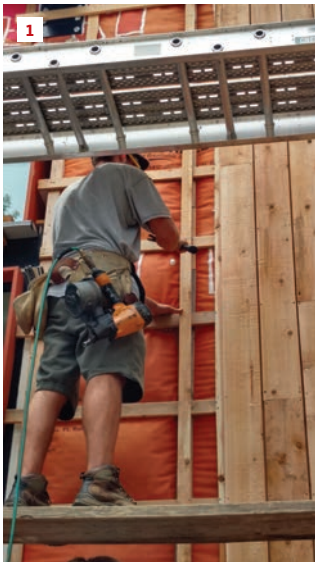
Reverse Board-And-Batten Siding

BY TED CUSHMAN

Since last fall, *JLC* has been following the work on a unique architect-designed custom home on Peaks Island, an off-shore neighborhood in the Portland, Maine, harbor. The building's unconventional form and its ambitious high-performance energy goals have posed one challenge after another for lead carpenter Mark Pollard and his crew at Thompson Johnson Woodworks. This month, we take a look at the home's "reverse board-and-batten" exterior, hand-crafted from locally milled 1x6 rough-sawn white cedar.



Photos by Mark Pollard

For a reverse board-and-batten cladding, the thin battens are nailed onto the wall first, and the wider boards are nailed over them, so the battens are behind the gaps **(1, 2)**. The method creates an ample space between the siding and the weather resistive barrier, for enhanced drying ability—a significant concern in this deep, superinsulated wall assembly **(3)**.

PERFORMANCE—AND LOOKS

Unlike conventional board-and-batten siding—where boards are fastened directly to the wall, and battens are nailed over the gap between the boards—with this technique, the narrow battens are applied first, and the wide boards are nailed on second.

"We were hashing out ideas in a design meeting with the architects [Portland-based Kaplan Thompson Architects], talking about types of siding," Pollard explains. "First it was vertical shiplap, then it was regular board and batten, and finally we decided on reverse board and batten because of the extra airflow that it would provide behind the siding."

By holding the wide boards an inch away from the wall, the battens would create air space behind the boards to help keep them dry and stable through seasonal weather changes. But Pollard adds, "The architects immediately liked the way the reverse method would create a little, 5/16-inch visual gap between the board edges, for shadow lines."

LAYOUT AND FASTENING

Right off the bat, however, the building's high-performance wall system created complications for the siding application. The fat assembly consists of an inner 2x4 stud wall that's sheathed with Huber Zip System oriented strand board (OSB) sealed at the joints with Zip tape. Outboard of this airtight box are fastened vertically run wood I-joists, with airtight, vapor-open WrapShield IT weather-resistive barrier membrane (vaproshield.com) stapled over the I-joists to create

cavities for dense-blown cellulose insulation.

The original idea was to apply horizontal 1x3 strapping over the WrapShield and nail the vertical battens and boards to the strapping. Unfortunately, however, horizontal strapping couldn't contain the insulation. In an early test on a dormer cheek, says Pollard, the insulation blower popped all the staples and blew the membrane off the I-joists, forcing the fiber into adjacent bays and pillowing out the wall surface. So the team had to backtrack and nail a vertical 1x3 over each I-joist to firmly secure the membrane to the wall, then attach the horizontal strapping over the vertical strapping, creating the grid shown here. "The horizontal strapping is really just there for nailing for the siding," says Pollard, "but combined with the vertical strapping, it did help create a bigger air gap for drainability and drying."

With that problem solved, nailing the siding in place was relatively straightforward. But there were a few time-consuming wrinkles, says Pollard. "We made a story pole for layout," he explains. "And where we had multiple windows in a run of wall, we didn't want to end up with a skinny little 1/2-inch piece of the 1x6 running down the side of a window. We were always trying to shoot for at least one-third of a board next to the window jambs. So in some places we had to thin down five or six courses from roughly 6 inches to 5 3/4 inches, to try to grow that last board that would land against the window. Kind of like you might do with clapboards or shingles—you adjust so you can hit the tops and bottoms of the windows. But we were doing it with the sides of the windows."

