Flashing is key to leak-free masonry

To keep water from penetrating masonry walls, flashing must be installed beneath parapet caps, at shelf angles, under lintels and sills, and at the base of the wall

By Christine Beall

Rainwater can penetrate a 4-inch brick wythe even if it's built with perfect workmanship. If workmanship is poor, mortar bond is incomplete, or cracks occur in the wall face, even more moisture will penetrate the exterior wythe.

But most of the water that enters masonry walls gets in at the parapet, roof, and windows. So it's critical that all these spots be flashed properly. If walls aren't well detailed and built, so much water may enter that it can't be drained back out quickly enough to avoid serious damage. If flashing is improperly installed or missing, or if weep holes are clogged with mortar, water remains in the wall, causing corrosion, or enters the building interior.

To prevent water damage, the entire masonry wall must be designed as a system. Cavity walls and masonry veneers act as drainage systems that collect and expel water by means of flashing and weep holes. For these walls to perform well, all flashing and weep holes must be located and detailed correctly. Here are tips for flashing a typical masonry wall from top to bottom.

In the parapet

Exposed on both sides, parapets face severe exposure to wind-driven rain. The top of a parapet also can act as a ledge for standing water and snow. Parapets are thus a primary source of water entering the wall.

To prevent water entry, cap parapets with a cast stone, natural stone, terra-cotta, or metal coping (Figure 1). Avoid brick copings; all the joints in a brick rowlock course present too many opportunities for leaks. Stone, precast, or terra-cotta copings can be cut in longer sections so there are fewer joints.

To keep coping joints closed and sealed against water, consider the differential movement of materials used for copings and parapets. Precast concrete works best over concrete blocks walls, and terra-cotta works best over brick. To help keep the coping weather resistant, rake out the joints and caulk them with a good elastomeric sealant.

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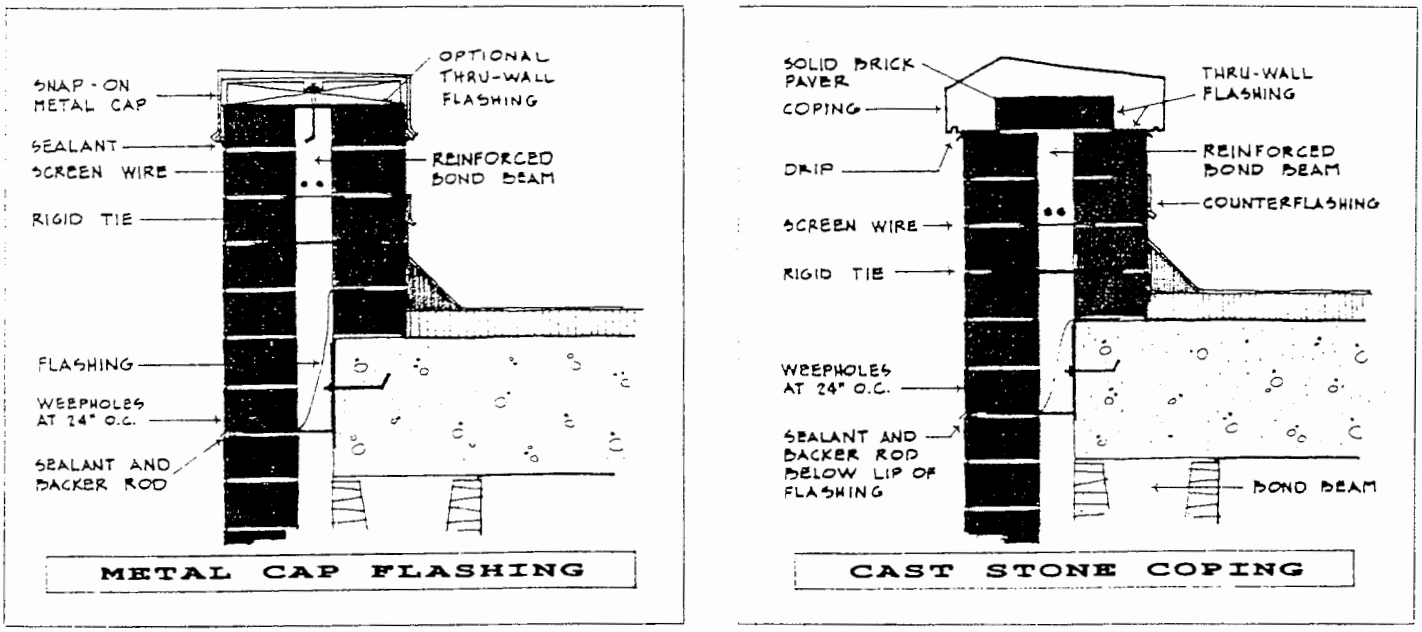

