

Rain and Water Control Systems

The Rain in Spain Stays Mainly in the Plain

If you've ever been to northern Spain, you'll know that's not true but it's certainly a tantalizing tongue-twister, particularly for those of us who enjoy the theatrical arts (the line is a key lyric in Lerner and Loewe's *My Fair Lady*).



The problem is that rain doesn't stay mainly in the plain. Unless you're living on the moon, the fundamental force of gravity always forces rain to seek the lowest possible point. Unfortunately, that lowest possible point usually includes your home's foundation, basement or crawlspace.

But water isn't just a menace *after* it touches the ground. There are lots of ways for water to cause damage in a home because there are so many options for water to get into the home: through the roof and siding, windows and doors, foundations, plumbing leaks or blockage, air conditioner condensation, and even leaking showers. Water can even rise up from under the slab (no, the force of gravity isn't magically inapplicable, the water is just pushed up by hydrostatic pressure and/or other forces).

Water is one of the biggest sources of home damage.

Water damage is particularly nefarious because water creeps in to your home over months or years without attracting much attention. You wake up one day and wonder why it costs so much to fix something that likely could have been easily avoided.

Therefore, it is critical to take preventive and, in some cases, corrective measures, to keep water where it belongs – away from your home. Because the topic of water damage can run off in lots of different directions (get it, "run off?"), we address ground water control and roof water control and will plan to cover other water issues in future releases.

Ground Control to Major Tom: Check Your Grading

Try wrapping your brain around this concept – a below-ground foundation is simply a reverse in-ground swimming pool designed to keep water out instead of keeping water in. Heavy, huh? Just like bending the spoon.

But seriously, controlling surface water around a home is the most important step to ensuring a proper defense against water ingress. Regrettably, it's almost always the most often overlooked strategy.

Surface water refers to water which is introduced to the soil when it rains. If not properly controlled, surface water may penetrate the home's interior and create damage to the structure, interior surfaces, and homeowner belongings (including your priceless supply of the last 37 years of National Geographic magazines).

Most homeowners look at their pretty landscaping and pretty flowers and pretty green grass without considering the effects of landscaping on water control. Two words: slope matters. When landscaping, it's

not just important to see the pretty flowers, but also the slope of the ground and any obstacles to water flow away from the house. Flowers are great, we love flowers, heck, everyone loves flowers, but flower beds close to the house can damage the home by holding water directly against the foundation walls.

Installing barriers (landscaping timbers, vertical plastic edging, or stones) often exacerbate the problem because the barriers don't just hold the flowers and mountains of mulch; they also block drainage. If you must cling to your landscape timbers and edging, make sure downspouts extend beyond the barriers.

If your home is in cold climes, don't direct downspouts onto the driveway and/or sidewalks; snow and freezing rain can make the walking areas unsafe and help to accelerate cracks in the driveway and/or sidewalk.

The Slope of Things to Come

When we mention grading as a defect in a home inspection, the most common question is "Huh?" We're generally more interested in the second most common question: "How do we fix our grading?"

For home inspections, "grading" is simply a term to help describe surface elevation changes when compared to other areas around or near the house. Proper grading is when the grade or slope of the elevation slopes downward and away from the home at a rate of 1 inch per foot for the first 6 feet and then a continued slope for at least 10 feet from the foundation.

It sounds complicated but it's pretty simple – a proper grade allows water to flow away from the home and foundation; an improper grade allows moisture to flow back towards the home and seep into the soil. With improper grade, rain saturates the soil, pressures the foundation, and eventually forces moisture through the foundation and into the basement or crawlspace.

When you're talking about grade, you may hear our home inspector use the word "swale," a depression in the grading that is sloped to divert water away from the house. A swale normally is used when the surrounding grade is relatively flat and the sloped depression creates a way for water to flow away without changing the overall grading.

Although there are other strategies for keeping water out, including drain tiles, damp proofing coatings, or sub-slab drainage pump systems, grading is the easiest and most cost effective primary defense against water.

Ups and Downs, Strikes and Gutters

Did you know that when 1 inch of rain falls on a 2,000 square foot roof, 1,250 gallons of water pours from the roof? That's a ton of water. Actually, that's five tons of water.

