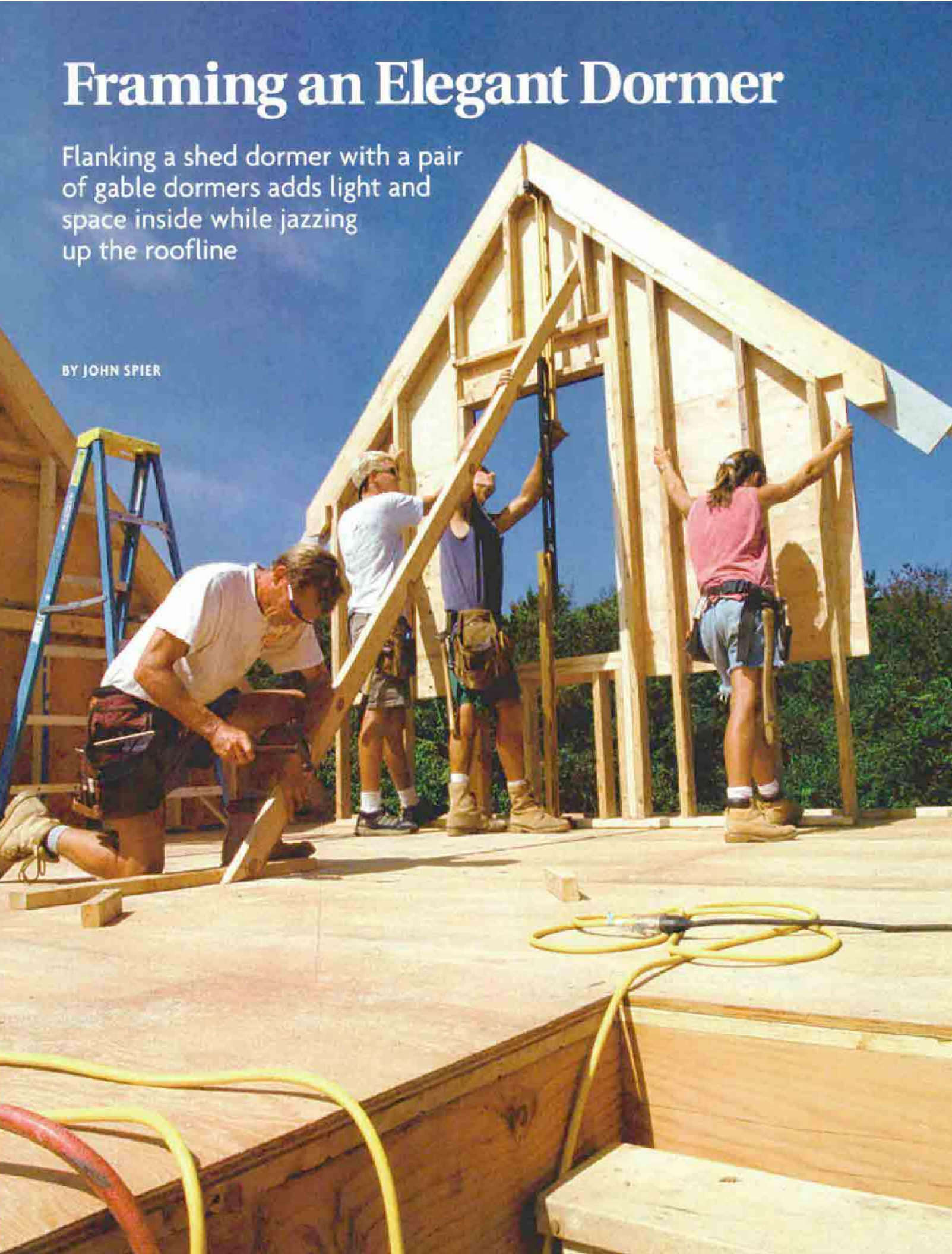
Framing an Elegant Dormer

Flanking a shed dormer with a pair of gable dormers adds light and space inside while jazzing up the roofline

BY JOHN SPIER



Hybrid dormer. Doghouse dormers create more room and larger egress for the bedrooms at the ends of this house, while the shed room in between creates a space for a full bath. The doghouse-dormer wall is plumbed and braced in place (photo facing page).

