The Problem – Very Wet, Very Soft Soils and Few Options

“Can you do anything with really soft soils?” It’s a question we hear almost every day in our office. Nearly every owner, engineer and contractor believes they have a site that may be more than we can handle. The fact is that we wouldn’t have a company if we couldn’t figure out how to deal with these challenges and give our customers results that defy their expectations.

When we arrived on site for the new Norton Medical Clinic on the south side of Louisville, conditions were terrible at best. This area around the Jefferson Mall is mostly swamp ground and anything being built will encounter significant subgrade problems due to the poor soils. Conventional methods would require deep excavations to find stiff soil or bedrock. This would require hauling off all poor soils and importing new aggregate to build up to subgrade. Depth of excavation on this site was expected to be 3-6’ to find stiff material. On an otherwise balanced site with no nearby dump site or borrow material, the option for excavation was extremely expensive and led the team to look for alternatives.

Chemical Modification Selected in lieu of Undercutting

Mt. Carmel Stabilization visited the site to give their recommendations to the site contractor, Kelsey Construction (Sheperdsville, KY). Mt. Carmel Stabilization Group’s proposal was based on anticipating very difficult working conditions. Lime Kiln Dust would be needed to dry most of the site prior to adding a high application rate of cement to stiffen the 16” treated subgrade.

Upon review of the 2 options - 1) Undercut and Replace, 2) Chemical Modification in place; the project team selected Chemical Modification because of the large cost savings. When it came time for construction, this site would prove a worthy adversary.
Extreme Conditions Require Extreme Methods

The Norton Medical Clinic site included a small building pad inside paved parking and service roads. The final subgrade elevation of these areas were nearly matched to existing elevations. With no natural drainage on the site, each rainfall made the already wet soils, even wetter and the moisture penetrated deeper into the subgrade in the cool fall temperatures.

On the day of construction, in early November, 2013, there were areas of the 60,000 Square Foot site that had standing water more than one foot deep. Conditions were so bad that Mt. Carmel was forced to use custom built tracked equipment. This equipment is designed for conditions such as these, where low ground pressure is critical and it is very difficult to bury these tractor & buggy spreaders. Within the first hour, they were stuck twice and had to be pulled out with a D6 Dozer. By the end of the day, multiple pieces of equipment would be stuck four more times.

Mt. Carmel Stabilization would have to use over 6% Lime Kiln Dust (LKD) to dry most of the site enough so that 10% cement could be applied to strengthen the subgrade. The combination of these chemicals is effective but rare. Depending on soil types, either chemical will provide a stable subgrade for a working platform on most projects, but this site was exceptional. It was so wet that it needed to be dried back before considering spreading and mixing cement. At the same time, it was so soft at such a depth that a high percentage of cement was needed to bridge the underlying soils.

In a typical year, Mt. Carmel Stabilization Group will work on over 400 unique projects in nearly a dozen states. This site offered an opportunity to fully demonstrate the true capabilities of chemical stabilization that is rarely seen.

Start to Finish In Less Than 10 Hours

By mid-day, the site had been dried using LKD and the processing of the cement had begun. Many soft areas were further revealed and more cement was added to counter this. By late afternoon, mixing was completed and some areas that needed touching up were dealt with. By 4:00 pm, the site was compacted, rough graded and completed. In less than 10 hours, over 400 tons of Lime Kiln Dust and Cement were used to build a stable working platform capable of supporting all the subsequent construction activities that would follow on a site like this including, base aggregate, utilities, foundations, etc.

100% Proof Roll Success

To the amazement of many, within three days after the stabilization operations were finished, This Entire Site Passed a Proof Roll. There were zero areas that required undercuts.

The savings on this project exceeded $50,000 - what can we do on your project?

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