GEOTERRA®

CONSTRUCTION MATS

SPECIFICATION & INSTALLATION GUIDELINE

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GEOTERRA®
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GEOTERRA Construction Mat System

The GEOTERRA system is an integrated, open, structural mat that consists of varying components depending on site conditions and loading requirements. The system's design and construction flexibility allows the use of only those components required for the project, reducing cost, and waste.

Three typical systems are presented below, listed in order from the most basic to the most rigorous requirements. Reference Table 1, or consult Presto Geosystems for assistance in determining appropriate system components for specific project needs.

Basic GEOTERRA System Components

Basic Components:

- GEOTERRA Units
- PADLOC® Connection Device
- Stakes or Earth Anchors (optional)

Typical Applications:

Prevent rutting, Protect turf, Use over sand, Create a uniform/stable surface.

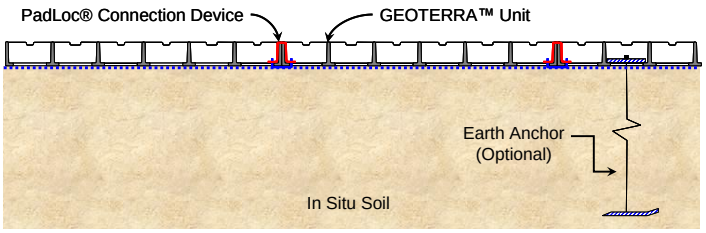

Figure 1: Basic GEOTERRA Components

Optional GEOTERRA System Components

Geosynthetic Under Layer Options:

- Geomembrane
- Non-Woven Geotextile/Geomembrane
- Single or Multiple Layers of Geotextile

Typical Applications:

Provide load support over poor/wet soils, Prevent rutting, Prevent subbase degradation/ contamination, Create a uniform/stable surface

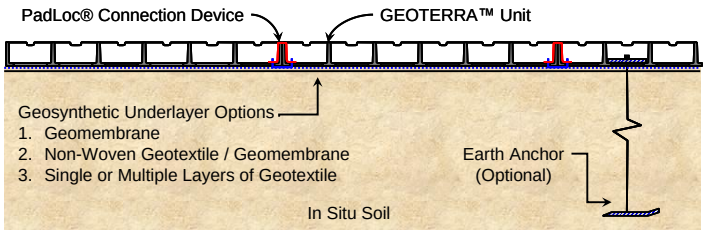

Figure 2: Optional Geosynthetic Under Layer Options

Drainage Components:

Drainage System primarily used over clay soils in high rainfall areas:

- Non-Woven Geotextile
- GEOTERRA Drainage System
- High-Strength Woven Geotextile

Typical Applications:

Provide load support over poor/wet soils, create an integrated drainable surface, Prevent subbase degradation /contamination, Create a uniform/stable surface

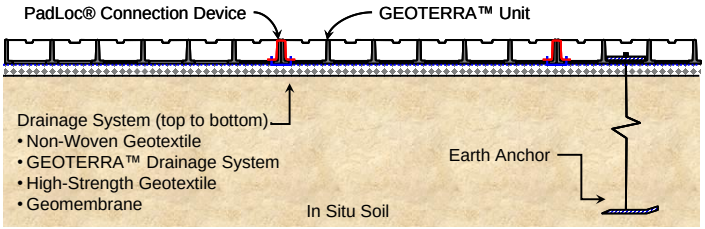

Figure 3: Optional Drainage Components

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GEOTERRA Applications

Table 1: Application Guideline

Applications	Systems Recommended for Use	KEY
Prevent Rutting	1, 2	1 Basic Components
Protect Turf	1	
Use Over Sand	1	**Optional Components** 2 Geosynthetic Under Layer Options 3 Drainage Components **Refer to Figures 1-3 for Systems and Component details.**
Provide Load Support over Poor/Wet Soils	2, 3	
Create a Uniform/Stable Surface	1, 2	
Prevent Subbase Degradation/Contamination	2, 3	
Allows for an Integrated, Drainable Surface	3	

GEOTERRA Units

Physical details of the GEOTERRA units used to form the top load-distribution / surface-wear layer are:

Length:	0.96 m (3.15 ft)
Width:	0.48 m (1.57 ft)
Depth:	50 mm (2 in)
Area:	0.46 m² (4.95 ft²)
Weight:	4.5 kg (9.9 lb)
Material:	Polyethylene blend
Crush Strength:	2,900 kPa (420 psi)

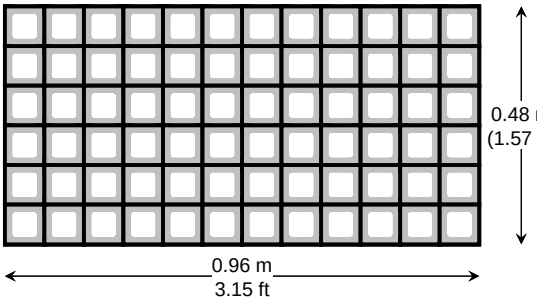

Figure 4: The GEOTERRA Unit

GEOTERRA units are connected and secured with the PADLOC Connection Device to form continuous, interconnected mats (Reference Figure 6.) GEOTERRA mats can be sized to meet specific requirements of the application area. Recommended layout patterns are illustrated in Drawing 1: Typical GEOTERRA Mat Layouts.

The PADLOC® Connection Device

The PADLOC Connection Device is used to connect and secure individual adjoining GEOTERRA units to form the GEOTERRA Mat System.

PADLOC Connection Devices can be removed and the GEOTERRA mat system can be disassembled for removal, storage, and reuse.

