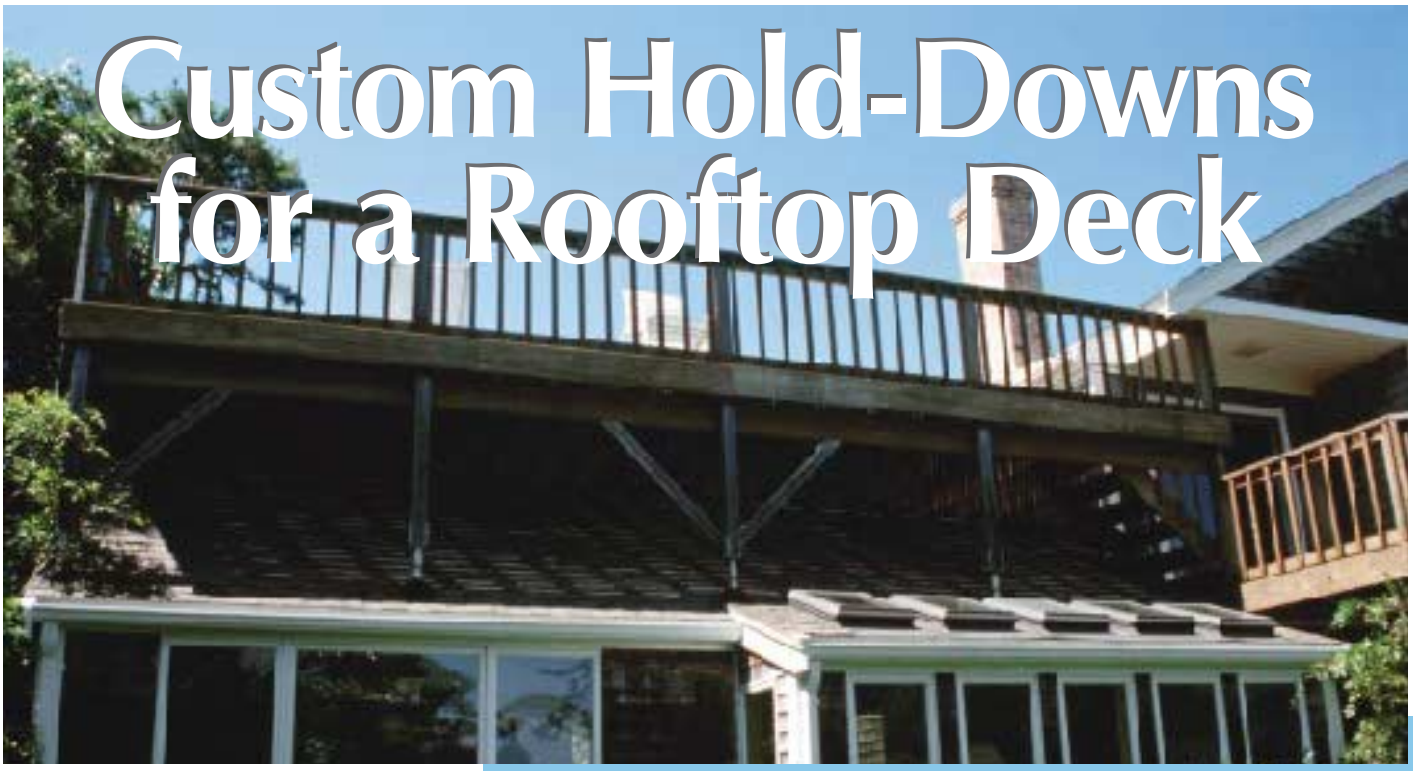
Custom Hold-Downs for a Rooftop Deck



This simple stainless-steel hardware anticipates reroofing

by Dave Holbrook

Nearly a decade ago, I designed and built a whole-house remodel that was located just a little too far back from the waterfront to enjoy an unobstructed ocean view. When I suggested a rooftop deck, to my pleasure, the owners jumped. I'd stuck my chin out a little, not having built a rooftop structure before — I knew there were a couple of unique problems to solve. I wasn't too worried about the structural issues; we'd retained only about 10% of the original building (to satisfy zoning requirements), so it was wide open for modifications. I figured a structural ridge beam and some ganged rafters would handle any point loads imposed on the roof by the deck and its occupants, and I had an engineer work out those details. My main concerns were how to tie the deck to the roof and how to make the connection leakproof. I expected the deck to outlast at least two generations of asphalt roof shingles, so the connector had to accommodate an eventual reroofing job.

