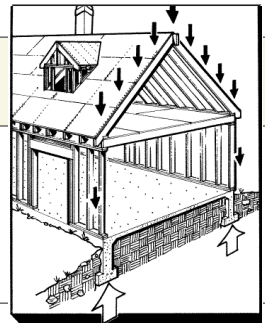
Keeping Water Out of Walls

by Robert Randall, P.E



While many of the building failures I investigate are caused by some structural oversight — like a weak framing member or an inadequate connection — just as many have another cause: water intrusion. Over the years, I have seen many cases of decayed framing, water-damaged interiors, and opportunistic carpenter ants nesting in wall framing, all because the builder failed to provide weathertight detailing.

Roofs generally receive a lot of attention, but keeping the water out of walls is equally important. It's easy to overlook important details when jobs fall behind schedule or the work gets rushed because of impending rain. Here are the most common trouble spots I see, with advice on proper prevention.

Housewrap

Before installing siding, cover the sheathing with some type of water- and air-barrier paper. I recommend the newer housewraps because they dependably divert water from rain or other sources while allowing water vapor from wall cavities to pass through. (Tar paper is less vapor-permeable and therefore a poorer choice, especially on old houses that don't have a good interior vapor barrier. Still, tar paper is a good weatherproofing membrane as long as indoor moisture levels are controlled.)

Install housewrap "shingle-lap" fashion (with the higher piece lapped over the outside of the piece below). This is sometimes forgotten when the housewrap gets torn and patches are put over previously placed material with no lap at the top. The right way to do this is to slit the previously placed housewrap above the tear, slide the patch up underneath at the top, then tape the slit.

At roof intersections and other flashed areas, be careful to lap the housewrap over the top of any flashings below and under any flashings above.

Window Heads

Many windows now come from the factory with self-flashing nailing fins that serve very well as window head flashing (see Figure 1). When the windows don't have self-flashing fins, install metal Z-flashing at the head, with about 1/2 inch bent down over the window head trim and 2 inches or more bent up against the wall sheathing. Install the housewrap over this head flashing so that any water that finds its way behind siding — as it inevitably will — is diverted to the outside.

Some trim details involve decorative pediments over windows and doors (Figure 2). Flashing must either lap over the top of these features or extend all the way up behind them from the door or window head flashing. Decorative gable louvers also require flashing.

Window Caulking

Window trim is often the source of leaks that give rise to decay and carpenter ant infestation; gable ends and

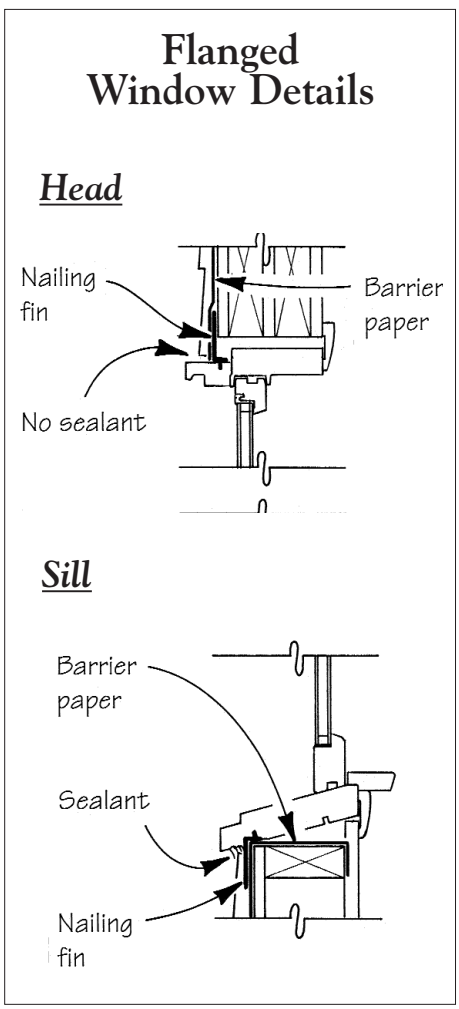


Figure 1. *With flanged windows, make sure the housewrap laps over the top fin. Don't caulk above the window head trim.*