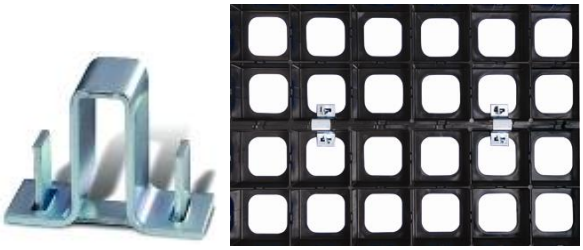

Figure 5: The PADLOC® Connection Device

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The PADLOC Connection Device consists of two joining parts:

- The upper piece referred to as the “Clamp”
- The lower piece referred to as the “Strap”

The U-shaped Strap is placed under the seam of adjoining GEOTERRA units, and the Clamp is placed over the seam of the adjoining GEOTERRA units at the groove points on the top edge of the GEOTERRA unit outer walls.

Figure 6: The PADLOC® Components

Four grooved connection points exist on the long side of the GEOTERRA unit and two points on the short side.

PADLOC Connection Devices should be placed at all connection points and secured as illustrated in the section, Installation of the GEOTERRA® .

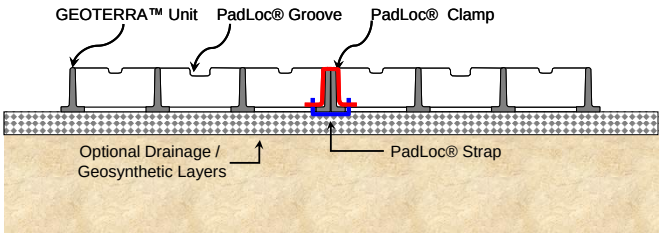

Figure 7: GEOTERRA System Cross-Section

Optional Components

If required by site conditions, the following components may be part of the system:

1. Non-Woven Geotextile
2. High-Strength Geotextile
3. Geomembrane Layers
4. GEOTERRA Drainage System

Non-woven Geotextile

If required, a 240 g/m² (8 oz/ft²) non-woven geotextile is placed directly over the subgrade, or over the interconnected GEOTERRA drainage system. A minimum 0.30 m (12 in) overlap is required at seams to ensure proper filtering.

The non-woven geotextile functions as a filter, allowing water to flow through it while providing a separation layer between the subgrade soils and the GEOTERRA mat system. The geotextile also prevents soil-fines from pumping and causing possible clogging of the GEOTERRA drainage layer when the drainage components are part of the system.

High-Strength Geotextile

If required, the high-strength woven geotextile shall have a 70 kN x 70 kN per meter (4800 lbf/ft) minimum wide-width tensile strength at 20% maximum elongation (ASTM D 4595), and a maximum apparent opening of 0.425 mm (16.7 mil) (ASTM D 4751).

For rigorous conditions, the high-strength geotextile provides a double function; first as a separation layer and second as soil reinforcement. The geotextile is placed directly on the graded, in-situ soil. A minimum 0.25 m (10 in) overlap is required at seams. Depending on the application, the strength requirements will vary. Consult Presto Geosystems or your local representative for assistance.

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Impervious Geomembrane

If required, the geomembrane layer is used to prevent subbase degradation and/or contamination of the underlying soils that may occur due to activities occurring on the mat. The geomembrane layer may need protection with a non-woven geotextile layer on one or both sides.

Function of Geosynthetic Under Layers

Various options are possible and construction details will vary depending on site-specific details. The items in Table 2 are presented as a guideline. The Presto Geosystems team can guide in the appropriate decision once knowledge of site conditions is obtained.

Table 2: Function of the Geosynthetic Underlayers

Typical Function	Non-Woven Geotextile	Woven Geotextile	Geomembrane
Provide Soil Separation	✓		
Provide Soil Reinforcement		✓	
Prevents Subbase Degradation / Contamination	✓ [1]		✓
[1] May be required on one or both sides of the geomembrane.			

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GEOTERRA® Unit Connecting Device and Tools

The GEOTERRA units are connected to form continuous mats with the following devices and tools specifically designed for the GEOTERRA system.

PADLOC® Tools

PADLOC tools are necessary when using PADLOC Connection Devices to secure GEOTERRA units.

The Lifting Lever

Used to securely hold the Strap up against the bottom of the GEOTERRA unit for placement of the Clamp.

Figure 8: Lifting Lever

The Torsion Tool

Used to twist the ends of the Strap 90º to secure the Clamp to the Strap. Place the Torsion Tool over the end of the Strap so the Strap is engaged in the slotted end of the Torsion Tool.

PADLOC Connection Devices can be unlocked for removal by reversing the twist of the Torsion Tool.

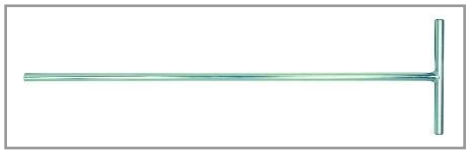

Figure 9: Torsion Tool

Optional Anchoring

Occasionally, the GEOTERRA units may require anchoring at specified intervals with stakes or earth anchors specifically designed for the GEOTERRA system. Quantity and spacing of anchor placement are a function of soil type, saturation, loading requirements and application. Consult Presto Geosystems or your representative for assistance in determining if anchors are required and for recommendations on anchor type, density, and placement.

Stake Anchors

For some light-weight applications or small platforms, stakes may be used to anchor the assembled GEOTERRA system from shifting due to torsional surface loading.

Earth Anchors

Earth Anchors are recommended to stabilize the GEOTERRA mat system for very large platform installations to control surface deformations.

