



Geotextile Sand Filter

Colorado

TL1 Design and Installation Manual



June 2017



125 McKee Street
East Hartford, CT 06108
Tel: 800-444-1359
Fax: 860-610-0427
www.eljen.com

Table of Contents

SUBJECT	PAGE
GLOSSARY OF TERMS	3
1.0 DESIGN AND INSTALLATION.....	4
2.0 TRENCH INSTALLATION SIZING AND GUIDELINES	8
3.0 BED INSTALLATION SIZING AND GUIDELINES	11
4.0 MOUND INSTALLATION SIZING AND GUIDELINES.....	16
5.0 DOSING DISTRIBUTION GUIDANCE	17
6.0 PRESSURE DISTRIBUTION GUIDANCE	17
7.0 SYSTEM VENTILATION	19
8.0 GSF INSPECTION CHECK LIST	21
GSF DRAWINGS AND TABLES	
DRAWINGS	
FIGURE 1: TYPICAL A42 GSF CROSS SECTION.....	7
FIGURE 2: PLAN VIEW – A42 TRENCH SYSTEM.....	9
FIGURE 3: SECTION VIEW – A42 TRENCH SYSTEM – LEVEL SITE	9
FIGURE 4: SECTION VIEW – A42 TRENCH SYSTEM – SLOPING SITE	9
FIGURE 5: PLAN VIEW – A42 BED SYSTEM	12
FIGURE 6: SECTION VIEW – A42 BED SYSTEM – LEVEL SITE	12
FIGURE 7: SECTION VIEW – A42 BED SYSTEM – SLOPING SITE	12
FIGURE 8: PLAN VIEW – A42 BED SYSTEM	14
FIGURE 9: SECTION VIEW – A42 BED SYSTEM – LEVEL SITE	14
FIGURE 10: SECTION VIEW – A42 BED SYSTEM – SLOPING SITE	14
FIGURE 11: PRESSURE PIPE PLACEMENT	18
FIGURE 12: CONTOURED TRENCH PRESSURE DISTRIBUTION.....	18
FIGURE 13: VENT FOR GRAVITY AND PRESSURE DOSED BED SYSTEMS.....	19
FIGURE 14: PRESSURE CLEAN OUT PRESSURE DOSED SYSTEMS	19
FIGURE 15: GSF WITH 4” VENT EXTENDED TO CONVENIENT LOCATION.....	20
TABLES	
TABLE 1: SPECIFIED SAND SIEVE REQUIREMENTS	4
TABLE 2: DESIGN FLOW	5
TABLE 3: APPLICATION RATES FOR TL1 SYSTEMS	6
TABLE 4: METHOD OF APPLICATION SIZING FACTOR.....	6

Glossary of Terms

A42 Module	48" x 24" x 7" (L x W x H)
Bio-Matt™ fabric	Proprietary filter fabric within the Geotextile Sand Filter Modules upon which the primary biomat layer forms.
Cover Fabric	The proprietary geotextile cover fabric (provided by manufacturer) that is placed over the GSF modules.
Cuspated Core	The rigid plastic core of the GSF module. It separates the geotextile fabric and creates downward infiltration channels and upward aeration channels to provide primary filtration and biological treatment of the septic effluent. The curvilinear shape of the cuspations offers increased treatment surface area and greater effluent storage.
GSF	The Eljen Geotextile Sand Filter System comprised of GSF modules and a 6" sand layer at the base, plus 6" of sand along the sides of each module.
GSF Module	The individual module of a GSF system. The module is comprised of a cuspated plastic core and corrugated geotextile fabric.
LTAR	Long Term Acceptance Rate (LTAR) is the average equilibrium absorption rate for effluent in a system, usually expressed in gallons per day per square foot.
SHWT	Seasonal High Water Table (SHWT), whether perched or regional, determined by direct observation of the water table or indicated by soil mottling where common mottles comprise at least 2% to 20% of the soil, in a progressive downward direction in the soil.
TL1	A treatment level designation by the State of Colorado when working with wastewater. It has CBOD ₅ less than 145 mg/l and TSS less than 80 mg/l before being applied to the Soil Treatment Area. Total Nitrogen is considered between 60 – 80 mg/l.

1.0 Design and Installation

1.1 REQUIREMENTS: GSF systems must meet the local rules and regulations, The Colorado Department of Public Health and Environment, Water Quality Control Division, 5 CCR 1002-43, effective June 30, 2017 and the guidance in this manual.

Please contact Eljen's Technical Resource Department at 1-800-444-1359 for design information on commercial systems.

1.2 SPECIFIED SAND SPECIFICATION FOR TRENCH SYSTEMS: The first 6 inches of sand immediately under and the 6 inches of sand around the perimeter of the GSF system must be an **ASTM C33 WASHED CONCRETE SAND WITH LESS THAN 10% PASSING A #100 SIEVE AND LESS THAN 5% PASSING A #200 SIEVE**. Please place a prominent note to this effect on each design drawing. See Table 1 for more information on the ASTM C33 sand and sieve specifications. Ask your material supplier for a sieve analysis to verify that your material meets the required specifications.

TABLE 1: SPECIFIED SAND SIEVE REQUIREMENTS

ASTM C33 Sand Specification		
Sieve Size	Sieve Square Opening Size	Specification Percent Passing (Wet Sieve)
3/8 inch	9.52 mm	100
No. 4	4.76 mm	95 - 100
No. 8	2.38 mm	80 - 100
No. 16	1.19 mm	50 - 85
No. 30	590 μ m	25 - 60
No. 50	297 μ m	5 - 30
No. 100	149 μ m	0 - 10
No. 200	75 μ m	0 - 5

1.3 SEPARATION DISTANCE TO LIMITING LAYER: Measure from the bottom of the system sand to the limiting layer.

1.4 CONNECTIONS AND FITTINGS: Connections of lines to tanks must be made using watertight mechanical seals. Use of any grouting material is not permitted.

1.5 PLACING GSF MODULES: The "White Stripe" on the GSF modules indicates the top of the module and is not intended to indicate the location of the distribution pipe. With the white stripe facing up, all rows of GSF modules are set level, end to end on the Specified Sand layer. No mechanical connection is required between modules.

1.6 DISTRIBUTION PIPE: SDR-35 or equivalent is required. Place perforated pipe on top of GSF modules with holes at 4 and 8 o'clock. Secure pipe to GSF modules with provided wire clamps, one clamp per Eljen module. All piping must meet state and local regulations.

1.7 COVER FABRIC: Geotextile cover fabric is provided by Eljen Corporation for all GSF systems. It is placed over the top and sides of the module rows to prevent long term siltation and failure. **Cover fabric substitution is not allowed.** Fabric should drape vertically over the pipe and must not block holes in the distribution pipe or be stretched from the top of the pipe to the outside edge of the modules. "Tenting" will cause undue stress on fabric and pipe.

1.0 Design and Installation

1.8 BACKFILL & FINISH GRADING: Complete backfill with a minimum 12 inches of clean porous fill measured from the top of the modules. Backfill exceeding 18 inches requires venting at the far end of the trench or bed. Use well graded native soil fill that is clean, porous and devoid of large rocks. Do not use wheeled equipment over the system. A light track machine may be used with caution, avoiding crushing or shifting of the pipe assembly. Divert surface runoff from the Soil Treatment Area, (STA). Finish grade to prevent surface ponding. Topsoil and seed the system area to protect from erosion.

