

Geosynthetic Fabrics and UltraBaseSystems®

Replacing Mass with Science

The importance of the proper geosynthetic fabric cannot be overstated as it pertains to the installation process for both UltraBaseSystems® and Tour Links® panels. We have always emphasized the soil and panel stabilizing effect a proper geosynthetic fabric can provide when coupled with our interlocking panel structure. In fact, we have a United States patent which systematically lays out what we believe is the ultimate panel installation process with geosynthetic fabrics being an integral step in the base preparation.

Recognizing the science behind geosynthetic fabrics is important due to the product's ability to stabilize less than perfect soil conditions. Over the last several months, I have spent time with some of the country's foremost authorities on geosynthetic fabrics and respect, even more, the products' importance in building a solid base utilizing our interlocking panels. We called on some of the brightest engineers in the industry, inclusive of those at TenCate Geosynthetics, the world's largest geo fabric producer, to help us better understand the choice of fabrics which will best complement our panels. As our project installations became larger in size, the necessity of maintaining flatness of a massive area and providing the proper drainage in diverse climates and soil conditions became increasingly important.

A good option of a geosynthetic fabric was 6.5 oz. spun bond polyester, a random layering of polyester strands which creates a non-directional cloth. We chose this fabric because of its tensile strength and relatively low elongation, good drainage flow which averaged around 35 gallons per minute per square foot and its smoothness which allowed our panels to slide easily across the fabric during installation. We experimented with products referred to as nonwoven needle punched products, but they tended to move, grabbing the panels and causing the fabric to bunch together between the panel seams, which made installation difficult. Non-woven needle punched fabrics are tough to puncture, but will deform under load. Obviously, this is not what we want. The smoothness and stiffness of the spun bond eliminates the bunching problem, allowing the panels to slide easily into each other and making quick work of installation. The choice of a spun bond fabric is a great one for putting greens, fields, and landscaping. Our knowledge of the science behind geosynthetic fabrics has grown, and we have learned that increased strength beyond the capabilities of spun bond is available with other types of geo fabrics.

As a result of our research, we have determined the characteristics for the geosynthetic fabrics to be used with our interlocking panel systems. They are as follows:

- high tensile strength
- low elongation
- a smooth face surface
- proper drainage requirements for the installation, meaning high flow or low flow, permeable or impermeable.

In essence, you want a smooth product that will not tear or deform.

When our panels are resting on top of the geosynthetic fabric, the goal is to eliminate or dramatically reduce the amount of indentation of the panel cells in the geosynthetic fabric and into the compacted earth. We don't want the panels to settle into the earth and block horizontal drain ports, but rather to ride on top of the prepared base allowing for free water flow underneath the panels. For this reason, a high strength woven polypropylene geosynthetic fabric is a great choice. They come in many weights and strengths. The extra heavy duty fabrics can be a bit pricier but when high load situations occur these products can be worth their weight in gold.

Companies like TenCate Geosynthetics offer a vast array of weights and properties in their woven products.

There are woven geo fabrics that have an incredibly high tensile strength and very low elongation and are a perfect solution. For normal soil conditions, these super strong products can have an amazing effect on stabilizing poor soil conditions which are worth the price in this kind of scenario. Woven geo fabrics can range from extremely high tensile strengths and flow rates down to acceptable tensile strengths and moderate flow rates. The proper choice will depend upon existing soil conditions and flow requirements. If I were to rate woven products from “good,” to “better” to “best,” I would start with Mirafi® HP270 as “good”, Mirafi® HP570 as “better” and RS280i as the “best.” To keep this in perspective, the RS280i is nearly 100 times stronger than the HP270 with almost twice the gallons per minute flow rate. The HP270 is still a good choice, but it will always come down to the requirements for a particular location.

