New Windows for Old Brick Veneer Walls

Sealing off the windows when there's no WRB

BY BILL ROBINSON

I've been in the construction industry for more than 30 years, much of that time as a licensed contractor. Over the years, I have learned about window installation on the job. More recently, I took the Installation Masters Certification course from the American Architectural Manufacturers Association, which gave me a stronger technical background and the confidence to install windows in a variety of situations.

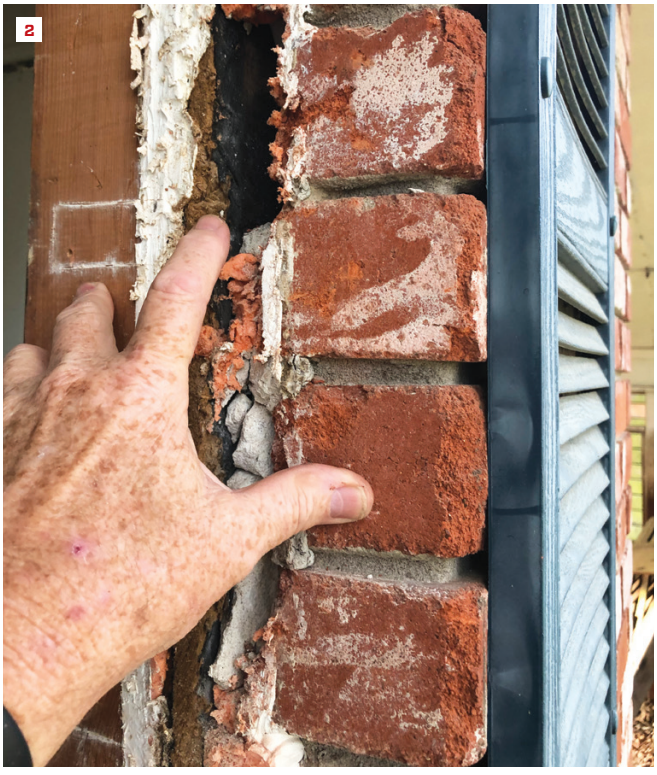
In my view, the same basic principles that apply generally to exteriors also apply to window installations:

- Install materials "shingle style" (what is below is covered by what is above).
- Avoid creating horizontal surfaces that could limit drainage.
- Ensure that materials used are compatible.
- Realize that air-sealing is key.
- Modify installation details to fit the climate and exposure.

This year, I've been helping an industry committee of the Fenestration Manufacturers Association, the American Architectural Manufacturers Association, and the Window and Door Manufacturers Association develop a standard of practice for installing replacement windows in existing brick veneer–clad residential buildings, without removing the brick cladding. Once completed, the document will be used for the training and education of field crews and supervisors.

The FMA/AAMA/WDMA Installation Committee has created a

Photos by Bill Robinson



The author identified several existing homes that were gutted and standing empty. The crew pulled existing single-glazed windows from the openings **(1)**. Inspection revealed that, in general, there was no intact drainage plane to be identified behind the existing brick **(2)**, so the decision was made to isolate the replacement windows from the walls.

number of similar documents pertaining to new construction. In those cases, the methods were tested and proven using mocked-up walls built in a laboratory setting. But this time, the idea was to demonstrate and test a method of installing replacement windows in a realistic setting.

I located several buildings in Louisiana that had been damaged in the 2016 floods and were gutted and standing empty. With help from committee members, industry representatives, and a local contractor, we installed two windows in each of three houses using various materials and methods and then tested the installations for water leakage using the standard test method ASTM E 1105. In the next few pages, I'll describe how we installed and tested the windows and what we learned from the process.

