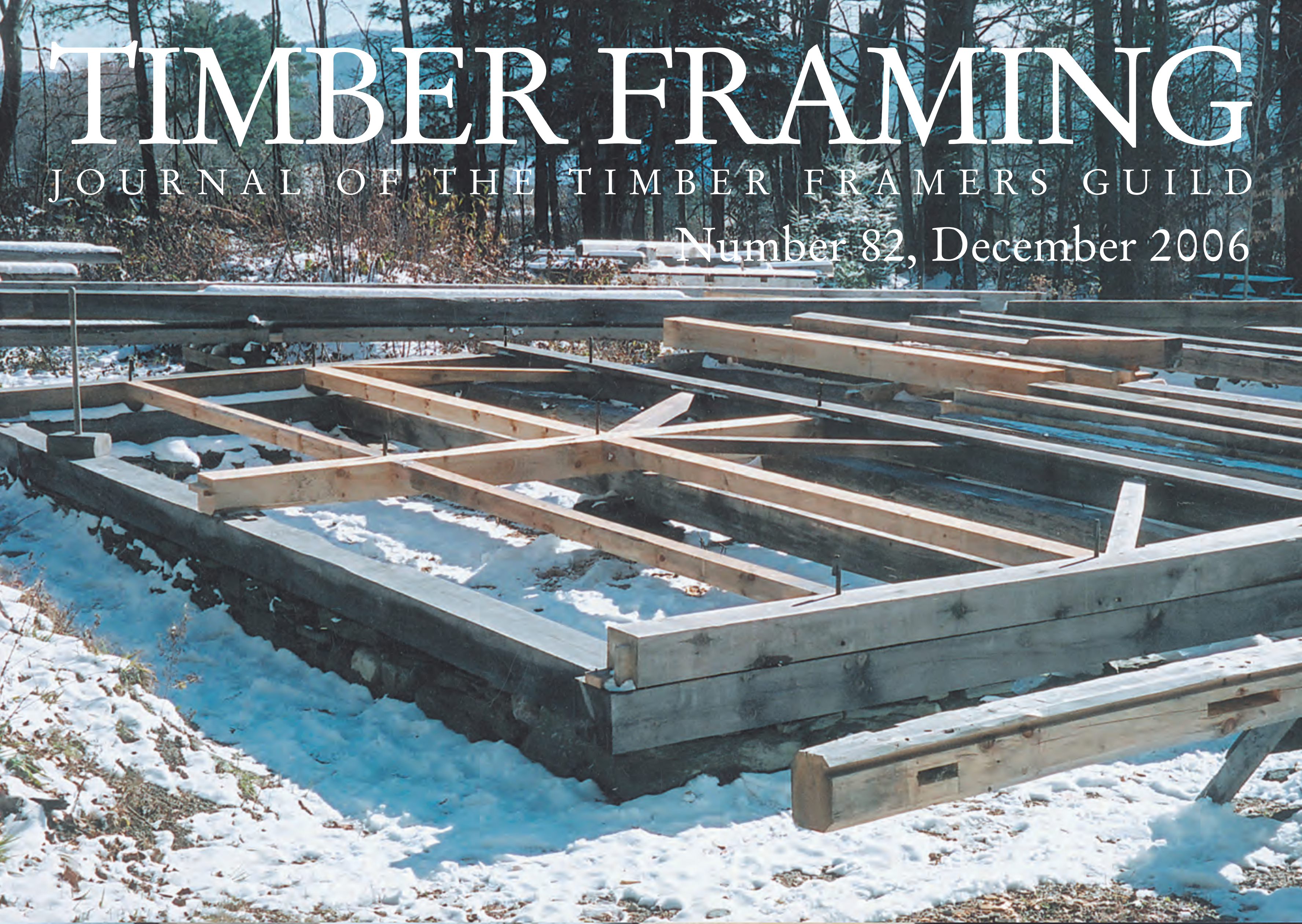
TIMBER FRAMING

JOURNAL OF THE TIMBER FRAMERS GUILD

Number 82, December 2006



Scribing an English Barn

TIMBER FRAMING

JOURNAL OF THE TIMBER FRAMERS GUILD

NUMBER 82 DECEMBER 2006

CONTENTS

On the cover, upper photo, completed scribed assembly of an endwall crossframe for an English barn built recently in Massachusetts. Lower photo, close-up of central joint where two braces and two wall girts meet the median post. Builder's marks incised with specialized race knife at each finished joint indicate wall locations as well as specific joint marriages to assure rapid organization and correct assembly at the raising. Photos by Jack A. Sobon.

PO Box 60, Becket, MA 01223
888-453-0879 www.tfguild.org

Editorial Correspondence
PO Box 275, Newbury, VT 05051
802-866-5684 journal@tfguild.org

Editor Kenneth Rower

Contributing Editors
Guild Affairs Will Beemer, Joel C. McCarty
History Jack A. Sobon
Timber Frame Design Ed Levin

Published quarterly. Subscription $25 annually or by membership in the Guild (apply to Becket address above).

ISSN 1061-9860

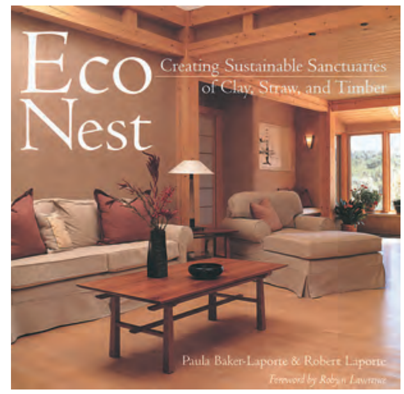
TIMBER FRAMING, Journal of the Timber Framers Guild, appears in March, June, September and December. The journal is written by its readers and pays for interesting articles by experienced and novice writers alike.

1985

BOOKS

Clay-Straw Into The Mainstream?

EcoNest: Creating Sustainable Sanctuaries of Clay, Straw, and Timber, by Paula Baker-Laporte and Robert Laporte. Layton, Utah, Gibbs Smith, Publisher, 2006. 9¾x9¾ in., 136 pages, copiously illustrated. Paper (Smythe-sewn), $24.95.



THE litany of accusations against modern construction is long. Mainstream techniques are energy and resource intensive, therefore exacting a devastating toll on finite natural resources. They rely heavily on mass-produced materials that cause pollution in their manufacture and transport and, combined with airtight construction, often result in poor indoor air quality. Their modular sizing is convenient for transport and sale but results in huge piles of virgin resources shipped to the dump in the course of the construction of even a modest home. The objective list goes on, but there is also a subjective component. For many people, modern buildings just fall short. They often feel essentially soulless. Far from esoteric, this effect is glaringly obvious. It's the difference between a modern shopping mall and a typical European pedestrian city center, or a McMansion and a house by Greene and Greene.

As a result, there is today a vibrant movement to develop new methods of construction and to return to old ones that produce buildings that fulfill our modern needs and create soulful spaces while respecting the natural environment. Happily, timber framing finds itself smack dab in the middle of this quest. The obvious reason is that timber frames make use of a renewable resource to produce notably strong structures of timeless beauty. A less obvious reason is that the large open spaces between structural members allow a lot of design flexibility.

This flexibility is most obvious in the case of exterior walls. In most climates, buildings intended for human habitation need to maintain a stable interior temperature in the face of constantly fluctuating exterior temperatures. Among other things, this requires that the interior space be wrapped in a cocoon of insulating material. In the case of exterior walls, this usually means some combination of a light, airy core and a hard, durable covering. The mass-produced structural insulated panel (SIP) is a ready example of this principle. However, the inherent structural strength and openness of timber framing allow for the option of producing wall infills on site from locally harvested materials. Currently, the most popular such alternatives are some combination of earth and straw.

As a group, there are several advantages to these insulation systems. They use local materials that are inexpensive and renewable or, in the case of earth, almost omnipresent. They generally require

---

Editor's Note. The series of articles on Japanese compound joinery, which last appeared in TF 80 (June), has been suspended. We look forward to publishing further articles one day.

less skill and machinery to install and are variable in thickness and composition, which allows them to be adjusted to the specifics of the situation at hand. This is a very important trait in environmentally conscious construction because every climate, actually almost every building site, presents a unique construction challenge that's best served with a flexible approach. In addition, these systems are all hygroscopic, which means they can take on and give off water vapor, thus contributing to even humidity and hence good indoor air quality. Just as important, they yield thick walls with natural irregularities that people respond to with archetypal glee.

On one end of the spectrum of this group is cob, a mixture of clay, sand and straw. The pros for cob are its remarkable structural strength (admittedly not particularly useful in combination with a braced timber frame), variable thickness, sculptability and thermal mass. On the con side, cob is very labor intensive and not the best insulation against conductive heat movement. Adobe is similar to cob, the difference being that the earth mixture is first formed into air-dried bricks, whereas cob is placed wet on the wall in lumps called, you guessed it, cobs. On the other end of the spectrum is an infill system comprised of straw bales covered with earth plaster. This combination creates walls with excellent insulative and sound-absorbing qualities without the labor intensiveness of cob and adobe. On the downside, though the earth plaster helps wick away water, bales are the most vulnerable to water damage of the infills in this group. A third option falls midway between these two extremes. It's a mix of straw covered with a wet clay slurry and variously called straw-clay, light clay-straw, clay-slip straw, and *leichtlehmbau* (German for "light loam building").

The latter is a material that can be varied in thickness and possesses both good insulation value and thermal mass potential. Though not structurally sound alone, clay-straw can be part of the structural equation of a timber frame system. If you don't believe me, just check out one of the many timber and clay-straw buildings that have been in continual use for hundreds of years in different parts of the world. For example, the old half-timber style buildings that have now become the Disney stereotypes of old-time Europe are often infilled with some form of clay-straw. In addition, using the same basic materials, clay-straw can be combined with cob to produce sculptural shapes such as thickened bases and arched window openings, as well as built-in shelving and furniture with a wide variety of styles, acoustical properties and thermal characteristics. Why make all walls look the same? Why should a cold north wall have the same insulation value as a sun-warmed southern wall? Why not boost the sound insulation between a teenager's bedroom and the rest of the family? Clay-straw construction can make all of these questions moot.

Though there are good books devoted to straw bale, cob, adobe and other forms of earth and earth-straw construction methods, Paula Baker-Laporte and Robert Laporte's new book *EcoNest* is, to my knowledge, the first book in English dedicated solely to a building system featuring clay-straw construction. The authors are a husband-and-wife team. She's an AIA architect and he's a timber framer, a student of *leichtlehmbau* and an early adopter and teacher of clay-straw technique in the US. Together they have developed a construction method they call the "Econest," which combines beautiful timber frames, judicious floor plans and deeply appealing interior detailing with a clay-straw wall infill (Fig. 1).

In addition to designing and building, the authors run workshops dedicated to the ins and outs of the Econest system. I don't know Paula and Robert, but they have always come highly recommended. After reading their book, I'm convinced they are a distinguished team and create buildings of singular beauty and environmental integrity. By developing a coherent, marketable system that incorporates a locally harvested, site-manufactured wall infill method, they are making a huge contribution to the effort to take "natural building" beyond the realm of the self-reliant eco-warrior and into the all-important mainstream.

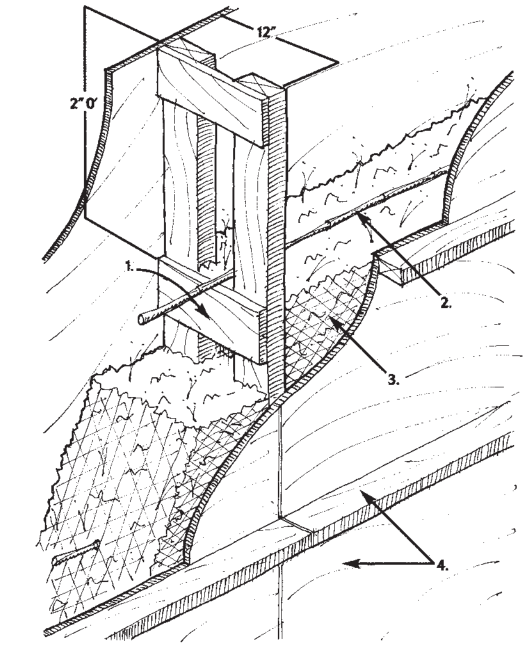
Laurie Dickson

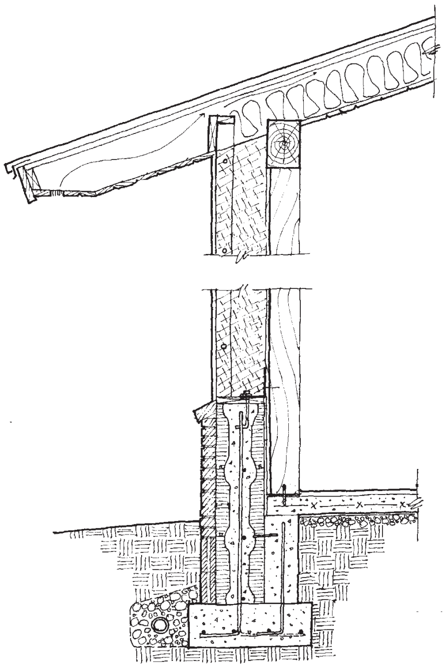
Fig. 1. With creative design and skilled execution, timber framing and earth-plastered clay-straw can combine to create inviting interiors.

