and collar-joints occur there is also a system of peg-holes, consistently spaced about 30 inches (measured along the cruck-blade) above and below the centre line of the collar. They do not penetrate right through the blade, and in general the drilling operation appears to have been preceded by indentations $1\frac{1}{4}$ inch square by $\frac{1}{8}$ inch deep cut with a chisel. If these holes are joined together diagonally from blade to blade, their intersection coincides approximately with the dowel-hole in the centre of the collar. The five points would therefore appear to be related and perhaps imply a system of superficial cross-bracing on this side of the blade.

The last member to be noted of the surviving framework is the cruck-blade forming a hip-roof at the NE end. In shape and profile this is similar to the coupled blades, and

it likewise has a spur affixed to its side at the same level as the others and the remains of a peg-hole at its base. The upper extremity has been cut at an angle in order to form a plane parallel with that of the yoke-soffit of the adjacent cruck-frame, against which it leans, and to which it was evidently intended to be secured by a single peg driven up vertically into the collar. This does not appear to have proved an adequate fixing and, subsequently, perhaps when the frames were re-erected, a cross-bar has been slotted through the blade about 18 inches from the top, so that the ends lean on the adjoining cruck-frame.

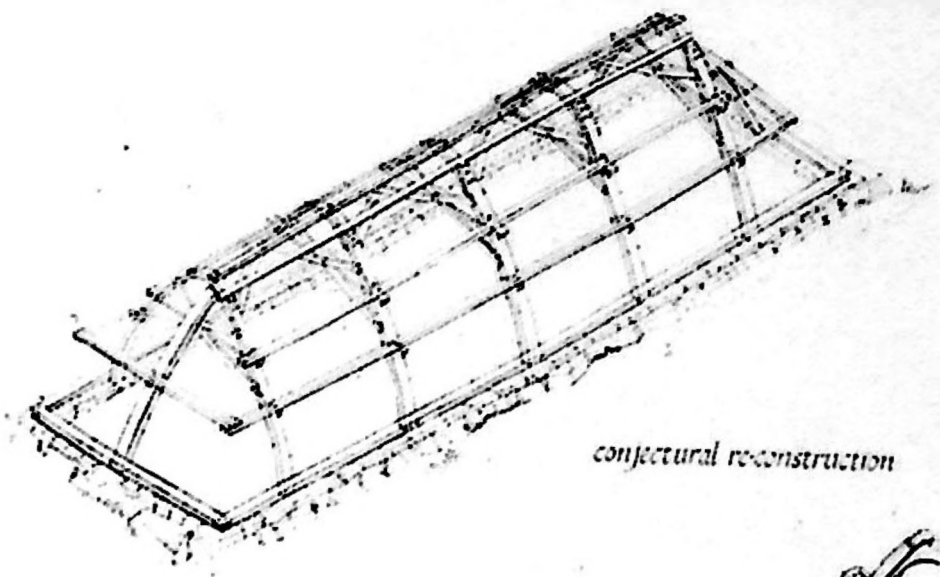
All the timberwork, including such small components as the pegs and dowels, appears to have been executed in Scots fir or pine.

From the above evidence it seems apparent that the cruck-frames were the primary agents for transmitting the roof load to the ground and, as will be seen, they probably supported the walls as well. The carpenter's design was presumably influenced by the need to obtain the considerable span, and to some extent he solved this problem by resorting to the laborious task of shaping the blades from the solid tree, in order to obtain members of sufficient length and curvature for the purpose. The other expedient was to adopt the curved yoke—virtually a small 'monolithic' cruck in itself—in order to space the blades further apart. Evidently he also saw the need for keeping the frame entirely rigid, if, in addition to the efficient joint between blades and yoke, it may be assumed that there was cross-bracing. The result, in effect, was to produce a strong, triangulated frame, capable of withstanding superimposed loads and any lateral movement.[5]

