TIMBER FRAMING

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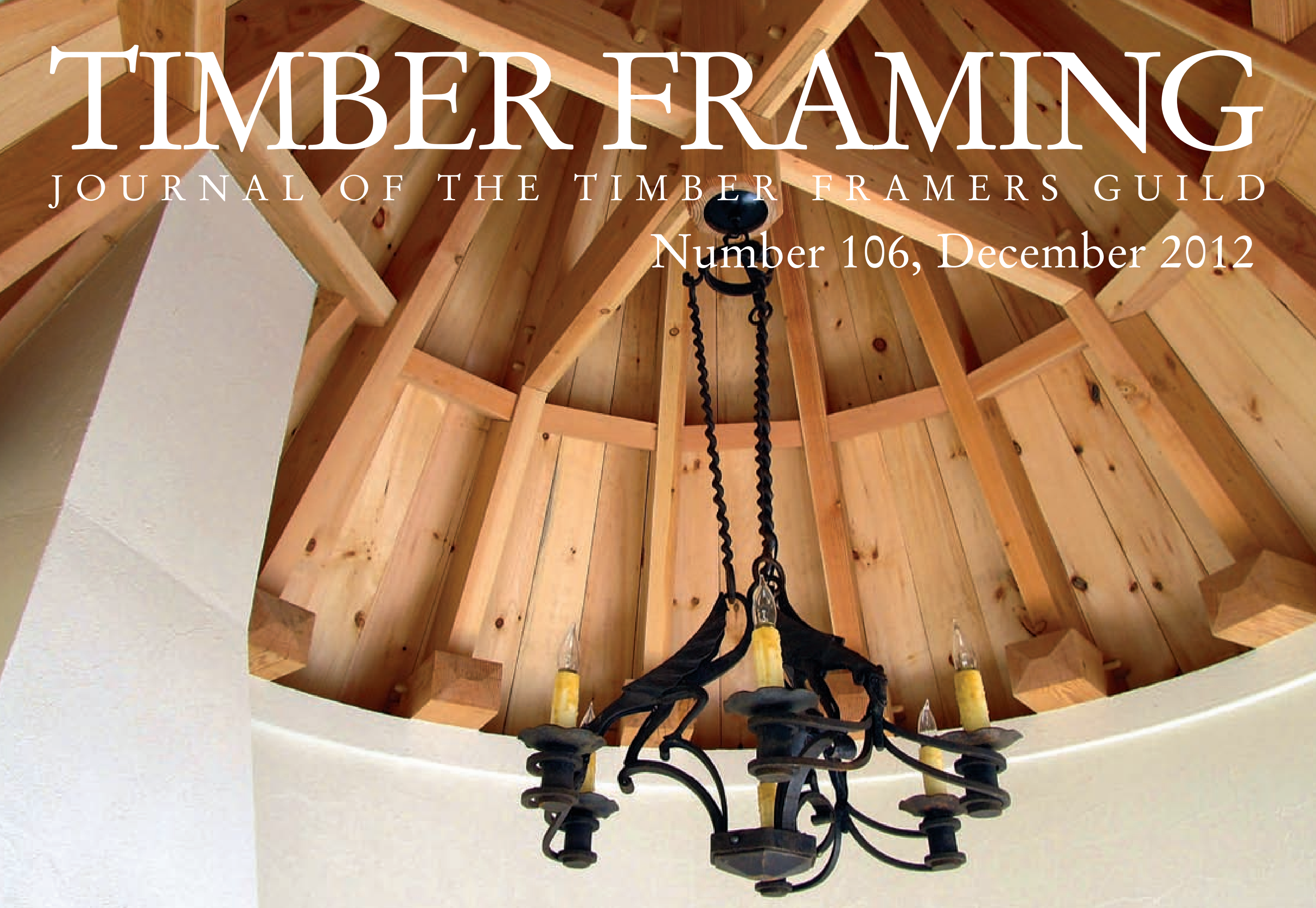

Conference Slide Shows 2012

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On the cover, two conical domes shown at 2012 Guild slide shows. Top, 12-ft.-dia., 16-facet Douglas fir dome over a brick folly in Wilmington, Del. Project design by Rodney Robinson Landscape Architects, timber work by Jack Witherington. Photo Rodney Robinson. Bottom, 18-ft.-dia., 24-facet, Douglas fir dome, part of a 1400-sq.-ft. covered patio, Glendora, California. Timber cut by Fraserwood Industries; structural design, CAD drawings and assembly by Pacific Post & Beam. Photo Terry Turney. On the back cover, ancient Swiss method of securing roof shingles. Photo David Bahler.

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TIMBER FRAMING, Journal of the Timber Framers Guild, appears in March, June, September and December. The journal is written by its readers and pays for interesting articles by experienced and novice writers alike.

1985

POEM

What I Want to Remember

ALL summer my hands strengthening
from good tools in wood—
a texture that gives in, resists, and gives.
All year the changing, mostly the trees',
the milky sap squeezed out beneath a chisel
slicing across seasons once spun
through trees now turning
into posts and beams.

The living, the still-growing trees,
and sometimes a secret dark moon—
the dense root of a branch
begun here—knotted so deep
within, so long ago, that I am ashamed
to have revealed it. How I worked carefully
around the whorl, but firmly.
How I thought those times of what radiates
from such a particular, invisible center.

The trees, the wood, the home that we are making,
the green and gold still wheeling
around the heart. This day
when the slow work of years and days
was raised upright like a forest or a house
of prayer, and held together,
surprising and true.

And I want to remember the air
alive like this with leaves, a threnody
of other trees ringing their leaves
through clear September air;
and our hewn hemlock, perfectly joined,
rising through the wild-wind colors
of the best and brightest and saddest season,
and the whole horizon opened up and calling
from the mountains to the rafters.

When there was a little rain,
and a little sun, and later a slight
and sickle moon that rose up high through the purlins
as if to cut clean the ribbons of grain,
as if the changing weather might scrub and shine
the bones of a home that lives
beneath the blessing sky.

—Alice B. Fogel

Alice B. Fogel (www.alicebfogel.com) is the author of Be That Empty, *a poetry best seller in 2008, and* Strange Terrain: A Poetry Handbook for the Reluctant Reader *(2009). A teacher, writer and custom clothier, she lives in Acworth, New Hampshire. This poem, inspired by the raising of her house in 1988, was collected in* Elemental *(1993).*

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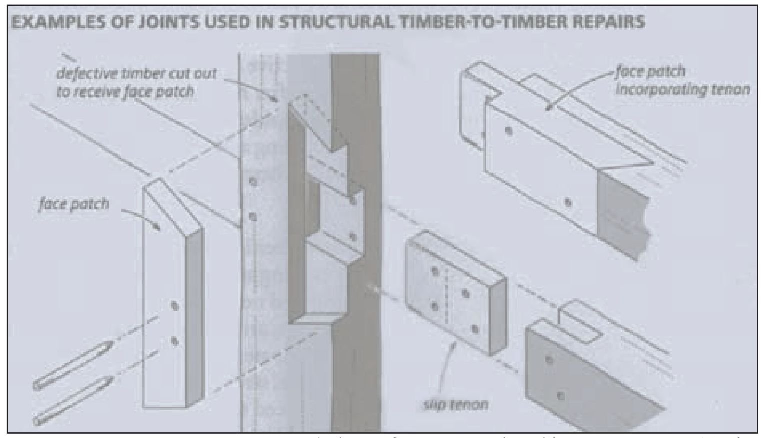
Repair and Conservation



Drawing and photos from *Practical Building Conservation: Timber*

Practical Building Conservation: Timber, by English Heritage, edited by Iain McCaig and Brian Ridout. Farnham, Surrey, UK, Ashgate Publishing, 2012. 9 x 9.75 in., 487 pp., profusely illustrated. Hardcover, $129.95.

TIMBER framers and other woodworkers who repair old buildings might when in need consult a variety of independent works on wood science, wood decay and repair methods, so it's convenient to find these three subjects treated in considerable depth in one volume. The subject matter is British buildings but the materials, the problems of damage and most of the methods will be recognizable to American workers. (The publisher in fact maintains a US office in Burlington, Vermont.)

Iain McCaig and Brian Ridout, editors and principal authors of the book, are senior architectural conservators at English Heritage, and Ridout, a biologist, is author of *Timber Decay in Buildings: The Conservation Approach to Treatment*. The many contributors to the volume include Richard Harris and Henry Russell, names that some Guild members will recognize.

English Heritage, a very large organization that owns and manages historic buildings throughout England (not the UK) and receives both government and private funding, also manages a building-record archive of some 12 million documents and publishes bulletins and books. Its Practical Building Conservation series published thus far includes *Glass and Glazing*; *Metals*; *Mortars, Renders and Plasters*; *Stone*; and the present work, *Timber*. Spring 2013 will see the publication of *Conservation Basics*; *Building Environment*; *Concrete*; *Earth, Brick and Terracotta*; and *Roofing.*

Timber is divided into four major sections, each about 100 or more pages long—materials and history of use, including tools; deterioration and damage; assessment; repair and treatment—plus a short chapter on care and maintenance (keep water away!), and a glossary. The deterioration section naturally has the most grisly photos, with portraits enlarged to a suitably frightening degree of the countless organisms that threaten the health of wood in service.

The book has clear (if somewhat fine-lined) drawings and particularly beautiful photos. For a technical manual, it inspires an irresistible urge just to leaf through it. The reader aware of modern occupational health and safety standards may be startled by a remarkable full-page photo of Westminster Hall under fumigation, perhaps in the 1960s, with thick clouds of "insectidal smoke" rising to the rafters from ejectors on the floor while a man in a white coat (could it be Alec Guinness? or Alistair Sim?) smokes a pipe and observes, and six other men, entirely unprotected, tend the ejectors or walk about unconcerned. The authors remark that the treatment at the hall was "used for many years, but there is no evidence that it had any significant effect on the beetle population."

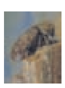
A sequence of pictures in the repair section (p. 350) raises a good question. A car collided with a functioning 12th-century cathedral gate, damaging about a sixth of its extent. The craftsman's procedure religiously observed the principle: conserve all possible original fabric. The result on the front of the gate is a crazy quilt of glued-together old bits and a few new ones in the affected paneling, and fastened on the back a prominent steel grill work reinforcing the affected framing. Why not, a craftsman might ask, do as a 12th-century framer would have done if a heavy wagon had struck the gate with the same result? Since most of the gate remained good and it was a functioning object, it could have been repaired in kind with new paneling and new framing where needed. That would have left the gate looking much more like it had originally looked before the car struck, the newer wood testifying to the historical facts of the collison and the repair. Is conservation of something relatively old always properly archaeology, or is it sometimes properly repair?

—Ken Rower

At top of page at right, typical technical drawing, here of correct elementary repair methods for mortise and tenon connections.

Above at immediate right, the death watch beetle, England's most famous insect, shown actual size, at work.

At immediate right, folding wedges and gibs tighten straps in historic trusswork. Middle right, stainless steel flitch to insert in beam shortened because of decay, far right, and restore bearing in masonry wall. Bolt holes just visible on right side of flitch.



Photos David Bahler

1 Typical Oberland house, built 1776, with plastered masonry walkout cellar, squared log construction above, usually of fir or spruce.

Houses of the Berner Oberland

SWITZERLAND'S Berner Oberland region is a natural wonder, with towering mountain peaks, steep valleys and turbulent rivers running with crystal clear waters, and the geography of the region makes it a popular tourist destination. Any visitor with an interest in wood construction or vernacular architecture, however, should turn for a few moments from the natural beauty of the Bernese Alps to the marvelous examples of craftsmanship in solid wood that dot the mountainsides.

The western half of the Berner Oberland can be divided culturally and architecturally into two distinct regions: the Simmental and the Frutigland. The Simmental is the region of the Simme River and its tributaries, home to such popular tourist traps as Gstaad, Saanen and Zweisimmen. The Frutigland in contrast has been a poorer region historically and is far less known than its neighbor to the west. But it is in the Frutigland that we can find one of the most spectacular vernacular building traditions in the world—called in the local Swiss German dialect the *Frutighus* or *Frutigtyp*.

Houses in the Berner Oberland, and the Swiss Alps in general, are built using the technique known in German as *Blockbau*. Squared timbers are stacked on top of each other, fitting tightly so that the entire wall bears all structural loads, not just a few points (Fig. 1). Usually invisible, stout pegs 6 to 8 in. long are fitted between the timbers every 2 to 3 ft. In times past, these timbers would be hewn to follow the natural taper of the original trees and then carefully laid up in an alternating pattern in the walls.

Corners are joined with a passing lap joint, secured with pegs on the outermost portion of the wall (Fig. 2). This simple joint can be modified with additional housing faces to prevent drafts.