BUT make no mistake, *Econest* is not a technical resource or a how-to manual. The book is a slim 136 pages, half of which are dedicated to "case studies," which amount to brief owner descriptions, floor plan diagrams and beautiful pictures. In fact, only 30 pages near the beginning of the book are actually dedicated to describing the Econest method.

This initial section includes a quick historical overview and some basic explication of the theories behind their approach. The gist is that clay-straw combines the advantages of thermal mass and insulation to create a wall with good thermal properties. A new technical study footnoted in the book found the R-value of clay-straw to vary with density. An average of the most common mix densities would put the Laportes' 12-in.-thick walls at an estimated R-19. Furthermore, in the authors' system, the clay-straw is "outsulation," meaning that it wraps the exterior of the structural frame in an unbroken cocoon of insulating material, therefore avoiding the thermal breaks that exist in stick framing and between-the-posts timber infill approaches. (A typical 2x6 wall insulated with fiberglass might have a true performance closer to R-14 or even less.) This property, combined with mainstays of environmentally conscious construction such as building small, using passive solar heating and cooling strategies, extending the living space into outdoor rooms and other basics such as ample roof overhangs and water management, creates an energy- and resource-efficient building strategy.

Much of this information is helpful to the beginner. Still, the brevity of the remarks leaves room for misinterpretation.





Econest Building Co.

Fig. 2. Section through an Econest, showing stem wall, straw-clay wall, timber frame and vented, insulated roof.

Fig. 3. Clay-straw tamped between temporary plywood formwork attached to 12-in.-deep frame wrapping exterior of timber frame.

Fig. 4. A finished clay-straw wall, ladder (Larsen) truss visible at corner. Clay-straw is lifted high off ground on ICF stem wall.

For example, there's the sticky issue of the role of thermal mass in determining temperature inside a building. No one disputes that dense materials such as water, concrete and earth (so-called thermal mass materials) hold heat well and are therefore a great boon to temperature retention when placed inside the thermal envelope, that is, surrounded by insulative materials. There is much debate and confusion, however, over the role of thermal mass in exterior walls. It's often claimed that high-mass materials can act as a form of dynamic insulation that helps stabilize internal temperatures. This definitely works in some situations. For example, in hot, arid climates where outside temperatures fluctuate daily above desired interior temperatures, heat moving through thick mass walls may not make it indoors before it "turns around" and starts moving back toward the cooler nighttime temperatures that arrive quickly after sundown. In my climate (the hills of western North Carolina), though, a north-facing wall that never gets hit by the sun will experience continual exterior temperatures below 50 degrees for much of the year. In this situation, a mass wall would cool down below the desired interior temperature for long periods and consequently start to pull interior heat into it. In short, all of my research tells me that this dynamic insulation or "mass enhanced R-value" effect is only narrowly applicable.

The authors either disagree with this understanding of thermal mass or are unclear in their writing. For example, in a paragraph titled "Earth Coupling," they claim that laying a mass floor directly on the earth will tie the building into its constant "55-degree" temperature and therefore help to heat and cool the building. In the case of cooling, this is definitely true, but in the case of heating, unless you are only trying to heat your building to 55F, I say that the earth will actually act as a huge heat sink, pulling heat out of the floor. (In my opinion, the answer in heating climates is to add some insulation under the mass floor. Two inches of rigid foam [R-10] suffice, since you are only dealing with the tropical-like climate of a constant 55F.) This conception of thermal mass is repeated in several other instances pertaining to the clay content in the wall infill.

Other brief comments and omissions also left me scratching my head. Can I really base the suitability of my soil on the existence in my area of bird's nests with mud content? Is silt content a problem in clay soils, as it can be with cob and adobe? Will the hygroscopic nature of clay-straw be sufficient protection for the straw in very humid or rainy climates? Commercial recycled cellulose insulation is also hygroscopic with very good thermal properties. How does its performance compare with clay-straw? Longer and more numerous discussions of theoretical basics could have helped with these and other questions.

The authors also choose to be brief in their description of how their system is actually built. The core of their method is a custom timber frame apparently attached conventionally to a concrete foundation. An Insulated Concrete Form (ICF) stem wall is then built around the exterior of the frame. Clay-straw requires formwork. In the Laportes' system, ¾-in. plywood formwork is attached to what they call a matrix, a series of 12-in.-deep ladder trusses framed from 2x lumber on top of the ICF stem wall (Figs. 2–4).

The interior of this framework is completely covered with plywood. Clay-straw is a mixture of straw, clay-rich soil and water. In the authors' system, the clay-straw is mixed ingeniously in a large homemade, horizontal motorized mixer. The mixture is then placed in the wall behind 2-ft.-wide ¾-in. plywood attached to the bottom of the exterior side of the matrix. Each 6-in. layer is tamped into place before more is added to fill the form. As soon as the mix is dry enough, usually the same day, this 2-ft. formwork is moved up the wall and another lift of clay-straw is installed. Once the walls are completed, the plywood formwork is removed and sensibly reused as roof decking. The finished walls are often covered with earth plaster, though there are other options including wood siding (Figs. 5–6).

This information is passed on in eight pages of text, illustrations and photos. Though I'm all for a quick read, I feel that such brevity might also leave the eager beginner wanting for information and perhaps even a bit confused. Some pivotal information is tantalizing—alluded to but not supplied. The topic of testing soils for clay content is reduced to a reference to another book. A "specially designed" plywood hopper for moving clay-straw mixture to the wall is mentioned but not described. The same goes for the motorized mixer, though there is a picture of the latter. In addition, many important questions are given no mention. How is the matrix attached to the frame? Can the roof be constructed and covered

Fig. 5. In the Southwest, the authors often use clay-based plasters for exterior finish on their designs. La Barbaria Canyon, New Mexico.

Laurie Dickson

Fig. 6. In areas with annual rainfall of more than 20 in., they opt for some form of wood siding. Fairfield, Iowa.

Povy Kendal Atchison

before the walls are infilled (a prerequisite in my wet climate)? How are the doors and windows framed? What prevents termites from crawling through the ICFs into the wooden structural members? Can a gravel trench foundation be used to reduce concrete use? What is the earth plaster mix and procedure? The three construction drawings included, though helpful, also introduce a bit of confusion. In one, what looks like an angle bracket is labeled as a sill plate. In another, the strange measurement of 2″0′ is repeated twice. These small mistakes add a level of confusion to an already skimpy factual representation of the system.

Perhaps my frustration derives from my excitement about the Laportes' system. I'm a fan of clay-straw and have built with it. When mixing by hand, the process is messy and time consuming. The addition of mechanization is important if clay-straw is going to move out of the realm of the owner-builder. I guess I wanted the book to have been written for me, a facts-hungry professional, when it was actually written for a different kind of reader. *EcoNest* is beautiful and nonthreatening to the layperson, with many lush, full-page photographs, large type and a pleasing graphic layout. It will serve as an excellent tool to illustrate to clients (and reluctant partners) that natural building can be every bit as comfortable and far more beautiful than the typical offerings coming off the conventional construction rack.

—Clarke Snell

Clarke Snell (clarke@thinkgreenbuilding.com) is the author of The Good House Book: A Common-Sense Guide to Alternative Homebuilding *and, with Tim Callahan, of* Building Green: A Complete How-To Guide to Alternative Building Methods. *Clarke and Tim run Think Green Building in Marshall, North Carolina.*

Plastered Straw Bale Enclosures for Timber Frames

YEARS ago, when I worked in standard construction, I began to have serious illnesses. I eventually traced my sickness to the buildings I was constructing and living in, and I began a search that has led me to an entirely new view of my place in the world as a carpenter. I was pushed to see how the way we build affects not only our own health but also that of many of the living systems of this world. I realized that I wanted to create healthful living spaces that took little energy to make and left no toxic residue behind. Locally milled lumber was the first piece to my puzzle, and straw bale walls have become the next. A timber frame enclosed by bales covered in clay plaster can return to the soils it came from when it is no longer of service, while so much of many modern houses will linger in landfills for generations. There are more puzzle pieces to find before this process can be deemed truly sustainable, but it's a good start.

Plastered bale walls and timber frames are a natural combination. A timber frame is a system for holding up roof and floors that's looking for self-supporting walls, while bale walls are structurally independent but looking for a roof over their heads. There are load-bearing straw bale walls that carry their own rafter plates but, in many parts of the country, it's prudent to build the roof first to provide shelter from rain (Fig. 1).

Photos and drawings Sarah K. Highland

Fig. 1. Roofed-over timber frame hybrid prepared with window and door bucks, ready for erection of the straw bale walls.

A bale wall is made of two parts: straw bales, usually stacked like giant bricks, and plaster on both inside and outside faces. Bales should be sturdy, dry and free of mold. They are often pinned with stakes down the centers or sides to stiffen the assembly until the plaster sets. Plasters may be made of clay, gypsum, lime or lime and cement, depending on performance needs. The bales and plaster work together to give the wall structural integrity, high thermal performance, fire resistance and moisture protection.

Structural Characteristics. A plastered bale wall behaves a lot like a structural insulating panel (SIP). The plaster skins carry loads, while the straw core prevents them from buckling. These thick assemblies are also resistant to bowing under perpendicular wind loads. Though more testing is needed to refine our understanding of the behavior and strength of straw bale walls, engineer Bruce King has compiled what is known to date in a new book, *Design of Straw Bale Buildings*. Some general principles can be outlined here for combining straw bales with timber frames.

First, recognize that the plaster will be stiffer than the frame, and therefore provide the racking resistance for the building. In smaller buildings, outside of earthquake and high wind zones, one can probably rely on simple abutments of plaster and framing. If anything, too close a contact between the two may lead to cracking of the plaster as the frame shrinks and settles. In demanding conditions, mesh reinforcement may need to be used. Second, support the plaster on the foundation. Since the load path goes through the plaster, it should be directed right to the ground. Third, make sure the plaster is well bonded to the straw and properly cured.

Research made available by the Ecological Building Network has found that even clay plasters can carry substantial loads. Clay plaster, reinforced with chopped straw, is most often applied directly to bales, without the use of additional mesh reinforcement. Testing has found that it can resist ordinary wind loads successfully.

Thermal Performance. Testing at Oak Ridge National Laboratory found a plastered two-string bale assembly to have an R-value of 27.5. This value indicates actual performance, as it does in the case of foam SIPs, without the convection loops and thermal bridging that can cause light-framed walls with R-19 fiberglass to have actual values in the low teens.

Unlike standard SIPs, bale walls have significant thermal mass in both the straw itself and especially the plaster skins. In climates or seasons where daily temperature swings range above and below the comfort zone, a half-day delay in heat transfer through the walls can boost thermal performance to extremely high levels. This effect has been documented at the Real Goods Solar Living Center in California. In cold climates, the thermal mass of the interior plaster layer, which lies entirely inside the insulation envelope, serves to dampen temperature shifts and allows heating systems to work more efficiently.

To achieve a high insulating value, it's essential that both sides of the wall be plastered and that any gaps where bales meet be stuffed with a straw-clay mix. These measures are also necessary for good sound insulation and fire resistance.

Fire. Tightly baled straw, like timber, does not burn easily because oxygen does not penetrate beyond the surface layer. Plastering the bale greatly increases its fire resistance. Test walls have passed two-hour ASTM fire tests and have likewise passed flame-spread tests with impressive results. A video of two fire tests as well as their results can be found at the Ecological Building Network website (see Resources).

Moisture. The most complex question to address is that of water, because so many variables influence how moisture can enter a wall. The Canada Mortgage and Housing Corporation studied existing straw bale houses and found that external moisture problems result from a variety of design shortcomings. The prescription for avoiding rain damage is largely common sense: elevate the walls a foot or more above grade, provide generous roof overhangs and gutters, use careful flashing detailing at door and window openings, avoid blocking air circulation with vegetation close to the building and, in areas of extreme exposure, use porches or siding to shield walls from the weather. Bale walls are customarily placed on a "toe-up" of two parallel 2x4s laid flat, or some equivalent, to elevate them slightly above standing water that could pool on the floor from a plumbing or roof leak.

