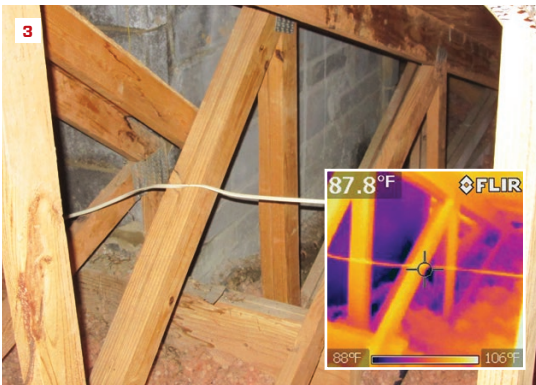


BY DOUG HORGAN

Rebuilding a Leaky Chimney From the Roofline Up



Water damage is evident on a ceiling above a second-floor fireplace (1). Infrared imaging confirms that the area is wet after rainstorms (2).



In the attic above the damage, IR imaging (inset) shows wet chimney block (3). An M & J trade partner inspects the chimney's base; roofing cement covers its shingle-to-flashing juncture (4, 5).



Early in the design process of a renovation project on a client's recently purchased home, we noticed some ceiling damage above a fireplace on the upper level (1). Infrared and moisture-meter measurements confirmed the area was wet after rainstorms (2), and a look in the attic showed that the masonry chimney for the fireplace was the source of the leak, with wet block and water dripping down onto the ceiling (3).

We brought in M & J Contractors from Sterling, Va., roofers who are experienced with complicated repairs. On the roof, we immediately noticed a large smear of roofing cement at the base of the chimney, obviously a previous attempt at repair (4, 5), as well as four different colors of caulking on the flashings, on mortar joints, and on the cracked crown of the chimney. When it's obvious that multiple repairs have been made, that can indicate the real problem is difficult or expensive to fix (6-10).

We also saw a lot of efflorescence—white, powdery residue—on the outside of the masonry. Efflorescence results from minerals, mainly calcium from the mortar, being dissolved and washed out of the masonry by water traveling through the structure. Once the water comes out, it evaporates and leaves the minerals behind. This was another clue about the problem—there was a lot of water moving within the chimney (6).

Inspecting the base flashing, we discovered it was nailed to the face of the stone (7, 8). With all the layers of caulking, it didn't appear to be leaking, but unlike a through-flashing run into the masonry, a face-applied flashing can't stop water within the masonry from traveling down below the roof level. Though many chimneys allow some water to soak down through the roof level in heavy rains, as long as there isn't much of it, this water can slowly dry out without causing any issues.

On this chimney, however, enough water was running through that it was wetting things that need to stay dry. The original masons had used a steel angle a course below the roofline to corbel the chimney out to hold the stone veneer above. This angle caught any water in the outer 4 inches of the chimney and pushed it out onto the primary bedroom ceiling, where we originally saw the water damage.

Through-flashing. We've tried several approaches to repairing leaky chimneys. Putting a good cap on the



Efflorescence-stained stone veneer indicates that a lot of water had moved within the masonry chimney (6). The base flashings along the back, sides (7), and front are nailed to the face of the stone (the peeled-back caulk reveals a nail head) (8).



The chimney's concrete cap (9) and corbeled 1-inch-thick bluestone top are heavily caulked in an attempt to keep out moisture (10). After assembling an impressive scaffolding anchored to the building at multiple levels to provide lateral strength, the masons begin to remove the stone veneer and the cracked crown on the chimney (11).

top can help keep a lot of water out (we've installed a number of metal chimney caps because they shed water well and last longer than the crowns the local masons typically install). Elsewhere, any cracked or open joints should be pointed up. "Breathable" masonry sealers are fairly effective, at least on brick, and last a few years. These approaches can reduce the water entering a masonry chimney and slow leaks to the point they don't add up to much.

However, this chimney was in bad condition from the roofline up. The large amount of efflorescence and failed attempts at stopping leaks over the years led us to recommend a more certain solution: installation of a through-flashing at the roofline, waterproofing up and over the chimney core, and a rebuild of the masonry veneer.

Chimney repair. Working from scaffolding, the masons, Stone-work by Santo, removed the stone veneer and the cracked crown from the chimney (11). Minor repairs were done to the first course of block at the roofline to make even steps for the through-flashings. A liquid-applied masonry waterproofing (MasterSeal 581, formerly Thoro-seal)—designed to fill holes and small voids, work on dirty, existing masonry, and make a uniform coating without seams, unlike sheet materials—was brushed onto the block to seal the chimney core (12).

We then used peel-and-stick window flashing to temporarily seal the roofline while we worked (normally, we use a layer of flexible adhesive masonry flashing, which we leave in place as a backup layer below the metal flashing). On smaller chimneys where the



A waterproof cement-based coating (MasterSeal 581) is applied up and over the block chimney core (12). The stepped, 16-ounce copper through-flashings are fabricated and soldered on site (13). The large pieces are tacked in place with masonry anchors, and the edges sealed with polyurethane caulk (14).



Textroflash peel-and-stick through-flashing is applied to the cured cement-based waterproofing on the chimney core and lapped onto the copper step flashing (15). The stone veneer is reapplied, building the chimney out to its original 44-by-66-inch dimension (16). A new chimney cap was later installed by the mason.

flues are closer to the outer layers, we sometimes avoid sticky flashings due to the potential for heat damage, but this chimney was large enough that we weren't concerned.

Next, M & J workers fabricated stepped through-flashings to cover the stepped masonry on site. They elected to make large pieces that covered many steps, but we often use one flashing pan per step, with upper pans overlapping lower ones. I feel more confident in overlapping pans, as there's no concern about thermal metal movement with such small pieces, and I also believe they're easier to do. But we've also done many large flashings with no problems so we let the people with the tools in their hands choose the method (13, 14).

We also typically use a separate counterflashing between the pans and the roof, which makes reroofing easier later. On this existing roof, the flashings were run as one piece.

With the metal installed, the masons put a layer of adhesive Textroflash through-flashing (h-b.com) on top of the steps, apply-

ing it to the cured waterproofing on the chimney's block core and lapping it onto the copper step flashing. Santo's crew prefer to add this layer to protect the metal from their work and from the caustic masonry over time (15). The veneer was reapplied to the top of the chimney (16), and a new cap placed at the top.

Once the masonry work was complete and the scaffolding removed, the roofers came back to lift the shingles and step flashings at the chimney and tie in with ice membrane and make other minor repairs to any shingles damaged from the scaffolding.

We often recommend this kind of complicated retrofit, as we've had numerous failures with half-measures. When clients elect to go ahead with the full repair, we know they won't have any problems in the future.

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