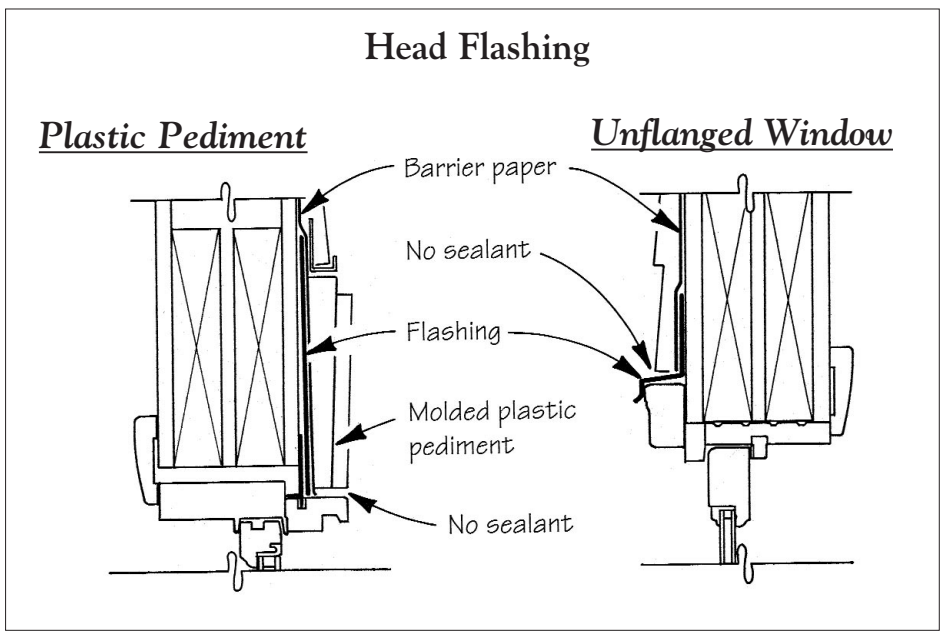


Figure 2. *Use metal flashing behind molded plastic pediments (left). Tuck the flashing behind the housewrap above and over the window fin below. With unflanged windows (right), install metal Z-flashing under the housewrap and over the window head trim.*

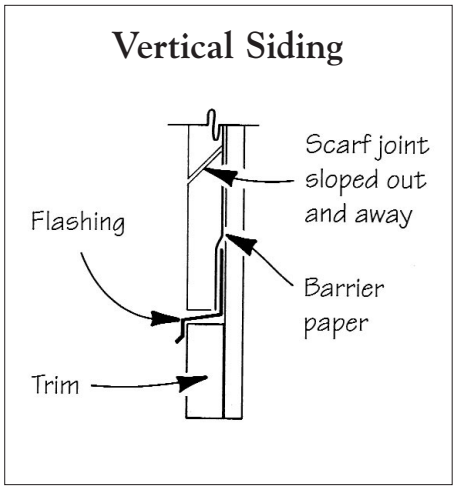


Figure 3. *Make sure joints in vertical siding are beveled so that water flows to the outside.*

other high-exposure areas are especially prone to these problems.

Most self-flashed windows depend on caulking at the sill to keep water from dribbling around behind the siding. This caulking is important, as is the detailing of the housewrap around the entire window. Pull the housewrap up over the rough sill and staple it on the inside to keep water out of the framing. At the jambs, I recommend a second strip of housewrap over the fins.

Do not caulk window and door heads; this can trap moisture and, especially with wood products, cause the siding to deteriorate. The flashing must be free to weep to the exterior.

Use urethane caulk. When caulking around windows and doors, be sure to use "the right stuff" — a low-modulus urethane sealant. Tremco DyMonic (800/321-7906), Sonneborne NP-1 (800/496-6067), Sikaflex (800/548-0496), and C.R. Laurence M64 (800/421-6144) are some good examples. The "wrong stuff" includes silicones, latex, acrylic, butyl, and most of the other products you'll find in the average building supply. It is well worth the effort to special-order the superior urethane product when sealing joints with one or both sides adhered to wood, masonry, or vinyl products.

Vinyl siding not weatherproof. Many contractors fail to realize that vinyl siding is actually little more than a decorative cover and ultraviolet screen for the sheathing and housewrap. J-channels at window and door openings and other vinyl trim pieces cannot be counted on to keep out wind-driven rain: The flashing and housewrap details must handle this job. With vinyl siding, I always double-cover the rough framing around windows with building paper, double-lapping all corners. Recently, I have begun to think that a self-adhering ice dam membrane might be a better choice for this critical area.

Vertical Siding

Vertical siding requires extra care in housewrap and flashing details because pressure differentials can cause wind-driven rain to work right through most tongue-and-groove or board-and-batten details. Even if water doesn't get all the way through, it must be able to weep out at the bottom.