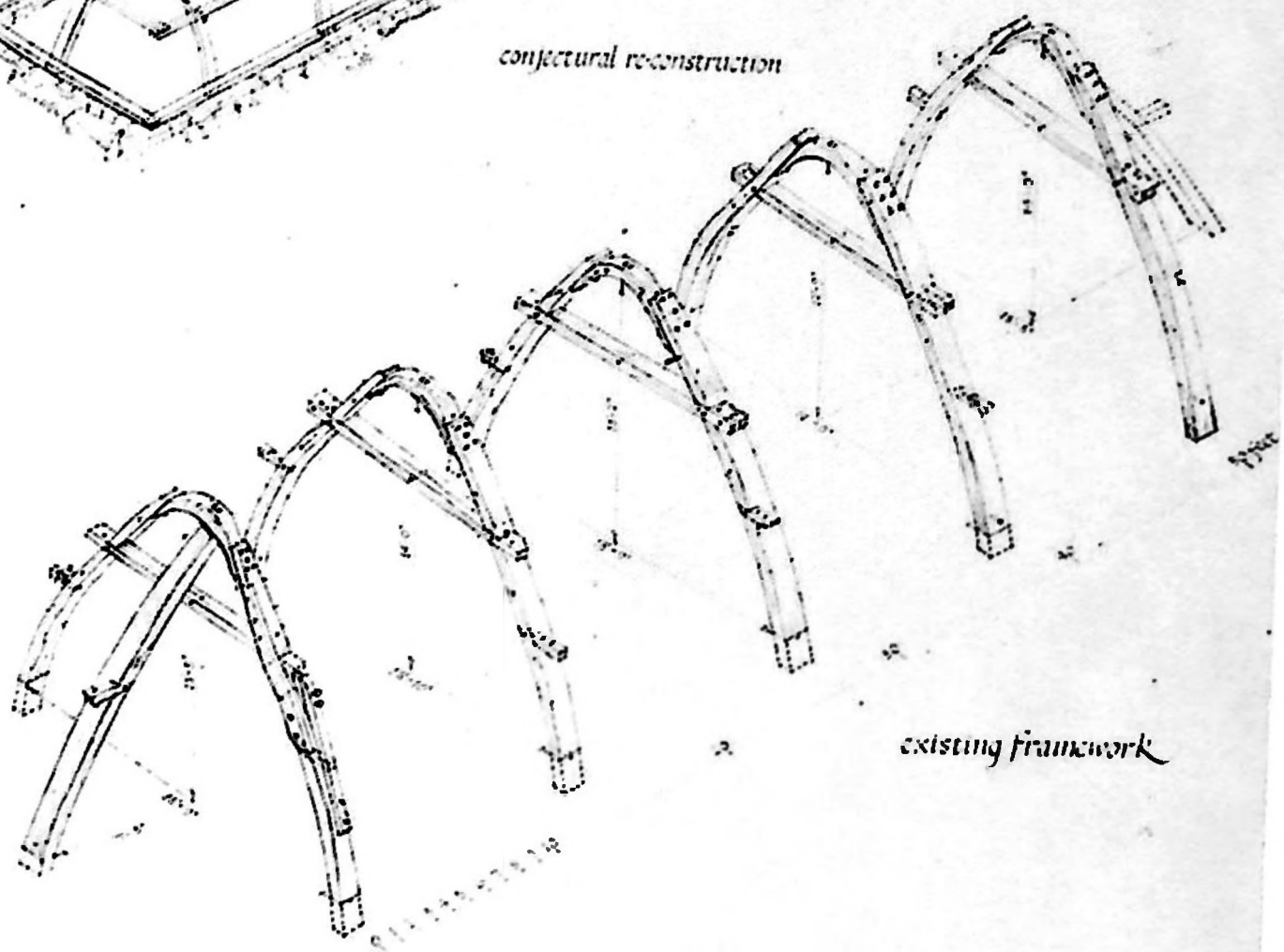
Such structural properties would also be of importance if, in common with traditional cruck-frame practice, the framework was assembled on the ground and then reared as a rigid unit.[6] Assuming this to be so, the cross-bracing (whether temporary or permanent) and the firm pegging between yoke and blades would be essential for resisting torsion. The side of the blades which receives the collar, the cross-bracing and the spurs, would represent the direction of assembly; and it may further be supposed that the frames were erected in succession from one end, with a hip-cruck serving conveniently as a prop for maintaining the first frame in position. Thereafter, the ridge pole and purlins would be utilised as distance-pieces and steadying members in the process of erecting consecutive frames (see drawing).

