
CASE HISTORY

TENAX TENDRAIN and GNT high flow triplanar geocomposites and geonets for an innovative landfill bottom liner system design, Florida

PRODUCT	TENAX GNT high flow triplanar geonets TENAX TENDRAIN high flow triplanar geocomposites
PROJECT NAME	New River Regional Landfill
LOCATION	Union County, Florida
PROJECT NAME	Aucilla Area Solid Waste Facility
LOCATION	Madison County, Florida
DATE	2000, 2001
INSTALLER	Conmaco Environmental Corp.
ENGINEER	Jones, Edmunds & Associates



PROBLEM

In a traditional sawtooth landfill design, leachate collection pipes are installed at the bottom of each lateral, and surrounded by gravel with geotextile wrap. The hydraulic performance of traditional landfill bottom liner systems significantly limits leachate recirculation and fullscale bioreactor operations. In addition, traditional designs require extensive coordination between specialized subcontractors, resulting in long construction schedules and high costs.

SOLUTION

Recognizing this, Jones, Edmunds & Associates developed a non-traditional bottom liner system with increased hydraulic performance to meet the operational challenges of bioreactors and to allow for a streamlined construction process. The innovative design features a high flow triplanar geonet in a configuration that eliminates the leachate collection lateral pipes, and a precast drop inlet that collects leachate from both the leachate collection and leak detection systems. The drop inlet design eliminates the need for pipe penetrations and their accompanying boots associated with more traditional liner penetrations and seaming techniques. The overall performance benefits of the new bottom liner

design over traditional designs include the significant increase in the hydraulic performance of the liner system.

The form and properties of the triplanar geonet used in the leachate collection system greatly improves the hydraulic characteristics of the liner system. The robust collection system can more easily accommodate increased hydraulic loading rates resulting from leachate recirculation associated with bioreactor operations. Another system benefit includes the associated decrease in threat to the environment, due to very low expected maximum head on the liner. Modeling results show that less than 6 mm of head are expected on the liner. The potential for leakage has been reduced by having only one liner penetration and by improving the weld quality with the drop inlet design. The orientation and access of the drop inlet results in high quality welds, which greatly minimizes the potential for leachate leakage. Welding the penetrated geomembrane to the drop inlet permits the weld to be tested, which is not possible with traditional pipe.

CONCLUSIONS

Replacement of traditional collection laterals with a triplanar geonet liner system has led to reduced construction complexity, duration, and costs. The elimination of collection laterals greatly simplifies the grading plan, and therefore enabled grading to be accomplished by landfill personnel and reduces construction time. In addition, the simplicity of the bottom liner system allowed owners to perform major elements of the construction without risk of impacting their contractors. Another significant innovation incorporated into the new bottom liner system, which allows a modular construction process, is the development of a composite HDPE/concrete precast drop inlet for leachate conveyance from within the lined cell.

The HDPE-lined top surface of the drop inlet easily facilitates the equipment that is necessary to weld the landfill liner directly to the top surfaces of the drop inlet. Significant reductions in project duration (over 60%) and cost (over 25%) over traditional bottom liner designs were achieved for these two projects.

The engineers of Jones Edmonds & Associates, in an effort to develop a flat bottom design for a landfill at New River Regional Landfill, were in search of a high flow geocomposite to incorporate into the design. TENAX TENDRAIN was determined to be the best solution for use in the design due to TENAX TENDRAIN's high flow capacity along long and flat slopes. TENAX TENDRAIN is also capable of maintaining high flow under heavy loads.

The combined effect of simplifying the bottom liner grading plan and eliminating the leachate collection laterals results in significant cost savings to the facility owner. It provides an estimated 31% reduction in construction costs, and an approximate 42% reduction in construction duration. The other benefits of this "low-head high flow" design include: reduced potential for leakage into the leak detection system and

environment due to minimal leachate head in the leachate collection system; reduced potential for construction claims and owner liability due to simplified construction requirements as well as separation of subcontractor work; and reduced potential for leachate system failure and associated regulatory exceedances, due to the entire triplanar geonet layer overlying the leachate collection geomembrane functioning as the "conveyance" channel, rather than relying on a small number of collection lateral pipes.