Rebuilding a Box Bay Window

BY EMANUEL SILVA

The clad windows in the existing box bay were in good condition, but there were signs of water damage to the trim on the exterior **(1)**. More signs of water stains and rot were visible on the subsill once the stool was removed **(2)**.

Photos by Emanuel Silva

A homeowner recently contacted me about repairing some siding on his house. That work led to a discussion about his box bay window, which a contractor had installed about 10 years before. Though the clad Andersen windows in the box bay appeared to be in good shape, my client explained that they were difficult to open and close and that he had noticed some water leakage on the interior.

Based on experience, I suspected that the leakage problem was worse than it appeared. My hunch was confirmed as I started pulling off the interior and exterior trim to look at the framing. On the interior, water stains were visible above and below the windows, and when I removed the windows' stool, it looked like mice and ants had taken up residence in the space between the stool and the subsill—never a good sign. Still, the worst of the damage remained largely hidden until I started removing the exterior trim and uncovered extensive rot in the 2x12s that had been added to the rough opening in the home's 2x6 wall to create the box bay.

The box-bay framing had a number of problems, such as a lack of sheathing, inadequate flashing, and no structural support for the 2x12 subsill other than the 2x6 wall that it was resting on. But the main problem was that water from the roof flowed down the fascia and behind the exterior head casing used to trim the windows. From there, it worked its way down the 2x4 jack studs separating the windows and collected on the 2x12 subsill. As a result, the subsill was rotted and split, and the bottoms of the 2x4 studs were rotted. At both sides of the opening, the 2x12 trimmers had virtually disintegrated, so once I removed the trim, nothing was holding the windows in place.

Reframing the box bay. After removing the windows from the opening and stripping the siding from the wall, I dismantled what remained of the box-bay framing. I made some minor repairs to the existing framing and sheathing where there was rot damage, then reframed the opening with new 2x12s, capping the 2x12 subsill with a layer of 3/4-inch plywood to give the assembly a little more strength and keep the subsill from splitting.

Originally, we had planned on reinstalling the existing windows, as they were still in good condition. But after discussing options with the homeowner and code requirements with the building inspector, we opted for new windows. Though the inspector assured us that the box bay window didn't require tempered glass—and despite the fact that the wait time for the new windows would add considerably to the project's timeline—we concluded that new windows and the $35 upgrade per sash would give my client some peace of mind and provide better resale value if the decision was ever made to sell the house.

While carefully checking Andersen's sizing chart for its stock 200 series windows, I divided the 10'-2" x 4'-6" rough opening into four window "bays" with double 2x4 jack studs. I felt that doubled studs would be more stable and less likely to twist or bow than the single studs used in the original design. This required reducing the size of the rough openings slightly, with two larger windows in the center flanked on either side by slightly narrower ones.

Better water management. At the top of the box, a strip of aluminum flashing had been installed to cover the gap between the soffit and the box-bay framing and help divert water away from the window. It was securely tucked between the fascia and soffit and overlapped the box-bay frame, so even though it hadn't done a very good job of water management, I left it in place temporarily, covering it with a wide strip of Vycor Plus flashing

The extent of the rot damage to the framing was clearly visible once the windows were removed **(3)**. The author stripped the siding and window trim from the wall **(4)**, then reframed the box bay with new 2x12s **(5)**. After reinforcing the subsill with a layer of 3/4-inch CDX plywood, he framed the individual window openings with double 2x4 jack studs **(6)** and used cripple studs to fill in the gap between the flat 2x12 "header" and the soffit **(7)**. The author then completely covered the opening with sheathing to make it weathertight while he waited for the new windows to arrive **(8)**.

tape to better seal the flashing to the soffit. While I was working, I could fold the flashing back and out of the way; at the end of the day, I could bend it down over the opening.