Some years ago, my wife, Kerri, and I built a small Cape-style house for ourselves on Block Island, Rhode Island, where we live and work. Most small Capes have essentially the same upstairs plan: a central stairwell and a bathroom at the head of the stairs with bedrooms on each side. Dormers provide the headroom to make these upstairs spaces usable.

The most common arrangement is probably a doghouse, or gable, dormer in each of the bedrooms, with a larger dormer on the other side for the bathroom. Another alternative is a shed dormer over all three spaces, but we weren't too keen on that look. Then at some point, one of us found a picture of a dormer that was essentially two doghouse dormers connected by a shed dormer.

This design would give us as much interior space as a shed dormer, and it was a lot nicer-looking. Of course, we argued over the choice at great length. Kerri, the artist, insisted on the beauty and complication of this hybrid dormer (photo above), while I, the practical carpenter, thought about how much easier and faster a basic shed dormer would be. I never had a chance of winning that argument.

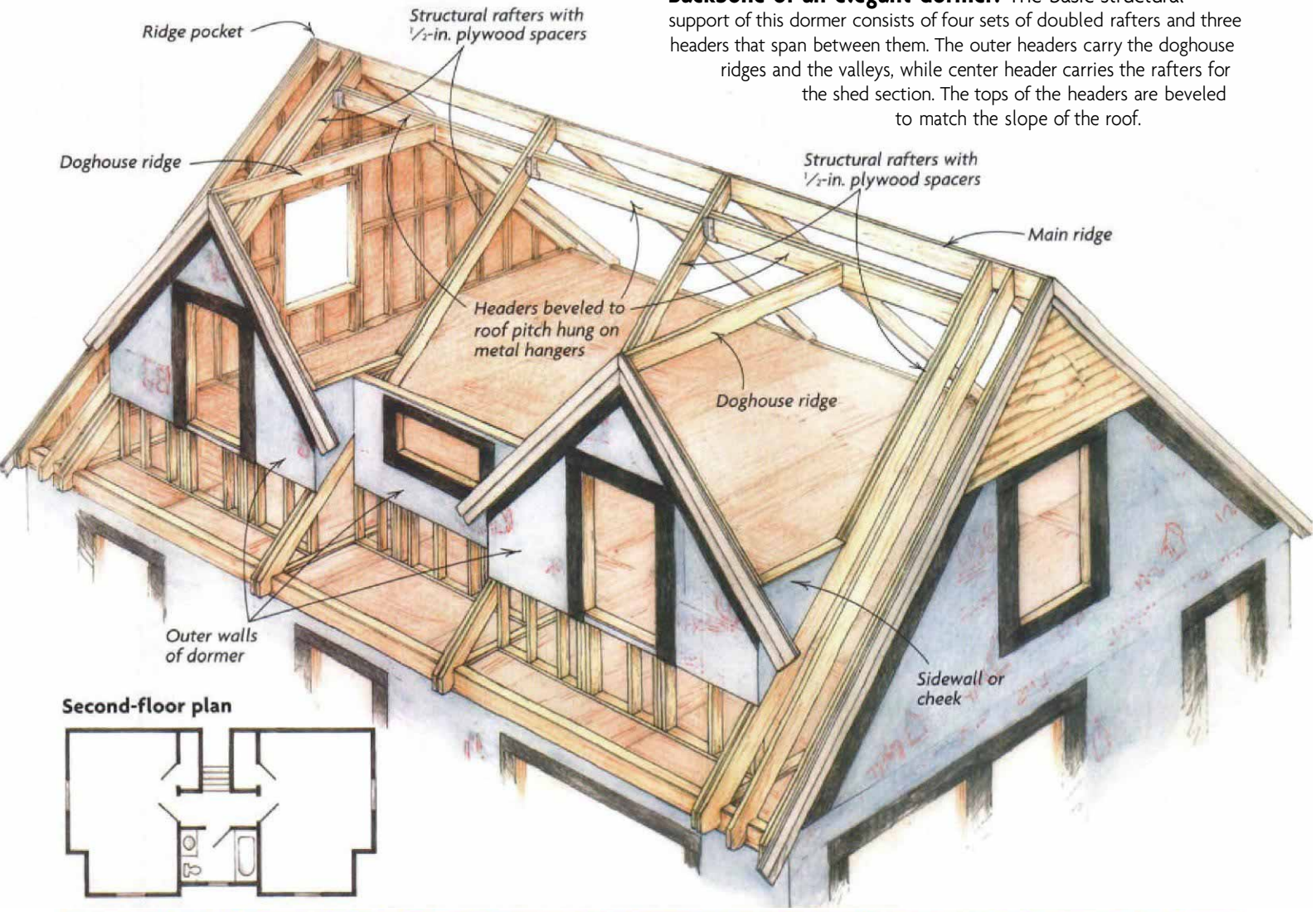
As our dormer took shape, an old-timer on the island told us that what we were building was called a Nantucket dormer. The name stuck, and we use it to describe the several different variations that we've built since, including the project in this article. (For more examples of these dormers, see "Finishing Touches," pp. 114-115.) Ironically, the history experts on Nantucket island disavow any connection to the name, claiming that the design has no historical precedent.