Before the feet of the blades were foreshortened they were probably set on padstones or possibly on the existing footings. The through-holes believed formerly to have been situated about 18 inches above the base of each cruck, probably testify to the existence of a sill-beam pegged to the back of the blade (see drawing).

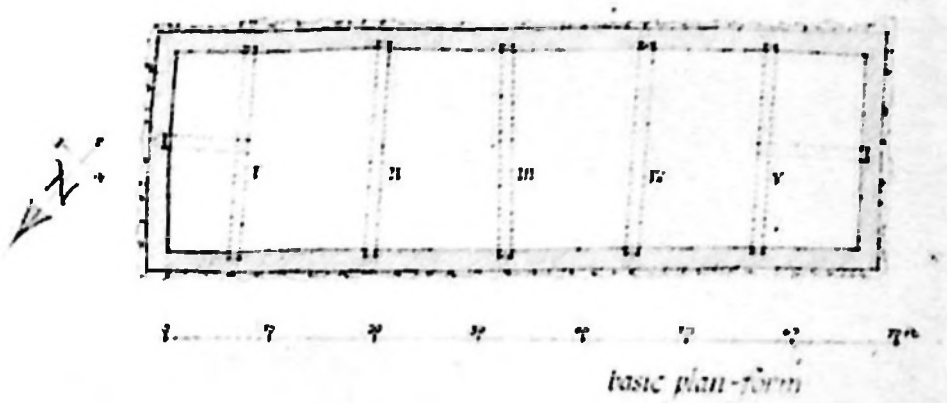
No horizontal members survive, and, like the suggested sill-beam, their nature and disposition can only be deduced from an examination of the bearing points situated at the crown and the sides of the yoke, the projecting ends of the collar and spurs, and the



conjectural reconstruction



existing framework



basic plan-form

Cruck-framed Building, Corrimony, Inverness-shire

plan and reconstruction to half-scale

PLATE IV Cruck-building, Corrimony, Inverness-shire: survey and reconstruction drawings.

