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Woven Slit Film Geotextiles: A Highly Efficient and Cost Effective Alternative to Polypropylene Geogrids for Base Stabilization Applications.

Fueled by effective promotion and well-documented research, rigid polypropylene geogrids have become the civil engineer's geosynthetic of choice for base stabilization. Well meaning specifiers have placed their faith in a successful, yet proprietary product, misunderstanding punched and drawn polypropylene geogrids unique physical properties to be an actual technology. As a result, preferential testing methodology and design 'standards' have stunted the development of performance based design criteria and discouraged good faith competition.

Specifications currently in use effectively exclude the use of viable design alternatives such as high-strength woven geotextiles. Many of these woven geotextiles had been used successfully for soil reinforcement nearly a decade before the development of geogrids. In particular, high-strength, high-modulas woven slit-film geotextiles have been virtually ignored as a design option.

Application of a base stabilization geogrid

Many geotechnical engineers practicing worldwide understand the type of geosynthetic used is irrelevant to the design of a reinforced soil structure. What is important is the geosynthetics' in-situ performance. As such, woven slit-film geotextiles are stronger and can offer a highly efficient and cost effective alternative to rigid, punched-and-drawn polypropylene geogrids.

In addition to superior strength and lower cost, slit film geotextiles offer an added advantage over any geogrid: separation. Geogrids rely on 'interlock,' a process whereby the soil particles or aggregate 'lock' into place within the geogrid's open structure or apertures. Base stabilization geogrid openings are typically 1.0" x 1.3". As such, it is critical that the soil particles or aggregate be of sufficient size to properly interlock with the geogrid. Often, the actual particle size is not known and/or varies widely. As a result, the amount of interlock provided can be in question.

While the slit-film geotextiles openings are large enough to allow the passage of water, they are small enough to impede all but the most minute soil particles. Therefore, separation of the weak and potentially wet soils from your base material is assured.

Specifically, the geotextile eliminates the pumping of weak material into your base that can occur with a geogrid.

At the Geosynthetics 1993 conference, a paper titled, "A Field Evaluation of Geosynthetic Reinforced Haul Roads over Soft Foundations," was presented that compared the reinforcing/stabilizing performance of geotextiles and geogrids in haul roads.

The paper's conclusion was that "[t]he aggregate subbase layer [in the geogrid sections] was contaminated with the cohesive subgrade soil... [However] excavation of the geotextile sections indicated no contamination of the aggregate subbase. The geotextiles did perform their function as separators and there was no evidence of actual tensile failure."

The fact is, geotextiles clearly have the strength to stabilize and are better separators than geogrids, which often require the use of geotextile as part of a separation/stabilization system.


Application of a base stabilization woven slit-film geotextile

One reliable and quantifiable measure of performance among all types of reinforcing geosynthetics is Ultimate Tensile Strength (ASTM D 4595/6637). With this criterion, slit-film geotextiles outperform polypropylene geogrids by as much as 40%. Other design properties including geosynthetic direct shear, soil pullout and reduction factors for creep, installation damage and biological / chemical degradation are all relevant.

Often, proprietary properties such as junction efficiency or index tests such as tortional rigidity, are included in specifications to the benefit of no one except a particular manufacturer's bottom line. Ultimate strain @ 2% and 5% relates to the rate in which a particular polymer reaches its final elongation and does not necessarily preclude one product or another.

When considering what type of geosynthetic to use in a base stabilization application, consideration must be given to the products' in-situ performance. Performance-based designs allow the contractor to pick from a variety of solutions taking into account additional factors such as ease of installation, pricing and product availability. Often, woven slit-film geotextiles provide a highly efficient and cost effective alternative to geogrids for base stabilization applications.