Foundation Waterproofing That Works

An effective system—one that prevents a wet basement—relies on three key components

BY MATT RISINGER

Photos by Matt Risinger

One of the worst phone calls you can get as a builder is the one from a client calling to say he has water in the basement. We do everything we can before backfilling a foundation to avoid getting this call. Of course, an effective foundation waterproofing system costs more up-front. But compared with having to return to the site, excavate the entire foundation, and fix the problem, the up-front cost is a bargain. Add in the loss of reputation and all the hard feelings you're going to have with the client, and the cost of doing it right from the beginning is negligible.

In this article, I will focus on the three components of an effective foundation waterproofing system and discuss some of the products that I rely on for keeping basements dry.

BLACK GOO DOESN'T CUT IT

In the old days, the go-to foundation waterproofing was an asphalt-based, black, nasty goo. That material is a byproduct of oil refining and is actually not considered "waterproofing" but only "dampproofing." Asphalt goo can't block bulk water that builds up against a foundation; it can only prevent the moisture from damp soil from seeping into concrete. As soon as that moisture accumulates and saturates the soil, it builds hydrostatic pressure that can drive the water right through asphalt dampproofing.

Effective foundation waterproofing is more than just one product; it's a system with three critical components: a membrane to protect the concrete; a drainage mat to relieve hydrostatic pressure

and allow water to drain down, instead of in; and a French drain at the footing level to carry water to a daylight drain or to a sump pump.

FIRST LINE OF DEFENSE

In the order of building, the first component in the system is a true waterproofing material applied to the surface of the foundation walls. This can be a liquid-applied coating or a peel-and-stick membrane.

Liquid-applied membrane. Newer-generation liquid-applied materials that use SBR (styrene-butadiene rubber) are specifically designed for waterproofing concrete. They function as true waterproofing because they are completely insoluble in water and can resist hydrostatic pressure (although we do want to limit this pressure, as I'll explain further on). The material is spray-applied as a liquid, so it goes on as a continuous, monolithic membrane. At critical areas—transitions between the footer and the foundation wall, inside corners, or pipe penetrations—a liquid material perfectly conforms to surface variations without a lot of fancy origami.

There are a number of waterproofing products formulated for concrete walls. A builder friend of mine, Brian Long, swears by Poly Wall's Home Stretch Liquid, a synthetic rubber product that has been used in the commercial market for more than two decades but has only recently been introduced to the residential market.

The first step in applying this material is to inspect the surface of the walls and fill any large voids with mortar **(1)**. Smaller voids are OK; the rubber will fill them. But larger imperfections will fill unevenly and create a weak spot in the monolithic surface.

All through-wall penetrations **(2)** and the cold joint between the footing and the wall **(3)** are critical areas that need a heavy bead of sealant, such as Poly Wall's 2200 sealant, first. The sealant should be

tooled to ensure good adhesion and complete coverage **(4)**.

You can roll on a liquid-applied membrane, but Brian Long likes to spray it on the wall **(5)**. Spraying is faster and makes it easier to control the thickness. He has a crew member follow with a roller to even out the laps **(6)**.

The material is sprayed on to a 60-mil thickness **(7)**, which dries to a 30-mil, one-piece, no-seam finish. The crew uses a hydraulic Graco 733 sprayer and periodically checks the thickness as they work. One nice thing with the sprayers: You can leave material in the machine for up to two weeks, which gives you the ability to return to a single job on multiple days without a lot of heavy clean-up.

After the membrane is applied, Long's crew checks the surface of the membrane and deals with any imperfections, using the 2200 sealant to fill in any holes, pock mocks, or places there isn't complete coverage **(8)**. This step may seem incredibly picky. But again, compared with dealing with an unhappy client, it is time well-spent.

Peel-and-stick membranes offer an excellent waterproofing alternative. I have had good experiences with the Cosella-Dorken Delta system. It starts with ColdJoint Barrier—a 40-mil-thick membrane that is applied to the horizontal ledge of the footing and up the wall for about a foot to protect that critical footing joint **(9)**. The vertical leg of the ColdJoint Barrier is overlapped by the Delta-Thene, Cosella-Dorken's foundation wall membrane **(10)**, a 40-mil-thick peel-and-stick product that's about 3 feet wide. We run the membrane vertically. Like almost all membrane products applied over concrete, Delta-Thene and ColdJoint Barrier require that a primer be rolled on first. We then pull the backing off the membrane to apply it, creating an adhesive-to-adhesive bond that holds tenaciously.

Over the waterproofing membrane, we add an insulation layer. Here in Austin, we need only one inch of foam; in northern regions

you'd need more, of course. A nice feature of the Delta system is the plastic stab anchors it provides for installing the insulation. The anchors have a peel-and-stick adhesive that bonds them to the surface of the Delta-Thene **(11)**. With these in place, all we have to do is push the insulation on to hold it in place. We can use the same anchors to install the drainage mat. Most important is that we end up with no penetrations through the waterproofing membrane.

DRAIN DOWN

After applying a waterproofing to the foundation, a lot of builders think the job is done and move directly to backfilling. But by doing so, you are allowing water to back up directly against the membrane, where it might find an imperfection and create a leak.