The GEOTERRA Earth Anchor 800-33 shall have:

- 360 kgf (800 lbf) resistance against pullout (may vary with soil types, saturation, and density).
- 0.84 m (33 in) cable length.

The earth anchor is made from a steel cable with a formed (stamped) steel anchor head at one end and a tensioning loop at the other end. A washer and cable stop move freely along the cable.

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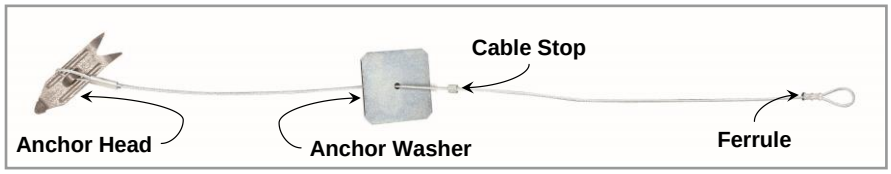

Figure 10: Earth Anchor

Earth Anchor Tools

The Drive Rod

The Drive Rod is designed to engage with and drive the anchor head to the depth (length) of the Earth Anchor cable.

Figure 11: Earth Anchor Drive Rod

Earth Anchor Set Tool

The Earth Anchor Set Tool is used to fully set the Earth Anchor head and can be adjustable so that a proper earth anchor set can be obtained for manual lifting conditions.

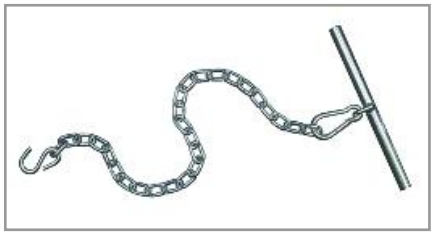

Figure 12: Earth Anchor Set Tool

Crimp Tool & Cut Tool

The Crimp Tool is used to crimp the cable stop to the cable and the Cut Tool is used to cut the excess cable above the cable stop.

Figure 13: The Cut Tool

Installation of the GEOTERRA® System

Site Preparation

Clean, grade, and compact the surface in preparation for the GEOTERRA System. If the surface is impervious, it must be graded such that water will flow from the surface. No depressions should exist that will hold water.

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Installing the Optional Geosynthetic Layers or Drainage System

If required, non-woven and/or woven geotextile and geomembrane layers should be installed according to specific manufacturer recommendations. These recommendations may vary depending on site-specific conditions.

If the Drainage System is Required:

- Place the specified high-strength woven geotextile over the graded surface. Overlap seams 0.25 m (10 in) minimum. See Figure 14: Placement of the High-Strength Geotextile.
- Place the GEOTERRA layer over the high-strength woven geotextile as required ensuring that all units are properly engaged.
- Place the non-woven geotextile over the GEOTERRA layer. Overlap seams 0.30 m (12 in) minimum.

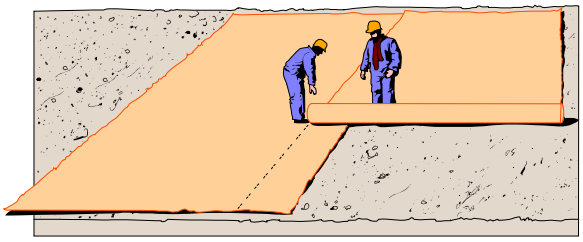

Figure 14: Placement of the High-Strength Geotextile

Forming GEOTERRA® Mats

The GEOTERRA mat system can be assembled in-place by connecting individual GEOTERRA units as shown in Figures 16-22.

If pre-assembled mats are used, connect adjoining mat sections using the same PADLOC connection devices and methods. Reference Section Constructing Pre-Assembled GEOTERRA® Mats.

Figure 15: Connecting GEOTERRA Units

PADLOC Strap locations around the GEOTERRA unit are noted in Figure 16. These locations can be identified by the presence of a PADLOC-sized groove in the upper wall of the GEOTERRA unit in which the PADLOC Clamp rests.

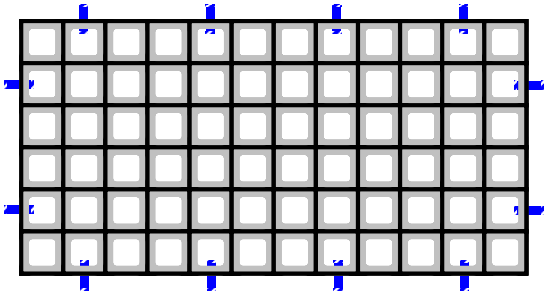

Figure 16: Position of PADLOC® Straps

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1. Place the first GEOTERRA unit or assembled mat section in position and place PADLOC Straps at all groove locations under the GEOTERRA Mat edge.

NOTE: For ease of installation, perform Step 2 before Step 1 when the GEOTERRA units or pre-assembled GEOTERRA Mats are placed directly over an aggregate or soil surface.

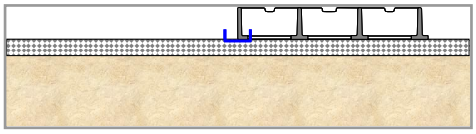

Figure 17: Placing PADLOC® Straps

2. Insert the Lifting Lever under the PADLOC Strap as illustrated.

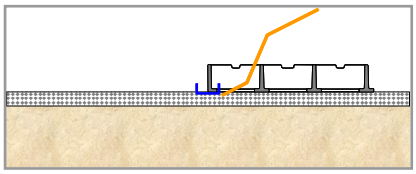

Figure 18: Inserting Lifting Lever

3. Multiple PADLOC Straps can be placed by using multiple Lifting Levers as shown in Figure 19.

Figure 19: Multiple Lifting Levers

4. Make sure that the Lifting Lever is directly under the PADLOC Strap. Step on the Lifting Lever to hold the Strap firmly against the bottom of the GEOTERRA Unit.

