TIMBER FRAMING

JOURNAL OF THE TIMBER FRAMERS GUILD

Number 59, March 2001

Compact Design in New Hampshire

Historic American Timber Joinery: V

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On the cover, from top, timber-framed core for 1100 sq. ft. house being raised in Alstead, N.H., April, 2000. Photo Stan Warchaizer. Below, principal rafter-common purlin roof frame in Windsor, Massachusetts, 1840s, now dismantled. Photo Jack A. Sobon.

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1985

UK, Sweden, Denmark, Canada

I'M still on the road, but that's not so bad. On this trip I ran into a college roommate in Heathrow, then Rob Thurrell of Maine and the Guelph bridge in the Iceland airport, and some little girl with a perfectly plummy English accent who dragged her increasingly skeptical mother toward me across the echoing-under-construction expanse of Paddington Station to misidentify me as Father Christmas. She (the girl, definitely not the mother) may have bought my explanation that I was on my way home, reinforced by my flashing of the Icelandair ticket jacket featuring glaciers and geysers. (How would you get home if you were Santa, and flying standby?) "But you don't sound like Father Christmas!" Father Christmas has to be a man for all seasons, and all countries, I explained. "We *must* be going, dear!" the mother explained.

The same customs woman from my last circuit (see TF 57) was also in Iceland this time, though off duty and lounging with the smokers on the lower level, handcuffs, firearm and radio all bright and shiny, face dull with that compelling Nordic ennui. Another bubble burst. Rob and I helped ourselves to the smoked salmon, but 7 am (or whatever time it really was) proved too early to sample the Icelandic vodka.

I was in recovery from ten days of timber-tourism, herding 15 framers across the breadth and length of the British Isle, in pursuit of the captured purlin (à la Hewett) and the Nun's Crutch (a nifty but gnarly scribed resolution of diminishing hip jacks). I was toasted, and still less than halfway to the TFG halfway house in Boston where I had stashed the motorcycle some weeks before. I hope it isn't raining.

IT was a good tour, but too much and too little all at the same time. Too few of you came along to fill the bus and balance the books, and, as the Guild is prone to do, we did way too much. Structures and landscapes worthy of a week's reflection hurtled by in an hour. Time and circumstance were so compressed that we actually found ourselves in a horrific UK Burger King (indistinguishable from its domestic incarnations), this in the land of the mixed grill (every organ of every animal) and warm beer. Bags went unpacked, postcards unsent, e-mail unread as we sprinted from marvel to marvel. There was some whimpering about gift shops and toothpaste, offset in good and frequent measure by Guild members native to those astonishing lands. Hats off and glasses raised in gratitude to Isobel Barnden of Bristol, who did all the work, and to Gordon MacDonald and Bill Keir and their fine crews at Angus and Chippenham who showed us unrelenting hospitality at every turn, not to mention old ways (new to us) of timber framing. I had best leave it to others to show the slides and tell the tales (of course we ate the Haggis); it should be sufficient to note for now that you

made a mistake not coming along. Still, there is opportunity: a more modest tour, led by Will Beemer, will be organized around the UK Frame 2001 meeting in September.

Did I neglect to mention Sweden and Denmark? Unlearn what you have heard about dour Swedes and silent Danes. Members Johannes and Äsa Kastle and the excellent Jonas Ekefjörd have a patent on hospitality a few hours' drive from the Stockholm airport, deep in anthroposophic territory, in a pastoral landscape of rock and wheat and forest and bronze-age graves, hard by the Baltic Sea. Stockholm is a very sophisticated city, with lots to recommend it, including elegantly populated coffee shops and a Hell's Angels Chapter House on a tug boat (how does that work?), but especially including a recently rebuilt timber church that we toured under the direction of the master builder, from creepy crypt to nave to bell to windy spire. But the countryside is like a fairy tale. Come visit; when I left the frame wasn't done. Johannes and Jonas were doing a workshop at a fascinating institution roughly translated as the People's University. Young adults (as opposed to late adolescents) were offered opportunities (paying only living expenses) to study with supremely qualified landscape painters, sculptors, woodworkers, fabric artists, ceramists and more, hands-on apprenticeship relationships that seemed to include solid pragmatic components (photographing your work, foundations of business, and so forth). It was the coolest place, run, as you might expect, by a formidable and charming woman.

Johannes and Jonas assembled a remarkable collection of folks from all over Scandinavia who had some interest (and as it turns out, some real experience) with timberwork. I learned, among other things, that there are only nine distinct jokes in the world; we fill in the blanks with the neighbor's nationality. I heard exactly the same joke about the chainsaw ("What's that noise?") told about the Norske as I had heard forever in New Hampshire about the French-Canadi*en*. It's comforting, in a way. We tried to do Night School, but the students were mostly fascinated (politely appalled, really) by what passes for North American culture. Pointed questioning was directed to the death penalty, firearms and the cost of gasoline. Still and all, some timber framing got done, some got drawn, and some got talked about in the classroom and around the fire. Great place, great people. Let's do it again. Scandinavians can do things with axes that North Americans can do only with slicks.

Mikkel Johansen and Jorgen Richter came up from Denmark for the raising (and the celebration) and swept me southwards with them across the channel on a ferry boat the size of an apartment building with underground garage. The Scandinavian countries have a fondness for land-use planning that is largely absent in our hemisphere. Say what you like about individual liberties, the urban areas I saw were high density, low-rise, and extremely well equipped with public transport, expressed a cheerfully unregulated mix of architectural period and style, and had quite abrupt boundaries with the countryside. No long dwindling strings of fast-food joints paralleling the highways for these folks. Very civilized.

Mikkel and Jorgen think they are the only timber framers in Denmark (they aren't the only Guild members, for sure). Be that as it may, there certainly are lots and lots of timber buildings in Denmark. Mikkel pointed me to a fabulous building museum just north of Copenhagen where groups of farmsteads were arranged by era and region. The museum administrators had gone so far as to surround these buildings with plant and animal species native to their context. It was amazing. Completely overrun with charming schoolchildren (which is good news if you think about it) speaking perfect Danish. I hooked up with a guy from the South who taught something like agricultural social studies, who spoke better English than most of us and who generously took me along on the tour with his (8th-grade?) students, switching languages without missing a beat. He seemed to know everything about the crops and the farming tools, but little enough about the timbers and their fabrication for me to masquerade as some sort of authority.

Mikkel and Jorgen showed me the sights, including a scary (access on the *out*side) timber church that had a lot in common with wedding cakes, a place named "Palmer's Grill" and the Peoples Republic of Christiana, where we did what tourists do, but then talked ourselves into several marvelous buildings (one military, the rest mutinous), buildings so ambitious, so whimsical and so far off the mainstream as to make you smile, then laugh out loud.

Back in the countryside, Mikkel and Ellen Johansen live in a renovated village bank in the shadow of what's left of a 10th-century monastery. There's a very pleasant guest room with a little bed, a big drafting table, a fancy computer and, by now, a crib. The monastery ruin backs up to a very old and very managed forest, a gristmill-museum-tearoom kind of place, all opening out into miles and miles of wheat stubble. It is surpassingly beautiful.

They took me around to job sites and then out to visit member Björn Ekeford, who hosted a quasi-Guild event a while back to build a hall for a therapeutic community providing refuge for younger victims of urban domestic explosions. Without understanding very well what this place was for, I was overwhelmed by its spirit, and his.

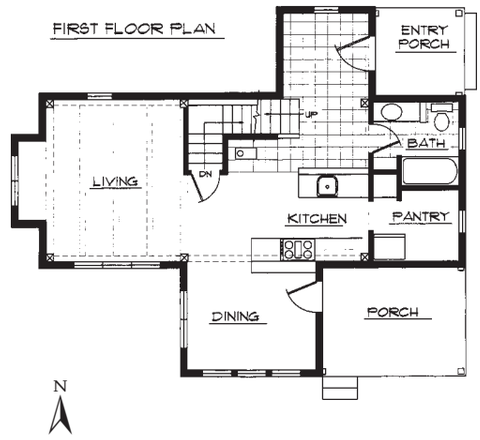
I DROVE to Ontario recently with the folks responsible for the Lake Lisgar Community Centre Rendezvous, scheduled for late June. Ontario is as nice as you remember it, and the site so situated that we could make an easy visit to Guelph for old times' sake. (I think I still have a tab open at The Albion Hotel.) Tilsonburg is a town of 14,000 in the flat landscape of southern Ontario, a languid three-hour drive from Buffalo or Detroit.

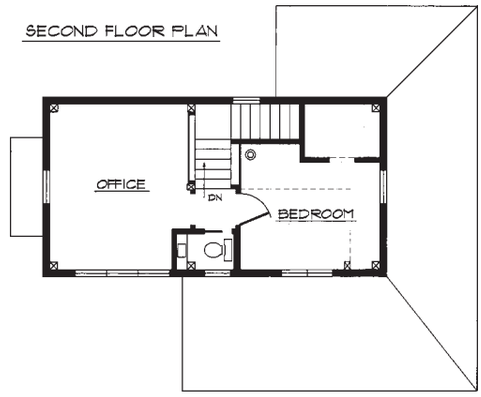
I met with the entire building team, a large, representative group of local folks all with a common goal that included the local building code official—a first, that, and also the very first time I have heard a building inspector use the word "innovative" in a positive way. The group is replacing a beloved community center, grown too small and decrepit for the arts and social programs of the town, situated in the middle of pleasant parkland that also includes a grandstand and racetrack, a big water slide and a fair-sized pond. I think the water slide could provide some opportunities for hilarity.

I spent a half-day with the mayor and the town administrator, both charming fellows who weighed in with expressions of support and enthusiasm. All the signs are auspicious: an existing and well-defined building need, an enthusiastic community in support, local heroes in place and money in the bank. But, after cups of coffee, it became strikingly obvious to me that this 17,000-sq.-ft. building (60,000 bd. ft.!) was not going to be brought to the point of raising with the time and labor we had at our disposal. The design isn't quite done, the engineering isn't quite begun and the budgeting isn't so well in hand as it might be. Normally we would ignore obstacles like these and bull ahead, counting on our charm and the alchemy of collective action to carry us through to a happy conclusion. Perhaps we are becoming more conservative as we age. I was forced to stand up and voice what seemed to be on everyone's mind, and so this project has now been postponed exactly one year, to late June of 2002. —Joel C. McCarty

Errata

The raising scene depicted on the back cover of the last issue (TF 58) in fact took place at Palomar College (San Diego) rather than at Pomona College (Los Angeles), many miles to the north. On page 3, Donna Williams met Bob Smith not at the 1997 Lexington Trébuchet project, as alleged, but some three years before. On page 22, James Whitcomb's mailing address and office telephone number were incorrectly printed. Mr. Whitcomb's correct coordinates are PO Box 44, Drewsville, NH 03604, 603-445-2154.





Photos and drawings Andrea Warchaizer

Above right, the second-floor plan shows extent of the 14x28-ft. timber frame core. Lower roofs covering entry, dining room and porches are unsupported structural insulated panels. Above left, southwest view of house. Boulders came from site. At left, small bedroom has no timber rafters overhead. Below left, view from living room toward kitchen-dining area. Diagonal line of sight expands perceived space; ceilings in view are smooth. Below right, southeast view of house, showing dining room exit door to porch.

Compact Design in N. H.

WHEN prospective clients approach me for design services, my first question after "Uh, do you need these drawings any time soon?" is always "Do you have your land?" The qualities of a particular building site are critical to the development of the design—the path of the sun, views, site access, terrain and the ineffable "personality" of the site will all influence the eventual look, layout and massing of a house.

So I naturally exercised common sense and said I'd have drawings ready by the end of the week when, years before I had acquired a house site, the opportunity came to act as client for a student-cut frame. The frame was to be cut by students at the Yestermorrow School, a hands-on school of building arts in Warren,Vermont. Guild members Steve Amstutz, Mike Peabody and Nancy Bernstein have taught a one-week class there for years, and I've helped out occasionally with the design portion of the course. If I wanted a frame cut for the cost of the wood and the trucking, I'd have to come up with a simple frame design that could be cut and raised by six to ten students in five and a half days. This seemed like a simple proposition, except for those niggling details of not having a site or a completed house design.

My solution to the site mystery was to conceive the house as a two-story timber-framed core containing the main living spaces; a lower wrap-around roof would shelter secondary spaces such as a pantry, bath, entry and porches. The exact locations of the secondary spaces could shift depending on the future site's critical features. I drew about ten variations to the floor plans based on possible site conditions.

Most of the wood came from Lester Phillips' sawmill nearby in Langdon, New Hampshire. A good bit of it was twice-salvaged timber. For instance, a used 8x18 Douglas fir timber might have been rejected for reuse over a long span because of excessive slope of grain, but in my house it certainly seemed strong enough to span 14 ft. and carry 50 sq. ft. of floor load. Overkill, perhaps, but it is a pretty piece of wood otherwise destined for the firewood pile.

The frame was cut, raised on the Yestermorrow campus in Vermont, disassembled, stored for three years, re-cut (of course the design changed just slightly once the building site was found) and raised on a freakishly temperate day last April. Alicia Spence Hammarlund of Northampton, Mass., was responsible for raising the frame and completing the house, assisted by Jeff McCarty of Alstead, N.H. The structure was conceived as a hybrid of timber frame and structural insulated panels. There are no timber rafters; with a bent just 14 ft. wide, the panels can easily span the distance from the timber ridge to the eave plate. Leaving out timber rafters was not meant to be a money-saving feature: with just a white-washed board ceiling overhead, the small upstairs rooms are light, airy and serene. Likewise, the ceiling of the kitchen bay is conventionally framed with dimension lumber. The flat ceiling unifies the space and draws the eye to the more important rooms beyond.

The house is small, just over 1100 sq. ft. including the walls. I used a number of small-house design strategies to get the most out of the limited space. There is only one main entrance. A tile floor resists muddy feet, and a half-wall hides the kitchen sink from immediate view while allowing me to dump the groceries right on the counter. The kitchen layout is a tiny galley but is open on all sides, making it feel more spacious. The refrigerator and the oven are in the pantry space. The addition of an open doorway defines the pantry as a separate room and prevents the kitchen from feeling too long and narrow. The stair does double duty as a library with bookshelves lining both sides. The world's tiniest half-bath upstairs turns out to be just big enough. The main living spaces are small. The living room is just 12x14, and the dining area is 10x12, but a few tricks make them seem larger. The addition of the small bumpout in the living room is key to a comfortable furniture layout. Light on three sides of both rooms opens them to the outdoors. Most important, the room layout allows for long diagonal views from any location in the house. Sitting at the dinner table, I can see 32 ft. to the front door and 30 ft. to the corner of the living room. These long diagonal vistas increase the perceived size of the interior space.