Interior moisture is also of concern, especially in cold climates. It's important to provide an air barrier on the inside surface of the wall to prevent bulk air movement. Plaster does this job very well. Where plaster meets timber, the joint must be bridged by a strip of building felt, drywall, or the like, which laps under the plaster (Fig. 2).

Installing a whole-house ventilation system is strongly advised, as the construction will be very tight.

Straw bale builders approach the questions of wetting and drying in a more realistic way than many conventional builders. It is a fact that water will enter any wall assembly, in time. The question is whether it will be able to leave again before it starts to cause trouble. Vapor barriers and impermeable cement stuccos will trap moisture, while vapor-permeable plasters will allow walls to dry to both the interior and the exterior. Therefore, permeable plasters, paints and sidings should *always* be used. Studies have found no problems of high moisture buildup at the interface between the straw and the outside plaster in cold climates.

Framing. Many variations are possible, but I will outline the methods timber framer Aaron Dennis and I prefer. It is simplest and most insulative to wrap the bale walls around the outside of the frame, like most SIP construction. Pad all the outside timbers with centered 2x4s and 2x6s to provide a 1½-in. gap between bales and timbers and thus allow the plaster (which will be above an inch thick) to tuck behind all posts and beams. A "gasket" of felt paper, masonite or drywall must be fastened to the outside of the pad and extend wider than the pad to allow the plaster to lap onto it.

Frame door and window openings with studs connected to the floor, but not extending above the header, to allow for uninterrupted horizontal runs of bales above. Second-story window bucks may be suspended from roof framing or stacked above lower openings. Hanging the bucks is fussy work—if possible, start by running king studs down to a floor or temporary plank, then cut the legs out from under them (Figs. 1, 3).

Fig. 3. Standing window buck on high foundation wall.

We have generally double-framed the openings with 2x4 studs and headers to the inside and outside of the wall. This method allows for traditional wood sills and header trim. Many builders single-frame their bucks and simply plaster sill and header bales. When going this route, the authors of *Serious Straw Bale* recommend that the bale above the window be given extra support with a suitable mesh sling running from the back side of the beam above, around and under the bale, and ending at the header. Deer netting or other mesh with approximately 1-in. openings allows the plaster to reach through and bond to the straw (Fig. 4).

At the base of the wall, we build a wire chase and notch the bales with a chainsaw to fit around it. The chase is simply a mini-stud wall with a backer board. The studs are predrilled for wires using a

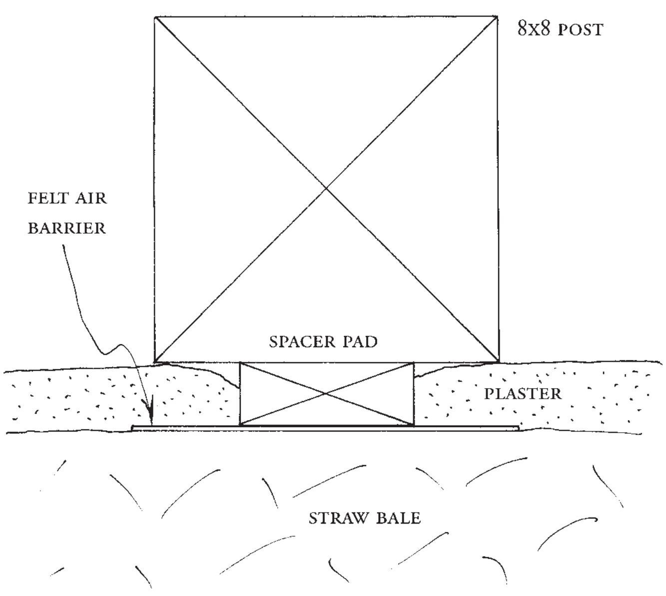


Fig. 2. General scheme for interface between timber frame and plastered straw bale wall.

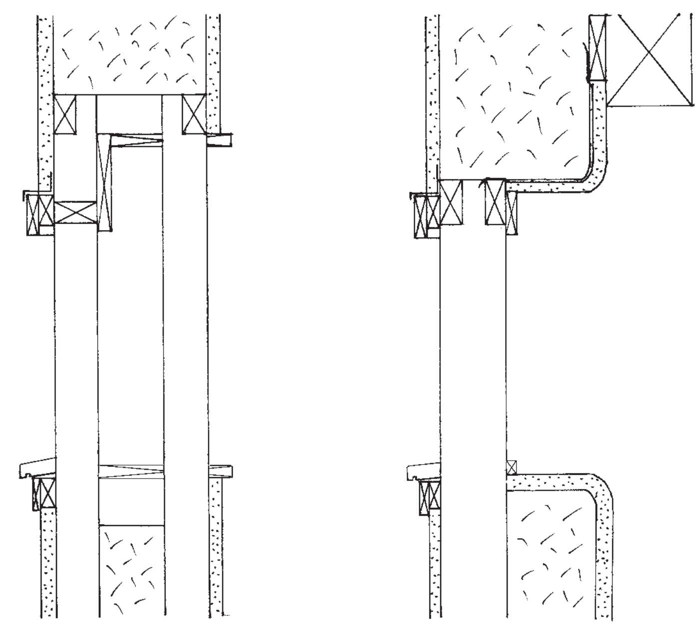


Fig. 4. Two methods of finishing around windows (side casings and sash omitted for clarity). System on right is reinforced at top.

drill press. We prefer to keep outlets in the baseboard chase and to run wiring for light switches at windows and doors before the bale installation. Bales are then notched to fit around the electrical boxes (Figs. 5–6). If it's necessary to mount a fixture away from the framing, its box can be screwed to a 2x2 stake driven into the bale, and the wire either zigzagged between bales or stuffed in a chainsaw kerf.

Figs. 5–6. Bales are notched at bottom for sturdy wiring chase. Below, switches are wired before bales are installed.

Many people who have run plumbing in bale walls have lived to regret it. As with any construction, water lines should be kept to interior framing. If you must run a pipe through a bale wall, insulate it and put it inside a larger pipe sleeve to direct a leak to the outside.

Stacking Bales. Bales are most often laid up like giant bricks, offsetting the joints in a running bond. Laid flat (with strings at top and bottom), they make an 18-in.-thick wall; on edge (strings showing), they give 14 in. of thickness. Because of the difference in heat conduction resulting from the orientation of straws in a wall, the two wall thicknesses have virtually the same R-value. Wherever straw abuts window framing, it can be secured using "bale nails," 20d nails with large square wooden washers. For fastening bales to timber, Aaron's "bale spike" is made from a vertical hardwood stake with a hole drilled in one end for a pole barn nail (Figs. 7–8).

Figs. 7–8. Bale nails fasten straw to window framing. Below, bale spikes fasten bales to timbers.

Frequently, custom short bales are needed, such as at window openings. The bales are divided by threading new strings through them at the desired length using a sturdy metal "bale needle"; the old strings are cut once the new ones have been cinched and fastened. Bales can also be ripped to narrower widths, notched and sculpted using a sharp electric chainsaw (Fig. 9).

Installing bales and modifying them to the many sizes and shapes needed in the course of the wall raising is best learned by hands-on experience at a jobsite or through a workshop. Several books illustrate these methods well.

Plastering. The plaster coat will be an inch or more thick. Smaller buildings can be efficiently plastered by hand. To move plaster around a two-story building, hiring a crew with a plaster pump will save a lot of hard labor (Fig. 10). Clay plaster, or a clay-lime mix, has many desirable properties for dealing with humidity, odors and indoor sound, and it's also the most environmentally benign choice. When superior strength or water-shedding ability is needed, pure lime is the next choice, followed by lime-cement. Lime sticks readily to clay, so it can be used just for finish coats. Plaster recipes and application methods have fierce and loyal followings. Do some homework and experiments before tackling a large project.

Fig. 9. Mike Basile chainsaws a bale to custom width.

Fig. 10. A plaster pump is practical for large jobs.

Straw bale construction stands in a place similar to where timber framing was two decades ago, with a growing inventory of buildings in service (Figs. 11–12). Ingenuity and enthusiasm have brought many choices to the table, and experience and testing are sorting out which are most viable. Building scientists and engineers are starting to confirm what many homeowners already believed: well-built straw bale structures are energy efficient, durable and strong. Joining straw bale construction with timber framing allows us to give our clients homes that are not only strong and beautiful, but that also support health at home and beyond. —SARAH K. HIGHLAND

Sarah Highland (hiberry@lightlink.com) lives in Ithaca, N.Y., where she cuts timber frames, works with straw and builds masonry stoves.

Resources

Ecological Building Network, www.ecobuildnetwork.org.

Guelbreth, Cedar Rose and Dan Chiras. *The Natural Plaster Book,* New Society Publishers, 2003.

King, Bruce. *Design of Straw Bale Buildings: The State of the Art,* Green Building Press, 2006.

Lacinski, Paul and Michel Bergeron. *Serious Straw Bale,* Chelsea Green, 2000.

Magwood, Chris, Peter Mack and TinaTherrien. *More Straw Bale Building,* New Society Publishers, 2005.

The Last Straw Journal, PO Box 22706, Lincoln, Neb. 68542.

Figs. 11–12. Timber-framed house, Lansingville, N.Y. At left, baling almost complete, with window and door bucks ready for trim. At right, plastered and trimmed. Broad overhang is desirable to keep walls dry. Roof brackets are independent of frame.

The English Barn in America

III. Scribing the Timber Frame

WITH the floor frame set on a firm foundation, its top surface level and square, we now have a platform for scribing the eaves-level frame, the longitudinal walls, the crossframes and the roof frames. The barn's floor frame is a full-size plan on which the remaining sections are superimposed. (Refer at any time to Figs. 29–32, sectional views of the frame, on pages 18–19.)

As each frame is set out, timber faces are made flush with the sill faces below, minimizing measuring and squaring effort. The eaves-level frame—made up of the plates and the tie beams—is scribed first. To prepare, scratch perpendicular lines across the top and down the outside of the long sills, indicating the face side of each bay, and mark locations for (or lay out) the eight post mortises.

If plates and ties are hewn, they should be lined (see the previous article in this series in TF 81). Plates are lined all four sides, ties only top and bottom. Above the sills, all joinery is laid out 1½-in. wide, 1½-in. from the reference edge. Set the plates on the sills, positioned lengthwise to stay clear of large knots or knot clusters at the tying joints. Scratch a line up the outside face and across the top to indicate the face side of each crossframe. Notice that the plates will not be flush with the outsides of the sills but will instead hang over 2 in. to house the top ends of the siding in a 1-in. board channel. Figs. 1–3 below explain the making and use of the channel.

If the plates are bowed, position their ends where they should be; the two intermediate tie beams can be scribed later to remove the bow. Level the top (face) surface of the plate across its width using wedges. If it is hewn and has been lined, level it using the level mark. Unless it has a severe taper along its length (a couple of inches or more), it isn't necessary to level it longitudinally.

Place the ties in position over the plates, their best edges flush with the scribed lines indicating the bays. The straightest ties should be at the end walls. If the ties are rectangular in cross-section, as are mine (7x9), the end ties are laid flatwise to allow extra wood for the board channel, while the interior ties are set on edge (Figs. 4 and 7).

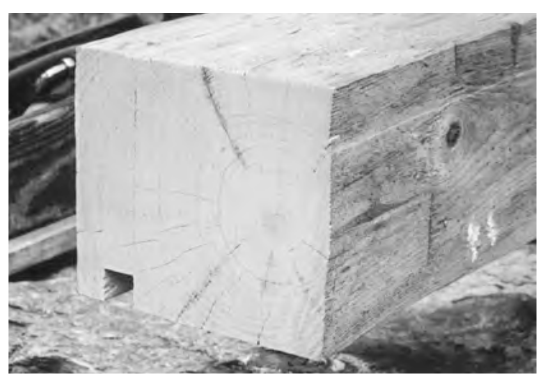
The top surface of each tie should be level across its width and the tie should bear flat on the plates without rocking. If not, plane its underside as necessary. Put a level mark on the top of each tie beam near its midspan. Next, scratch a line on the underside at each side of the plate. If the plates are bowed, mark the width of the building on the underside of the tie (remembering to account for the 2 in. at each end for the board channel) and move the tie as necessary to mark the plate width.

