

## Soil stabilization to eliminate ‘slow-moving earthquakes’

ENVIRONMENTALLY FRIENDLY ELECTROMECHANICAL PRETREATMENT CAN STABILIZE SWELLING CLAYS BEFORE CONSTRUCTION.

*Contributed by Earth Science Products*

To a developer or builder, one of the biggest nightmares occurs when swelling clay has been discovered under buildings, roadways, or other structures — after they already have been constructed. In many cases, when moisture gets into the clay, it can swell up and lift a building off its foundation, or heave up parking lots, roadways, and even runways.

“In effect, swelling clay is like a slow-moving earthquake,” said Shawn Lawson, a foundation repair expert from Texas. “The damage doesn’t happen as quickly, but the results can be just as bad.”

Lawson’s company, Perma-Pier, specializes in repairing foundations and under pavements that have been damaged by swelling clay throughout the Texas prairie lands in the Austin, Dallas-Fort Worth, and San Antonio regions. Although his firm does a lot of remedial work, he recommends that developers and builders pre-treat soil containing problematic clay so that the damage doesn’t occur in the first place.

“The right pretreatment will eliminate the problem before it gets started,” he said. “And it can be a long-term solution. Virtually 100 percent of the soils we’ve treated with an electromechanical solution have remained stable.”

### **Charged clay the culprit**

In volume, swelling clay attracts water because the clay is electrically charged with ions that pull the moisture into it. This electrical attraction is so strong that it can draw in water from as far as 12 feet. In the process, the flow of water creates a vast network of tiny, sponge-like capillaries through which the clay can rise and, later, fall.

“The damage can range from stuck doors and windows to severely buckled walls, floors, roadways, and commercial structures,” Lawson said. “Utility lines fail. And most attempts to solve the problem through mechanical means or drying agents will not last. As a result, damage recurs.”



Damage from swelling clays can range from stuck doors and windows to severely buckled walls, floors, foundations, roadways, and commercial structures.

Lawson added that recurring problems can inflict painful consequential damages as well as structural ones. Commercial buildings can lose insurance certifications, or be subjected to tenant turnover lawsuits and safety issues. He said that traditional mechanical or chemical approaches to solving a swelling clay problem are inadequate. Swelling clay can rise above piers inserted under homes, creating severe damage and even knocking the structure off these supports. Conventional chemical treatment substances, such as lime and potassium chloride, are temporary and also are considered hazardous to the environment.

The most effective solution for Perma-Pier and other foundation specialists is to stabilize the soil permanently by injecting a solution that neutralizes the electrical charge present in swelling clay. The solution Lawson uses is called Condor SS, an “electromechanical” (both electrical and mechanical) soil-stabilizing compound that produces ions with a charge opposite those in the clay. Once the ions in the clay have been neutralized, the clay no longer attracts water. The moisture already present in the soil will likely evaporate in warm weather. Or, the water can be “squeezed” out of the soil by compaction, which removes the water passageways in the clay. Either way, the water and its electrical attractor are gone.

### **Heading off the problem**

Most developers are aware of the problems that result from building on soils containing swelling clay. Their structural engineers, who design foundation plans, work with geotechnical specialists to have soil studies performed that test the stability of the earth in which foundations are placed.

However, since swelling clay often is concentrated in pockets, some of this thirsty earth may remain undiscovered, causing damage to structures once they are in place.

If swelling clay is identified before building, the developer or builder may decide to excavate and replace the clay with inert soil. Or they may choose to install chemical water barriers in the area where structures will be built. In some cases, developers “pre-swell” the soils so that they get them as close as possible to the maximum potential vertical rise (PVR). However, both approaches are expensive, and may not be a thorough solution.

For those reasons, Lawson recommended that developers and builders pre-treat soils with a swelling-

prevention solution such as Condor SS.

This form of pretreatment is a good investment and easy to apply, he said. Manufactured by Earth Science Products (Wilsonville, Ore.), Condor SS is an environmentally safe concentrate that is mixed with water and then injected into the soil. After injection, the soil will shed moisture rather than absorbing it and swelling during the wet season. This treatment maintains the soil in a more consistent state, allowing construction to occur without bringing in select fill or using other expensive measures to counter the adverse effects of clay and variable moisture.

### **A Texas-sized pretreatment**

The developers of Frisco Square, a master-planned development near Dallas, decided that pre-treating the entire 147-acre site with injected soil stabilization solution would be a good investment for protecting the life of the structures in the multi-generational complex.

“We stabilized the entire town,” explained Shane Kennedy, president of Earth Science Products. “All of the building pad sites, driveways, walkways, and parking lots were stabilized with Condor SS while under construction. The chemical stabilizer allowed the project to function as though clay soils were non-existent, resulting in smooth streets and curbs, healthy landscaping, and a distinct lack of the usual problems associated with the swelling and contracting of clay soils.”



Pre-treating an entire project site with an electromechanical stabilizer can allow a development to function as though clay soils were non-existent.

In an earlier case, contractor Rockwell Construction of Texas chose to inject the same electromechanical stabilizer as an alternative to removing 6 feet of expansive soil (including swelling clay) that was spread across a 130,000-square-foot parcel. The goal of proposing this alternative process for soil stabilization was to find a more cost-effective method of reducing the PVR of the building pad to within the limits set by the owner's geotechnical engineer (1 inch or less PVR). When the figures were run, the net cost savings to the owner turned out to be approximately \$135,000. And, after installation, the stabilization process met or exceeded the geotechnical engineer's requirements for potential vertical movement reduction.

Thomas LaLonde, president of stabilEarth, an Arlington, Texas-based distributor of advanced soils treatment products, agreed that pretreatment is by far the ideal solution to potential swelling clay problems.

“Pro-active builders who want to lower the risk of warranty claims, lawsuits, buybacks, or other problems have approached us for chemical stabilization,” LaLonde said.

He added that foundation specialists also can see major benefits from using the product. “One of the main benefits that foundation companies enjoy in using this technology is that they have fewer callbacks and warranty for damage that recurs from moving structures. If they inject the stabilization product, they will limit future problems, and that’s a big deal.”

*For more information, visit <http://earthscienceproducts.com>.*