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CRACKS, MOISTURE AND STAINS IN BASEMENT WALLS AND FLOORS

Winter is brutal. Freeze - Thaw cycles destroy pavement and frozen rain can pull down wires and trees. Those same forces are busy below grade as well, and they can wreak havoc on the home's structure. When the ground freezes, it swells and pushes against the foundation. This pressure can crack the wall, occasionally resulting in serious damage to the home. Most often though, the crack is merely a cosmetic concern.

As a general rule, **all concrete foundation walls will crack**. The crack is usually vertical. It is caused by shrinkage of the concrete as it cures. If you find a vertical crack, rub your fingers across it. If both sides of the crack are even, the crack is most likely from shrinkage. This is a common cracking pattern and is rarely a structural concern. Although, if you have water entering through the crack, get it professionally repaired.

Occasionally the wall on each side of a vertical crack is not even. A backhoe operator in a hurry may have caused this type of crack. Walls are sometimes cracked during the backfilling process before the concrete is fully cured, or by driving heavy vehicles too close to the walls, i.e. having a driveway beside the foundation. Sometimes, ground shifting due to the proximity of heavy machinery or by blasting can shake the ground and cause it to shift. If the soil gets wet because of a faulty downspout, it might expand and cause the walls to bulge. Tree roots can also push concrete walls until they fracture, and in some areas of the Okanagan, expansive clay can cause concerns, especially from season to season and between wet and dry periods.

Concrete block walls are prone to problems as well, and obviously, these walls are not as strong as a poured concrete wall. If properly installed and maintained, they generally perform well. Again, a vertical crack is usually not generally a concern. The wall is merely segmented, and the wall on both sides of the crack is doing its' job. Look for water penetration, and if present, get it repaired.

If you find long horizontal cracks in your wall, you should be concerned. A horizontal crack compromises the integrity of the entire wall and could possibly lead to structural failure. If the crack appears to be moving or if the wall has a noticeable bow in it, call a structural engineer or geotechnical specialist. These horizontal cracks usually appear about a metre below grade. They are generally caused by hydrostatic pressure against the sidewall, and force the wall to bow inwards. If a new crack is found, my first advice is to "monitor the crack". If the crack never changes, you most likely don't need to worry about it.

Monitor the crack? Watching cracks change in size and shape is like watching the minute hand on a clock ... it's very difficult to see it move. Creative ways can be designed to measure movement and direction of crack. Soil conditions can vary greatly between the seasons, so it takes a while to be sure there is no movement. If the crack is moving, call an engineer.

When an inspector finds a crack in a basement wall, the first thing we try to do is to determine is "what the crack has been doing **lately**". Cracks caused by improper backfill, or water damage ten years ago, are far less of a concern than a crack that is moving today. When there is evidence of movement, a specialist should be called as soon as possible.

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What about cracks in basement floors? This is usually less of a concern than cracks in walls. One of the purposes of a concrete floor is to keep the exterior support walls from being pushed in by outside forces. Basement floors (including garage & carport floors) are usually not designed to the same standards as footings or walls. Sidewalks are often built stronger than floor slabs. Floor slabs can be thinner, may or may not be poured on undisturbed soil, and often have reinforcing wire or bars that are (at the best) only somewhere near the place where they should be. They **will** crack - usually in long irregular lines.

Sometimes, floor slabs crack diagonally near a corner of a basement and sink toward the corner. In this case, there may be several reasons why this happens. Most often, the ground under the floor slab was incorrectly compacted, the footings may be undermined or disturbed by moisture or tree roots, and both the footing (and the floor slab) actually crack and sink. This could be serious ... or not.

As inspectors, we want to know if this is a recent occurrence and is it still active? Or has this crack been around for many years...cracks that happened years ago are obviously less of a concern than a new crack. Most inspectors will run upstairs and examine the interior walls above the crack. Then we run outside to see what the siding is doing. Stucco siding is very brittle and unforgiving (as is gyprock, sheetrock, and plaster) so any settlement of the building will generally be reflected in the amount, the size, the location and the type of cracks that are present. We try to determine what repairs have been made to the walls above the original crack. Often, we find little or no evidence of cracks, repairs or other damage to stucco or gyprock. Inspectors try to determine if the crack is serious enough to warrant further investigation, or is it "typical" for a home this age in this area and could it just be a nuisance.

What about water in a basement or crawlspace? People often think that a crack will let in water... and they are right. BUT, most cracks have little to do with water entering a home. If water is present on the outside of a concrete wall, a crack is simply the easiest way in... NOT the only way. If you fix the crack, water moves to the next easiest place to enter. Walls and floor slabs are designed with structural concerns in mind...they leave water drainage concerns up to other systems. This includes: proper grading, gutters and downspout extensions, gravel gullies, weeping tile (Big O pipe) and waterproof membranes. One or all of these, act as a system to prevent water from entering your home.

Approximately 95% water entering a basement or crawlspace comes from the roof or from irrigation systems. Only 5% can be identified as ground water. If you get water into your basement or crawlspace, there is a good chance that **you can control it**. Check the location of downspouts, make sure gutters and downspouts are not clogged, add extensions to downspouts, Improve drainage away from the home and confirm that hose bibs are not leaking. Ensure that irrigation water is directed away from the building.

There are a multitude of methods to repair cracks in foundation walls and floors. They obviously vary in price depending on the labor involved. One thing is certain, if you have a crack in the basement wall, check it regularly, and if you are at all suspicious of it moving, call a **geotechnical expert**, and if needed, get another professional to repair it. This isn't the same as painting the back porch. If the job's not done right, the down side can be expensive.