All the rooms except the kitchen and living room have pitched ceilings. This makes a huge difference, even with the low 4/12 pitch on the lower roof. I thought that the high ceilings might feel like wasted space, but just the opposite proved true—I now can't imagine the small first-floor bathroom feeling comfortable without the extra space overhead. Upstairs, the 12/12 pitch allows the little 9x12 bedroom to feel plenty spacious. My office feels palatial.

I've tried to make some use of every bit of space. And yet, at the center of the floor plan, between the kitchen, stair and living room, is a sizable empty space. This is the nexus of the house, a spot I pass through dozens of times a day, and it acts as a touchstone. Its calm and very emptiness help me manage the confusions of a modern existence.

SO how did the building site finally influence the house design? The terrain is flat on the north side of the house, where you enter, but slopes down to a brook on the south side. The drop to the brook is steep enough that the brook itself, just 70 ft. from the house, is not visible except to the southwest where it makes a slight bend and the slope flattens out. The two main downstairs spaces open to the south and west, for light and the view. The floor plan ends up a sort of zig-zag. If you wanted to see this meandering path from the front door to the living room as a metaphor for the brook beyond, I wouldn't object.

It's hard being both the architect and the homeowner. I found myself falling into the same bad client behavior I advise against—for instance, asking the carpenter in mid-hammer swing, "Are you sure that stud is supposed to go there?" I learned the hard way that a smaller house is not necessarily less expensive, especially when you account for the fixed site development costs for septic, well, trenching for utilities and all the rest. I would still advocate building small, but I am more interested than ever in models such as co-housing, where some of those development costs can be amortized over several units. I knew from the start that my design was not the cheapest to build per square foot. A simple two-story box would have fit the bill. I absolutely got my money's worth, though: all those expensive corners make for a light-filled house with lots of character. Make sure you have a few extra credit cards to allow for design "opportunities" in the field.

A number of years ago, I consulted to an architect on the design of a timber-framed house. One evening, the architect and I met the client at a local Chinese restaurant to discuss progress on the project. After the meal we opened our fortune cookies. Mine said something helpful like "You are about to find great adventure with new friends." The architect's said, knowingly, "Pay no attention to the advice of others." But the client had the most appropriate fortune of all: "Empty pockets, full heart." —Andrea Warchaizer

The author holds a degree in architecture and operates Springpoint Design in Alstead, New Hamphire (springpt@sover.net).

HISTORIC AMERICAN TIMBER JOINERY

A Graphic Guide

V. Roof Joinery Excluding Trusses

THIS article is fifth in a series of six to discuss and illustrate the joints in American traditional timber-framed buildings of the past, showing common examples with variations as well as a few interesting regional deviations. The series was developed under a grant from the National Park Service and the National Center for Preservation Technology and Training. Its contents are solely the responsibility of the author and do not represent the official position of the NPS or the NCPTT. Previous articles, which appeared consecutively in TF 55-58, covered Tying Joints:Tie below Plate, Tying Joints:Tie at Plate, Sill and Floor Joints, and Wall and Brace Joints. The remaining article in the series will cover Scarf Joints.

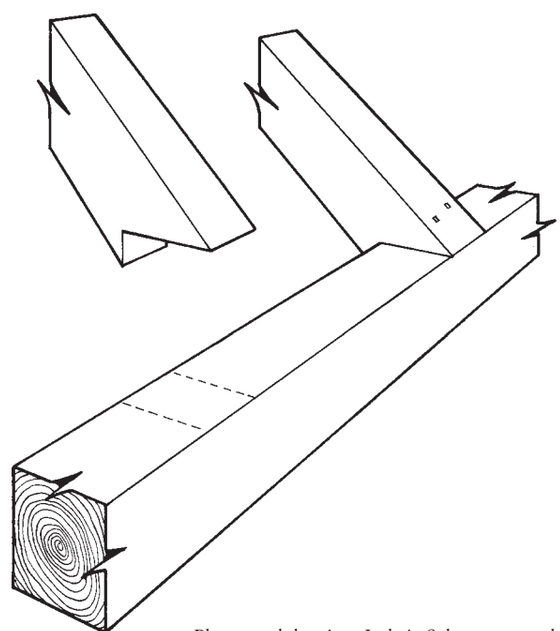
IN the design of timber-framed buildings, the roof is the dominant element. The structural system necessary to support its expanse greatly influences the total building design. In masonry buildings, the roof structure may be the only timber-framed element. The carpenters who timber framed America hailed from European countries where roofs were predominantly thatch, tile and stone. In America, the abundance of excellent timber and the economy of working it led to a preponderance of board and wood-shingle roofs. The timber quality also affected the framing choices. In Europe, efficient use of timber was essential. Timber-framed buildings included members of all sizes, shapes and lengths, making the best use of the forest. Here, time and labor constraints dictated timber selection. In general, using longer, straighter timber required less joinery work. Thus it made sense to use the best, burning the rest in the fireplace. One can easily see how the abundance of wood here changed roof carpentry.

COMMON RAFTERS. The simplest roof system comprises only rafters spanning from plate to peak. When all rafters carry a similar share of the roof load, they are referred to as *common* rafters. Common rafters occur frequently on gable-roofed buildings up to about 30 ft. wide. Beyond that width, the rafters become excessively long and heavy, and the outward thrust on the plates becomes unmanageable. Many common-rafter roofs have collars connecting every rafter couple. Contrary to popular belief, these collars aren't ties to prevent spreading; they function as struts to stiffen a long rafter span.

On wider gable roofs, the span of the common rafters was shortened by introducing a pair of purlin plates, usually at the mid-span of the rafter. These purlin plates also reduced the outward thrust at the plates considerably. We will look at the joints where common rafters meet the plate, peak and purlin plate.

Rafter-plate Joints. The simplest joint between rafter and plate is a level cut on the rafter and no cutting on the plate, a *butt joint*. Nails, pins or both are used to secure the joint. Though hardly to be classified as joinery, it could be effective and economical if well secured. Examples of this connection survive from all periods.

A better solution was to cut a *birdsmouth* in the rafter to bear against the inside edge of the plate (Fig. 1). This simple joint, named after its similarity to the open beak of a bird, could handle



Photos and drawings Jack A. Sobon except where noted

Fig. 1. With a birdsmouth cut to fit the inside of the plate, roof thrust is adequately resisted. Here the joint is secured with nails.

the thrust without loading the nails or pins. Unfortunately, the roof thrust in tandem with the natural checking tendency of a boxed heart rafter causes a split to develop at the mouth that can be its ruin. The situation is further exacerbated by shrinkage. Acute angles on the ends of timbers become more acute as they season and shrink; thus the load is borne by the feathered extremes of the birdsmouth. The same weakness can be worsened by a waney or out-of-square plate.

To counter these concerns, some builders used a *housed birdsmouth* joint (Fig. 3). The lower edge of the rafter is supported in a pocket, increasing its shear strength substantially. Occasionally, the top of the plate had a gain to receive the rafter. This may have been done to get a good bearing on a roughly hewn plate, or to increase the overhang slightly.

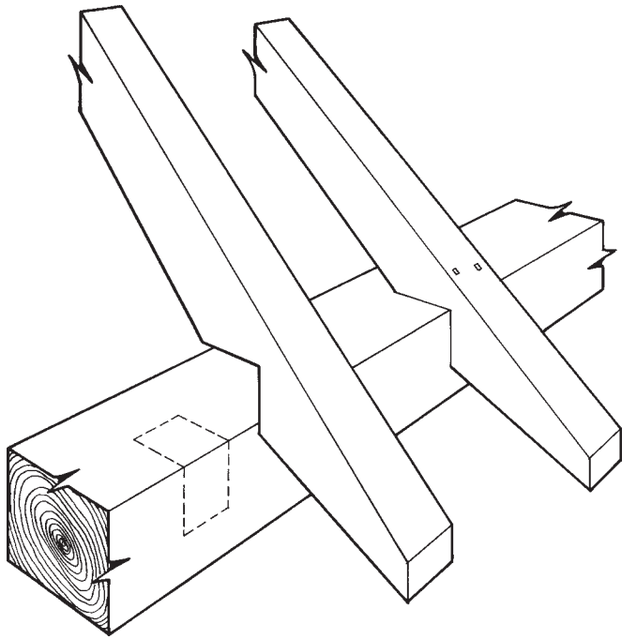


Fig. 2. As is popular today in conventional framing, the birdsmouth in this late 19th-century barn in Root, New York, is cut to fit the outside of the plate. Though the fastenings must resist thrust, there can be a substantial overhang.

In many New York State Dutch barns, the large-section (7x7, 8x8) rafters terminated in 2-in. stub tenons (Fig. 4). Sometimes they were barefaced (as shown), sometimes double-shouldered. Though the resulting mortise is strange (one expects a mortise to run parallel with the grain), the joint functions much like a housed birdsmouth. On the gable end rafters there can be relish between the mortise and the end of the plate. These joints often had no fastenings.

Rafters with Tails. To keep rainwater off the side of a building, builders used rafter-plate joints that allowed the rafter to project beyond the plate. These extensions, called "tails," could support a boxed-in cornice or could be exposed, as on a barn.

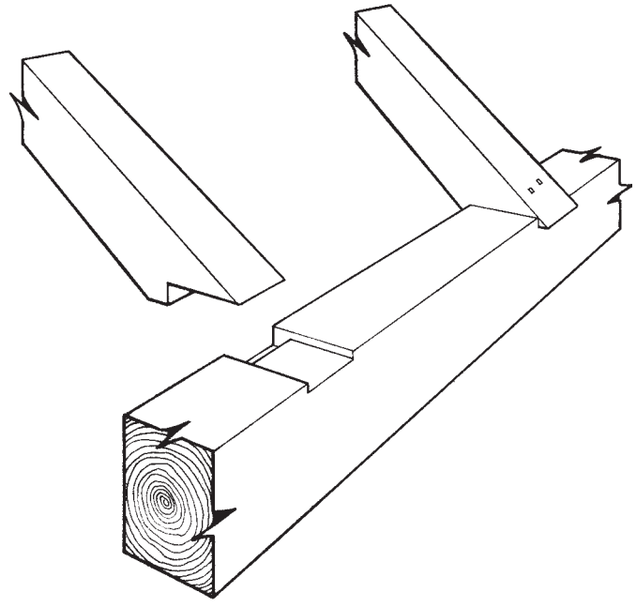


Fig. 3. The housed birdsmouth supports the lower side of the rafter and eliminates the tendency of the rafter to split up the mouth. This example is also housed into the top of the plate.

Rafters from a Great Barrington, Massachusetts, carriage shed showing a housed birdsmouth. This joint could be completely sawn.

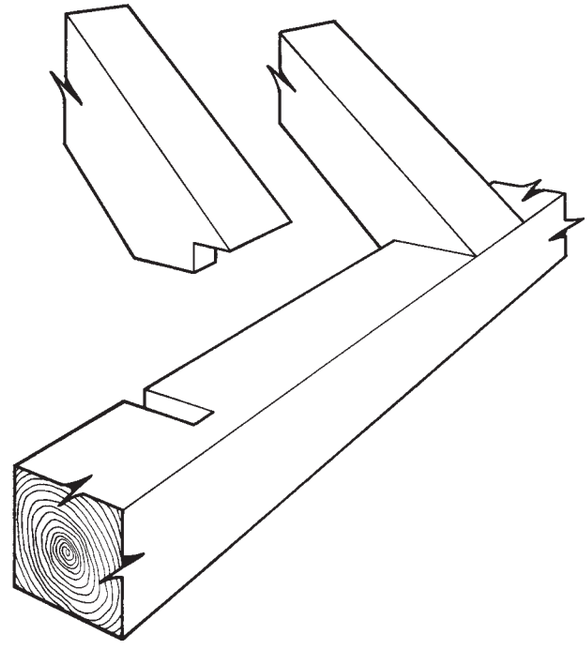
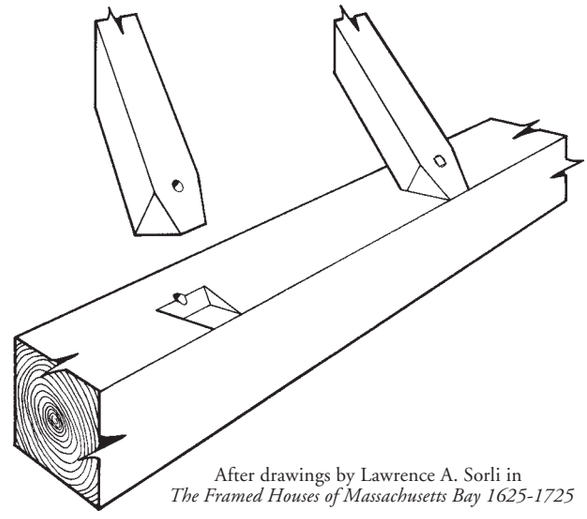


Fig. 4. On large Dutch barn rafters, a birdsmouth stub tenon is common. This example is barefaced.



After drawings by Lawrence A. Sorli in
The Framed Houses of Massachusetts Bay 1625-1725

Fig. 5. Unusual rafter feet found in the ca. 1637 Fairbanks house in Dedham, Mass., and the Samuel Pickman house in Salem (before 1681). The dovetail matrix is apparently designed to resist roof thrust.

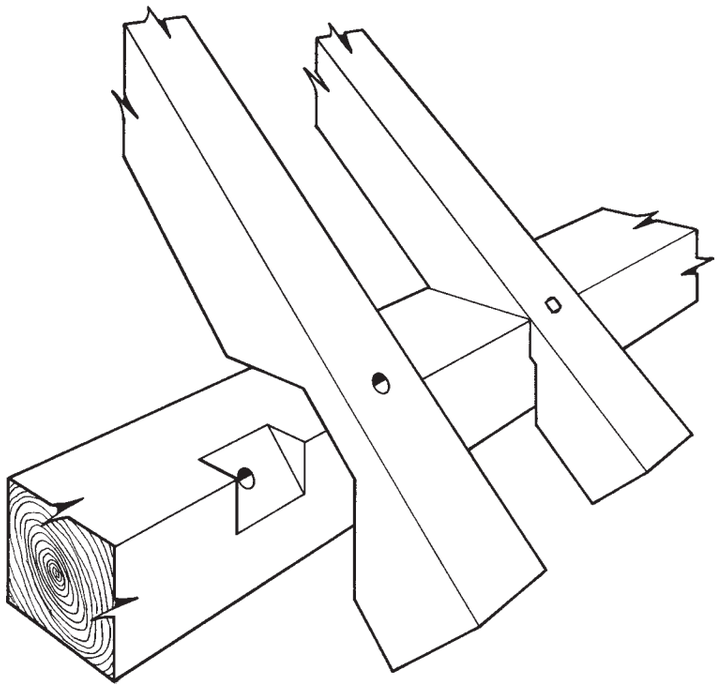
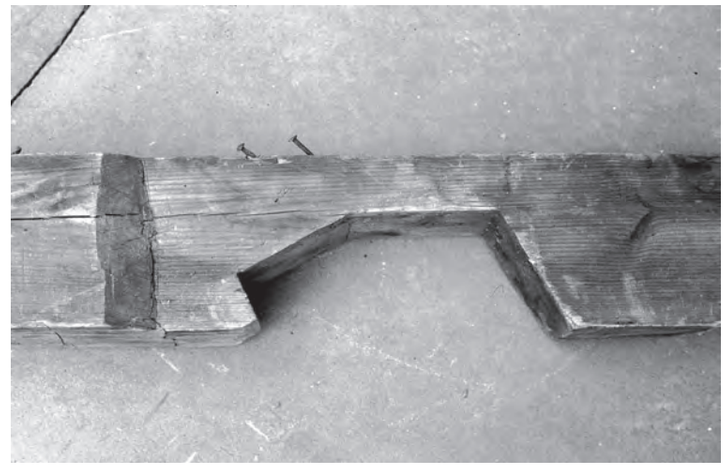


Fig. 6. In a mid-19th-century house in Shelburne, Massachusetts, the rafters have a level cut with a through tail to support a cornice.



