BY KYLE DIAMOND

Fixing a Poorly Flashed Cupola

Last fall, my company was asked to investigate a roof leak originating from a cupola atop an attached carriage-house garage **(1)**. From the exterior, nothing appeared to be wrong with the cupola or the surrounding roof. But the inside was a different story. The house was fairly new, approximately 10 years old. Above the garage was a guest bedroom with a cathedral ceiling that reflected the roof's four valleys. At the peak, the cupola, with its four awning windows, served as a light well. According to the homeowners, there had been gradual, periodic leaking around the interior light well since the home's initial construction. After a particularly bad storm last summer, the water staining worsened, prompting them to remove the damaged drywall—exposing open-cell-foam-filled stud bays and water damage to the framed enclosure **(2)**. That's when they called us.

A WHOLE BOWL OF WRONG

During our inspection, the clients informed us of the leaky cupola's history. The original builder had blamed the window manufacturer for the leak, and the manufacturer had blamed the builder. After a lot of finger pointing, the builder agreed to "remedy" the problem by retrofitting a piece of ¾-inch quarter-round trim around the windows on the exterior, rendering the awnings inoperable. The feuding parties moved on—without having solved the problem.

Photos by Isaias Antonio-Santos


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We began our investigation by removing the outer, plywood-clad finish base of the cupola **(3)**. The copper roof-to-wall flashing had been reverse-flashed, with the copper placed on the outer surface of peel-and-stick—the previous builder had omitted the housewrap, which could have easily lapped the vertical leg of the roof-to-wall flashing. Another red flag was that sheathing behind the peel-and-stick at the top of the base felt spongy, which led us to remove the cedar corner boards and wrap-around sill **(4)**. We then discovered that where the cupola's upper portion transitioned to its wider, lower base, there was no flashing; the upper portion's Typar drainage plane dumped onto the 2-inch-wide, exposed plywood strip at the stepped-out base **(5)**.

So, as far as flashing was concerned, the workmanship on the cupola was a whole bowl of "wrong." There should have been either pan flashing installed under the existing cedar wrap-around sill or a metal cap installed over it. Without such details, this handsome architectural feature had become a conduit for water.

THE FIX

Our plan was to rebuild the cupola's base in place, salvaging as much of the upper portion as possible. We set up temporary roof protection made from plywood and 2-by stock (see photo 1, page 31). After removing the existing peel-and-stick, we found that roughly half of the cupola base's sheathing and framing was rotted beyond repair, while the other half had slight water damage, but was still structurally intact.

Starting where the damage was the worst **(6)**, we carefully removed the deteriorated material, a little at a time to keep the cupola stable. Fortunately, the existing framing wasn't too far gone, and we could confine the demolition work to the upper portion of the base and to the exterior. We cut the existing framing down to just above the existing copper roof-to-wall flashing (which was in good shape and we were able to re-use), finding structurally sound wood closer to the roof deck. We spliced new 2-bys to the existing studs of the cupola's base **(7)**, then sheathed the base and began work on the sill.

The existing windows didn't need to be replaced. The damage was confined to the frame's outer, factory-applied wood sill. The seam between the protruding, factory sill and the trim had held water and caused

them to rot, while most of the framed sill, which concealed the awning's operable hardware, was not damaged **(8)**. This saved us from having to do any interior trim or drywall work. We managed to remove the rotted portion of the sill, then pulled the sashes and began waterproofing the base.

We applied Grace Ice and Water Shield, lapping the existing copper roof-to-wall flashing. Then we installed Zip System Stretch Tape, which sealed the 2-inch-wide, stepped transition between the upper and lower portions of the cupola. We ran the Stretch Tape down the window jambs and later covered the existing sheathing at the corners with building paper. Also, to help determine the finish elevation of the top of the cupola base, we dry-fit a new "through-sill" to replace the rotted exterior part of the windows' factory sills, and used blocking to represent a new wrap-around sill to finish the top of the cupola base **(9)**. We made these finish sills out of Boral, tapering the stock for drainage, while kerf-cutting the underside of the wrap-around sill to provide a drip.

For the cladding on the cupola base, we cut the triangular shapes out of a ⅝-inch 4x8 sheet of PVC by Koma, fastened them with screws at trim locations, and glued trim pieces on top to hide the fasteners **(10)**.

Next, we installed aluminum pan flashing, slipping it under the existing window frames about an inch and running it up the flanking walls. We used four pieces of flashing, Zip-Taping the vertical joints at the corners, as well as lapping the horizontal legs of the metal flashing and setting the lapped joints in a bed of OSI Quad Max sealant **(11)**.

Then, we installed the Boral wrap-around sill, applying the OSI sealant at the mitered seams and fastening it with stainless-steel ring-shank fasteners. We butted the new through-sill up against the existing window frame, running sealant along the seams **(12)**. The through-sill solved the problem with the leaky seam between the existing factory-applied sill and trim; the window sash's weatherstripping now sits on top of a solid piece of Boral. For the wall trim and corner boards, we used 5/4 Boral to match the existing salvaged cedar stock **(13)**.

The entire restoration took two carpenters eight days to complete, not including the painting.

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