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Soil Conditions

Soils with the potential to shrink or swell are found throughout the Untied States. Soils with this shrink/swell potential create difficult performance problems for buildings constructed on these soils. As the soil water content increases, the soil swells and heaves upward. As the soil water content decreases, the soil shrinks and the ground surface recedes and pulls away from the foundation. These problems are of particular concern in homes with shallow foundations. See Foundation Basics.

Homes are normally not built in areas where the soil conditions are perfect. The developer selects land for various reasons, which may include availability, cost, proximity to industrial areas, and proximity to schools. The main reason for selecting a parcel to develop, of course, is that there is a strong demand of people who want to buy homes in that area and a profit can be made from selling the homes.

The best way to find out if the soil beneath your house is expansive is to ask a geotechnical engineer. In many housing developments a Soils Report will have been prepared, but this requirement varies depending on the region of the country.

A geotechnical engineer will make soil borings on your site and take samples so these soil samples can be tested for expansiveness. These samples will show how expansive the soil is and at what depths. The geotechnical engineer will provide a written report on his findings.

What is the "active zone"?

From the ground surface downward, there is a depth over which expansive soils experience a
change in moisture conditions as the climate (or seasons) change. This results in the soils shrinking or heaving. This zone is an average of 18 feet deep.

A shallow foundation will be more impacted by soil and climate considerations than a deep foundation (see Foundation Basics for more information about shallow foundations).

Soil Types:

Here is an overview of soil types:

Expansive Clay Soils

Expansive clays will swell/heave when wet and contract/consolidate when dry. If the foundation system is in the active zone (a shallow foundation), the foundation will move as moisture conditions change in the active zone.

Select Fill/Loam

Select fill is normally defined as a sandy loam that shows little change with moisture variations. A building pad properly built with select fill/loam will support the foundation. Problems could occur if erosion occurs that changes the bearing capacity of the soil.

Sand

Sand will not change as moisture conditions change. However, sand can erode if drainage around the lot allows water to work its way under the foundation. Sand can also fall in a crack created by drying soils and cause the foundation to drift (move horizontally).
Rock

Rock can erode and expand slightly only if it is a low density of shale. In some slope conditions, fractures/ faults in the rock can allow sliding and failure if not properly pinned with tie back anchors.

When a structure is supported by various soil conditions, the house may move *differentially*. As an example, if one half of the foundation sits upon expansive clay and the other half bears on select fill and/or rock, the amount of seasonal movement will vary from one half to the other half. If the foundation system is not properly designed, the differential movement may cause damage to the foundation and structure.

Many times building pads will be cut and/or filled so the bearing soil is all of the same type.

Shrink/Swell Soil

Many soils in Virginia have the characteristic of Shrink/Swell. This is also called expansive soil. This simply means it decreases in size/volume. This is a natural occurrence. Everything that gets wet swells to some degree, including you!

The problem with shrink/swell soil is how it affects the foundation of your house. The constant shrinking
Shrink/swell soil can occur anywhere. There can be a 5 foot section of it in one corner of your yard and 10 feet away it is dry. There are companies out there who can install systems that will maintain a constant moisture level.

How can you tell if there is a problem? During a home inspection we don't test for Shrink swell soil- no home inspectors do it. The thing you are interested in when looking at a home is the condition of the foundation. It would be very unusual to see a home that has this problem.