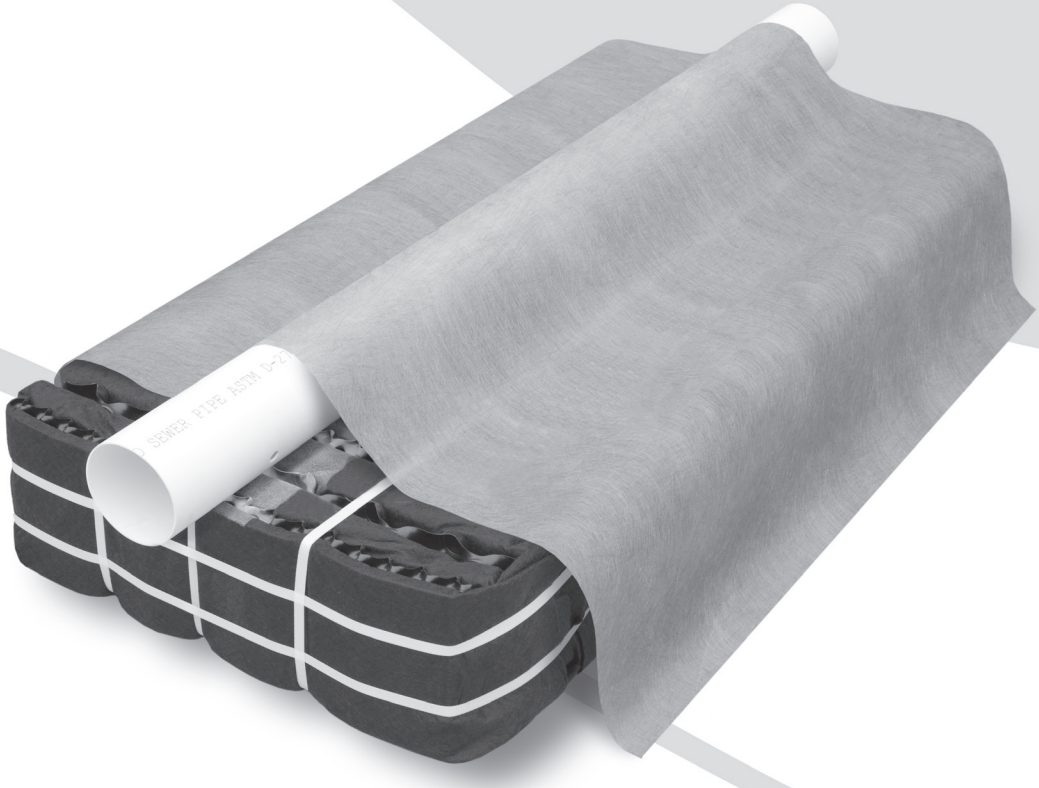
GSF®

Geotextile Sand Filter

Georgia
Design & Installation Manual



eljen CORPORATION

Innovative Onsite Products & Solutions Since 1970

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DRAWINGS

TABLES

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 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.
Design Flow	The estimated peak flow that is used to size a GSF system is 150 gallons per day per Bedroom for residential systems. Section J of the Georgia Regulations provides sizing for non-residential systems.
Drop Box	A plastic or concrete box that receives effluent from a septic tank and splits the flow to pipes placed above the GSF modules. For equal distribution, the outlet pipe orifices are typically set at the same elevation to equalize the flow to each line.
EHGWT	The Estimated High Ground Water Table (EHGWT) is the elevation of saturated condition as measured or as estimated from evaluation of soil color.
Flow Dial/Equalizer	Special insert placed in the end of distribution pipes within the distribution box to compensate for possible unlevel installation and promote favorable flow to the distribution pipes.
GSF	The Eljen Geotextile Sand Filter Modules and the 6-inch sand layer at the base and 6 inches along the sides of the modules.
GSF Module	The individual module of a GSF system. The module is comprised of a cuspated plastic core and corrugated geotextile fabric.
Restrictive Horizon	A soil horizon that is capable of severely retarding the movement of groundwater or effluent, and may be brittle and cemented with iron, aluminum, silica, organic matter, or other compounds. Restrictive horizons may occur as fragipans, iron pans, organic pans or shallow rock formations, and are recognized by their resistance in excavation and auger boring.
Serial or Sequential Distribution	Designs common to sloping sites where GSF lines are laid on the contour, receiving effluent from a series of drop-boxes or a serial step over at different elevations. Effluent floods up-slope lines and then spills excess effluent to down slope or “stepped” lines. Use of drop boxes allows inspection and control of effluent into each line of modules and can be used to rest up-slope lines if the GSF system is managed.

Specified Sand To ensure proper system operation, the system must be installed using ASTM C33 sand with less than 10% passing a #100 sieve and less than 5% passing a #200 sieve. Listed below is a chart outlining the sieve requirements for the Specified Sand. 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. 30	590 µm	25 - 60
No. 50	297 µm	5 - 30
No. 100	149 µm	0 - 10
No. 200	75 µm	0 - 5

STA Soil Treatment Area

STE Septic Tank Effluent (STE) is anaerobically digested effluent that is discharged to a Geotextile Sand Filter module for further treatment.

