

## Case Study: Development Rests on Solid Ground

Posted: July 26, 2011

*A Texas company battles swelling clay by stabilizing the soil from the outset.*

For a contractor, one of the biggest nightmares occurs when swelling clay is discovered under buildings, roadways or other structures—after they have already been constructed.

And when the clay swells, it can 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. The damage doesn't happen as quickly, but the results can be just as bad.

This destructive problem can happen when moisture gets into the clay. In volume, swelling clay attracts water because the clay is electrically charged with ions that pull moisture into it. This electrical attraction is so strong that it can draw in water from distances of up to 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, subsequently, fall.

When the clay expands and retracts, it can cause damage ranging from stuck doors and windows to severely buckled walls, floors, roadways and commercial structures. Utility lines can also fail. If damage recurs, it can have other ripple effects. Commercial buildings can face safety concerns and tenant turnover lawsuits, as well as the possibility of losing insurance certifications.

### Texas Treatment



*Five Star Development is using Condor SS to treat Frisco Square, a master-planned, multi-generational development near Dallas.*

The contractor of a master-planned, multi-generational development near Dallas wanted to avoid the problems caused by swelling clay by stabilizing the soil at the outset. Prior to construction, Five Star Development, located in Frisco, Texas conducted a comprehensive soil report at Frisco Square, which indicated a problem with expansive clays. Five Star sought a solution that would protect the life of the structures on the 147-acre site.

Five Star could've attempted to stabilize the soil through mechanical means or drying agents, but those solutions have potential drawbacks. Some of the problems with traditional solutions are that swelling clay can rise above piers inserted under structures, and chemicals such as lime and potassium chloride are temporary and can be considered hazardous to the environment.

If swelling clay is identified before construction, contractors can excavate and replace the clay with inert soil. They can also install chemical water barriers in the area where structures will be built. In

some cases, contractors "preswell" the soils so that they get them as close as possible to the maximum potential vertical rise. However, these approaches can be expensive and may not be a thorough solution.

So Five Star searched for a different solution. The project manager at Frisco Square had read about Condor SS, manufactured by Earth Science Products in Wilsonville, Ore., which works to permanently stabilizes the soil by injecting a solution that neutralizes the electrical charge present in the clay. It is 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, and the moisture already present in the soil will likely evaporate in warm weather. The water can also be "squeezed" out of the soil by compaction, which removes the water passageways in the clay.



*Condor SS, manufactured by Earth Science Products in Wilsonville, Ore., permanently stabilizes by neutralizing the electrical charge present in the clay.*

## Keeping it Covered

One benefit of using Condor SS is that it is a preventative solution that can treat the entire site. Typically before construction occurs, the 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. But swelling clay is often concentrated in pockets, and some of this thirsty earth may remain undiscovered despite the soil studies. This can cause damage to structures once they are in place.

Norman Alexander, senior project manager for Five Star Development, says they decided to treat the 145-acre site with Condor SS and did not use any other chemical stabilizer for the project.

"We committed to using Condor SS exclusively for this entire project," Alexander says.

According to Shane Kennedy, president of Earth Science Products, another advantage of using Condor SS is that it is an environmentally safe concentrate that is mixed with water before it is injected into the soil, and it is easy to apply. It takes two to four workers injecting it into the soil using an injection rig.

It took about 10 days and 50,000 gallons of Condor SS to treat the Frisco Square development.

"All of the building pad sites, driveways, walkways and parking lots were stabilized with Condor SS while under construction," Kennedy says.

After injection, the soil will shed moisture rather than absorbing it and swelling during the wet season, Kennedy says. This treatment maintains the soil in a more consistent state, allowing construction to occur without bringing in select fill or using other measures to counter the adverse effects of clay and variable moisture.

"The chemical stabilizer allowed the project to function as though clay soils were nonexistent, 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," Kennedy says.

"Pretreatment is by far the ideal solution to potential swelling clay problems."

As the Frisco Square project moves into new phases of the project, they continue to use Condor SS.

Company: Five Star Development

Location: Frisco, Texas

Project: Frisco Square

Equipment Used: Condor SS Soil Stabilization by Earth Science Products



*Shane Kennedy, president of Earth Science Products, says it took about 10 days and 50,000 gallons of Condor SS to treat the Frisco Square development.*