On larger structures, the successive log courses of intersecting walls are set at alternating heights allowing the joint to bear shearing forces and thus removing shear load from the pegs. On smaller structures, the pegs are capable of handling this load, but by alternating the timbers so that corners interlock, the pegs bear no loads whatsoever.

The interior walls of these houses are joined to the exterior walls using the same lap joint, or in some cases half of the timbers employ the lap joint and pass through to the outside while the others are joined to the walls with a blind lap or dovetail (Fig. 3).

On structures of any appreciable size, joining the interior walls in this manner is not only an attractive architectural detail but a structural necessity. These walls serve to brace the shell of the structure and keep the exterior walls from bending outward over time (Figs. 3 and 4). Fig. 7 shows an alternative stiffening method.

Long log walls with no median support are unstable and over time they deform. There may be no roof thrust but there are live loads. For example, significant wind loads created by the massive roofs do cause walls to bend over time if they are not held solidly by intersecting walls or tying beams.

The system of horizontal joinery creates a strong and durable structure, but the genius of the Oberland style lies in the clever incorporation of posts, reinforcing what might otherwise be weakness in the structure at door and window openings and lending versatility to the entire system. The posts are cut shorter by a calculated amount than their original spaces to account for the expected settling of the horizontal timbers.

As the squared logs in the walls shrink and settle, the gaps at the tops of the posts close or nearly close. These posts, however, are not designed to bear loads, rather to terminate log ends and to fit—just—the ultimate height of the opening (Fig. 5). They must not be too long lest they force open the settling wall. Old buildings can attest to the great skill of the carpenters in this regard, showing perfect fits after all settling and shrinkage has occurred. Such posts secure the tenons at the ends of the wall timbers and are held in place top and bottom by unfastened stub mortise and tenon joints. The wall timber tenons float freely in the grooves.

With this framed-opening system it is possible to have a great many windows. The posts are typically the same thickness as the wall but, in some cases such as animal stalls or parts of the house not often seen, they may be several inches thicker than the walls and the horizontal timbers can join them in their full thickness (Fig. 6).

On the interior, posts are used to support floor and roof loads and to help frame interior walls. Posts might be used for wall intersections in the interior of the structure instead of the more laborious lap joints on the exterior, and again must be cut short to account for settling of horizontal wall timbers. The interior of structures with such arrangements is then essentially framed rather than log built (Fig. 8).

2 A form of *Blockbau* construction near Reichenbach im Kandertal, showing lapped corner joints, here with gaps between the courses for ventilation of hay. Pegs seen at laps recur frequently between courses in walls. Mid-19th century.

3 Near Reichenbach, interior walls project through to stiffen exterior walls. Mid-18th century.

4 Sometimes only a few timbers project through, and in a decorative pattern. Erlenbach im Simmental, 1612.

5 An *Alphüttli*, a farmhouse on a high mountain pasture in Alp Ausser Rüederigs, Gehrihorn. Window and door openings are headed off and framed by jambs cut shorter than opening in anticipation of surrounding wall logs' settling. Settling appears to be incomplete or unequal across opening at shuttered window in foreground.

6 In certain cases wall timbers are grooved full thickness, rather than tenoned, into posts. Freilicht Museum, Ballenberg, Brienz. Originally from Adelboden, 1698.

7 Hay shed in Frutigen, 1800, shows system of clamped vertical timbers to keep exterior walls straight in barns without interior walls.

8 *Alphüttli* at Ballenberg. Posts instead of partitions are sometimes used to support interior loads.

9

10

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12

9, 10, 11, 12 Single beam, the *Unterzug*, spans width of room, supports plank floor. Course of projecting timbers grooved on inner faces, the *Bund*, holds planks' edges and ends around perimeter of room. Planks meet in tongue-and-groove or loose-tongued (*Heidendecke*) joints. Central plank in floor, wedge-shaped, is driven from outside of building to tighten floor and left proud to continue tightening as necessary.

Floors are constructed with a space-saving technique likely arising out of limited building height, economic conditions possibly dictating that these houses be built quite small. Floor joists are absent and the planked-floor load is carried by the walls and a single beam, called the *Unterzug*, spanning the room (Fig. 9).

The course of wall timbers that supports the floor, called the *Bund*, is usually broader and deeper than the other wall timbers, with a groove on the inner edge perhaps 2 in. deep, into which fit tongued-and-grooved planks 2½ to 3 in. thick (Fig. 10).

On older buildings, the planks are all grooved and joined by a loose tongue, in the local tradition called *Heidendecke* (Fig. 11). Each room in the structure has its own independent floor. The key to any of these floors, however, is the final plank; all the other planks are set in place and this final, tapered one is driven through a hole in the wall, wedging tight the entire floor. The outer ends of such final planks may project from the façade of a house, for further tightening, while the inner ends must be short of home (Fig. 12).

The Bund timber's additional width over the rest of the wall usually projects to the interior of the structure (Fig. 10), but at some point craftsmen began to use the material to achieve an added level of refinement and decoration on the exterior. By projecting the extra width to the exterior, the upper story becomes slightly jettied, and the resulting arris can be carved and decorated (Fig. 15).

ONE of the defining characteristics of the Oberland style, and indeed its most recognizable characteristic, is the roof. Oberland houses, in common with other architectural forms in the canton of Bern, have immense roofs covering the combined residence, animal stall and hay shed. But compared to the farmhouses of the northern part of the Canton of Bern that serve the same three functions, Oberland houses are small. In most, the living quarters comprise a great minority of the space, and ceiling height is often in the range of 6 ft. Living space is then short and the rooms small. Even the animal stalls are small with short doors, meant for a short breed of cattle (which no longer exists) to fit the cramped conditions. In addition, multiple families would have shared the same dwelling in the past.

Oberland houses have a relatively shallow roof pitch, historically covered with unnailed wooden shingles held down by long half-logs pegged through to the rafters and held in place with large boulders (see back cover). With this system, a relatively shallow roof pitch kept the boulders in place. Snow trapped on the roof of a dwelling by the obstructions was formerly viewed as insulation.

With generous overhangs and ornately profiled corbeled and flying purlins and ridge beams, the oversized roofs have overhangs of about 8 ft. at the eaves and 6 ft. at the gables, providing wonderful protection from the elements (Figs. 13, 14). No doubt they are an important reason why numerous buildings in this region date from the 1500s.

Such large overhangs require a great deal of support, and thus one of the style's most attractive features: the corbeled purlin, supported underneath by successively shorter timbers. With an overhang at the gable reaching 6 ft. or more, the roof purlins and ridge must support flying rafters well outside the load-bearing wall structure, so support for the purlins is necessary to transfer the load efficiently into the wall. On some very old examples, angled struts support extended purlins and ridge beams, but the common method is the corbeled purlin. The successively shorter timbers beneath the purlin are profiled and carved, each matching pair often having its own unique profile (Fig. 13).

At the eaves, overhangs of 8 ft. or more are accomplished by means of oversized rafters spaced approximately 2 ft. apart. These are supported past the walls with flying purlins, supported in turn by extended wall timbers or by braced struts. In many instances, extended wall timbers support a balcony that in turn supports the purlins, instead of the wall timbers supporting the purlins directly (Figs. 14, 15).

A universal feature of the Oberland houses is the structural ridge, a necessity as the buildings are not tied transversely to resist roof thrust. The supported ridge beam eliminates overturning thrust at the walls and the need for any kind of tying joint. Tying beams could mean wasted interior space in buildings generally lacking in height—the top of the second story is typically less than 15 ft. above the ground, with ceiling heights often much less than 7 ft. (second-story rooms may only be 5 ft. in height). Only 2½ to 3 in. separate the two stories except for the Unterzug (you get used to ducking around these ceiling beams, one in each room). Local wisdom has it that buildings are short because only the wealthy could afford to heat a tall room during the long alpine winter, and in any case the plank floor is a very efficient use of both space and materials. Elsewhere in Switzerland, floor joists are used, and houses have a taller profile.

Stacked timber walls sometimes support roof purlins and ridge beams, but when these buildings have large open storage lofts they cannot have such walls interrupting the space. In the case of open lofts, the purlins are supported by posts on wall beams. Chalets, which serve only as residences, commonly have purlins supported directly by walls; most traditional farmhouses have posted purlins to preserve the open loft (Figs. 16, 17). And in general, Berner Oberland houses fall into those two distinct categories according to

13, 14 Generous overhangs of 1816 house near Reichenbach provide protection from elements, preserving untreated wood of walls. Purlins or ridge beams extending past gable ends are supported in a variety of ways, most often by corbeled timbers. Flying purlins beyond side walls can be supported by extended wall timbers.

15 Flying purlins can also be corbeled or posted to a balcony itself supported by extended wall timbers, as shown here. *Bund* and other timbers projected to the exterior provide arrises for carving and decoration, well represented in this end wall. Agensteinhaus in Elrenbach im Simmental, built 1766 by *Zimmermeister* (master carpenter) Hans Messerli, and today part of Talmuseum Erlenbach, a living-history village.

16 In a residential chalet, with no requirement for open loft storage of crops, purlins are supported directly by walls, as evidenced here on the exterior. Near Reichenbach, 1798.

17 Compared with solid wall supports, posted purlins and ridge beams in farmhouses preserve open storage in the lofts. Adelboden House, Ballenberg, 1698.

18

19

use—the solely residential chalet and the *Mehrzweckhaus* (multipurpose house), the latter serving as both residence and barn. The houses of farmers traditionally include space for an animal stall and an upper storage space for grain and hay. The traditional Frutighus, home of the alpine herdsman, is a Mehrzweckhaus.

Two variations of the basic style should be noted. The first is relatively new to the Frutighus although it has been practiced in the neighboring Simmental for hundreds of years. To simplify construction, as noticed earlier, the first level of the structure is sometimes built with heavy corner posts instead of lapped corner joints. This creates a timber-framed first level, and the stacked timbers between the posts bear no loads, serving only as infill and bracing for the frame. Considered a shortcut in the Frutigland, this style is much more common today than in times past. Fig. 18 shows an early and unusual variation of the posted style.

The second variation includes a mystery. The principle behind it is simple: the structure up to the height of the eaves is built using the Blockbau technique, and the ridge beam and purlins are then supported by heavy gable posts slotted to receive a plank infill. The ridge post and sometimes purlin posts as well are held in place by paired, lap-dovetailed braces footed in a Bund. The mystery lies in the legendary status of this very old technique, in German called the *Heidenkreuz*, or heathen cross, the figure formed by two angled braces joining the ridge or purlin post. This feature can only be seen on the oldest buildings, and local lore asserts that it must be the work of heathen carpenters—that a Christian surely would not have used this technique for any reason. Indeed, there are many buildings from the same period that lack this detail, but it is unknown whether the brace configuration held any religious symbolism in early carpentry (Figs. 18, 19).

THE Berner Oberland is rugged terrain, and its houses are nearly always built on a heavy slope. On the valley side, the lowest level is built of masonry, in the past random round stone mortared together with lime, more recently brick or concrete. Regardless of the underlying material, the walls are always plastered smooth. This cellar space, or in German the *Kellergeschoss,* above ground level on one side and often completely underground on the other, is used for storage and at times also as a work space. If a house is built on land with excessive slope, the uphill side of the first level above the cellar, called the *Wohngeschoss*, the living space, may also be built of stone. In some cases a room on the front of the house two stories above ground may be at ground level on the back.

A century or so ago, these houses would have been built entirely without metal; no nails were used even to secure wooden shingles, and windows and doors relied on wooden hinges. According to residents of the Berner Oberland today, the farmers who built the houses could not afford the high price of hardware. Yet the carpenters who built these houses went beyond the bare necessities and took great pride in their work; very often they decorated ornately, usually a sign of prosperity, and always they built well, with exceptional attention to detail.

Decoration of the Frutighus includes the *Segenspruch*, an inscription on the façade. A house always displays the year it was built and typically also bears the names of the master carpenter and the original owner. Generally, there will be a blessing as well and a reference to the Bible or a church hymn, an ancient custom derived originally from pagan incantations and charms. On the oldest houses, the inscriptions are simply painted on. On later houses they are carved, first with Roman capitals, then transitioning over time to late medieval Blackletter and then High German Fraktur script (Figs. 20, 22).

Any timber end or corner that projects past other timbers is carved or profiled, which gives these houses a refined look. In particular, the Bund projects past the timbers of the lower story on the façade, its lower corner richly profiled, and the timbers of the upper story continue at this new level. But here there is great variation: on some very old houses the Bund does not project at all, and the façade is left flat. On other buildings, false beam ends are added and the timbers above and below are similarly projected and carved. The specifics of the decoration are dependent entirely on personal preference, and a great deal of variety can be found. The façade, always turned toward the valley, is often highly decorated, while other wall faces may at times use unrefined and partially round timbers or be left bare (Fig. 21).