Rafter with housed birdsmouth and through tail from 18th-century Dutch house in Muitzenkill, New York. Three of the five cuts could be sawn; the other two had to be chiseled.

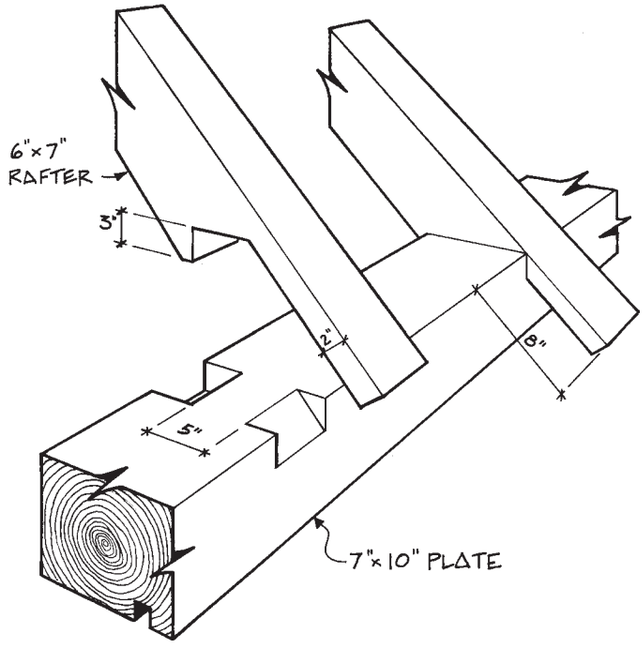


Fig. 7. These housed birdsmouth rafters with through tails were found in a well-crafted 18th-century barn formerly in Hoosac, New York. The rafters were supported at mid-span by a purlin plate and joined to a ridge at the peak. The groove in the underside of the plate was for vertical wall boarding.

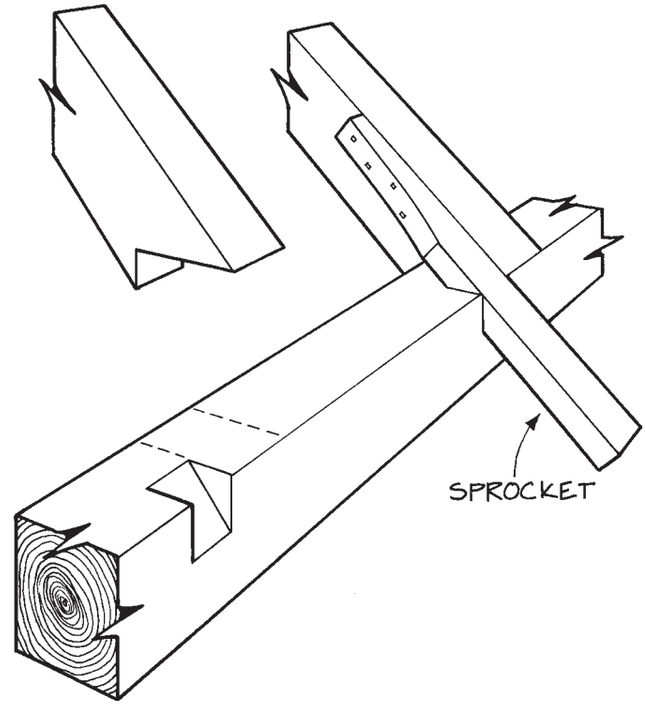


Fig. 8. Tails were often added to rafters to provide an overhang. These tails or sprockets are nailed or pinned in place. They can also be angled to provide a pitch change at the eave.

The simple level-cut butt joint can be provided with a tail. To minimize cutting, the roof plane is raised a couple of inches to allow the tail to extend past the plate. If the roof plane touches the corner of the plate (an arrangement that builders seemed to prefer), then the plate must be notched to allow the tail to pass. As with the butt joint, the thrust must be resisted by the fastenings.

A stronger solution is the *birdsmouth with through tail* (Fig. 7). This requires more notching in the plate but resists the roof thrust well. Its disadvantage is that the level cut on the rafter cannot be sawed out; it has to be chiseled. The tediousness of this operation would seem to account for the rarity of this joint.

The best solution to connecting rafter and plate, at least to this author and builder, is the *step-lap rafter seat* (Fig. 9 facing page), the joint found more often than any other. It was used on one of England's oldest buildings, the Barley barn at Cressing Temple, ca. 1200 (see Cecil A. Hewett's *English Historic Carpentry*), and was a standard here in America. It performs well in all respects, including economy. Though it appears complex, it is fairly simple to fabricate. The rafter has only one sawcut (not including the end of the tail), and that at 90 degrees. The axe or adz can be used to swiftly shape the surfaces toward that sawcut. The plate notches involve sawing and chiseling but can be cut quickly, with the inner V-notch presenting the only difficulty. The step is usually either 1½ or 2 in. and the tail thickness the same. The shape of the tail varies depending on the cornice detail and the builder.

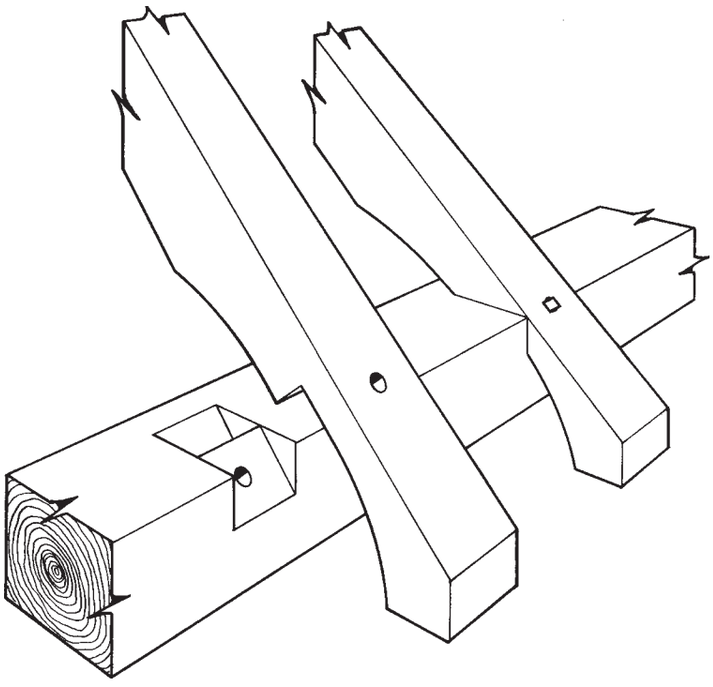


Fig. 9. The step-lap rafter can be shaped with an adze. Here the tail has a plumb and a level cut to support a cornice. A squarish pin through the tail secures it.

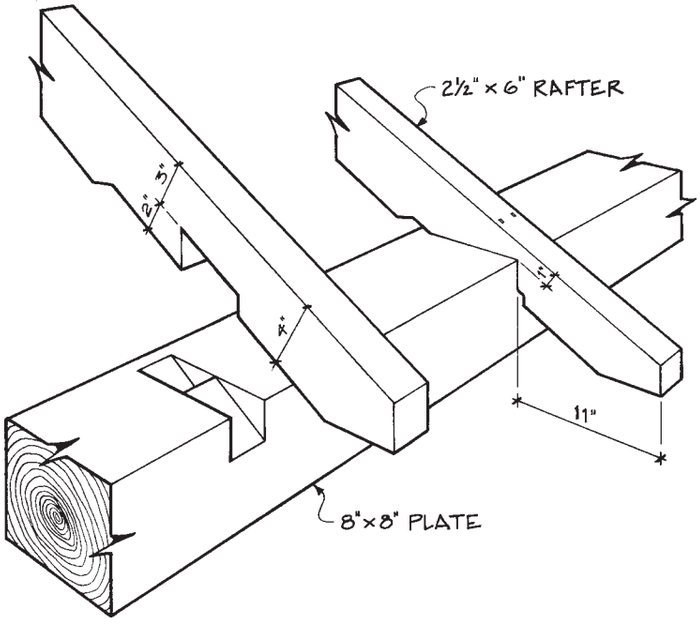
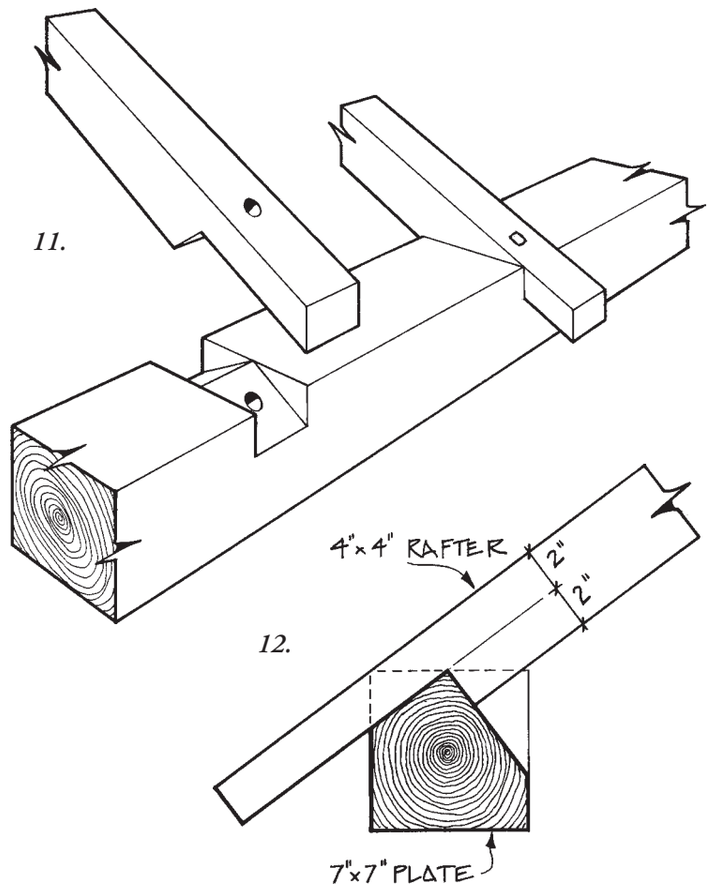


Fig. 10. Variation of the step-lap with plumb abutment. The roof plane is also elevated above the edge of the plate to increase the tail strength in this mid-19th-century carriage barn in Adams, Massachusetts.

Step-lap rafter seat at the end of a plate from a house in Windsor, Mass., from the early 1800s. The squarish pin, here to be driven through the rafter body rather than the tail, kept the rafter from slipping off the end of the plate.



Figs. 11 and 12. The builder of a 19th-century South Lee, Massachusetts, barn (11) attempted to improve the step-lap seat by making it easier to cut. Here both parts of the seat could be sawed full depth. But the obtuse-angled rafter abutment tends to ride up and over the plate from the thrust of the roof. Fortunately, the roof loads in this 20x20 barn are small. The builder of a Rowe, Massachusetts, barn addition (12) also re-designed the rafter seat. Unfortunately, with its lower edge unsupported, the shear strength of the rafter is severely diminished, and the plate is also weakened, by losing its remaining upper arris.

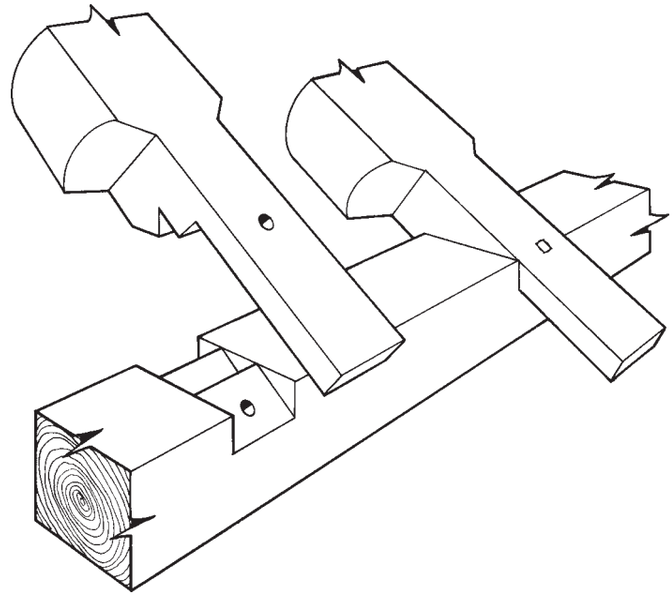


Fig. 13. The ultimate rafter-plate joint must be this example found in an 18th-century barn in Sheffield, Massachusetts. It combines the step-lap with the housed birdsmouth to create this magnificent but obviously time-consuming joint.

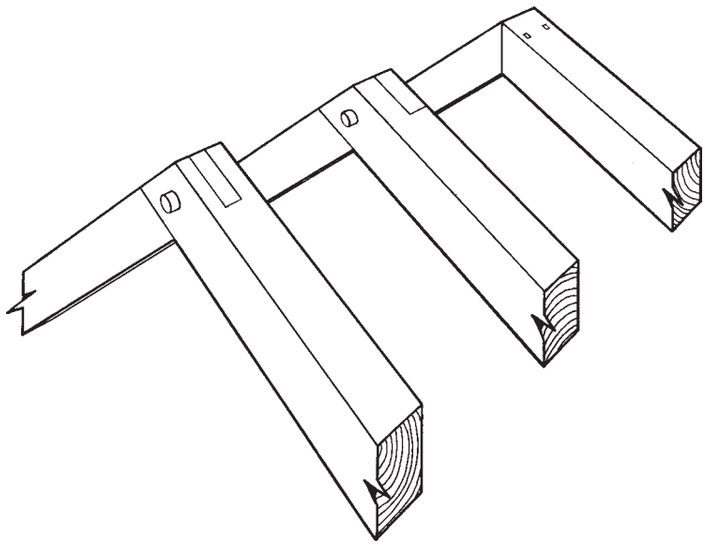


Fig. 14. Above, from left, three forms of joint for common rafters at the peak: open mortise and tenon, half-lap, butt.

