



Crew member Garrett DeBlois takes a prybar to the 22-year-old asphalt roof shingles, which had begun to leak.

Restoring the
dormers and
wood roof of
a 118-year-
old house

PEAK PERFORMANCE

Check out
www.thisoldhouse.org
for more on the roofing materials
and dormers at the Manchester
project, including archived
photos of the transformation.

LAST APRIL, WHEN THE CREW FROM *THIS OLD HOUSE* STARTED WORK on David and Janet McCue's house in Manchester, Massachusetts, the roof was covered with thick, brown asphalt shingles from the late 1970s. "From the ground, they looked okay," says *TOH* general contractor Tom Silva. "But when you got up close, you could see they were shot." Some had cupped or chipped, much of their protective granular coating had eroded, and water stains were showing up inside—

all signs that it was time for new roofing. There was no question in the McCues' minds that the replacement material would be wood. A desire for historical authenticity influenced their choice—early photos of the 1883 house showed cedar shingles covering the roof—as did their love of the look of wood. "A wood-shingle roof has such a wonderful texture," Janet says. Those old black-and-white pictures also showed that the profile of the original roofline was nothing like the



Chris Hastings fits a 2x12 IVL next to a roof rafter to shore up the framing on the side of the dormer opening. Three shed dormers on the back of the house will replace five late-1970s skylights.

flat, skylight-dotted expanse in place before this renovation started. “There used to be three wide shed dormers on the back, and two smaller ‘swept-roof’ dormers on the front,” says the project’s architect, Stephen Holt. After consulting with Holt and Tom, Janet and David agreed to reconstruct all five elements in their original locations, not only to break up the otherwise planar look of the top of the house, but also to bring more natural light and headroom to the third floor.

So, armed only with the pictures and a few clues left in the old roof framing, Tom and his crew set out to recreate these pieces of the house’s past using some much improved 21st-century materials. “The old dormers and the wood shingles had been taken off because they leaked—we could see water stains and the old rotting rafters on the inside of the roof sheathing,” says Tom. “This time, we’ll use a combination of rubber, metal, and wood. That ought to keep the weather out.”

FRAMING THE DORMERS

By all appearances, a simple shed dormer doesn’t look like much of a building challenge. But Tom says, “There are quite a few things to juggle when you plan how to build one.” He first considers the slope of its flat roof. “You need at least a four pitch; otherwise there’s the danger of rain blowing under the shingles.” (A four-pitch roof rises 4 inches for every foot it covers horizontally; Tom ended up with one that rises 4½ inches per foot.) Next he takes into account the height of the window and its distance from the floor. The taller the window, the longer the dormer has to be in order to maintain the minimum roof pitch. And the longer a dormer, the closer the windows come to the eave, and to the floor. In this case, Tom decided to leave the sill of each dormer’s window where the old framing indicated it had originally been. That determined the dormer’s length and, by extension, the window’s height. With a little tweaking of Holt’s design, he made the opening just big enough to accommo-