Two different strategies for two different interiors

Even though its design seems to be two dormers connected by a third, the Nantucket dormer is actually built as a single structure. The front wall can be a single plane, or its center section can be recessed. The project in this article has the center section stepped back, a look that I've come to prefer. As with most dormers, I think Nantucket dormers look better if the walls are set back from the ends and edges of the main roof and from the plane of the walls below.

I frame Nantucket dormers two different ways to produce two distinctively different

Backbone of an elegant dormer. The basic structural support of this dormer consists of four sets of doubled rafters and three headers that span between them. The outer headers carry the doghouse ridges and the valleys, while center header carries the rafters for the shed section. The tops of the headers are beveled to match the slope of the roof.



Laying out the ridge. To get the rafter layout to match precisely, the layout on the plates is transferred directly to the ridge stock.

Drawings: Christopher Clapp

Doghouse ridge drops in. The doghouse ridge connects the outer wall of the doghouse dormer to the header.

interiors. The difference, roughly speaking, is that one method uses structural rafters and the other uses structural valleys.

Framing the dormers with structural valleys allows the interior partitions to be eliminated, creating one big open room with interesting angular ceiling planes (see photo bottom right, p. 115). For the project in this article, however, we used the structural-rafter method to create the more common floor plan with two bedrooms and a bath.

The key element in supporting a Nantucket-dormer design is that it is point-loaded, either at the bases of the valleys or at the bottoms of the carrying rafters. Those loads need to be carried by appropriate floor or wall structures below. The same frame that supports the uniform load of a shed dormer might not carry the point loads of a Nantucket dormer. If you have any doubts at all, it's a good idea to have a structural engineer evaluate the support structure.

Doghouse walls go up first

After the main gables of the house are raised and braced, we lay out the locations of the main roof rafters on the top of the main wall plates. We also locate and snap lines for the outside walls of the doghouses and the shed on the second-floor deck.

The first things that we build are the two doghouse gables. We use the same process that we used for building and raising the main gables, only in a smaller scale (see *FHB* #122, pp. 88-93). Just as with the main gables, the walls are framed, sheathed, housewrapped and trimmed before they are lifted and braced plumb (photo p. *62).*

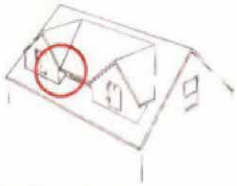
Next, we turn our attention to the main ridge of the house. Temporary scaffolding or pipe staging is set up down the middle of the house to work from while the ridge is set. We place the ridge boards (in this case, 2xl2s) on top of the plates and transfer the rafter layout directly from plate to ridge (photo facing page).

The ridge boards are set in their pockets and held up with temporary posts and a few common rafters, which help to keep them straight and level.

