SEPTEMBER 18, 2002 - Stabilization of Expansive Soils Using EcSS 3000 Electrochemical

Speaker: Russ Scharlin,P.E., Vice President of Environmental Soil Stabilization, LLC.

PRESENTATION SUMMARY

Russ Scharlin gave a presentation to a room of 40-45 entitled, "Stabilization of Expansive Soils Using EcSS 3000 Electrochemical." He said that this solution (EcSS 3000 Electrochemical) is a proprietary hydrogen ion exchange solution reduces the shrink/swell potential of clay. The application of the solution is done by his company, which was started in 1993, with the sole mission of treating expansive soils with this solution.

The solution was described as a mild sulfonic acid that is non-hazardous to people or vegetation. Although the initial mixed pH of the solution is 3 to 4, it quickly takes on the pH of the soil after injection. The reaction takes place within 72 hours of injection.

The cost to treat a building pad to the maximum 10 ft. depth is about $0.75 to $1.00 per SF. To do remedial treatment around a foundation, the cost is about $30. to $35. per LF. They use 3/4 inch injection rods at 3 ft centers. The ionization takes place within 72 hours and spreads out 3 ft radially so there is plenty of overlap. They mix the solution with water at a ratio of 1:300 and inject it at 147 gpm at 250 psi, truck mounted. They can also go hand held on remedial jobs but at 5.5 gpm at 500-800 psi but only to 7 or 8 ft depth.

Mr. Scharlin said they have had Texas A&M do rigorous testing on their proprietary solution in the late '90's. Their findings were:

- Moisture content increased from 25% to 41%, but without swelling the sample. This is because the original clay particles that were negatively charged (and therefore repelled each other) become more attractive and move closer together, apparently compensating for the volumetric increase in water.
- Plasticity indices were unchanged and were therefore no longer useful indicators of swell potential (in other words, you have to do swell testing).
- The chemical makeup of the soil remained the same except that the aluminum content decreased and the iron content increased (they were not sure why).
- The microscopic structure of the clay changes from crystalline to amorphous when treated.
- Suction testing was not done but they feel suction should be reduced since the moisture content is increased.

The solution can be applied by mixing it with fill. The treated clay is easier to compact since the treated clay becomes less plastic and does not stick to the equipment. Also, they found the treated clay has a more tolerant compaction curve, which extend out to about 6 percent above the original optimum moisture content.

Mr. Scharlin said they have checked a treated site 8 years later using a transmission electron microscope and found the ionization process had not reversed itself during that length of time. They also found that the ionization process had migrated another 2 or 3 feet deeper after 8 years, so it actually got better with time.

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