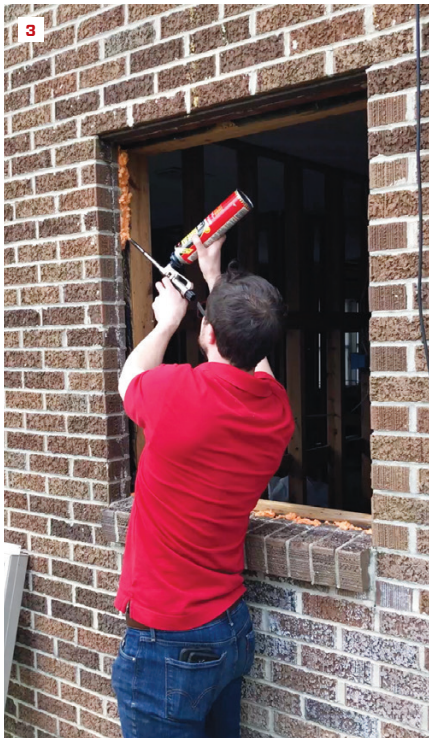
JLC has covered the installation of replacement windows in brick veneer walls before ("Replacing Windows in Brick Veneer Homes," *Coastal Contractor*, May/07; "Installing Full-Frame Replacement Windows," *JLC*, Oct/13). In those stories, the authors describe attempting to integrate the window flashings into the existing weather-resistive barrier behind the brick. The houses we worked with in Louisiana, however, were built in the 1950s through the 1980s (when there was no statewide building code), and they all lacked functioning WRBs behind the brick.

Because field conditions varied so widely, the committee decided to treat the surrounding wall system in each of the three homes as an unknown factor that could not be relied upon for robust integration from an air- and water-management standpoint. The principle of membrane drainage behind the wall façade simply did not apply. Instead, the decision was made to isolate the windows from the brick wall and the wood frame behind it. With the opening isolated, water would not be able to enter the wall through the window and the window opening; any water entering the opening would be directed to the exterior.

MEASURING THE OPENINGS

Once the homes were identified, I set out to take measurements. Because we would not be removing the exterior cladding, it was important to take measurements inside and outside and identify the limiting dimension.

The standard is to take six measurements: bottom, middle, and top on the sides of the opening, and left, middle, and right on the head and sill. For sizing windows, the smallest measurement is selected. In this case, we measured the rough wall framing as well



Some openings were prepped by filling the gap between the brick and the wall framing with gun foam **(3)**, and caulking over the rough jambs **(4)**. Site-bent coil stock was used at the head and sill of the openings **(5)** to direct water out to the face of the exterior.

as the brick-veneer opening, for a total of 12 measurements.

To determine the actual window dimensions to order, a deduction is made from the exact rough opening size. The amount subtracted depends on the window manufacturer's specifications. I prefer to make a note of the exact measurement of the opening on site and calculate the deductions later at the office, or at least somewhere there are no distractions.

Since these homes had been flooded and gutted, the interior finish had been removed and the wall cavities were open, so we took the measurements from framing rather than from finishes. In most situations, however, there would be some material—drywall or wood, for example—in the returns, which would need to be accounted for. In that case, it would be necessary to think about whether to size the window to fit inside the existing jamb return finishes, or to remove the jamb return finishes and go to the framing.

Another decision to be made is about fastening the windows. These windows were block frame—that is, with no mounting flange—and so we could either fasten the windows through the jamb or secure them using masonry clips.

We also had to make a decision about the placement of the replacement windows: whether the exterior face of the window would be flush with the framing or extend past it partway so the jambs overlapped the brick on the sides of the opening. Because there was no intention to add brickmold to the installation, we decided to extend the outer face of the window beyond the framing, covering the gap between the sheathing and the interior face of the brick. As it turned out, that space between the brick and the sheathing meant that we needed to use clips to install the windows, because not enough of the window jambs overlapped the framing to fasten the jambs directly to the framing.

PREPARING THE OPENINGS

Three manufacturers (Pella, Jeld-Wen, and Milgard) provided windows for this exercise.

On one install, the window arrived at the site too large to fit in the rough opening, which fortunately was smaller to the interior. A crew member used a chain saw to rip a half inch from a jack stud to enlarge the framing rough opening.

