# GeoMat™ Leaching System
# INSTALLATION MANUAL

Geomatrix Systems, LLC
114 Mill Rock Road East - Old Saybrook, CT 06475
P: 860-510-0730 - F: 860-510-0735
www.geomatrixsystems.com

# Index

## 1.0 ABOUT GEOMAT

The GeoMat™ Leaching System (GeoMat), manufactured by Geomatrix Systems, LLC (Geomatrix) is low profile and designed for maximum treatment and infiltration of wastewater into soil; in certain instances, it is used for subsurface irrigation and nutrient reuse. GeoMat may be utilized with wastewater from a septic tank or pretreatment system (treatment unit). The GeoMat comes in 6, 12, 24, or 39 inches wide and nominally 1 inch thick.

Water flows into the GeoMat through gravity and pressure piping systems. The water is discharged into a highly transmissive core that is covered by a hygroscopic membrane. This combination of the core and membrane draw the water between the application points and uniformly apply the water to the surrounding soil. The soil then draws the water away from the surrounding membrane through capillary action. This results in a much more uniform application of water to the soil and minimizes the point loading associated with other low profile systems. GeoMat can be installed in trench and bed layouts and function with gravity, pump to gravity, and pressure distribution (PD) system configurations. GeoMat with 6 inches of ASTM C-33 sand beneath it can be configured to meet NSF Standard 40. When NSF Standard 40 certification is required, please contact Geomatrix for appropriate design information.

The combination of a high surface area to void space ratio and shallow placement in the soil profile result in enhanced aeration. Shallow placement in the more biologically active soil horizons additionally enhances treatment of nitrogen, phosphorus, pharmaceutical compounds and other emerging contaminants of concern, Biological Oxygen Demand (BOD), Total Suspended Solids (TSS), viruses and other pathogens

Geomatrix products are the result of intensive research and development, including in house and third party testing. Test reports are available by contacting Geomatrix.

While some codes do not require the use of PD, treatment units, flow equalization or SoilAir, Geomatrix, highly recommends the use of these features to enhance treatment and system lifespan, especially where high flows and challenging waste streams are present.

**Warning: Only Authorized service providers should install, inspect, maintain, or troubleshoot the GeoMat Wastewater Treatment System.**

## 2.0 GEOMAT TREATMENT CAPABILITIES

When the wastewater is nonresidential in strength, the BOD and TSS should be reduced utilizing pretreatment or a SoilAir system to ensure that there is sufficient oxygen to reduce BOD; alternatively the size of the GeoMat system should be increased proportionately to account for the higher BOD.

Contact Geomatrix Systems for assistance on projects other than single family homes.

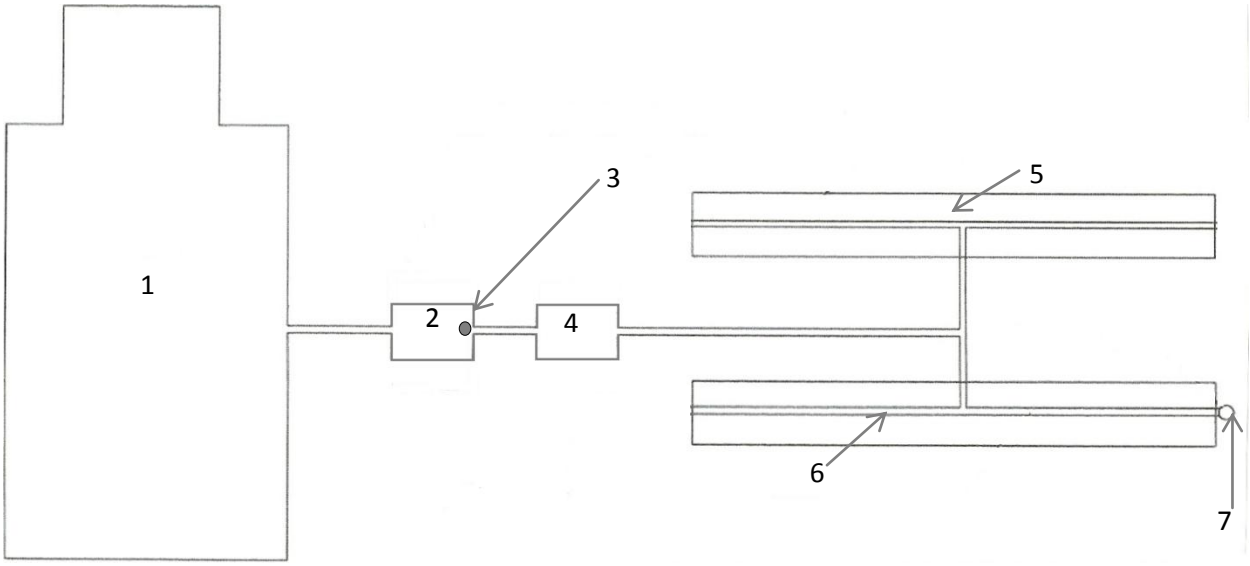
## 3.0 COMPONENT HANDLING AND INSPECTION