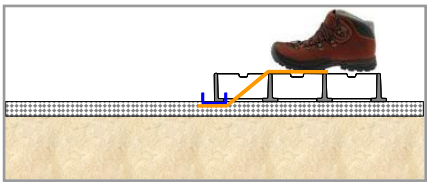

Figure 20: Engage Lifting Lever

5. While stepping on the Lifting Lever, place the adjoining GEOTERRA unit or mat section in position and over the in-place PADLOC Strap.

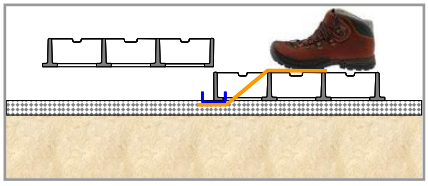

Figure 21: Place Adjoining Units / Mats

6. Place the PADLOC Clamp over the adjoining GEOTERRA walls and into the groove such that it engages with the PADLOC Strap.

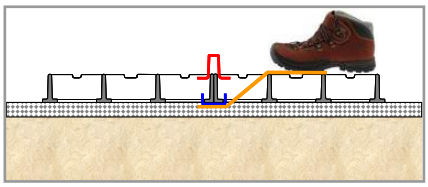

Figure 22: Place PADLOC® Clamp to Strap

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7. Place the slotted end of the Torsion Tool over the end of the Strap so it is fully engaged. Twist the Torsion Tool 90º (+/-15º) so the ends of the PADLOC Strap secure the PADLOC Clamp and Strap together.

NOTE: Twisting more than that which is recommended may cause breakage of the PADLOC Strap. Twisting less than that which is recommended may cause a weak connection.

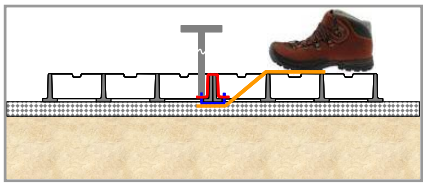

Figure 23: Twist Strap with Torsion Tool

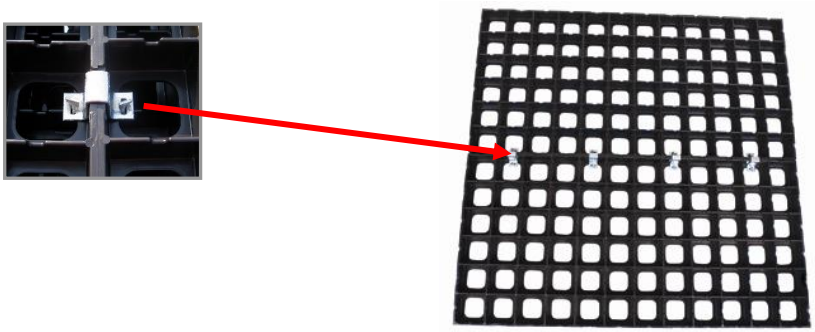

Figure 24: Fully Fastened PADLOC® Connection

Constructing Pre-Assembled GEOTERRA® Mats

For construction efficiency, GEOTERRA units can be assembled into multi-unit mats, either in an assembly area on site or off-site and transported to the site. See Figure 25 and Figure 26.

Typical recommended layout patterns:

- Herringbone Pattern for multi-directional traffic. See Figure 27.
- Bricklayer Pattern for single-direction traffic.
- Side-by-Side Pattern for temporary or light-weight traffic. See Figure 28.

Figure 25: Pre-Assembled GEOTERRA Mats

Figure 26: Transporting Pre-Assembled Mats from Off-Site

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Figure 27: Assembling GEOTERRA Mats (Herringbone Pattern)

Figure 28: Assembling GEOTERRA Mats (Side-by-Side Pattern)

Placing the GEOTERRA Pre-assembled Mats

Organize and place the pre-assembled GEOTERRA mats directly over the specified geosynthetic layers and/or drainage system.

In some situations, the GEOTERRA mats may be placed directly on the subgrade.

Consult Presto Geosystems or your representative for recommendations.

Figure 29: Placing GEOTERRA Mats Over Geotextile Layer

Connect adjoining pre-assembled mat sections with the PADLOC connection device.

Depending on the chosen layout pattern, individual GEOTERRA units may be used to adjoin two pre-assembled mats together.

Figure 30: Connecting Pre-Assembled GEOTERRA Mats

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Anchoring the GEOTERRA System

Stakes: May be used for some light-weight applications or small platforms to anchor the assembled GEOTERRA system from shifting due to torsional surface loading.

Earth Anchors: May be recommended to stabilize the GEOTERRA system for very large platform installations to control surface deformations.

The Earth Anchor system is installed after the GEOTERRA Mat System is fully assembled (Reference Figure 10: Earth Anchor). The process is as follows:

1. Engage the Drive Rod with the Anchor Head.
2. Holding the Drive Rod and Cable together, place the Anchor Head in one of the openings in the bottom of the GEOTERRA units. Reference Figure 31: Installing the Earth Anchor.

Figure 31: Installing the Earth Anchor

3. Using a sledgehammer, drive the Anchor Head through the drainage / geosynthetic layer system into the soil to the length of the cable or until resistance is reached. Reference Figure 32: Driving the Anchor Head.
4. Remove the Drive Rod.
5. Position the Washer in the bottom of the GEOTERRA cell.
6. Attach the hook of the Earth Anchor Set Tool to the tensioning loop on the end on the cable.
7. Hold the handle and lift vertically to set the Earth Anchor. Reference Figure 33: Setting the Earth Anchor.