Wire Clamp Wire Clamps are used to secure perforated distribution pipe above the GSF modules.

GSF System Description

The Eljen GSF Geotextile Sand Filter system is a cost-effective upgrade from other septic technologies. Comprised of a proprietary two-stage Bio-Matt™ pre-treatment process, the geotextile modules apply a better-than-secondary septic tank effluent to the soil, increasing the soil's ability to accept the effluent. The result is superior treatment in a smaller soil absorption area.

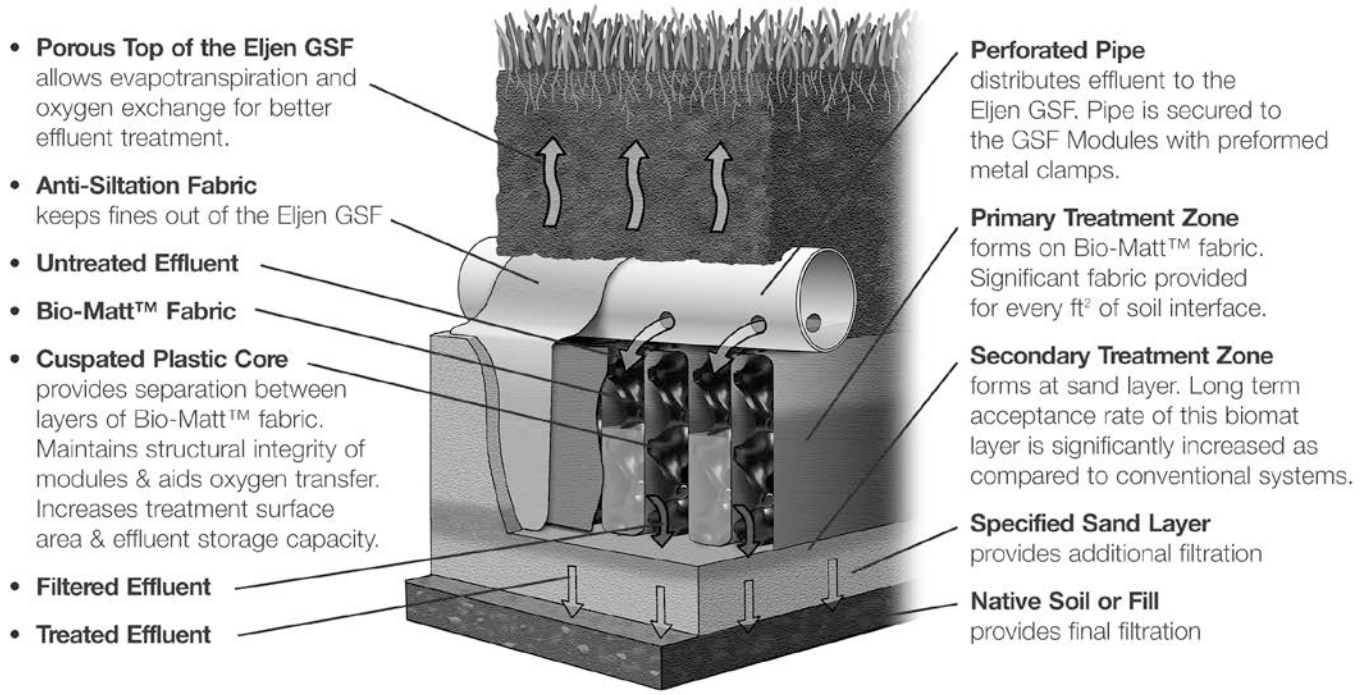
Primary Treatment Zone

- Perforated pipe is centered above the GSF module to distribute septic effluent over and into corrugations created by the cuspated core of the geotextile module.
- Septic effluent is filtered through the Bio-Matt fabric. The module's unique design provides increased surface area for biological treatment that greatly exceeds the module's footprint.
- Open air channels within the module support aerobic bacterial growth on the modules geotextile fabric interface, surpassing the surface area required for traditional absorption systems.
- An anti-siltation geotextile fabric covers the top and sides of the GSF module and protects the Specified Sand and soil from clogging, while maintaining effluent storage within the module.

Secondary Treatment Zone

- Effluent drips into the Specified Sand layer and supports unsaturated flow into the native soil. This Specified Sand/soil interface maintains soil structure, thereby maximizing the available absorption interface in the native soil. The Specified Sand supports nitrification of the effluent, which reduces oxygen demand in the soil, thus minimizing soil clogging from anaerobic bacteria.
- The Specified Sand layer also protects the soil from compaction and helps maintain cracks and crevices in the soil. This preserves the soil's natural infiltration capacity, which is especially important in finer textured soils, where these large channels are critical for long-term performance.
- Native soil provides final filtration and allows for groundwater recharge.

FIGURE 1: GSF SYSTEM OPERATION



1.0 Basic System Design

1.1 REQUIREMENTS: GSF systems must meet the local rules and regulations except as outlined in this manual. The Georgia's Manual for On-site Sewage Management Systems (revised April 2007) and the local regulations will be referred to as the *Code or Regulations* in this manual.