The Frutighus is a unique form of building with a history of thousands of years. People have lived in the region since ancient times, and direct ancestors to modern practices can be attested as far back as the Romans. The fundamental principles behind the building style have not changed in this great stretch of time, and by the high Middle Ages the architecture reached a form remarkably similar to what is still practiced. Minor variations such as the shape and size of windows and the openings in the cellar walls along with the style of the carvings and inscriptions can be used to identify the time period of a particular building, but even so a house built by a modern carpenter has more in common with one built 500 years ago than it has differences (Fig. 22).

If you are ever fortunate enough to travel through Switzerland, be sure to take the time to visit the Berner Oberland and study these fantastic buildings. Perhaps there are a few lessons for us here. The inhabitants, after all, have mastered the art of wood building and created a form that can stand proud against time. Here houses dating from the mid-1700s are a common sight, and the watchful observer can find others dating back as far as the 1400s.

—David Bahler

David Bahler (dlbahler@live.com) is a carpenter near Kokomo, Ind.

18 Heidenhaus, a somewhat unusual *Frutighus* built ca. 1500 in Reichenbach im Kandertal, with triple *Heidenkreuz* (heathen cross), numerous midwall posts and crooked back wall.

19 House from 1560s near Reichenbach. Heathen cross motif, plainly seen here, comprises a ridge post (or sometimes purlin post) and two dovetailed braces securing it to a wall beam below.

20 Ornate chalet in the Kandertal dated 1778. Decorations depict family crests of builders (husband and his *Hausfrau*), with floral motifs and richly carved and painted timber arrises. Fraktur script is in typical Oberland style.

21 Stuckihaus, Reichenbach, 1781. Decorated house with flying purlin and plain eaves wall on village side street. Wall beam ends are frequently scalloped and the scallops picked out in bright paint.

22 Modern house (2007) in the Frutigtal built using traditional methods. Lower story built with posts and timber infills, a technique relatively recent in the Frutigtal (and its tributaries, the Kandertal and Engstligental), but common even on old buildings in the Simmental. Flags stand for canton of Bern and local village.

Guild Conference Slide Shows 2012

THIS past year's spring Western Conference at Asilomar, in Pacific Grove, California, and the fall Eastern Conference at the National Conference Center in Leesburg, Virginia, produced a crop of images of recent work by Guild members. The Asilomar conference, held in conjunction with the International Log Builders Association, naturally included logwork and mixed log and timber work.



Dai Ona

Deck framing in kiln-dried Douglas fir with innovative joinery by Daizen Joinery in Chase, B.C., for house in British Columbia designed by Karl Willms. Some mortises conceal lapped notches similar to ones exposed in view above.

Terry Turney

Above and above right, views of Douglas fir roof framing for timber and structural insulated panel house in Kensington, California, 3600 sq. ft., designed by Dan Kallal of Pacific Post & Beam in Paso Robles. Timber roofs are supported on SIP walls with a few exposed posts. Detail view shows Craftsman-style detailing at prominent connections. At right, six scissor trusses in valley roof frame cut from recycled Douglas fir for new house in Carmel for an architect who worked with Pacific Post & Beam on its structural design.


Leif Calvin

Above, nonstructural red oak roof trusses supported by hidden steel ridge beam designed and built by Timber Creations, Santa Rosa, for small winery in Geyserville, California. Hammered steel straps at chord connections and at bottom chord splices are also decorative.

Below, recycled-redwood gate to a swimming pool enclosure (thus the high door handle) in Portola Valley, California, built by Mike Laine of Wooden Heart, Menlo Park. Roof ridge about 9 ft. above grade, entry door mahogany, posts through-bolted to stones. Below right and at bottom, details and view of recycled-redwood Roji gate to tea house at Green Gulch Farm (San Francisco Zen Center), Marin County. Seven-fold cedar shingle coverage is a Japanese style, perhaps meant to invoke memory of thatch.

Mike Laine

Dave Petrina

Adam Riley

At top, 48-ft.-dia. two-story house with 6-ft. roof overhang, Sidney Island, B.C., built by Kettle River Timberworks, Ltd., Vancouver. Western red cedar debarked natural posts, Douglas fir beams, 2600 sq. ft. Design by Jamie Martin Designs; engineering by Cascade Engineering Group. Above right, red cedar log 3 ft. dia. at top end, which supports inner ends of 36 rafters.

At left, finished reciprocal-style frame for a 200-sq.-ft. gazebo in Victor, Idaho. Timbers were bandsawn Douglas fir, "a few of which were somewhat square and straight," builders Teton Timberframe in Driggs said. Collaborative design by Adam Riley, Al Klagge and Jake Amadon. Above left, Jake swings a mallet during raising.

Ed Shure

At top and above, exterior and interior views of log and timber house, 1,400 sq. ft., near Nederland, Colorado, with scribe-fit walls of fire-killed spruce, timbers of fire-killed Douglas fir, and curved pieces of grain-matched glulam, built by Timmerhus in Boulder, with engineering by Fire Tower Engineered Timber. "We were instructed to handcraft as much as possible (even the windows), and build as green as is practical," reported Ed Shure of Timmerhus.

At right, valley roof system in Glen Ellen, California, of Douglas fir free of heart center and radio-frequency kiln-dried, curved elements reconstructed from solid sawn material, all by Timber Creations of Santa Rosa. While design originally called for steel moment frames clad to look like timber, Timber Creations and Alpen Engineering redesigned and engineered solid timber elements on view. Architectural design by Jim Henderson AIA.

Leif Calvin

Chris Drake

Scribed white fir frame for house near Fort Collins, Colorado, with doubled collars, rafters and purlins. French-style *jambes de force* carry roof load from collar to tie beam to help resolve kneewall spreading problem. Design (based on daisywheel geometry) and construction by Frameworks Timber in Fort Collins, structural engineering by CTL Thompson. House almost ready for occupancy was lost in Colorado's High Park wildfire of 2012, which burned some 87,000 acres in the mountains west of Fort Collins.

Dana Southworth

Trail shelter destined for the Cohos Trail in the Nash Stream Forest in Stark, N.H., 10x12 ft., shown here still unsheathed at Garland Mill Timberframes in Lancaster, where some of it was cut in a workshop. Design and fabrication by Garland Mill and Glenn Dodge of New Boston. Pine, spruce, fir and maple.

Queenpost-trussed white oak pavilion about 26x35 ft. for outdoor instructional space at the Virginia Military Institute, Lexington, Virginia. Designed by Col. Grigg Mullen II, drawings by Dan Fadden, John Mumaw and Tim Whitehouse, and built by VMI cadets, Timber Framers Guild and Carpenters' Fellowship volunteers, Massachusetts College of Art students and faculty from Fanshawe College. Designer's comment: "The challenge was to design a pleasing structure that was also easy for a crew of mostly novice framers to complete in four days—all while changing things enough to keep the volunteer civilian framers interested."

Cindy Mullen

The builders pose before a thicket of Western red cedar benefit gates designed by Karl Willms, with CNC file by Kevin Mattson, cutting by Daizen Joinery in Chase, British Columbia, and assembly by volunteers. Timber was donated by the Likely, B.C., Community Forest and milled by World of Wood. "Concept was to provide motivation for fund support. We listed the price of the gate and asked for a donation to Red Cross for tsunami relief. We then provided the gate in appreciation. We have sold 29 gates," said Dai Ona.

Dai Ona

Below left, students sit proudly on ash shaving horses they made with hand tools at the Heartwood School in Washington, Massachusetts. Below right, 16 young French Compagnon apprentices, or "rabbits," cover a student frame they erected while visiting the school.

Will Beemer

Michele Beemer

Brian Armbrecht

Longitudinal queenpost framing 70 ft. 10 in. x 54 ft. for chapel space at summer camp in Dewittville, New York, on the shores of Chautauqua Lake. Architectural design by LRK Design Group in Faulconer, frame construction by Frame of Mind Timber Werks in Bemus Point. Frame design by Paradigm Builders of Philadelphia, engineering by Whitecrest Engineering, Granby, Connecticut.

Clark Bremer

At left, center section 24x24 ft. of multiwing studio in Minnesota framed in recycled Douglas fir and hot-dipped galvanized steel plate by Northern Lights Timber Framing, Minneapolis. Engineering by Eric Bunkers and Associates, St. Paul; architectural design by Dennis Wedlick Architect, New York City. All timber reclaimed from Boeing Plant #2 in Seattle, where B17s were made in WWII. Cast-steel turnbuckles and 1-in.-dia. tension rods maintain shape of roof. Above, connection detail.

Neil Godden and David Bowman

House frame 24x36 ft. with additional light-framed wings, in Montgomery, Massachusetts, mostly Eastern white pine with cherry, maple and birch. Architectural and frame design by Jack A. Sobon of Windsor, frame construction by Neil Godden of Goshen and David Bowman of Worthington. Frame uses conventional and base cruck crossframes, many natural-form elements.

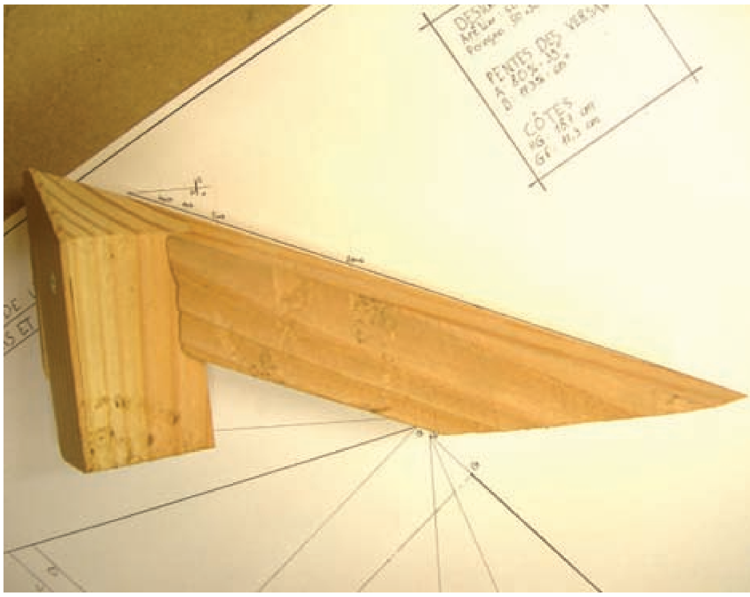
Gabel Holder

Cypress roof frame for 54-ft.-dia. pavilion in Conservation Park near Panama City Beach, Florida, designed to resist 130mph winds. Heavy 10x14 hip rafters 30 ft. long are supported at both ends by concrete moment columns. Architectural design by Al Shortt, engineering director for Panama City Beach; engineering by Fire Tower Engineered Timber, Providence, Rhode Island. Timber was cut on site and raised by Gabel Holder, Chris Gunn, Adam Valesano and Justin Rasmussen. “It was hot,” Gabel said.

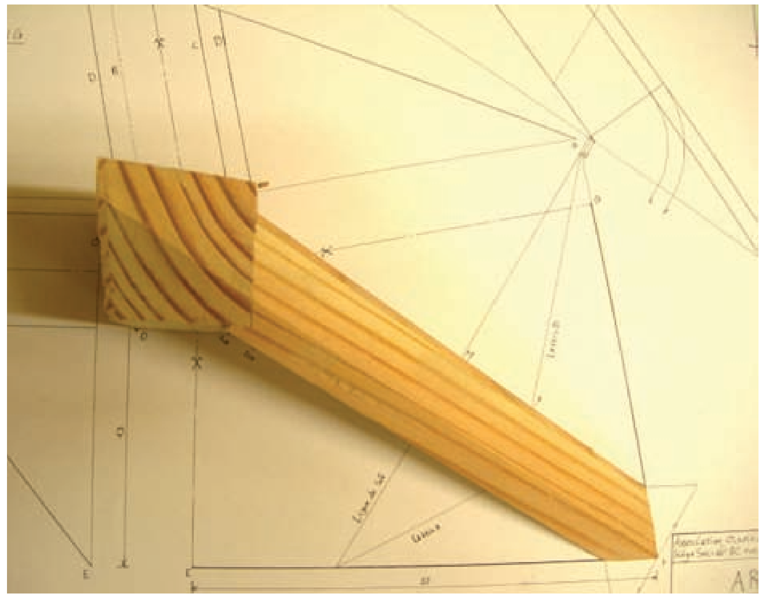
Dennis Marcom

At right, complete timber-framed interior space about 20 x 40 ft., an irregular octagon stretched into an oval, in radio-frequency kiln-dried Douglas fir selected for clear vertical grain, built by Bensonwood of Walpole, New Hampshire, and assembled ship-in-a-bottle style inside an existing room during a remodel of a house in Middletown, Rhode Island. Design by Andreozzi Architects, Barrington, engineering by Chris Carbone of Bensonwood. Above right, view of half-arches waiting on horses in workshop, with scarf joint plainly seen before pinning and wedging, a consequence of architect insisting upon solid-sawn timber for the curved arches.

