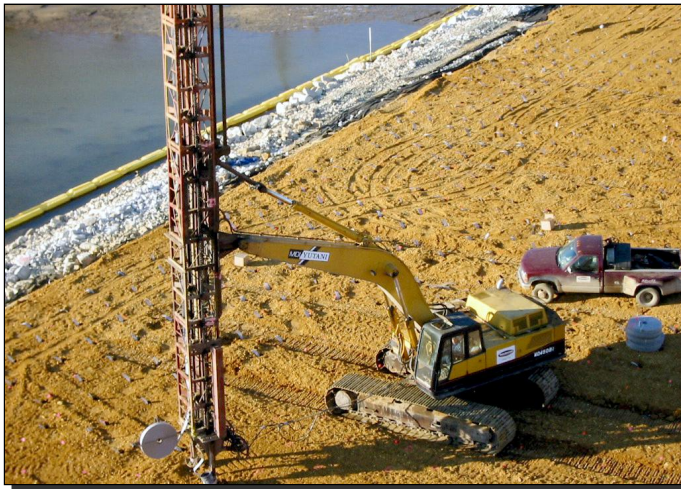


# Wick Drains

## What are Wick Drains?

Long-term settlement of soft silt and clay often creates serious problems in construction. Ten or more years may be required for consolidation of thick compressible layers of soil.

To accelerate the consolidation process, the site can be surcharged with fill material in conjunction with wick drains, also called prefabricated vertical drains (PVDs). A typical wick drain is approximately four inches wide and consists of a central plastic core surrounded by a filter jacket. Wick drains serve as atmospheric vents or drainage paths for relief of excess pore water pressure generated by the surcharge loading. With wick drains the consolidation time period can be reduced to a matter of months.



Woodrow Wilson Bridge, Prince George's Co., MD



DD(X) Land Based Test Facility, Wallops Island, VA



Norfolk International Terminal, Norfolk VA

## How are Wick Drains Installed?

Wick drains are installed with specialized equipment, called stitchers. The stitchers, which are mounted on either excavators or cranes, consist of a vertical mast housing a special installation mandrel. The mandrel, containing the wick drain, is hydraulically pushed or vibrated into the ground to the desired treatment depth, typically to the bottom of the soft-soil stratum. As the mandrel is withdrawn back into the mast, the undamaged wick drain is left in place within the soil mass. The mandrels are generally less than 10 square inches in cross-section, thus causing minimal disturbance to the soil. Depending upon soil conditions, installation rates may be as high as 2,000 feet per hour.

## What are Typical Applications?

Wick drain projects have included dams, large storage areas, highway embankments, sedimentation ponds, tanks, bridge abutments, buildings, and airport runways.



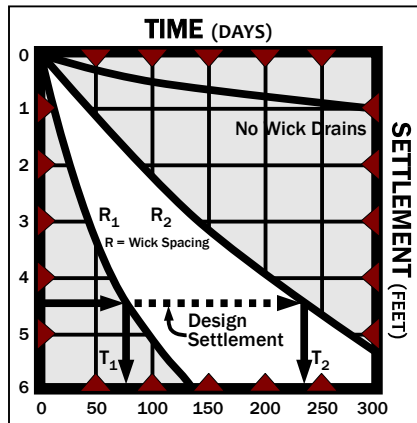
# Wick Drains

The most common application of wick drains is for accelerating the settlement rate of compressible soils. At some sites, the primary purpose of wick drains is to increase the shear strength of underlying soft soils. As soil consolidates, the shear strength increases due to a reduction in the water content. This application is particularly important when high area fills have to be placed over soft soils with low shear strength. Potential instability problems can be overcome by loading the site in stages and allowing the soft soils to gain in strength under each stage before placement of the next stage of fill.

Wick drains have also been used in conjunction with other ground improvement techniques such as dynamic compaction to allow rapid dissipation of excess pore pressures, thus allowing more effective compaction.

## How are Wick Drains Designed?

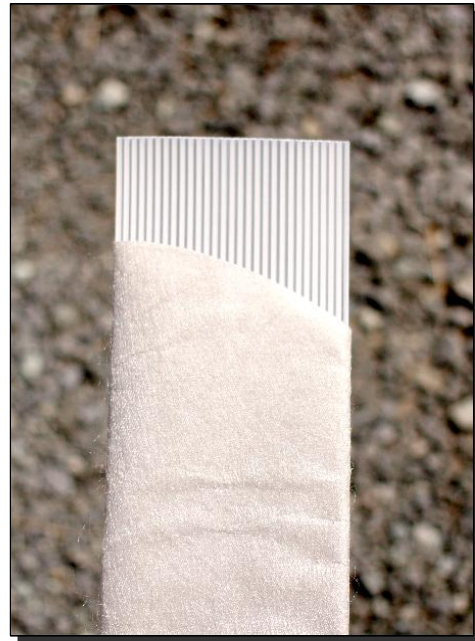
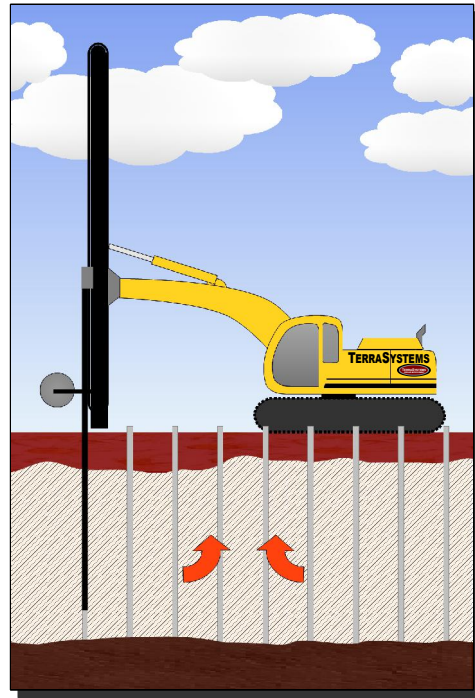
The rate of soil consolidation or settlement is controlled by how rapidly the pore water can escape from the soil. The controlling variables are the spacing between the wick drains and the permeability of the soil. The amount of consolidation is independent of whether wick drains are present and is determined by the soil compressibility and the weight of the fill above the wicks.



By developing a set of design curves of drain spacing, fill height, and consolidation time, the most economical drain spacing and height of fill can be selected to achieve a given degree of consolidation in a specified time period.

## What is the Cost?

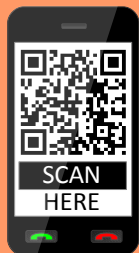
There are many factors affecting the cost of wick drains, including subsurface conditions, whether predrilling is required, the project size, prevailing wage rates, type of drain used, etc. However, the cost of installation is primarily affected by the subsurface conditions.



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