

Case Study - 2 Component Polyurethane Soil Stabilization

Project: CVS Pharmacy Site Work - Orlando FL

Engineer: Ardaman and Associates

Contractor: Stable Soils div of Foundation Services

The Problem

In Orlando FL there was a new commercial development which included a new CVS Pharmacy to be constructed. Prior to the commencement of construction, a geophysical survey was undertaken to determine if site conditions were suitable for building. The survey included soil borings and DCP (dynamic cone penetrometer) readings to determine soil compaction.

The results of the survey indicated a layer of Florida muck between 10' and 5' below grade; this is very typical in Florida. The engineers recommended excavation down to 10' to remove the muck from the entire building pad area as well as the entire parking lot area. After the demucking process, compactible fill was to be brought in and compacted prior to pouring the building pad and preparing the parking lot for asphalt paving.

When the site work contractor informed the general contractor that the site was prepared, the GC called in the engineer to do some testing and sign off on the site work. Testing revealed that in a majority of parking lot area, only the upper area of the soil had been excavated and replaced but the muck still was in place between 5 and 10' deep elevation. Some corners had been cut and the project came to a halt.

At this point the curbs were in, the crush and run had been put down, and all utilities were already in the ground including: Water, Gas, Sewer, Electrical, and Fiber Optic. The engineer presented them with two options:

- 1. Remove all the utilities and dig up the entire parking area site and do it as they had recommended in the beginning.
- 2. Use 2 component polyurethane injection in a grid pattern and at different depths, to densify the soils and muck.

To remove everything and start over was going to take in excess of 2 months to complete. Facing liquidated damages from the property owners for the delays, this was going to be extremely expensive and would most likely end up in litigation.

The soil stabilization with the polyurethane foam was selected as the method for the following reasons:

- 1. Installation in less than one week
- 2. No excavation required
- 3. Clean installation and environmentally safe product
- 4. Proven system used by departments of transportation DOT
- 5. Factory trained, engineer approved contractor

The Product

Alchemy-Spetec rigid polyurethane foams start out at 7000 PSF bearing capacity. This rating is based on the unconfined strength of the foam. In the soil or beneath concrete the polymer will increase in strength up to 15X. For comparison, the compaction requirements for pouring slabs or building roads is about 2000 to 2500 PSF. When installed in a grid pattern the polyurethane, which expands up to 24X by volume, creates a squeeze in the soil and can actually generate lifting forces from as deep as 10'.

The Contractor

Stable Soils of Florida is the Chemical Grouting division of Foundation Services of Central Florida. Based out of Ocala Florida, they bring more than 30 years of construction and foundation repair combined with nearly 10 years of chemical grout injection. Areas of chemical grout expertise include: Shallow subsurface polyurethane injection, permeation polyurethane injection, permeation with acrylic resin, and crack and joint injection of polyurethane. Applications include: Infrastructure leak seal and stabilization, soil densification, excavation wall grouting, waterproofing, FDOT road and highway stabilization, and sinkhole grouting with cement followed by polyurethane. Stable Soils has a reputation for responsiveness, fairness, quality, and safety.

Results

The parking area soils were densified to the requirements of the engineer and the job was completed in 5 days. No curbs, road base, or utilities had to be removed or relocated saving enormous amounts of additional cost and delays.

Following page images:

- Fig 1 Layout prepared by engineer showing grid points
- Fig 2 Injection tubes installed in a grid pattern
- Fig 3 2 component slab lifting rig
- Fig 4 Gun to pipe connection with hydraulic extraction tool