Upon delivery inspect to ensure no damage has occurred to the components.

Keep the GeoMat and distribution piping clean and free of soil, dirt, oil, grease, PVC saw dust and associated debris, and any other substance that may impede performance.

Although GeoMat is rugged, it should be handled with care. If components are not used immediately after delivery or purchase, they should be stored away from sunlight and in a fashion that will not damage their shape over time. Rolls can be stacked up to 3 high, circle side down.

## 4.0 SYSTEM COMPONENTS




| | GeoMat System Components | |
|---|---|---|
| | Component | Function |
| 1 | Source | Generates wastewater |
| 2 | Septic Tank or Pretreatment Unit | Pre-treats wastewater |
| 3 | Effluent Filter | Strains wastewater |
| 4 | Optional Pump Chamber | Accumulates water for lifting and pressure distribution to GeoMat |
| 5 | Distribution Piping | Delivers wastewater to GeoMat |
| 6 | GeoMat | Treats and disperses wastewater |
| 7 | Optional Cleanout/ Distal Head Port | Provides access for servicing distribution piping and measurement of distal head |

## 5.0 FLOW PATH IN A PROPERLY CONSTRUCTED GEOMAT SYSTEM IS:

**5.1.** Wastewater flows from a source to a properly sized septic tank or pretreatment unit.
**5.2.** The water then flows from the septic tank or pretreatment unit after filtration.
**5.3.** When the GeoMat is installed at a higher elevation than the septic tank or pretreatment unit, wastewater is directed to a pump chamber for lifting wastewater up to the GeoMat; unless the pretreatment unit has a pump incorporated.
**5.4.** Wastewater then flows through the distribution piping for discharge into the GeoMat. When pressure distribution is utilized, a flow differential of less than 10% between first and last orifice is recommended.
**5.5.** Wastewater flows out of the distribution piping through holes/orifices that are in contact with the core.
**5.6.** The water then infiltrates through the underlying soil for final polishing and recharge to the water table.

## 6.0 MATERIALS REQUIRED FOR SYSTEM INSTALLATION

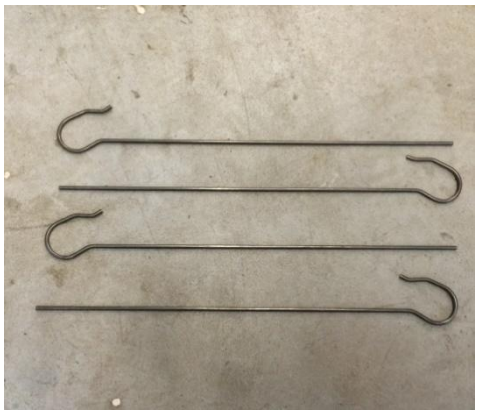
| **Materials required for system installation not supplied by Geomatrix** | |
|---|---|
| 1 | Septic tank or pretreatment unit which meets all applicable standards |
| 2 | Pump tank which meets applicable standards, where lifting or pressure distributing of wastewater is required (optional) |
| 3 | Piping for wastewater transport and distribution. |
| 4 | Distribution box or manifold (If required refer to design) |
| 5 | Air supply line piping (optional refer to section 11.0 for airline sizing) |
| 6 | Approved sand |
| 7 | Miscellaneous fittings (couplers, caps, elbows etc.) |
| 8 | Two-part solvent/glue |
| 9 | Common construction and electrical installation tools and supplies and excavation equipment |
| 10 | Effluent Filter if not provided for by pretreatment unit. (If utilizing SoilAir or HyAir, filter may require the ability to house a float switch.) A filter can be supplied by Geomatrix. |
| 11 | Pressure filter (optional refer to design) A filter can be supplied by Geomatrix. |

