

Effects of Groundwater Drainage Tubes System (GWDTs) on Geotechnical Characteristic and Infiltration Rates in Clayey Soils

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Abstract

The purpose of the study is to determine the effects of soil tubes on geotechnical properties such as the infiltration rate. Soil tubes are a newer version of sand drains. The term groundwater drainage tubes system (GWDTs) will be used for any structures or tubes introduced into the soil to enhance its properties. Places known for high precipitation and clayey soil, such as Michigan, US, are the target locations for the tubes. Soil-water relation is complex and is dependent on multiple physical, chemical, and biological factors. Therefore, experimental study was necessary to evaluate the effects of the tubes. The method was to make two undisturbed soil samples through settling of soil material in a box. Experiments were done on two soil samples from Wayne County, Michigan. Clay #1 is identified as CL/A-2-6, and clay #2 is identified as CL/A-4. The soil is tested before and after the installation of the GWDTs for infiltration rate and soil properties. Then the soil's geotechnical characteristics including permeability, compaction, shear strength, moisture content, and Atterberg's limits are found pre- and post-installation of GWDTs to determine the effect of the tubes. The results are that the permeability, moisture content, and void ratio increased by factor of 3 in clay #1 and factor 4 in clay #2. This concludes that tube drainage systems should be effective for in-situ engineering of soils for high infiltration rates

Index Terms

Clay Soil, GWDTs, Permeability, Moisture Content, Infiltration