Soil Permeability Reduction

Terra Pave International, would like to propose to you a method, by which lower soil permeability or permeability reduction can be reached in accordance with environmental regulations where lower soil permeability is required, while at the same time accomplishing this task of permeability reduction as efficiently as possible. Our method is well tested and has been proven in many other similar situations where permeability reduction is required.

Our product Top-Seal sits on the leading edge of technology for products specifically designed with dust control, road dust control, soil stabilization, erosion control and soil permeability enhancement as the end objective.
Decreasing Soil Permeability

The task of decreasing soil permeability is not only a costly proposition but also a logistical challenge when the needed material is not readily available. Purchasing, excavating, transporting and placing material with a natural low permeability large percent of the cost of a permeability reduction project. Our program allows our customers to reduce the cost of the total project by reducing costs associated with the procurement of material with a lower soil permeability. The **lower soil permeability and permeability reduction** is defined by the required permeability coefficient ($k$) as directed by federal and state environmental protection agencies as well as resource management departments nationwide. This coefficient is a calculation based on a materials ability to restrict the movement of a liquid, in this case rain water, through a cross section of the boundary material. In most cases the lower soil permeability of a boundary material, must be equal to or less than $1 \times 10^{-7}$ cm/sec. The challenge is then placed on the necessity to find a suitable material to use as a boundary that will meet these standardized regulations defining low soil permeability.

An alternative to Low Permeability Soils

This is where our company is able to assist. Finding a suitable material for a soil permeability project is often difficult due to land population and usage. It can also be hindered by the fact that in many areas of the country suitable material is not readily available and must be hauled many miles. Locating and hauling a suitable material is becoming one of the largest cost factors for permeability projects. Terra Pave International is able to assist in this process by allowing the customer to utilize what would be considered high permeability material while still meeting the requirements of **lower soil permeability simply with our permeability reduction program**.

For example, a town in Colorado is located in a section of the state where it is mostly brown sand. The permeability of this material is nowhere close to the required $1 \times 10^{-7}$. In order to find a suitable material they would have needed to truck material from a location over sixty miles away. The material was expensive and the transportation would have not only been time consuming but also very costly. The town delivered a sample of their local material to a third party testing facility where an unbiased controlled test was completed. In this case the testing facility was Jack Holt Ph. D. Associates in Austin Texas. Knowing that the material required for soil permeability project must have no more than $1 \times 10^{-7}$ as a permeability coefficient, the town was skeptical about the possibility of using their native soil and our permeability reduction program.
The Testing Results from our soil Permeability Reduction Product

Once the material arrived at the testing facility, a test sample was created in accordance with ASTM Section 5084, Flexible Wall Parameter, requirements. The sample was then treated with our soil enhancing permeability reduction product, Top-Seal, in accordance with our standard permeability application methods. Upon completion of the curing process the sample was tested for soil permeability in accordance to ASTM 5084.

For their project the required permeability coefficient of material used had to be no more than $1 \times 10^{-7}$ cm/sec. Upon completion of the test the laboratory found that the enhanced “un-suitable” material now had a soil permeability coefficient of $2.9 \times 10^{-9}$ cm/sec several factors less than the “suitable” material. Our soil permeability reduction program proven very worthwhile to this and many other customer.

To put this in perspective please see the following graph. The higher the bar, the more water will permeate through the soil. The lower the bar, the less water will permeate through the soil.
Simply by using a material that would normally be regarded as “un-suitable”, and enhancing it with soil permeability reduction product, Top-Seal, we are able to enhance the soil permeability coefficient beyond the requirements set by the EPA and resource management regulations. Again the smaller the column in the graph, the less water will be allowed to penetrate the soil.

These facts translate into several positives for those requiring material for lower soil permeability projects. The first and most obvious advantage is that by using Top-Seal to enhance a soil that would normally be considered “un-suitable”, we are able to take advantage of the discount that comes with that material. The material that is considered “un-suitable” is advantageous in the fact that the cost of that material is often times several dollars less per cubic yard then a material that is considered to have a lower soil permeability and permeability reduction coefficient. In many cases we have seen a price difference to be as much as fifteen dollars per yard. This varies from location to location depending on population and land usage and prevalent soil types. By using the “un-suitable” soil and treating it with Top-Seal we could save the client several hundreds of thousands of dollars on their low soil permeability project.
Lower Soil Permeability Objectives

Remember the objective here is to create a barrier that has a soil permeability coefficient of less than or equal to the required $1 \times 10^{-7}$ for their project. Top-Seal enhanced soils have shown to meet those requirements and often times exceed them by several factors while at the same time saving much needed capital that may be used elsewhere.

One other advantage to a Top-Seal treated soil is that the material can be sourced from a local supplier. By using a local supplier you are keeping the cost of transportation down as well as keeping the money and the work local. Many times a project of this magnitude bypasses the local economy all together. This is not the case when Top-Seal is the chosen method by which to enhance soil permeability.

In these economically challenging times, where the environment and the need for fiscal responsibility are at odds with each other, we at Terra Pave International are here to help bring these projects in at a reasonable cost. We cannot overlook the need for success in our soil permeability projects while at the same time we must maintain fiscal responsibility. By utilizing tried and proven technologies to meet these needs we can provide a material that will meet your soil permeability needs while at the same time maintaining financial stability.