We claim no special skill in math, but this one is a pretty simple calculation – if the home has four downspouts, there are over 300 gallons of water dumping near the foundation in four different areas.

If an area receives only 4" inches of rain per month, the roof sheds 60,000 gallons of water annually. At the risk of stating the obvious, it is critical to control water draining from the roof and divert the water away from the foundation walls to prevent water penetration.

What's the best way to control roof water? Gutters and downspouts are inexpensive and simple ways to keep rain water from dripping down and accumulating around the foundation and saturating the soil near the foundation.



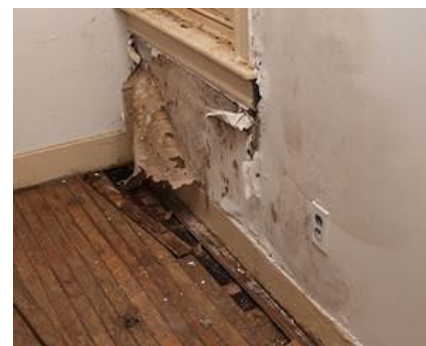
Gutters must be sloped or pitched to allow water to drain to the downspout area. Too little pitch and there's not enough flow to remove debris in the gutter; too much pitch isn't aesthetically pleasing. Generally speaking, an effective gutter slope is roughly ¼ inch drop for every 10 feet of gutter. Gutter runs in excess of 30 feet should have a downspout installed at each end, pitching the gutter from the center towards each downspout.

Over time, gutters sag as attachment points loosen; this phenomenon allows water to stand in the gutter and concentrate debris in low areas, the weight of which makes gutter attachments even looser and creates more sagging until the gutter hangers or spikes fail completely. Therefore, it is important to clean the gutters regularly; check to make sure that hangers are tight to prevent sagging.

Downspouts (or leaders) collect water from gutters and divert water to the ground. Downspouts must terminate at least 3 inches from the foundation walls. Problems occur when downspouts don't direct water properly or where there is blockage directly in front of the downspout. If the turn piece where the downspout meets the ground (90° or elbow) is missing, the downspout will direct all water straight down the foundation, erode the area and pond water directly against the foundation.

When Water Avoids Even the Best of Prevention Intentions

Even with the best of water prevention intentions, we've all been victims of April showers that seem to last for 40 days and 40 nights and which figure out ways to push water into the basement or crawlspace. Thankfully, most recently constructed homes offer some drainage systems installed on the interior and/or exterior of the home.



What's the first thing you think of when it's raining heavily? That's right: "Gosh, I hope my sump pump is working." It's probably a good idea to check your sump pump before the heavy spring and summer rain seasons. Check to make sure that either the vacuum switch or the float triggers the pump and that the ejector line is clear of debris. As with downspouts, sump pump discharge should be away from the foundation, not obstructed and not discharged on sidewalks or driveways.

Unless you live in an area with near zero rain, ground water is almost always present, and water may well up under the slab during times of heavy sustained rainfall even when grading is proper and roof water is controlled. In addition to a sump pump, there are other ways to address ground water, including sub-slab drainage, and directing drainage lines to the exterior.

Controlling ground water in a crawlspace is a similar battle. Add a sump-pump or drainage system and if the crawlspace is dirt, cover the area with a vapor barrier (heavier weight plastic), which helps to prevent moisture from escaping into the crawlspace area. The vapor barrier won't stop ground water from flowing into the crawlspace, but it helps to reduce humidity and acts as a deterrent to keep water vapor and dirt smell out of the crawlspace.

[Avoid the Swimming Pool in Your Basement](#)

Although it may be a grand idea to invite the neighborhood kids over to go swimming, you probably didn't imagine setting up the pool in your basement.

The challenge of water control is just like anything else in life – prevention is the best cure.

If you properly employ simple and inexpensive water control methods – grading, gutters, and downspouts – you will greatly reduce your risk of long-term damage caused by water.

If you or your clients have any questions about water control or any inspection service, US Inspect is pleased and available to guide and assist you.

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