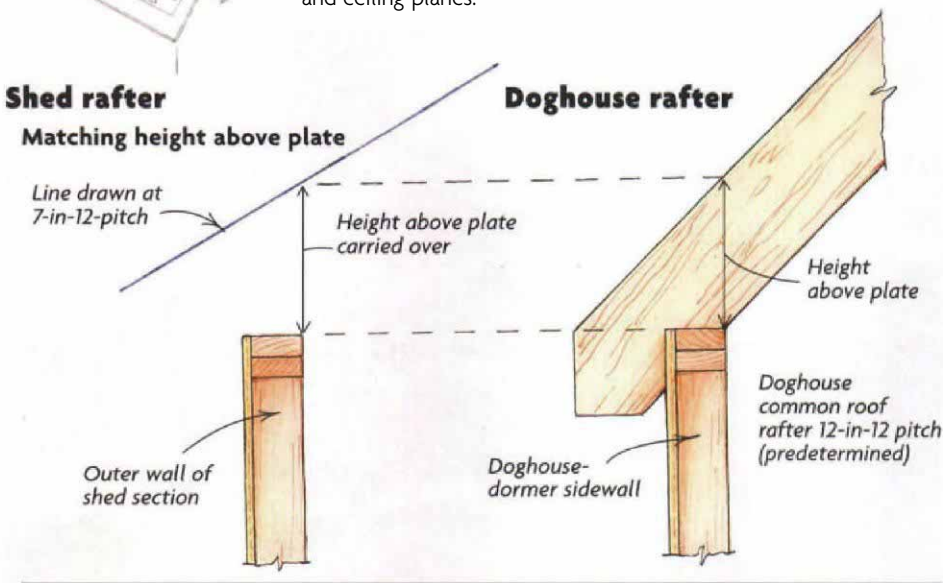
Structural rafters and headers form the backbone of the dormer roof

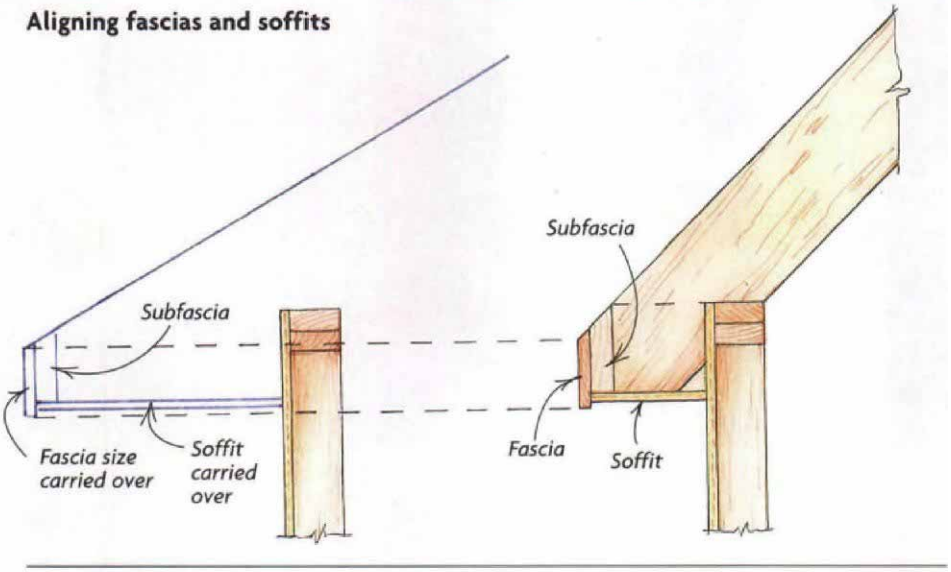
With the ridge in place, the structural rafters adjacent to the doghouse walls are installed. We doubled these rafters using ½-in. plywood spacers in between to create a total