It's important to avoid butt joints on vertical siding, and to scarf any butt joints that can't be avoided, placing the angle to deflect water down and away (Figure 3). I have seen bevels set backwards, which leads water behind the siding.

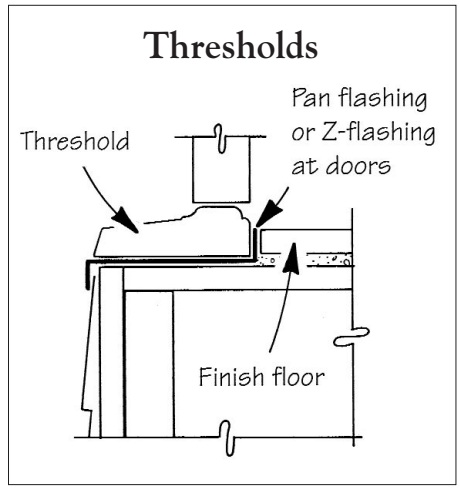


Figure 4. *A manufactured pan flashing or metal Z-flashing is important for keeping water out of the framing at doorways.*

Pan Flashing for Doors

Premanufactured door pan flashings are the best bet for keeping water from entering beneath a door sill. These are simple to install, and are adjustable for different door widths. In lieu of a pan, use a Z-flashing to direct water out beyond the face of the building (Figure 4).

Deck Ledger Flashings

All too frequently, even on new construction, I see deck ledger boards with poor flashing details or no flashing at all (Figure 5). Proper flashing at decks should extend at least 6 inches up behind the siding and housewrap. Flashing should then extend down behind the ledger board to a drip-edge below. When flashing is extended horizontally on top of the framing, water often runs across the tops of the joists and behind the ledger. In many cases, all these issues can be avoided by building the deck so that it stands free of the wall or with a spacer between the house and the deck band joist.

Cantilever Deck Joists

Whenever a deck or balcony cantilevers from within the structure, the joist penetrations are a trouble spot. I usually prefer to cantilever galvanized steel members at wide intervals as main carrying beams, then run the wood framing parallel to the building

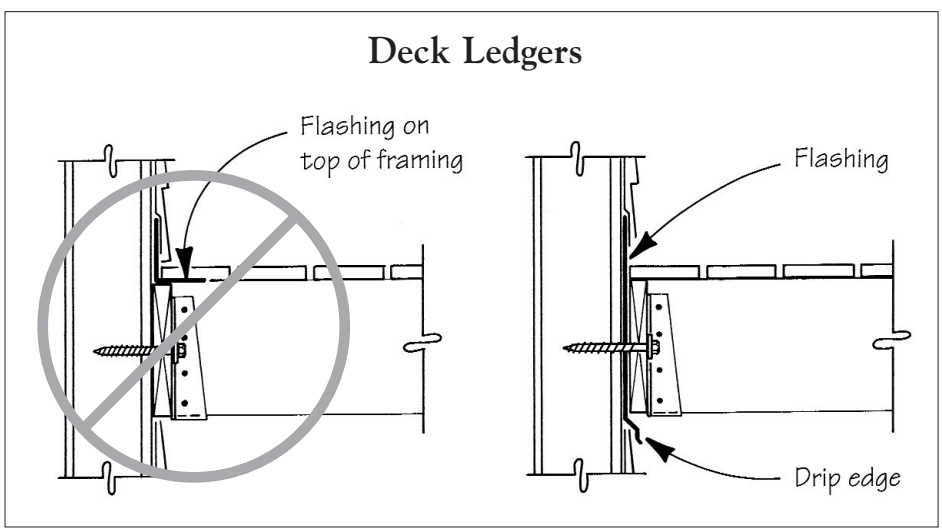


Figure 5. *Flashing on top of deck framing (left) allows water to seep underneath into the framing. The proper way (right) is to flash behind the ledger.*