VARIABLE MATERIAL

Thickness of the boards also turned out to be an issue, Pollard says. "The lumber company milled this wood at an inch and a quarter," he explains, "but the pieces shrank differently. We had some that shrank down to 1 3/16 inches, and some that shrank down to an inch, depending on whether the piece was vertical grain, rift sawn, or plain sawn." The reverse battens were ripped from the same 1x6 material, says Pollard—"so you had to be careful which reverse battens you put next to each other, because you could kick the 1x6 pretty heavily at an angle, if you weren't paying attention." Tall walls compounded the thickness problem, says Pollard: "We had to pay attention to the thickness of the battens and the thickness of the boards as we stacked them on top of each other."

"The work went more slowly than we expected because of all the nailing," adds Pollard. "Each reverse batten gets one nail per course of horizontal 1x3, and we alternated sides as we went up. And then when you nail the 1x6 on, it's two nails every 16 inches, all the way up the wall—and you have to be careful, because you want

At window heads, the crew applied pre-bent flashing, supplied by the roofing company and made with the same heavy-gauge steel as the roof **(4)**. Nylon insect screening and Roof Saver ridge-vent material were installed between the vertical battens (behind the horizonal batten) **(5)** to protect the air inlet from bugs. Then the screen was wrapped around and stapled to the horizontal batten **(6)**.

those nails to visually line up. I bought 70,000 stainless steel ring-shank siding nails, and we used just over 50,000 by the time we were halfway done. It's a shocking amount of nailing."

DETAILING THE OPENINGS

The rainscreen system requires a way for any wind-blown rain that penetrates behind the siding to drain out, and for air to enter at the bottom and exit at the top for drying. Openings have to allow good airflow and drainage, but without letting bugs in. This makes for a complicated detail above windows and penetrations. The roofing company had supplied some pre-bent coated steel flashing, says Pollard: "We used the steel roofing material, and it was too heavy for our brake to handle." But Pollard did site-bend the ends of the flashing pieces after cutting them to length.

To flash above windows (see photos, page 18), the crew taped each piece of flashing to the WrapShield membrane, then caulked the tape joint for good measure. Then they applied insect screen to the wall and nailed the vertical strapping over the screening. Next they placed a piece of Roof Saver ridge-vent material, cut to fit, between the battens, then installed a piece of horizontal strapping over the Roof Saver, and finally folded the screen material under the opening and up onto the horizontal batten. The result is a screen-protected drain opening and air inlet behind the horizontal strapping.

This still leaves another air opening to protect behind the full-width boards, between the reverse battens (right). At this gap, Pollard decided not to use screening, which might be visible through the small gap between boards. So the crew nailed small pieces of Roof Saver into the gaps, sized so that the material would get slightly compressed as the boards were nailed on.

None of these details, notes Pollard, were drawn on the architectural plans. But early on in the project, Pollard and his carpenters built a full-scale mockup of the whole wall assembly using the actual materials. The model included the floor-to-roof and roof-to-wall structural connections, and as the job progressed, the crew added siding details to the mockup.

CONNECTING TO THE SITE

As the project nears completion, the cladding system is serving an interesting design function: The rough material, applied in its distinctive way, is helping the building with its strikingly original forms to blend into its rustic setting on a back road on a wooded island. "At this point," says Pollard, "we can step back and look at it, and we're thinking, 'this is pretty cool.'"

Ted Cushman is a senior editor at JLC.

The reverse board-and-batten method creates a substantial air space behind the wood siding, allowing excellent seasonal drying potential. Air inlets behind the horizontal strapping are protected with screening. Gaps between the strapping are protected using Roof Saver vent material, but no screening **(7, 8)**, in order to keep screens from being visible at the spaces between boards.