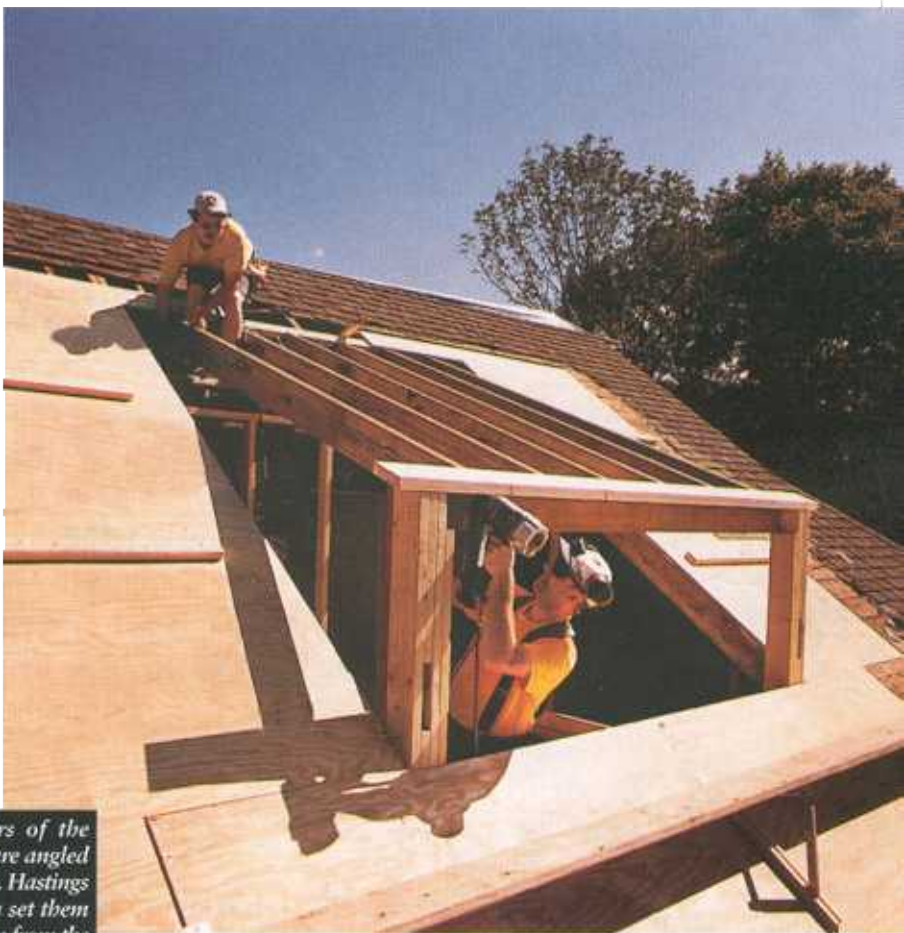
date standard-size awning windows. (Custom, made-to-match replicas of the original windows would have doubled the cost of the dormers.)

Framing a shed dormer is a reasonably straightforward exercise. First, Tom's crew scrapes away all the old shingles and tar paper from the sheathing in the vicinity. Then, with four snaps of a chalk line, Tom marks out the position of the dormer opening. He cuts through the roof sheathing with a circular saw and severs the rafters with a reciprocating saw. To preserve the roof's structural integrity and support the dormer around this opening, he adds doubled headers at the upper and lower edges and fastens additional, laminated veneer lumber (LVL) rafters to the common rafters that shore up the sides. (See "A Matter of Detail: Dormer Framing," page 78.) "Whenever you cut structure out of a roof, you've got to put it back somewhere else," Tom explains. Finally, he builds 2x6 stud walls for the dormer's sides—the cheeks—and hangs 2x6 LVL rafters from metal brackets on the window header. Hanging the rafters, instead of nailing them on top of the header, enables him to install a taller window without reducing the dormer's roof pitch.

APPLYING A WATERPROOF MEMBRANE

"If this house ever blew off its foundation in a storm and landed upside down in the harbor, it'd float like a boat," says roofer Mark Mulloy as he straddles the peak of the roof on a breezy September day. He's only half-joking. Every inch of the roof is cloaked in a wet-suit-black skin of waterproof bituminous membrane so sticky (on one side) that it seals itself around puncturing nails and welds itself together at overlapped seams. Many roofers lay the stretchy, 1/8-inch-thick material only along eaves to prevent ice dams, but Tom wants the extra insurance of total coverage. "Because we're so close to the ocean here, we get wind-blown, horizontal rain, which can penetrate under the shingles," he says. "But water can't get past this stuff, even with ten thousand roofing nails driven through it."

