# What are Expansive Soils?

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Expansive soils are soils that expand when water is added, and shrink when they dry out. This continuous change in soil volume can cause homes built on this soil to move unevenly and crack. Each year in the United States, expansive soils cause $2.3 billion in damage to houses, other buildings, roads, pipelines, and other structures. This is more than twice the damage from floods, hurricanes, tornadoes, and earthquakes combined.

Although expansive soils can be found in almost every state and in Canada, the problems related to expansive soils are the most severe and widespread in California, Nevada, Arizona, Colorado, and other western and southern states.

Often, damage from expansive soils can be seen within the first few months or years after a home is constructed. As water from irrigation or rainfall migrates underneath the home's foundation, the soil around the edge of the foundation expands, pushing up on the edges of the foundation. This condition, called edge-lift, can cause cracking in the drywall and in the foundation itself. Over a period of years, as the moisture further migrates underneath the center of the slab, center-lift can occur, causing additional damage to the home.

Additionally, trees planted near homes can cause long term damage to the foundation. As the trees age and their roots grow beneath the foundation, the roots extract the moisture from the soil, causing it to dry out and shrink. This shrinking can result in increased settlement of the structure many years after the original construction.

The original design of the home can have a major impact on its short-term and long-term success. Builders are required by law to have a geologic engineer prepare a soils report to identify expansive soils and give the builder recommendations to build a home that will withstand these soils. These recommendations often include removal of the expansive soils, importation of non-expansive soils, soil chemical treatments, a post-tensioned or structural floor foundation, caissons embedded in bedrock, gutters and downspouts, limits on placement of irrigation systems, underground and surface drainage systems, and above ground structures with segmented interior design and increased flexibility.

After initial construction, homeowners and homeowners associations should be careful to maintain their property to prevent excessive moisture from entering the soil near the foundation. Landscape watering should be limited and consistent to prevent soaking or desiccation of the soil. Drainage patterns around buildings should be maintained so that surface water flows away from, rather than toward the buildings. Gutters and downspouts should be maintained and kept clear of debris, and should not discharge water next to the foundation. The property should be regularly inspected after heavy rains to determine areas of ponding, and measures should be taken to correct the drainage. Underground drains should be regularly inspected and cleaned so that the flow of water remains unobstructed. If the property has a swimming pool, the pool should be

regularly inspected to ensure that pressurized water lines do not leak. Separations between buildings and exterior concrete slabs such as patios should be caulked using a flexible caulk designed for exterior use. Cracks in exterior concrete slabs should be repaired with epoxy injection.

When purchasing a new or previously owned home, the buyer should obtain a copy of the soils report which will indicate the presence, if any, of expansive soils. The buyer should be on the lookout for cracks in basement or garage slabs, in driveways and sidewalks, and in drywall—especially at the corners of doors and windows. If the buyer suspects that damage may have occurred as a result of expansive soils, the buyer should have the home inspected by a geotechnical engineer before completing the purchase. This inspection, which may cost approximately $150 to $300, is a homebuyer's best protection from buying a home that may have future soils-related repair costs in the thousands of dollars.