There were two basic steps involved once the conditions were identified. We needed to fill the gap between the interior face of the brick and the exterior face of the sheathing, then we needed to seal up the opening against water intrusion. We filled the gaps using gun foam or backer rod, then covered the rough-opening jamb area with liquid-applied flashing to create a moisture-resistant cavity to keep water from entering the wall and to isolate the opening. On these perimeter gap details, some form of gap filler (such as backer rod) is necessary to create an effective caulk joint. This prevents three-sided adhesion and creates an hourglass-shaped caulk bead. It's important to have a sealant with high solids content and with good adhesion (meaning it sticks to the substrate) and good cohesion (meaning it sticks to itself).

For some windows **(6, 7)**, gun foam, Tyvek sealant, and vinyl coil stock were used to isolate the windows from the opening. In other cases **(8, 9)**, backer rod and Prosoco sealant were applied. Good quality control proved critical in both applications.

We employed a combination of materials on each window. On some windows, the installers placed backer rod in the gap between the brick and the sheathing, then applied Prosoco R-Guard FastFlash to the jambs. In other cases, they filled the gap using gun foam and completed the seal using DuPont Tyvek Fluid-Applied Flashing and Joint Compound. The DuPont and Prosoco products are both high-solids Silyl Terminated Polyether (STPE) formulas able to be gun-applied and troweled. (In other window replacement projects where brick left a rough, irregular opening, we have found these liquid-applied flashing products to be by far the simplest way to isolate the opening and especially to create a panning system at the sill.)

In addition to using liquid-applied sealants, we fabricated head and sill flashings. Vinyl coil stock was used at the head and sill to deflect water in the wall out over the head and to direct water that might leak through windows out over the brick at the sill. At the head, we tried two different ways of attaching the flashing. In one case, we stuck the flashing onto the framing using Echo double-sided tape, but in most cases, we simply wedged the bent flashing up between the sheathing and the framing so that friction could hold it in place until the window was installed.

Once the windows were installed and the masonry clips were secured, the perimeter joint around the new windows was addressed. From the exterior, sealant was installed around the head and the side jambs and at the sill. A couple of gaps were left at the bottom to allow any incidental water to drain. Remember, we are using a drainage system where any water from the window or other sources is not trapped in the cavity defined by the window jamb thickness. This also requires that the window be spaced a little off the sill to allow water to drain.

On the interior, the joint between the window and the framing was fully caulked (with no drainage gap at the bottom), using the same materials and methods as on the exterior. Before testing, all the caulk was allowed to cure according to manufacturer's instructions.

TESTING THE ASSEMBLIES

Window testing was done by Intertek to the ASTM E 1105 standard. This test looks at the install only, so the window was taped off from the exterior to exclude any flaws in the window itself.

A calibrated spray rack was set up on the exterior, and to the interior, a chamber was established to allow a negative pressure to the test area. The spray rack is calibrated to deliver five gallons per hour of water per square foot of window opening, to simulate a heavy rain. (In passing, the test rack on the exterior did not look like it was putting out the torrential summer rains we get here on the Gulf Coast, although it might represent heavy rain somewhere else.) The variable was the negative pressure on the interior; there were three timed cycles using increasing negative pressure to determine how well the install would withstand defined wind and rain exposures. The test pressures were marked on the interior test film to keep track.

The results? On one home, the installation passed all three cycles. On one window in another home, the interior caulk bead had been overlooked, but after the coil-stock head flashing was removed and the caulk applied, the installation passed the test. On another window, there was a holiday in the caulk bead on the interior, allowing a leak into the sill. Once that was fixed, the window passed.

The final takeaway is that isolating the windows from the opening worked well, given careful site craftsmanship. My "Aha moment" relates to the interior caulk bead: When the install is used as a drainage system and there is a functioning sill pan, the back caulk is the key that will save you from callbacks. This assumes that the rough opening is fully sealed and flashed into the opening to a depth deeper than the window jamb depth, preferably with a liquid-applied flashing, and the interior back seal is done with backer rod and a high-solids content STPE sealant.

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A standard ASTM test rig was set up to apply a constant spray of water to the window opening **(10–12)**. The windows were taped off so that the test would concentrate on the installation method, not on possible leaks in the windows themselves.