The sizing tables in Appendix A apply to residential systems with typical waste strength. Sizing tables for commercial systems with less than 200mg/l BOD and TSS waste strength are also located in Appendix A. Please contact Eljen's Technical Resource Department at 1-800-444-1359 for design information on systems not covered in this manual.

1.2 VERTICAL SEPARATION TO GROUND WATER OR LIMITING LAYER: A minimum vertical separation of 12 inches of naturally occurring soil must be between the infiltrative surface and any impervious or limiting soil horizon.

1.3 SPECIFIED SAND SPECIFICATION FOR TRENCH AND BED SYSTEMS: 6 inches of Specified Sand immediately under, between rows and around the perimeter of the GSF system must be an ***ASTM C33 WASHED CONCRETE SAND OR EQUIVALENT 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.

1.4 PLACING GSF MODULES: Each row of modules is laid level, end to end on the Specified Sand. No mechanical connection is required between modules.

1.5 DISTRIBUTION PIPE: 2 – 4 inch SCH 40pipe or equivalent is required. Place SCH 40 perforated pipe on top of GSF modules with holes a 5 and 7 o'clock (if pipe is not predrilled, drill ½ inch holes at 5 & 7 o'clock, every 6 inches). Refer to Section 2.0 and 3.0 for level and serial piping details respectively. Secure pipe to GSF modules with provided wire clamps, one clamp per Eljen module.

1.6 DROP BOX: Set the gravity system D-box outlet invert a minimum of ⅛ inch drop in elevation per linear foot to the top first module in the Trench or Bed configuration. Set a 2-inch minimum drop for dosed systems from the D-box to the modules (Refer to Georgia Regulations). Flow Dials may be used in either Gravity or Dosed installations. See section F-2 of the Georgia Regulations for more guidance.

1.7 COVER FABRIC: Geotextile cover fabric is provided by Eljen Corporation for all GSF systems. It is placed over the top and the 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.

1.8 BACKFILL & FINISH GRADING: The system should be backfilled with clean native soil with a minimum of 6 inches of cover over the pipe. Make sure that the final grade is crowned to allow for any natural settlement and to ensure diversion of surface water. Do not use wheeled equipment over the system. A light track machine may be used with caution, avoiding crushing or shifting of pipe assembly. Divert surface runoff from the Soil Treatment Area, (STA). Finish grade to prevent surface ponding. Seeding and stabilizing the soil cover is required to protect the system from soil erosion.

1.9 NUMBER OF GSF MODULES REQUIRED: The charts located in Appendix A indicate the minimum number of A42 GSF modules required for various soil percolation rates, system configurations and separation distance to limiting layers. All systems use a minimum of 7 A42 units per bedroom.

1.10 ADDITIONAL BED GUIDANCE: Beds designed for systems with peak flows greater than 600 gals per day must use pressure distribution.

1.11 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 increased for expected higher than normal water use.

For example:

- Homes with a Jacuzzi style tubs, and other high use fixtures.
- Homes with known higher than normal occupancy.
- Homes with water conditioner backwash (Diversion from septic tank required).

1.12 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 the following measures must be taken to prevent solids from leaving the tank and entering the GSF system:

- Increase the septic tank capacity by a minimum of 50% and
- Installation of a second septic tank installed in series or
- Installation of a dual compartment tank and
- And the installation of an appropriate sized septic tank outlet effluent filter.

Eljen **supports** Georgia's mandatory use of septic tank outlet effluent filters on all systems (especially on those systems that have single compartment tanks) even if up-sized, and when the dwelling has a garbage disposal installed. Refer to the *Regulations* for further inquiries.

1.13 WATER SOFTENERS/CONDITIONERS: Water conditioners can adversely affect septic tank treatment and add to hydraulic load of the system. Discharge of residential conditioner backwash from these devices shall be into a separate alternative disposal system. This location should be far enough away from the STA as to not affect its performance.

1.14 VEHICULAR TRAFFIC: All vehicular traffic is prohibited over the GSF system. This is due to the compaction of material required to support traffic loading which greatly diminishes absorption below the STA; and the void space that naturally exists in soils for oxygen transfer on top of the STA is reduced by compaction from vehicular traffic.

1.15 SEPTIC TANKS: Georgia requires the use of 2 compartment tanks.

1.16 EFFLUENT FILTERS: Effluent filters are required as a means of preventing solids from leaving the tank.

1.17 RISERS: It is recommended that risers be installed which will extend the septic tank lids to finish grade. This will provide easy access to the septic tank for periodic maintenance such as pumping, inspection, and filter maintenance. Please follow all State and Local Regulations in regards to installation requirements for risers.

1.18 SHALLOW IN GROUND AND AT GRADE SYSTEMS: Use a slope of 5:1 from the topsoil to the toe to help eliminate soil erosion. Seed with grass to strengthen the slope.

1.19 SITE PLAN: Site plans are required in GA; however it is not always required to be done by a Professional Engineer. Appendix B shows the minimum standards for a site plan submission.