Roll the tie over to lay out and cut the half-dovetail. Though a half-dovetail (flared on one side only) is the most commonly found joint in old work, occasionally a full dovetail was used. The straight side of the half-dovetail is typically on the face side of the timber. As with many joints in traditional timber buildings, the square is the guide to laying out the dovetail. The tongue of the square (or the blade for wide plates) is placed so one side aligns at the base of the dovetail and the other side at the tail, yielding 1½ in. of flare. On the gable-end tie beams, the dovetail can be narrowed and moved inboard to provide extra relish on the end of the plate. The dovetail depth is typically 1½ in. as well, though 2 in. is found on large members (Figs. 5–6).

After cutting the dovetails on the tie, roll it back into position on the plate, check for level at the level mark and scribe the dovetails into the plate. Note that, for hewn members, the dovetail and housing are cut to the depth indicated by the chalk lines. Assemble the ties, check for level and number the ties. I numbered them I–IIII from north to south (left to right), marking the west end on the vertical face. Old examples also have the numbers on the top side as well as on the bottom concealed inside the dovetail lap.

The Roof Frame. With the plates and tie beams in place, it's logical that the roof should follow. First, scribe each pair of principal rafters to a tie beam. Turn the tie beam face up out of its dovetail and shim it until the level mark is plumb.

Before proceeding further, we should understand roof pitch in scribe rule terms. Rather than a ratio of rise over run (something in 12), as commonly understood today, pitch in scribe rule terms is



All photos and drawings Jack A. Sobon

Figs. 1–3. Plates and end-wall tie beams are grooved on their undersides to accept upper ends of vertical siding boards. Such grooves or channels, 1 in. wide and 1 in. deep, are commonly found in old barn frames. Though it also saved on precious hand-forged nails, the channel's real savings was in time and labor. Siding (once checked for thickness at one end) could be applied by a worker standing on the ground; no scaffold was required. The author fitted an old 1-in. wooden rabbet plane with a 20-in. maple fence and a 1-in. spacer block set 1 in. above the plane bottom for a depth stop. Experiments on a test block showed that to plane the channel down to its full depth would require about 100 passes, about a mile and a half of walking. To speed the process, the author first defined the groove with the plane, then made 1-in.-chisel cuts about ⅞ in. deep and 1½ in. apart, and levered out the waste. With chisel bevel down, the author then pared the bottom surface, finishing with passes of the plane. When finished, the groove's appearance matched that found in old barn frames, a planed bottom with a few chisel marks.

Fig. 4. Deck assembled, the eaves-level frame (plates and ties) superimposed for scribing. Plates lie outside long sills to account for siding groove. Interior ties are on edge, end ties flatwise. Sufficient trim is left to allow some adjustment at joints to avoid timber defects. Plates will ultimately be trimmed for an 8-in. overhang at the gable ends.

Figs. 5–6. Lapped half-dovetail joint at plate. Mating surfaces have been corrected.

Fig. 7. Scribing end tie over plate.

the length of the rafter to the width of the building. Though possibly unsettling to today's trig-minded building professionals, this notion is practical. It tells the builder directly how long a rafter has to be for a given width of building. In these terms, a 3:4-pitch roof is typical in parts of England where thatch roofs were common. Here in America, a 2:3 or 5:8 pitch is more often encountered. Using a 2:3 pitch, a 30-ft.-wide barn needs 20-ft. rafters. (However, to confound those of us surveying old structures, the ratio length of the rafter often includes an overhanging tail. So, the hypotenuse of a 20-ft. rafter minus its 6-in. tail would be 19 ft. 6 in. and the actual pitch 13:20, somewhat less than 2:3.)

For my barn I chose 5:8 pitch (9:12 by today's rise-over-run method), the convenient 3–4–5 ratio. Calculated on a width of 25 ft. 10 in. outside to outside of plates, my rafters should measure 16 ft. 1¾ in. from peak to top outside edge of plate. I scratched two lines this distance apart across the top surface of each of my rafters. When the rafters are laid over the ties for scribing and the shoulder length is ticked off, one mark aligns with the point on the side of the tie beam representing the top outside corner of the plate, the other mark with the peak of the roof.

The rafters are tumbled individually. (See description of tumbling in part II of this series in TF 81.) Of any pair, the first rafter tumbled will be the one mortised at the peak. But only the lower (tie beam) joint is tumbled, with the second rafter used as a gauge to locate the peak end roughly. (I don't believe that mortises for the rafter feet were historically precut, as are most mortises in a scribed frame.) After the first rafter's bottom tenon is cut, the tie beam mortised and that rafter assembled with its tie, the second rafter of the pair is tumbled between the peak and the tie beam (Fig. 8).

Fig. 8. Scribing rafter to tie beam. The roof triangle, face up, lies flat, supported by the next tie beam. One rafter has been scribed and fitted; the second is in process.

Because my rafters, tapering from about 6 in. at the peak to about 9 in. deep at the foot, varied in size at their feet, I marked the lower tenon length on each side before tumbling to give me the mortise lengths and cutoff lines on the tie beams. I allowed 2 in. of relish at the ends of the mortises to strengthen the rafter foot joints.

Tumbling a piece at other than a right angle requires a special technique. The length is ticked off as usual, on the obtuse-angled (greater than 90 degrees) side (Fig. 9).

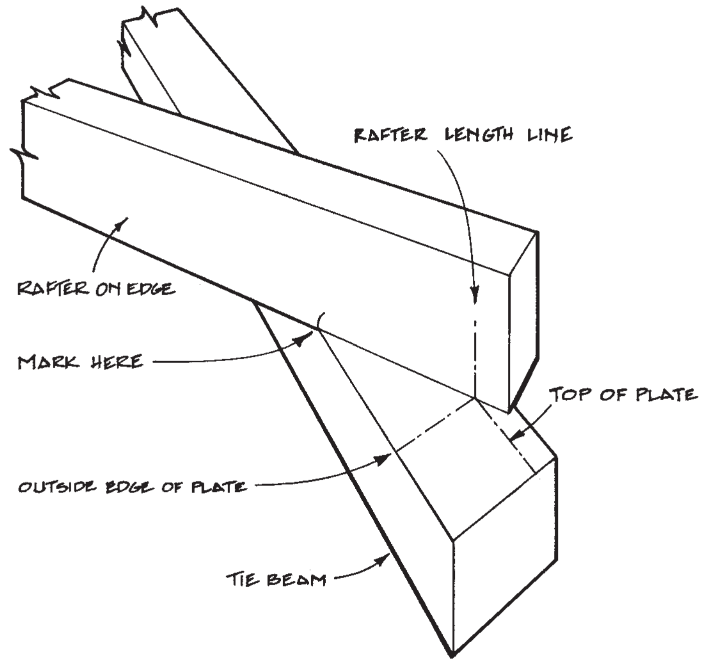


Fig. 9. Scribing the rafter to the tie: rafter set on edge over tie beam set on edge.

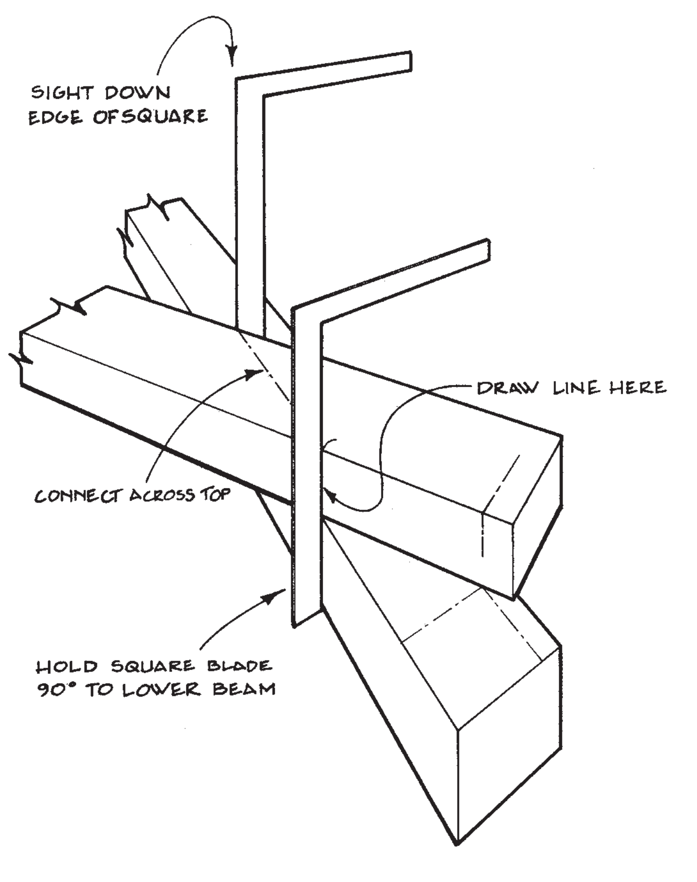


Fig. 10. Rafter rotated back into assembly position; framing squares manipulated to mark for tenon shoulder line.

When the rafter is rotated back into position, the square is applied on the obtuse-angled side as though the timbers were meeting at 90 degrees (lower square in Fig. 10). On the acute-angled side, this technique will not work. Instead, sit the end of the square on top of the lower member, its edge perpendicular, and sight down the edge, moving the square until it's in plane with the lower surface; then draw the line (upper square in Fig. 10).

When connecting the lines across the top, sight down the edge of the square to verify that it's parallel with the edge of the timber below.

After each of the rafter pairs has been cut and assembled and numbered at the tie beam, lay on and scribe the secondary members by tumbling. The gable rafter pairs have collars to serve as nailers for the vertical siding. The intermediate rafter pairs, which carry a greater portion of the roof load, have short raking struts to help support the rafters (Fig. 11). The collars are numbered I and IIII while the raking struts are numbered I, II, III, IIII with corresponding marks on the rafter.

Fig. 11. In this view of a test assembly, end rafters are collared to support siding, intermediate rafters strutted to help bear roof load.

Disassemble the rafter couples and put the ties back into their dovetail housings for the scribing of the roof frames, which comprise the principal rafters and the purlins. Snap a line down the center of the building on top of the tie beams to represent the ridge, and set the peak ends of the rafters to this line. The rafters lie over their respective tie beams, their peak joints partially engaged and shimmed level (Figs. 12–13).

The common through-purlins are on 4-ft. centers, located by chalk lines across the rafters. In old structures, one finds uninterrupted purlins the full length of the barn as well as shorter ones lapped over a rafter. For interest, I combined the two. In old structures, full-length purlins were typically hewn from slender trees, following the natural taper in the width (but held to uniform depth). I sawed mine from small pines, spruces and a red maple, also following the taper, which goes from 8 in. to 5 in. wide, the wider end used over the larger of the irregular spans. In depth, the purlins are a uniform 4 in., reduced to 2½ in. where they half lap the rafter and will be secured with square pins. The 2½ x 3½ ridge purlin (Fig. 12) is reduced to 2 in. and will be nailed in place. The tumbling of the purlins is straightforward.

For the width of the notch in the rafter, I squared down from the purlin. (I don't believe these notches were historically made to match the profile of the purlin, a time-consuming endeavor.) After fitting, I snapped lines and trimmed the purlins to length, providing an 8-in. overhang (Fig. 14). I numbered them from I–VII on their top sides at the north end.

Figs. 12–14. Above, small ridgepole sitting over rafter peaks (peaks no longer over struck centerline); tenoned side of joint will be notched later at raising. At right, 13, purlins are already joined to the rafters. Below, 14, closeup of half lap joints and 8-in. purlin overhang.

Rafters and purlins are now removed and stacked for raising day. The ties are removed but kept close by. The plates are rolled to the center of the floor frame.

The Longitudinal Walls. Most old barns are proportioned to allow both long walls to be worked on simultaneously. Post and brace mortises are first cut in the underside of the plates to standard sizes (7 in. for posts, 6 in. for braces). Post locations are already located by the bay divisions on the plates and the brace mortises measured from the post mortises. Although they are often set at 45 degrees, brace angles can be adjusted as desired.

Check the face of any mortise for irregularities and, if necessary, true it up. If there is wane at a mortise, to simplify the scribing process shave it flat, if possible parallel to the mortise. Scribing and cutting shoulders to a curve is extremely time consuming, requiring a set of carving tools, and generally is not seen in old work (Figs. 15–17).

Shave the inside (vertical) face of the plate flat and uniformly thick where it will pass through the post. If the plate is hewn, the surface can be checked by squaring off the dovetail lap. After cutting the mortises, bore the pinholes. I use 13⁄16-in. pins, historically the average size for ordinary timber frame pins in England, set 1½ in. from the face of the mortise. The typical modern 1-in. pin is probably larger than it needs to be for joints in compression.

