TENCATE Geotube®

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Combination of TenCate™ Corporate Capabilities Offer Distinct Advantage with Both Geotechnical and Geosystems Expertise.

Mirafi® and Geotube® Technology combine for demanding, large-scale dewatering project in Brazil.

Geotechnical projects come in a variety of sizes and scope — each presenting unique challenges. Many times these challenges are multi-faceted and require engineers to apply different disciplines and use a mix of products and methodologies to solve their project issues.

TenCate™, manufacturer of Geotube® materials, is equipped with the capabilities and knowledge to address these multiple geotechnical issues. TenCate™ develops and produces materials that function to increase performance, reduce cost, and deliver measurable results by working with our customers to provide advanced solutions.

Combined Capabilities

As the world's leading provider of woven and non-woven geosynthetics and industrial fabrics, TenCate™ holds a deep knowledge of materials and understands engineering and product innovation. The corporation often combines the efforts of multiple company divisions to design the best methods for a geotechnical project.

"We take a hands-on, collaborative approach to providing answers and solutions, said Mark Gunzenhauser, Vice President Sales for TenCate™ Geosystems and South America. "The combined capabilities of TenCate™'s multiple company divisions serve as a distinct differentiation in the industry. We're truly a one-stop shop for our customers."

Benefits of TenCate™'s Combined Capabilities

- Engineering support
- Technical support & assistance
- Design support & analysis tools (software)
- Chemical conditioning knowledge
- Stacking expertise
- Experienced managers & installers
- Complete project follow-up & support

Geotube® dewatering containers are supported by a Miragrid® 24XT base layer in the dewatering cell. As the project is completed, this area will be covered and developed into new green space.

Example of Project Collaboration

TenCate™ recently completed a project with a contractor in Brazil. The project required the construction of two lined Geotube® dewatering cells that contain three stacked layers of 120-ft. circumference x 200-ft. long GT500 Geotube® units. The total height of the finished project measures 25-ft. of filled Geotube® units.

This site would be subject to an overburden of up to 2,400 lb./ft.^{2} when completed. The planned area of the dewatering cells was to be constructed over an area that was created more than 60 years ago when dredge spoils were deposited to create an island. The contractor's challenge was how best to design and construct stable dewatering cells that would not be subject to bearing capacity failure or deferential settlement due to extreme overburden load of the filled Geotube® units. If a deep subsurface failure occurred, the resulting deferential settlement could rupture the cells' impermeable liner system leading to a catastrophic loss of heavy metals contaminated sediments contained within the Geotube® units.

TenCate™ provided the contractor with support and guidance in three areas:

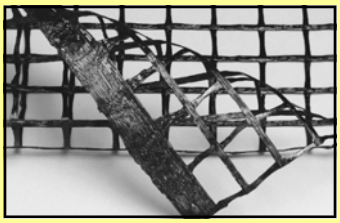
(1) Technical assistance in the analysis of the potential failures.
(2) Methodologies to model the many variables.
(3) Products that could be incorporated into safe designs to provide project security.

"TenCate™ Geosynthetics has spent the past 60 years developing proprietary products and design methodologies to aid engineers and contractors to solve the multitude of problems that they routinely face," said Tom Stephens, Director of South American Operations for TenCate™ Geosynthetics . "This specific project is a perfect example of how TenCate™ can combine corporate capabilities to solve the most challenging problems."

The project planning and development involved a preliminary four-step process. First, TenCate™ engineers provided settlement and bearing capacity analysis using the overburden calculations. This allows the engineers to calculate the settlement of Geotube® structures when installed over high-moisture content sub-grade soils.

(More)

Samples of the Specified TenCate™ Materials



Miragrid® 24XT Geogrid

Geotube® GT500 Fabric

Mirafi® 1160N Geotextile

Next, TenCate™ conducted global stability analysis, incorporating Miragrid® reinforcement to increase the factors of safety required. This allowed the team to study the stability of an overburdened soil mass that included a Geotube® structure installed over soils with various sub-grade conditions. Engineers were able to incorporate Mirafi® reinforcement materials, model their impact, and measure how they improved the structure's global stability.

In order to calculate the structure's allowable forces, the team used two TenCate™ proprietary software programs: Geotube® Simulator and Geotube® Estimator. This software provided design information for the critical structures. Using dry mass data, size dimensions, and base pressure of specific Geotube® units, the engineers determined the total mass of each structure and the downforce that could be exerted as a total footprint on the existing sub-grade layers. They were able to calculate the forces that could be safely resisted during the installation and filling of each Geotube® layer.

Finally, an overall stability analysis was conducted by a TenCate™ technical engineering team to insure that the entire project could be constructed with high factors of safety resulting in a successful project.

Additionally, the engineers included two layers of Mirafi® 1160N non-woven geotextile in the design of the dewatering cell containment system. The first layer was installed underneath the HDPE impermeable liner to protect the lower surface from the aggregate base course, and the second layer was placed on top of the HDPE liner to protect the upper surface from the gravel drainage media.

Miragrid® 24XT reinforcement was installed between two layers of base stone. Its simple installation took two weeks.

Construction of the dewatering cell utilized reinforcement layers of Mirafi® 1160N non-woven geotextile for safety.

Project Results & Details

The project was concluded without a single incident of concern due to the technical support provided by the TenCate™ team using the latest proprietary TenCate™ software, high-strength Miragrid® 24XT geogrid reinforcement (PVC-coated, woven polyester geogrid), and Geotube® GT500 fabric containers.

This project took 5.5 years from inception to fruition. The planning process of data collection and project analysis was completed in 18 months. And, the complete installation took another 18 months. The site will be vegetated in Spring 2011. Redevelopment of the site is planned, including parks and bike paths.

This was the first project in Brazil that incorporated three TenCate™ technologies (Geotube® dewatering, geogrid reinforcement, and non-woven geotextile liner protection) in a single project. It is believed that these positive results will lead to the continued use of TenCate™ technologies and materials for future projects in the country.

For More Information

A TenCate™ representative can work with an organization to provide engineering support for a variety of geotechnical projects and provide recommendations for Geotube® dewatering technology. To learn more, call 1-888-795-0808 or visit online at www.geotube.com.

How Geotube® Dewatering Technology Works

Dewatering with Geotube® technology is a three-step process.

In the ***filling*** stage, the Geotube® container is filled with dredged waste materials. The Geotube® container's unique fabric confines the fine grains of the material.

In the ***dewatering*** phase, excess water simply drains from the Geotube® container. The decanted water is often of a quality that can be reused or returned for processing or to native waterways without additional treatment.

In the final phase, ***consolidation***, the solids continue to densify due to desiccation as residual water vapor escapes through the fabric. Volume reduction can be as high as 90 percent.

Step 1: Filling

Step 2: Dewatering

Step 3: Consolidation

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