1.20 AREA FILL MOUND SYSTEM: The minimum depth of original soil to the seasonal high groundwater table, rock or other restrictive soil horizon shall be 12" inches. A minimum of six inches of topsoil material shall be placed over the fill which must be mulched to avoid erosion. The maximum permeability of the top 12 inches of original soil shall be 30 minutes per inch. The slope of the fill material from the shoulder to the toe of the fill must have a minimum of a 5:1 slope. The area fill should not be used on sites with slopes that exceed 12%. Refer to the *Regulation* for further inquiries.

2.0 Systems for Level Sites

2.1 SYSTEM CONFIGURATIONS: Design level in-ground or bed systems with 12-inch minimum spacing between module rows. The Specified Sand, Trench, Bed, GSF modules, and distribution pipes are installed level at their design elevations.

2.2 DISTRIBUTION PIPE LAYOUT: Perforated SCH 40 pipe or equivalent runs along the center of the modules for both Trench and Bed configurations. Additional Bed options:

- Ends for Bed systems may be connected with non-perforated pipe at the distal end of the system.
- For Bed systems over 40 feet in length, a non-perforated "cross-over" connection may be installed perpendicular to the length of the STA connecting all distribution pipes at the midway point of the system.

3.0 Systems for Sloped Sites

3.1 ROW SPACING: Trenches have a 7 foot center-to-center separation distance. Eljen recommends a 4 foot edge to edge (8 foot center-to-center) separation for 4 foot wide trenches.

3.2 DROP BOX: A D-box at the beginning of the first row of modules will positively affect effluent distribution and velocity reduction. D-boxes also serve as a system inspection port. Lower rows may also require D-boxes with Flow Dials to insure effluent is loaded to the upslope Trench first before continuing to lower Trenches within the system. **Note**: Drop-boxes do not require concrete footers.

3.3 SERIAL STEP OVERS: Serial step overs are permissible by Eljen Corporation and may replace drop-boxes.

3.4 VARYING TRENCH LENGTH ON A SLOPED SITE: Trench length may vary with the use of D-Boxes or Serial Step Overs. These technologies provide complete trench utilization before flowing to the next which allows for placement of the trenches around trees or rock outcrops.

3.5 TRENCH LAYOUTS ON SLOPES: Trench layouts on slopes or contoured terrain follow the ground contour and work with the existing landscape. Trenches can be as little as 3 inches lower in elevation to allow for flow from upper trenches to lower trenches through successive drop boxes. If less elevation exists, loading from a central D-box is possible with outlet flow controls (Dial-a-flow, Speed Levelers, etc.). All trenches must be spaced a minimum of 7 feet on-center.

FIGURE 2: SLOPING TRENCH LAYOUT WITH VARYING TRENCH LENGTHS

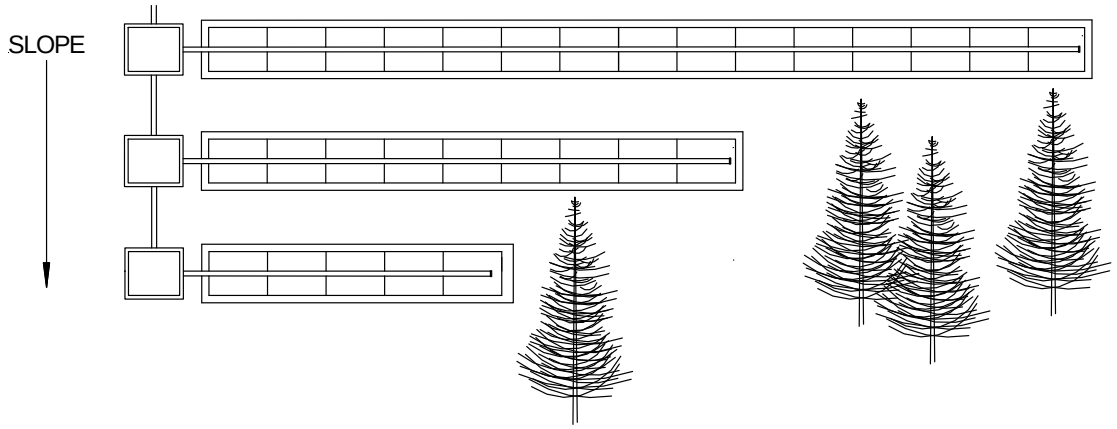
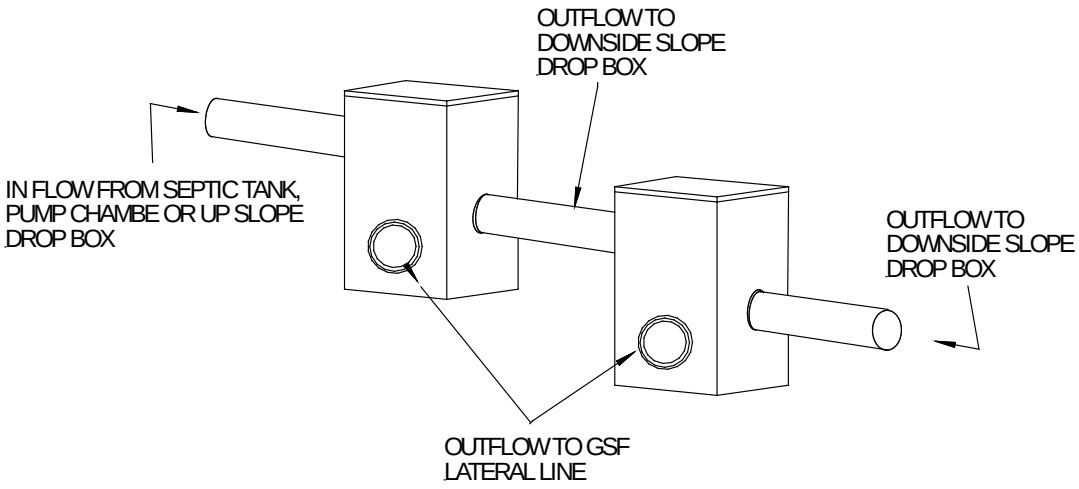