1.9 ADDITIONAL FACTORS EFFECTING RESIDENTIAL SYSTEM SIZE: Homes with expected higher than normal water usage may consider increasing the septic tank volume as well as incorporating a multiple compartment septic tank. Consideration for disposal area may be up-sized for expected higher than normal water use.

For example:

- Luxury homes, homes with a Jacuzzi style tubs, and other high use fixtures.
- Homes with known higher than normal occupancy.

1.10 GARBAGE DISPOSALS: Eljen discourages the use of garbage disposals with septic systems. If a GSF system is to be designed and installed with garbage disposals, follow the guidance from the guidelines.

1.11 WATER SOFTENER BACKWASH: At no time should water softener backwash be disposed of in the septic system. Water softener backwash should be discharged to a separate soil absorption field.

1.12 SEPTIC TANKS: Many designers are now specifying dual compartment tanks for all their systems. Eljen supports this practice as it helps to promote long system life by reducing TSS and BOD to the soil treatment area. Gas baffles are also recommended.

1.13 EFFLUENT FILTER OR SCREEN: Wastewater filters are mandatory as a means of preventing solids from leaving the tank and entering your system. Filter manufactures require that filters be cleaned from time to time. Ask your installer or designer for specific cleaning requirements based on the type or make of the filter installed. Eljen requires the septic tank to be pumped every three years or as needed which would be a good time to check and conduct filter maintenance.

1.14 SYSTEM VENTING: It is strongly recommended to vent all systems that are over 18" below finished grade and systems beneath any surface condition that would not allow for surface air exchange with the system such as patios. See Section 7.0 for a more detailed explanation of venting GSF products.

1.15 DESIGN FLOW: The design flow is based off of the on-site wastewater treatment system regulations, 5 CCR 1002-43, Table 6-1.

TABLE 2: DESIGN FLOW

# Bedrooms	Occupancy (# of Persons)	Wastewater Flow Per Person (gallons/day)	Design Flow (gallons/day)
2	4	75	300
3	6	75	450
4	7	75	525
5	8	75	600
6	9	75	675

1.16 NUMBER OF GSF MODULES REQUIRED: For trenches, divide the total field size by 12 sf/module to determine the number of modules needed. In bed systems with gravity or pump to gravity distribution, divide the total field size by 24 sf/module to determine the number of modules required. In a bed system with pressure distribution divide the total field size by 16 sf/module. A minimum of 6 A42 modules are required per bedroom.

1.0 Design and Installation

1.17 SIZING GSF SYSTEM FOR TRENCHES, BEDS & SAND MOUNDS:

TABLE 3: APPLICATION RATES FOR TL1 SYSTEMS

Soil Type, Texture, Structure and Percolation Rate Range					
Soil Type	USDA Soil Texture	USDA Soil Structure-Shape	USDA Soil Structure-Grade	Percolation Rate (MPI)	Treatment Level 1 LTAR
1	Sand, Loamy Sand	--	0	5 - 15	0.80
2	Sandy Loam, Loam, Silt Loam	PR (Prismatic) BK (Blocky) GR (Granular)	2 (Moderate) 3 (Strong)	16 - 25	0.60
2A	Sandy Loam, Loam, Silt Loam	PR, BK, GR 0 (none)	1 (Weak) Massive	26 - 40	0.50
3	Sandy Clay Loam, Clay Loam, Silty Clay Loam	PR, BK, GR	2, 3	41 - 60	0.35
3A	Sandy Clay Loam, Clay Loam, Silty Clay Loam	PR, BK, GR 0	1 Massive	61 - 75	0.30
4	Sandy Clay, Clay, Silty Clay	PR, BK, GR	2,3	76 - 90	0.20
4A	Sandy Clay, Clay, Silty Clay	PR, BK, GR 0	1 Massive	91 - 120	0.15
5	Soil Types 2-4A	Platy	1, 2, 3	121+	0.10

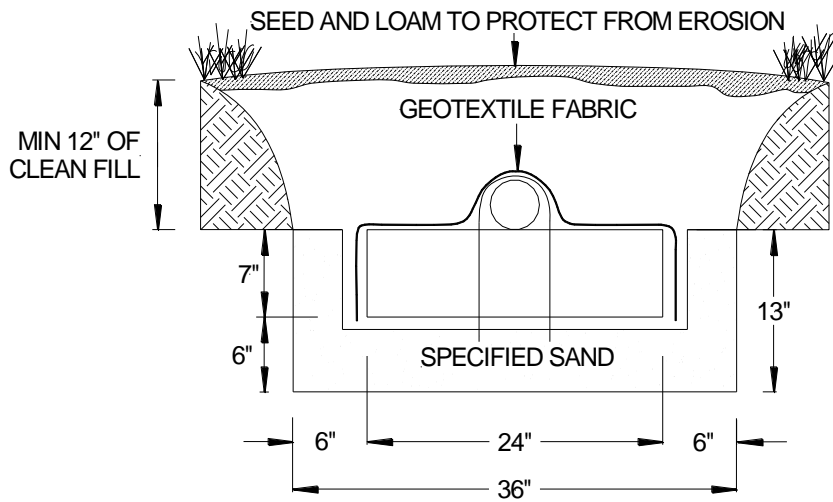
Determine the conventional field size by dividing the Design Flow by the appropriate Application rate. Additional sizing factors are found in Table 4.

TABLE 4: METHOD OF APPLICATION SIZING FACTOR

Type of Soil Treatment Area	Method of Effluent Application from Treatment Unit Preceding Soil Treatment Area		
	Gravity	Dosed (Siphon or Pump)	Pressure Dosed
Trench	0.7	0.63	0.56
Bed	0.84	0.77	0.7

Conventional field size is multiplied by the distribution method multiplier from the regulations. The numbers above have been modified to include the reduction for using the GSF product.

FIGURE 1: TYPICAL A42 GSF CROSS SECTION



- 6 inches of Specified Sand is at the edges of the GSF module
- 6 inches of Specified Sand is at the beginning and end of each GSF Trench
- 6 inches of Specified Sand is directly below the GSF module
- Minimum 12 inches of native soil fill above the module

2.0 Trench Installation Sizing and Guidelines

TL1 Trench Example:

House size	4 Bedrooms
Percolation Rate	22 Minutes Per Inch
Design Flow	525 gpd
Distribution Method	Gravity
Application rate from Table 3	0.60 gpd/ft ²
Conventional Field Size: Design Flow ÷ Application Rate 525 gpd ÷ 0.60 gpd/ft ² =	875 ft ²
Method of Application Multiplier from Table 4	0.7
Field Size: Conventional Field Size x Application Multiplier 875 ft ² x 0.7 = 612.5, round to	613 ft ²
Modules Required = Field Size ÷ 12 ft ² / Module A42: 613 ft ² ÷ 12 ft ² / Module	51.08 Modules, round up to 52 Modules
For this example, assume the number of trenches equals three:	
Trench Width: Module width (2 ft) + Sand Sidewalls (6" + 6") =	3 ft
Modules per Row: 52 modules ÷ 3 trenches =	17.33 A42 round to 18 modules per row
Trench Length: Modules per Row x 4 ft + 1 ft 19 A42 Modules x 4 ft + 1 ft	73 ft
Trench area (width x length x trenches) – 3 ft x 73 ft x 3 trenches =	657 ft ²

