

Managing Crawl Space Water

In my past life as a contractor, I installed numerous drainage systems. There have been lots of questions about this lately, so here are some basics about crawl space water management:

To begin, I am a firm believer that whenever possible, crawl space water should be mitigated before it reaches the sub-structure. In practice, that means the installation of a sump pump in the crawl space should be the last choice. Water which could be mitigated at its source, but is allowed to enter the crawl space may ultimately cause foundation damage and settling as well as creating conducive conditions for wood destroying insects. Granted there are occasions where a sump pump is the first and best choice, but in my opinion, that is not the rule. Managing crawl space water means having an understanding of where water comes from and then designing a system which will prove empirically whether the design was correct or not. The plan should start with the obvious and every subsequent step of the plan should be able to build upon the previous so the customer is not throwing good money after bad.

Sources of Water

Roofing System

This is the first and most obvious culprit. Did you know that if we had one inch of rainfall a 1500 square foot Rambler will shed 1000 gallons of water off the roof? That same Rambler would have dumped over 17,000 gallons of water during the record rains in November.

Soil grade

Soil should slope away from the house, ideally dropping 3 inches over 5 feet. How many times do the landscapers create issues with grade? How many times are houses built at the bottom of a hill side? Take a look at some of these big new construction sites and notice how soil grade will put water into surrounding houses.

Sub-surface runoff

This is a big issue where there are layers of clay just under the permeable soil such as Steamboat Island area and Cooper Point. Again, houses at the bottom of hillsides are particularly susceptible.

Hard surface runoff

This includes driveways and patios. I am finding more and more issues on newer construction where the soil was not adequately prepared prior to pouring the flatwork. In just a few short years, patios and sidewalks are settling and often sloping toward the

structure and directing water into the crawl space. Driveways sloped toward the house with no way to divert water can also be a culprit.

Springs and high water table

Springs are a rarity, but a high water table can exist, especially in areas like Devon Loop and Steamboat island area. These are the types of situations where a sump pump may be the first and only choice.

Acts of God

I remember the 100 year rains of 1996 and of course we are all still intimately familiar with November. The fact is, no drainage system, regardless of how well constructed, can withstand forces of nature to those extremes. So is it appropriate to spend thousands to install a drain system for something that only happens every 100 years? Personally, I say no. However, issues of liability continually overshadow common sense and I know that a great many systems have been installed because of this.

Mitigation, Step by Step

- Determine where in the crawl space the water is and look for signs of entry, like efflorescence on the concrete, water staining at the foundation vents or even water wicking through the concrete. Mildew and stringy insulation hanging down are indicators of a chronic problem. Take what you see and draw it on a foundation and site map, plotting out signs of water in relation to downspouts, patios, driveways and soil grade toward the structure. Everything happens for a reason and sometimes the answer pops right out at you when you put it down on paper. And consider too that often, there is more than one source.
- Make sure the gutters are intact and not plugged with debris. It sounds like a “gimme”, but you would be amazed how often water conditions can be fixed just by repairing and cleaning gutters so they don’t leak or overflow.
- Make sure the downspouts are draining away properly. If unsure about the condition of buried drain lines, have them professionally inspected and video scoped. Builders are becoming better about connecting downspouts to tight lines, but they generally make no provision to keep debris out of the system. Further, who knows what happens to the drains when the backfilling is done. If you think that the water in the crawl space is coming from the downspouts, or a damaged drain line, there a couple of cheap things to do to prove your theory: First, go to the hardware store and buy some 10 foot lengths of *non-perforated* 4 inch drain line. Connect these to your downspouts so you can be absolutely certain the roof runoff is getting far away from the house. If the crawl space dries up, then you know where the water is coming from and you can probably reuse the drains to correct the problem. You can also try running septic dye down the downspouts and see what happens in the crawl space.

- Make sure the soil grade is away from the structure. Swales can be constructed to help direct water away. Be sure the foundation vents are not below soil grade.
- Check hard surfaces for level and sloping toward the house. There are things like “slab jacking” which can re-level concrete flatwork. Sometimes sealing the concrete where it meets the house foundation will help.
- If necessary, install a perimeter drain to capture water before it reaches the crawl space. If there is slope to the property this can be done by gravity. If not, an exterior sump pump can be installed to get water away. Sometimes dry wells can be dug to allow water to diffuse into the soil, but it really depends on soil type. If you install a perimeter drain, tie your downspouts into it and make sure it terminates (daylights) well away from the house. Depending on soil type, be sure to use filter paper so the drain system does not fill with sediment over time. If the house is on a hillside, be careful the drainage doesn't contribute to erosion. Again, make sure the drainage you are moving out of the crawl space gets far away from the structure. I have seen many instances where drains terminate so close to the house, the water simply goes back into the crawl space creating a continuous cycle of recycling the same water in and out.
- If it now becomes apparent that a sump pump in the crawl space is needed, make sure it is done properly with a rated sump container, not a \$2.00 plastic K Mart garbage can with holes in it. Sumps should be plugged in to a GFCI outlet, not hardwired. Drain lines should have a device for back flow prevention and they should not terminate in the sewer. As part of this system, pea gravel may be installed throughout the crawl space under the vapor barrier. This is to prevent capillary action which may allow water to wick upwards.

Lastly, a word about *encapsulated crawl spaces*, which was the question that started all this. According to what I have read, encapsulating crawl spaces with a thick plastic is being touted as a way to deal with moist crawl spaces, but perhaps not wet ones (See the other article I attached). My biggest concern with this system is that there is no provision made for what we call a “Termite Window”. In other words, if one installs plastic over the entire crawl space, up to the wood sill plate atop the stem wall, this creates a perfect environment for Subterranean Termites to get to the wood. With no space or gap in the plastic, there is no way to inspect for insect activity. Further, this also tends to take all the moisture under the plastic and concentrate it near the wood sill plate and lower wall, increasing the risk of rot.

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