French Hip Layout



1 **Elevation view of typical model to be built as an exercise.**



Drawings and photos Patrick Moore

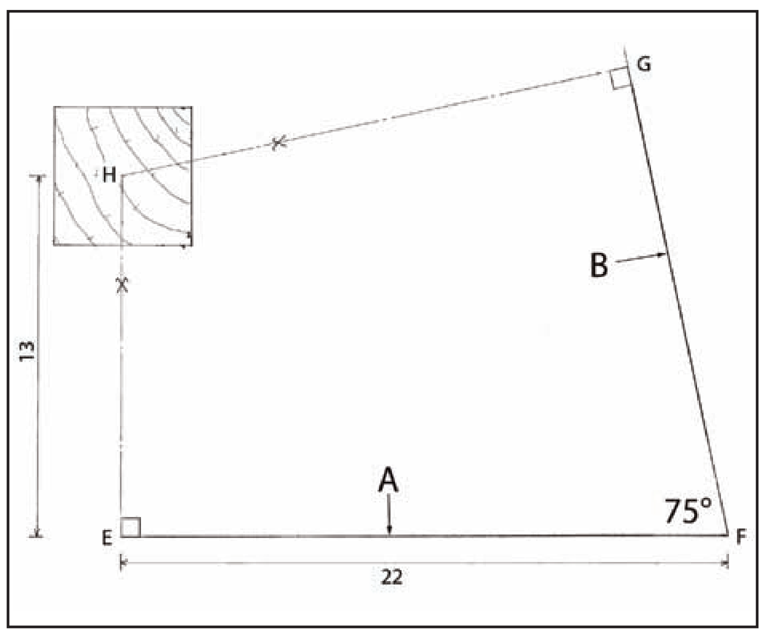
2 **Plan view of model placed over its drawing.**

THE objective of this exercise is to lay out and build a hip joining a square kingpost in an irregular-plan, irregular-pitch hipped roof—that is, the roof pitches differ and they meet at other than 90 degrees (Figs 1, 2). We are given sections of the hip and post, the pitch of the main roof, the distance along the plate line from the corner of the building to the centerline of the post, and the common rafter run from plate line to centerline of hip.

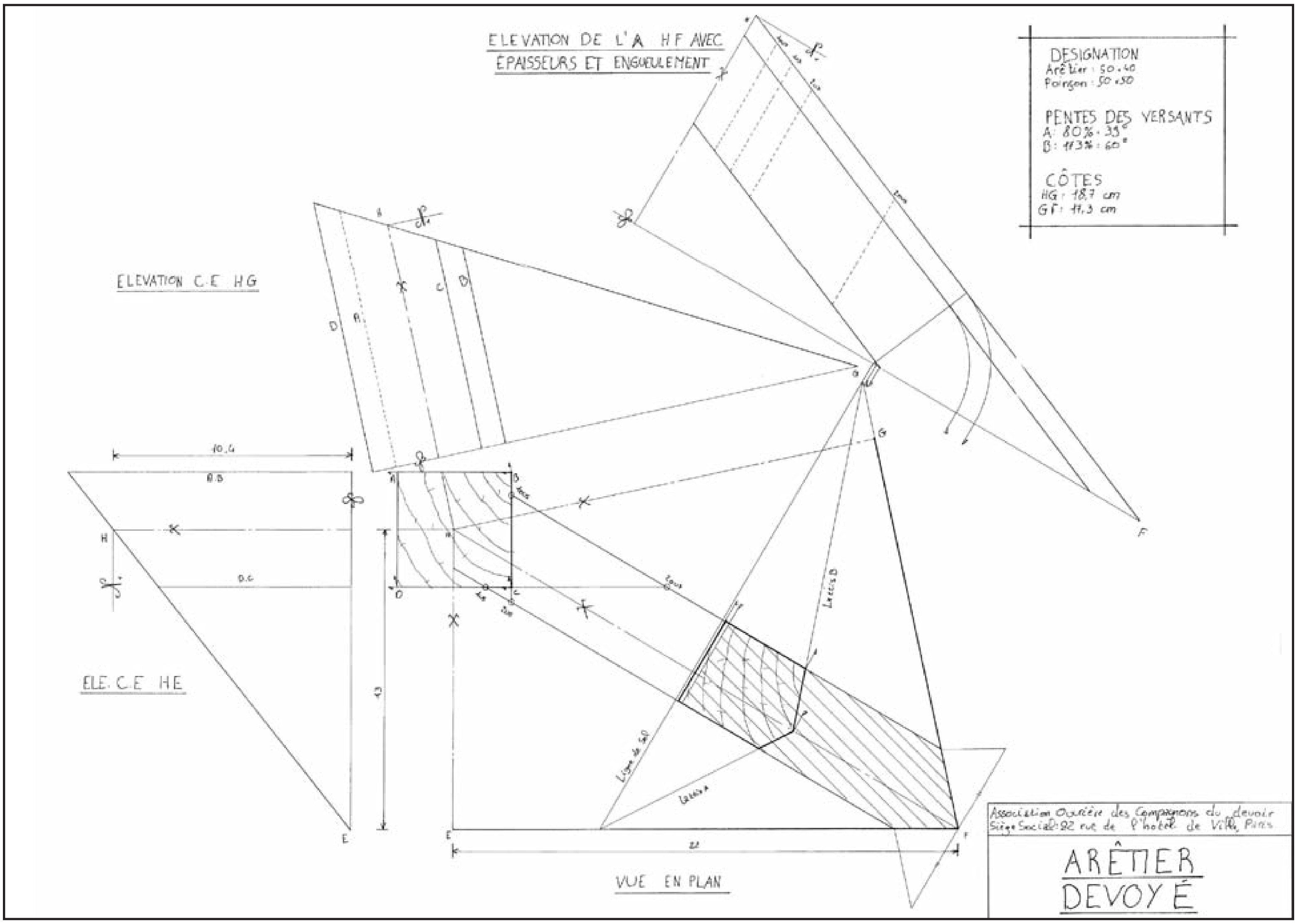
We will make a full-scale drawing (Fig. 3 facing page) and take our layout marks directly from it. The process demonstrates what we do when working with timbers. We will also use appropriate marks, which French Compagnon apprentices must memorize (Fig. 4).

Hip section is given at 40mm x 50mm, the kingpost section at 50mm square. Slope of the main roof, on side *A* in Fig. 5 below, is given at 39 degrees or 80 percent. Slope of the adjacent roof is not given. (Note that a 45-degree slope is at 100 percent. Thus steeper pitches are greater than 100 percent.) Length of top plate from corner of building to centerline of first common rafter on side *A* is given at 22cm. Run of this rafter to middle of kingpost is 13cm. Run of adjacent roof (side *B*) common rafter is obtained geometrically, by erecting a perpendicular from its top plate to the center of the post (*GH* in Fig. 5). Plan angle at corner of building is given at 75 degrees. Arrows *A* and *B* point to exterior faces of top plates. With this information we can solve for all our requirements.

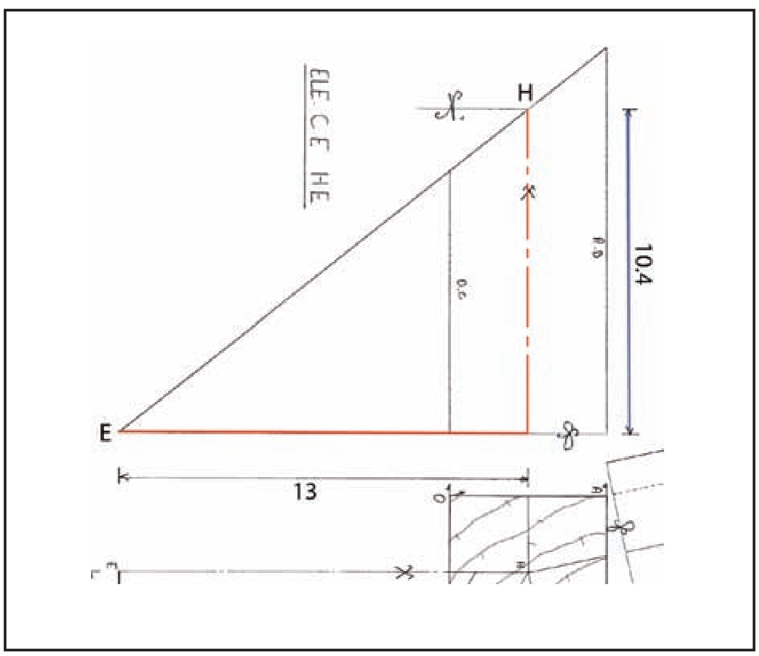
4 **Table of marks. Each signifies a member, joint or layout line.**

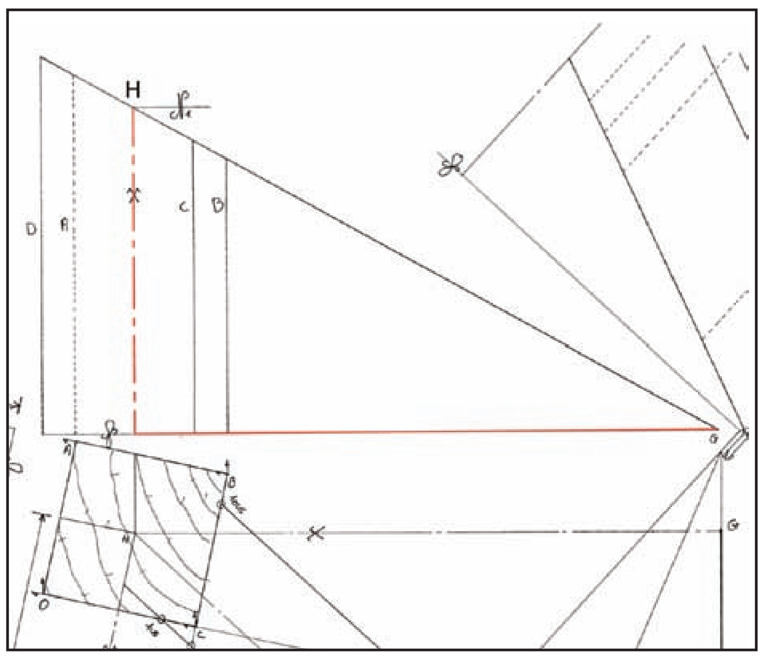


5 **Our given information in plan, omitting the hip. To arrive at a section for the hip with its backing angles, different for each of the roofs, we will develop individual triangles for each pitch. Having laid out the top plates *EFG* for model, we will develop the elevation view of the first common rafter, with centerline *EH*.**



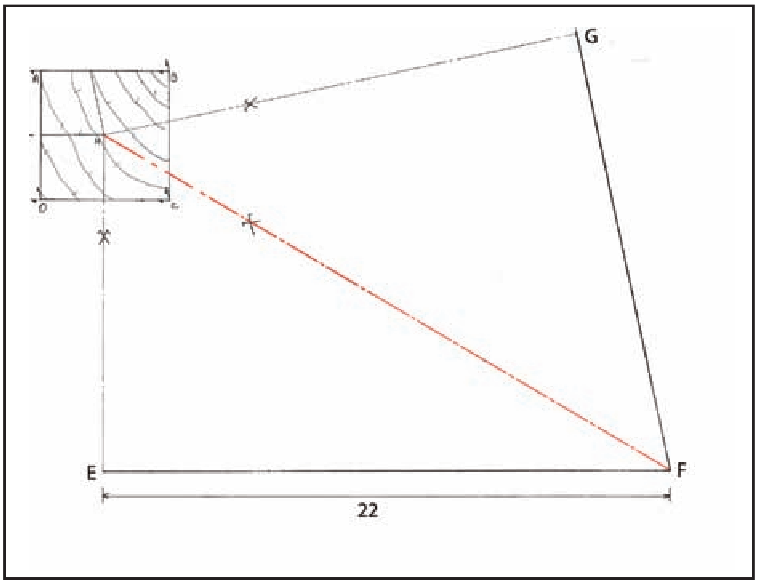
3 "Hip Rafter Developed." Plan view with developed elevations showing length and pitch of main roof common rafter, adjacent roof common rafter and hip rafter, as well as the section of the hip rafter giving backing angles.