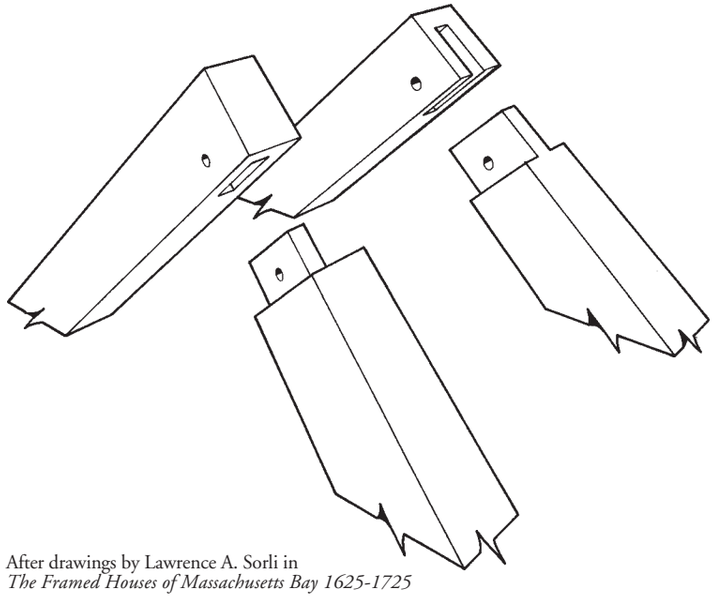


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Fig. 15. On deeper section rafters, there may be some economy to these variations of the mortise and tenon. At left above, principal rafters in the ca. 1665 Gedney house, Salem, Massachusetts; at right, principal rafters in the Fairbanks house (1637), Dedham.

Rafter-to-Peak Joints. Where common rafters reach the roof peak, they may be joined to each other or to a ridge beam or a ridge board. When joined to each other, they are butted and secured with nails, half lapped with a pin, or mortised (open or blind) and pinned (Figs. 14 and 15). Of these, the mortised joints perform the best but require the most time to execute.

Ridge beams often appear in common rafter roofs. They are continuous members, occasionally scarfed, and typically cut out to permit a center chimney in houses. Though there are more joints to cut, the use of a ridge evens out any slight variations in rafter length to create a straight ridgeline and makes possible wind bracing down to the rafters.

The sides of the ridge are perpendicular to the roof slope and, unless the roof pitch is 12/12, the cross-section usually ends up five sided (Fig. 16). Pin holes are offset toward one edge of the joint so they don't intersect the opposing ones. As a result, all rafters are

View down the ridge beam of a mid-19th-century 40x50 barn in Hinsdale, Massachusetts. The 3x4 rafters have barefaced tenons.

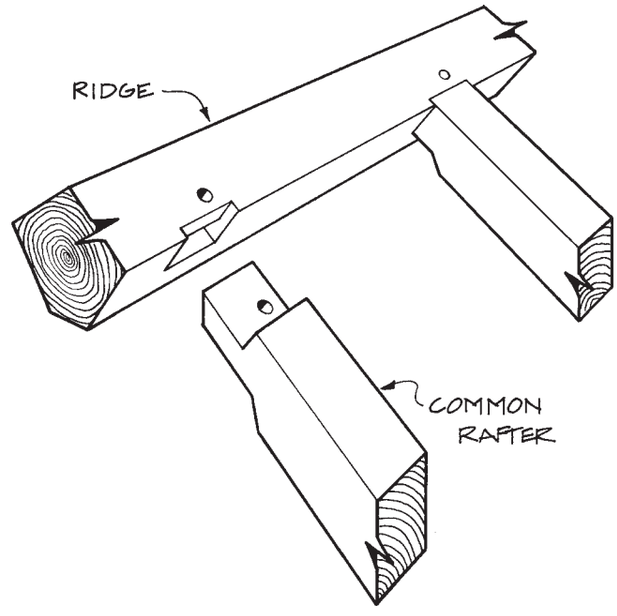


Fig. 16. The typical ridge beam, here a Square Rule example, is sized to accommodate the rafters. Pin holes are offset to avoid intersecting in material below mortises. The end of the tenon is cut plumb to provide maximum relish beyond the pin hole.

identical except the gable ones. They have narrower tenons to accommodate relish in the ridge mortises. In a few structures, the ridge ran uninterrupted below the rafters. Then the rafters joined each other above. A less satisfactory but still effective ridge was a ridge board. Here, the rafters butted a board or plank and were nailed (Fig. 17, facing page). This arrangement became common in the late 19th century and early 20th century, and is typical of stick framing today. A variation has shallow gains cut into a plank ridge to set the spacing and resist twisting of the rafters.

Rafter-to-Purlin Plate Joints. On wide buildings with purlin plates, if the purlin plate is set level, connections similar to the rafter-to-plate joints may be used. Because support from the purlin plate reduces the outward thrust of the roof, the joinery here may be quite simple. A simple notch to fit around the purlin plate (a modern birdsmouth) with a substantial pin is common in Dutch barns (Fig. 18). Also common is a through notch where the rafter may pass through undiminished or be reduced to a consistent size (Fig. 19). In some Dutch barns, this through notch is not sawn but shaped with an adze as a sort of chamfer a couple of feet long.

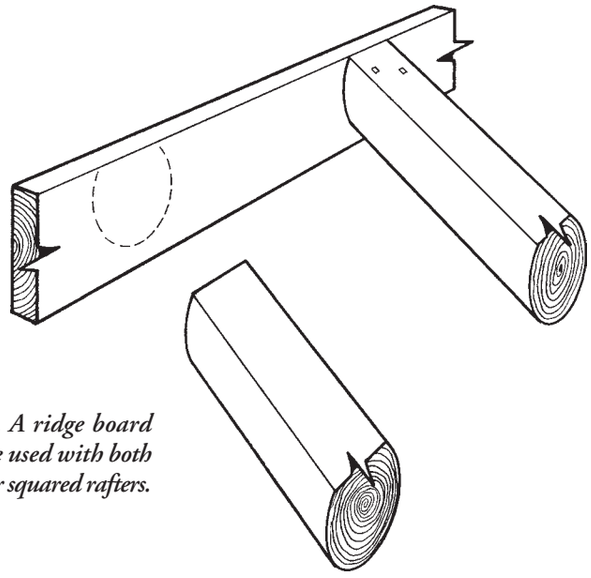
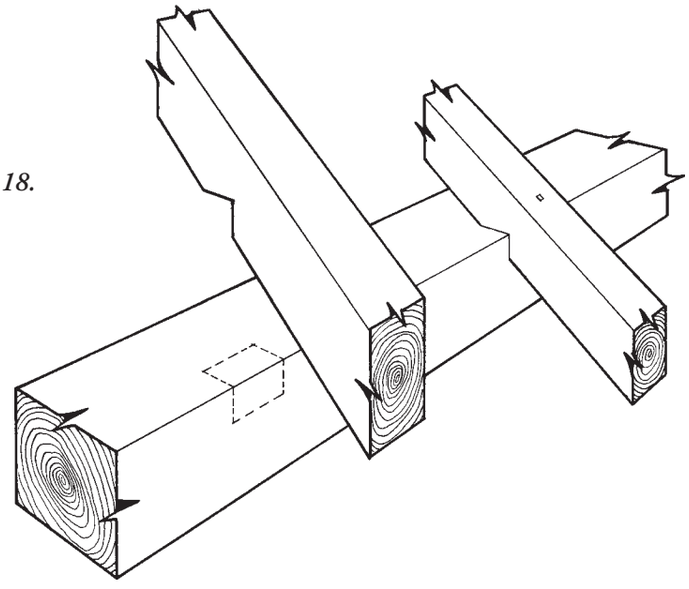
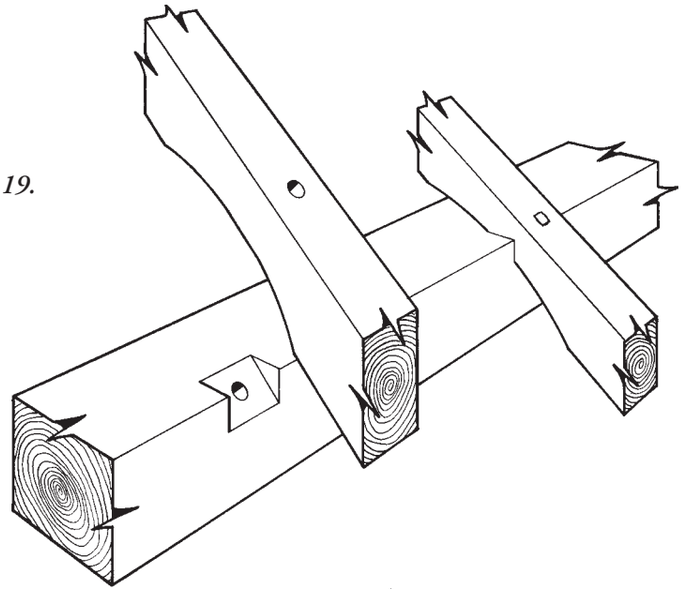


Fig. 17. A ridge board could be used with both round or squared rafters.



18.

Figs. 18 and 19. Above (18), a simple birdsmouth cut on the outside of the purlin plate is quite common in Dutch barns. A pin or spike is used to secure it. Below (19), rafters are reduced to a consistent, smaller size where they pass over the purlin plate. Only the pin resists thrust.



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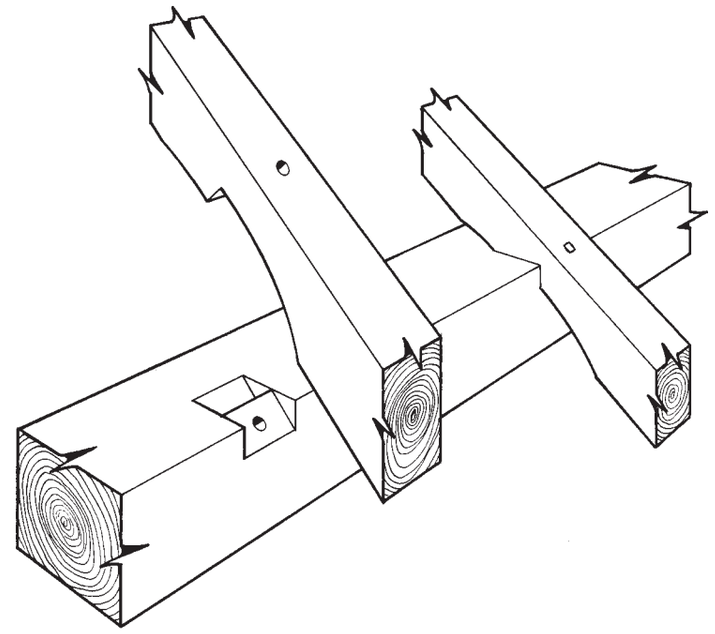


Fig. 20. The step-lap works equally well on purlin plates, but the rafter cross-section at the through point is thicker than the tail at the plate. Note how the rafter stands above the corner of the purlin plate.

In buildings with the step-lap rafter seat at the plate, the purlin plate will often have the same seat (Fig. 20). The rafter, however, is elevated above the corner of the purlin plate to maintain sufficient rafter thickness.

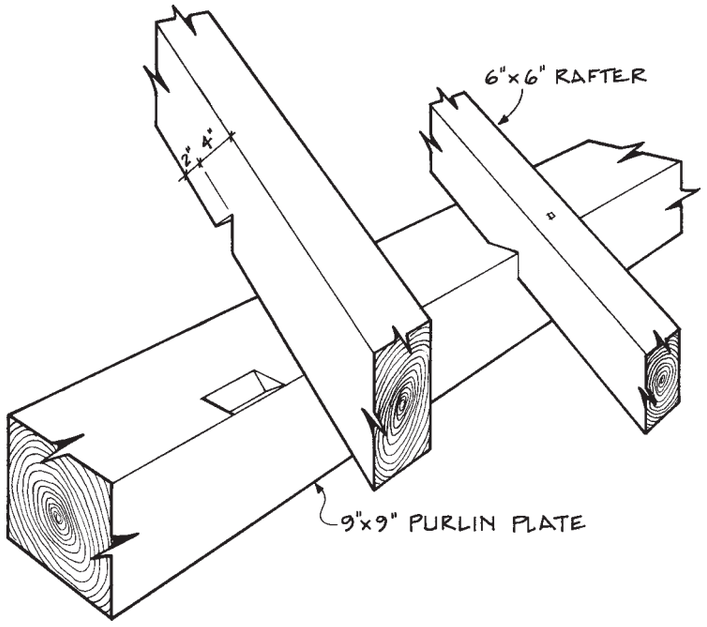


Fig. 21. This purlin plate joint was found in a 45-ft.-square barn in Middleburg, New York. It is simple and effective.

Mid-19th-century Hinsdale, Massachusetts, barn before dismantling. The continuous purlin plate assembly is canted perpendicular to the roof and the purlin plate is flush with the roof. The rafters tenon into both upper and lower faces of the purlin plate.

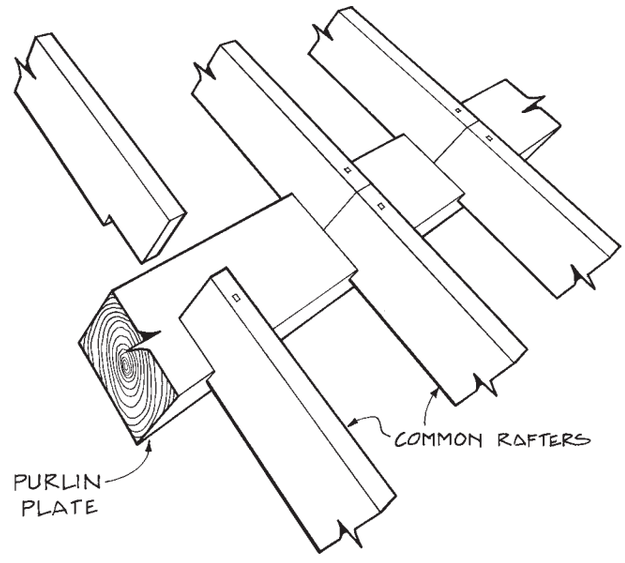


Fig. 23. Canted purlin plates eliminate considerable cutting since rafters (here sized and butted) can pass over the purlin plate.