A42 Trench Dimensions:	
Length =	73 ft/trench
Width =	3 ft
Trenches =	3
Modules =	52 A42
Total Area =	657 ft ²

2.0 Trench Installation Sizing and Guidelines

FIGURE 2: PLAN VIEW – A42 TRENCH SYSTEM

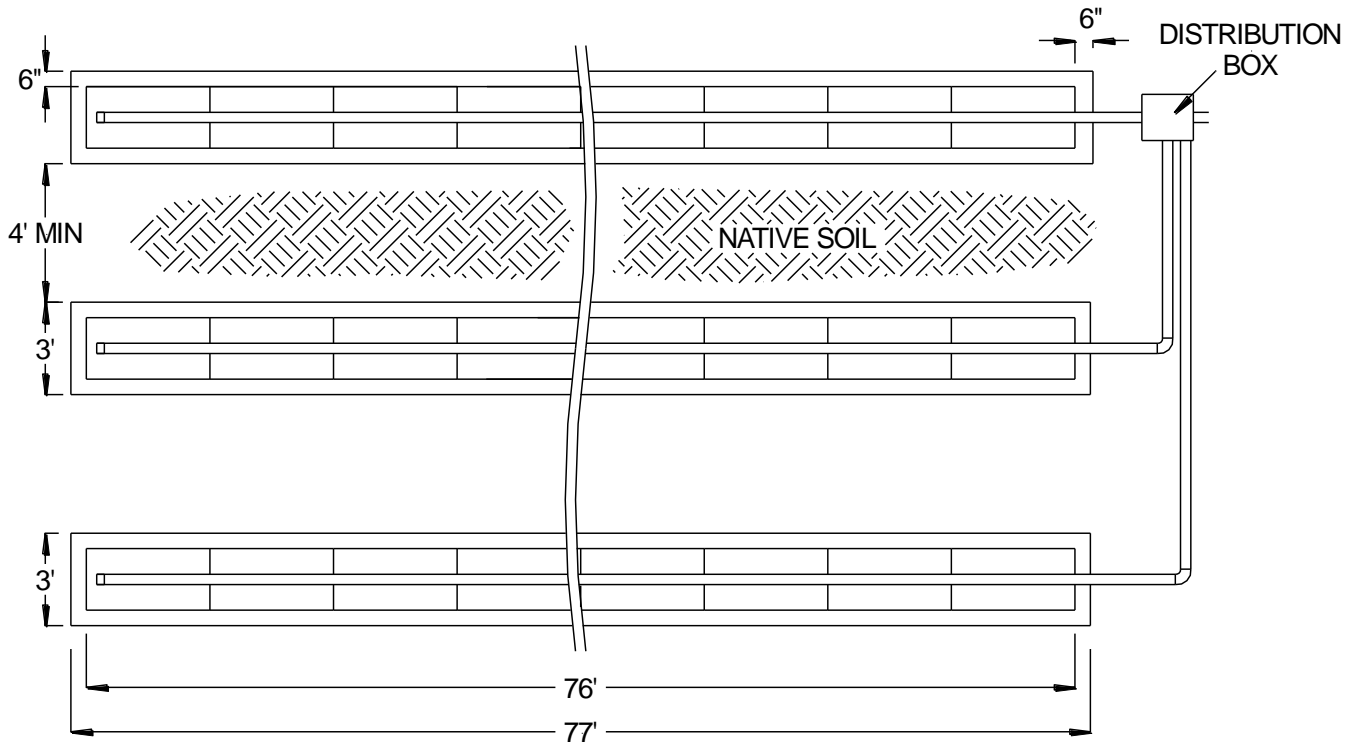


FIGURE 3: SECTION VIEW – A42 TRENCH SYSTEM – LEVEL SITE

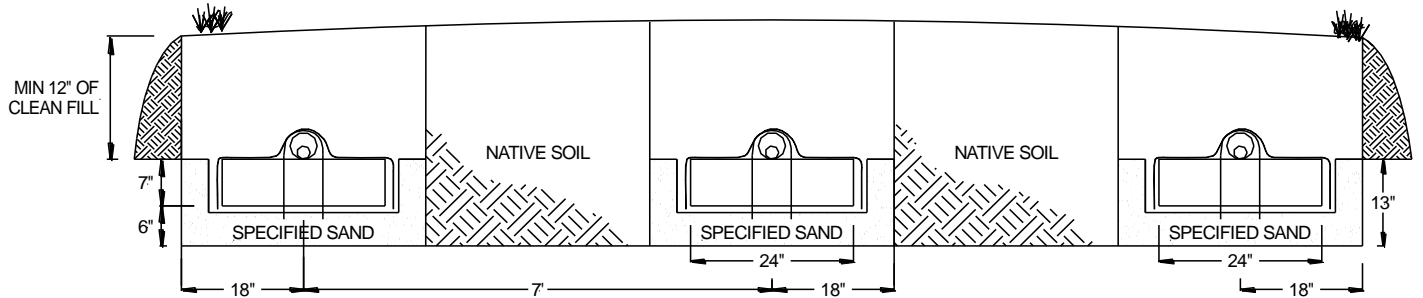
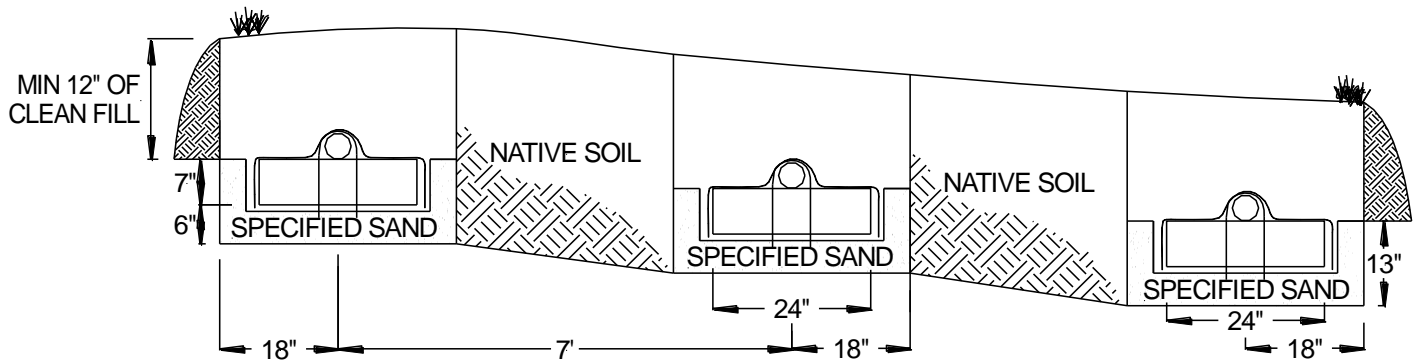