## 7.0 COMPONENT IDENTIFICATION, SYSTEM MATERIAL SPECIFICATIONS AND PIPE SIZING

**7.1** GeoMat Component Identification

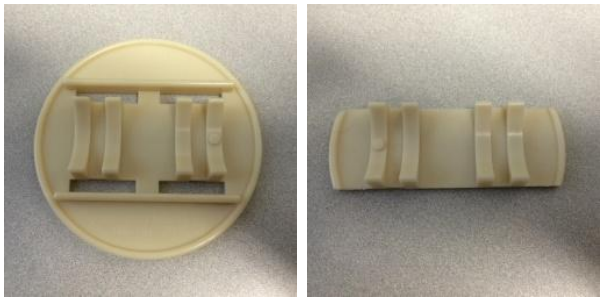
**GEOMAT 600, 1200, 3900**


**GEOMATRIX STAKE CLIPS FOR INSTALLATION OF GEOMAT EDGE 600 1200 AND 2400**



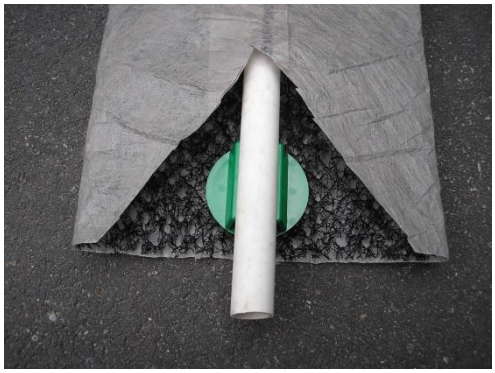
**GEOMATRIX GRAVITY DISTRIBUTION PIPE**

**ORIFICE SHIELDSFOR FLAT OR EDGE INSTALLATIONS**



**FLAT** **EDGE**

**PRESSURE PIPE**



**GEOMAT EDGE SPACERS**

**7.2** Massachusetts Sand Specifications

| Massachusetts Sand Specification | |
|---|---|
| Sieve Size | Percent Passing |
| #4 | 100 |
| #50 | 10-100 |
| #100 | 0-20 |
| #200 | 0-5 |

**7.3** GeoMat Piping

In gravity applications, the minimum perforated pipe diameter is 2 inches. In pressure applications, the minimum pipe diameter is 1 inch.

## 8.0 SITE LAYOUT

GeoMat must be installed according to applicable state and/or local regulations. If unsure of the installation requirements for a particular site, contact Geomatrix, your designer, engineer, and/or regulatory agent.

**8.1** System Sizing

See Geomatrix Massachusetts GeoMat Design Manual for specific guidance in designing GeoMat Systems.

**8.2** Excavation considerations:

GeoMat in a Sand Bed

A minimum of 6 inches of approved sand must be utilized beneath the GeoMat and 2 inches of sand should be placed over the GeoMat fabric membrane.

GeoMat Flat should be installed utilizing the following parameters:

- GeoMat laterals can be butted together, sidewall to sidewall, when laid flat and in a bed configuration; however, it is best to pull them apart by a minimum of 4 inches edge of core to edge of core.
- A minimum of 12 inches of sand should surround the perimeter of the GeoMat in a bed configuration.

GeoMat Edge should be installed with a minimum spacing of 6 inches center to center.

