



Symptoms of Foundation Failure

The most obvious indicators of foundation movement are:

- Diagonal cracks in interior wall finishes at the corners of doors and windows. Cracks may also occur at the intersection of walls and ceilings, and at the intersection of wall surfaces.
- Doors bind or do not open or close properly. The gap between the top the doors and the adjacent door frames will not be uniform.
- Windows bind or do not open or close properly.
- Cabinet doors do not close properly.
- Floors are not level.
- Cracks in exterior brick.
- Cracks in the concrete perimeter beam. (Look at the concrete beam below the siding or brick along the perimeter of your home.)
- Separations of wood trim at the exterior corners of your home above brick.
- Separations of the brick and the adjacent wood surfaces at the sides of garage doors.
- Separations of the brick and the adjacent wood surfaces at the sides of the chimney.

Causes of Foundation Movement

Your home's foundation is designed to transfer the weight of the structure and contents to the underlying soil or rock. In the southern United States most foundations constructed today are slab-on-grade; however, pier and beam foundations are still used in certain situations and many older homes have pier and beam foundation systems.

Swelling and shrinking of expansive soils underlying your home's foundation are the primary causes of foundation movement throughout the south. Expansive clay soils swell when soil moisture levels increase and shrink when moisture levels decrease resulting in lifting or settlement of your home's foundation.

The second most frequent cause of foundation movement is consolidation of improperly compacted soil or rock fill, which can cause portions of the foundation to settle.

Because your home's foundation transfers the weight of the structure and contents to the underlying soil, your foundation moves when the soils move. If the foundation moves uniformly and does not deflect or become unlevel the foundation is performing as designed. If some parts of the foundation move more than others then the foundation is undergoing differential movement. It is this differential movement that damages your foundation and the cosmetic finishes throughout your home.

Limiting Differential Movement

Because soil moisture variations cause swelling and shrinking of the soils supporting your foundation anything you can do to minimize those moisture variations will also minimize foundation movement. The three most common things you can do to minimize foundation movement are:

- Water your lawn and the areas adjacent to your foundation uniformly during dry periods.
- Make sure that surface water cannot pond against the perimeter of the foundation. The soil at the foundation perimeter should be higher than the surrounding soils so surface water will drain away from the foundation.
- Large trees or extensive plantings of shrubs in close proximity to the foundation can result in drying of the soils under the perimeter of the foundation. The shallow roots of these trees and shrubs extend under the foundation and decrease soil moisture levels. Normally trees should be planted at a distance from the foundation equal to their mature height. If existing trees or shrubs are affecting the stability of your foundation, a barrier trench can often be installed between the trees and foundation.

Note: Plumbing leaks beneath your foundation can cause lifting of portions of the foundation. In extreme circumstances excessive moisture may cause a loss of bearing capacity and result in foundation settlement.

Foundation Repair Procedures

Minimizing foundation movement normally involves underpinning the foundation with deep piers, correcting poor drainage or both. Deep piers are designed to extend below the active surface soils to areas less affected by season moisture variations. Piers transfer the foundation loads to those deeper, less active soils. The vast majority of registered professional engineers specify deep drilled, steel reinforced, cast-in-place concrete piers. This is the same pier design used in the construction of commercial multi-story buildings and highway overpasses.

Many other foundation repair techniques are marketed. Segmented concrete piers, driven steel piers and helical piers are the most commonly used alternative repair techniques. Be sure and check with a registered professional engineer or a foundation repair specialist familiar with soil conditions in your area before choosing an alternative repair method.