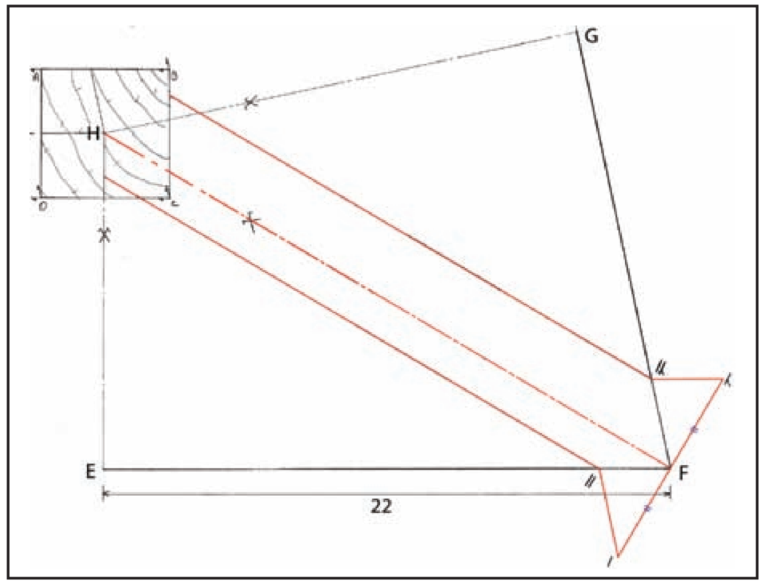




6 "Laying down" the rafter. We take a common rafter line in plan view and lay it down by drawing, using a reference line (called a *gutter line*) parallel to the plan view of the rafter run and remembering that common rafters always run 90 degrees to the top plate in plan. We know the run of rafter in plan view, to middle of the kingpost, 13cm, and the roof angle, 80 percent. With one side and one angle, then, we can construct a right triangle that yields us the height of kingpost at *H*, 10.4cm.

7 Laying down adjacent roof rafter (above right). We then repeat for the adjacent roof angle *B*, this time transferring the 10.4cm height of kingpost at *H* to the elevation view of adjacent common rafter *B*. With the run found geometrically and the rise transferred, we have sufficient information to construct a second right triangle.

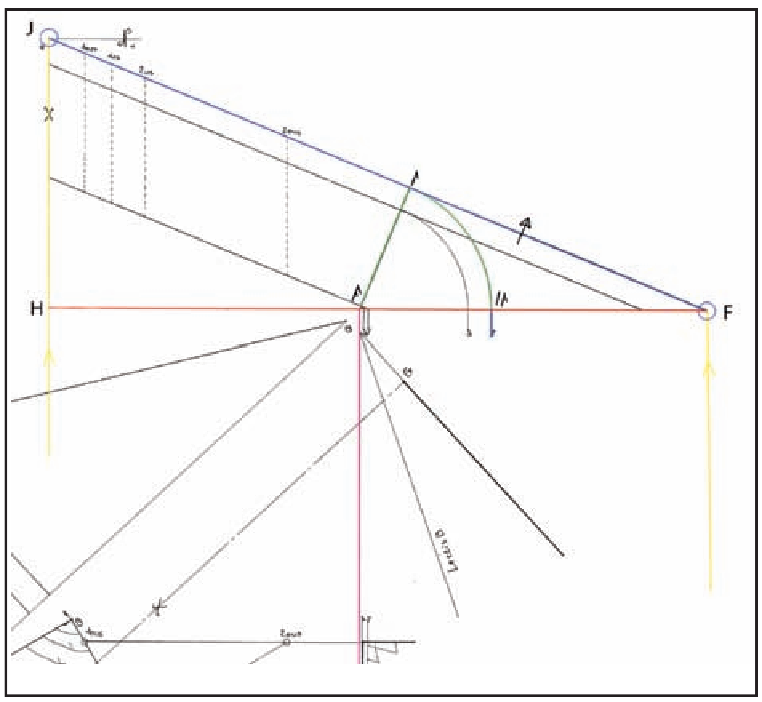




8 Laying out hip run. We can now draw line *FH*, the run of the hip, from the corner of the top plates to the center of the kingpost. This line also represents the ridge of the hip backing in plan view, in this case not a true centerline (despite the centerline mark) as the hip will be displaced to obtain equal heights on its sides.

9 Laying out hip plan view. At point *F* draw a line (the red line hash-marked twice) perpendicular to hip run line *FH*. Along this line mark off the 40mm width of the hip on both sides of point *F* (indicated in the drawing respectively by a / and a ʎ. To the top plate *FG*, lay out a parallel at / , meeting the adjacent plate at // .

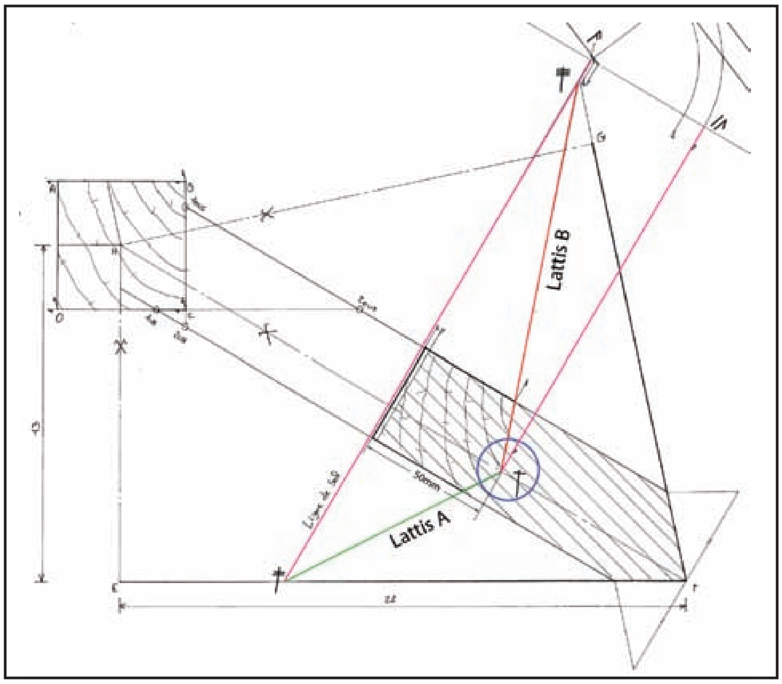
To top plate *FE*, lay out a parallel at ʎ to meet ʎʎ at its adjacent plate. Now strike lines parallel to hip backing line, originating respectively at // and ʎʎ , the latter reaching the post and the former passing as far as the line *EH*. These lines define the sides of the hip seen in plan.



10 Laying out hip elevation. We can now proceed to lay down the hip to obtain the elevation view. Parallel to *FH*, the hip backing line in the plan view, draw a new line, shown above in red, a level reference line for our new drawing. (Refer back to Fig. 3 to see this line in context.) Perpendicular to the new line, bring up points *F* and *H* from the plan view, as indicated by yellow lines.

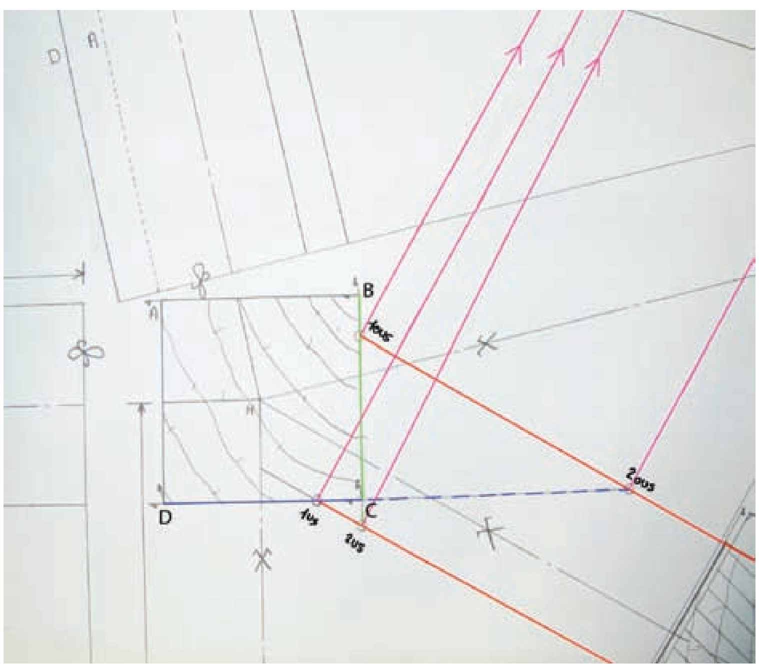
Transfer height of kingpost, as developed in Fig. 6, at *H*. Connect point *J* to point *F* to define peak of hip backing, marked with a broad arrowhead and shown in blue. This line is the arris where both roofs meet. Now, arbitrarily draw a perpendicular (shown in green) from the backing line down to the level reference line, and mark the point by ʌ. Using the new line as a radius, swing an arc (in green as well) centered on ʌ down to the level line and mark the point by //ʌ. Note the magenta line descending perpendicular to the level line.

These operations will lead to the sectional or end view of the hip. Imagine that the hip is cut at 90 degrees to this line and you bring it down to the level line. The straight green line is like a door hinged at ʌ.

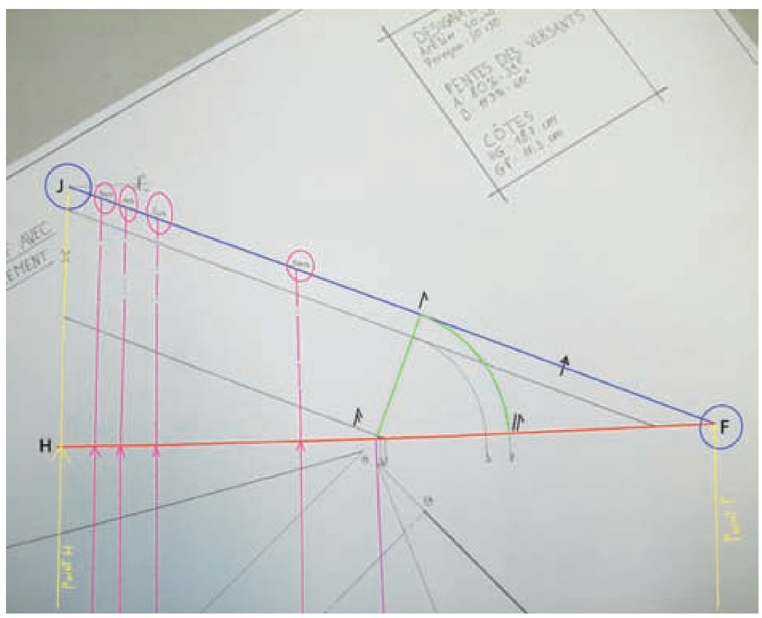


11 At /\ on the figure, drop a perpendicular from the level line down across the plan view (marked *Ligne de Sol* and colored magenta). This hinge line touches the top plate lines, intersections respectively marked by a single stroke with two crossings ǂ and a single stroke with three crossings ǂǂ.

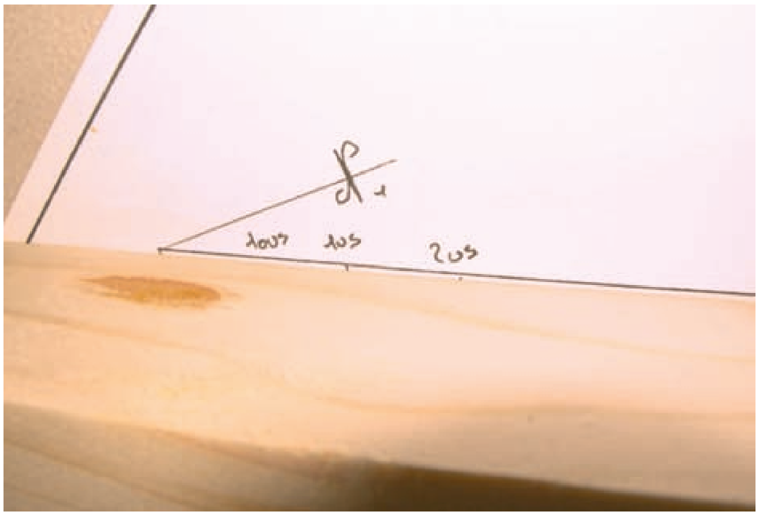
Do the same operation with the point //\ until it touches the hip peak line, marked / and circled in blue (the actual point of intersection marked by a small flag). Now connect point ǂ to / and ǂǂ to /, producing the lines shown in green and red respectively. These lines are the lattices and represent imaginary planes of roofs *A* and *B*. We can now complete the section of the hip (remaining lines in black) using the 50mm height we were given at the outset to produce the section or end view, and we now also have the angles with which to cut the hip backing.