GeoMat in Native Soil

GeoMat can be installed directly in Class I native soils. GeoMat in Class II, III, and IV soils require a minimum of 2 inches of approved sand beneath, to the sides and above the GeoMat.

GeoMat Flat when installed in native soils should be installed utilizing the following parameters:

- GeoMat shall be separated, sidewall to sidewall, from adjacent rows of GeoMat by the 2 times the width of the GeoMat utilized.
  - GeoMat 600 = 12 inches
  - GeoMat 1200 = 24 inches
  - GeoMat 2400 = 48 inches
  - GeoMat 3900 = 78 inches
- When specifically configured for gravity flow, and generally, on all configurations, the use of SoilAir should be considered. If SoilAir is not going to be installed, it is advisable to install a conduit from the outlet baffle of the septic tank to the future SoilAir enclosure location. The SoilAir enclosure should be located where a power supply can be readily configured. It is also recommended, that an airline be run from the SoilAir enclosure location and connected to the wastewater supply pipe serving the GeoMat. This air line should be a minimum of 2 inch ID SCH40 PVC for a 5 bedroom or smaller single family home. Please contact Geomatrix for airline sizing on other projects. The air line should be pitched downwardly from the SoilAir enclosure location to the wastewater supply pipe and capped. These components are inexpensive and will facilitate simple remediation of the system, if necessary in the future.
- Contact Geomatrix for SoilAir™ information and design assistance with SoilAir Systems.

When installed in other than Class I native soils a minimum of 2 inches of approved sand is required beneath, to the sides, and above the GeoMat.

**8.3** Maximum Lengths

In gravity applications, GeoMat piping runs should not exceed 50 feet without a wastewater feed point.

With pressure distribution, there is no maximum length for GeoMat piping runs; however, designs should result in a less than 10% flow differential between the first and last orifice.

## 9.0 SITE PREPARATION

The area directly above and adjacent to any septic system should be protected from heavy vehicle traffic and excess weight loads before, during and post construction.

Prior to construction, it is recommended that the proposed septic system location be staked and flagged/fenced to prevent encroachment during home construction. If vehicle encroachment is expected to be a problem, after construction, barriers such as garden timbers, railroad ties, fences, walls, etc. should be used to protect the septic system area.

Do not install the system in wet conditions or in overly moist soil; this can cause smearing and compaction of the native soil horizons.

The soil between the dispersal trenches shall remain undisturbed when practical and not in a bed configuration. If the presence of boulders and/or other obstacles makes trench construction impractical, the entire leach field area may be excavated as necessary and backfilled with a minimum 6 inch layer of approved sand to the design elevation.

**9.1.** Use the design plan and an engineer scale to measure the location of the system components on the plan from an existing physical or natural feature. Use a tape measure and swing ties from the same existing physical or natural features on the plan for location in the field and transfer the bench mark elevations if too far to work with. If unsure how to locate these on the plan, please contact Geomatrix, your designer, engineer and/or regulatory agent. Set stakes for location and elevation reference points. Ensure trees and shrubs are removed within 10 feet of the GeoMat to prevent root intrusion. No Weeping Willow or Black Locust trees shall be within 30 feet of the GeoMat. These separation distances can be minimized through the use of root barriers. Please contact Geomatrix for assistance.

**9.2.** Excavate system area to design elevation. Excavation depth should allow for approved sand below the GeoMat if required.

**9.3.** The bottom of excavation must be level. Excavation should be sufficiently large enough to accommodate GeoMat system design width and length. Rake the bottom and sides of the excavation to provide proper scarification and remove stones larger than 1 ½ inches and any other debris. In fine textured soils prone to compaction, minimize walking in the excavation to prevent compaction and loss of soil structure.