For the jowled post tenons we will employ the double-cut scribing method. The double-cutting sequence is first to cut a tenon's shoulders square and a bit strong, then assemble the joint, set dividers to the greatest gap and scribe the shoulders. The allowance left to scribe is dependent on how much a receiving timber is out of square or on the extent of its wane. Generally the allowance is less than an inch. The shoulders are then recut to the scribed line, hence the term double-cut.

In our case, we have two tenons to cut at the top of the post—the teazle tenon into the transverse tie beam and the plate tenon into the longitudinal plate. These tenons stand at different levels and at right angles to one another, and they are dealt with in separate scribe assemblies. (See Fig. 18 overleaf.) Before cutting any joints in the jowled post—really even before hewing or sawing out the posts—several relationships must have been worked out, taking into account the height of the plate, the depth of the dovetail housing in the top of the plate, the length of the jowl and the location of the transverse brace mortise on the inner face of the post.

Figs. 15–17. Sequence of scribing brace shoulder to waney timber. Truing wane parallel to mortise side simplifies procedure.

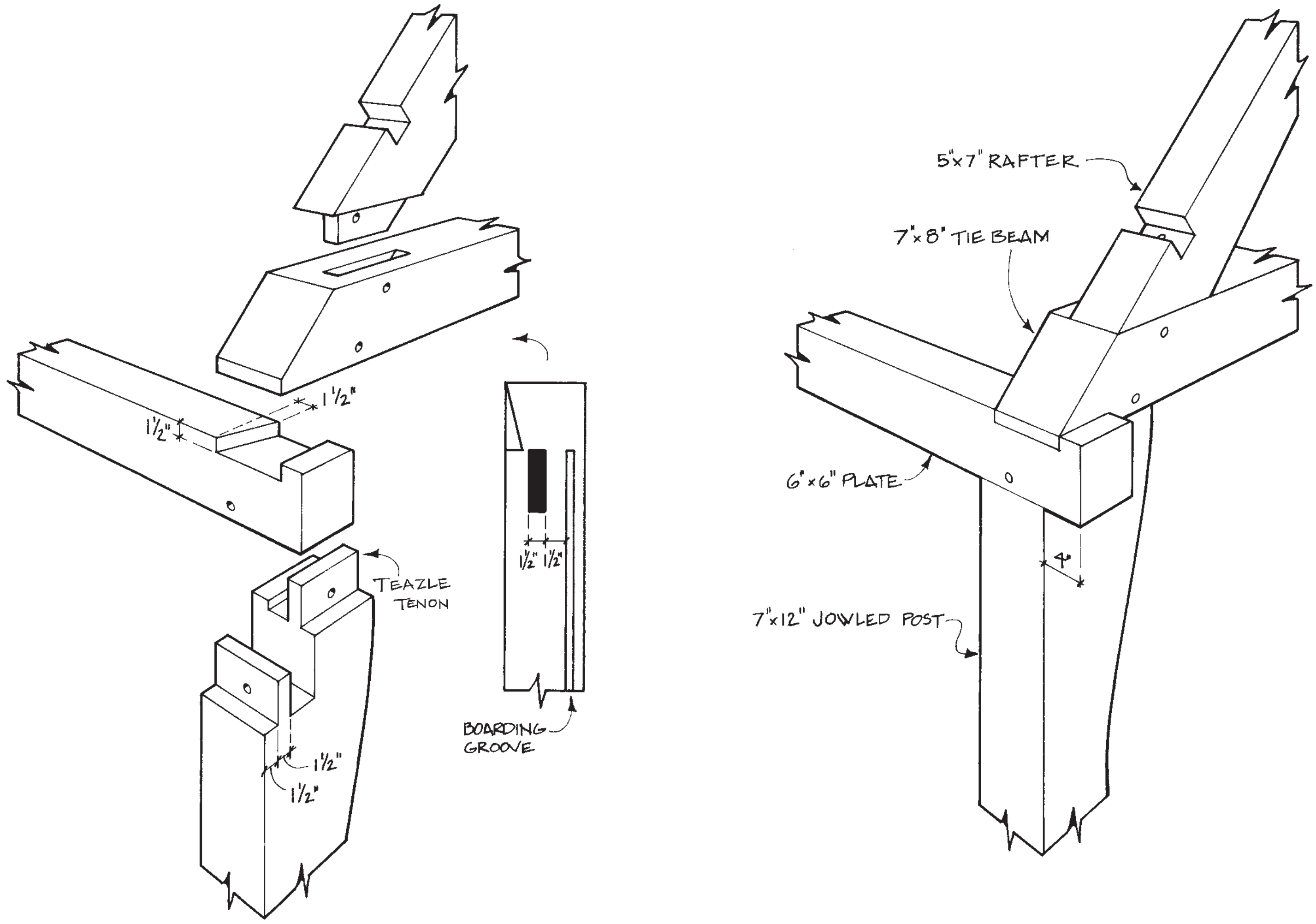


Fig. 18. Exploded and assembled views of a gable-end English tying joint (ca. 1680).

My gunstock posts have a tapered and stopped jowl (the "gunstock") beginning just above the mortise for the transverse brace (Fig. 19). To locate the plate and teazle tenons, I worked upward from the stop on the jowl.

Fig. 19. Stop at base of jowl lies just above transverse brace mortise, lengthened here to accept loft floor beam.

To make the plate tenons, part of our long wall scribe assembly (Fig. 20), cut away the jowled end of each post on its outside face to match the corresponding width of the plate inside the board channel, and cut a tenon with square shoulders left long. Assemble the joints, the posts flush on their best edge with the sill below and blocked up level both across their face and lengthwise. Plumb the plate's level mark and check for parallel with the long sill. Using a pair of dividers set to the greatest gap, scribe both sides of the joint, keeping both divider points at the same level. Remove each post in turn and chop and pare down to the scribe from each side. On old work, these shoulders are typically concave, sometimes grossly so, to make sure only the scribed edges bear (Figs. 21–22).

The posts can now be reassembled to the plate and checked for fit (a hookpin draws the joint tight), the pinholes pricked through the holes already bored in the plate mortises and the post withdrawn sufficiently to recenter and bore the pinholes through the tenons (Fig. 23). The post bottom tenons can next be laid out, measuring from the plate down, and cut. The sill mortises may be left for cutting shortly before the raising, to minimize time spent collecting water in the weather.

Next come the longitudinal braces, typically a pair in each end bay. As I have mentioned in previous articles, they often share mortises with girts or other braces (Figs. 19 and 25). This arrangement allows each brace to be separately tumbled, cut, fitted and pinned without moving the setup, a real timesaver.

Braces and girts in this barn are unhoused, as is typical of many scribe rule English barns. When one does find them housed, braces usually have diminished housings while girts (and other beams) might have either parallel or diminished housings. Because the diminished housing is easier to chisel out than the parallel, it was the more popular choice. I believe the sequence remains the same for cutting housed as for unhoused members, but with the additional step of drawing a second shoulder line to match the mortise face. A knifed sighting line to aid this process is sometimes found extending from the diminished housing at the mortise face.

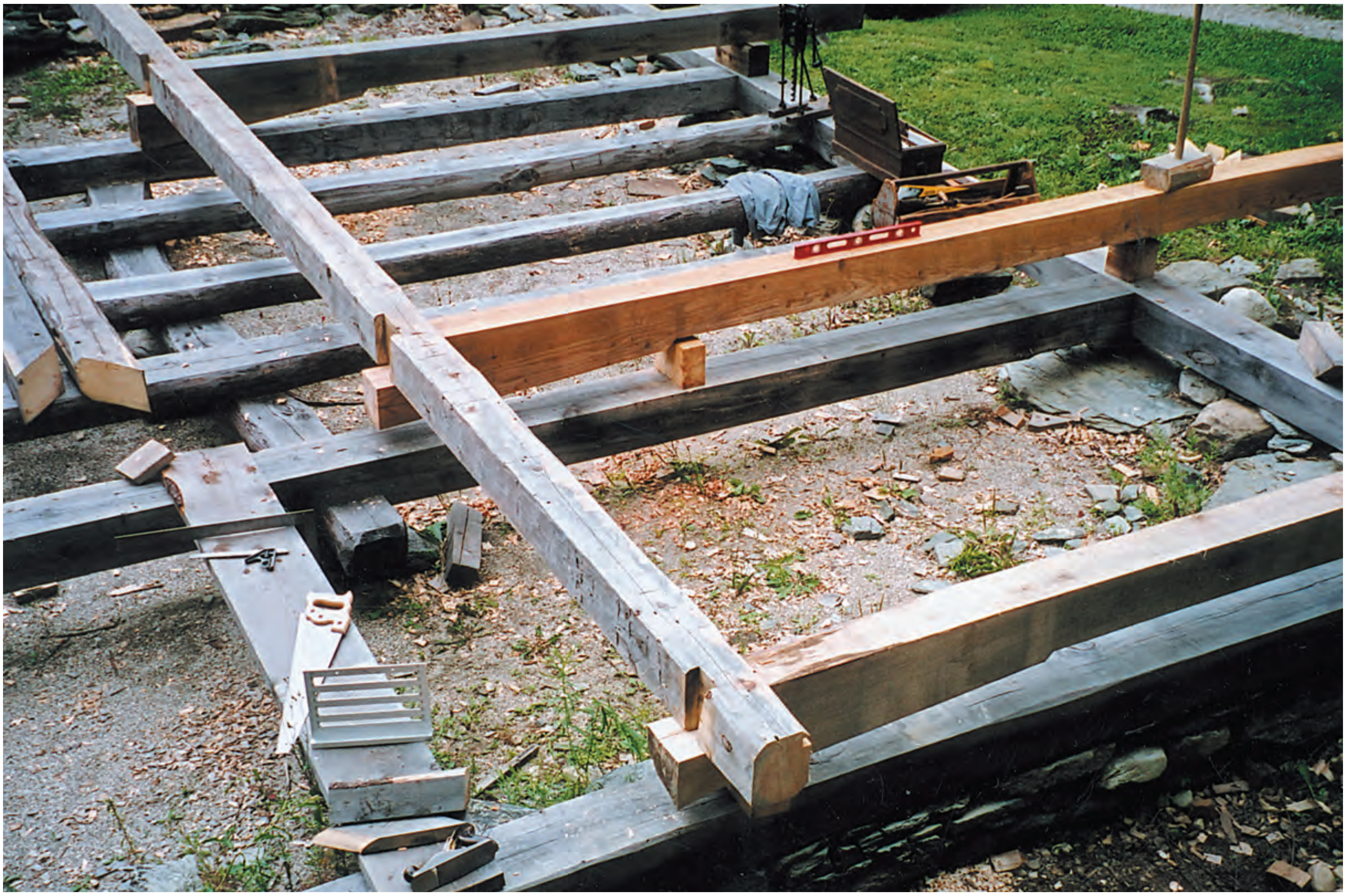


Fig. 20. Principal posts fitted with their first-cut tenons, assembly is squared with sills below and individual components leveled. Post species, from foreground back: quaking aspen, European larch and white pine. Post in first two pictures below is aspen; plate is white pine.

Figs. 21–23. Sequence for joining plate to post. Tenon shoulders are cut strong, then recut after scribing of waney mortise face. The joint brought home, pinhole center is pricked through previously drilled hole across mortise. Plate is then withdrawn sufficiently to recenter the pinhole mark closer to the tenon shoulder for the draw, and the hole is drilled through the tenon and (if the bit allows) the rest of the post.

The tumbling of the girts, door studs, and door headers follows the tumbling of the braces. Fig. 24 shows all these elements in the front long wall. Unfortunately, the setup has to be dismantled partially to insert these members. Pin and check the completed wall assembly and number the components (Fig. 25).

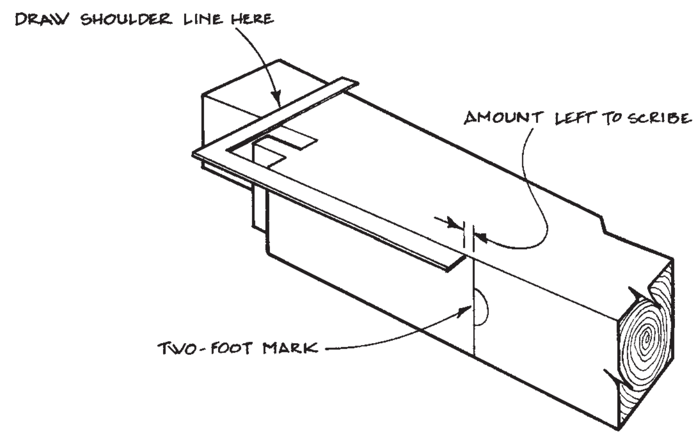
Fig. 24. Front long wall assembly completed, with braces, door headers and nailers scribed and fitted. Note detached inverted end tie at right with boarding groove showing on underside.