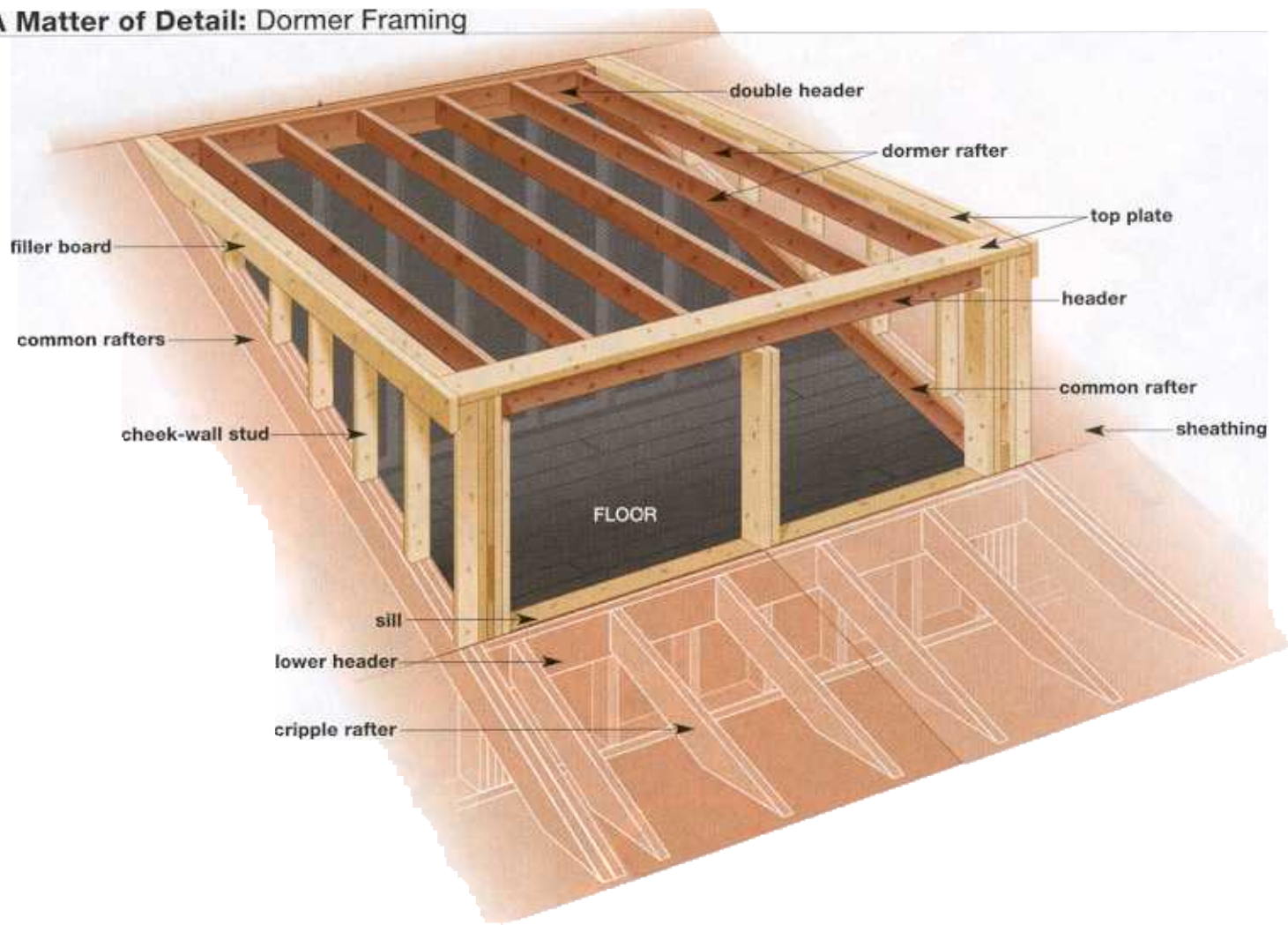
Tom had all the old board sheathing ripped off, then replaced it with sheets of 3/4-inch plywood so that Mulloy and his crew member, Jason Williams, would have a pristine surface for adhering the membrane's 3-foot-wide rolls. Starting at the eaves, Mulloy and Williams roll out a length of the material, strip off its protective plastic backing, and press it against the plywood, where it sticks like chewing gum to hair. The pair work their way up the roof, overlapping each row by 3 inches until they reach the ridge. Where the main roof meets a dormer's



ABOVE: The rafters of the shed-dormer roof are angled at about 20 degrees. Hastings and John Sheridan set them before hanging them from the window header and toenailing them to the upper header. **BELOW:** Once they have finished the framing, the pair sheath the roof and cheeks with 3/4-inch plywood.



A Matter of Detail: Dormer Framing



vertical wall, they fold the membrane at the corner and run it 8 to 10 inches up the wall. “Cheeks are notorious for leaking,” says Mulloy. “But anytime anything intersects or penetrates a roof, whether it’s a wall, a chimney, or a plumbing vent, you have to take special care. Using this membrane solves a lot of problems.”

As good as the material is at keeping out water, it does have an Achilles’ heel: sunlight. “UV rays will eventually break down the membrane if it’s exposed to sun,” says Mulloy. The shingles protect it from the sun on the wide, flat runs; metal flashing safeguards the edges and intersections.