**Heavy equipment should be kept off the sand base. If unavoidable, a tracked machine with a ground pressure not exceeding 2.5 psi may be utilized, with the use of ¾ inch plywood over the sand as support, to cross the sand base. You must avoid multiple trips over the same area, abrupt starting and stopping and excessive time spent working in one location on the sand base. All turns should be made beyond the sand footprint and only track in a straight line across the sand bed. Operating a machine on the bed should only be done if absolutely necessary. In summary, uniform sand density is critical to system performance and can be negatively impacted by machinery and other static and dynamic loads on the sand base.**

## 10.0 GEOMAT INSTALLATION

### 10.1. GeoMat Flat (Horizontal) Installation

**10.1.1.** Roll out GeoMat. Cut the GeoMat to desired length plus 4 inches.

**10.1.2.** Separate the core from the fabric. Cut out 2 inches of core from GeoMat ends, leaving the fabric intact to facilitate future stapling of the ends once the piping is installed. Piping should be free of saw dust and associated debris before joining. It is best to use a ratcheting PVC pipe cutter. PVC saw dust and associated debris can clog orifices in the laterals, keep pipe ends temporarily sealed to avoid soil or other materials from entering the pipe during installation.

**10.1.3.** Install laterals into the GeoMat by feeding it in from one end. Ensure that the orifices or perforations are aligned and oriented as desired. Glue distribution pipe together using two-part solvent weld glue, and SDR 35 or SCH40 PVC fittings according to manufacturer's specifications.
Piping entering the GeoMat should pitch to the GeoMat or back to the septic or pump tank in a free-draining manner to prevent freezing.

**10.1.4.** When pressure distribution is utilized, install a distal head port/cleanout at the

terminal end of each lateral. Extend this to a convenient location a **minimum** of 6inches from the end of the GeoMat. A length of non-perforated pipe of the same size and construction as the distribution pipe in the GeoMat and coupler may be required.
Connect a sweep 90$^{o}$ elbow or two 45$^{o}$ elbows to this extension pipe. The sweep elbow can be terminated with a ball valve, expandable gripper plug or threaded end cap.
Glue piping components together as described above.
The distribution piping should not have any holes / orifices outside of the GeoMat.
This distribution line extension pipe and associated fittings should pitch back to the GeoMat to prevent freezing.

**10.1.5.** Make certain that distribution pipe is centered in the GeoMat on top of core. Make certain that the perforation / orifices are equidistant from the ends of the GeoMat. Using an Arrow P22 stapler (or equivalent), seal ends by stapling the top fabric to the bottom fabric, being careful to seal the fabric tightly around where the pipe enters and exits the GeoMat. Use sufficient staples to ensure that sand cannot enter the core. Carefully move mat along ground, if it is not already in desired location and keep inside of pipe clean.

**10.1.6.** Again, ensure that the orifices or perforations are located, aligned, and oriented as desired. Connect the GeoMat distribution pipe to the septic tank or pretreatment unit, pressure manifold, distribution box, pump chamber, etc., per system design.

**10.1.7.** Before backfilling, ensure that distribution lines are centered on the GeoMat core. Confirm that all piping and the GeoMat are secure, properly glued and in the correct position and elevation. Take pictures, record all measurements and notify the applicable regulatory agency for inspection if necessary.

### 10.2. GeoMat Edge (Vertical) Installation

**10.2.1.** Roll out GeoMat. Cut the GeoMat to desired length plus 4 inches.

**10.2.2.** Separate the core from the fabric and cut out 2 inches of core from each end of the GeoMat. Leave the fabric intact to facilitate stapling and sealing after installing the piping. The interior and exterior of the piping should be free of saw dust and associated debris before joining. Best results are achieved by utilizing a PVC pipe shear. PVC saw dust and associated debris can clog orifices in the laterals. Keep pipe ends temporarily sealed to

avoid soil or other materials from entering the pipe during installation

**10.2.3.** Install laterals into the GeoMat by feeding it in from one end. Ensure that the flat section of the orifice shield is aiming down and contacting the core. Glue distribution pipe together using two-part solvent weld glue and Sch. 40 PVC fittings, according to manufacturer's specifications.
Piping on the proximal or distal ends of the GeoMat should pitch to the GeoMat or back to the septic or pump tank to facilitate draining and prevent freezing.