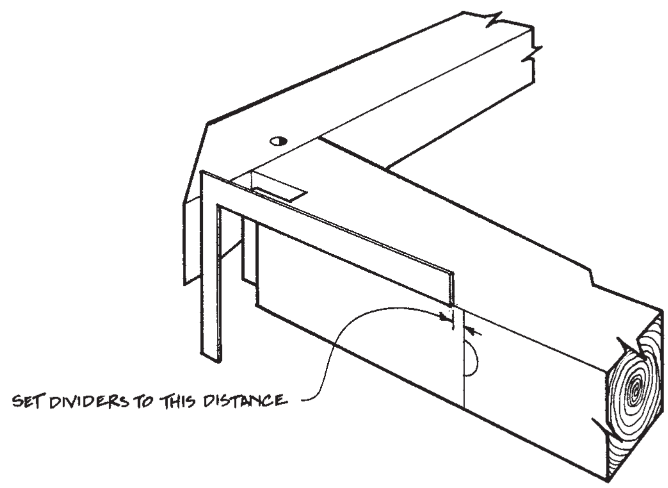
Fig. 25. Brace and girt mortises (or mortises for opposed braces) can be shared advantageously, easing and speeding the work. When numbering, Vs are inverted to suit action of race knife, which cuts most controllably if pulled from point of V.

The Two-Foot Mark. Before disassembling the long walls, we must put the important two-foot marks on the eight principal posts. These will guide the double-cutting of the teazle tenon, the upper post tenon that will go into the tie beam in the transverse (crossframe) assembly, assuring the fit of all the English tying joint's parts. Put a perpendicular line across the face of the post exactly 24 in. down from the seat of the lapped dovetail housing. The measurement is made complicated by the plate being 2 in. proud of the post (for the board channel). To distinguish the two-foot mark from other scribed lines, the scribe rule builder typically sets dividers on the line and adds a half-circle (Figs. 26–27). All the principal posts in a given wall would carry the same mark, with the opposing wallposts marked by full circles (again centered on the line) instead. Because these principal posts will be set up for crossframe scribing, they all need level marks as well.

(Notice that the two-foot mark alternatively could be put on the posts before fitting them to the plate, and all the post's mortises and its bottom tenons then precut to save on one cycle of assembly and disassembly. Dividers would be set to the exact amount to bring the plate to its proper position. This method would involve working up from the bottom of the post rather than down from the top. If I build another English tying joint frame, I will try it that way, as it seems less work.)

The long walls can now be disassembled. Except for the posts, which will be needed immediately, the parts can be stacked out of the way until raising day.





Figs. 26–27. Use of the two-foot mark to scribe the shoulders of the teazle tenon into the tie beam. Mark is made before long wall is disassembled (Fig. 24), measuring down from the seats of the dovetail housings. When all is done, the soffits of all the tie beams will sit 2 ft. above the marks and the bottom shoulders of all the posts at the sill will stand a uniform distance below the marks.

The Crossframes. Starting with the north wall, the crossframes, each comprising posts, a tie beam, transverse braces and sometimes nailers, can now be scribed. The teazle tenons, the upper of the two post-top tenons on the principal posts, will be double-cut using the two-foot mark (Figs. 26–27).

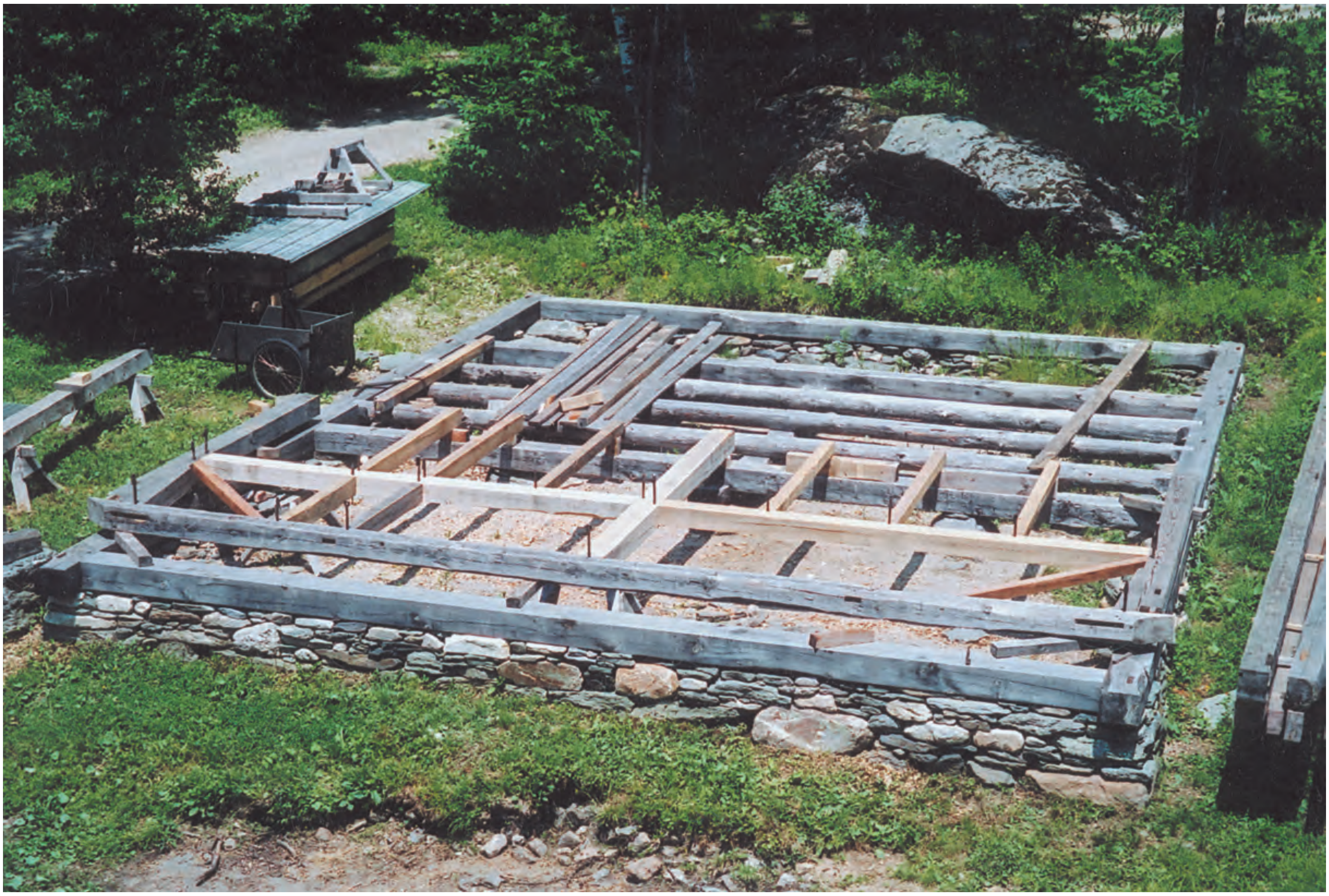


Fig. 28. To scribe crossframes, align posts with outsides of long sills, their bottom ends with a cross-sill. Note ladder uprights and studs for stalls.

At each jowled post, apply the edge of the square's blade against the face with the tongue hanging down the best face. Slide it on the post until the end of the blade is above the two-foot mark just the amount you want to leave for scribing (this procedure of course assumes your framing square has a 24-in. blade). Again, the amount you leave to scribe is based on the amount of wane on the bottom of the tie or the amount that it is out of square. Taking off ⅛ in. is considerably easier than taking off 1 in. Scratch a line along the outside edge of the tongue for the shoulder of the teazle tenon, and square it around the post top (Fig. 26). Add 24 in. to your tenon length to find the end cut. Now rough-cut the tenon shoulders.

Set the posts on the floor frame, face up, flush with the long sills and their bottoms flush with their appropriate cross-sill (Fig. 28). Shim them until their level marks are plumb. (It can be advantageous to elevate the pieces on 2 in. of blocking.) The post and brace mortises have been made in the tie beam and their pinholes bored. Assemble the tie beam on the first-cut teazle tenons of the principal posts and level it. If you've left more to scribe at one end of the tie than the other, make sure each post is square with the tie before proceeding. Apply the square along the top (best edge) of the post, the tongue hanging down and tight against the soffit of the tie beam (Fig. 27). Set dividers to the gap between the end of the blade of the square and the two-foot mark. With the dividers sliding against the underside of the tie, scratch new shoulder lines on each side of the joint. Connect the lines across the top of the post and, after removing the tie, chisel to the scribed lines. Reassemble, check for fit, level, etc., prick, recenter and bore the pinhole. Secure the joint with a hookpin.

The simply tenoned tops of the median posts are again double-cut, but the use of the two-foot mark is optional. I chose to double-cut the post-top to fit the tie, then snapped a line between outside post-bottoms to locate the center post bottom. The girt and brace locations I measured off the bottom of the post. (Using the two-foot mark before scribing the top, however, I could have cut and bored for pins all the post's joints except the top tenon. I suspect the latter method uses less labor.)

As with the long walls, the braces are scribed in next. Sharing mortises with the girts, they are tumbled and inserted without moving the assembly (Fig. 25). Finally, the girts are tumbled and inserted. Before disassembly, number any components that haven't yet received a number. To distinguish crossframing from longitudinal, builders used the race knife with compass point to inscribe small but prominent circles. Following a common system, I cut half-circles on all the numbers in the first crossframe, a whole circle on the second, two half-circles on the third, and two whole circles on the fourth. This made components easy to identify.

Repeat the process for each of the other three crossframes, making sure that each set of post bottoms is flush with its particular sill. The two end frames could be done simultaneously, then the two interior ones likewise. One of my interior crossframes has studs to partition off the horse stalls and a built-in ladder to the loft (Fig. 28, ladder rungs to come). I tumbled the top tenons on these studs, blocking up the bottom end. When the tops were pinned in place, I snapped a line across them all for cutting the bottom tenons. (Alternatively, you could plumb up from the sill, marking a line on each side of a stud.) I marked out the holes for the ladder rungs on the verticals but bored the 1¼-in. holes and inserted the riven red oak rungs after the crossframe was disassembled.

With the completion of the scribed crossframes, the deck can be cleared and the timbers readied for the raising. They say that many hands make light work. In the next article you will see how one person (with only two hands) erected this barn frame safely, without straining, in a relatively short time.

—Jack A. Sobon

This article is the third of a series. Previous articles appeared in TF 80 and TF 81.

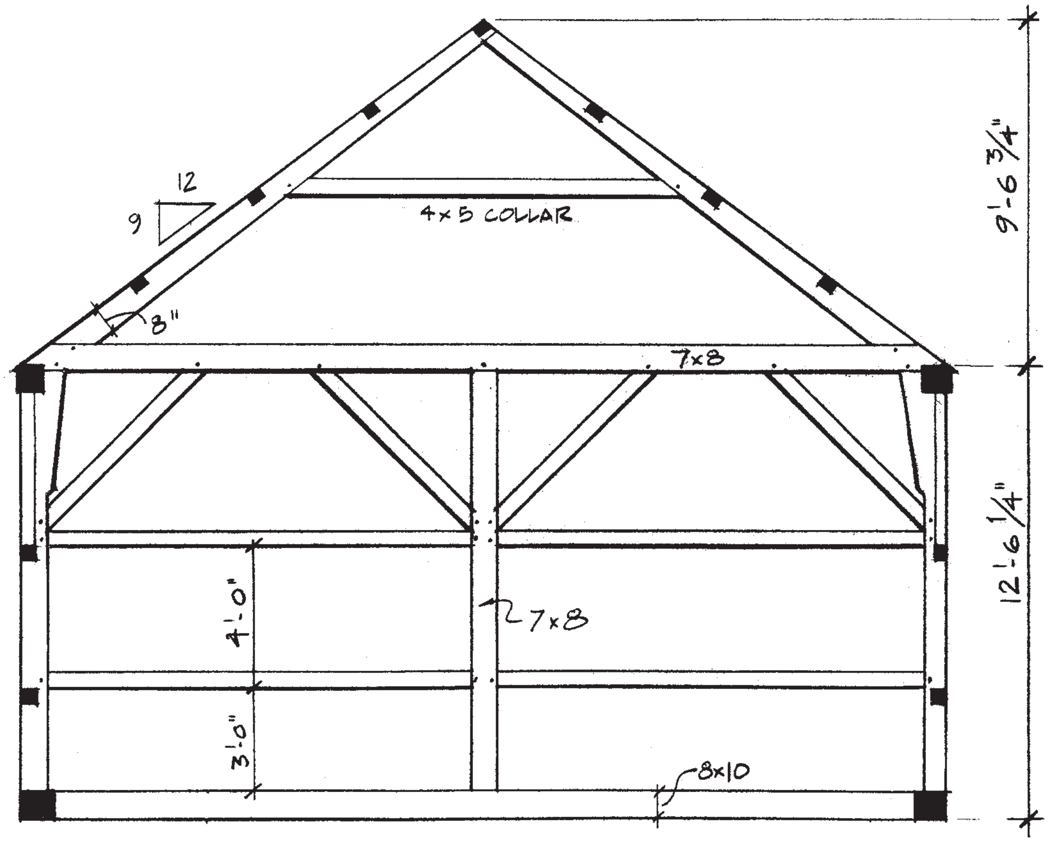


Fig. 29. Transverse section (I) of barn, gable wall framing.