Fast Jack Rafter Layout and Cutting

BY DALE DIAMOND

Having been a builder for 45 years, I've learned a number of helpful framing tricks along the way. One such trick is a technique for framing hip roofs quickly—mainly, streamlining the process of laying out and cutting the jack rafters. My guess is that quite a few carpenters out there measure and install jack rafters individually after the hip rafters are placed. This is time-consuming and unnecessary. The following method will help increase your installation speed and reduce the amount of cutting and material waste when you are making jacks for a standard hip roof.

There are a couple of things to note up front. For one, you need to lay out the jack rafters on the plate at their proper centers so that you can determine their lengths ahead of time. You also need to verify the common-rafter length (I typically cut a couple of test commons and set them in place to make sure they fit). Once I've established the common rafter's length, I can set up a site bench and cut all the jacks and commons on the ground without a lot of measuring and head scratching.

Using a pattern made from a common rafter, I can quickly lay out all the jacks on my rafter stock. I trace and cut the birdsmouths and rafter tails on both ends of the rafter stock all at one time (see photo, top left). Then I make the hip plumb cuts, where one cut results in two jack rafters (see photo, center left). This system works whether you're building a small hip roof, like this one, or a monster roof with 40-foot-long hips and valleys.

A pool-house renovation I recently worked on gave me the opportunity to demonstrate this method on a small scale. My company added a second floor and hip roof to an existing one-story pool house. The hip roof is framed with 2x6 common and jack rafters on 16-inch centers and with 2x8 hips and ridge (see photo, bottom left). Starting out, I needed to adjust the run and length of the common rafters based on the thickness of the ridge (see illustrations on page 24). From there, we laid out and marked the rafter stock (see illustrations on pages 26 and 28).

Cutting the jacks. With the first group of 2x6s marked (one group includes enough material to frame one corner of the hip roof), we repeated the process on the remaining three groups, after which I was ready to cut all my stock. I lined up the 20 2x6s on my site bench

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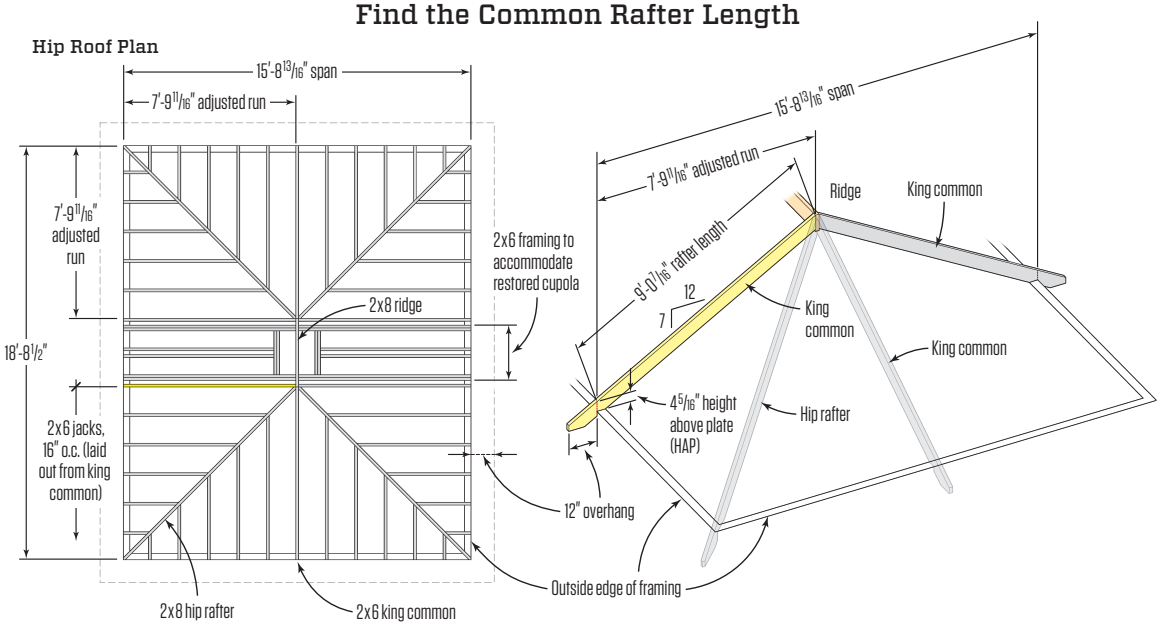
Photos and illustrations by Tim Healey

