

Living With Expansive Soils

A Guide to Expansive Soil and a Few Suggestions on How to Minimize its Effects

What is Expansive Soil?

There are three basic types of soil naturally occurring in this area: sand, silt and clay. Clay soils are generally classified as "expansive." This means that a given amount of clay will tend to expand (increase in volume) as it absorbs water and it will shrink (lessen in volume) as water is drawn away. One of the most expansive of the clay soils is called "adobe".

Expansive soils are naturally occurring materials found in low lying regions and flood plains. In Torrance, such regions are the Walteria Lake area (between South High School and Hawthorne Boulevard) and most of North Torrance (generally north of 190th Street and east of Hawthorne Boulevard.)

What are the Effects of Expansive Soils?

The effects can be dramatic if expansive soils supporting structures are allowed to become too wet or too dry.

Patios, driveways and walkways may crack and heave as the underlying expansive soils become wet and swell. Sometimes the cracking and heaving appear temporary as the soils dry and shrink back to their original position.

However, footings can behave differently. The concentrated weight of the structure will inhibit the soil's upward expansion. Outward expansion on the other hand may continue. The footings will not be returned to their original position as the soils dry and shrink. Instead, they can "ooze" down to a slightly lower level. This process can accumulate if the wetting and drying is allowed to continue season after season, year after year.

- Original Construction

Foundation with load embedded in expansive soil at low to medium moisture content.

- "Wet Behavior" - Lateral Soil Migration

Lateral migration of soil particles occur as a result of lateral confining pressures being lower than vertical confining pressure by foundation.

- "Dry Cycle Behavior" - Foundation Settlement

Progressive settlement occurs with successive wet and dry cycles.

Damage is most noticeable if the footings "ooze" at varying rates under different areas of the structure. Cracks may appear, windows and doors may stick and floors may slope as the footings become progressively more out of level.

This differential can be caused by improper drainage, plumbing leaks, and even thirsty trees. (Please see the following section.)

What Can I Do to Minimize the Effects of Expansive Soil?

Some movement, resulting in hairline cracks, is likely to occur in houses built on expansive soils. However, a homeowner can minimize cracking and possibly prevent major damage by judicious attention to maintenance constant and acceptable moisture levels completely around the structure. Following are a few simple suggestions that might help.

1. Roof Drainage - Install rain gutters with downspouts that drain to the street via non-erodible surfaces.
 2. Planter and Yard Drainage - All areas should drain to the street. Even puddles are potential problems.
 3. Concrete and Asphalt Areas - These also should drain to the street. Where possible, concrete and asphalt should flow to a yard or planter area.
 4. Subsurface Drainage - Install drains if necessary to eliminate ponding. Maintain all lines clean and free-flowing. Drain lines should discharge at the street.
 5. Repair Plumbing Leaks - Monitor consumption. An unexplained increase your water bill could indicate a leak. Repair immediately.
 6. Landscaping - Plan carefully. Trees, small ones, can draw huge amounts of from nearby soils. They should not be planted close to structures.
 7. Watering - Year-round watering should be planned to avoid too much moisture in the rainy season and too little in the dry season. Automatic watering systems may help, but they can require a seasonal adjustment and attention to maintenance. If the valve accidentally sticks open, major damage could result.
-

What Can I Do To Repair Expansive Soil Damage?

Cosmetic repairs such as new paint or stucco will not fix the problem. Preventative measures should be implemented immediately. If necessary, a professional Geo-technical Engineer can make a site inspection and perform laboratory tests. After analyzing your particular situation he can make recommendations specific to your property. By following the engineer's suggestions you may prevent major damage and minimize the nuisance problems associated with expansive soil.

Last Revised: *April 8, 2009*