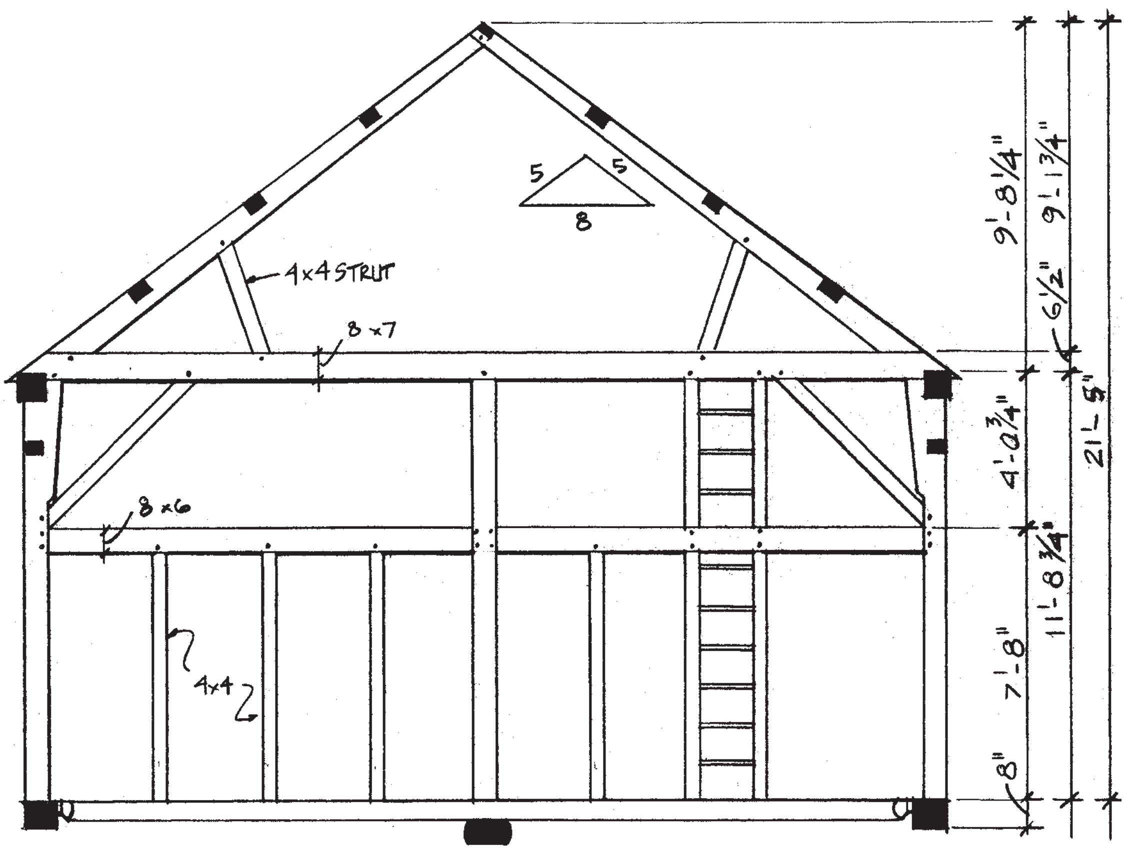
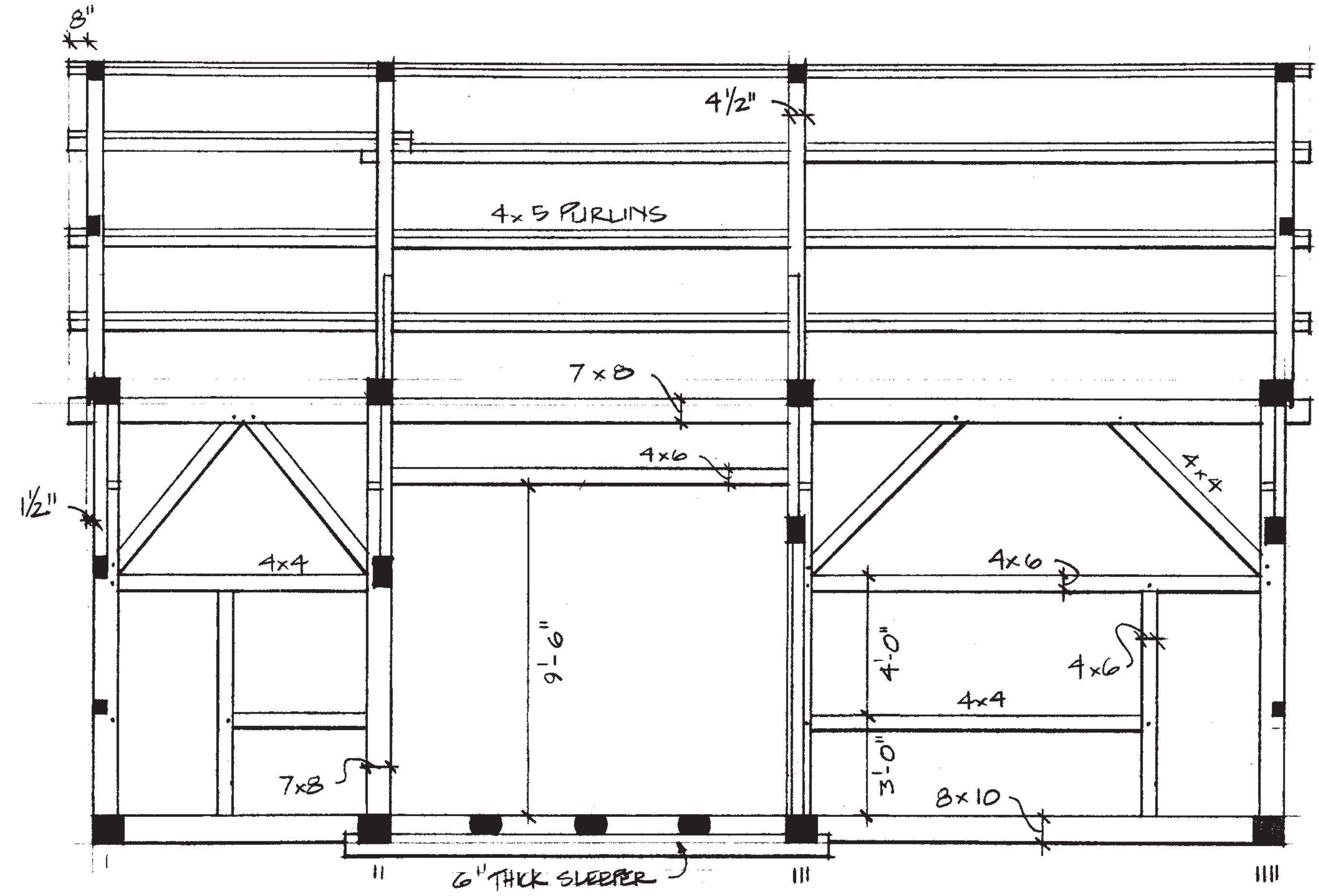
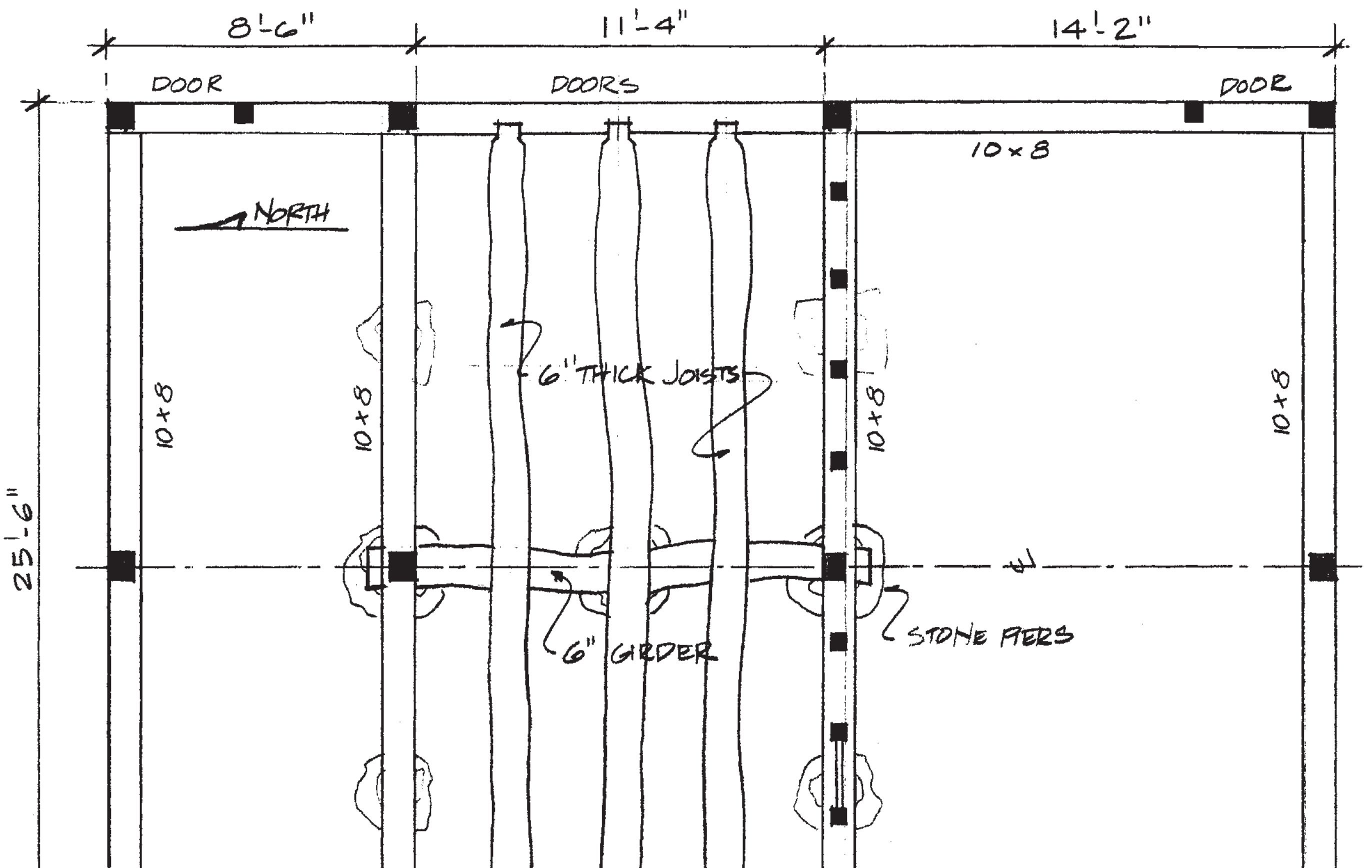


Fig. 30. Intermediate transverse section (III) with ladder and studs for horse stalls.



Figs. 31–32. Longitudinal section of barn (seen from inside) showing wall frame with openings for human and wagon access, and roof frame with irregular spans. Below, floor frame. Drawings altered for publication.



Rebuilding a Potawatomi Cabin

Fig. 1. Photo of Bourbonnais cabin after a tornado struck in 1905, near Shawnee, Oklahoma. Cabin was inhabited by a family of eight.

THE Citizen Potawatomi Tribe was originally from the upper Midwest. In the late 1860s, as the white settlers' frontier drive pushed west, they opted to sell their allotments and move into the new territories so that they might live under their own government. The tribe, numbering roughly 28 members in four families, came to Oklahoma, near what is now Shawnee. They moved to a fertile and wooded area between the North Canadian and South Canadian rivers, now Potawatomi County. When they arrived in Oklahoma, some of the first permanent dwellings they built were log cabins, using local logs but importing windows, doors and planking hauled via wagon from Coffeyville, Kansas.