Find the Common Rafter Length



Determine Adjusted Run

15'-8 13/16" (span) – 1 1/2" (ridge thickness) = 15'-7 5/16" (adjusted overall run)

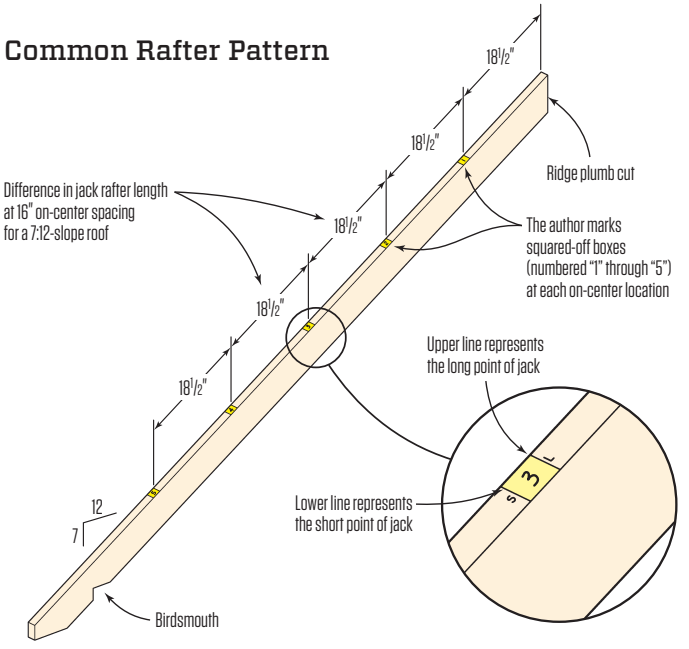
15'-7 5/16" ÷ 2 = 7'-9 11/16" (adjusted run)

Calculate the Common Rafter Length

On the Construction Master, punch in the following sequence:

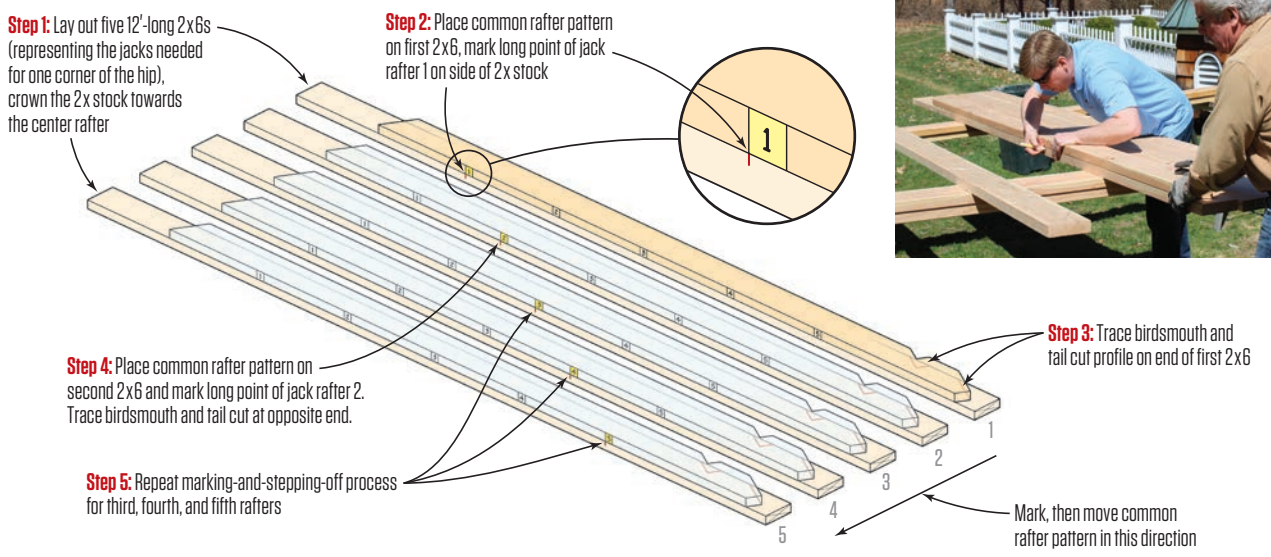
7 Feet 9 Inch 11 / 16 Run 7 Inch Pitch Diag = 9'-0 7/16" (rafter length)