FIGURE 4: SECTION VIEW – A42 TRENCH SYSTEM – SLOPING SITE



2.1 Trench Installation Sizing and Guidelines

1. Ensure all components leading to the GSF system are installed properly. Septic tank effluent filters are required with the GSF system.
2. Determine the number of GSF Modules required using the trench sizing example.
3. Prepare the site. Do not install a system in saturated ground or wet soils that are smeared during excavation. Keep machinery off infiltrative areas.
4. Plan all drainage requirements above (up-slope) of the system. Set soil grades to ensure that storm water drainage and ground water is diverted away from the absorption area once the system is complete.
5. Excavate the trench; scarify the receiving layer to maximize the interface between the native soil and specified sand.
6. Minimize walking in the trench prior to placement of the specified sand to avoid soil compaction.
7. Place specified sand in a 6" lift, stabilize by foot, a hand held tamping tool or a portable vibrating compactor. The stabilized height below the GSF module must be level at 6".
8. Place GSF modules with **PAINTED STRIPE FACING UP**, end to end on top of the specified sand along their 4-foot length.
9. A standard 4-inch perforated pipe, SDR 35 or equivalent, is centered along the modules 4-foot length. Orifices are set at the 4 & 8 o'clock position.
10. All 4-inch pipes are secured with manufacturers supplied wire clamps, one per module.
11. (Pressure Distribution Systems Only) Insert a pressure pipe (size per design and code) into the standard 4-inch perforated pipe. The pressure pipe orifices are set at the 12 o'clock position as shown in Figure 11. Each pressure lateral will have a drain hole at the 6 o'clock position. Each pressure lateral shall have a clean out at the end of the trench.
12. **Cover fabric substitution is not allowed.** The installer should lay the Eljen provided geotextile cover fabric lengthwise down the trench, with the fabric fitted to the perforated pipe on top of the GSF modules. Fabric should be neither too loose, nor too tight. The correct tension of the cover fabric is set by:
 - a. Spreading the cover fabric over the top of the module and down both sides of the module with the cover fabric tented over the top of the perforated distribution pipe.
 - b. Place shovelfuls of Specified Sand directly over the pipe area allowing the cover fabric to form a mostly vertical orientation along the sides of the pipe. Repeat this step moving down the pipe.
13. Place 6 inches of Specified Sand along both sides of the modules edge. A minimum of 6 inches of Specified Sand is placed at the beginning and end of each trench.
14. Complete backfill with a minimum of 12 inches of clean porous fill measured from the top of the modules. Backfill exceeding 18 inches requires venting at the far end of the trench. Use well graded native soil fill that is clean, porous and devoid of large rocks. Do not use wheeled equipment over the system. A light track machine may be used with caution, avoiding crushing or shifting of pipe assembly.
15. Divert surface runoff from the system. Finish grade to prevent surface ponding. Topsoil and seed system area to protect from erosion.

3.0 Bed Installation Sizing and Guidelines

TL1 Gravity or Pump to Gravity Bed Example:

House size	3 Bedrooms
Percolation Rate	70 Minutes Per Inch
Design Flow	450 gpd
Distribution Method	Gravity
Application rate from Table 3	0.30 gpd/ft ²
Conventional Field Size: Design Flow ÷ Application Rate 450 gpd ÷ 0.30 gpd/ft ² =	1,500 ft ²
Method of Application Multiplier from Table 4	0.84
Field Size: Conventional Field Size x Application Multiplier 1,500 ft ² x 0.84 =	1,260 ft ²
Modules Required = Field Size ÷ 24 ft ² / Module A42: 1,260 ft ² ÷ 24 ft ² / Module = 52.5 round up	53 Modules
For this example, assume the number of rows in the bed equals two:	Even out modules to 54
Each bed row is 6 ft wide. With a 12 ft wide bed, we can fit 2 rows. (non-repair)	
Modules per Row: 54 modules ÷ 2 rows =	27 A42 modules per row
Bed Length: Modules per Row x 4 ft + 1 ft 27 A42 Modules x 4 ft + 1 ft	109 ft
Bed area (width x length) – 12 ft x 109 ft	1,308 ft ²

A42 Bed Dimensions:	
Length =	109 ft
Width =	12 ft
Rows =	2
Modules =	54 A42
Total Area =	1,308 ft ²