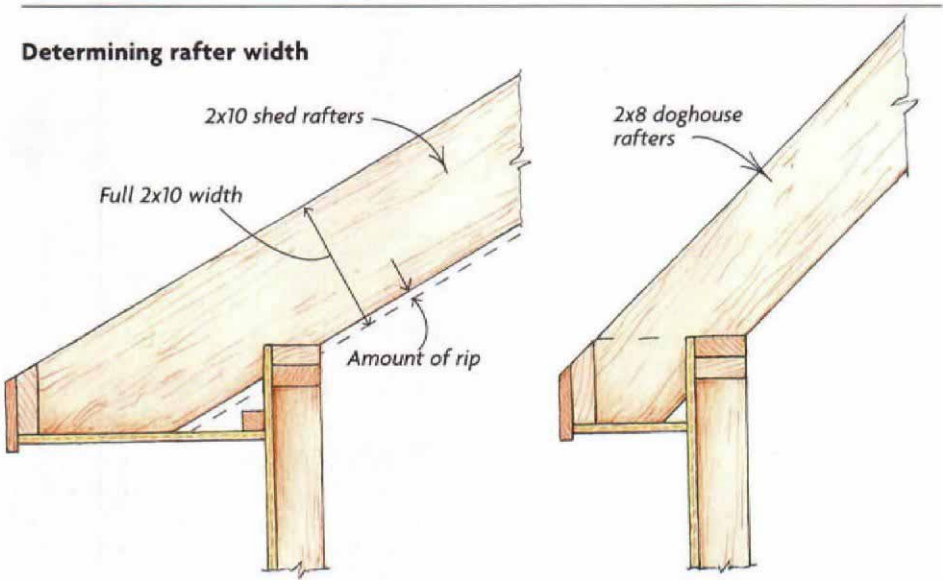
WORKING OUT THE DETAILS OF THE SHED RAFTERS



The rafters on the doghouse sections are 12-in-12 pitch, and the shed rafters are 7-in-12 pitch. A three-step drawing gets the fascias and soffits to line up, along with the roof and ceiling planes.

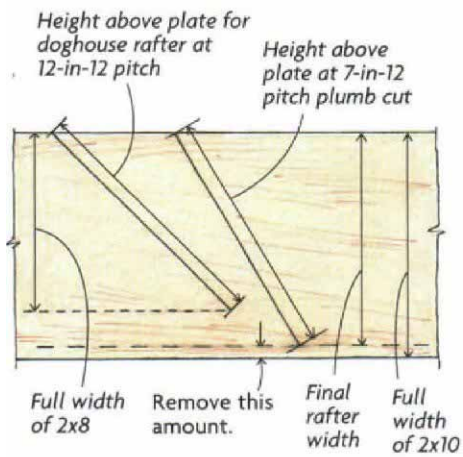






Finding the exact rip

Once the stock size of the shed rafters has been determined (in this case, 2x10), a simple procedure determines the final rafter width. First, the height-above-plate distance is measured for the 2x8 doghouse-dormer rafters. Next, that distance is transferred to a plumb-cut line at the shed-rafter pitch. That point marks the final width of the rafter.



thickness of 3½ in., which matches the width of wall plates for interior partitions below the doubled rafters. If you're building larger dormers, a triple rafter or a double LVL can be used.

The four sets of structural rafters split the main roof into three bays. Our next step is to hang doubled 2x12 headers in each of these bays. The tops of the headers are beveled to match the pitch of the rafters they hang from, and steel hangers hold the headers in place.

The two outside headers carry the valley rafters and the ridges of the doghouses. The center header holds the rafters of the shed section. Along with the structural rafters and the dormer walls, these headers form the backbone support for the dormer-roof structure (drawing p. 64).

While the headers are being built and installed, other crew members build and raise the front wall of the shed section. Next, we build and sheathe the triangular sidewalls, or cheeks, on the doghouses that support the common rafters for the two end sections. The doghouse ridges are dropped in next (photo p. 65), and their common rafters are cut and installed.

Lining up the roof planes and soffits

Until this point, all the framing has been fairly routine. But now we bump into the chief complication in framing the Nantucket dormer, the fact that the shed roof in the middle is at a different pitch from the gable roofs of the doghouse dormers on each side. In this case, the pitch of the main house roof and the doghouse roofs was 12-in-12, and the shed roof worked out to be 7-in-12.

Different roof pitches mean that the valleys where the roof pitches intersect are irregular (they don't run at a 45° angle in plan). It also means that the roof planes have to align and that the rafter tails have to be adjusted to get consistent fascia heights and soffit levels. So early on in the process, I work out the rafter details (drawing left, facing page). These elements can be worked out on the drawing board, but most often, I make a full-scale drawing of the trim details on either rafter stock or on a sheet of plywood. With this on-site drawing, I can design the rafter tails before I pick up a saw.