Common Rafter Pattern



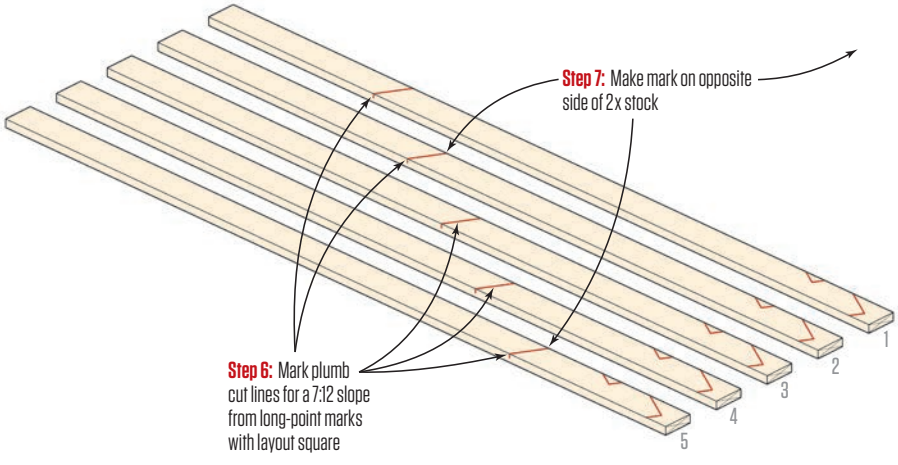
After finding the adjusted common rafter length (see calculations, above), the author marks and cuts the ridge, birdsmouth, and rafter tail on a 12'-long 2x6 for his rafter pattern. Using the scale on a framing square, he finds that the difference in length between 16"-o.c. jacks for a 7:12-slope roof is 18 1/2". Starting at the lower end of the rafter, he marks 18 1/2" centers—18 1/2", 37", 55 1/2", and so on—along one edge of the pattern rafter. At each measurement, he marks the long and short points for the jacks (see inset, left), and then numbers each layout "1" through "5," for the five jacks that will make up one side of a corner of this hip roof.