3.0 Bed Installation Sizing and Guidelines

FIGURE 5: PLAN VIEW – A42 BED SYSTEM

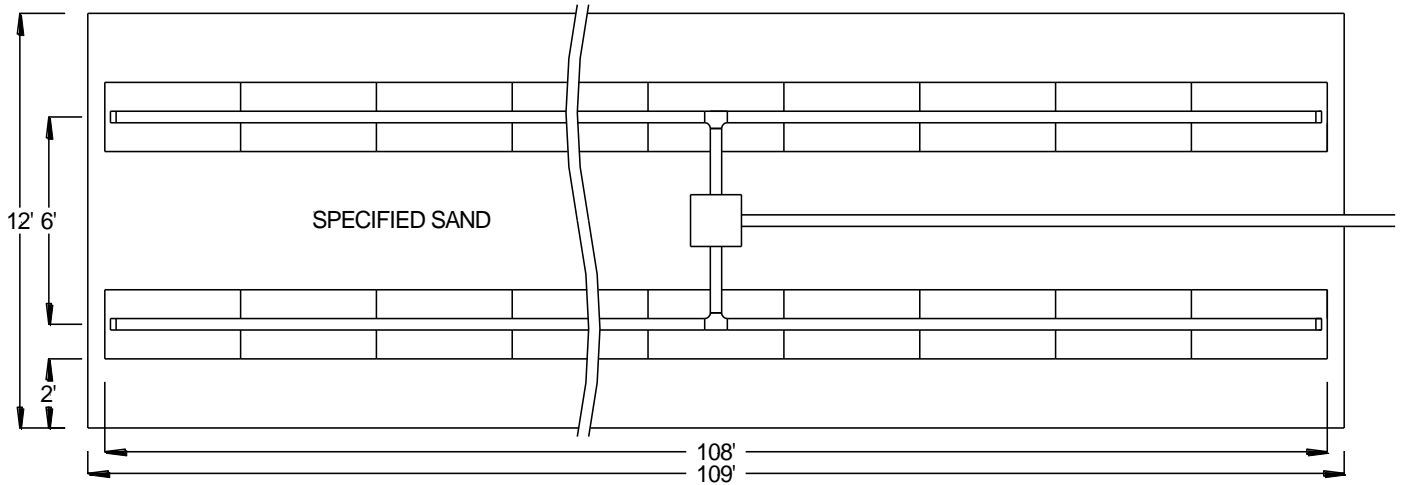


FIGURE 6: SECTION VIEW – A42 BED SYSTEM – LEVEL SITE

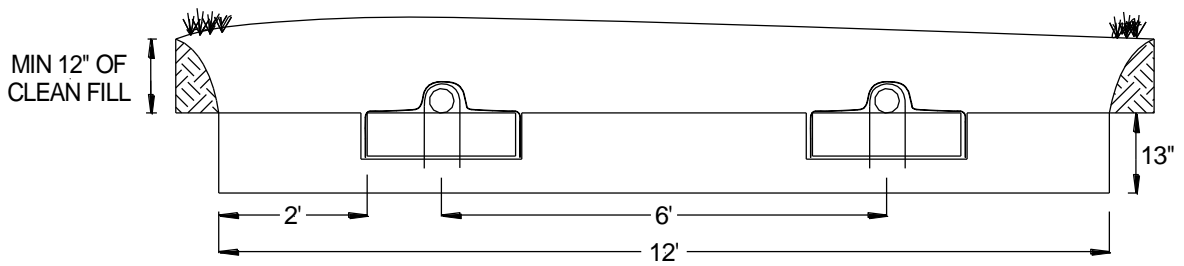
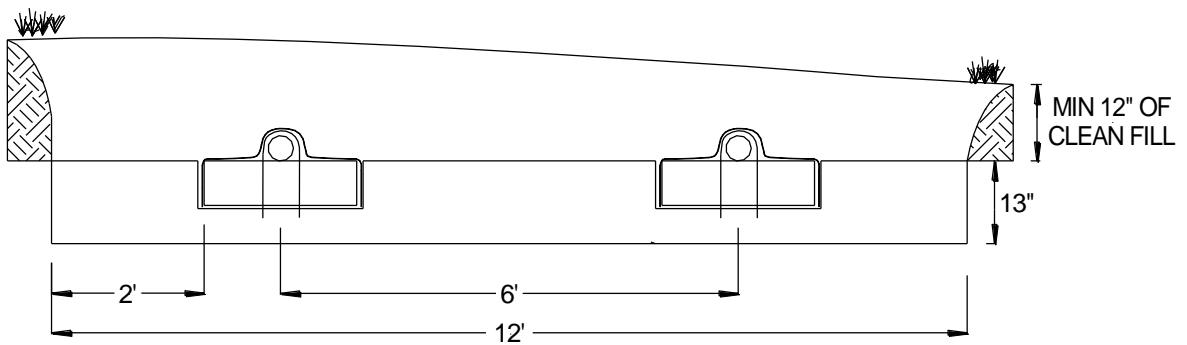


FIGURE 7: SECTION VIEW – A42 BED SYSTEM – SLOPING SITE



3.1 Bed Installation Sizing and Guidelines

TL1 Pressure Dosed Bed Example:

House size	3 Bedrooms
Percolation Rate	70 Minutes Per Inch
Design Flow	450 gpd
Distribution Method	Pressure Distribution

Application rate from Table 3 0.30 gpd/ft²

Conventional Field Size: Design Flow ÷ Application Rate
 450 gpd ÷ 0.30 gpd/ft² = 1,500 ft²

Method of Application Multiplier from Table 4 0.70

Field Size: Conventional Field Size x Application Multiplier
 1,500 ft² x 0.70 = 1,050 ft²

Modules Required = Field Size ÷ 16 ft² / Module
 A42: 1,050 ft² ÷ 16 ft² / Module = 65.6, round up to 66 Modules

For this example, assume the number of rows in the bed equals three:

Each bed row is 4 ft wide. With a 12 ft wide bed, we can fit 3 rows. (non-repair)

Modules per Row: 66 modules ÷ 3 rows = 22 A42 modules per row

Bed Length: Modules per Row x 4 ft + 1 ft
 22 A42 Modules x 4 ft + 1 ft 89 ft

Bed area (width x length) – 12 ft x 89 ft 1,068 ft²

A42 Bed Dimensions:	
Length =	89 ft
Width =	12 ft
Rows =	3
Modules =	66 A42
Total Area =	1,068 ft ²

3.1 Bed Installation Sizing and Guidelines

FIGURE 8: PLAN VIEW – A42 BED SYSTEM

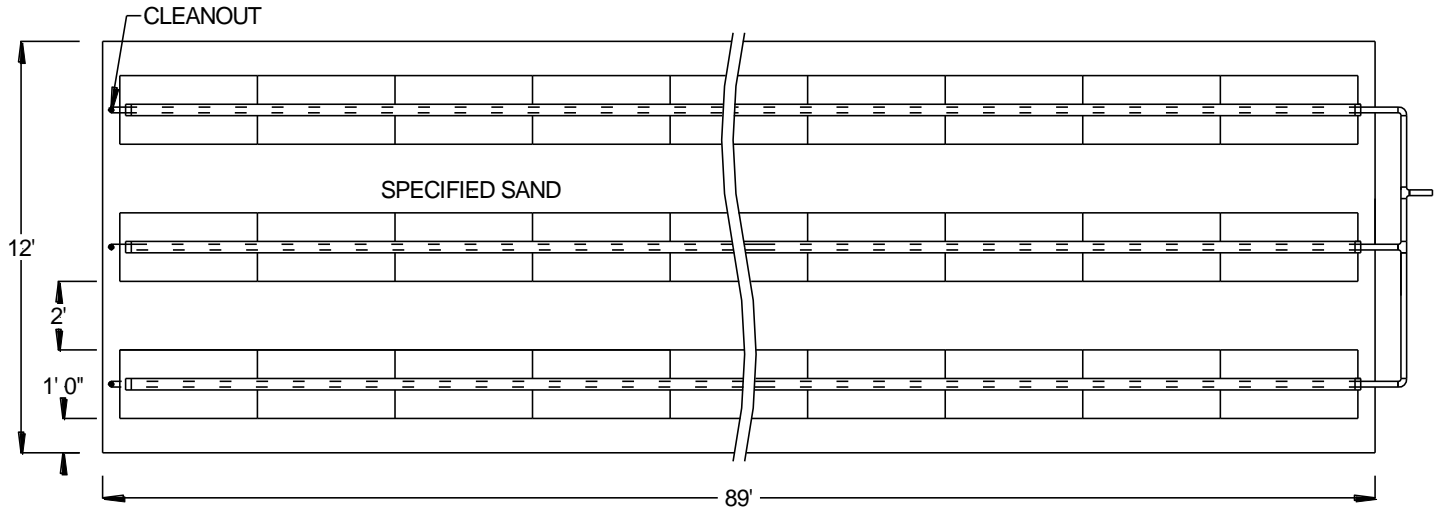


FIGURE 9: SECTION VIEW – A42 BED SYSTEM – LEVEL SITE

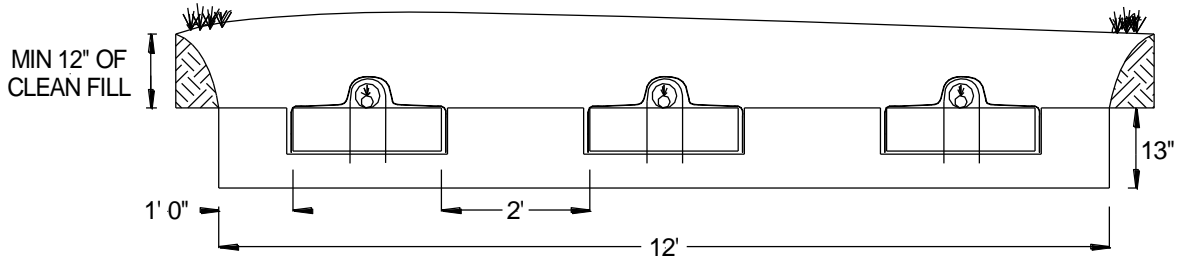
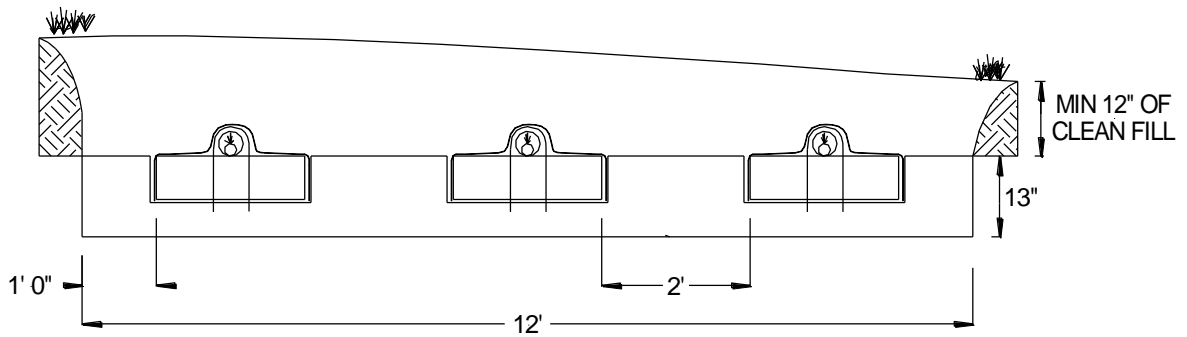