One of these cabins—12 x16 ft., 1½-story, single-room—was built in 1881 by Louis C. Tyner. In 1882, Antoine and Mary Ann Bourbonnais purchased the cabin. Antoine was born in Montreal of French and Potawatomi ancestry. Mary Ann was born and educated in New Orleans. Both were leaders of their people. Aside from taking care of her own family, Mary Ann Bourbonnais was called upon to act as midwife, doctor, spiritual counselor and record-keeper for the community.

The Bourbonnais (sometimes spelled Bourbournnais, as in the photo inscription) added five rooms to the cabin, in the form of a second cabin attached to the original with an open roof and loft (otherwise known as a "dogtrot"), later or perhaps almost immediately closed in with vertical logs. The new rooms included a 10x16 kitchen off the back and a front porch that ran the full length of the 40-ft. building. The completed addition comprised approximately 1600 sq. ft. of living space plus 400 sq. ft. of covered porch area. The oldest photos of the building date from about 1900, when the Bourbonnais inhabited it with their six children (Fig. 1). Photos in the Potawatomi Cultural Heritage Museum in Shawnee show other local buildings constructed in a similar fashion.

Though entirely of chinked construction, the building as we reconstructed it at the request of the Citizen Potawatomi Nation is a mixture of log corner styles, starting with the original dovetail-corner cabin built in 1881, and the second, half-lap-corner cabin built adjacent to it after 1882. The Bourbonnais filled in between the two cabins with vertical logs (Figs. 2–3).

The smaller of the two cabins (1881) was built of large white oak logs hewn two sides and joined at the corners by half-dovetails. The wall thickness was around 5½ in. and the largest log about 16 in. in diameter before flattening on the two sides. This cabin, built without any sawn lumber, had full log gable walls, round purlins, round and hewn joists and hewn door and window jambs. The original floor planking was gone when we arrived, but everything else was original. This cabin style is similar to other log buildings we have worked on in the Midwest that date from 1800 to the 1880s and is clearly similar to other existing cabins in the area, specifically those of the nearby Sacred Heart Mission.

The larger of the two cabins (after 1882) measured 14x16 ft. and used a lapped corner joint. The white oak logs were much smaller than in the 1881 cabin, suggesting the possibility of a scarcity of local materials as the settlements grew or the need to build quickly, or perhaps the limits of the builder's craftsmanship. The wall thickness was around 5 in., and the log diameter averaged about 8 in.

Photos Simon Gnehm

Figs. 2–3. Front and back walls show mix of horizontal chinker and a kind of stave construction. Concrete foundation and pressure-treated deck framing concede to modernity. On the roof, left photo, Rick Collins (l.) and Adrienne Walker; right photo, Isaac McCoy (l.) and Scott Russell.

Fig. 4. Plank door swings on wooden pintle hinges.

Fig. 5. Isaac McCoy at work on a plate log. Log walls are a mix of old and new.

Like the dovetail cabin, it had full log gable walls, round purlins, round and hewn joists, and hewn door and window jambs. The only sawn material originally in either of these buildings would have been the floor planking. It's fairly clear that when the Bourbonnais built the second cabin they imitated the design of the original one except for the time-consuming dovetail joints. According to the photos from 1900, the entire structure was covered by riven or sawn shingles about 12 in. wide laid with about a 10-14 in. exposure. Photos in the Potawatomi Cultural Heritage Museum show other buildings from this period with similar shingles.

The dogtrot and kitchen were built using hewn 4½-in.-thick logs varying in diameter from 4 to 7 in. Photos from the 1930s show the cabin sided with clapboards except for the kitchen and dogtrot. It's not clear why the Bourbonnais elected to build using vertical logs in these two rooms, but the logs used in this later addition were of a much smaller diameter than in the original buildings.

What's consistent about the entire structure is that (with the exception of the millwork) it was produced locally and with simple hand tools. At about the same time, French monks were establishing a school, church and monastery nearby in Sacred Heart, Oklahoma. Cabins on the Sacred Heart site are similar in method except that the roofs use sawn oak rafters instead of round purlins, the floors sawn oak joists instead of logs hewn on the top face, and the dovetail slope at the corners is not as steep as in the joint used for the Bourbonnais cabin (around 22 degrees). The Sacred Heart cabins were built for the monks and priests to live in until larger stone structures were completed. The mission was built close to the Chisholm Trail, serving as a stopping point for many on journeys east or west.

At our shop in Illinois, we fabricated the shingles, trim, wooden hinges, hewn replacement timbers (approximately 10,000 bd. ft. of white oak and mixed hardwoods) and flooring, while the on-site crew (consisting entirely of itinerants) spent a little over a month installing log walls and a purlin roof system, custom shingles and flooring, trim, handmade doors with wooden hinges and Oklahoma-made windows (Figs. 4–5). While on site we received excellent support from the Citizen Potawatomi Nation. Having contracted with them to restore and relocate this important structure, we hope it has reached its final resting place in Shawnee (Fig. 6).

—Rick Collins and Adrienne Walker

Rick Collins (r.collins@trilliumdell.com) runs Trillium Dell Timberworks in Knoxville, Illinois. When not on the road, Adrienne Walker (awalker@darkhorsetimberframing.com) lives in Galesburg. Illinois.

Fig. 6. Relocated and restored cabin reposes among American elms in Shawnee, Oklahoma.

Framespotting UK 2006

Photos Will Beemer

Unusual whitewashed frame (undated) in Ludlow with colorful infill. Black timber against white infill was a late-Victorian affectation. Original oak timbers would have been unpainted, and walls would have reflected color of local clay.

THE Guild's fifth Framespotting tour of England in September included 18 people traveling the byways of the Welsh borderlands (The Marches), visiting villages, churches, houses and timber-framing shops. Although we covered some of the same ground as in our 2003 tour, the specific buildings we saw were previously unvisited territory.

Our guide, Paul Caton, a woodcarver and part-time timber framer, knew the area intimately. He lined up a number of architectural historians to join us for parts of the tour to illuminate specific buildings. Paul is also a member of the UK Carpenters Fellowship, whose Frame 2006 gathering formed the centerpiece of our trip and was well attended (over 300 participants).

The villages of Ledbury, Ludlow, and Weobley provided the main focus of our black-and-white tour in Herefordshire and Shropshire, although we also visited the city of Worcester and numerous back-road settlements and farms. —WILL BEEMER

The Feathers Hotel (1619), Ludlow. Carved details include ostrich feathers, symbol of the Prince of Wales, and visages of local dignitaries.

House over Upper Linney Alley in Ludlow. The simple panel is frequently seen in the region.

Late 13th-century tithe barn at Leigh Court, Worcestershire, reputed to be the largest full cruck frame in Britain, 150 ft. long, 33 ft. 6 in. wide, 34 ft. high.

Roof of Gueston Hall at Avoncroft Museum of Historic Buildings, originally over the Priory at Worcester Cathedral and moved to the museum in 1969 to be the roof of the new lecture hall.

The post office in the tiny hamlet of Brockhampton doubles as a restored residence. Successive British governments have done away with most village post offices.

New base for post in the market hall in Ledbury.

Rare chamfer stop on a half-post in a small open chapel near Ludlow.

At left, Grange Court in Leominster, built by the King's carpenter in 1633 originally as an open market hall. Leominster, incorporated 1554, was a wool town from the 13th to the 18th centuries and the site of frequent fairs. With its bustling atmosphere and profuse jettied overhangs, it epitomizes the historic English market town.

Michael Burrey investigates frame of notable freestanding bell tower at Pembridge.

Colorful half-timber house in Weobley.

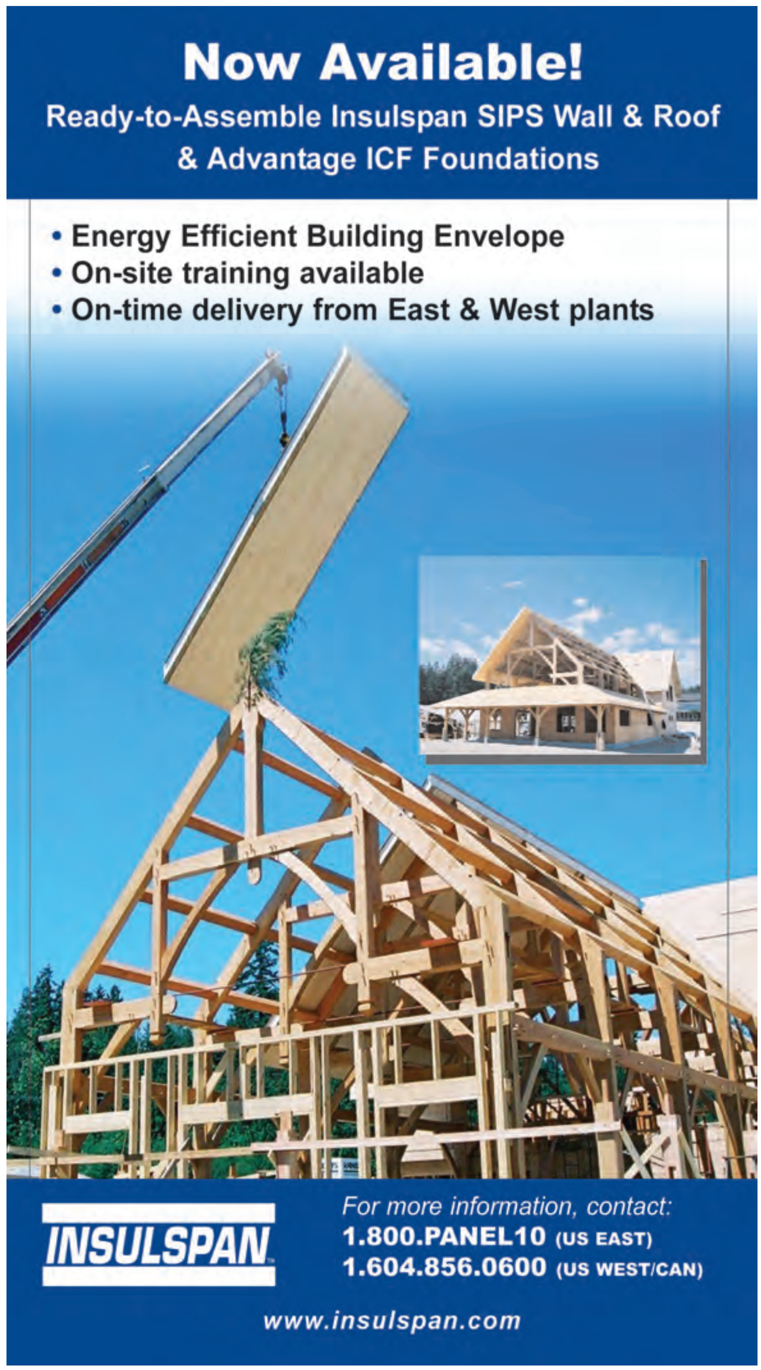
Roof framing, 12th-century octagonal Chapter House at Worcester Cathedral.

Shopfronts in Ledbury, probably Victorian.

Port Orford cedar, Curry County, Oregon


TIMBERWOLF
TOOLS
Your best source for
specialty power tools
PROTOOL®
SBP 285
11-5/8"
Portable
Bandsaw
Optional storage trolley
is convenient and
keeps tool safe
www.timberwolftools.com
Call today to request a FREE CD-ROM
featuring the PROTOOL Line!
1-800-869-4169


TIMBERLINX®
...the ultimate timber connector
TIMBERLINX can be used in any joint
wood to wood, wood to concrete, wood to steel
Impossible joints become possible
Fast, cost-effective, certified for tension and shear
Contact: Michael Preston
Neil Maclean
1-877-900-3111
timberlinx@sympatico.ca
www.timberlinx.com


Now Available!
Ready-to-Assemble Insulspan SIPS Wall & Roof
& Advantage ICF Foundations
• Energy Efficient Building Envelope
• On-site training available
• On-time delivery from East & West plants
INSULSPAN
For more information, contact:
1.800.PANEL10 (US EAST)
1.604.856.0600 (US WEST/CAN)
www.insulspan.com

PUBLISHED BY
THE TIMBER FRAMERS GUILD
PO BOX 60, BECKET, MA 01223

NONPROFIT ORG.
U.S. POSTAGE
PAID
BARRE, VT
PERMIT NO. 222

Will Beemer

View down King Street in Ludlow. Framespotting UK 2006, page 22.