You can expect geo-synthetic fabric to add \$.15 to \$.35 per sq. ft. to the project, but its role in creating a stable base supporting our panels is invaluable. Remember we are trying to eliminate as much rock and stone mass and labor as possible, utilizing the existing stabilized earth, properly compacted. We are striving to replace rock and gravel or asphalt and concrete base construction with the science of geosynthetic fabric coupled with the science of UltraBaseSystems® and Tour Links® panels. This combination of scientifically engineered products creates an incredibly stabilized structural base, ready for turf installation. Geosynthetic fabrics are being used successfully in creating roads, parking lots, runways and other bases where soils that are less than perfect need to be stabilized and able to accept excessive load. These fabrics are especially effective for our panel installations because we essentially have very little load. Unlike a landing strip for military aircraft or an access road into a construction site, the mere pound and a half weight per square foot of UBS panels and a layer of turf is nothing for these super fabrics to stabilize and support.

In certain cases, you may decide to utilize an impermeable geosynthetic stabilization liner in order to direct water out towards a perimeter drainage system or designated drain field. A situation that may require this is if the soil is a heavy clay base which becomes unstable when saturated with rainwater or frost situations. Installing our impermeable liner would remove the water properly or, in other words, starve the ground from water entering from the surface, creating predictability in the sub base. The incredible flow characteristics of the UBS panels allow water to flow through the panels, under the panels, and across the liner to the perimeter or in-field drain systems. Although the impermeable liners don't often come with the super high tensile strengths, if used in combination with a high tensile strength fabric listed above, extreme strength and impermeability can be achieved. To date, our “best” choice would be a 20 mil to 30 mil impermeable liners. All options should always be discussed with a certified geo or civil engineer.

Along with geosynthetic fabrics, there are two other products worth mentioning that can be used in combination with geo fabrics and they are referred to as geo-grids and cellular confinement systems.

A geo-grid, when laid on top of a geosynthetic fabric and layered with rock and then a final layer of another geo fabric is an amazing base preparation for poor soil situations. In this case, what you do is create a sandwich of a small layer of stone between two layers of engineered fabrics. The result is an incredibly strong system that can turn unstable soil into a perfect base for an UltraBaseSystems® installation. You may see a situation like this occur

if the soil is heavy in organics or lime and the decision is made not to remove all the organics, but instead to stabilize them.

A cellular confinement system is essentially an accordion-like grid system installed over a layer of geo fabric. Fill material is deposited into these individual cells which create an incredibly strong sub base. A way to describe it is taking a bucket and filling it with sand, packing the sand and then turning the bucket upside down. By leaving the bucket in place, encapsulating the sand, you have created an incredibly strong base which will support enormous weight. However, if you remove the bucket and try to stand on that pile of sand, it will collapse. The cell grid acts as the bucket and has hundreds of individual cells that capture the soils, creating a solid sub base which allows water to flow horizontally through the fill, helping to eliminate erosion. You probably have seen this product in use on roadside hills where water erosion is a problem. This product is also used by the military to build instant roads and aircraft landing strips. For our panel installations, a geosynthetic fabric would be placed over compacted ground; the cellular confinement system would be anchored in place and filled; an additional thin layer of geosynthetic fabric would follow and the installation finished with UBS panels. A system like this would allow for installation of a field on a desert or a sandy beach or provide a solid permeable concrete replacement solution for athletic courts.

These are the types of decisions that you, as the installer, will need to make or will consult with a professional soil engineer about. Our goal here is to simply alert you to the different products that are available to be used in conjunction with our panel system.

Again, the reason for presenting you with these different types of geosynthetic materials is to emphasize the importance of their stabilizing effect on diverse soil conditions. The science behind these products is fascinating and is being utilized around the world every day in helping build the tallest buildings, the largest roads, and the busiest airports by incorporating fabric technology into traditional building materials. In our installations, we recognized early on the importance of these geosynthetic fabrics and cell systems as a partner for our interlocking panel systems. The geosynthetic products help to stabilize the soil, and the panels create the perfect structural weight-bearing base, incorporating superior drainage, extremely good GMAX and HIC results, high-performance playability, and safety with a major reduction in installation time and labor expense. By incorporating the most advanced geosynthetic material technologies available to engineers and the revolutionary UltraBaseSystems® and Tour Links® panels as the structural base system, the world of synthetic turf fields and court installations promises to be forever changed.

Our mission at Tour Links and UltraBaseSystems is to “replace mass with science,” in other words, eliminate as much bulk material as possible and replace it with technology.

We welcome you to contact us to receive more information on these products and are more than happy to help guide you through any geosynthetic fabric questions you may have.