‘Tis the season! The season of wet, mucky construction sites, that is. The two most important soil characteristics that must be achieved for site construction—stability and compaction—are more difficult to achieve when wet fall or spring weather conditions prevent sites from drying naturally. The good news is that there are solutions that allow construction to progress. Being prepared to address wet soils with appropriate options will help keep both your schedule and budget intact.

Options to achieve appropriate subgrade stabilization

When excessively wet soils are encountered during construction, there are three primary approaches to achieving appropriate soil stability and compaction:

1. **Remove and replace** This approach is as straightforward as it sounds. Soils with excessive moisture content are excavated and replaced with controlled fill material, typically imported stone. While this works well for small areas, there are usually more cost-effective strategies for larger areas.

2. **Chemical drying** *Soil modification* is the addition of materials such as lime and LKD (lime-kiln-dust) used in relatively low percentages to speed up the soil drying process and improve the workability and constructability of the soils. *Soil stabilization* uses the same construction process as soil modification and some of the same additives to create a structurally enhanced layer which is an engineered product that is designed to meet exact specifications. While soil modification can be used as a solution for wet soils, the use of soil stabilization must be determined early in the design process so appropriate specifications are developed.

3. **Bridge over or reinforce with geogrids and geofabrics**
   This common approach introduces specific types of geo textiles that are incorporated within soils or between soil substrates and aggregate layers to improve their characteristics.
Determining workable solutions

When determining which approach or combination of approaches to use to remedy wet soils, engineers and technicians consider the following factors:

- Extent of movement (see explanation below)
- Whether or not old fill material is present on site
- Pavement sections, specifically whether it’s heavy or light duty pavement
- What the road will be used for (e.g. heavy truck traffic at warehouse docks, residential apartment complex, school bus loading area)
- Whether or not heavy construction traffic will be traversing the area before the building is completed
- The types of soils
- Extent of moisture content
- Applicability of the proposed solution
- Cost analysis of various applicable options

Proof-roll test reveals extent of movement

“Extent of movement” is an important concept to be familiar with, as that’s how engineers and technicians will describe their soil stability findings. There are two types of movement that will be tested based on a “proof-roll” with a loaded tandem-axle dump truck:

1. Rutting – occurs when the proof-roll truck’s wheels punch through, indicating that excess moisture is mainly in the soil near the surface.

2. Pumping and deflection – if the soil exhibits a wave effect as the truck traverses the test area, that indicates there is excess moisture as much as a couple feet deep. This is the more difficult situation to remedy.

It’s common to have both rutting and pumping and deflection, which means there are two different problems to address.

Geofabrics solutions for wet soils

Geotextiles, geofabrics, and geogrids are all terms for synthetic materials used to improve soil characteristics including separation, filtration, reinforcement or stabilization, drainage, and protection. Which product is recommended depends on what problem(s) needs to be solved.

When working to stabilize or compact wet soils, we’re primarily focused on products that enhance soil separation and stabilization qualities.

Separation

Excessively wet or soft soils will allow the intermingling of different layers of material. A geogrid placed between layers will preserve the integrity of the separate subgrade and base course of stone.

Geogrids or needle-punched geofabrics allow the passage of water through the fabric while preventing soil particles from migrating into other layers
Geotextiles, also called geofabrics, are cloths or woven fabrics typically made of polypropylene or polyester and manufactured in three basic forms:

a. Woven fabrics – usually high strength materials that provide reinforcement and separation but are not typically permeable
b. Needle punched – these felt fabrics are comprised of chemically adhered fibers; they offer excellent separation and filtration characteristics but do not offer much in terms of reinforcement
c. Heat-bonded – the fibers are bonded together using heat instead of chemicals; these thin fabrics offer excellent separation and are inexpensive, but do not offer much in terms of reinforcement or filtration as they can be almost impermeable

Geogrids are mesh or lattice-shaped synthetic materials whose primary function is to strengthen and reinforce soil. Geogrids are composed of stretched high-strength polymers or welded high-strength composite materials.

a. Stretched geogrids are manufactured from a solid polymer sheet that is hole-punched and then stretched in one or multiple directions.
b. Welded geogrids are made of high yield strength materials woven and/or glued into a grid pattern.

Geogrid aperture (hole size) is designed to interact with specific stone sizes when used for subgrade stabilization purposes. For example, a 1” aperture is used for ODOT 304 stone to No. 57 stone gradations, while a larger aperture of 2.0-2.5” is used for larger aggregate such as No. 2 stone.

or drainage pipes. Common applications are keeping subgrade and base course layers separate (shown in illustration above), finger drains below pavement, and granular drains along slope fills or toes.

**Stabilization**

The use of geogrids or high-strength woven geofabrics help resist and distribute stresses and contain deformation in soil structures. For subgrades, geogrids can help bridge wet or soft soils and allow compacted fill placement by spreading out the stresses.

Stone is commonly placed atop the geogrid with a dozer to create a bridging effect. The grid aperture and stone size need to be carefully matched to maintain separation of the subgrade and stone base.

When separation and reinforcement materials are both required, manufacturers sell composite geotextiles in a single roll for easier installation.

**Additional geofabric applications**

While geofabrics are useful in the field to resolve problems with soft or wet soils, they also offer cost-saving advantages when considered during the design phase. For example, pavement sections can usually be reduced when geogrids are included for reinforcement, allowing savings on stone and/or overall pavement depth.

Typical geofabric applications include:

- Loading dock areas, truck parking areas, dumpster pads, and bus stops where pavements will endure frequent heavy loads
- Heavily traveled areas such as primary circulation roads and those subjected to heavy vehicles
- Erosion control on slopes and drainageways
- Earth reinforced retaining walls with either block or natural vegetation face

**Need more information?**

For more info about geogrid and geofabric applications for your construction projects, call GCI at 614.895.1400 or contact:

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GCI Welcomes New Addition to Drill Rig Fleet

The newest addition to GCI’s fleet of drill rigs was recently delivered.

The new CME-45C track-mounted all-terrain vehicle (ATV) drill rig, affectionately nicknamed “The Tank,” combines a lower deck height and a shorter vertical mast to only need about 21 to 22 feet of clearance when fully extended.

The shorter mast allows the rig to access areas that couldn’t be drilled before, such as below tree canopies and inside structures. The track-mounted rig can navigate through softer, wetter conditions than the truck-mounted drill rigs.

The Tank is GCI’s second ATV-mounted drill rig, joining “The Beast,” a rubber-tire ATV-mounted drill rig. GCI also operates four truck-mounted drill rigs.

With six active drill rigs and experienced drilling crews, GCI can provide the site assessments necessary to keep your projects on track.