The ideal way to solve this is to put a drain board over the membrane. The primary purpose of this drain board is to provide an air gap so that water running towards the foundation hits that gap and flows down to the footing drains. Think of the gap as a pressure relief valve. If there is an open gap, water pressure can't easily build up against the foundation.

Secondarily, the drain board protects the waterproofing membrane against rocks or road base or whatever you are using as a backfill material.

I've used Delta-Drain, a dimple mat from Cosella-Dorken. Like most drain boards, it's covered with a filter fabric that keeps soil from clogging the gap. The boards run vertically and are installed over the insulation using the same stab anchors mentioned above **(12)**.

Poly Wall's Arroyo drain board works well, too. It comes with a unique layout of dimples, with larger ones at the bottom of a 2-foot-wide starter course, and smaller dimples at the top of the section that mesh with the dimples of the next, 4-foot-wide course.

Long's crew installs the Arroyo product using a spray contact adhesive that they apply to the board's back **(13)** and to the wall. They


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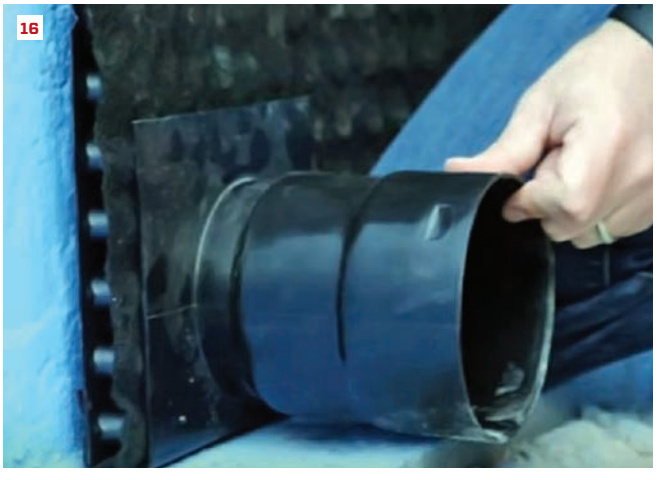
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allow the adhesive to flash off, the way you would with a countertop adhesive, and then apply the board to the wall **(14)**. It sticks tenaciously, and there's no need for fasteners that would make penetrations through the water barrier. At corners, the crew scores the back to break cleanly and fold over the corner **(15)**. You don't want to cut the filter fabric anywhere. The fabric at edges runs long so you can stretch it over the course above or around a corner. You want to maintain an unbroken, uniform fabric surface to keep any sediment from getting in and clogging the spaces created by the dimples.

Arroyo drain boards run horizontally, so you can install them in lifts, backfilling as you go. This makes it easier on the crew, because they do not need to reach up the entire height of a tall wall.

The Arroyo system offers an outlet system **(16)** that works if you are not using a traditional French drain. The outlets tie right into the drain board and allow you to tie in a solid pipe to drain water out directly from the boards.

DRAIN OUT

Any foundation waterproofing system that protects the foundation from water and relieves hydrostatic pressure needs a third critical component: a way to drain out. We always install a traditional French drain system—a standard that Americans have been using for generations on houses. This consists of a drain pipe that is run in a bed of rock. We typically use 4-inch Schedule 40. We have found that Schedule 20 can collapse (and the corrugated black pipe seems essentially worthless), so it's worth going with the thicker-walled PVC pipe. The holes are predrilled and always face downward. The perimeter pipe is covered with a coarse gravel or septic rock that must be separated from the surrounding soil with filter fabric to prevent soil from clogging the rock.

A conventional footing drain uses a single pipe around the perimeter and a filter sock, but the sock limits the volume of stone that you can install to provide drainage.


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Long takes the French drain to whole new level, using two pipes (see photo on page 43), each with a clean out that he installs at every corner **(17)**. If a problem ever occurs with the drain system, it will be easy to run a snake down to free up a clog.

Around the perimeter of the footing, Long pours gravel over the twin drain pipes into what he calls a "drainage burrito," starting with a wide piece of filter fabric running up the wall and onto the bottom of the excavation. He lays in the drain pipes and covers them with a healthy amount of septic rock. He then applies spray adhesive along one edge of the filter fabric **(18)** and pulls the fabric over the rock, adhering the edge to the fabric draped up the wall **(19)**. On top of this, he comes in with another layer of filter fabric and then covers that with another layer of filter fabric **(20)**. This double layer of rock and fabric ensures that he doesn't allow any sediment inside the drain; the house shown in the photos is in a part of Texas that has a fine caliche that is adept at finding its way inside a drain, so Long needed to be meticulous about how he detailed the fabric.

In many of the houses that I build, we run a second French drain around the inside of the footing as well. The inside drainage and the outside drainage are connected by short sections of Schedule 40 every 8 to 10 feet that run crosswise through the footing. This provides a nice failsafe: If one section of the drain fails, water can bypass to the interior or exterior path and still get out.

On a hilly site, it is usually easy to run the perimeter drain to daylight, but in most cases we run it to a sump pump. Sump pumps tend to fail during heavy rains from working overtime, however, or stop when the power goes out. Because that is not when you want to be without a working sump pump, we always include a secondary pump wired into the system with a battery backup.

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