**10.2.4.** Install a distal head port/cleanout at the distal end of each lateral. Extend the interior distribution pipe a **minimum** of 6 inches past the end of the GeoMat. A length of non-perforated pipe, the same size and specification as the interior distribution pipe and coupler, may be required. Connect a sweep 90$^{o}$ elbow or two 45$^{o}$ elbows to this distal end. The sweep elbow(s) can be terminated with a ball valve, expandable gripper plug or threaded end cap.

Glue piping components together as described above.
The distribution piping should not have any holes / orifices beyond the GeoMat core.

This distribution pipe, with or without the extension pipe, should pitch back to the GeoMat to prevent freezing.

**10.2.5.** Fasten pipe into place inside the GeoMat with Geomatrix stake clips on approximately 24 inch centers.

**10.2.6.** When sealing the ends of the GeoMat, be careful to seal/staple the surrounding fabric membrane tightly around the pipe entering and exiting the GeoMat

**10.2.7.A** GeoMat Edge in a Sand Bed
Layout area where GeoMat will be located.
Place the GeoMat with the interior piping and stake clips (previously installed), into the rough location where it will be backfilled. Turn the GeoMat assembly on edge, pipe and clip on top, and slide the GeoMat spacing templates over the GeoMat assemblies to maintain the required 6 inch spacing between GeoMat. Move the GeoMat, installed in the spacing templates, into the desired position. Using leveling equipment, push stakes into the sand base until GeoMat is set at desired elevation. Connect Interior GeoMat piping to the supply manifold.

**10.2.7.B** GeoMat Edge in Native Soils
Measure out where the GeoMat and associated piping will be located. Utilizing mason's line, paint, laser level, etc. mark out the location where the GeoMat laterals and associated piping will be located. Excavate to the desired elevation with excavating or trenching equipment. Place sand fill in trench bottom if required. Place GeoMat and previously installed interior distribution piping and stake clips into trenches. Push stakes into trench bottom to desired elevation, as determined by leveling equipment. Connect interior GeoMat piping to the supply manifold.

**10.2.8.** Confirm that the orifices and shields are aligned and oriented with the flat side facing the GeoMat core

Complete piping the system per design.

**10.2.9.** Before backfilling, ensure that all piping and the GeoMat are secure, properly glued and in the correct position and elevation. Take pictures, record all measurements and notify the applicable regulatory agency for inspection if necessary.

## 11.0 OPTIONAL AIR SUPPLY LINE

**11.1** It is recommended that an air supply line and a float switch conduit be installed in case system remediation is necessary, at some point in time, due to time, hydraulic or organic overloading. For typical installations on a 5 bedroom or smaller single family home with runs of 50 feet or less, the air supply line should be a minimum of 2 inch SCH40 PVC. Runs from 50 - 200 feet should be a minimum of 3 inch SCH40 PVC. Contact Geomatrix for runs longer than 200 feet.
The air supply line should pitch towards the GeoMat and is installed by teeing into the distribution piping anywhere downstream of the septic tank or pump tank at an elevation equal to or higher than the bottom elevation of the GeoMat. The air supply line is then

extended with appropriate fittings to a location that would be convenient for future connection to a SoilAir Blower. Glue piping components together as described above. It is also advisable to install a conduit from the outlet baffle of the septic tank or from the pump chamber to the future SoilAir enclosure location. This conduit will be potentially utilized for a float connection to control the SoilAir blower at some time in the future..

## 12.0 BACKFILLING

**12.1.** Carefully place approved sand or suitable soil on the GeoMat to hold it in place for backfilling. Gently cover the GeoMat with a layer of approved sand or suitable fill to the top of the distribution pipe, being careful not to drop backfill material from an elevation higher than 18 inches.

Install valve boxes over the distal ports if present.

Final cover material for placement over the sand should be clean and free of stones larger than 1½ inches and debris. This cover material should be suitable for growing grass.

Acceptable cover depth over the GeoMat distribution laterals should be from 6 – 24 inches; 12 inches is typical. Whatever depth is selected, it is recommended that the depth of cover should ideally not vary by more than 15% across the entire system and should extend a minimum of 18 inches beyond the sand bed footprint, if present. Final backfill should be such that surface water drains away from the GeoMat system and associated tanks.