LAYING WOOD SHINGLES

Ever since Manchester’s heyday in the 1880s, the town’s grand (and not-so-grand) houses have sported roofs and walls covered with red cedar shingles. Naturally durable and visually appealing, this material was the best barrier available against seaside weather. But even with regular maintenance, such roofs had a life expectancy of about 25 to 30 years, after which time the laborious and very expensive process of installing a new roof had to start anew. Given how adamant the McCues were about getting a new wood roof but how reluctant they were to regularly sweep it clean, Tom ordered bundles of shingles made from pressure-treated southern yellow pine (see “A Shingular Replacement,” page 80). This

no-maintenance product, 24 inches long and between 3 and 8 inches wide, is the same wood used for mudsills, decking, and below-ground framing. “The best thing about these shingles is their 50-year transferrable warranty,” says Tom.

The manufacturer says the shingles can be installed directly on top of sheathing, but Tom knows from experience that ventilating the underside of wood shingles allows them to dry faster and adds to their longevity. So he has Mulloy unroll and nail down over the entire roof membrane a ¼-inch-thick mat of loosely woven nylon. The coarse, open weave of the matting allows air to circulate up, down, and across the roof, so that any water that finds its way beneath the wood shingles will rapidly dissipate. Finally, the roof is ready for the pine’s installation.

Mulloy first tacks a 24-foot aluminum straightedge at the eave to serve as a guide for aligning the starter course. As fast as he can set the shingles side by side with the butt ends on the straightedge, Williams follows behind with a pneumatic gun, driving in 7d stainless-steel ring-shank nails, two to a shingle, 1 inch from each side and 8 inches up from the butts. To give the roof a beefy, more substantial edge, Mulloy fastens a second course directly on top of the first one, overlapping the joints.

With this starter course finished, Mulloy moves the straightedge 7 inches up the roof, keeping it parallel to the eaves; the next over-



Before any shingles are laid, Tom Silva covers the roof sheathing with a waterproof membrane, taking care to bridge any joints between the sheets of plywood, especially where the dormer meets the roof.

Before starting on the roof, Mulloy worked in his shop to bend the flashing into various V and W shapes with a metal brake so that on the job site he could just grab the appropriate one and keep going. On the front edge of the dormers, beneath the windows, he places the base flashing, one V-shaped piece that runs

across the entire width of the joint, 5 inches up the dormer face and 5 inches down and out over the roof. Along the dormer cheeks, he fits step flashing, 8-inch-wide-by-9-inch-long rectangles, bent lengthwise into right-angle Vs. Starting at the base of the dormer and working upward, Mulloy weaves the step flashing

in with the last shingle in each course so that metal overlaps one course, then is overlapped (and hidden) by the next. (See “A Matter of Detail: Flashing,” page 80.) He nails each piece to the roof, just once, about 1½ inches below its top edge, with the same 7d stainless steel nails he used on the shingles. This layered system of shingle, flashing, shingle, flashing makes the

whole length of the cheek-to-roof juncture weathertight.

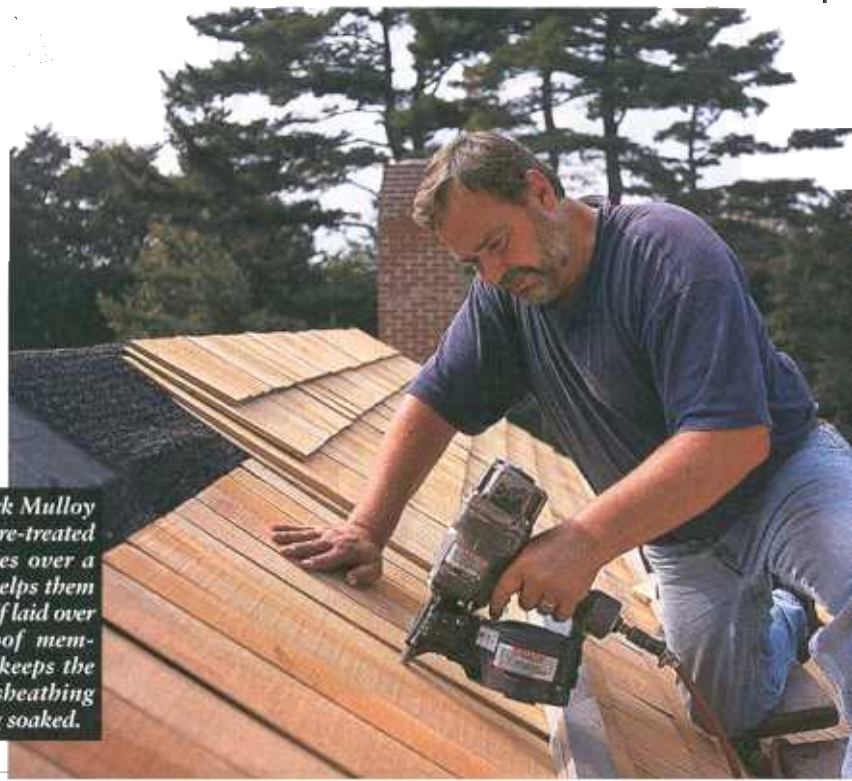
Once all the step flashing is tucked neatly between shingles, Mulloy overlaps the exposed metal on the cheek with another layer of membrane that Tom will cover later when he shingles the dormer cheeks. “Any water that gets under a roof or sidewall shingle will run onto the step flashing and out on the roof, rather