FIGURE 10: SECTION VIEW – A42 BED SYSTEM – SLOPING SITE



3.2 Bed Installation Sizing and Guidelines

1. Ensure all components leading to the GSF system are installed properly. Septic tank effluent filters are required with the GSF system.
2. Determine the number of GSF Modules required using the bed sizing example.
3. Prepare the site. Do not install a system in saturated ground or wet soils that are smeared during excavation. Keep machinery off infiltrative areas.
4. Plan all drainage requirements above (up-slope) of the system. Set soil grades to ensure that storm water drainage and ground water is diverted away from the absorption area once the system is complete.
5. Excavate the bed absorption area; scarify the receiving layer to maximize the interface between the native soil and specified sand.
6. Minimize walking in the absorption area prior to placement of the specified sand to avoid soil compaction.
7. Place specified sand in a 6" lift, stabilize by foot, a hand held tamping tool or a portable vibrating compactor. The stabilized height below the GSF module must be level at 6".
8. Place GSF modules with **PAINTED STRIPE FACING UP**, end to end on top of the specified sand along their 4-foot length.
9. A standard 4-inch perforated pipe, SDR 35 or equivalent, is centered along the modules 4-foot length. Orifices are set at the 4 & 8 o'clock position.
10. All 4-inch pipes are secured with manufacturers supplied wire clamps, one per module.
11. (Pressure Distribution Systems Only) Insert a pressure pipe (size per design and code) into the standard 4-inch perforated pipe. The pressure pipe orifices are set at the 12 o'clock position as shown in Figure 11. Each pressure lateral will have a drain hole at the 6 o'clock position. Each pressure lateral shall have a clean out at the end of each module row.
12. **Cover fabric substitution is not allowed.** The installer should lay the Eljen provided geotextile cover fabric lengthwise down the row, with the fabric fitted to the perforated pipe on top of the GSF modules. Fabric should be neither too loose, nor too tight. The correct tension of the cover fabric is set by:
 - a. Spreading the cover fabric over the top of the module and down both sides of the module with the cover fabric tented over the top of the perforated distribution pipe.
 - b. Place shovelfuls of Specified Sand directly over the pipe area allowing the cover fabric to form a mostly vertical orientation along the sides of the pipe. Repeat this step moving down the pipe.
13. Place 6 inches of Specified Sand along both sides of the modules edge. A minimum of 6 inches of Specified Sand is placed at the beginning and end of each module row. A minimum of 12 inches of Specified Sand is placed in between module rows.
14. Complete backfill with a minimum of 12 inches of clean porous fill measured from the top of the modules. Backfill exceeding 18 inches requires venting at the far end of the bed. Use well graded native soil fill that is clean, porous and devoid of large rocks. Do not use wheeled equipment over the system. A light track machine may be used with caution, avoiding crushing or shifting of pipe assembly.
15. Divert surface runoff from the system. Finish grade to prevent surface ponding. Topsoil and seed system area to protect from erosion.

4.0 Mound Installation Sizing and Guidelines

1. Ensure all components leading to the GSF system are installed properly. Septic tank effluent filters are required with the GSF system.
2. Determine the mound dimensions using the design example.
3. Prepare the site. Do not install a system on saturated ground or wet soils that are smeared during excavation. Keep machinery off infiltrative areas.
4. Plan all drainage requirements above (up-slope) of the system. Set soil grades to ensure that storm water drainage and ground water is diverted away from the absorption area once the system is complete.
5. Scarify the receiving layer to maximize the interface between the native soil and Specified Sand. Minimize walking in the bed prior to placement of the Specified Sand to avoid soil compaction.
6. Place Specified Sand in two 6 inch lifts, compact each lift at a time. The compacted height below the GSF module must be level at 12 inches. A hand tamping tool or vibrating compactor is both acceptable.
7. Place GSF modules with **PAINTED STRIPE FACING UP**, end to end on top of the specified sand along their 4-foot length.
8. A standard 4-inch perforated pipe, SDR 35 or equivalent, is centered along the modules 4-foot length. Orifices are set at the 4 & 8 o'clock position.
9. All 4-inch pipes are secured with manufacturers supplied wire clamps, one per module.
10. (Pressure Distribution Systems) Insert a pressure pipe (size per design and code) into the standard 4-inch perforated pipe. The pressure pipe orifices are set at the 12 o'clock position as shown in Figure 9. Each pressure lateral will have a drain hole at the 6 o'clock position. Each pressure lateral shall have a clean out at the end of each module row.
11. **Cover fabric substitution is not allowed.** The installer should lay the Eljen provided geotextile cover fabric lengthwise down the row, with the fabric fitted to the perforated pipe on top of the GSF modules. Fabric should be neither too loose, nor too tight. The correct tension of the cover fabric is set by:
 - a. Spreading the cover fabric over the top of the module and down both sides of the module with the cover fabric tented over the top of the perforated distribution pipe.
 - b. Place shovelfuls of Specified Sand directly over the pipe area allowing the cover fabric to form a mostly vertical orientation along the sides of the pipe. Repeat this step moving down the pipe.
12. Place 6 inches of Specified Sand along both sides of the modules edge. A minimum of 6 inches of Specified Sand is placed at the beginning and end of each module row. A minimum of 12 inches of Specified Sand is placed in between module rows.
13. Complete backfill with a minimum of 12 inches of clean porous fill measured from the top of the distribution pipe. Backfill exceeding 18 inches requires venting at the far end of the bed. Use well graded native soil fill that is clean, porous and devoid of large rocks. Do not use wheeled equipment over the system. A light track machine may be used with caution, avoiding crushing or shifting of pipe assembly.
14. Divert surface runoff from the system. Finish grade to prevent surface ponding. Topsoil and seed system area to protect from erosion.

5.0 Dosing Distribution Guidance

5.1 PUMP DISTRIBUTION BOX: Specify an oversized distribution box for pump dosed systems. Provide velocity reduction in the D-box with a tee or baffle. Set D-box invert 2 inches higher than invert of perforated pipe over GSF modules. If the absorption area is installed deeper than 18 inches, the system must be vented. See section 7.0 of this manual for detailed information on venting of systems.