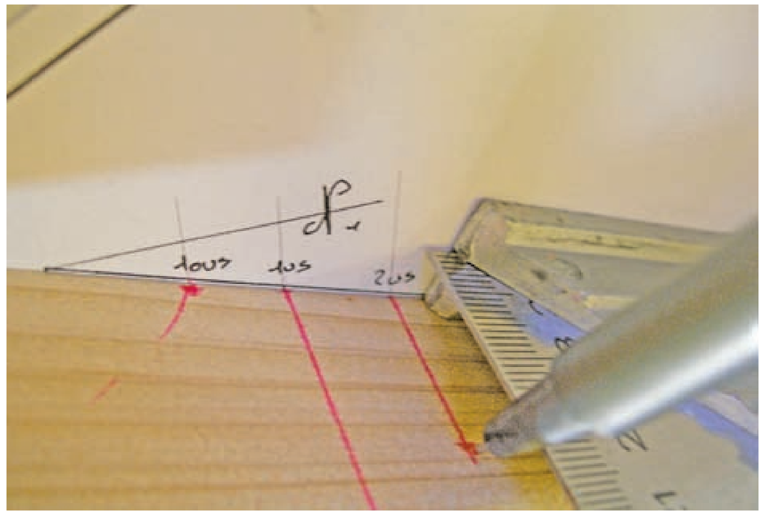
12 Hip peak cut layout at post. We must now find the angles of the hip against the kingpost. We can see the sides of the hip (in red) and where they touch the kingpost, at points marked *1us* and *1ous*. (The letters are abbreviations of *dessus,* or above, and *dessous*, or below, and refer to later marking positions on the workpiece.) Project the face *DC* of the kingpost to intersect the farther side of the hip (blue) and project face *BC* to intersect the nearer side (green), marking the points *2ous* and *2us* respectively. From these points, raise perpendiculars from the hip sides to the hip elevation in Fig. 13.



13 Transferring points to hip. Bring these lines up to the elevation view of the hip (rotated in this view; refer to Fig. 3 for context), marked by the magenta lines in the drawing. The points of intersection circled in magenta will be used to lay out the upper end of the hip.

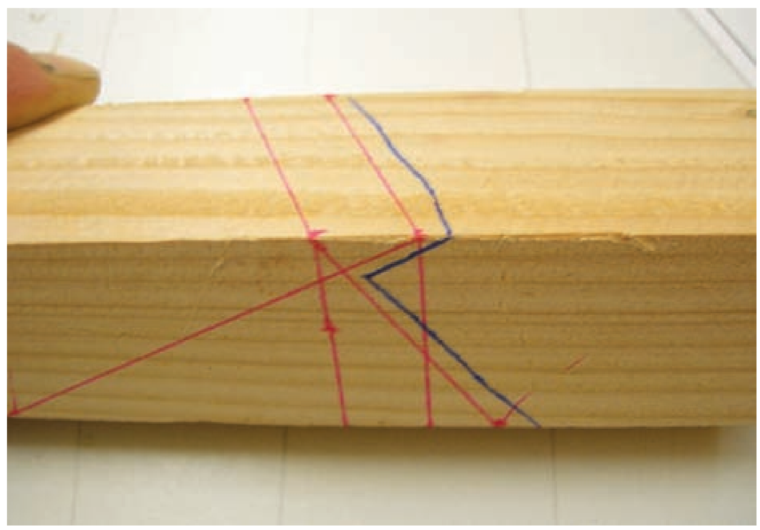


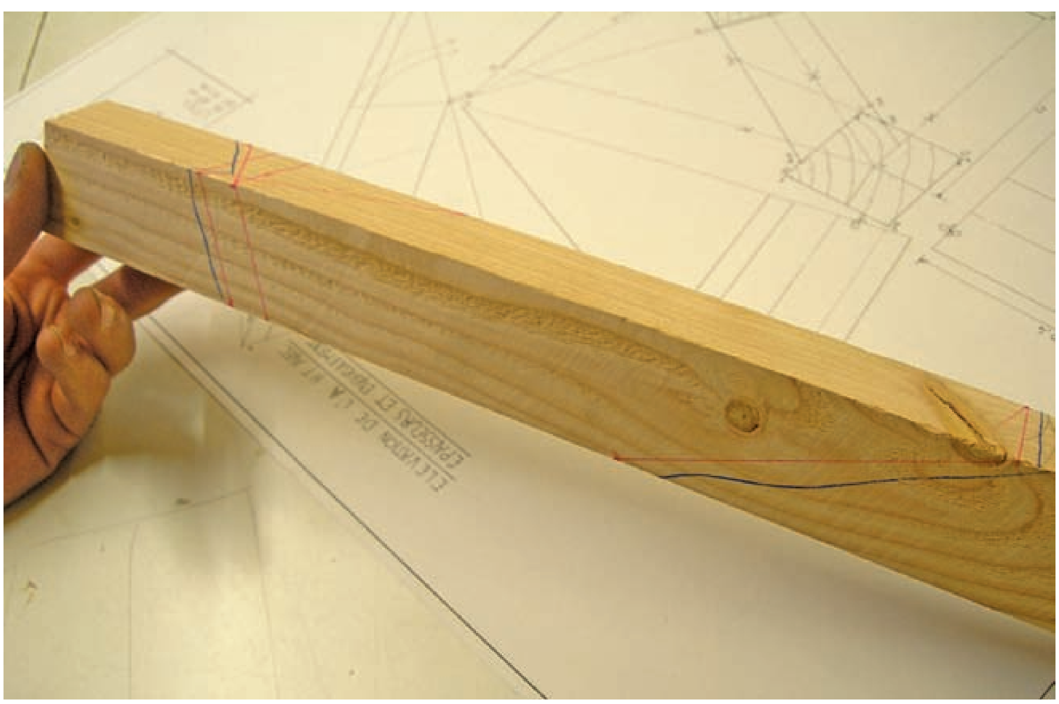
14 Direct layout of the hip. Take the length of wood, not yet backed and so still a rectangular section of 40x50mm, and lay one side of it (50mm) down on the elevation view of the hip. Make sure that the arris of the hip touches the line marked with the arrow (the blue line in Figs. 10 and 13).



15 Side of hip laid on drawing. Use a small square to bring up the respective lines for the plumb cuts against the kingpost. Lines from points *1us* and *2us* on the elevation view of the hip (Fig. 13) are transferred across what will be the top of the hip when in position. Make only little ticks where lines *1ous* (shown) and *2ous* (out of view) touch the piece of wood. These points are shown connected to their corresponding points in Fig. 16 below.

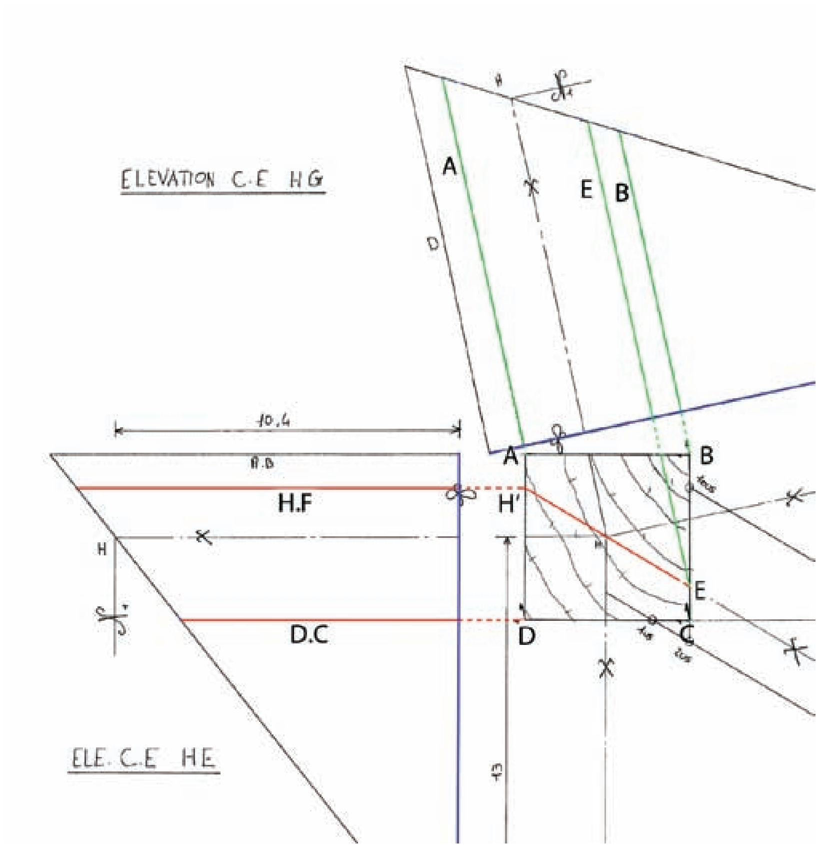
16 After marking similarly for the simple level cut at the bottom of the hip, you can remove the piece of wood from the drawing and connect the various points and lines. Connecting lines *1us* to *2ous* and lines *2us* to *1ous* will automatically form a cross on what will be the top surface of the hip in position (seen facing us in the photo), representing the two faces of the kingpost, *CD* and *CB*.





17 At left, the hip laid out, ready to cut.

18 Above, top end of hip after cuts are made to meet kingpost, viewed from bottom surface of hip.



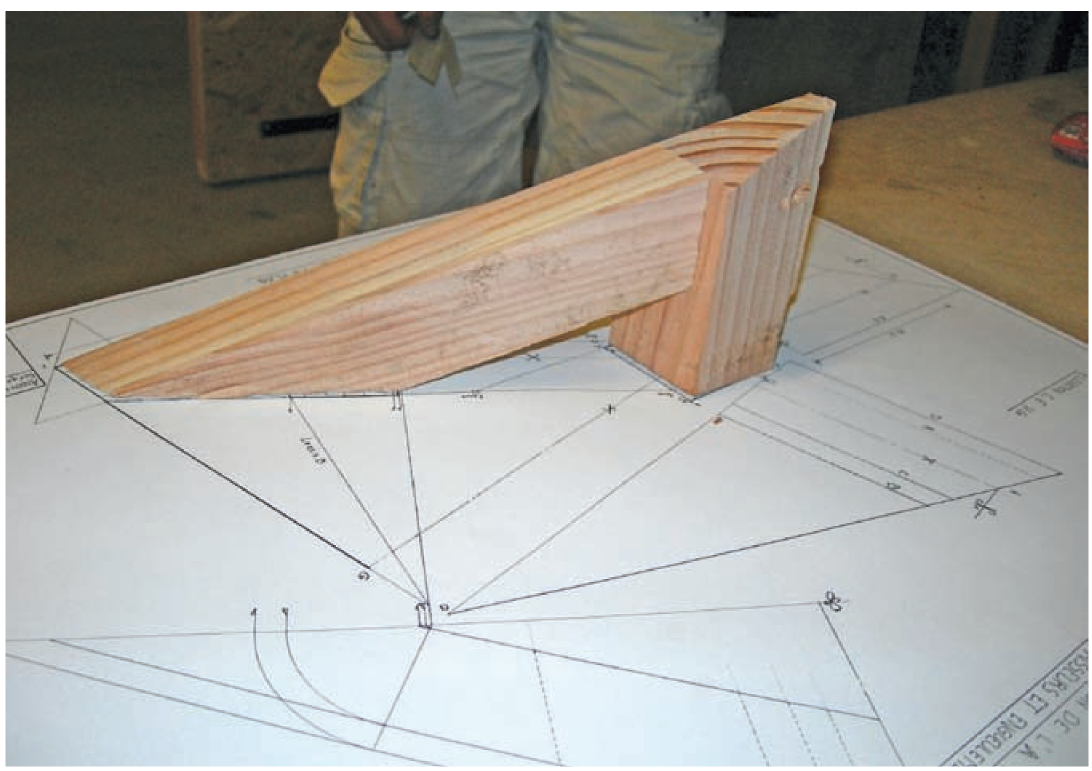
19 Post top cuts. To obtain the layout for the bevel cuts at the top of the post in plane with the hip backing, we project heights from the plan view of the hip where it intersects the post onto the main roof and adjacent roof elevations. The resulting heights *D.C* and *H.F* (red lines) are transferred to the *AD* face of the post to define the bevel coplanar with the main roof. Height *D.C* is marked right on the *D* arris and the *C* arris but height *H.F* must be set in the distance *AH*[1] from the *A* arris as indicated on the plan view of the post (that's where the ridge of the hip projected lands on the *AD* face of the post). Heights *H.F* and *D.C* define the bevel on the *AD* face of the post, heights *D.C* and *E* on the *BC* face of the post.

To lay out for the bevel on the adjacent side (green lines), height *A* is marked on arris *A* of the post, likewise height *B* on the *B* arris of the post. Height *E* must be set in the distance *CE* from the *C* arris as shown in the plan view of the post (that's where the ridge of the hip strikes the post). Heights *B* and *E* define the bevel on the *BC* face of the post, heights *A* and *H.F* on the *AD* face.

THE layout method described here can be applied to any compound joinery configuration and the principle of developed drawing itself allows the practical description of nearly any shape that can be built.