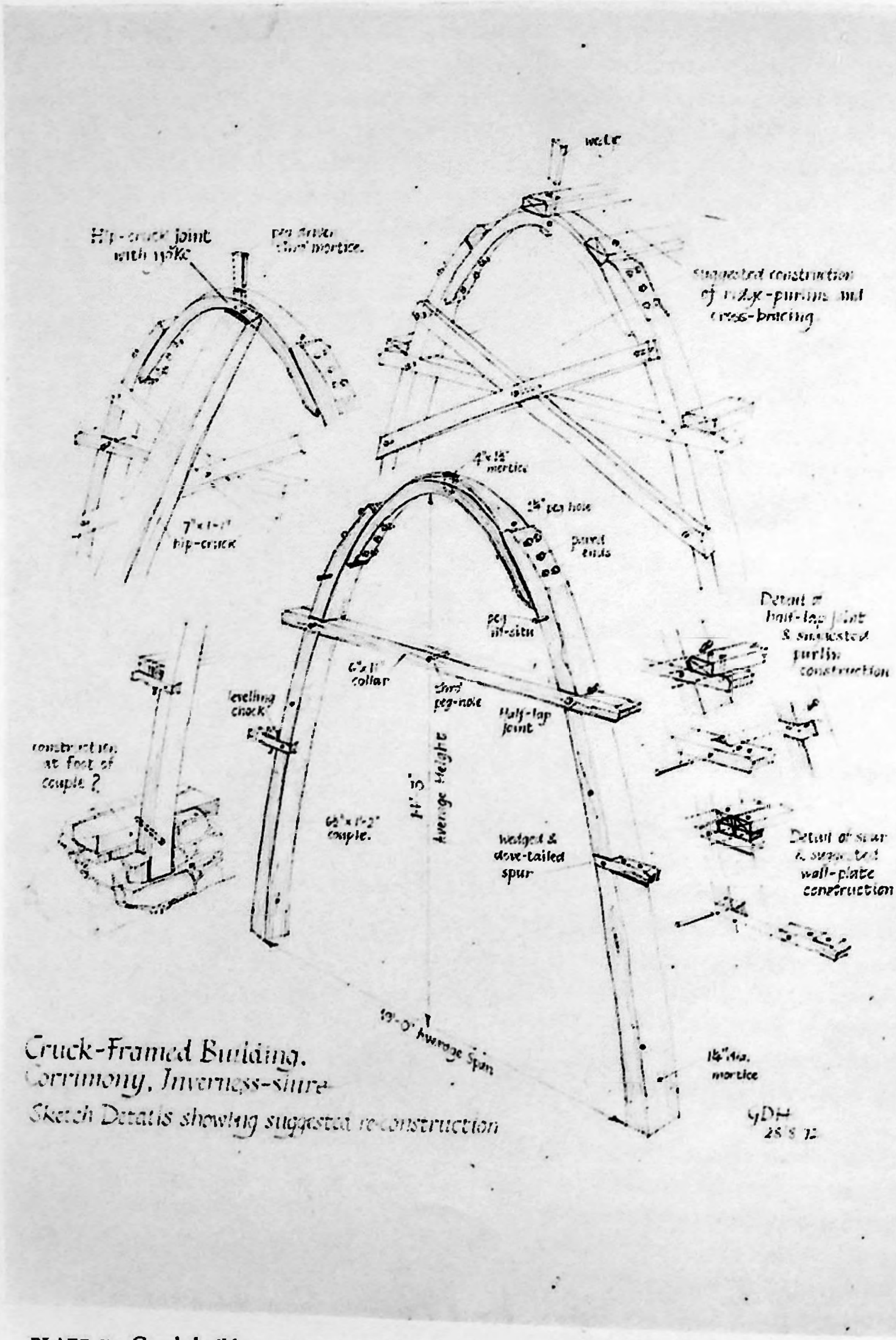


PLATE V Cruck-building, Corrimony, Inverness-shire: survey and reconstruction drawings.

PLATE VI Cruck-building, Corrimony, Inverness-shire: interior from NE.

hip-cruck and junction with cruck I

(above) cruck base and mortice-hole (NW blade, cruck V)
(left) collar-joint and bracing peg (NW blade, cruck III)

PLATE VII Cruck-building, Corrimony, Inverness-shire.

associated peg-holes for holding them in position. But from this evidence it may be assumed that the longitudinal members consisted of a ridge pole, and side purlins mounted on the yoke and the butt of the blade: lower down, purlins are mounted on the collar projections, and on the cruck-spurs. These members, which facilitated the initial erection of the frames, had the more permanent function of providing structural stability, hence the strong pegging, and, of course, the important function of carrying the roof itself.

On the present evidence it is only possible to speculate on the nature of the external covering to walls and roof, but certain features give important clues to its general form. The curved yokes and the disposition of associated ridge pole and purlins indicate that the ridge had a rounded profile, and that likewise, the roof continued down over the lower purlins in the form of a convex curve. Beyond this point, if it may be assumed that the spurs carried the wall plates, the roof would give way to some form of walling. However, as already noted, the spurs do not project sufficiently outward to engage with any vertical wall built up from the sill-course, and therefore if they were an integral part of the wall construction it must have leaned inwards with a considerable batter. On this hypothesis, there would have been little visual distinction between the profile of walls and roof, and combined with the hipped ends, the general shape of the building must have been hog-backed almost down to ground level.

The roof would presumably have been thatched with turf or straw, bedded on a groundwork of roughly shaped rafters or branches, with a counter-layer on top. It is perhaps of more interest to speculate on the nature of the walling.

Since it has been demonstrated that a solid vertical wall, of mud, turf or stone, would not connect with the spurs, it seems reasonable to suppose that the walls were of a lighter material in the form of external cladding attached to the cruck-framework. Conceivably, they were of wattle and daub, or, having regard to their incline, wattle as a groundwork with turf divots laid in overlapping courses in the manner of slates.