Mark 2x6 Stock With Rafter Pattern

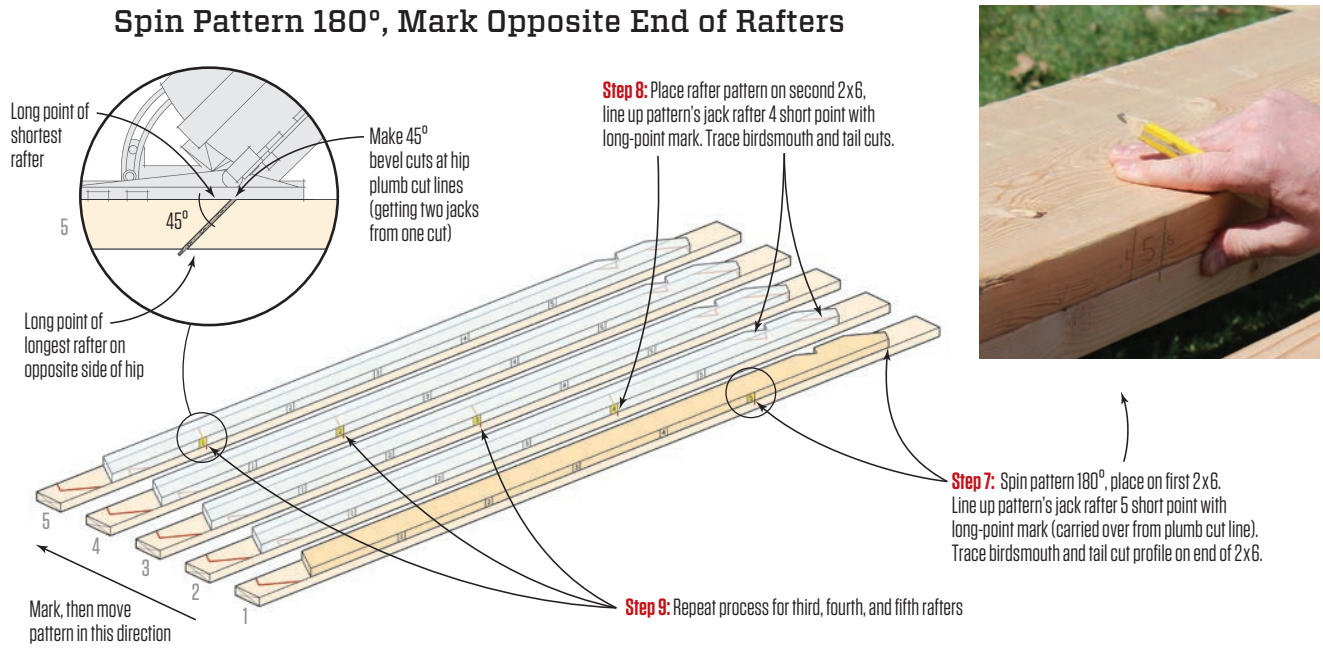


The author and his son, Kyle, then lay out five 2x6s for the jacks for one corner of the hip. To minimize any bow in the rafters, they face the crowns of the stock towards the middle 2x6, the center rafter being the straightest one. Using the rafter pattern on the first piece of 2-by stock, Kyle marks the long point for the first jack rafter, while the author marks the birdsmouth and rafter tail. Moving down the line, they mark the remaining rafters: long point "2" on the second 2x6; long point "3" on the third, and so on. In the photo, Kyle Diamond marks long point "4" on the fourth 2-by, while the author traces the birdsmouth and tail cuts.

Mark Plumb Cut Lines



Holding a layout square at a 7:12 angle, the author draws lines representing the long-point plumb cuts where the jacks will meet the hip. He then carries those lines onto the opposite edge of the rafter stock to line up the rafter pattern for the next step of the layout process.



With the rafter pattern spun 180°, the team starts with the first 2x6 in the group. Kyle holds the pattern with the short point of jack rafter "5" aligned with the long-point mark carried over from the plumb cut line of jack rafter "1." The author then traces the birdsmouth and rafter tail on the opposite end of the stock. Working down the line of rafter stock, they line up and mark the remaining four rafters. With this method, each piece of stock yields two jack rafters with only one plumb cut needed for each pair.

(being careful to keep the four groups together) and cut all the birdsmouths and tails on one side, then on the opposite side. I made my 45° bevel cuts last, getting two jacks from one cut: From the first 2x6, I got the longest jack for one side of the hip and the shortest for the opposite side; from the second 2x6, the second-longest jack and the second-shortest, and so on, stacking the two sides of the hip in two separate piles.

If you have a crew, they can be setting the ridge and hip rafters while a guy down on the bench (in this case, me) is preparing jack rafters and supplying them all their pieces to fill in the gaps. On big roofs, I typically show up on site a few days earlier and start cutting so when my guys are ready to frame the roof, they have plenty of commons and jacks ready to go (see photo, left). Finally, as a cautionary note, if you miss any of the steps I outlined in this article, you will be out of luck. My advice is to start out on a small roof to get the hang of it. My hope is you'll find this fairly simple technique saves you a ton of time—and money—framing hips.

Dale Diamond is a partner with his son, Kyle, in New Dimension Construction, in Millbrook, N.Y.