Figure 32: Driving the Anchor Head

Figure 33: Setting the Earth Anchor

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8. With the Washer positioned in the bottom of the cell, place the Cable Stop on top of the Washer.
9. Crimp the Cable Stop with the Crimp Tool securing it to the Cable. Reference Figure 34: Crimping the Cable Stop
10. Remove extra cable above the Cable Stop using the Cut Tool. Reference Figure 35: Removing Extra Cable

Figure 34: Crimping the Cable Stop

Figure 35: Removing Extra Cable

Equipment and Tools Needed

- Torsion Tool – from Geosystems
- Lifting Lever – from Geosystems
- Drive Rod – from Geosystems
- Anchor Set Tool – from Geosystems
- Crimp tool – from Geosystems
- Cut Tool – supplied by others
- Sledgehammers – supplied by others

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Product Limited Warranty

Presto Geosystems warrants each GEOTERRA® unit, PADLOC® unit, and Earth Anchor that it ships to be free from defects in materials and workmanship at the time of shipment. Presto's exclusive liability under this warranty or otherwise will be to furnish without charge to Presto's customer, at the original point of manufacture, a replacement for any item which proves to be defective under normal use and service during the **2-year period** which begins on the date of shipment by Presto. Presto reserves the right to inspect any allegedly defective items in order to verify the defect and ascertain its cause.

This warranty shall not cover defects attributable to causes or occurrences beyond Presto's control and unrelated to the recommended application, including, but not limited to, abuse, misuse, mishandling, neglect, improper storage, improper installation, improper alteration, or improper application. This warranty applies to use by tracked and pneumatic-tired vehicles over approved subsoils. Some bending, scarring, and/or other surface wear is considered normal and shall not be covered by this warranty.

PRESTO MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, WRITTEN OR ORAL, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OR MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, IN CONNECTION WITH THE GEOTERRA SYSTEM. In no event shall Presto be liable for any special, indirect, incidental, or consequential damages for the breach of any express or implied warranty or for any other reason, including negligence, in connection with the GEOTERRA system. Contact Presto Geosystems at Ph: 1-800-548-3424; 1-920-738-1707
Email: info@prestogeo.com.

Product Service Life

Reynolds Presto Products, Inc. shall warrant the GEOTERRA® units through the original installation and through the second installation provided that the total time of installation of the GEOTERRA units does not exceed the years stated in the Product Warranty. PADLOC® units and Earth Anchors are non-reuse products.

Disclaimer

This document has been prepared for the benefit of customers interested in the GEOTERRA® System. It was reviewed carefully prior to publication. Presto assumes no liability and makes no guarantee or warranty as to its accuracy or completeness. Final determination of the suitability of any information or material for the use contemplated, or for its manner of use, is the sole responsibility of the user. Project specifications take precedence over all manufacturers' recommendations.

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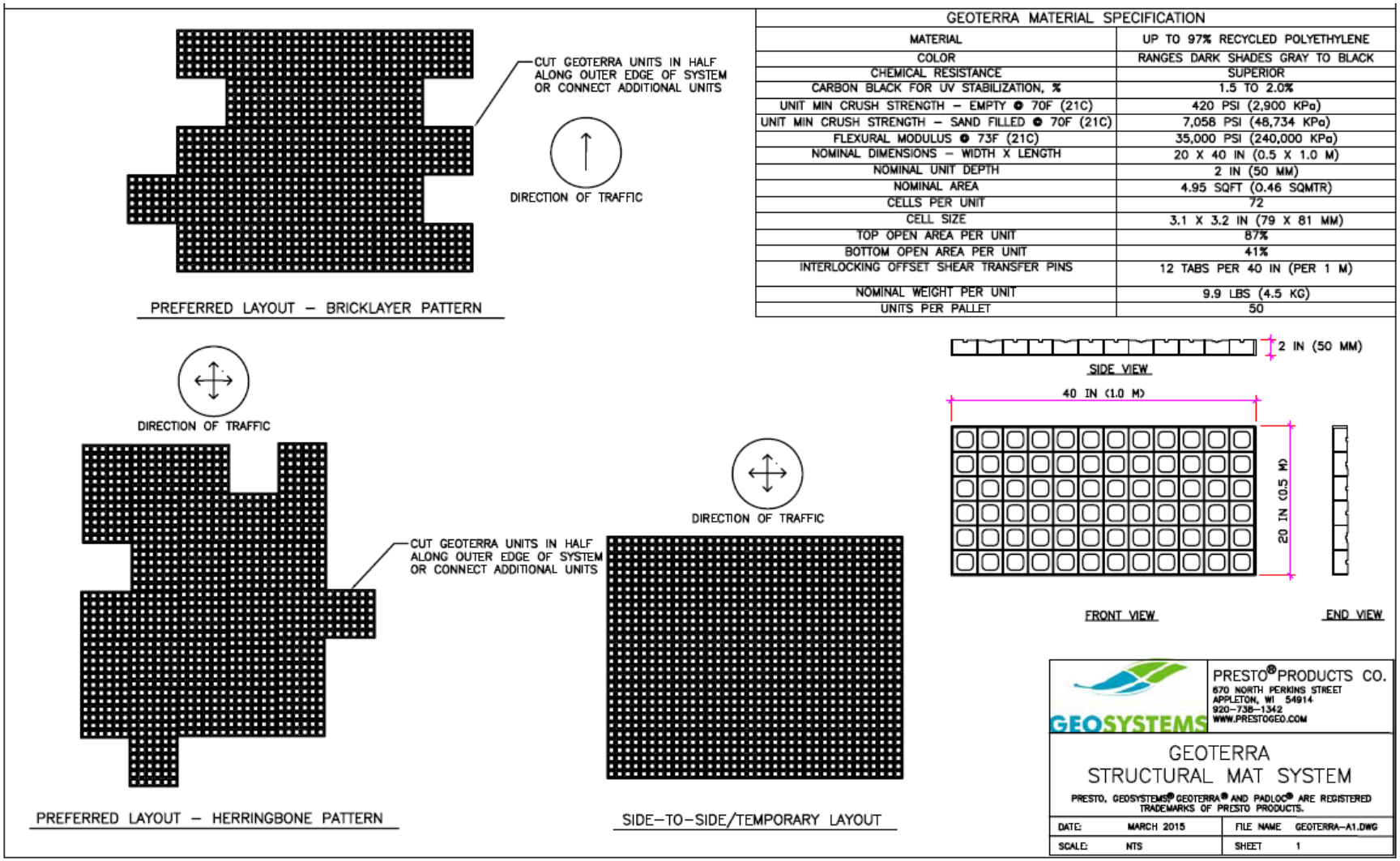

