Geosynthetics 101
Improving Your Footing

Geosynthetic is a broad term for synthetic polymer products developed for uses in civil engineering (road building, erosion control), geoenvironmental and hydraulic applications. Different types of geosynthetics do different things including erosion control, soil separation, drainage, containment and soil stabilization. For our purposes, we will focus on the geosynthetics that have these important attributes for a good horse paddock:

1. Separation of soil
2. Filtration
3. Reinforcement properties

Two common types of geosynthetic materials that work well to enhance the effectiveness and lifespan of your footing material are geotextiles and three dimensional geo-grids. These products are used as a layer between the soil and footing material to keep them separate. You will need less footing material and need to replace it less often if it does not come into contact with the soil. This separation will also help footing maintain its position, improve drainage and increase the load bearing capacity of the site. These products can also help prevent compaction of soil, which often leads to uneven surfaces, erosion and poor drainage; a horse’s weight will be spread over a much larger area when using a product with reinforcement qualities.

**Geotextiles.** These are large rolls of continuous fabric made of petrochemical-based polymer products which resist bacterial or fungal action and are non-biodegradable. They are used as underlayment for building roads, for filtration and for erosion control. The rolls are typically 8 to 15 feet wide and 120 to 450 feet in length. Geotextile fabric is available in woven or non-woven material. Both types can work well, however, you must make sure that the fabric you choose has a good filtration rate so that water can drain through it and not pool in your paddocks. Generally non-woven fabrics drain fastest, but with the proper pore size, woven fabrics will work as well. These fabrics are susceptible to deterioration from ultraviolet/sunlight, so they must be covered with footing material as soon as possible after installation. They can also become extremely heavy when wet, they should be kept dry until ready to install.

Geotextile fabric is available in weights ranging from 3.5 to 18 ounces per square yard. The proper weight range for high-traffic area applications for the non-woven fabric is generally five to six ounces per square yard. Another geotextile you may come across is landscape fabric (sold mainly in home and garden centers); this is not suitable for livestock use as it is very lightweight and designed as a weed barrier only. It has no load bearing ability and will break down quickly in a paddock application.

**Geo-grids.** These are open grids that are typically used for reinforcement or stabilization of soil. The type of geo-grids used for paddocks are sometimes called geo-matrices. They are a three
dimensional cellular grid as opposed to the flat two dimensional grids that come in rolls and are used for soil stabilization along roadways and are not suitable for horses. Three dimensional geo-grids are generally made from polyethylene and come in square sections that snap together to form a continuous surface. Drainage is not a problem with geo-grids if properly installed. Since they have large uniform holes, water drains very quickly away from your surface. Geo-grids provide a strong, stable base for your footing while preventing soil compaction and soil intrusion.

Contact your local conservation district for assistance in choosing a product that is best for your site, soil type and situation. Geotextiles are generally more affordable than geo-grids, however you need to consider the cost of the footing material too; geo-grids require much less footing than geotextiles.

HCW devotee Kent Wiles of Clatskanie, OR installed geotextile fabric in his paddock areas. He shared his experience with us.

“My roll of fabric was so heavy,” Kent notes, “that it took myself and another strong individual (my Dad) to simply move it around. As leverage, we used 4” x 8’ wood rails or poles that you can purchase at most feed stores to move it around. The poles are simply inserted into the tubular ends of the roll to lift it about. Sharp scissors cut across the fabric in a sliding motion quite easily and I would recommend they be used as opposed to a box cutter for the control and accuracy they give.”

Kent adds, “I also have some experience with the Typar brand of landscape fabric. It is a spun-bonded fabric that appears to be more cloth like. I’ve used it under a sand and hog fuel footing with good success in my horse corrals and have not had a mud problem in our rainy climate. Although, I will probably not choose hog fuel again for a variety of reasons.”

Kent used different kinds of stakes to hold the fabric down. “The stakes shown here are U-shaped six-inch pins or staples that were purchased in affordable packages at Home Depot in their gardening section. They were designed and are sold for use with landscape fabric installations.”
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Installation. Once you've selected the proper product for your situation, the best time to install it is when the soil at the site is dry. Here are some tips on installation:

1. Clear the area of any sharp objects, stumps or debris. Remove old footing material and/or manure that has accumulated in the confinement area.

2. Scrape until firm ground (mineral soil or hard pan) is reached. Grade the existing soil surface to enhance water movement and to create a level surface for installation. To determine the grade needed for your site, consult with your conservation district or contractor.

3. For geo-grids: Put down a base layer of clean angular gravel (5/8 inch minus) without fines per manufacturer instructions. Lay grids on top, snap together and then fill grid cells “level-full” with gravel. Over-fill with one inch or more of footing material; geo-grid systems may be driven on by equipment during installation and topdressing. Hogfuel and some types of sand are not recommended as topdressing for geo-grids as they may impede drainage. Check with the manufacturer or your conservation district to determine which available footings will work best with your geo-grids.

4. For fabric: The fabric should not be dragged across the ground or allowed to snag, tear or get filled with dirt. At seams, fabric should overlap at least 12 inch to 18 inch. Fabric also needs to extend beyond fence lines so horses cannot grab or paw up loose ends. Anchor fabric with six inch staples or spikes. The footing material should be spread in the same direction as the geotextile fabric overlap to avoid separation and wrinkling between the seams. It is recommended that driving on the fabric be avoided. Have the rock unloaded in a pile to the side, not on the fabric, then the gravel can be pushed over the fabric with a tractor bucket. Once a pad is formed then it is safe to drive on that gravel instead of on the fabric. Complete the final spreading and smoothing by hand or with earthmoving equipment like a dozer, front-end loader, skid loader or scraper.

Maintenance. Since geotextile fabric and geo-grids provide separation between soil and gravel, you will not need to add footing material nearly as often as you would otherwise. Maintain the integrity of your footing material by cleaning up manure often—on a daily basis, if possible. Visit www.geosyntheticssociety.org to learn more about geosynthetics.

Get Help. For other creative design ideas and guidance on purchasing the correct geosynthetic, purchase the HCW Tip Sheets Creating the Sacrifice Area and Planning and Building an Outdoor Arena or contact your local conservation district.

Additionally, here is another resource that may be helpful:

Ohio State University Fact Sheet Using Geotextile Fabric in Livestock Operations http://ohioline.osu.edu/aex-fact/0304.html