5.2 DOSING DESIGN CRITERIA: Dosing volume must be set to deliver a maximum of 3 gallons per A42 Module per dosing cycle with low head high-volume pumps preferred. Higher flow rates and short dose cycle push the effluent down the line and thus disperse the effluent over a larger area. A valve on the force main is recommended to set the flow rate so that the orifices on the outlet pipes are submerged and the d-box does not overflow. Adjustment of the flow rate is likely needed if a row of modules are rested thus changing the number of outlets. Fewer outlets in the d-box force more effluent down each line and improve linear loading. Head loss and drain back volume must be considered in choosing the pump size and force main diameter.

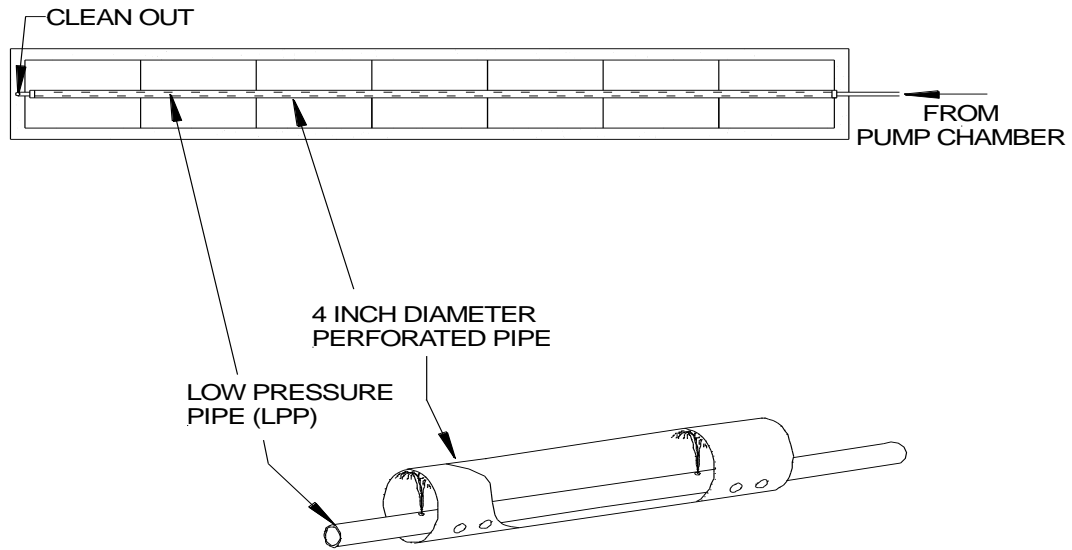
5.3 SELECTION OF DISTRIBUTION METHOD: Distribution lines shall be a maximum of 150 feet long. Distribution lines longer than 100 feet shall be pressure dosed or the application of the effluent shall be at the center of the line. A local public health agency may limit the length of distribution lines to a maximum of 100 feet

6.0 Pressure Distribution Guidance

Standard procedures for design of pressure distribution networks apply to the GSF filter. Orifices shall start in the center of the first module in the row and then be equally spaced throughout the lateral. A minimum orifice size of 1/8 inch shall be maintained. A ¼ inch diameter drain hole is required at the 6 o'clock position of each pressure lateral for drainage purposes. The lateral pipe network (*size per design and code*) is placed within a standard 4-inch perforated pipe. The perforation in the 4-inch outer pipe are set at the 4 and 8 o'clock position, the drilled orifices on the pressure pipe are set to spray at the 12 o'clock position directly to the top of the 4-inch perforated pipe as shown below.

6.0 Pressure Distribution Guidance

FIGURE 11: PRESSURE PIPE PLACEMENT



PRESSURE PIPE CROSS SECTION FOR ALL APPLICATIONS

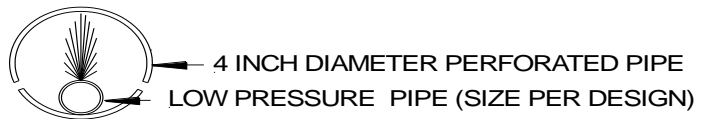
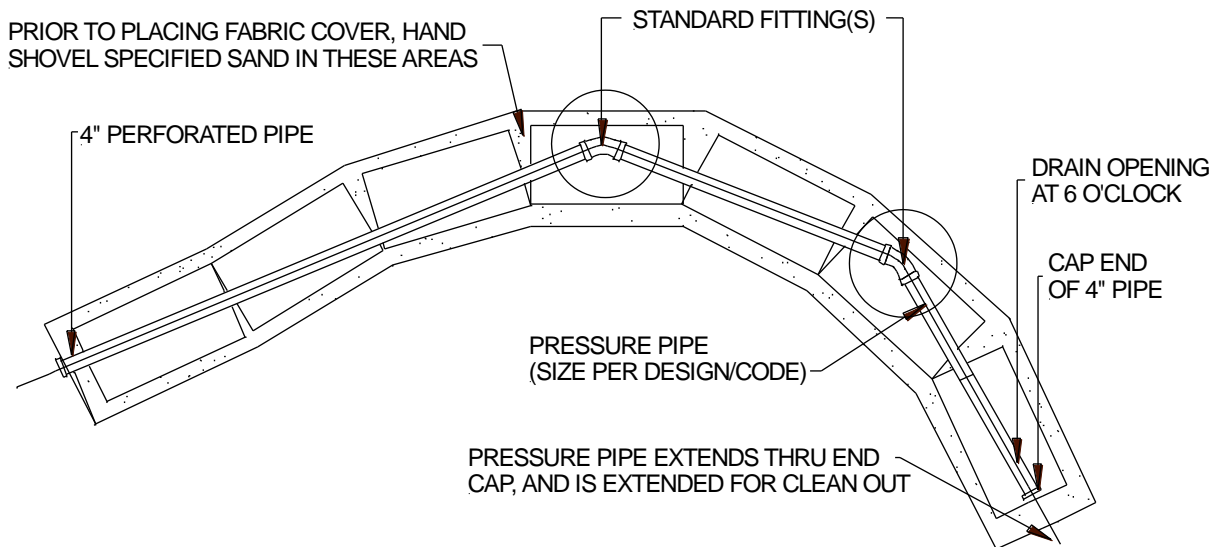


FIGURE 12: CONTOURED TRENCH PRESSURE DISTRIBUTION



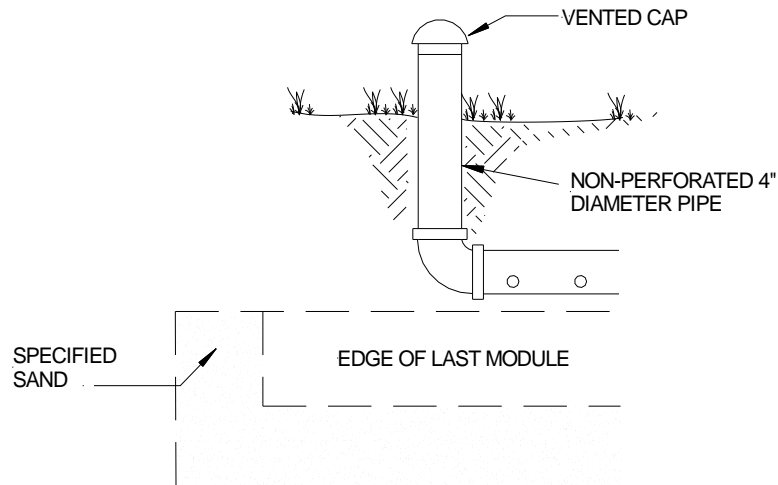
GSF Pressure Distribution trench placed on a contour or winding trenches to maintain horizontal separation distances.