—Patrick Moore

Patrick Moore (blind_p@hotmail.com) is a Canadian woodworker now training in Paris with the Association Ouvrière des Compagnons du Devoir. William Denton IV, of Dover, Pa., Will Beemer and Ed Levin assisted materially with the preparation of this article.



20 A finished model, similar to the one described in process, placed on its drawing.

Photos Thomas Allocca

Above, clockwise from left, Abbey San Domenico at Isola Liri, Italy, framing detail of arcade tie at inner seat with double corbels and strap; view of full tie; the abbey at a thousand years old; crypt where Domenico himself is buried.

Below left, braced shed rafters, one nonconforming, some in pairs with ties over a side aisle. Below right, kingpost roof trusses, reproductions from the 18th or 19th century, over nave of abbey.

Facing page, passing under an arcade from the nave to a side aisle, an affecting experience for the author.

The Trusses of Abbey San Domenico

WE are used to reading architecture through monumental buildings, so our received idea of what to define as architecture is what is impressive for its dimensions or the importance of its history. But monumental architecture, which makes up just a small part of what we have built in history, and until the beginning of the last century considered the only architecture deserving to be reported, was built for nobles and magnates with the primary intention to celebrate themselves through the extraordinary, and this has contributed to cultural damage. The Abbey San Domenico of Sora, in Isola Liri (Frosinone) in south-central Italy, an ancient jewel of the Middle Ages dated to the beginning of the 11th century, is excluded by most important historical accounts even though it was the mother church of the later and celebrated Casamari Abbey.

Born in Foligno in 951, in Umbria, the green and mystical heart of Italy, Saint Domenic eventually became abbot of Sora and died there in 1031. A great builder of monasteries, he was one of the Benedictine monks who helped bring the Roman Church flourish during the 10th to 13th centuries. The monastery in Isola Liri, which became an abbey, was one of the important religious "castles" to control the Church's territories between Rome and Naples.

The ground plan of the church shows Roman ruins both in the external walls and in the crypt where the saint is still buried. Christian churches often were built over pagan temples to take advantage of the foundations, to reuse the stones and to overlay the traces of older gods. The church of San Domenico, however, was built not over a temple but rather over a domicile, the family house of Marcus Tullius Cicero (106–43 BCE), hence the Roman ruins. The location was strategic, at the confluence of two rivers, the Liri and the Fibreno, controlling water and land routes from Rome to Naples under the protection of the Earl of Sora, Pietro Rainerio, who donated the land to Domenic to build his church. Medieval monasteries were the most sophisticated and effective invention to acquire or reacquire control of territory, and when the local lord was unable to do so, he helped the Church to build monasteries. Abbey San Domenico was the stronghold of the Benedictine order north of Montecassino and at the same time a stronghold for the earl on the local trade roads.

Built in Romanesque style with a Latin cross plan, three aisles and three half-circle apses, the church's perimetral design is strictly contained inside a regular shape in a rectangular ratio of nearly 1:2 (width to length), which along with the ratio 1:1 was typical of Romanesque Christian churches. These ratios evoke the geometry of the square and the Christian symbology of the number *4* (first of all associated with the cross). These ratios were usually applied in the design of the aisles, with the central nave squared in ratio 1:1 and lateral aisles in the ratio 1:2. But these ratios do not apply at San Domenico. Adaptation of the main structure to the underground Roman house of the family of Cicero appears to have determined the dimensions.

The trusses probably date back to a restoration during the late 18th or early 19th century. Apart from the central section of the transept, covered by a square roof of modern design, the nave and the transept are covered by a double-sloping roof while the side aisles are covered by simple sloping roofs, lower than the others. The most interesting woodwork is perhaps in the side aisles, where a sort of half-truss or frame at the stone pillars of the arcade alternates with simpler braced rafters at the open arches, in effect altering the perceived depth of the church. Praying in a side aisle one has the impression of being in a secluded cell or chapel.

Each of the 15 trusses of the nave, on centers of about 2m, comprises a *catena* (tie beam) about 25x20cm, *puntoni* (upper chords) about 20x20cm, a *monaco* (kingpost) about 18x18cm, and *saette* (here, struts) about 18x18cm, as well as a metal-strapped connection between kingpost and tie beam, which do not touch. (Indeed, some straps do not even touch the underside of the tie beam, demonstrating their superfluousness to the truss except to maintain alignment of the kingpost.) Purlins about 9x9cm support roof planks about 20x5cm. It is supposed that a second set of purlins supports the roof tiles, perhaps with a plank layer between the two sets. Almost the same design and sections describe the transept truss.

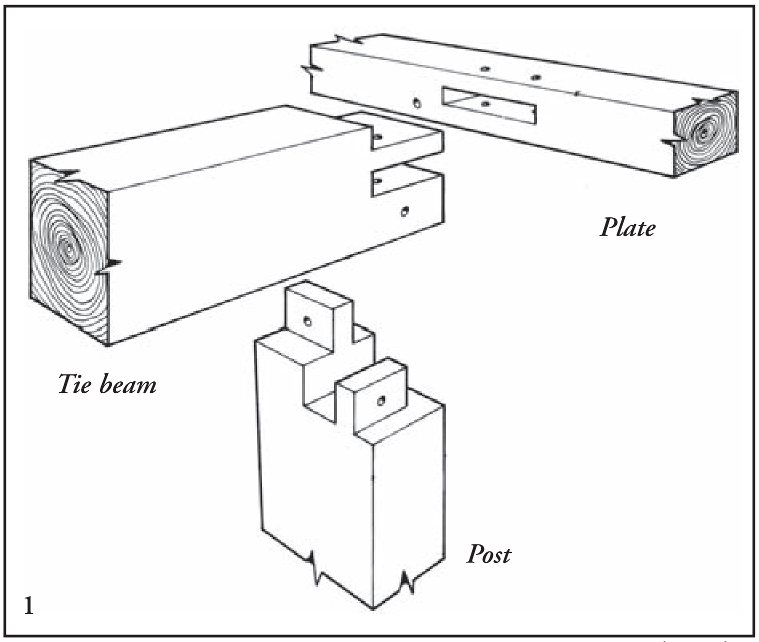
The 20 frames of each side aisle are combined in four couples including aisle ties and correspond with the stone pillars (about 140x180cm) of the arcade, while the 12 intermediate frames might best be considered simple beam systems, each with a footed strut stiffening a rafter footed at the outer end of a vestigial tie used for visual and structural uniformity. Timber sections here are the same as in the nave, but on different centers: about 120cm between the trusses and about 160cm between the simple inclined beams.

At sunset the village of Sora grows quiet, the silence just broken by the Fibreno river's melody. In the mystical light of the nave, I felt moved back in time to the Middle Ages and desired to kneel and ask for mercy, feeling myself not adequate to the sacredness, whatever the religion, whatever the god beloved, in that temple. In the nave, the sequence of the trusses recalled the sequence of the stairs to the higher transept (higher than the nave in 15 steps, like the number of the trusses) and evoked the long path to the perfect faith, augmented in the aisles by the rhythm of the differently centered frames and their differing designs, and ineffably by the attraction of the crypt below, where San Domenico from Foligno is buried. Deity is everywhere but the path to it is through simplicity.

Architecture can work as a spiritual or better as a multidimensional gate. Abbey San Domenico is noteworthy in just this way and its wooden trusses play a distinct role, above all when passing from the central nave to a side aisle. Architecture works not necessarily when it is huge and spectacular but rather when it has interesting stories to tell, when it speaks to us in a low voice and we understand, whatever might be our language, when it invites us to kneel around it naturally as around an elderly wise storyteller speaking of the past and the richness of life. —Thomas Allocca

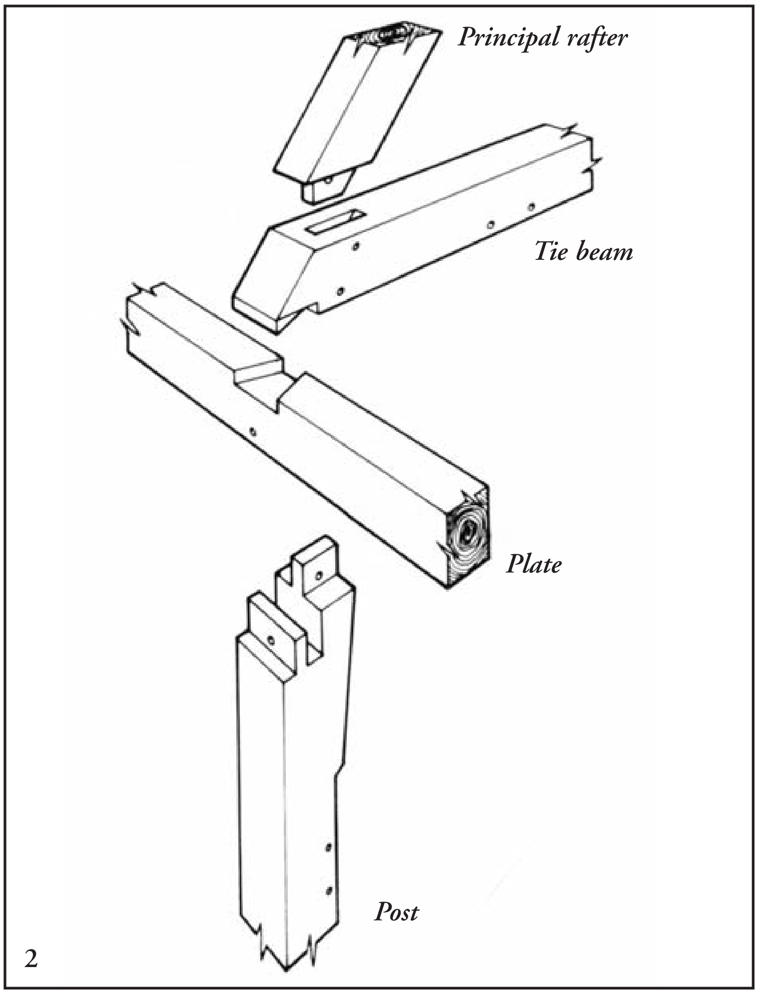
Thomas Allocca (www.wooden-architecture.org) is a journalist and architectural designer in wood in Frosinone (Lazio), Italy.

The Triple-Bypass Tying Joint



Drawings Jack A. Sobon

1 Exploded view of representative triple-bypass joint as found in a cluster of 18th-century Connecticut houses and a number of barns from the 18th and 19th centuries mostly along both sides of the western border of New England, and occasionally farther west. Note that jowl (or upper) tenon engages plate. Found invariably with common rafters.



2 Exploded view of English tying joint, found throughout New England and sometimes beyond, from the first period of English settlement until about 1800. Note that jowl tenon engages tie beam. Found typically with principal rafters.

THE timber framing joint lately called the *triple bypass* is an eaves-level tying joint employing a reversed and usually level assembly and three tenons (Fig. 1). The assembly is reversed in the sense that normal English assembly puts the tie over the plate whereas here the plate sits over at least part of the tie. The assembly is level in that the top of the tie and the top of the plate are flush when the joint is made up, whereas in the English tying joint, the tie beam lies mostly above the plate (Fig. 2).

The triple bypass is found occasionally as an alternative to the English tying joint but is significantly simpler in form while more complicated to assemble or disassemble. Most framers' first acquaintance with the connection will be in an English-style American threshing barn of the 1780–1820 period (Figs. 3, 4), where the observer will notice that the principal posts, while flared as if for an English tying joint, are turned sideways in the walls so the flares (perhaps in the form of jowls or gunstocks) are parallel to the eaves. Further investigation will reveal a series of connections among tie beam, plate and wall post that appear impossible to disengage, thus leading some to call the assembly the "secret joint," and frustrated barn dismantlers to describe it in formerly unprintable terms.

Once understood in its separate parts, the triple bypass is not mysterious to execute, but merely requires a willingness and the wherewithal to lift and move large parts of a frame simultaneously. The framer must find a way to block up at least four tie beams several inches off their posts; next, slip a plate 40 to 60 ft. long onto the horizontal tenons of the several tie beams; and then drop the long and heavy ensemble back down onto the multiple tenons (half of them rotated) of all the posts—which have been erected previously and stabilized in a straight wall assembly.

All the triple-bypass frames I have seen have common rafters. Unlike in the case of the English tying joint, a principal rafter and the retention of its thrust are not integral parts of the assembly.

Constance Kheel, curator of a group of conserved and reassembled barns at Nipmoose Farm for the Persistence Foundation in Buskirk, New York, has wondered about the origins of the so-called secret joint—whether it was Scottish in origin or just somehow showed up on Scottish immigrant farmsteads typical of her region. A large barn (30x60 ft.) there with triple-bypass tying joints was reassembled years ago by Richard Babcock (Figs. 5, 6). It had probably been dismantled and moved once before, since the horizontal tenons of the joint had already been cut from the tie beams and replaced with free tenons.