GEOTERRA MATERIAL SPECIFICATION	
MATERIAL	UP TO 97% RECYCLED POLYETHYLENE
COLOR	RANGES DARK SHADES GRAY TO BLACK
CHEMICAL RESISTANCE	SUPERIOR
CARBON BLACK FOR UV STABILIZATION, %	1.5 TO 2.0%
UNIT MIN CRUSH STRENGTH – EMPTY @ 70F (21C)	420 PSI (2,900 KPa)
UNIT MIN CRUSH STRENGTH – SAND FILLED @ 70F (21C)	7,058 PSI (48,734 KPa)
FLEXURAL MODULUS @ 73F (21C)	35,000 PSI (240,000 KPa)
NOMINAL DIMENSIONS – WIDTH X LENGTH	20 X 40 IN (0.5 X 1.0 M)
NOMINAL UNIT DEPTH	2 IN (50 MM)
NOMINAL AREA	4.95 SQFT (0.46 SQMTR)
CELLS PER UNIT	72
CELL SIZE	3.1 X 3.2 IN (79 X 81 MM)
TOP OPEN AREA PER UNIT	87%
BOTTOM OPEN AREA PER UNIT	41%
INTERLOCKING OFFSET SHEAR TRANSFER PINS	12 TABS PER 40 IN (PER 1 M)
NOMINAL WEIGHT PER UNIT	9.9 LBS (4.5 KG)
UNITS PER PALLET	50

Drawing 1: Typical GEOTERRA Mat Layouts

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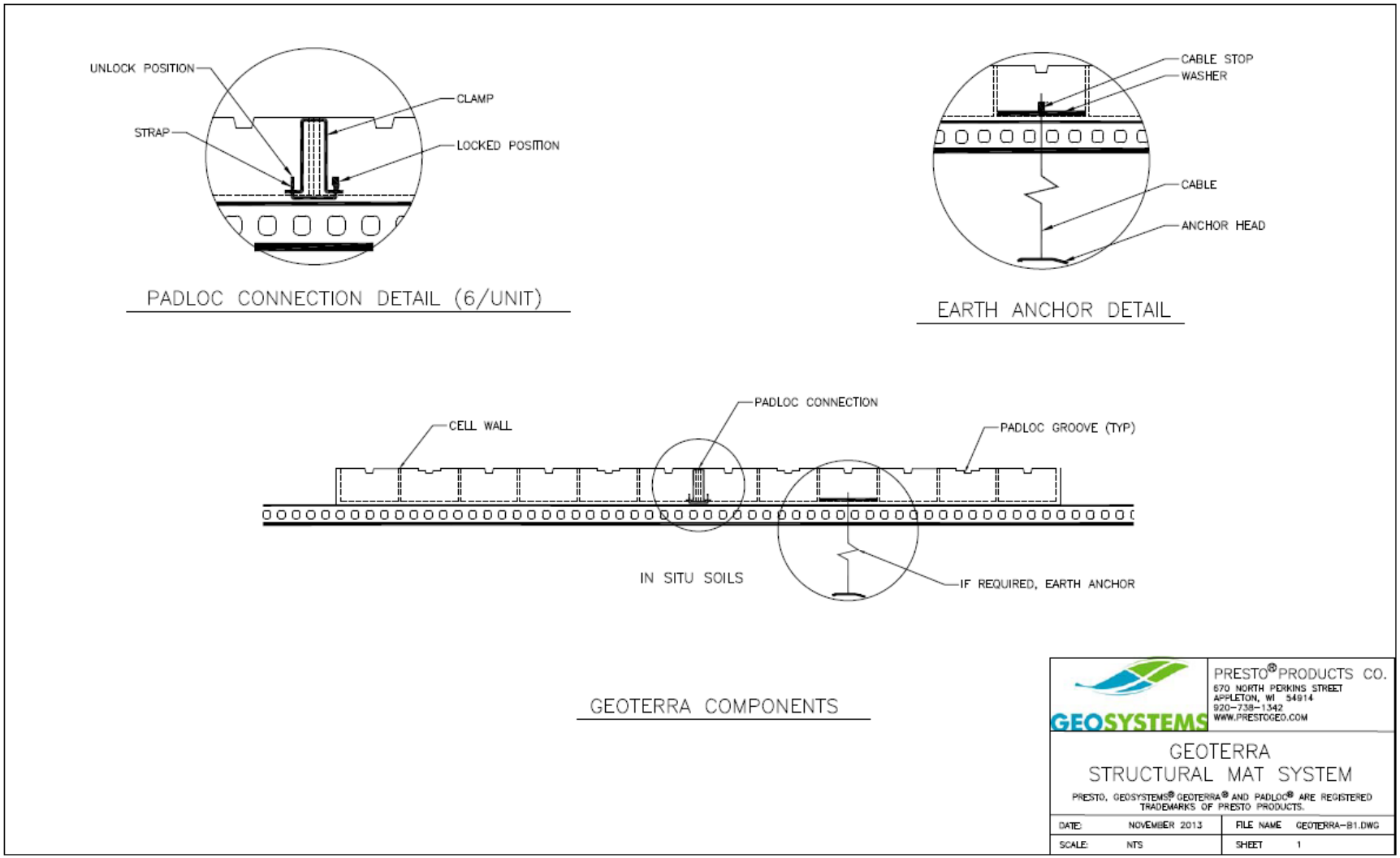