**Heavy equipment should be kept off the system. If unavoidable, a tracked machine with a ground pressure not exceeding 2.5 psi may be utilized, with the use of ¾ inch plywood over the system as support to cross the system if a minimum of 12 inches of specified material is over the internal GeoMat distribution piping. You must avoid multiple trips over the same area, abrupt starting and stopping, and excessive time spent working in one location. All turns should be made beyond the sand footprint and only track/run in a straight line across the system. Operating a machine on the bed should only be done as absolutely necessary. In summary, material densities are critical to system performance and can be negatively impacted by machinery and other static and dynamic loads on and around the system.**

Uniform cover depth, material consistency, permeability, and compaction across the entire GeoMat system results in consistent oxygen transfer to the entire system; this results in uniform performance.

**12.2.** Cover material should be graded to direct storm and surface water away from the system. Seed and mulch disturbed area immediately after installation to stabilize soil.

**13.0** For repair or replacement of damaged system components please contact Geomatrix Systems, LLC at info@geomatrixsystems.com or 860-510-0730; or your authorized dealer.

**STANDARD LIMITED WARRANTY**

(a) The structural integrity of leaching products ("Product(s)") manufactured by Geomatrix Systems, LLC (Geomatrix), when installed and operated in a leach field of a septic system, in accordance with Geomatrix's instructions for the Product, is warranted to the original purchaser ("Purchaser") against defective materials and workmanship for one year from the date that the septic permit is issued for the septic system containing the Product; provided, however, that if a permit is not required by applicable law, the warranty period will begin upon the date that the Product is received by the Purchaser. To exercise its warranty rights, Purchaser must notify Geomatrix in writing at its main office in Old Saybrook, Connecticut within fifteen (15) days of the alleged defect. Geomatrix will supply replacement Products for Products determined by Geomatrix to be covered by this Limited Warranty. Geomatrix's liability specifically excludes the cost of removal and/or installation of the Product.

(b)THE LIMITED WARRANTY AND REMEDIES IN SUBPARAGRAPH (a) ARE EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE PRODUCT, INCLUDING NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE

(c) This Limited Warranty shall be void if any part of the leaching system is manufactured by anyone other than Geomatrix. The Limited Warranty does not extend to incidental, consequential, special or indirect damages. Geomatrix shall not be liable for penalties or liquidated damages, including loss of production and profits, labor and materials, overhead costs, or other losses or expenses incurred by the Purchaser or any third party. Specifically excluded from Limited Warranty coverage are damage to the Product due to ordinary wear and tear, alteration, accident, misuse, abuse or neglect of the Product; the Product being subjected to vehicle traffic or other conditions which are not permitted by the installation instructions; failure to maintain the minimum ground cover set forth in the installation instructions; the placement of improper materials into the system containing the Product; failure of the Product or the septic system due to improper siting or improper sizing, excessive water usage including leaking or running plumbing fixtures, storm water flow into leach field and/or Product, insufficient oxygen to meet the demands of the wastewater, improper grease disposal, or improper operation; or any other event not caused by Geomatrix. This Limited Warranty shall be void if the Purchaser fails to comply with all of the terms set forth in this Limited Warranty. Furthermore, in no event shall Geomatrix be responsible for any loss or damage to the Purchaser, the Product, or any third party resulting from installation or shipment, or from any product liability claims of Purchaser or any third party. For this Limited Warranty to apply, the Product must be installed in accordance with all conditions required by the septic system designer, state and local codes; all other applicable laws; and Geomatrix's installation instructions.

(d) No representative of Geomatrix has the authority to change or extend this Limited Warranty. No warranty applies to any party other than the original Purchaser.

This represents the Standard Limited Warranty offered by Geomatrix. A limited number of states and counties have different warranty requirements. Any purchaser of Product should contact Geomatrix's main office in Old Saybrook, Connecticut, prior to such purchase, to obtain a copy of the applicable warranty, and should carefully read that warranty prior to the purchase of the Product.