7.0 System Ventilation

7.1 SYSTEM VENTILATION: Air vents are required on all absorption systems located under impervious surfaces or systems **with more than 18 inches of cover material** as measured from the top of the GSF module to finished grade. This will ensure proper aeration of the modules and sand filter. Under normal operating conditions, only a fraction of the filter is in use. The unused channels remain open for intermittent peak flows and the transfer of air. The extension of the distribution pipe to the vent provides adequate delivery of air into the GSF system, as shown in Figure 14.

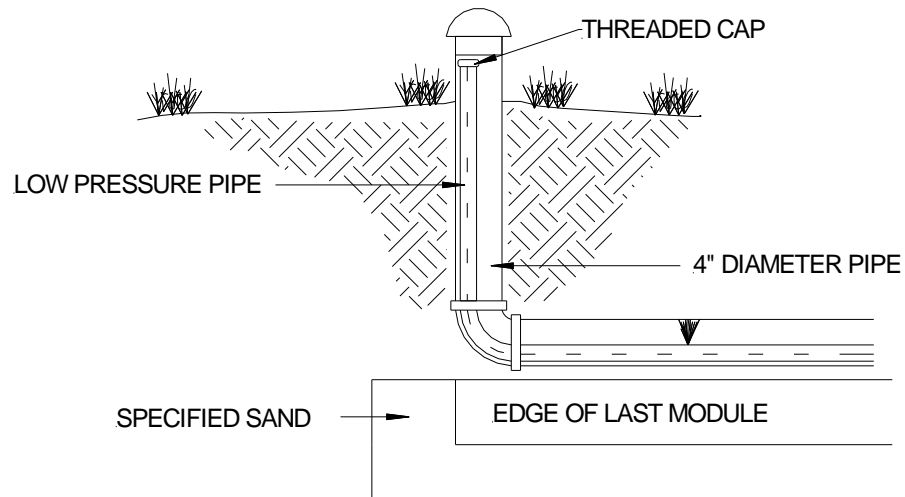
Home plumbing operates under negative pressure due to hot water heating the pipes and reducing the density of air in the house vent. As hot air rises and exits the home, it must be replaced by air from the GSF. To maintain this airflow and fully aerate the GSF system, it is important that air vents are located only on the distal end of the GSF pipe network.

FIGURE 13: VENT FOR GRAVITY AND PRESSURE DOSED BED SYSTEMS



7.2 VENT PIPE FOR LOW PRESSURE DISTRIBUTION SYSTEMS: If the system is a low-pressure distribution system with greater than 18 inches of cover, ensure that the LPP clean outs are located in the vent for easy access.

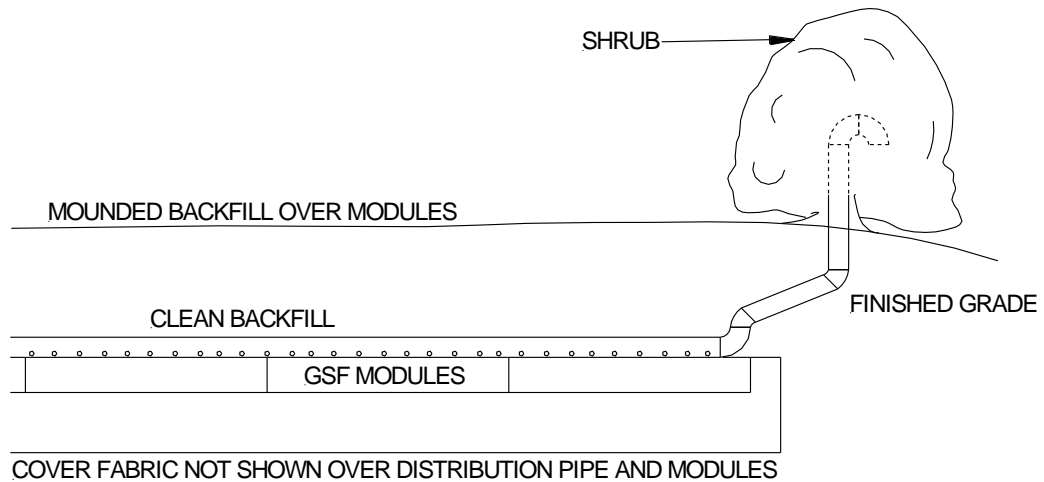
FIGURE 14: PRESSURE CLEAN OUT PRESSURE DOSED SYSTEMS



System Ventilation Example Drawings

7.3 VENTILATION PLACEMENT: In a GSF system, the vent is usually a 4-inch diameter pipe extended to a convenient location behind shrubs, as shown in Figure 15. Corrugated pipe may be used. If using corrugated pipe, ensure that the pipe does not have any bends that will allow condensation to pond in the pipe. This may close off the vent line. The pipe must have an invert higher than the system so that it does not drain effluent.

FIGURE 15: GSF WITH 4" VENT EXTENDED TO CONVENIENT LOCATION



8.0 GSF Inspection Check List

Geotextile Sand Filter, (GSF) Checklist				
Facility Owner:				
Facility Address:				
Installation Date: (MDY)				
Previous Inspection Date: (MDY)				
Date of Inspection: (MDY)				
Residential Number of Bedrooms:				
Is this a Commercial Design? If yes what type:	Yes	No		
What is the estimated BOD5 and TSS strength?	BOD5	TSS	Comments	
Observation Port Location(s):	1	2	3	
Inspection Data, (complete all fields)				
Is daily flow within the system design flow? If no, explain:	Yes	No		
Does the owner verify the system use as described above? If no, explain:	Yes	No		
Septic tank last inspection date:	Date			
Inspected by:				
Septic tank last pumped date:				
Is pumping recommended?	Yes	No		
Condition of the soil absorption system: Wet, Dry, Firm, Soft, Vegetative, or Other. If Other, explain:	W	D	S	F V
Is there evidence of storm water flows or erosion over the septic system? If yes, explain:	Yes	No		

8.0 GSF Inspection Check List

Is there evidence of soil slump or compaction by traffic or other means in the vicinity of the soil absorption system? If yes, describe:	Yes	No	Comments
Is effluent visible through the observation port? If yes, describe the condition and the fluid level:	Yes	No	Comments
Is there a garbage disposal in the home?	Yes	No	Comments
Is a water softer connected to the system?	Yes	No	Comments
Are solids visible through the observation port? If yes, describe the condition and depth of solids:	Yes	No	Comments
Are the system vents in place?	Yes	No	Comments
Are they operational? If no, describe conditions and location:	Yes	No	
Describe any other pertinent issues:			

Inspected by:	
License Number:	
Date:	
Time:	
Print Name & Signature of Inspector:	
<p><i>I certify I have inspected the system at the above address, completed this report, and the information reported is true, accurate, and complete.</i></p>	

THIS PAGE IS INTENTIONALLY LEFT BLANK.



Innovative Environmental Products and Solutions Since 1970