The date and purpose of the building, as it formerly existed, is not known, and these notes and drawings mainly serve to place the surviving structure on record. What cannot be disputed, however, is that the cruck-frames at Corrimony are superior both in the size and span of their timbers, and the quality of their carpentry compared to other surviving examples in Scotland.[7] A feature of special interest is the yoke, which, by reason of the careful attention given to its span, curvature and jointing, appears to have been designed as a structural extension of the main cruck profile rather than as a bridging-member of the short-yoke or saddle type. The disposition of the cruck-blades, with their shallow sections in the direction of critical stress would appear to be quite unorthodox, but it probably derives simply from the carpenter's need to extract a long, curved blade from a relatively straight trunk within the limits of its girth. The lengths and nature of the timbers available do, of course, raise other important considerations, which may well have influenced the design and workmanship of the cruck-frames at Corrimony.[8] For in a region traditionally endowed with rich supplies of oak and pine,[9]

the local carpenter would certainly be allowed far more scope with regard to the liberal applications of timber to buildings and in the advancement of his craft.

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NOTES

1 Now part of a later farm complex, whose buildings range in date from early nineteenth century onwards, it is situated about 130 yards SW of the farmhouse known as the Grange, and about 100 yards south of Corrimony House (NGR NH 376305).

2 The research was conducted on behalf of the Royal Commission on the Ancient and Historical Monuments of Scotland, and this account is published by courtesy of the Commissioners. Photographs, original survey drawings (of which a selection is illustrated here at a reduced scale), and a detailed technical specification, are available for reference in the archive of the National Monuments Record, Edinburgh.

3 This calculation is based on the evidence of cruck II, whose SE blade extends at least 15 inches into the wall below a mortice-hole, one of a series formerly penetrating all the cruck-bases at a common level.

4 The dimensions of the blades and other components subsequently referred to in this article may be summarised as follows:
Blades: The sections range respectively in width and depth, from 12½ inches by 7 inches to 15 inches by 8 inches at base, and 10½ inches by 7 inches to 14 inches by 7 inches at top. The through-holes near the base range in diameter from 1 inch to 1⅜ inch.
Yoke: The section at the crown averages 12 inches in width by 6 inches in depth. The crown mortices average 4 inches in length by 1½ inches in width.
Collars: The sections range respectively in width and depth from 9½ inches by 5½ inches to 12 inches by 5½ inches. The collar-ends project about 15 inches.
Spurs: These are cut from a 6 inch wide by 4½ inch deep section; their length ranges from 19 inches to 26 inches and the ends project from 15 inches to 18 inches.

5 Drawings in NMRS archive: two diagrams illustrate respectively the true structural behaviour of the stresses on the cruck-frame and that probably envisaged by the carpenter.

6 F. W. B. Charles in *Medieval cruck building and its derivatives* (Society for Mediaeval Archaeology, Monograph Series No. 2, London 1967), discussed the methods of assembling and rearing crucks in England.

7 C.f. R.C.A.H.M.S., *Inventory of Stirlingshire* (Edinburgh 1963) II:384–5; J. G. Dunbar, 'Pitcastle, a cruck-framed house in Northern Perthshire', *Scottish Studies* 4:113–17; G. Stell, 'Two cruck-framed buildings in Dumfriesshire', *Dumfriesshire Transactions* (in course of preparation).

8 The trusses of a small cruck-framed cottage at Morile Mor, Tomatin, Inverness-shire (now demolished) had a maximum, clear internal span of 14 feet 9 inches. In this case the cruck-blades were abbreviated above an upper collar and supported a rafter superstructure in which the principal rafters were crossed at the ridge. The peculiarity of this form of base-cruck construction and the internal clear span, considerable for a cottage of this type, may perhaps be explained by the nature of the local materials used, Scots pine being more readily available of course in straight rather than curved lengths. Measured drawings, photographs and a description of this building are in the NMRS Archive.

9 See William MacKay, *Urquhart and Glenmoriston, Olden Times in a Highland Parish* (1893: 448–9).