Simply eliminating the gap between the upper 2x12 "header" and the soffit would help prevent water from running underneath the fascia and into the framing projecting out from the wall. Here, I installed 2x4 cripple studs, then sheathed the upper part of the assembly.

Structural support. To provide better structural support for the box bay, I cut away a 2-foot-high section of sheathing below the 2x12 subsill, removed the existing fiberglass insulation from the stud bays, then sistered 18-inch-long 2x12 blocks to the 2x6 wall framing below the window opening using structural screws. To reinforce the connection and prevent the blocks from splitting, I added a 3/4-inch plywood layer to each block, again with plenty of structural screws. I notched the blocking to fit snugly around a 2-by strongback that I had installed beneath the subsill over the existing wall sheathing to stiffen the opening. While installing the blocks, I set

Reinforced with plywood and notched to fit, 2x12 blocks were installed to provide support for the 2x12 subsill, which cantilevers out over the 2x6 wall framing **(9)**. A string line keeps the bottoms of the blocking aligned **(10)**. The author notched the new sheathing to fit around the blocking **(11)**, nailed it in place, then insulated underneath the subsill with rigid foam and filled the gaps with spray-foam insulation **(12)**. After sheathing the entire box bay, he flashed it with self-adhering butyl tape **(13)**. Once the windows arrived on site, the author cut out the window openings, installed a section of cedar clapboard ripped to 4 inches wide at the bottom of each opening, and then completed flashing the openings **(14)**.

up a string line to ensure that the bases of the blocks were aligned.

After refilling the wall cavities with fiberglass insulation, I resheathed the wall with Zip panels ripped to size and notched to fit around the blocking. Then I cut blocks of rigid foam to fit snugly underneath the 2x12 subsill between the blocking and sealed all of the joints with canned spray-foam insulation. Finally, I completed sheathing the box bay so that it was enclosed on all sides and taped the seams with Blueskin butyl flashing tape so that the box would be weathertight until the new windows arrived.

Window installation. Once the new windows were on site, I cut out the openings, added a beveled clapboard at the base of each one for positive drainage, and prepped the openings with flashing tape. As I installed each window, I bedded the top and side nailing flanges in sealant and left the bottom flange unsealed to allow for drainage. Then, before trimming the box bay with PVC trim, I taped the top and side flanges to the wall with flashing tape.

Underneath the windows, I installed a 2 1/2-inch-wide sill extension made up of two layers of 3/4-inch PVC ripped with 15-degree

The window flanges were bedded in beads of sealant at the tops and sides of each opening and nailed through the sheathing into the framing **(15)**. The author trimmed the box bay with PVC, replaced the water-damaged roof fascia with PVC trim, and installed an angled PVC kick-out cap to cover the gap between the window trim and fascia and to divert water out and away from the windows **(16)**. On the interior, he filled gaps with sealant or spray foam depending on the size of the gap **(17)** before installing new trim **(18)**. After completing the window installation, the author re-sided the wall with cedar clapboards **(19)**.

bevels on the edges. A shallow kerf underneath the outer edge of the sill creates a drip edge that directs water out and away from the windows. A water-table detail across the base of the box bay serves a similar function.

At the top of the box bay, I screwed and glued together a triangular kick-out cap that covers the joint between the window trim and the fascia. I had replaced the existing wood fascia with one made from PVC, added a nailer to make it easy to screw the cap to the fascia, and bedded the cap to the fascia in sealant. If for some reason any water does penetrate the box bay, a series of 1/8-inch-diameter holes drilled 12 inches on-center through the bottom from underneath will allow it to drain out.

On the interior, I filled all of the joints between the windows and the framing with low-expansion spray foam. Then I trimmed the windows with new S4S clear pine, giving the stool a bullnose profile. At his request, I left it up to the homeowner to prime and paint the completed box bay window.

Emanuel Silva, a contributing editor for JLC*, owns Silva Lightning Builders in North Andover, Mass. Contact him at silvalightningbuilders@gmail.com.*