lapping course is laid out and nailed down as before. Mulloy chooses to leave the lower 7 inches of each shingle exposed to the weather. Any given point on the roof is then protected by three layers of wood as the remaining 17 inches of each thin rectangle are covered by three successive courses. “Kind of like fish scales,” says Mulloy.

He and Williams move up the roof, fitting shingles and nailing them off, course after course. As they work, the pair are careful to stagger their joints, keeping the spaces between shingles at least 1½ inches to either side of those in the previous two courses. “On a wood roof, you can’t let the joints fall directly above the ones in either of the last two courses,” says Mulloy. “Any closer than that, and there’s a chance for water to infiltrate.” Every few rows, he and Williams measure from the butt of the last course to the ridge of the roof at both ends. If there’s a difference between the two measurements, they adjust the exposure ever so slightly in the next course so the shingles will meet in a parallel line at the top.

FLASHING

Whenever Mulloy reaches a dormer cheek, a chimney, or a valley where two roof planes meet, he bridges the juncture with metal flashing. “Don’t get me wrong,” he says, “I think the bituminous membrane is a great product. But people get into trouble when they use it as their only means of diverting water.” For this job, he’s using 20-ounce lead-coated copper. The soft gray lead subdues the shine of bright copper and prevents it from oxidizing and possibly staining everything with its runoff.



Roofer Mark Mulloy nails pressure-treated pine shingles over a mesh that helps them dry out, itself laid over a waterproof membrane that keeps the plywood sheathing from getting soaked.

A SHINGULAR REPLACEMENT: SOUTHERN YELLOW PINE

When the McCues' house was built in 1883, the roof was covered with finely textured and weathered western red cedar. But by the time Janet and David bought the place, the top of the house sported flat, deteriorating asphalt shingles—about as suitable to the Shingle style as a mohawk on a Gibson girl.

Instead of restoring traditional cedar to the roof, the McCues chose to install shingles made of pressure-treated southern yellow pine. Manufacturers mill the ½-inch-thick shingles from 25- to 50-year-old plantation-grown trees, then impregnate the pine with chemicals that ward off fungal decay and wood-boring insects. This allows the manufacturer to offer a 50-year warranty with the product—20 years longer than the highest-end red cedar roofing. It also means that, unlike cedar, the pine doesn't require periodic cleanings to keep rot from taking hold. "With the long warranty and zero maintenance, pine was a good option, especially since the house is near water," says Tom Silva.

The shingles do have some drawbacks. The pressure-treating process uses chromated copper arsenate (CCA), which contains

arsenic and chromium. The manufacturer also offers—and is moving toward exclusively producing—a shingle treated with more benign ammoniacal copper quaternary (ACQ) that costs 10 percent more.

Roofers used to altering the size of a cedar shingle with a score

and a snap might be frustrated by pine's hardness. "Each cut for the Manchester installation had to be made at the table saw," says Mark Mulloy, who mounted his on the steeply pitched roof. Moreover, the pine only comes in 3- to 8-inch widths (cedar runs to 10 inches), making it more time-consuming to stagger the joints between courses. "There's definitely a learning curve," says Mulloy. As a result, though the two materials cost about the same, pine can jack up the labor bill by more than 15 percent. Finally, wide-grained and occasionally knotty shingles do shrink and move more than a piece of fine-grained red cedar cut from the heart of a centuries-old tree. So after a few years of