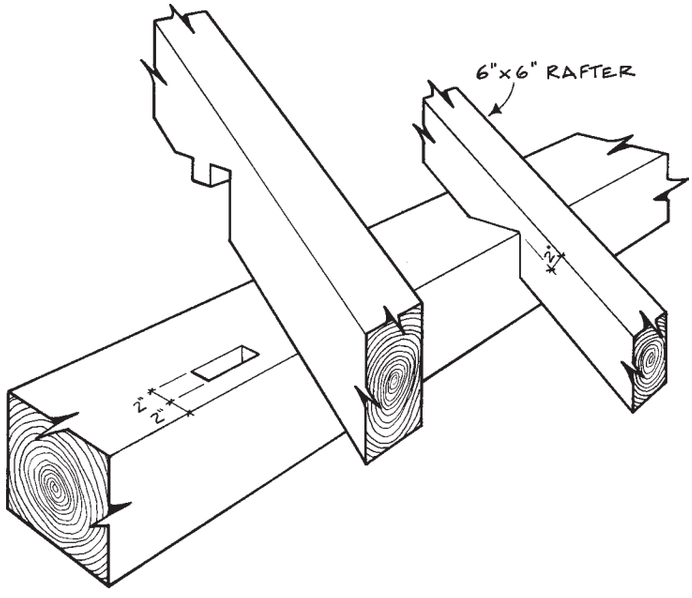
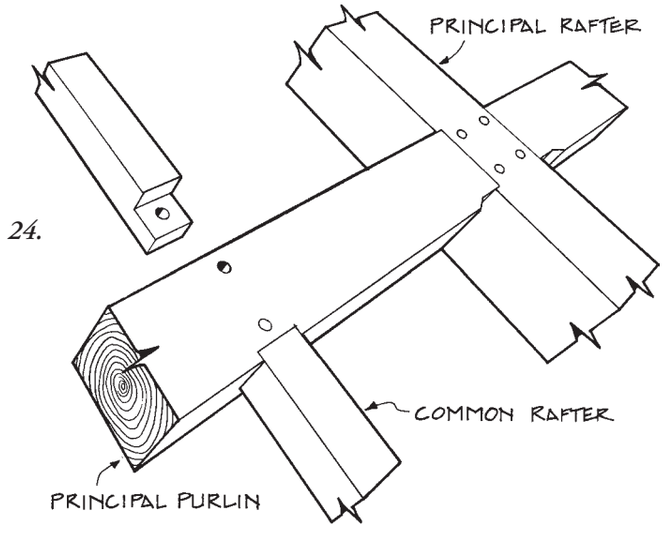
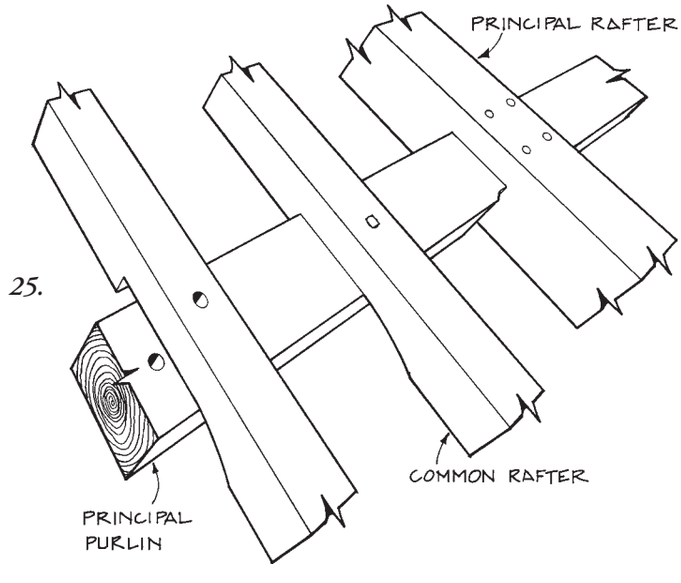


Fig. 22. A re-used rafter in a ca. 1825 Somerset County, N.J., barn implied this unusual purlin joint in its original location. Because of short grain in the tenon, its application would be best for roofs steeper than 45 degrees. The rafter section is reduced to one-third at the joint.





Figs. 24 and 25. Above (24), a flush principal rafter-principal purlin-common rafter roof, with rafters tenoned into the purlin, itself tenoned to the principal rafter. Below (25), purlin framed below principal rafter and through rafters notched where they cross the purlin.

In the mid-19th century, when purlin plates and their canted posts were framed perpendicular to the roof slope, as shown at top, the rafter joints were simplified. In many barns, rafters continued across the purlin plate undiminished and secured with nails. Often they were sized down to a consistent section, where a shallow square abutment increased thrust resistance (Fig. 23). Or, they could be two short rafters simply butted over the purlin plate.

If the purlin plate was flush with the roof plane, the rafters could join with a simple mortise and tenon (Fig. 24).

PRINCIPAL RAFTER-PRINCIPAL PURLIN-COMMON RAFTER ROOFS. This most elaborate roof system includes purlins supported by principal rafters. The purlins may be tenoned between the principal rafters or run over them, and the common rafters then span between the principal purlins (Fig. 24), or run over them (Fig. 25). The advantages of such a design to warrant the extra cutting work are that the common rafters can be shorter and of lighter scantling, and bracing can be conveniently framed in to

stiffen the roof. (Since many 17th-century roofs were not sheathed completely with boards, the roof framing required bracing.)

The principal rafters were typically tenoned at their feet into tie beams, creating a rigid triangle at each cross frame. (See the second article in this series, "Tie at Plate," in TF 56.)

The joinery that accompanies this roof type varies depending on whether all or some of the members are flush with the roof plane as seen in Figs. 24-27. Common rafter joints at plate and peak are unchanged from those already addressed.

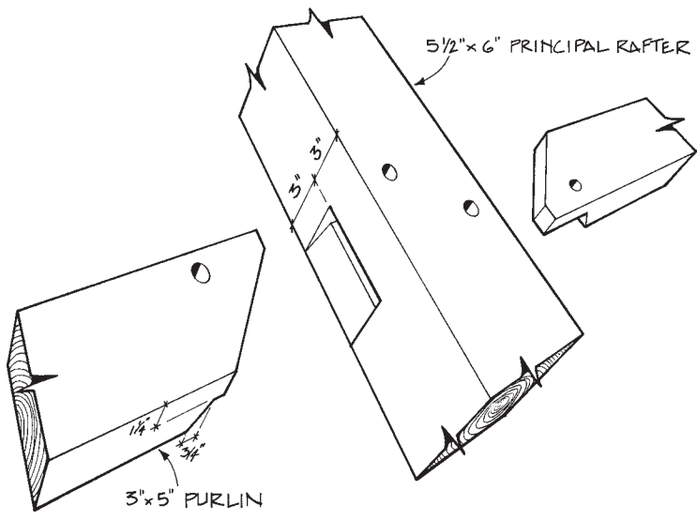


Fig. 26. This unique purlin-to-principal rafter joint appears in the 1668 Turner House (House of the Seven Gables) and the 1665 Gedney house, both in Salem, Massachusetts. Its advantage lies in the way a fairly narrow principal rafter could accommodate two purlin tenons with sufficient pin hole relish to be effective.

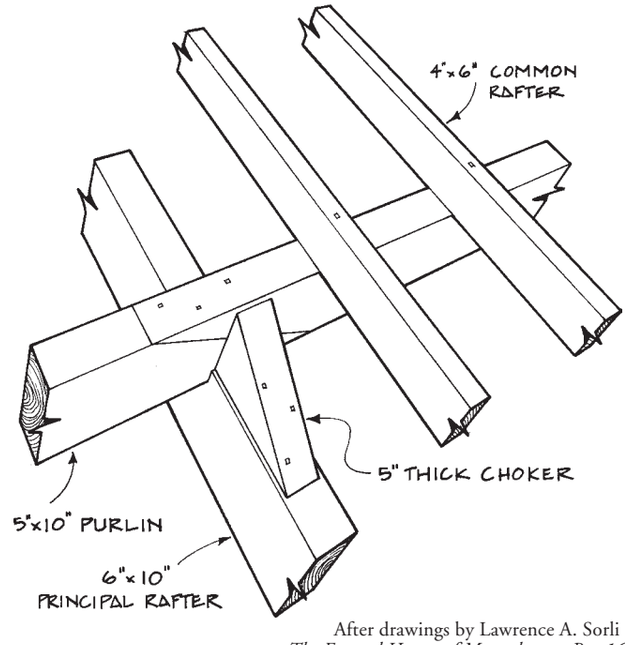


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Fig. 27. In trussed roof buildings, the purlins may bear on top of the principal rafters, as shown here in the Cabildo in New Orleans. The deep-section cypress purlins are scarfed over the principal rafter in what the French refer to as a "whistle cut." The purlin end cut is then recycled as a sort of cleat, a "choker," to keep the purlin from rolling.

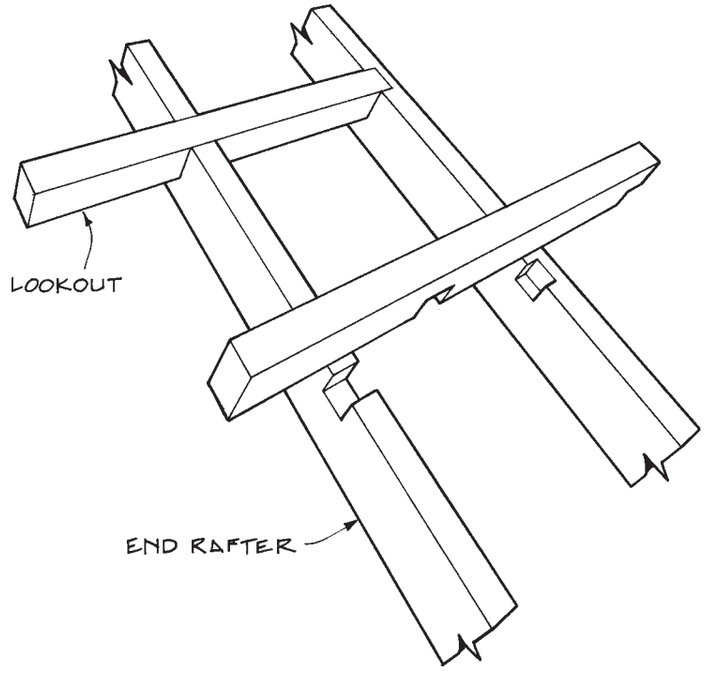


Fig. 28. In common-rafter roofs where a substantial rake overhang is required, "lookouts" are framed to cantilever out.

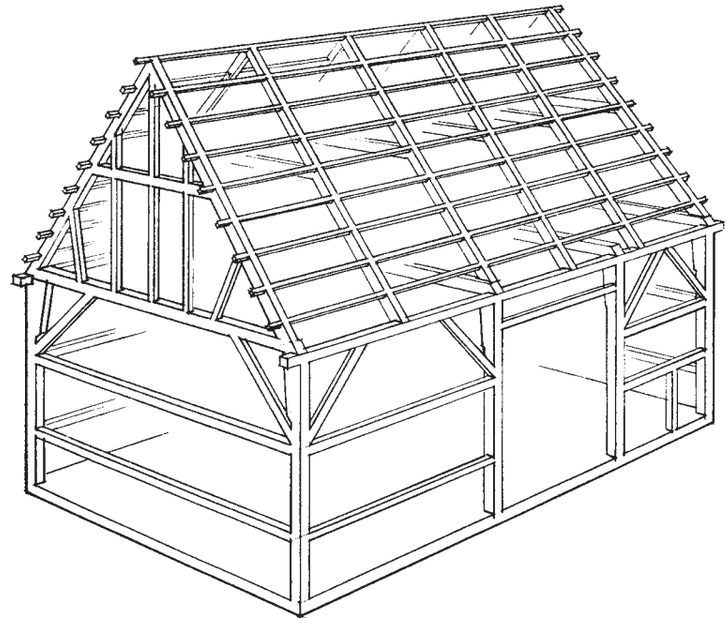


Fig. 29. This 17th-century barn in Seekonk, Massachusetts, has principal rafters spaced a little over 6 ft. apart with 2x3 common purlins spaced about 2 ft. on center. The purlins extend past the gable to provide an overhang.

PRINCIPAL RAFTER-COMMON PURLIN ROOFS. This roof type is most common in eastern New England. The oldest common purlin roof remaining from the Massachusetts Bay colony is on the Coffin house at Newbury, ca. 1654 (see Abbott Lowell Cummings, *The Framed Houses of Massachusetts Bay 1625-1725*). In the earliest examples, this roof type was not sheathed with boarding but covered with thatch or riven shakes. In some later examples, the roof sheathing, running vertically, was a weathertight board-on-board. The additional expense of framing a common purlin roof instead of a common rafter roof was apparently justified by the savings of a board covering compared with a shingled one.

Common purlins usually run continuously across the rafters and often extend at the gable to support the rake overhang. In two-bay houses and smaller barns, the purlins typically run the full length of the building and are often hewn from slender trees. Common purlins up to 40 ft. long are not unusual, but in larger structures they more often are made up of two or more lengths, hewn or sawn. Where purlins meet, they may be staggered or scarfed. Because the chimney normally runs through the peak, the ridge purlin in houses can be in two lengths and doesn't require a scarf.

The typical common purlin-to-principal rafter joint is a through trench in the rafter with a pin to secure it. The purlins may pass at full size or be reduced or halved in the trench (Figs. 30-34). Fig. 35 on the back cover shows the special case of a hip roof. Common purlins are often small (1½ in. x 2½ in. up to 3x5) and are usually laid flat.

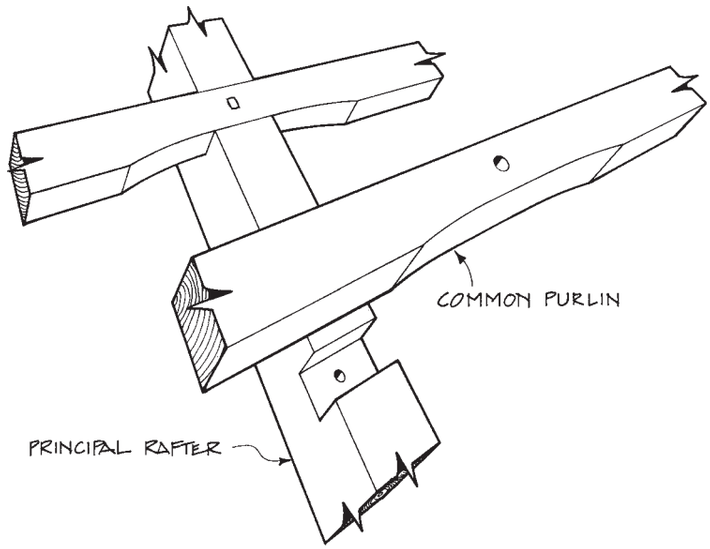


Fig. 30. Common purlins are typically trenched across the rafters and secured with a squarish pin. Here they are reduced to a consistent width with an adze.

