Ask Jon Eakes

Basement Perimeter Drainage and Leaking Foundations

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This article deals with walls below grade, foundation walls. For insulating above grade cinder block walls see How do you Insulate a Brick and Block construction as well as Insulating an Above Grade Block Wall from the Inside.

The best way to prevent water from leaking into the basement is not waterproofing the wall, but keeping the water away from the wall in the first place. If this only happens in your house with Spring flooding during the Winger thaw, a time when you have ice in the ground and water on top, you may not have to do any drastic foundation drainage or waterproofing work at all.

Rain gutters and landscaping that flows water away from the house is the first line of defense. I estimate that 80% of all those Spring flooding problems can be solved by controlling both roof and yard water flow. Check out the Overview listing on Spring Flooding of Basements.

Then in new construction you can do the real quality job of installing an foundation Air Gap Membrane. That is a plastic sheet that looks like an egg carton. The little feet keep the soil away from the house and if any water does head towards the wall, it falls down the air gap and goes right to the weeping tiles or perimeter drain. That means no water pressure at all on the wall, no leaks into the basement. These products work -- products like: Platon, Delta MS or DMX. Drainage membranes simply avoid future problems and are inexpensive to install when the wall is still totally exposed. I wouldn't build a new house without one. (Follow this link for an extended discussion on Air Spaces in Walls.)

In renovation with a foundation that leaks, and it is not just frozen ground directing too much water towards an imperfect foundation in the Spring, you are faced with a number of possible solutions. Always try raingutters, downspouts away from the foundation and slopping your landscaping away from the house first. Only when that doesn't solve the problem you need to look at a confusing array of solutions..

If you can determine that the water is coming from a high water table, you need to look at installing a sump pump or improving the one you already have. A sump pump could also just be part of a larger improved drainage system.

All the other repairs are divided into two catagories: repair from the inside or repair from the outside. Outside solutions are always technologically better and always more expensive -- and because of the expense, not always justified.

Inside solutions are never perfect but can be quite effective and they are less expensive, assuming that you are not destroying a beautiful finished basement to do it.

Outside is more expensive simply because you have to excavate. I am not a proponent of injecting blindly from the outside with things like bentonite clay because although it can work, it often simply clogges up drain tiles. If you have no drain tiles at all, then it could be an acceptable and non-disruptive solution. But remember, you have blocked the water for the moment, you have not removed the water pressure from the wall.

Outside can also become expensive because of the presence of decks, driveways, walkways and other obstructions. However when you can do it from the outside the question comes up -- should I water proof or concentrate on drainage.

Liquid waterproofing coatings exist and can work, but I far prefer to work on drainage. Any crack that is missed in waterproofing, or that opens up with structural movement, will leak. When we take a drainage approach, the perfection of the wall has little importance, the water just doesn't get to the wall.

External Drainage

If you are going to dig up all around the house, my ideal objective would be to go down to the footings, repair or install good drainage tiles alongside the footings that either drain away or under the house to a sump pump. Now before putting back the soil, I would install a drainage membrane on the wall that will catch any water that approaches the wall and drop it to the perimeter drains and away, never putting any water pressure on the wall. Cracks are miminally caulked, but with the drainage membrane and no water pressure on the caulking, they will never leak. Now you have the best water protection we have developed to date for a foundation. See the links above for a couple of membranes. It even works with imperfections, unlike a water proof membrane that has to be perfect.
I would not dig everything up only to put in a drain and then put the soil back without installing an air gap membrane. The biggest cost of an air gap membrane is digging the hole, and you are sitting there with a hole already made for the drain. The air gap membrane is so effective in the long term that you have really missed an opportunity for a permenant solution if you don't install one while you are there.
This same technique can be done on a very localized basis for a single crack, assuming you have functioning perimeter drains already. Simply dig down to the drain only a couple of feet wide on each side of the crack. Caulk the crack with butyl caulking. Put a strip of a Air Gap Membrane over the crack about 2 to 4 feet wide. Replace the soil. Now any water that gets around the plastic, will free fall to the drain, not try to find a hole in the caulking. There is no water pressure on the caulking.
Internal Drainage
The concept with internal drainage is that we will let the water into the basement and direct it to a drain or sump pump -- so we are not fighting against all the water, we are controlling it.
One technique is to dig a trench through the concrete all around the basement and install a perimiter drain under the concrete slab. This will draw water that might be rising up to the slab, or coming in under the footings and run it off to a gravity drain or a sump pump. Aside from all the work of digging up the concrete and repouring concrete, this technique can potentially create a problem of errosion under the footing, if in fact the water is coming from a concentrated source outside the foundation.
A second technique is to drill holes in the foundation wall and let the water in right on top of the floor slab, and then with special channels, often called Beaver Dams, we direct that water towards the drain or sump pump. This channel looks a bit like a piece of floor trim. It is sealed to the floor but not to the wall, which allows any water that might drip down the wall to follow the controlled flow as well. A plastic sheet or other membrane could be placed on the wall to prevent this wall moisture from getting into the basement and directing it into the drainage channel. On a cinder block wall, holles must be drilled into the bottom of each and every vertical empty cavitiy because sometimes one is full of water and the one next to it is not. Done right, this system is an excellent system. One reputable company that specializes in solving basement water problems from the inside with this and other techniques is Basement Systems.
When we drain water problems from the inside, we accept that the concrete or block wall will potentially become quite moist -- and we have to deal with that to avoid excessive humidity in the basement or moisture in wall finishes. Generally this can be controlled with a simple plastic sheet that starts at ground level and goes down to the floor, tucked into the drainage channel. If we are adding heavy insulation over this we can get into trouble with a double vapour barrier, that is why we do not extend that plastic sheet higher than ground level. It is high enough to intercept any water coming into the wall through the soil, but it leaves a good portion of concrete bare at the top, behind the insulation, that will allow the moisture to escape outward through the concrete -- hence not a complete double vapour barrier. Some people prefer to waterproof the concrete with something that is permeable but waterproof, like Xypex. Even with this, there is no reason to work above the level of the soil on the other side of the wall -- water just doesn't come in above the soil, unless through a large crack and a large crack above grade would be visiable and sealable from the outside.

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