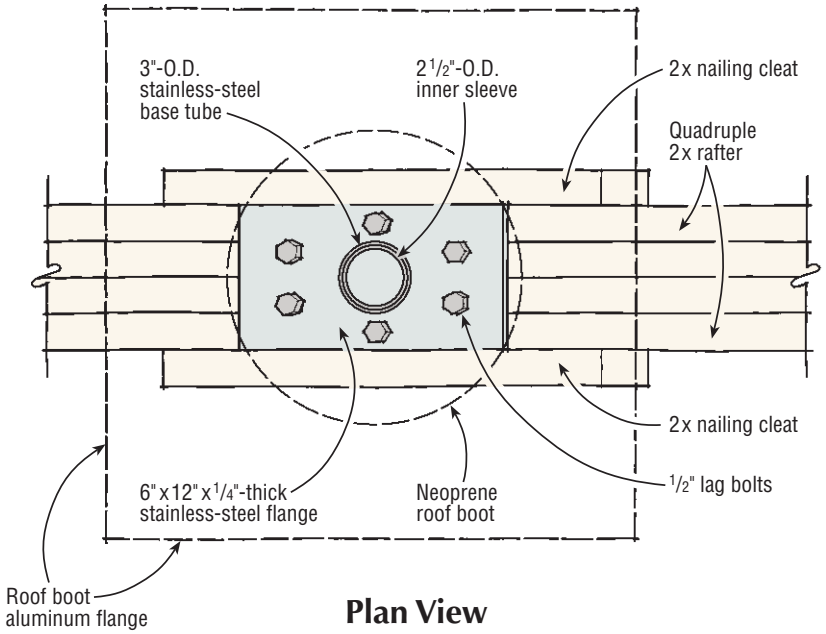
In a rare attack of logic, I noted that plumbing vents poke through the roof in a nice, dry fashion, so I used a standard plumber's neoprene roof boot with an aluminum flange (see photo, right) as the jumping-off point for my deck post anchor design. If I could support the deck on small-diameter steel tubing, a roof boot would seal the connection. Because roof boots are typically replaced along with the roofing, I had to make sure the supporting connectors could be easily removed and set back into place, one at a time, by the eventual roofer. I drew a couple of plans of the connector, made a couple of templates to duplicate the two roof pitches I had to contend with, and headed for my local welder's shop.

The Design Is Simple

A rectangular, stainless-steel flange, 1/4 inch thick by 6 by 12 inches, forms the base of the connector. Its perimeter is drilled with six 1/2-inch-diameter holes for lag-bolting to quadruple 2-by rafters. The holes are staggered and placed so that they'll be close to the