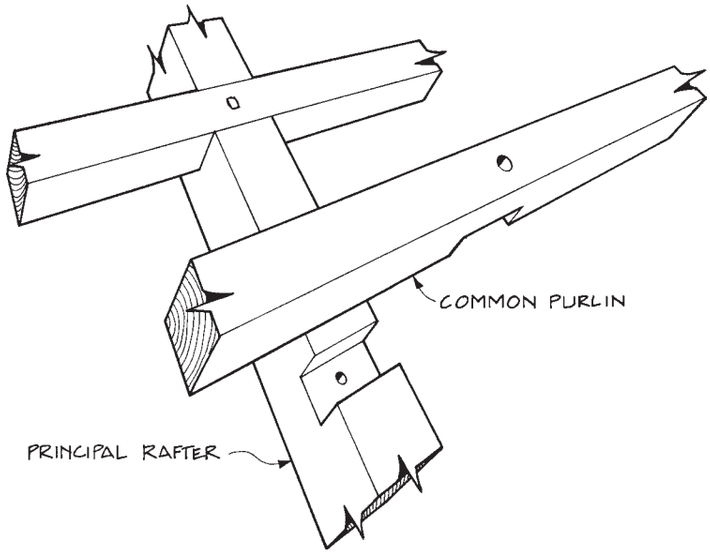


Fig. 31. To avoid unduly weakening principal rafters, deep-section purlins are notched or halved where they cross.

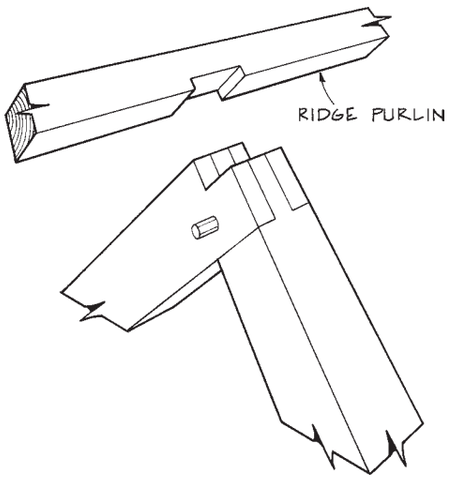
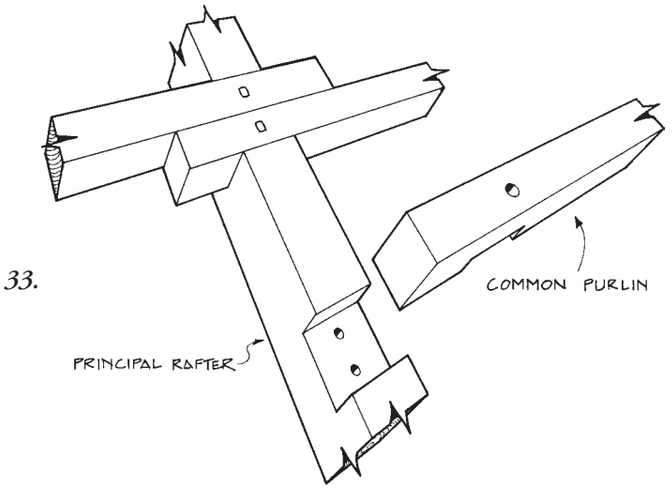
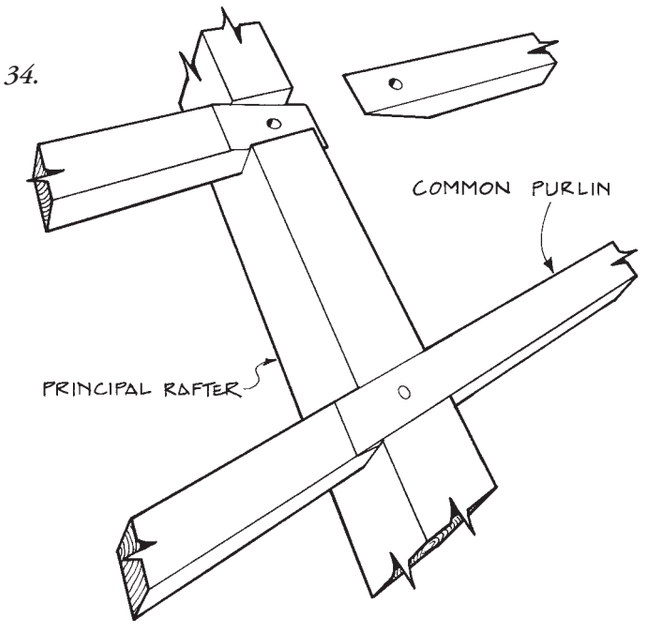


Fig. 32. The mortised rafter receives the notch for the ridge purlin.





Figs. 33 and 34. Above (33), many buildings have the purlins staggered to avoid scarfing. Here, purlin relish beyond the halving augments the pinned connection and ties the roof longitudinally. Below (34), purlins may be skived (scarfed) in line and secured with a pin.

OTHER ROOF JOINERY. Lean-to-roofed additions are common on old structures, some built simultaneously with the main frame. By lessening the pitch of the lean-to roof—to produce a *broken back* roof—the rafter connections are simplified. The lean-to rafter can bear on the plate or on top of the main roof rafters (Figs. 36-38).

The Dutch and Germanic barns built in New York and New Jersey often had *pentice* roofs (see TF 43) over the main doors at each end and occasionally over the smaller side-aisle doors. Various techniques were used to support such a roof. In the simplest design, triangular blocks 1½ to 2 in. thick were nailed onto the sides of the studs over the doorway and supported board sheathing (tenoned variant, Fig. 39). In other designs, joists spanning the end bays cantilevered over or through the gable anchorbeam to support a plate and rafters (Fig. 40). These 2-ft. to 3-ft. pentice roofs protected the doors and sill below from the weather. —JACK A. SOBON

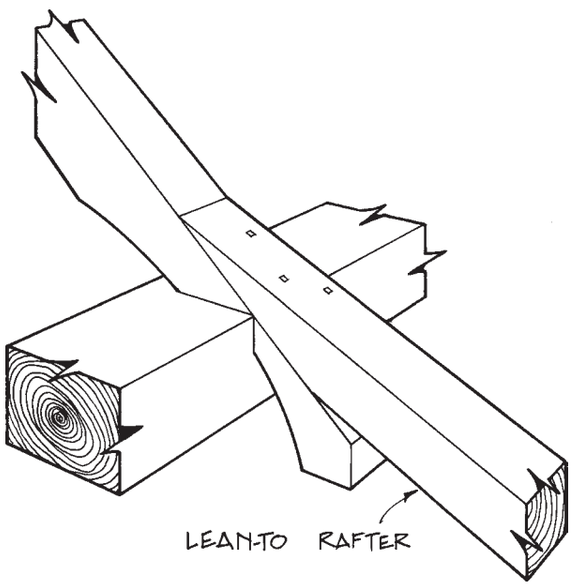


Fig. 36. Dutch houses often had "broken back" lean-tos, where the lean-to pitch was lower than the main roof pitch. A simple, effective solution was to bear the lean-to rafter on the back of the main rafters and secure the connection with a pin or nails.

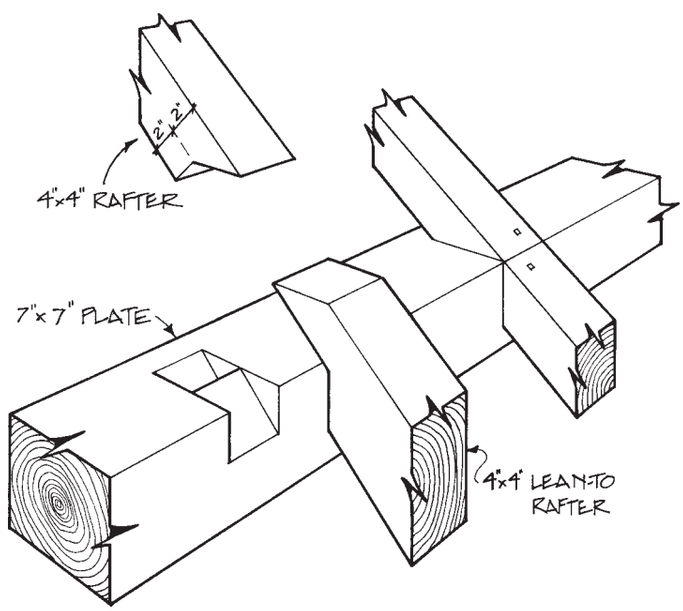


Fig. 37. In this early 19th-century Pittsfield, Massachusetts, house, the lean-to pitch matches the main roof pitch and the rafters are beveled in the step-lap seat.

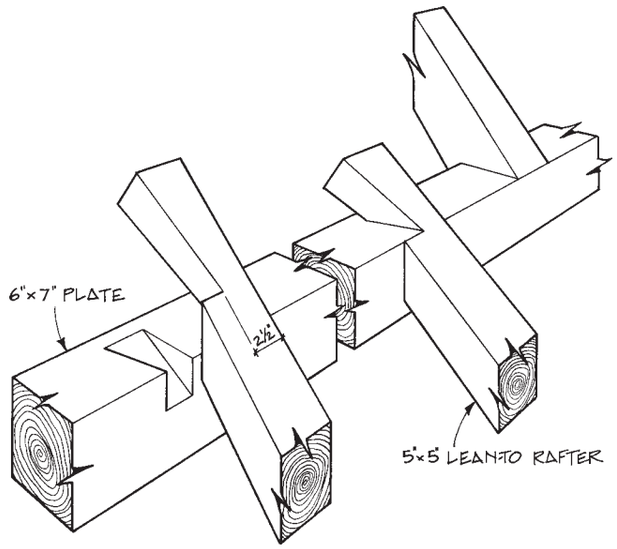
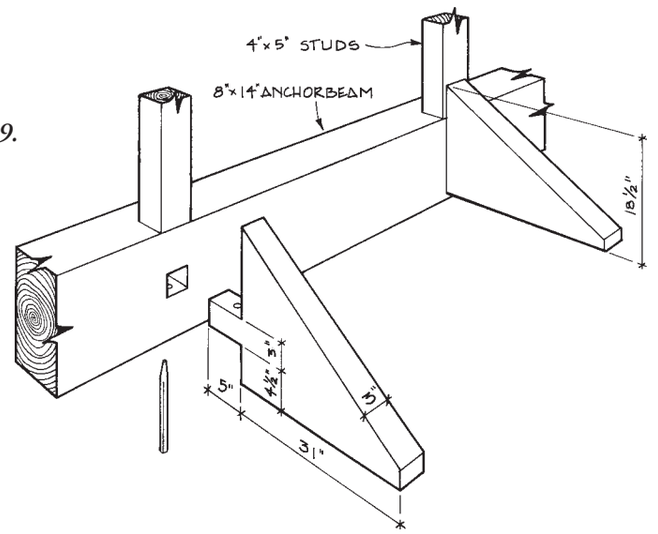


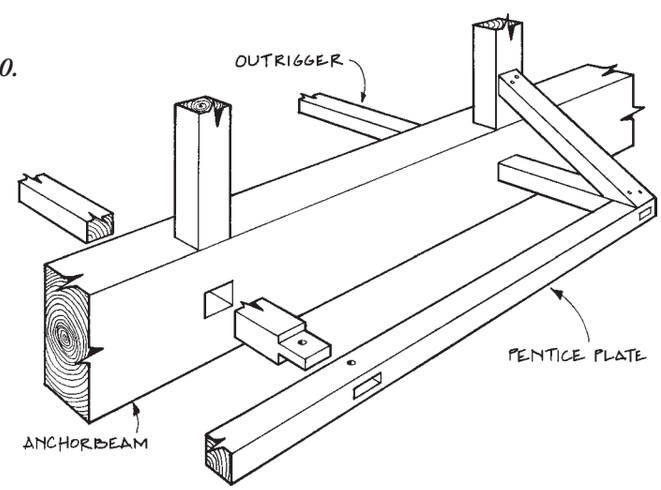
Fig. 38. In this ingenious and singular example from a barn in Seekonk, Massachusetts, the lean-to rafters are half-dovetailed in both width and thickness to lock into the main plate.

39.



Figs. 39 and 40. Above (39), many end anchorbeams have tell-tale mortises, but only one example of this type has been found with all pentice parts intact, on a 44x45 barn that originally stood in Berne, N.Y. Though the 3x3 tenon 5 in. long would seem undersized, it worked for over 200 years. Below (40), many Dutch barns had cantilevered pentice arms mortised full-size through the gable anchorbeam. Four or five of these supported the pentice plate and rafters.

40.



A Business Roundtable

BILL KEIR poses the question: Is there a protocol in common use among the framing fraternity in North America when one is asked to price a job and finds out that someone else is already giving estimates or is in negotiation or having preliminary discussions? There is no such protocol here in the UK, and (depending on the opposition) reactions range from immediately phoning up the other guy to quietly sniggering into one's beard.

Chris Madigan:
In most cases I find that someone else is being asked to provide a price. I know that I have bid on jobs against Benson Woodworking, Ed Levin and Ken Rower (as Paradigm builders and as solo framers) and Jonathan Orpin (New Energy Works), among many others. Some of those bids we won and some we lost. Sometimes we all knew, which I think is best when the information comes from the client. I don't think it's appropriate to call your opposite number until after the contract is signed and all have been notified of the decision, at which point I have called to congratulate them on getting the job. I think it would be bad form to call someone when you got the job. When I am told by a prospect that they have decided to go with someone else, I am as positive as I can be. When I am in some doubt about the skills of the framer or company chosen, I thank the prospect for considering us and, without irony, wish them all the best with their project. Otherwise I might offer an enthusiastic endorsement, saying that I know that X or Y will do an excellent job for them. If the conversation allows, I try to discover why the prospect chose the other guy, to help me in future bids and to better understand what clients are looking for. I try to do this in a way that I don't get a whitewash. If they are courteous enough to call you back (not all prospects are), they will usually tell you at least a part of the truth.

Len Brackett:
Our general policy is that if people want to compare our bids against others, we tell them we don't do competitive bids. Period. I know that sounds either truculent, arrogant or self-indulgent, but I would argue that I want clients who want us. One of the oddest things is that as soon as I tell people that, either they say thank you very much and disappear from my life or they marry us.

Rudy Christian:
I very much agree with Chris—very eloquent. I too try not to send mail bombs, spies or heat-seeking e-mails when I am aware of a multiple bidding situation. Truth is, the development of several publications that promote timber framing in the US have pretty much made it a given that you aren't the only one a prospective client is talking to. Often you can tell by the list of questions they ask straight out of a published buyer's guide. That said, I really try my best to sort out "shoppers" early in the interaction. It's one thing to have someone canvas several companies to see who feels right. It goes to the extreme when they send you drawings done on their handy-dandy home computer "House Design" program, and send the same thing to 10 or 20 other companies because they can! I feel it is important to respect the amount of work that goes into developing a *good* set of plans that include a *good* timber frame design. If the shopper can't recognize the value, we fire them before they hire us. If we see drawings come in that are obviously whited-out copies of someone else's work, we do the same. Customers come and go. Our brothers in business will be around.