FIGURE 3: DROP BOX LAYOUT



4.0 Pumped Systems

4.1 PUMP DISTRIBUTION BOX: Specify an oversized distribution box for pumped 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.

4.2 DOSING DESIGN CRITERIA: Dosing volume must be set to deliver a maximum of 3.5 gallons per A42 module per dosing cycle with low head high volume pumps preferred. Higher flow rates and a 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 or 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.

4.3 DOSING TANKS ARE REQUIRED FOR SYSTEMS WITH OVER 500 LINEAR FEET: A dosing tank is required where more than 500 linear feet of absorption trench is required. Dosing shall be by automatic siphon or by sewage pump installed in the dosing tank. Refer to section E of the *Georgia Regulations* for further guidance.

4.4 ALTERNATING SIPHONS OR PUMPS ARE REQUIRED FOR SYSTEMS WITH OVER 1000 LINEAR FEET: When more than 1000 linear feet of absorption trench is required, alternating siphons or pumps shall be used. Refer to section E of the *Georgia Regulations* for further guidance.

4.5 BED SYSTEMS AND 4 FOOT WIDE TRENCHES: All bed systems and 4 foot wide trenches must be dosed. For dosing methods, refer to the Georgia manuals pertaining to pumped, siphoned or other flow applications devises. Center-manifold or end-manifold designs are acceptable.

5.0 Pump Controls

Demand Dosed controlled systems will include an electrical control system that has the alarm circuit independent of the pump circuit, controls and components that are listed by UL or equivalent, is located outside, within line of sight of the pump chamber and is secure from tampering and resistant to weather (minimum of NEMA 4). The control panel shall be equipped with cycle counters and elapsed time meters. Where a water supply water meter is available it may be possible to eliminate the counters or timers.

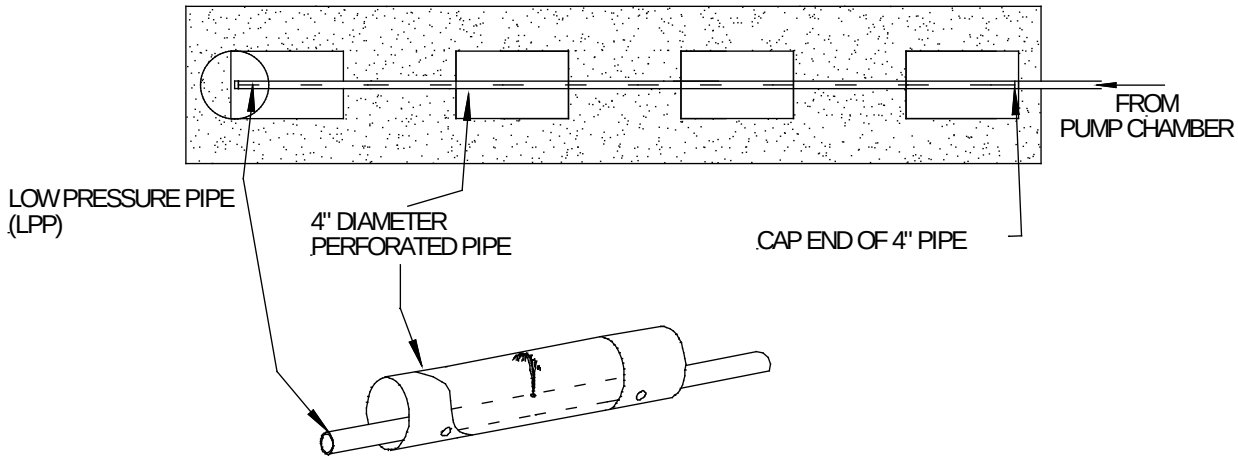
The control panel shall be equipped with both audible and visual high liquid level alarms installed in a conspicuous location. Float switches shall be mounted independent of the pump and force main so that they can be easily replaced and/or adjusted without removing the pump.

6.0 Pressure Distribution Guidance

6.1 STANDARD PROCEDURES: Standard procedures for design of pressure distribution networks apply to the GSF filter. Minimum orifice and lateral pipe size is accordance with the *Regulation*. A ¼ inch diameter drain hole is required at the 6 o'clock position of each pressure lateral for drainage purposes. A standard 4-inch perforated pipe, SCH 40 or equivalent, is centered along the modules 4-foot length. Orifices are set at the 5 & 7 o'clock position (if not predrilled, drill ½ inch holes at 5 & 7 every 6 inches). Insert a 1.5 inch pressure pipe into the standard 4-inch perforated pipe. The pressure pipe orifices are set at the 12 o'clock position as shown in Figure 4. All 4-inch pipes are secured to the modules with manufacturers supplied wire clamps, one per module. Systems shall be dosed at a maximum of 3.5 gallons per module per dose.