Figure 1. A major water entry point, the parapet should be capped with a stone, cast stone, terra-cotta, or metal coping, but not brick. Install through-wall flashing in the bed joint immediately below the coping.

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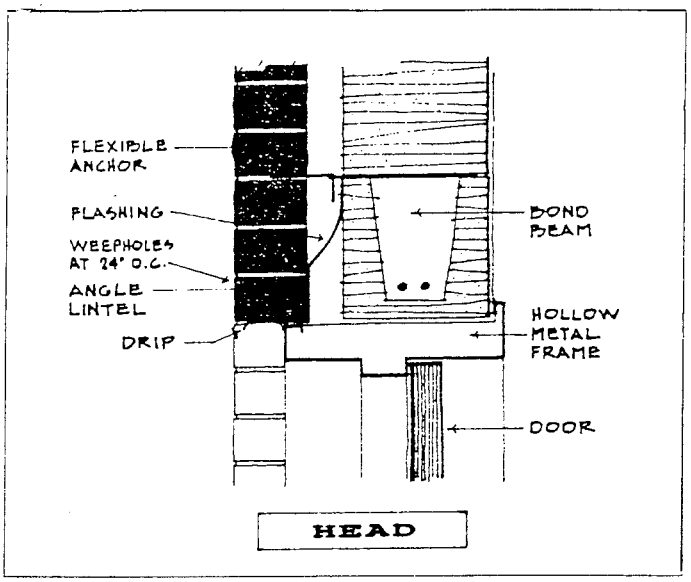

Figure 3. Also install flashing above window and door lintels. Set the windows and doors back from the wall face so less rain reaches the joint between the lintel and head of opening.

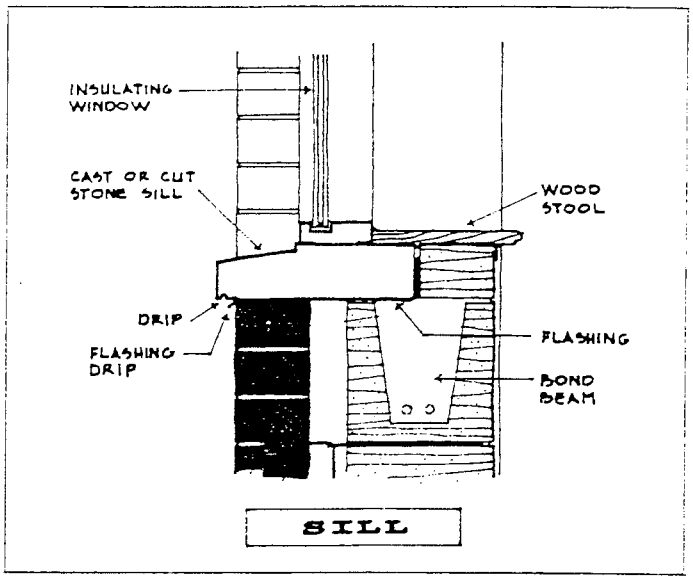

Figure 4. Avoid using brick sills; their many horizontal mortar joints offer too many opportunities for leaks. Use stone or cast stone sills instead and place flashing immediately beneath them.

Lintels and sills

Whenever possible, set windows and doors back from the face of the wall. This creates a drip that keeps rain off the sealed joint between the window head and lintel. It also creates a shadow line to hide the flashing (Figure 3).

Brick usually is not recommended for use as sills on commercial buildings for the same reason it doesn't make a good coping—too many joints are exposed horizontally. Instead, use cast stone or natural stone sills (Figure 4). Shed water off sills by sloping them away from the window, but put flashing in the joint below to catch and redirect any moisture that does get in. To install weep holes below a sill, place oiled ropes or rods in the mortar bed before setting the sill, then remove them after the mortar has hardened.

