Foundations – The Bottom Line

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A foundation is supposed to support the house, so one could say as long as the house is standing, the foundation is working. Most of us tend to be more attentive to somewhat cosmetic things like cracks in the walls, broken floors, odd unintended openings and the possibility of structural damage. These may or may not be indicators of foundation problems. How much foundation movement is too much? Zero movement is an interesting intellectual concept, but everything in the universe is moving all the time, so zero is out, and the discussion revolves around how much movement is too much.

The nature of the problem

It is possible to build a foundation that is super extra strong – that cannot break under any normal type loads – but the foundation alone would cost more than most houses. Keep in mind we are talking about holding up the whole house, which accounts for many tons of building materials arranged in some sort of hollow structure. That directs all the weight to the walls. Walls are typically thin relative to the rest of the structure, so all that weight is concentrated in very small areas around the house. It's almost like a challenge to Mother Nature. We do have a national heritage of adventure.

It would be nice to always build upon a rock, but alas, there are many places with a scarcity of convenient well anchored rocks. Thus, we must consider it normal for foundations to move, at least somewhat. When your foundation is neither built on a rock nor of the infinite strength type, it is open to other forces that cause movement.

Most soil grows and shrinks with presence or absence of the water. Rainfall is never consistent in its patterns for most places. These two facts work together with the contour of the land to create foundation movement. Several areas have one or more of these factors magnified. Here in Southeast Texas, we have it all. We have very expansive soil which really grows and shrinks with moisture changes. We also have periods of deluge and drought. To make it even more interesting, the land contour is pretty much flat.

In dry times, the moisture around the edges of the foundation departs more rapidly than in the center, so the outer foundation edges begin to droop downward. When it rains again, the perimeter expands more than the center and tends to bend upward. Larger foundations, can move more than smaller ones.

As if this were not enough, we have at tendency to make things even more interesting by planting vegetation around some areas of the house, which sucks prodigious amounts of water out of the ground in those spots. A few bucks are often "saved" by not putting gutters in some areas, so parts of the foundation get much more water than others when it does rain. In a final act of defiance against Mother Nature, we encourage a few selected low spots around the house that collect any water that does show up, creating even more moisture differentials around the edges of the foundation.

Every now and then someone will become even more adventurous and plant one or more trees near the foundation. Trees suck even more water out of the ground and their roots can move event the most stubborn structure.

For pier and beam designs, we may have the option of jacking around under the house to correct for periodic movement. Of course you need enough space for a real person to get underneath to do this. When the surrounding contour is higher than the space under the house and drainage is inadequate, we begin to explore new dimensions of experimental moat construction and mosquito generation.

In the Northern areas of the country, we also have freeze/thaw problems to deal with. For even more adventure, most people in these areas add potential indoor swimming pools, sometimes referred to as basements.

Naturally, in the land of opportunity, we have developed many other creative methods to undermine the integrity of the foundations we build. We tend to like our floors relatively flat, so it is common to scrape off high spots and fill in low areas. If this fill is not adequately compacted, or of the wrong type, it will not hold up to these awesome stresses.

Sometimes a house is even built on a natural fault – a lot like building part of it on a large freight elevator – oops.

One of the more insidious forms of built-in failure is the occasional attack of cheapness resulting in inadequate site testing, preparation, and even omission of rebar in the structure. Beware of our most popular epidemic – squeezing a few dimes up front, so you can blow lots of dollars later on.

How much movement is too much?

While somewhat flexible, concrete is mostly brittle. It can also crack during the curing process, though usually restricted to small cracks on the surface. Interestingly, there is no definitive standard about how much movement is too much. Some suggest anything over a half inch needs attention, while others may get excited about any visible cracks.

We can start with two serious indicators. When there is any discernible vertical dislocation between two sides of a crack in a foundation you have trouble. When the attic structure is visibly separating over a foundation crack, you have trouble.

Wall cracks in one area adding up to a half inch or more spell trouble. If the crack pattern continues up the wall, across the house and down the opposite wall you have more trouble. Windows and doors that no longer close are a red flag too. Combinations of these indicators are even more serious.

You can measure the flatness of your floors. Unless you have prior measurements, you really don't know where the floors started, but measurement will give you a reference for future movement. While there is no "standard" for floor flatness, it is generally acknowledged that 1/4 inch per four feet of length is a reasonable maximum deviation for floor level. For a 20 foot wide floor that would allow a one-and-one-quarter inch deviation. Some floors have been known to begin life less level than this.

Repairs?

For structures with major site faults, there is no simple repair. Detailed analysis and examination is required to determine the precise cause(s). Occasionally whole neighborhoods can be adversely affected.

Since most houses have inadequate drainage, the first step is to fix the drainage problems. Once the ground is stabilized, destructive movement may stop. This is especially true for smaller cracks. Larger, older cracks will probably not return to the original position and may require additional work.

The most common form of foundation "repair" is addition of vertical support, usually in the form of some sort of piers. Once this is done, the foundation, which was designed to be entirely supported by the ground, is moved into a different design category, supported only by several concentrated stress points. This should always be done in conjunction with design and supervision by a qualified, experienced foundation engineer.

The bottom line

Fix your drainage problems now. Inspect your foundation during your monthly maintenance walk-around. [You do make a monthly maintenance inspection of your home investment, don't you?] Nothing really fixes itself. Unchecked degradation always gets much more expensive with time. Prevention is always far cheaper than repair.

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