6.2 LOW PRESSURE DISTRIBUTION: Pressure distribution lines and orifice sizing and spacing should be based on design and regulation. Design requirements will vary depending on length of system and dose volume. At least one drain hole per line at the 6 o'clock position must added to each line. Eljen recommends that timed pressure distribution systems be designed by a qualified person. See Figures below for examples of Low Pressure Distribution drawings. Flushing ports are required at the distal end of all pressure distribution networks. Alternatively, a flushing network may be used.

FIGURE 4: PRESSURE DISTRIBUTION LAYOUT



PRESSURE PIPE CROSS SECTION FOR ALL APPLICATIONS

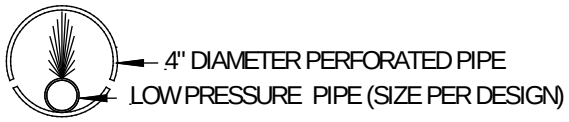


FIGURE 5: EXAMPLE PRESSURE DISTRIBUTION

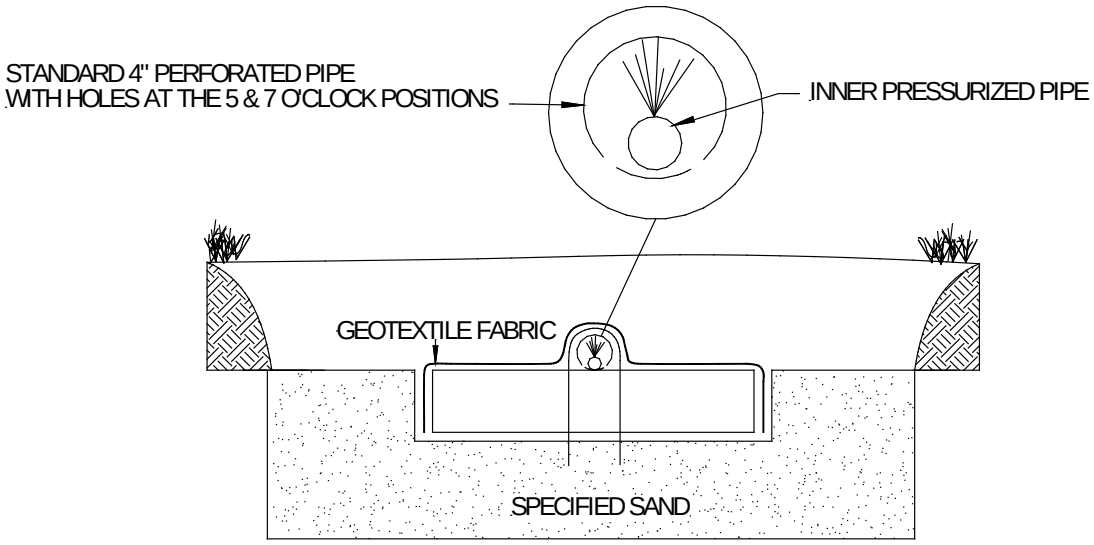
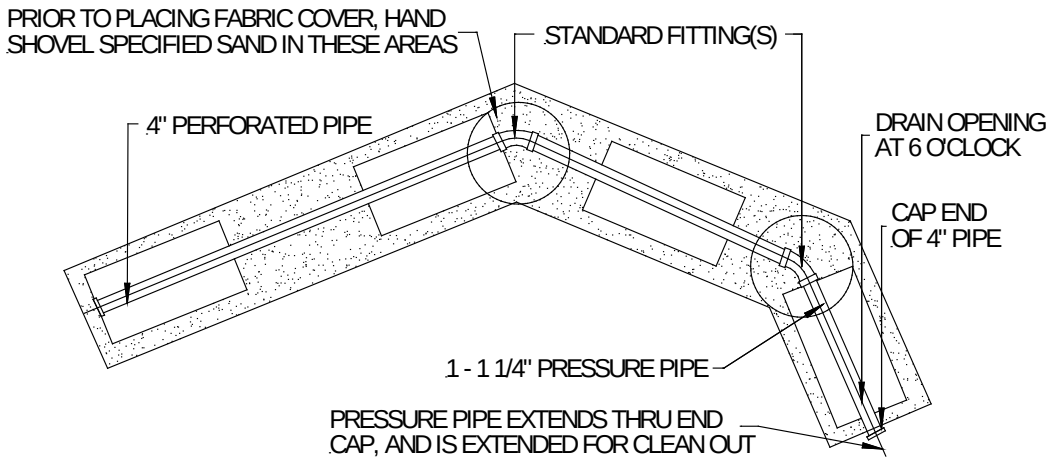


FIGURE 6: CONTOURED TRENCH PRESSURE DISTRIBUTION



GSF Pressure Distribution Trench System can be placed along a contour or in winding trenches to follow natural grade and maintain horizontal separation distances from setbacks or other constraints. This method is also applicable for Dosed, Gravity, or Pressure Distribution systems.