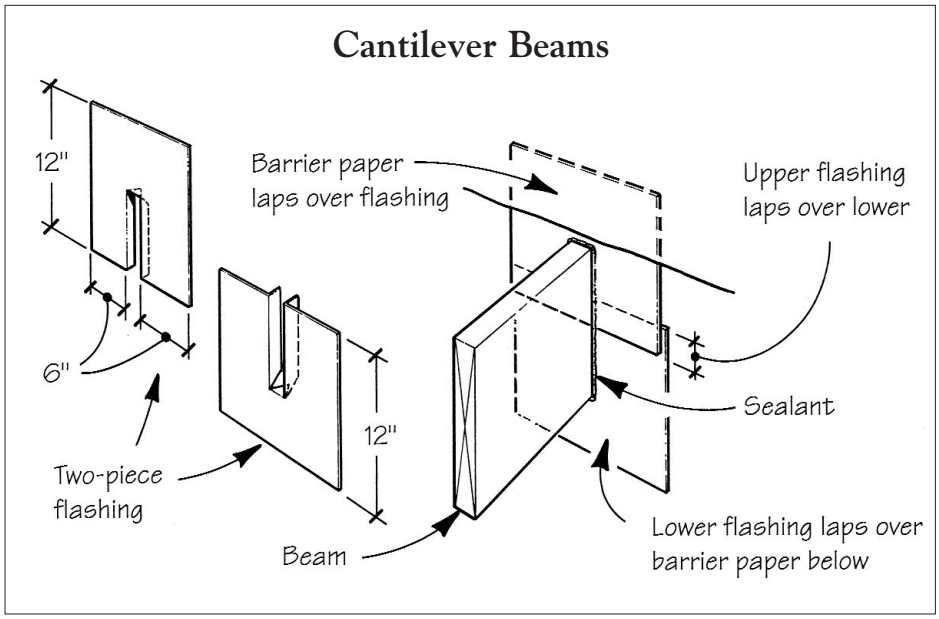


Figure 6. *A two-part flashing sealed with urethane is a good way to protect beams that penetrate the house skin.*

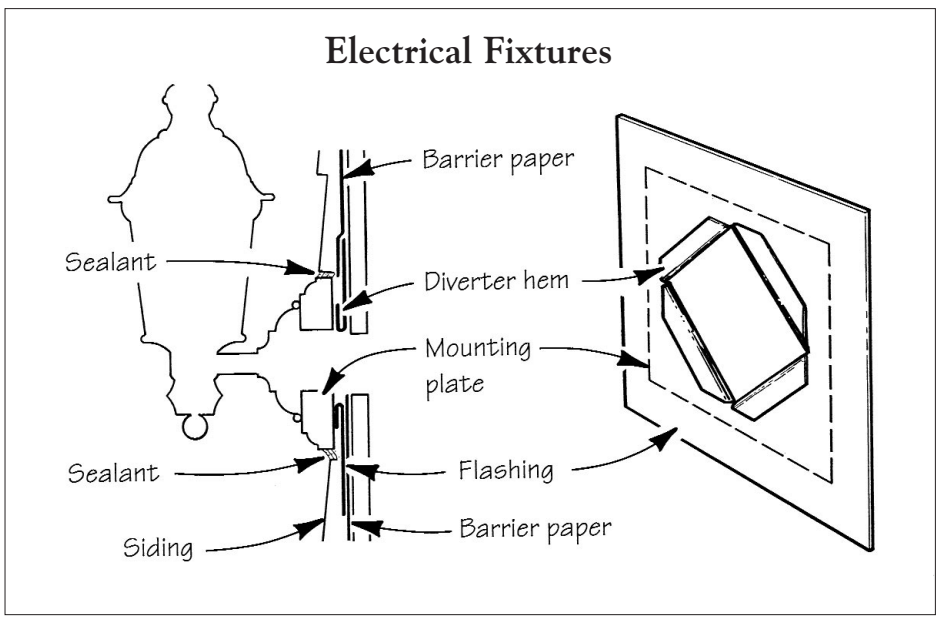


Figure 7. *Exterior wall-mounted electrical boxes and fixtures can be sealed with a metal flashing cut out and hemmed to divert water.*

wall, with the closest joist at least an inch away from the siding. Where this detail doesn't work, I specify two-piece flashings, as shown in Figure 6.

Electrical Fixtures

It's common to see wall-mounted lights, exterior receptacles, and other wiring fixtures simply mounted over the siding with little or no thought given to keeping the water out of the wiring penetration. A good solution is to install a mounting plate with metal flashing beneath. Use urethane sealant to seal the siding to the flashing, and seal the electrical device to the mounting plate (Figure 7). There are manufactured mounting plates available. It's a good idea to double up the housewrap at these locations as well.

Keep Wood Framing Above Grade

Never let site conditions force you to build frame walls below grade. Always keep at least a few inches of exposed foundation below the bottom of the siding. Otherwise, moisture and insects are sure to destroy the bottom of the wall. ■

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