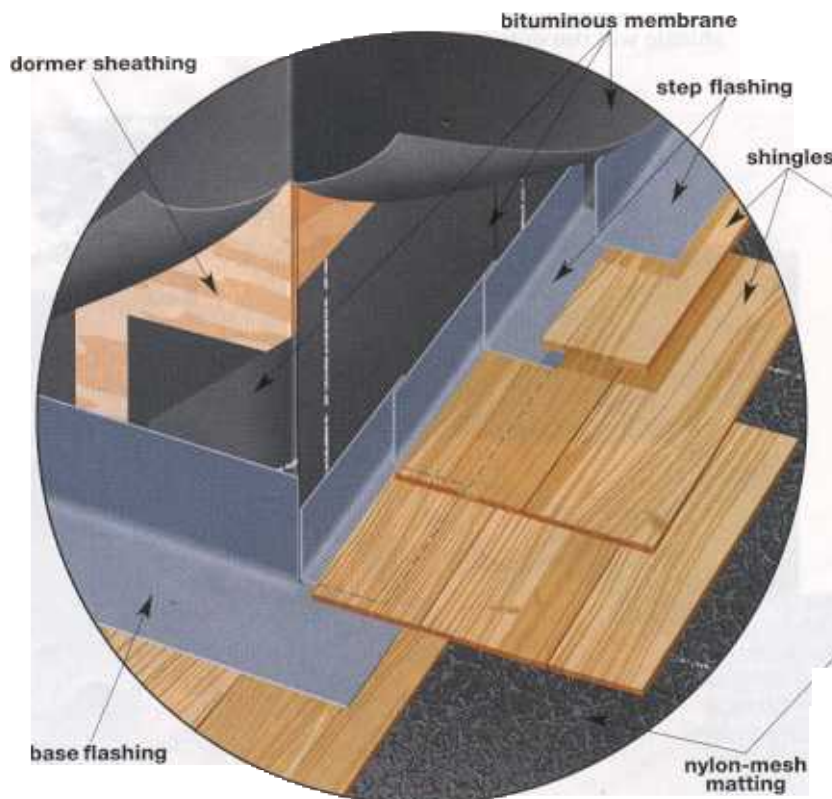


weathering, a pine shingle may look more rustic than one made of cedar, but that suits the McCues just fine.

—Dan DiClerico

A Matter of Detail: Flashing

ROOF-TO-DORMER CONNECTION



IN ROOF VALLEYS





ABOVE: Mulloy nails down a piece of lead-coated copper step flashing to seal the vulnerable joint between dormer and roof. The flashing will be hidden by another shingle. BELOW: He caps the roof's ridges with shingles fitted together in an inverted V.



than into the building," says Mulloy.

Where two planes of the roof meet and form a valley, Mulloy lays flashing bent into a slightly flattened, 18-inch-wide W shape: The 8½-inch-wide legs on the left and right side of the W extend up each side of the roof to channel rainwater as it flows downward. The small inverted V between these legs diverts water that might otherwise run down one side of the flashing and splash up the other (see "A Matter of Detail: Flashing," page 80). Mulloy seals the flashing's edges with two more overlapping strips of membrane on each side. When he reaches a valley with a course of shingles, he covers the flashing to within 2½ inches of its centerline, with the edges of the shingles cut parallel to that line.

The house's chimneys are flashed in much the same manner as the dormer, with step and base flashing. Mulloy overlaps these with counterflashing—pieces of L-shaped lead-coated copper mortared into the bricks' joints and folded down over the steps—instead of membrane. But on the side of the chimney that faces the peak, where masonry and roofing intersect to form an acute angle, water can puddle and

leaves can collect, inviting rot and leaks. That's where he plants a cricket, a small, peaked plywood rooflet that diverts water and debris to either side of the chimney and down the roof. (See Ask Norm, "Save the Chimney," June 2001, page 34.) "Eighty percent of the calls I get about leaking roofs center around a chimney that's not properly flashed," Mulloy says. He covers the cricket with a wide sheet of lead-coated copper that runs 6 inches up the face of the brick—overlapped by counterflashing—and 18 inches out onto the roof at the sides and back of the cricket.

When the shingle courses are all on, Mulloy finishes the job by capping the ridges of the roof. Here he uses pairs of shingles, nailed edge-to-face like a tiny wooden tent, and overlaps them as he has on the other courses. In a few months' time, the yellow-green shingles will weather to match the flashing, and the inside of the house will stay dry despite the battering winds, sleet, rain, and snow of winter. ■