7.0 Troubleshooting GSF Systems

If the GSF system is not operating properly, a system inspection should be performed *by a Qualified Service Provider* to identify the cause of the problem so that the system can be restored to normal operation. Possible problem areas to check if a system is not operating properly are:

Septic Tank:

- Line to septic tank is clogged due to uneven settling or roots.
- Clogged septic tank outlet filter.
- No outlet baffle or tee.
- Septic tank needs to be pumped.
- Line to distribution box is cracked or settles and needs repair or replacement.
- Cracked or leaking septic tank results in low water levels with discharge of solids, or infiltration of stormwater, ground water, or surface water.

Pump Systems:

- Incorrect float settings discharge a high volume or pumping rate to D-box and the GSF system.
- Too low float settings does not account for drain-back and results in repeat pumping of effluent.
- Wiring or electrical problems.
- Infiltration of ground water or surface water into pump chamber results in a higher volume or pumping rate to the D-box and GSF system.
- Line to D-box is cracked or blocked and needs repair.

Soil Treatment Area:

- Soil and sizing was not correct resulting in too small of a system installed.
- Lower soils permeability due to smearing or compaction during construction.
- Excessive backfill over system.
- Crushed distribution pipe(s).
- Distribution pipes and modules experienced differential settling with part of the system not in use.
- Poor quality backfill over system resulting in no oxygen flow to the system.
- Poor quality sand or fill used below the system.
- Organic layer was not removed prior to construction.
- Stormwater from roofs and upslope not directed away from field.
- Excessive water use or change in occupancy than included in the design. For example, room over garage or in a basement that has been converted to apartment for extended family members.

8.0 Designs for Failed Systems

Before designing a Geotextile Sand Filter system to replace a failed system, identify all possible reasons why the previous system failed. Proper identification of the failure is critical to ensure the GSF system will operate properly. Listed below are the most common reasons for septic system failures.

IDENTIFY THE CAUSE(s) OF FAILURE <u>PRIOR TO</u> REPLACEMENT
a) Leaky plumbing fixtures
b) Inaccurate percolation test
c) Pump settings incorrect or not working properly
d) More occupants or bedrooms than system were designed for
e) Unusually high water usage
f) Garbage disposal
g) Water softener backwash
h) Excessive grease in system
i) Detrimental chemicals being used
j) Failed or missing septic tank outlet baffle
k) Infiltration of ground water into septic tank or pump chamber
l) System is faulty in design or installation
m) Specified Sand that does not meet the requirements as outlined in this manual
n) Improper materials
o) Mounding due to poor drainage or soil permeability
p) Part or system not used because of blockage or excessive settling
q) System is undersized

9.0 Required Notes on Design Plans

1. This system (is/is not) designed for the use of a garbage disposal.

2. This system is not designed for backwash from a water softener.

3. Organic Loam Layer must be removed from the absorption area and slope extension areas prior to fill placement. Scarify subsoil prior to fill placement.

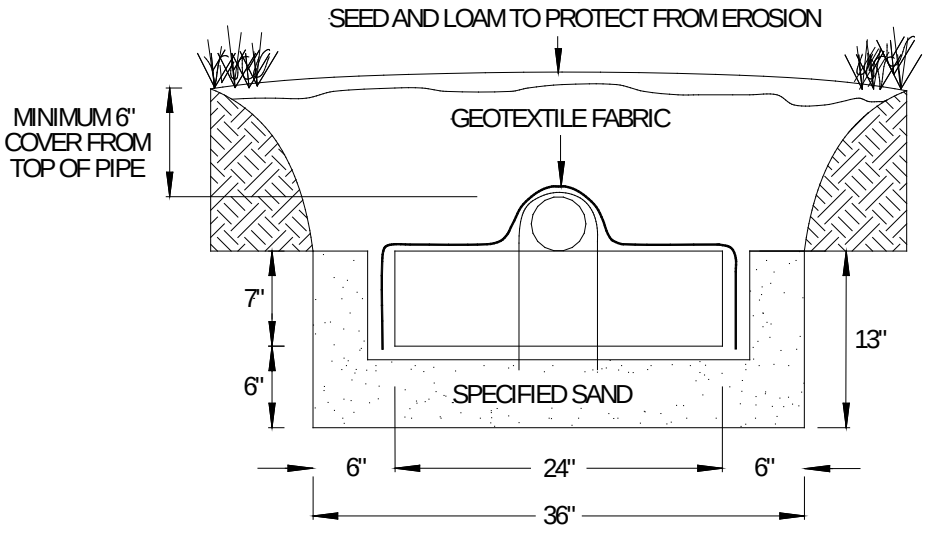
4. Fill material shall meet or exceed the Eljen GSF Design & Installation Manual requirements. All fill material shall be clean sand, free of topsoil, directly beneath the STA.

5. The 6 inches under and around the GSF modules shall be washed concrete sand meeting the requirements of ASTM C33 with less than 10% passing a #100 sieve and less than 5% passing a #200 sieve.