Drawing 2: GEOTERRA System Components

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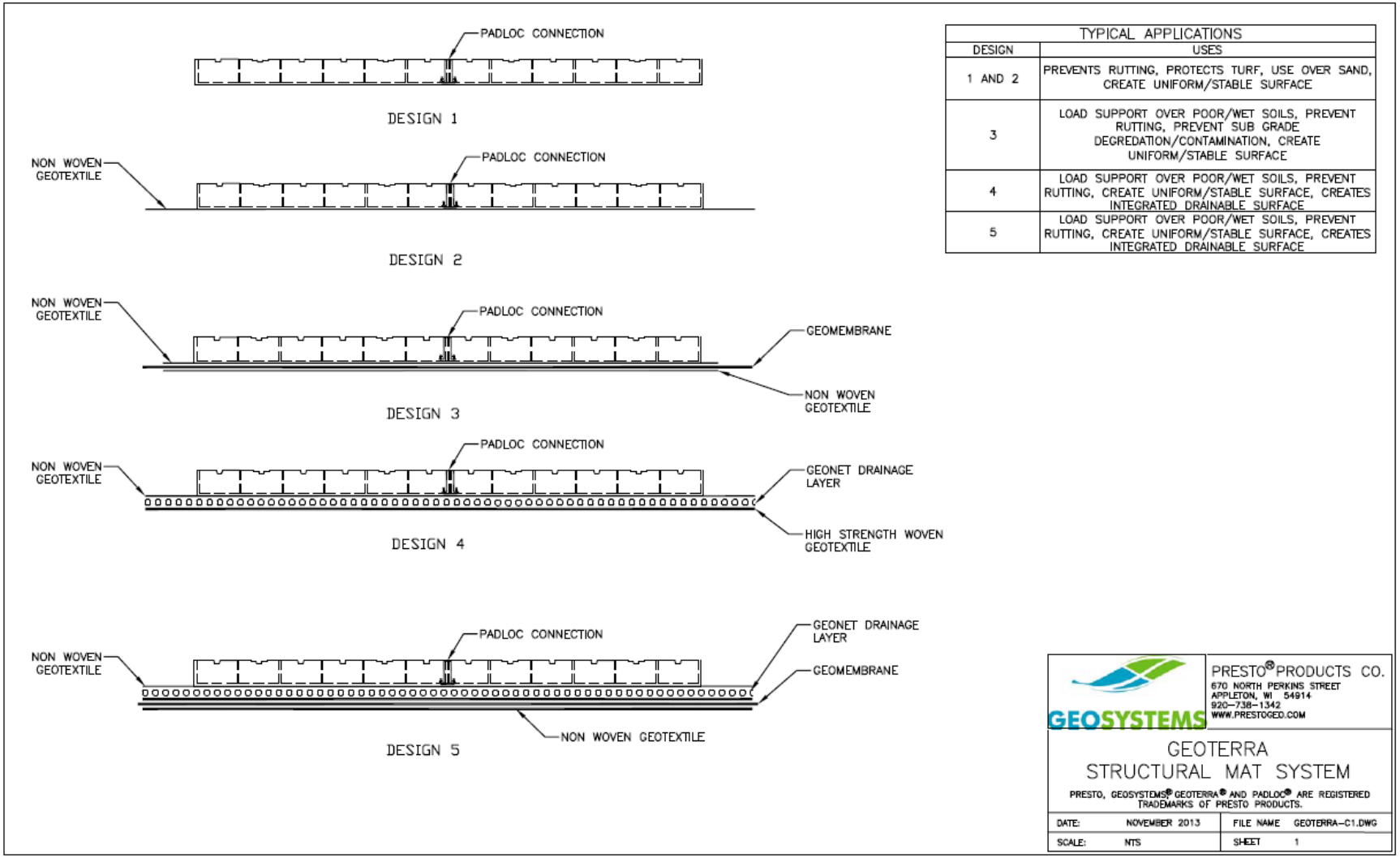