Chris Madigan:
I may not be quite as quick to fire potential clients, but I also lose interest quickly when the number of bidders exceeds three or four well-chosen companies. If I hear that certain companies are being asked to bid and find out that the client plans to go with the low bid (almost always), I too decline to bid. I share Rudy's outrage over 20 companies being asked to bid on plans.

Bill Keir:
In a bidding contest, it used to be that it was us and someone else. In the mainstream of UK construction ten years ago, it was always three tenderers [bidders], but we have seen that creep up to five or six as the norm, and that's after the pre-tender interviews, the weeding-out processes. Effectively this means that in 1990 a firm might have been able to hit an average of one in three jobs. Now, with all other things being equal, it has automatically been reduced to one in six. Therefore, to maintain the same work flow, you have to price and process twice as many jobs. Sound familiar? That's got to be at least two percent off your bottom line straight away. I know that tendering for a project worth a quarter to a half a million pounds is going to cost between £5,000 and £10,000 minimum. If you are having to do twice as much (and the client side is doing twice as much too), it's no wonder that A, construction continues to become more expensive; B, our margins do not reflect the quality of the work we do or the efforts of our employees; C, there is an exponential growth of (cheap, shiny bean-counting bureaucrat) suits getting between the craft and the client.

Len Brackett:
My tack with clients is to say that we need to be supported in doing this. As a hobby, it's . . . too expensive. I tell them that we will make a great effort to do their work and do it well, and that in return we need to be supported. Do they want to support this kind of stuff? If so, great. If not, then go away, leave us alone and don't waste our time.

Ed Levin:
While we're all raising our blood pressures with this very justifiable whining, mention should be made of the fact that not only is inflation in the number of bidders per job an issue for timber framers, it is compounded by the prevalence of bid documents that either omit timber frame plans and specs entirely or give only the sketchiest indication of something wholly unappealing and unbuildable, leaving the aforementioned multiple bidders the choice of either passing up the project or first designing the frame from scratch for free so they can make a bid. In my experience there is no other area where architects are so cavalier as when they attempt to pass off the emperor's new frame as reality. Of course, since we compliant fish always rise to the bait, this absurd practice lives on and we can hardly blame them for saving the cost of a consultation. If we are going to play with the big boys and be able to bid professionally, apples against apples, we need to encourage uniform professional architectural practice and either bid to real designs or insist on payment for design work (not bidding work, design work).

Len Brackett:
I cannot tell you how often I am called by some client who tells me they have a Japanese house they want me to consult on, and then I look at the drawings and they're all wrong and indicate no knowledge of the architecture. We end up redrawing the whole thing.

Chris Madigan:
In the US and Canada, magazines such as *Timber Frame Homes* are influential (that list of questions we are all asked), and an article there preaching the gospel of good practice may have some effect.

Jonathan Orpin:
We've sponsored two sobering speakers recently who deal directly with copyright law, and it applies to this discussion a bit. If you bid someone else's design work, and you end up getting the job and doing something like it (note that it doesn't have to be exact, nor does the original plan have to have the little copyright symbol), then you can reasonably end up in a pile of bad. The literature goes on for a while, but our industry has already seen at least one big dollar award. As to Ed's point, I don't completely agree. The idea of fully developed plans offers two potential downsides: the first is that architects and engineers actually draw the frame to completion, an act that usually means it gets done about like that. This is fine in the case of the qualified designer, but I'd argue it's not the norm. And therefore number two: our industry has excelled at breakneck speed for a variety of reasons, not the least our success in design-build, allowing creative interplay between craft and design, between those in the sawdust pile and those in the conference room with the client. I would doubt that many of us lose much money because we bid concept plans. Upon award, if the designer or client suddenly says s/he really meant 20 percent more wood than you thought, then either you negotiate for more in good faith or you get out, taking your lesson with you. Ed, you are the exception, a designer who has enough understanding to push the medium. If we stand up as an industry and want apples to bid, we'll generally get the garden variety, and I'm after the exotic, which is often flushed out later, a process that can be a funfest. I would still bet that the bulk of the industry's work is done with only a minor amount of bid work, compared to negotiated. Our main competition is the 99 percent plus that isn't heavy timber.

Ed Levin:
Jonathan, I have to agree with much of your point. I'm not looking for more bad frames from architects, engineers or any designers who have neither the intuition nor the experience that the best frame designers bring to the table. Many major building elements (like steel structure, for instance) are typically designed by qualified consultants, a standard that could be easily carried over to timber frames. And, in deference to your point number two, an architect could commission say a 50-percent design, that is, with enough specifics to avoid anarchy and enough schematics to allow some design scope to the qualified bidders. Of course, this is a frame designer speaking, and one who has too often been called in to repair damage done by an imperfect bidding process (an opportunity that seems unfortunately to offer plenty of work with little or nothing in the design budget to cover it). I agree that negotiation is the preferred way to go, wherever possible.

Bill Keir:
I often preach another odd concept. This is what I sometimes tell clients: No one ever believes this, but the best way to build is to hire (honest) people by the hour or day. It reduces unpleasant and distracting rows about extras (low bidders often claw back their margins by claiming extras, a product of the competitive tendering process that sadly has become the norm). It also means that the tradesmen (and -women in our case) don't face the pressure to cut corners in both the quality of work or materials, or become morose and demoralized because they are losing money as a result of getting their price wrong. It also gets rid of the arguments and unpleasantness that can surround changes or alterations to the original that was priced. For example, it is a truism that it doesn't matter whether the original bid had a concrete or tarmac drive, but swapping after the contract has been signed will cost *more*. Pick people whom you trust and like, whom you will be able to get on with, especially the actual tradesmen, and try to get real references. You need to get the best advice up front, from good professionals. Most people go over budget, over program, some don't like what they end up with. It seems true that you can choose any two of the following: built well, built on time or built to budget.

Len Brackett:
We do a lot of work that way, and we get the clients to go along by giving them an unedited list of every client we have ever had and inviting the new one to ask about our ability to estimate costs. We use critical path schedules, which take a week to develop for each project and which we update daily while building. We are seldom more than a week off schedule, even for a year-long job. We wouldn't be able to make it without critical path schedules. They are that important, I think.

Ben Brungraber:
I only feel the need to point out that people who send floor plans with black squares in the corners (what many feel to be a thorough description of a timber frame), and who expect firm, close, quick pricing are (mostly) acting out of ignorance. How much does this frame cost? they ask, and then are shocked that prices range a bit, or that I balk at designing, for free, enough to give them a responsible bid. I do not feel outrage at their methodology. But, I have also learned that it is almost never worth the time and effort it takes to try to educate the people who would pursue this course. I like to think that they generally get the home they deserve, and from some desperate framer who had to win the job on cost alone. I hope that the timber framing industry does not start to pick up an unfortunate image as rudely unable to provide instantaneous pricing to a public who seem to have come to expect it.

Rudy Christian:
I am struck by Bill's giving us insight into the fact that a trusting relationship between craftsman and customer often leads to a very successful project, while Ben can rejoice in the "just deserts" aspect of the bidding endgame. Although Ben is probably right about the "educability" of too many wide-eyed frame shoppers, we never miss the chance to explain that we gave up trying to make money by doing the job right at the same price as someone who bid it while intending to cut corners. If the clients still don't get it, they probably get what they deserve, but not from us. I do take offense at the "desperate framer" whom Ben describes. All I have to do to see one is look in a mirror. For the first few years, I felt terrified every time I submitted a bid. Was it too high? Too low? Why is this so hard? Recently we've had better luck getting it right, and occasionally have been lucky enough to find customers who aren't all that interested in our spending hours crunching numbers. True desperation comes in believing you can either be happy doing what's right, or make money. I think the Guild has helped us believe that's not true.

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My Lunch with Helmut and Sebastian

Dick Schmidt

Helmut Stoll and, in traditional protective hat, Sebastian Röthele.

FROM August 1999 until August 2000, while on sabbatical from the University of Wyoming, I was fortunate to live and work in Braunschweig, in the state of Niedersachen in northern Germany. During that year, I taught and did research at the Technical University of Braunschweig and traveled throughout much of northern Germany. Of course, I had a chance to see a wide variety of timber frame buildings and learned much about their history and preservation. But most valuable among the experiences that my family and I had were the friendships that we developed. Included in our list of new friends are two engineering students, Helmut Stoll and Sebastian Röthele, who had both served their apprenticeships as carpenters. Helmut finished his engineering studies at the *Fachhochschule* (technical college) in Hildesheim during the summer of 2000. Sebastian will complete his engineering degree at Braunschweig in the summer of 2001.

The formal educational system, the variety of knowledge and skills and, of course, the unique style of dress of the German carpenter all captured my interest, and so I recorded this conversation at lunch one day last July with Helmut and Sebastian.

Helmut, can you tell me why you became a carpenter even though you wanted ultimately to be an engineer?

H: I wanted to learn how buildings go together before I went to the university. To be an engineer, you must do a 12-week internship, usually within the first two years at the university. The internship is supposed to help you learn about construction, but it's usually just a waste of time. No one wants you on the job site and you're not allowed to do any work; you just watch. As an apprentice, you get do to real work, to learn about construction because you're working in a company in addition to going to school. Then after you finish your apprenticeship, that counts as your internship.

How many years of school is the apprenticeship?

H: To be a carpenter it takes three years. The first year is just going to school and learning to do different kinds of work typical of the construction site, like bricklaying, plumbing, building foundations, concrete work, roofing, interior finishing, laying tiles, all of the work that is typical on site. Because I have my A-levels (university qualifying exams), I did not have to do this. I started in the second year. In the second year, you work at your company and you go to school on the days that you don't work. We have an A week and a B week. In the A week, we go two days to school. In the B week, we go only one day to school. The other days you're at your company.

Is your work normally on a job site or in a factory?

H: It depends on the structure of the company. I was with a very small company, so I worked cutting beams and doing other shop work, and then we were on site. Because we were a small company, everyone was in the shop and then everyone was on site. At a bigger company, like one my friend was at, he was just cutting timbers [while] others were on site for several weeks. They produced nail-plate trusses for a few weeks and then went on site, raising all this construction. So this work was more monotonous. What we did more in winter was restoration, remodeling old homes, old buildings, *Fachwerk* [timber frames]. So I think it's an advantage to be in a small company, doing everything. You can get a whiff of everything.

Sebastian, did you have the same motivations?

S: Almost the same motivations. I wanted to study architecture as well. I didn't really know if that was a good choice, so I wanted to go on the job site and see what people really do, what their job is on site. I thought if I worked as a carpenter on site and participated in the work, it would be more interesting than just doing an internship for 12 weeks. During an internship you just stand at the job site and watch what people are doing. They would not let you lay a hand on anything. So if you really become a carpenter you're in regular practice and you have to learn, you have to work. This is possible in a short time for people with their A-levels.

So you were also able to skip your first year?

S: I was also able to skip my first year.

How does the A-level qualify you to skip over all of these practical aspects of the profession?

S: I would say, it does not qualify you at all! It does not qualify you at all for the practical matters on the job site, but it does qualify you in matters of common sense. So people who usually do an apprenticeship are not doing their A-levels. They have a more basic school education.

H: *Berufschule* is the type of school where you do your apprenticeship. So after that you're ready to start a job full time.

S: The levels you were supposed to do in school you can also do in the *Beruffachschule*. So if you have only been at the *Hauptschule* then go to the *Beruffachschule*, you can qualify just like you can in a *Realschule* [preparation for tradesmen]. You do make-up work.

S: Yes, but then they can do this apprenticeship as well. So many people come together when you do your apprenticeship, from many different social levels and backgrounds.

I met a carpenter up in Rostock [a city in the former East Germany on the Baltic Sea]. He's an engineering student at the university there. He has his carpenter's apprenticeship. His father, grandfather and great grandfather were all carpenters.

S: Yes, of course, all the way back to Jesus and Joseph!

His father was an engineer, but a carpenter before he became an engineer. So it sounds as if this is not so uncommon, you're not the only ones in Niedersachen doing this?

H: No, no. Definitely not.

So, although it's not the average road, it's also not an unpaved road for you to do this?

S: It all depends where you're coming from, socially. If your father and your father's father were craftsmen, then this would be a very common way to go.

So generally, if your parents were professionals and you went to the Gymnasium*, and you knew you were going into a profession, you would probably not go into craft training first*?

S: Usually not.

H: It depends where you want to end up studying. Many people have the opinion, and it's my opinion as well, that it's good to have a craft before studying. You have an idea how it is in working life. You have earned money, and you know why you're studying.

S: It's a good basis for an academic degree because if you're only going for the academic way, you have no idea what the working world is like.

Is this an idea that you came up with yourself, or is it something that someone suggested?

H: Both.

S: Civil engineering and architecture studies require this practical experience, the internship.

And that's supposed to start before you have your coursework?

S: Yes, at least in the first half of your studies so you can still do it while you're studying. I think it should be before you start studying.

So the apprentice program is three years and you guys did it in two. You skipped the first year. You went straight into the second year, into a company and worked there. What's the third year?

H: It's the same thing, but there's this class at the *Zimmererzentrum* [carpenter's center]. At this center you do work like cutting mortise and tenon joints and other joints that aren't common any more but were common in *Fachwerk* construction.

This is year three?

H: Years two and three. In year two you're at this center for 14 to 16 weeks doing these joints, roof construction, main trusses. We built a small *Fachwerk* building we donated to a *Kindergarten* [preschool] and then after that year we did an examination where we had to show our skills, what we learned in that year.

The examination is to actually build something?

H: Build a small roof model, hip, valley and jack rafters, something like that.

S: The difference between the second and third year in this practical training is the 2-D construction in the second year. You don't have hip rafters and valley rafters in the second year. In the third year you do the more complex things.

Is a carpenter in Germany primarily a roof builder?

H: Yes, I would say in my area, many people build a brick home and then the only carpentry work is the roof. There are big prefab home companies, and carpenters work there building wood-frame houses. But most houses in Germany are brick.

S: It's not only roof building, but also reconstruction of old *Fachwerk* houses.

Is there at least one Zimmererzentrum *in each state?*

S: More. I think there's one in each, what you might call, county.

H: No, not county, that's too much.

S: Here in Braunschweig we have one. It's supposed to be for this county.

H: I think in Hessen [state in central Germany] there are three or four.

Are they regulated by each state or by some local professional group?

H: They are run by the *Handwerkskammer* [chamber of handicrafts]. But the *Zimmermeisteren* [master carpenters] are in a *Prüfungsausschuss* [board of examiners], and they control the work.

H: They evaluate the tests at the end of the second and third years. If they think the students, the craftsmen, did not learn enough, then they give comments and the *Zentrum* has to change the education plan.

So it's private, not run by the government?

H: Both, I think.

Government employees are in charge?