At all sills and lintels where the flashing does not extend the length of the wall, form end dams by folding each end of the flashing up into a head joint. This keeps collected water from running off the ends and into the cavity. At all corners and intersections, lap the flashing and seal it with mastic.

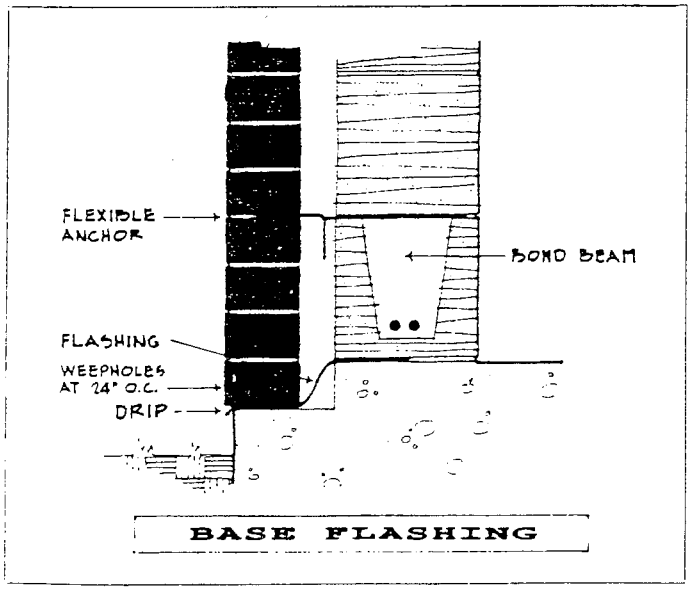

Figure 5. Installing flashing at the base of the wall provides one last route to drain water to the outside. Project the exterior brick slightly over the edge of the foundation to create a shadow that hides the exposed flashing and any differences in tolerances.

At the wall base

A course of flashing at the base of the wall catches all the remaining water that enters the wall and drains it out the bottom course of weep holes (Figure 5). To eliminate some of the aesthetic problems of conflicting tolerances between veneer and foundation, project the brick slightly over the edge of the foundation. This makes different tolerances less noticeable and again creates a shadow line that hides the exposed flashing.

For a drainage wall system to work, flashing must be properly selected and installed at all these locations: under the parapet coping, above each shelf angle, above lintels and below sills, and at the base of the wall. Omit flashing at any one of these locations and a leaky wall is likely. The cost of replacing failed flashing and other components damaged by water far exceeds any savings realized by skimping on materials, detailing, or workmanship.

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Metal cap flashings come in fairly long sections, do not have exposed joints, and are nonporous. If a metal cap is used, locate lap joints with sealant above the expansion or control joints in the parapet. This accommodates differential movement between the masonry parapet and the metal cap.

Slope copings so they drain toward the roof. Also, make certain they overhang the wall on both sides and have drips to keep water from running down the face of the wall.

Place through-wall flashing in the bed joint immediately below the coping or metal cap. This is the wall's second defense. Any water that penetrates the coping is diverted by this flashing. If coping anchors penetrate this flashing, seal around them with a flexible mastic.

Strengthening the top of the parapet by constructing a grouted bond beam between wythes presents another moisture barrier.

Because parapets are exposed to weather on two sides, they experience greater movement from expansion and contraction than any other part of a masonry wall. To absorb this extra movement, twice as many movement joints should be used in the parapet as in the wall below or the parapet should be reinforced with steel. To keep the back and front of the parapet expanding and contracting at the same rate, both faces should be constructed of the same material. A brick facing that is expanding at the same time a block backup is shrinking can tear the coping apart or separate it from the wall.

