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Stabilization of Sludge Basins

by Rich Haro

Removal of sludge at wastewater treatment facilities has traditionally been a major operational concern. Most large sludge basins require removal of processed sludge by large heavy equipment, causing the basin subgrade elevation to become unstable under equipment loads. A proven method to reduce the amount of maintenance required is to modify the existing subgrade soil. This method of soil improvement consists of treating the native soils with additives such as portland cement.



Compaction of soil-cement as a liner.

Soil treatment increases the strength and reduces the compressibility of the existing subsurface strata to maintain ground stability and to control ground movement under loads induced by heavy construction equipment. An added benefit to treating with Portland cement is the reduction of the soil's permeability.

Portland cement is mixed into the native soil with water creating a material called soil-cement. This method of stabilization is conducted under a controlled environment to provide a consistent and uniform mat structure. This stabilized mat creates a hardened surface that allows for many years of maintenance access for sludge removal.



Flooded soil-cement lined drying bed.

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Design Consideration and Quality Control

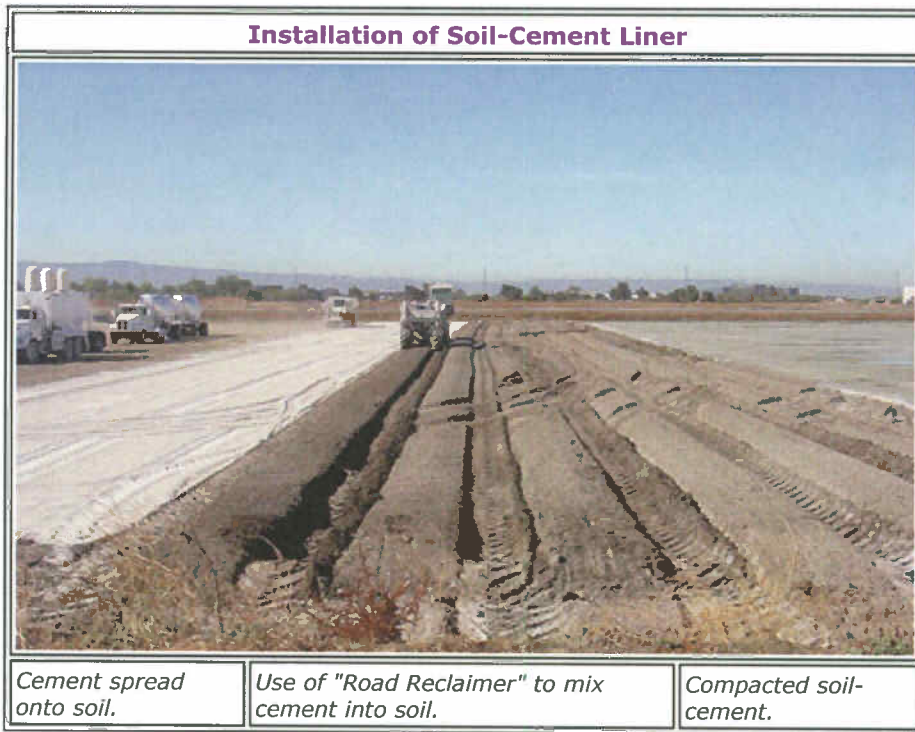
In order to structurally evaluate the stabilized soil, laboratory tests can establish such properties as: 1) unconfined compressive strength, 2) flexural and tensile strength, 3) R-value 4) fatigue behavior, etc. Probably the single most important strength parameter is the unconfined compressive strength as other strength parameters can often be estimated from unconfined compressive strength as a result of regression analysis.

The test samples can include laboratory and field wet samples prepared before, during, and after construction, respectively. The results can be used for design,

construction quality control and quality assurance.

Features/Benefits of Soil Stabilization in Sludge Drying Beds

- Directly supports end loaders allowing them to drive directly on the sludge drying bed without destroying the subgrade.
- Loading and cleaning time is significantly reduced.
- Reduces the permeability of the native subgrade soil.
- Establishes a clear distinction between the sludge removal and subgrade.
- Reduction in the amount of grading required at the site, due to enhancement of the strength of the existing soil.
- Increases the service life of the sludge bed from five years using an untreated aggregate base to over 20 years using a treated subgrade base.



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All photos courtesy of Griffin Soils.

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