S: It's called *überbetrieblich* [many companies together]. It's not run by one company, but it's for all companies in the county.

H: I think it's run by the guild, the *Handwerkskammer*.

So, the system is run by people in the business, who have decided among themselves to impose these restrictions on themselves. The guild has some governing authority?

H: They only decide how to do it. It's called a dual education system. You learn in the company and in the *Zentrum*. That means it's half private and half run by the state. Every apprenticeship in every craft is run that way. This is how education works if you want to become a qualified carpenter.

Do you pay to go to the Zentrum?

H: The company pays you.

But you're just an apprentice of the company?

H: The company pays you, but the company gets money as well, so the money's going different ways.

S: The money is coming from the state to the companies. They share the cost.

The state pays for your apprenticeship, and then the company pays for you to work there? That's similar to the university system, where the state will pay you to go to school, a scholarship of sorts. Do you have a living allowance?

S: I think it depends on your personal ability to pay. If your parents don't have enough money, there are funds to sponsor you.

Are the guilds dedicated to a particular type of carpentry, such as timber framing?

H: There are two different types of guilds. There is the *Innung*, where companies in a certain area form the guild. Then there are guilds for journeymen. We call them *Schächte*.

S: There are certain organizations into which all journeymen are organized, differentiated by the region they originally came from.

Do they have an educational mission?

S: Yes. They give you certain rules of behavior. It's like a state within the state, with a different legal system. It has rules of conduct.

H: But they have many stupid rules.

S: The rules of conduct give security to the journeymen so they can have things that they can rely on. If one journeyman meets another on the road, it's like they're brother and sister. They are that close together. You're never alone. You treat each other well.

H: For example, in this one journeyman guild, there is a rule where you're not allowed within 50 km of your home place.

S: This is not a stupid rule.

H: No, that's not, but then if you meet someone who has been long on their journey, and you're just a rookie, you have to do everything for him. You have to clean his shoes, bring him beer, and if he tells you that you have to drink ten pints, you have to drink the ten pints, whether you want to or not.

S: That is a little stupid, yes.

H: If you don't do that, he'll find some other things to give you

some more pain. I knew some of them and they were all alcoholics. They do good work, but for the most part, the ones I know just drink. They start with 50 DM on their journey, and they have to end with 50 DM. They're not allowed to end with more money than they start with. These rules don't bring you any closer to being a better carpenter. You don't learn out of this.

S: There are certain rules that give you orientation or tasks in your life. One is you're not allowed to stay in the same place for more than six weeks. Therefore, you remain a foreigner during that time.

I think that's probably good. That's the whole idea.

S: You learn different styles of building, and you gather the best information.

The guilds for the profession, for the companies, are for what purpose? Again to establish a code of conduct?

H: No, they are more for business matters. The members talk about problems, do they have enough apprentices, enough work.

That's a trade organization, the idea being to promote business, help the business grow, to develop and maintain a good labor force?

H: What they do, but they're not supposed to do, is to talk about their area, what jobs may show up in the next few weeks, and they might say, "Okay, I have enough work. I don't need any of these projects that may show up in the next few weeks." Others say, "I do want this work," and they keep the price high for the projects. They keep the competition off and keep the price high.

This is illegal, or it certainly is in the US.

H: Yes, it's illegal. But they do this. But then one guy thinks, well, maybe I would like to have some more work, and knows that everyone else will have a high price [and underbids] and then gets the job. This isn't good. Then they're annoyed with each other.

That's not a guild.

H: No.

How was the quality of the education you received?

H: The program at the *Zentrum* is difficult because students with many different qualifications meet at one place, because of the different styles and sizes of companies they come from and the different work they do. They all have to do the same thing, build the same model. And faster students have to wait for slower students.

S: Or help them.

H: They always wait for the slowest students in class.

S: You have to build a house, and when you finish you have to wait until the next project comes along. You wait for the slowest.

This may be a week or a day?

H: It could take a few more days.

So there is pressure on the slow students?

H: Well, no, not pressure. In my class we were done very soon and then we had to wait. We asked if we could do some more work. We were told no, that would not be good because the class has to be one unit, just as if we were one company and good friends. That was difficult. Good students don't want to wait, they want to work and learn.
S: That's a little different from my *Zentrum*. The master didn't wait too long. If someone didn't finish, he had to come back.

Come back and do the whole thing again?
S: Yes, or there are two or three advance weeks each year where people who were ill and missed these classes or didn't do their work could come in and finish.
H: In France they have three different classes. They select the students and split them into groups. The high quality students have practical courses in the day, and in the evening they have theoretical courses at this *Zentrum*. I think that system, for highly motivated people, is better.
S: It was a good chance for us here in Braunschweig because we were four or five people who were faster than the others and they gave us a chance to work faster.

Is that why you were able to finish in a year and a half?
S: Yes. We all had our final examination a half-year before the other people.

You're at the school two days a week, or five days a week for 14 weeks, or what?
S: It's different from Helmut's school. We didn't have an A week and a B week. We were in the classroom for two days each week, for 12 weeks in one year. Then for 30 weeks we were at the company full time. The last ten weeks were practical training, not classroom lessons, at the *Berufsbildungszentrum [trade development center]*.

It's normal at a Berufschule *to have the carpenter's component?*
H: These classes are smaller, perhaps 20 students, and you study mechanical systems, math, political science, language training in German, religion if you want to, sport if you want to and building construction. Because carpenters do the formwork for concrete, we had courses in building reinforced concrete things and how to build forms. Then, if the teacher was motivated, we talked about deerhunting and vacations. This was very interesting.
S: We did not have that.

So after your apprenticeship, typically two years, you take the journey if you're to continue?
H: Traditionally, yes.

It's not required?
S: No. And not everybody does it. I'd say most people don't do it.
H: It's like students after their studies go on a long break.

Can you reach the master carpenter level

without having been a journeyman?
S: Yes. It's not required to be a journeyman to be a master. But you have to work for three years before you can start your master's.
H: If you finish your apprenticeship very well, you can do the class for the master's in two years or something like that. It depends. They want the students to have enough practical experience.

After the two or three years of practical experience, what does a person do to become a master carpenter?
H: I think there are different ways to become a master. The class in Kassel [a city in northern Hessen] is a full-time school for one year. You have courses five days a week, or sometimes six days a week, the full day. You have to work at home. You first have theoretical education, and then practical. You do more complex buildings. For instance, in southern Germany there are churches where the towers are circular, like an onion. You learn how to connect an onion into a normal roof.
S: In addition they are educated in accounting and business administration in order to run a company themselves.
H: They have building construction courses, structural analysis, and in Hessen a master is allowed to design a house, a one-family home, all on his own and run the job.

He can act as the general contractor?
H: Yes, he can do all these things, he can do the structural design even for a brick building. I think the maximum height for these buildings is 7 or 11 meters.

Are there other trades that have a standard dress like the carpenters?
S: Almost every craftsman on site has it. The roof makers have the same [as the carpenters], except for the belt buckle.

Do you mean the people who finish the roof, put the shingles on?
S: Yes. Then you have the bricklayers. They have a gray uniform. Painters are in white. *Tischlers* [cabinetmakers] have brown.
H: The colors of the carpenter's uniform are also important. Black means you're high socially.White means you're clean in spirit. The carpenter in the town was even higher than the local pastor. He could think in three dimensions. These colors, black and white, mean he is an honorable person, clean, and takes care of himself. Carpenters are very proud of this tradition. They are very strong people, intelligent, they have muscles, they do not care about the weather. They're *"the man!"*

Who does the finish carpentry, the Tischler *or the* Zimmermann?
H: The *Zimmermann* does the finish carpentry. He puts in the windows, hangs the doors and the gypsum board.
S: This is also a degree that is earned after the second year. It's called *Innenaus-*

baufacharbeiter [interior finish laborer]. So if you stop then, you're not a qualified carpenter, but a qualified finish carpenter. I think this isn't traditional, but it was initiated by the government for the apprentice system so that you have a degree even if you don't finish the whole thing.

H: In Germany everybody needs to be a qualified person. If you're highly educated and unemployed, it's very difficult to get work, even if there are jobs that you're interested in doing. The *Arbeitsamt* [government employment office] tells you that you aren't allowed to do this work because you're overeducated.

With an engineering degree you would not be permitted to work as a carpenter?

S: You can start your own business, but it's hard to find a job at another company if you're overeducated.

H: If I'm unemployed, I'm not allowed to push the wheelbarrow at the site.

But can you pick up a hammer and saw because you're a carpenter?

H: No, an engineer would not be employed to work as a carpenter.

So, you're both apprentice carpenters. What does that mean in terms of your ability to get a job as an engineer?

H: It's an advantage because you know what you're talking about, you know how to make the things you're building into reality.

And employers recognize that?

S: Yes. There's even different payment. Usually the companies pay more if you've done an apprenticeship. You're more qualified.

Okay, so there's the motivation. I think we're back where we started.

S: This could be one motivation. If you don't know what to study and you do an apprenticeship first, it's always good in the end. You have another basis for choice.

H: Once, Mr. Kessel [my colleague and host at Braunschweig] brought in an oak peg and gave it to the students. In some faces you could see confusion. They were thinking, "What's that? What's the use of that?" Then they gave it to me and I said, "That's an oak peg." A student asked me how I knew. I said, "Well, I see it! If it's fresh cut, I can smell it." He didn't believe I knew it was oak.

S: The biggest problem they have here [at the university]is to understand what they're doing. Even the names of the things are completely new. If you work on site and someone points to something and tells you it's a rafter, you know what its function is and what it means to make one.

H: The student in Mr. Kessel's class asked me what a knee brace was and what it was for. In Kessel's class the students are well educated and should know many things. But they don't always know the practical things.

S: If you don't start from scratch with a subject, you can't build up from the basics. The practical is missing from the university. That's why you're supposed to do an internship. [But] internship is a waste of time because you're not allowed to do anything. The only way to get real practical experience is to do an apprenticeship.

H: That's important. You should know what you're doing.

You told me the carpenter's uniform was not just for style. There are also practical advantages. You have the corduroy trousers that keep slivers out, the vest you can use as a back brace, bell bottoms to keep the dust out of your shoes and pockets everywhere to hold your tools. What else?

S: The wide-brimmed hat against the weather. Not only against the weather, but also protection against hitting your head against the beams, a little bit of padding.

H: The gold earring is also a part of the uniform. Because a carpenter was in a high position in society, the earring was golden. It made sure that if this person died, he would have a proper burial, which could be paid for with the earring. It also showed that he was a craftsman. If someone did bad work, people would rip the ring out of his ear and he would have this gap. We call it *Schlitzohr* [splitear]. Even today, if someone calls you *Schlitzohr*, it means you're doing bad work, you're cheating.

S: If you had a splitear, you would never get a job. So you had to become a criminal.

How long ago was this?

H: I don't know, in the Middle Ages, maybe 14-15-1600s. If you went into a new town, no one knew you. But they could see if you had the gold earring, you were okay. If you had a gap in your ear, everyone knew you were a cheat.

S: If you had your earring and you were a good craftsman, you could go into any town, go up to the mayor, and [recite] a certain saying that told him, "I am a carpenter, I am a good craftsman." The mayor would tell you where to go to find something to eat, a place to sleep and some work.

Do you know that saying? Do you have it written down somewhere?

S: It's a secret. If you're not a journeyman, you're not supposed to know it. It's like money. But it starts like this:

Mit Gunst und Verlaub so frag ich an,
Gönnt Red' und Wort dem Zimmermann.

This means:

With favor and permission, so I inquire,
Respond to the request of the carpenter.

You have to start your journey before you learn the rest of the saying.—DICK SCHMIDT

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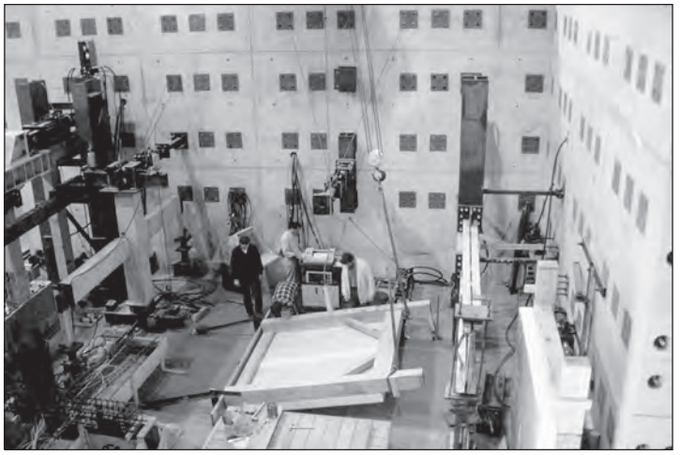

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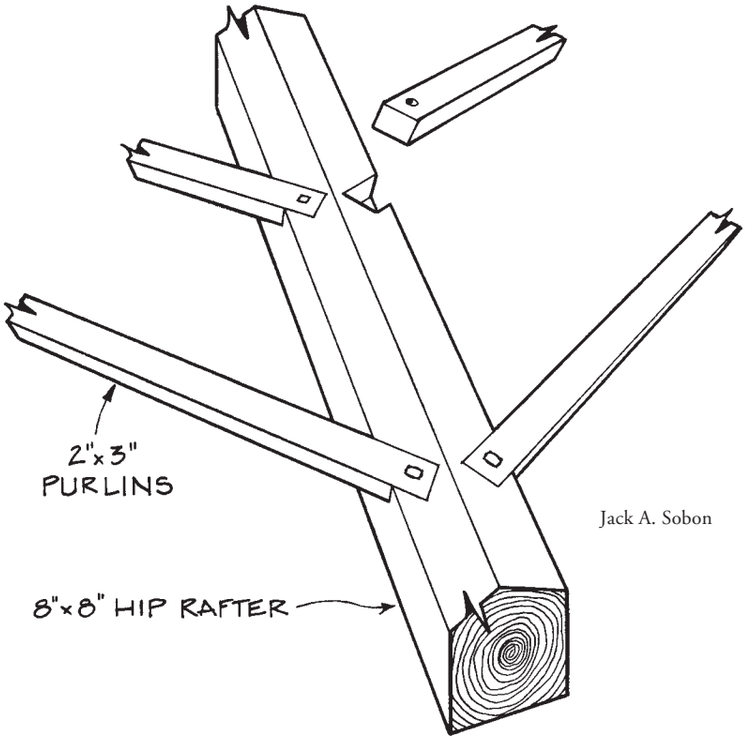
Below, plate end showing step-lap rafter seat with peg to secure absent rafter, Windsor, Massachusetts, early 1800s. At right, configuration of common purlins in 18th-century hipped-roof meeting house, Pownal, Vermont. Below right, an unusual European-style rafter foot found in a stone barn in Oley (Berks County), Pennsylvania. Rafters are seated in short beams notched over the plate and forged straps secure the connection. *See page 6.*



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