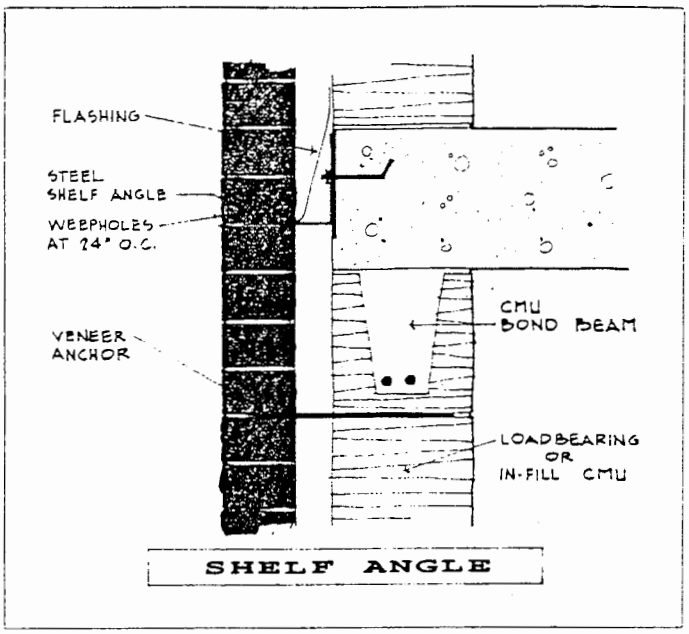
At shelf angles

At the roofline, install a shelf angle and flashing to separate the parapet from the wall below (Figure 2). This separation allows the parapet to move at a different rate than the wall below without ripping either wall apart. However, it also introduces an unbonded plane of weakness. Without enough allowance for expansion, parapet movement can cause horizontal sliding at this flashing line.

Flashing also should be installed at each shelf angle throughout the height of the wall. Extend the flashing from the backup through the exterior wythe. To allow moisture to escape, in the first course above the flashing install weep holes in the head joints every 2 feet on center. It takes both flashing a weep holes to make the system work.

Set the brick directly on the flashing without any mortar. This allows a little additional drainage and prevents the joint from becoming too wide aesthetically. Below the shelf angle, leave a 3/8- to 1/2-inch-wide soft joint to allow for brick expansion and differential movement between the veneer and backup. To reduce the visual impact of a wide soft joint, use a special brick with a lip that covers the exterior edge of the shelf angle.

BIA recommends extending the flashing beyond the face of the brick and turning it down to form a drip. Metal flashings can be handled this way, but if the edge is not hemmed, it looks wavy across the facade. Some



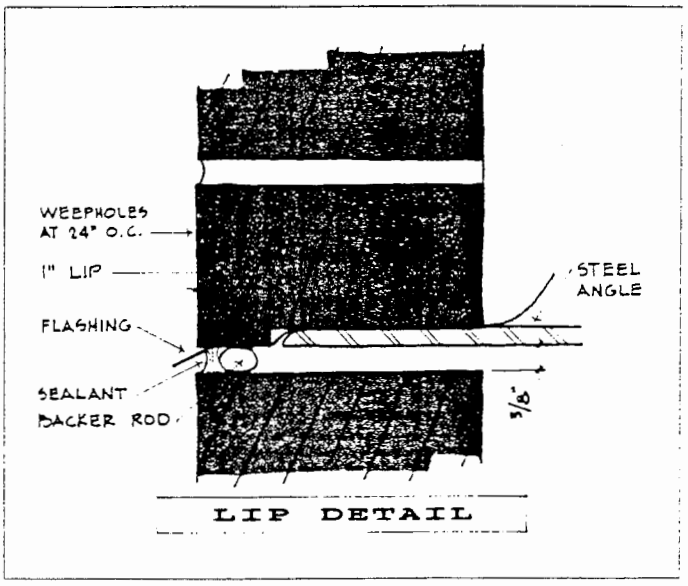


Figure 2. Install flashing above each shelf angle in the wall. Project the flashing beyond the wall face and form a drip. Below the shelf angle install a horizontal soft joint. If the extra-wide joint created by the soft joint is aesthetically displeasing, use a brick shape with a lip.

architects project the courses above or recess the courses just below the shelf angle to create a shadow line that hides the exposed flashing. Introducing bands of different color brick (recessed or flush) also helps disguise the flashing and joint.

Flexible membrane flashings cannot be formed into a drip, but they should still be projected beyond the wall face and trimmed flush after the brick is placed. The most important thing is not to stop the flashing short. If you do, water can find its way around the flashing and back into the wall.