Jack Sobon wrote on the subject of the triple-bypass tying joint as early as 1991 (see TF 21), noting New York and New England examples. The method enjoyed a period of popularity in the 18th century in Connecticut houses. James Sexton, an architectural historian in New Rochelle, New York, identified many examples of the triple bypass, or *triple-tenoned tying joint*, as he calls it, the earliest dating from the 1720s, in Bridgeport. Sexton treated the topic in 1995 in his article "Tying Joint Evolution 1690–1790" (TF 36).

A 1994 book by P. S. Barnwell and A. T. Adams, *The House Within: Interpreting Medieval Houses in Kent*, a publication of the Royal Commission on Historical Monuments (UK), discusses varieties of reversed assembly in 14th-century Wealden houses. (A *weald* is a forest.) On page 68 there is an exploded drawing of a deluxe version of the triple bypass with four tenons and three jowls, providing not merely a reversed, but also a level assembly with horizontal tenon (Fig. 7).

3

4

Jan Lewandoski

3 Ca.-1805 English-style barn 30x42 ft. relocated to north-central Vermont from the Lake Champlain town of Orwell.

4 Triple-bypass tying joint at east drive bay of the Orwell barn.

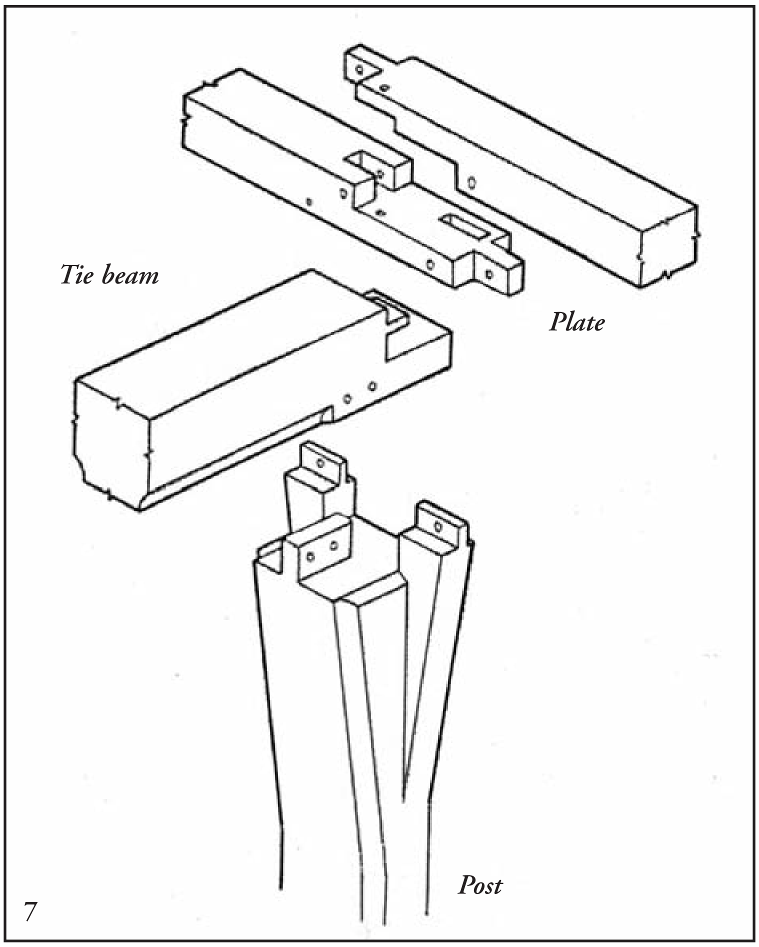
5 Triple-bypass joint during reassembly at Buskirk, N.Y., with plate not yet offered. Free tenon in tie beam presumably replaces integral tenon cut away for earlier dismantling.

6 A similar joint assembled in completed barn at Buskirk. Note scribed post shoulder to match wane of tie beam underside.

7 Exploded view of superb tying joint in 15th-century Kentish house, with tenons for both sides of scarfed plate as well as post.

5

Constance Kheel



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P. S. Barnwell and A. T. Adams, *The House Within: Interpreting Medieval Houses in Kent*. ©Royal Commission on Historical Monuments, 1994. Used by permission.

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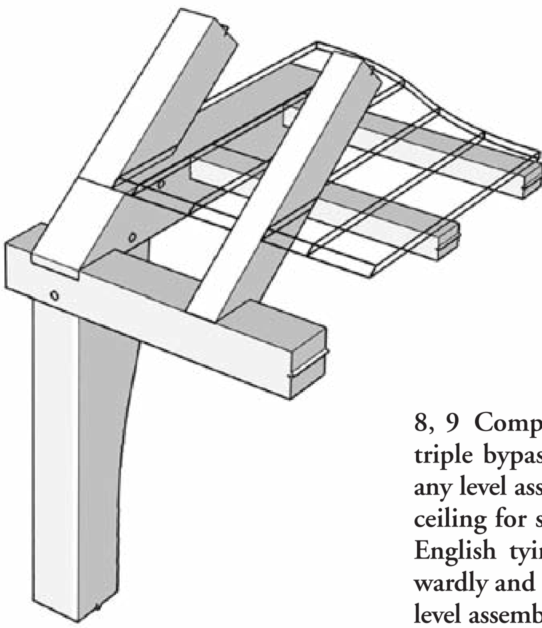

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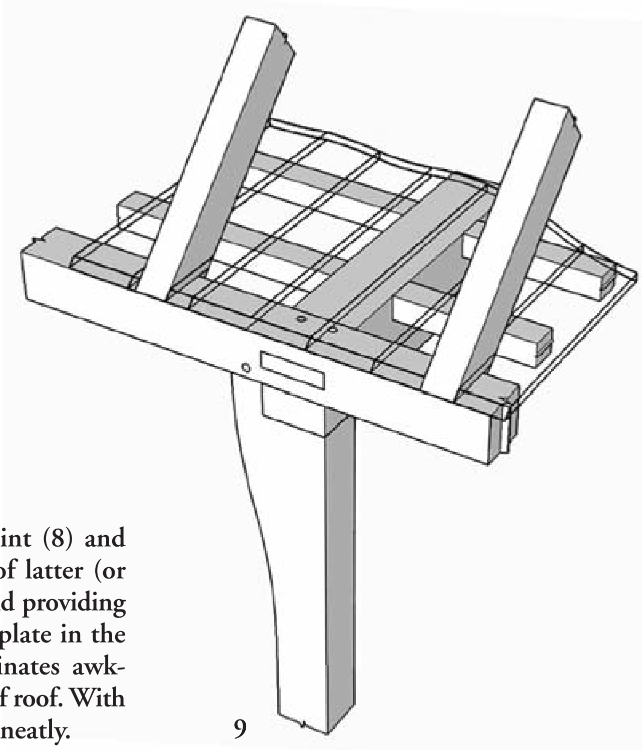

9

Ed Levin

8, 9 Comparison of English tying joint (8) and triple bypass (9) showing advantage of latter (or any level assembly) for flooring attic and providing ceiling for story below. With tie over plate in the English tying joint, floor layer terminates awkwardly and unsupported at underside of roof. With level assembly, floor layer closes space neatly.

Barnwell and Adams are architectural historians with a good understanding of framing, and a particular sensitivity to the aesthetics of the frame within the space. They observe that "a jowled post set sideways . . . attracts attention to the joint because it looks so unusual" and praise the three-jowled version illustrated because "it gives the joint a more usual appearance."

Research continues despite a suggestion from an English wag that we abandon the search for origins and assume "the joint was invented when some carpenter was having a bad day." On the contrary, Sexton some time ago framed our question well: "Why did the craftsmen of Guilford [Connecticut] deviate from a centuries-long tradition? Why did these construction methods appeal to the builders, leading to their adoption not only in Connecticut, and not simply for a generation but, in the case of the triple-tenon post head joint, for nearly a century?"

There is rarely any completely new thing under the sun. What have we, then? Joinery with flared posts turned sideways in the wall, a reversed assembly, and a horizontal tenon from tie beam to plate existed in 14th-century Kent. An efflorescence of the joint occurred in mid-18th-century Connecticut, but entirely in two-story houses (30 to 40 examples). The joint also appeared in barns from the late 18th and early 19th centuries around East Durham, New York, an area settled by persons from Fairfield, Connecticut, an earlier cultural hearth of this joinery. Jack Sobon identified eight examples along a north-south line starting in northwest Connecticut, through western Massachusetts and into southern Vermont. I have seen five triple-bypass examples in Vermont fairly close to a northern extension of the line formed by the Sobon examples.

I know of two more examples in Vermont's Northeast Kingdom, well off the geographical line but perhaps built by settlers of the same origin. (Establishing a concrete link between any given barn and a builder with a particular Connecticut background, however, would be a research project of another sort.) Meanwhile, New York restoration framers report seeing the joint in early-19th-century barns in central New York, again well away from the known line.

A final question to ask is why the joint exists at all. Sexton and Barnwell and Adams focus on the advantages of level assembly—an attic floor clear of obstructing tie beams and a direct square connection between wall and ceiling in the rooms below. The English tying joint, by contrast, requires either that the tie beams be exposed in the attic or that common rafters pass down through the attic floor into the space below (Figs. 8, 9). These advantages are important in houses (Figs. 8, 9), where Sexton found most of his examples, but they are not important in barns, where we continue to find ours.

Barnwell and Adams observe (p. 66), "Whichever form of joint is used, reversed assembly is not nearly as strong as the standard kind described above, since the wall plate can much more easily twist and move outwards than in the standard type of assembly [the English tying joint]. On account of its relative weakness, reversed assembly was rarely used after the 14th century." Their observation certainly does not hold for the New World.

In the long international history of timber framing, no doubt certain self-confident and experienced framers occasionally felt inventive, and the nature of the materials could provoke the same invention by experienced framers at different times and locations. But this hardly explains the century-long popularity of this joint in the Northeast and the likelihood that there are hundreds of examples. We see but a small fraction of the existing stock, not to mention any of those examples destroyed.

Sobon believes that the triple bypass could easily be a completely American innovation to replace the English tying joint. It offered the same procedural advantages to the scribe-rule builder of the day, in that its top plates could be laid over assembled sills for scribing the upper-level assembly (which became impossible with later dropped-tie-beam designs). The triple-bypass design offered the builder as well the advantages of common rafter roofs, vastly simpler than the combination of principal rafter, principal purlin and common rafters traditionally erected over English tying joints.

We know a bit about the distribution in time and space of the triple bypass in America, but we have an implausible gap to fill between the recorded 14th-century English example and the 18th- and 19th-century American ones. An early documentary source discussing this new joinery is unlikely ever to have existed, any more than for the ancestral English tying joint, or for the mortise and tenon joint transfixed by a pin, which last seems to have been invented independently in different cultures at different times all over the world. Discussion of joinery begins to show up in carpenters guides in the 18th and 19th centuries, mostly dealing with new and challenging framing such as trusses and arches, not with those elements thought to be the common heritage of vernacular framers. So we must await more observations. Where have you seen the triple-bypass joint and what can you tell us about it?

—Jan Lewandoski


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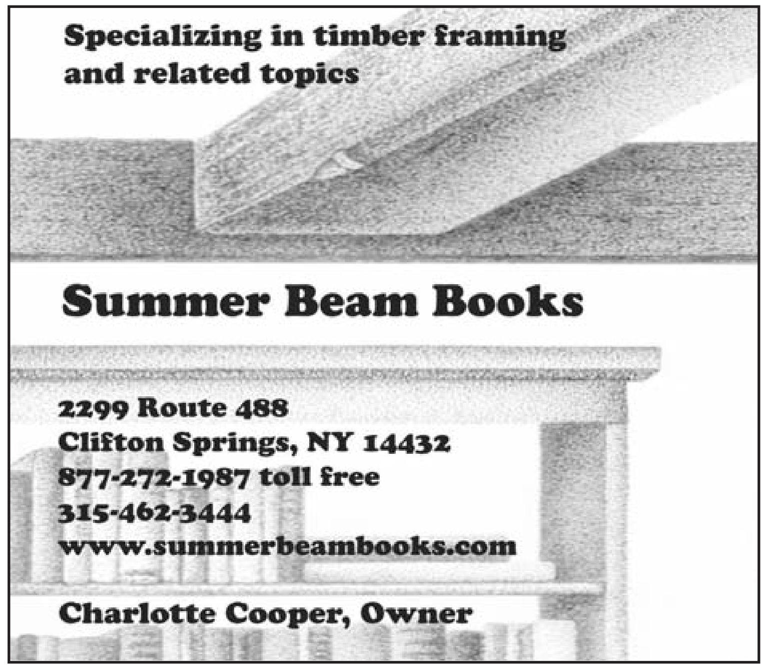
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