Drawing 3: GEOTERRA Design Guidelines

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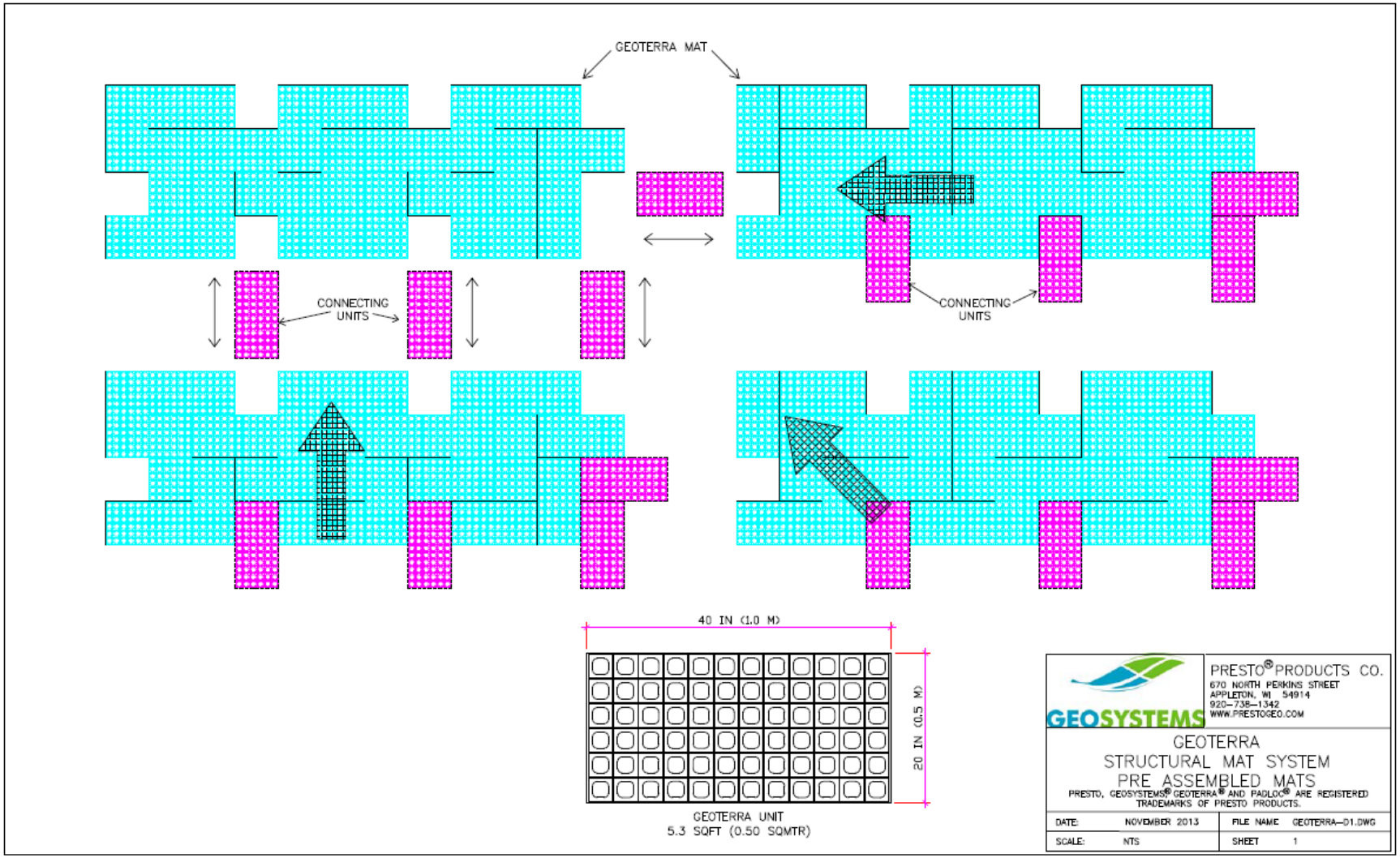

Drawing 4: GEOTERRA Pre-Assembled Mats for Truck / Container Transportation

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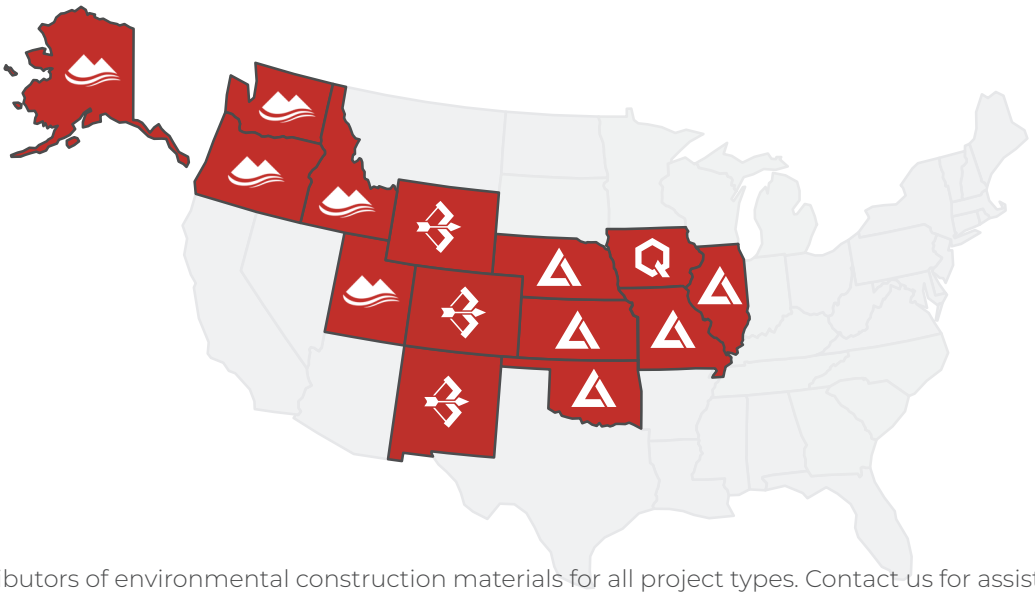

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