

## Expansive Soils

"Expansive Soils Across The Valley" – AZ Republic-January 18, 2000

"Valley Homes Vulnerable to Cracking" – AZ Republic December 26, 1999

"Homeowners Hit Del Web With Lawsuit" after soils compaction caused their houses to sink" – Tribune November 15, 1999.

These recent headlines exemplify the very real problem that exists throughout the valley and warrants our attention as professionals in the Community Association Industry .

### **What are expansive soils and what damage can they cause?**

Expansive soil clays are made up of plate like particles, smaller than the eye can see, which absorb moisture between the plates and can expand to over 100% of the original size when wet. This "swell pressure" between particles can push up and crack concrete slabs, driveways, and walls that have less weight than the soil pressure. When these same soils dry the reverse process occurs and shrinkage results.

Building and floor slabs are affected by soils expansion from the outside inwards. As soils around the edge of the structure become wet from water infiltration they heave relative to the middle of the structure. This process is called "edge curling." With time, the underside of floor slabs draw in water from the soil, like blotting paper and cause a heaving effect in the middle of the slab called "doming". This can take years to develop.

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### **What are some of the building solutions with expansive soil?**

The solution is to keep soils at a constant moisture content. Sudden increases in rainfall and landscape irrigation can be harmful, as can drying out of the soil due to lack of rainfall or irrigation. Prior to construction, soils samples are tested in the lab to determine how much "swell" is possible when the particular soil is saturated. Engineers then must assume the worst case soil moisture conditions when they design against expansion and shrinkage.

Solutions are limited, however, the obvious preventative measure is to make sure water does not pond next to buildings. Lots are usually graded to slope to the street. However, builders can change drainage patterns during construction, or during landscaping. Builders often fail to provide proper roof gutters and drainage control, and water can sheet off roofs into the soils around the building.

Another solution, consists of replacing expansive soils with non-expansive, sandy soils to a depth of several feet. Although effective as a remedy , this solution is not always practical due to cost or the availability of non-expansive materials. Expansive soil properties

can be modified by adding chemicals such as lime or cement. Polyurethane liquid can be injected into the soil which hardens to a plastic like material. However, these materials are not always inert and may be harmful to occupants and landscaping.

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Another, more widely used approach is to support buildings on stiff, heavily reinforced foundations, called "post-tension" slabs. With this method, steel tendons built into the floor slabs and footings are tightened after the concrete sets to make foundations systems more rigid. Other remedies include "pile foundations" which hold the building down like large anchors.

Exterior slabs such as walkways, driveways, patio decks and pool decks are the hardest to design for against expansion. Thicker slabs, reinforcing, non-expansive soils, crack control joints, and pre-wetting of soils are just some of the techniques used by engineers and builders with varying degrees of results.

All these remedies add cost to the project, but it is well worth the investment to provide a quality product that will last it's intended useful life.

**What should association managers and homeowners do about expansive soils?**

Martin Owen, of Owen Geotech, a licensed soils engineer in Arizona and California suggests the following:

1. If the development was recently completed you can request a copy of the soils report from the developer or general contractor. The report will indicate how expansive the soil condition is and what remedies were originally recommended. If the builder cannot or will not provide the report, one may be able to be obtained from the local building department. Additionally, a general map showing expansive soils in the Phoenix Valley is available on-line at <http://www.az.nrcs.usda.gov/technical/soils/shrinkswell.html>.
2. "Think drainage", says Mr. Owen. Is there good drainage to the street? Are there roof gutters and do they discharge away from the footings of the structure. Is there excessive standing water after a rain?
3. Examine the building, looking for cracks in the walls, especially around windows and doors. Look for variances in texture or paint that may indicate where cracks have been filled and painted over. Check to determine that doors and windows open properly.
4. Association managers and homeowners should annually inspect their property for warning signs of soil movement. Our firm has created an annual inspection checklist called the "Construction Quality Assessment" The assessment addresses some of the most common problems areas and will assist you in determining if your project or home may have construction defects or damage due to expansive soils.

If red flags exist, seek expert advice. Our law firm will provide a no-cost investigation by a licensed professional to evaluate your buildings, grounds and common areas, followed by a preliminary report of the findings and recommendations. These efforts will assist your association's Board of Directors in fulfilling their fiduciary duties while providing an invaluable service.

*Ritchie Lipson, Esq. and Michael Dicks, Esq. are attorneys with the law firm of Dicks and Coglianese. Dicks and Coglianese has offices in Phoenix and Southern California and limits its practice to the representation of homeowners and homeowner associations in construction defect cases. If you would like a complimentary copy of the "Construction Quality Assessment" or have any questions regarding this article, you are encouraged to contact Mr. Lipson or Mr. Dicks at 602-254-4222 or by e-mail at [rlipson@hoadefectlawyers.com](mailto:rlipson@hoadefectlawyers.com) or [mdicks@hoadefectlawyers.com](mailto:mdicks@hoadefectlawyers.com).*