TENAX Corporation

CASE STUDY

Leachate Collection and Removal System (LCRS) using Tenax TenDrain GNT geocomposites and geonets TNT at Saratosa Landfill in Florida.

Problem

Sarasota County, Florida is located on the west coast of peninsular Florida. This area is very flat, with natural slopes less than 1:2.000. As expected, drainage is poor. Consequently the water table is very near the surface of the ground during much of the year.

PRODUCT	TENAX GNT high flow triplanar geonets TENAX TENDRAIN high flow triplanar geocomposites
LOCATION	Sarasota, Florida, 1999
INSTALLER	Comanco Environmental Corp.
ENGINEER	Camp Dresser & McKee, Inc.

The project site elevation is about 6.1 m above mean sea level. The Florida Department of Environmental Protection (FDEP) has established extensive rules regarding landfill construction. The Florida Administrative Code (FAC) contains specific design criteria for composite and double synthetic liner systems. Also included are requirements for maintaining liner systems above seasonal high groundwater to protect the liner components from the potentially harmful effects of fluctuating hydrostatic pressures. The physical characteristics of the project site, coupled with regulatory requirements, mandate that the entire liner area for the new landfill be constructed above the natural ground elevation. This required the excavation of large onsite pits to provide over 3 million cubic meters of soil fill to construct access roads and elevate the landfill area above the natural ground. To reduce the amount of fill required and thus the construction costs for the facility, the amount of slope used for thedrainage system needed to be minimized.

The minimum design slope allowed for a primary drainage system by Federal Subtitle D landfill regulations is 2 percent. The size of each landfill cell also needed to be minimized to reduce construction and operating costs. Early in the design process, the decision was made to eliminate penetrations of the liner system by using leachate sump pumps in each landfill cell. The sump pumps would remove leachate from the low point in each cell continuously. Each cell would, therefore, have a dedicated sump pump and related appurtenances. For the 24 hectares first phase it was desired to use five cells to limit the costs for construction and future operations. To meet this requirement, each cell needed a maximum cell width of 120 m. This results in a drainage layer slope length of 60 m from each side of the cell to a central collection lateral. A 60 m long drainage layer slope is considered the maximum for practical design purposes.