Another complication caused by the differing roof pitches is getting the planes of the cathedral ceiling inside to line up. Obviously, a 2x10 rafter meeting a valley at a 12-in-12 pitch will do so at a much different depth than one meeting it at a 7-in-12 pitch. The simplest approach to this problem is to increase the size of the framing material for

Measuring an irregular valley. The quickest way to figure out the irregular valley is to stretch a line from corner to corner. Here, a measurement is taken along that line.

Finding the plumb cut. A rafter square held in the corner against the string determines the angle of the valley plumb cuts.

Corner of the valley. Angles that are taken on each side of the string determine the corner cuts that are needed for the ends of the valley rafter.

Valley rafter slips into place. After all the angles have been cut into the valley rafters, including a bevel on the bottom edge where the ceiling planes intersect, the valleys are nailed in permanently.

Jack rafters complete the framing. With the valleys in place, jacks are cut and installed to finish the framing of the roof planes.

the shed-roof section. With dormer gables at the same pitch as the main roof, the vertical depth of the rafters at the plate can be measured. The central shed portion of the dormer has a shallower pitch, so it requires a larger rafter size to achieve the same vertical dimension. For this project, the doghouse rafters were made of 2x8s, but the shed-roof rafters had to be 2x10s. But for the roof planes outside and the ceiling planes inside to match up, the 2x10s had to be ripped down to around 9 in. (drawing right and photo, p. 66).

Valleys are strung and measured

Four years of architecture and engineering school taught me that it is possible to work out the framing details of an irregular valley using math and geometry. They even gave me the tools and education to do it. But 20 years as a carpenter have taught me that figuring out irregular valleys is faster and easier with a taut string.

After cutting and installing the common rafters and subfascia for both the doghouses and shed, I stretch a string from the corner where the subfascias meet up to the intersection of the header and the doghouse ridge. From this string, I measure the length of the valley rafters (top photo, p. 67) as well as the angles of the top and bottom plumb cuts (photo center left, p. 67), the seat-cut angle and the bevel angles I need to cut into the rafter ends (photo center right, p. 67), Armed with all this information, I cut a valley rafter and drop it into place. Then, using a straightedge from the commons on each side, I mark the bevel cuts on the bottom edge.

After cutting the bevels, I install the valley rafters permanently (bottom photo, p. 67) and then lay out and measure the jack rafters. The jack rafters in the center section usually have a compound cut where the miter is beyond the 45° or even 60° that most saws can cut.

If I have a lot of those cuts to make or if the framing is to going be left exposed, I make my cuts with a jig using either a handsaw or a reciprocating saw to make a clean, accurate cut. However, the typical dormer has only three or four jack rafters per side, so I mark the angles on the rafter stock and cut them with a circular saw as close as the saw allows. I carve out the remainder of the wood by slowly and carefully dragging the circular saw blade across the face of the cut. This operation is potentially dangerous, so if you're not comfortable with it, you can use one of the methods mentioned above.

The rest is plywood

While jacks are being cut and fit (photo above), other crew members fill in the cripple rafters that complete the main roof framing below the three dormer sections. The subfascia is applied to the main eaves, and we can start running the sheathing. Other than the fact that the various plywood shapes are somewhat irregular, sheathing proceeds in the usual fashion, working from the eaves up (photo facing page).

With the outside framed, sheathed and ready for roofing, we can turn our attention to the inside. The interior of a Nantucket dormer is usually finished with a cathedral ceiling, which helps the small second-story spaces to feel more spacious and airy.

Instead of applying the cathedral-ceiling finishes directly to the bottoms of the rafters, here in New England, we nail 1x3 strapping to the rafters, usually 12 in. or 16 in. o. c.

Strapping the ceilings of the Nantucket dormer not only simplifies board hanging, providing an extra measure of resistance to deflection and nail popping, but the strapping also helps to provide a smooth, easy transition between the various ceiling planes. To this end, I usually supplement the strapping by running 1x6 or 1x4 on the undersides of the valley rafters where the roof planes intersect. □

John Spier and his wife, Kerri, have a general-contracting and renovation business on Block Island, Rhode Island, Photos by Roe A. Osborn.

Skinning the dormer. When the framing is complete, the sheathing is applied, bringing out the final dramatic shape of the Nantucket dormer.