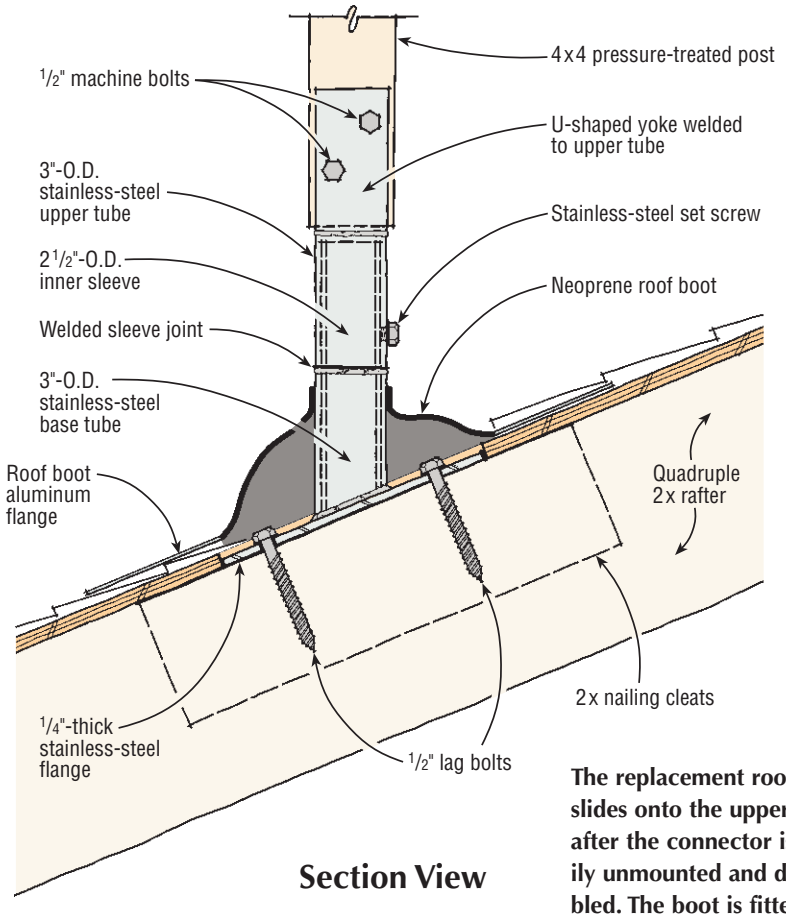
Making use of available flashing technology, the author designed this hold-down around a common plumbing vent roof boot.

Hold-Down Details



Plan View

Roof framing was modified with a structural ridge beam and quadruple rafters to carry the point loads of the deck above. Flange bolt holes were oriented to center on the rafter for maximum thread hold.



Section View

The replacement roof boot slides onto the upper section after the connector is temporarily unmounted and disassembled. The boot is fitted down into place after refastening the connector to the rafters.

center of the rafter they land on, for maximum connector strength.

Next, a 6-inch length of 3-inch-outside-diameter stainless-steel tubing is welded to the center of the flange. The tubing is first cut at the appropriate angle to stand plumb on the roof, and this angled end receives the weld. A second, 11 1/2-inch length of smaller, 2 1/2-inch-O.D. tubing gets the same angle cut and slips inside the first piece. It's permanently welded to the base tube, sealing the joint completely. A third piece of 3-inch-O.D. tubing, 6 inches long, fits over the insert. At the bottom end of this third piece, I had the welder drill and tap a hole to receive a stainless-steel set screw. The set screw firmly clamps this tube to the inner sleeve. Welded to the top of this same tube is a U-shaped yoke, 3 inches wide by 6 inches high, with a 3 1/2-inch interior spread to receive a 4x4 pressure-treated wood post. The yoke is through-drilled for two 1/2-inch-diameter machine bolts to secure the post.

My welder charged me $100 per connector, less than I'd expected to pay for custom stainless brackets. So far, so good; but when we got them on the roof, I realized that the combined thickness of the flange and the lag-bolt heads was not going to allow the boot to lie down flush. I always use minimum 5/8-inch plywood to sheathe a roof, so I decided to let the brackets into pockets cut into the sheathing, atop the rafters. The plunge-cut pocket left a foot-long unsupported edge of plywood on either side of the ganged rafter, so I added 2-by nailing cleats along the underside of the cutout.

After almost ten years in use, the connectors have performed well. When it comes time to reshingle, the roofing contractor can unbolt the flange from the roof, remove the two post bolts, and remove the connectors (one at a time!) from the roof. After the set screw is loosened, the lower section of the connector can be slid off. The replacement roof boot is slid onto the upper section, the connector is bolted back into place, the boot slides down, and it's roofing as usual.

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