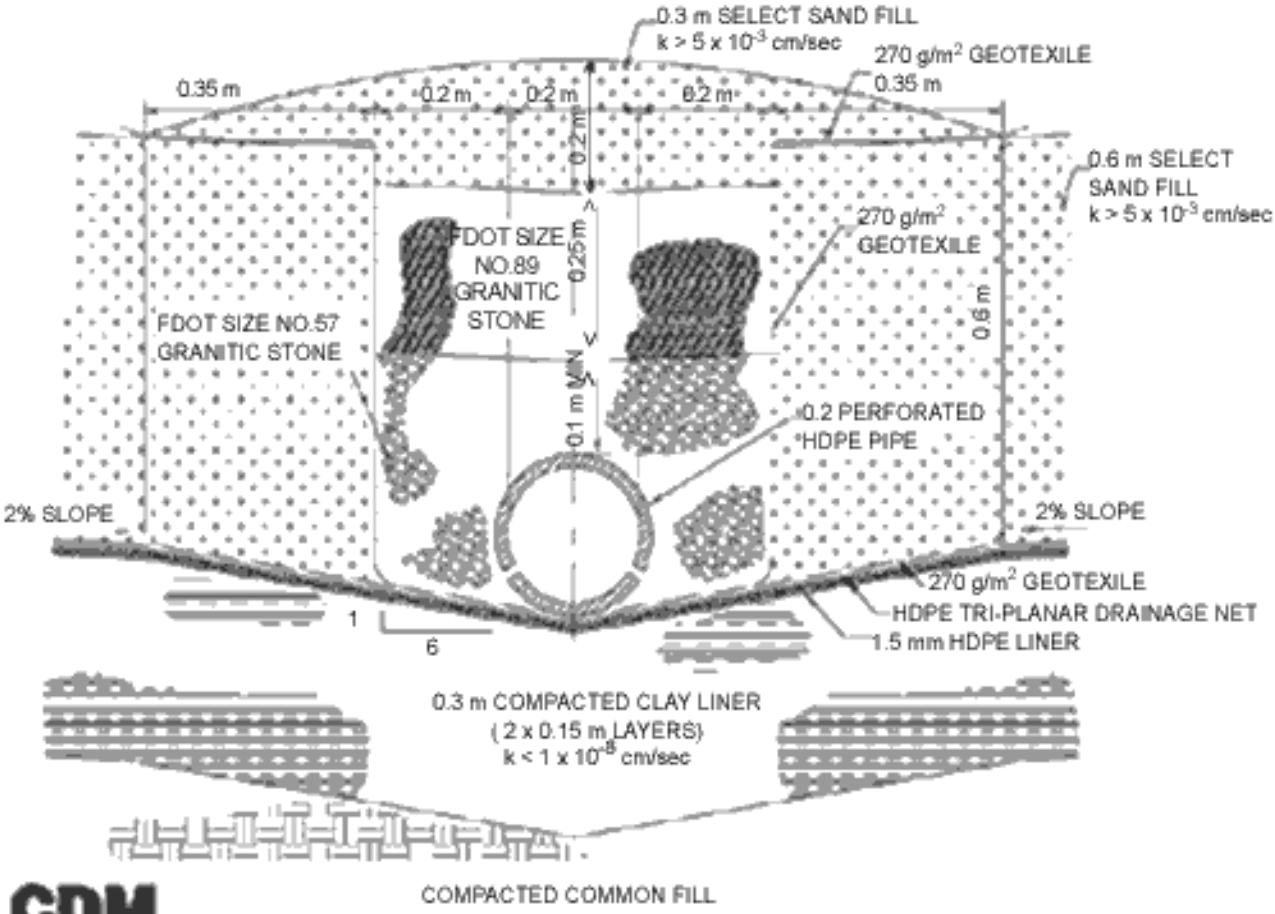
Solution

To achieve the most cost-effective landfill design from initial construction through long-term operation, the primary design criteria became maximum slope length and minimum degree of slope. To accomplish maximum slope length and minimum degree of slope, a highly efficient drainage layer was required so that FDEP design criteria for the allowable head on the liner could be met.

The original design calls for a double layer biplanar geonet system. Anevaluation has been conducted to demonstrate that the triplanar drainage net could exceed the design requirement by over a factor two even when long-term variables which may restrict flow were considered.

There is a considerable concern regarding the actual performance of double geonet systems due to the quality of the installation. Koerner and Hwu (1989) discuss the problem of reorientation of the two layers such that they may fold into one another. This condition may occur if the panels are not aligned properly during construction. The result of this condition could be a greatly reduced flow capacity for the system.

Another important consideration in using double geonets is the low interface friction between the two layers. For the above stated reasons, this project used a single-layer of triplanar geonet instead of two layers of bi-planar geonets.



CDM
Camp Dresser & McKee

Central County Solid Waste Disposal Complex
Typical liner system section

Conclusions

The original design of this landfill in Florida called for two layers of conventional drainage geonet in the LeachateCollection and Removal System in order to meet the flow requirements of this landfill.
After extensive evaluation, the engineer discovered that two layers of traditional geonet could be replaced with one layer of TENAX TENDRAIN.

TENAX TENDRAIN is a triplanar high flow geocomposite capable of replacing two layers of geonet. Use of the triplanar drainage geonet core simplified field construction, minimized the potential for construction problems caused by using two layers of drainage geonets, and produced an efficient leachate drainage layer and critical component of the total liner system.

The triplanar geocomposites have a structure with thick vertical ribs, these ribs significantly increase the compressive resistance and the tensile strength of the geonet. The vertical ribs are also supported by inclined planar ribs that reduce geotextile intrusions into the flow channel. The triplanar geonet has both mechanical and hydraulic advantages over typical bi-planar geonets, such as high insoil flow capacity under high normal load, great compressive strength, and high tensile strength. High tensile strength of a geonet is an added advantage especially when the geonet is placed on steep slopes.

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