6. Backfill and Finish Grading: Carefully place backfill over the modules, a minimum of 6 inches of well graded sandy fill; clean, porous, and devoid of rocks, as measured from the top of the distribution pipe. Finish grade must divert surface runoff from the STA and prevent surface ponding. Protect the system area from erosion by loaming and seeding or by using other approved methods of erosion control.

7. This design complies with and must be installed in accordance with the most current Eljen Design and Installation Manual.

FIGURE 7: TYPICAL A42 GSF CROSS SECTION



A42 MODULE (L x W x H) 48” x 24” x 7”

All Systems are required to have a Minimum of:

- 6 inches of Specified Sand at the edges of the GSF module.
- 6 inches of Specified Sand at the beginning and end of each GSF Trench.
- 6 inches of Specified Sand directly below the GSF module.
- Minimum 6 inches of native soil fill over the pipe.

10.0 Trench Installation Sizing and Guidelines

Trench Example:

House size –	4 Bedrooms
Soil Permeability min/in –	15 min/in
Separation Distance to Limiting Layer –	1 ft
Trench Width –	4 ft
Design Flow – 150 gpd x 4 bedrooms =	600 gpd

Refer to Appendix A, locate the appropriate chart and retrieve the minimum number of units required for installation, and your application rate.

Minimum Number of Units Required –	28 A42 Modules
Application Rate –	0.789 GPD/ft^2

Determine the Minimum Bottom Area for the Trench.

Design Flow ÷ Application Rate = 600 GPD ÷ 0.789 GPD/ft^2 =	760.45 ft^2, round to 761 ft^2

For this example, assume the number of trenches equals two:

Trench Width:	4ft

Trench Length: Minimum Bottom Area ÷ Trench Width ÷ Number of Trenches

761 ft^2 ÷ 4 ft ÷ 2 trenches = 95.125 ft, round to	96 ft

Number of Modules per Row: Number of Modules ÷ Number of Rows

28 modules ÷ 2 rows	14 Modules

Spacing of A42s inside the trench:

Trench Length – 5 ft (6" sand at each end of trench+ 1 Unit) ÷ (Number of Units per Row – 1)

(96 ft – 5 ft) ÷ (14 modules – 1) = 91ft ÷ 13 =	7 ft center to center spacing
Edge to Edge Spacing – Center to Center spacing – 4 = 7 ft – 4 ft	3 ft edge to edge spacing

Trench bottom area (width x length x trenches):

4 ft x 96 ft x 2 trenches =	768 ft^2

Trench Dimensions:	
Length =	96 ft/trench
Width =	4 ft
Trenches =	2
Modules =	28 A42s
Total Area =	768 ft^2

FIGURE 8: PLAN VIEW – 600 GPD – TRENCH SYSTEM – LEVEL SITE

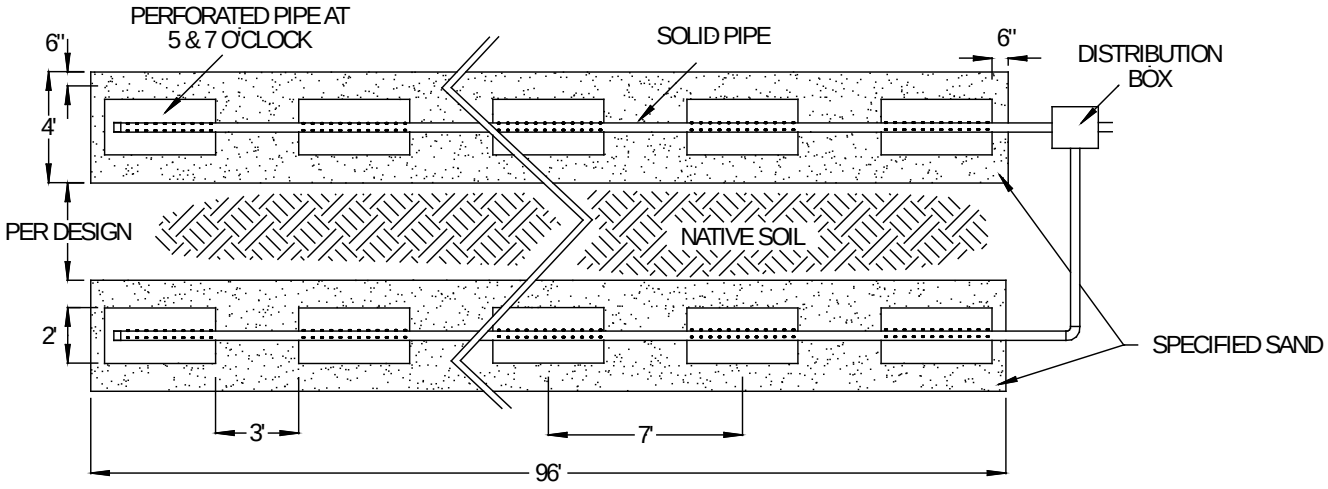


FIGURE 9: SECTION VIEW – 600 GPD – TRENCH SYSTEM – LEVEL SITE

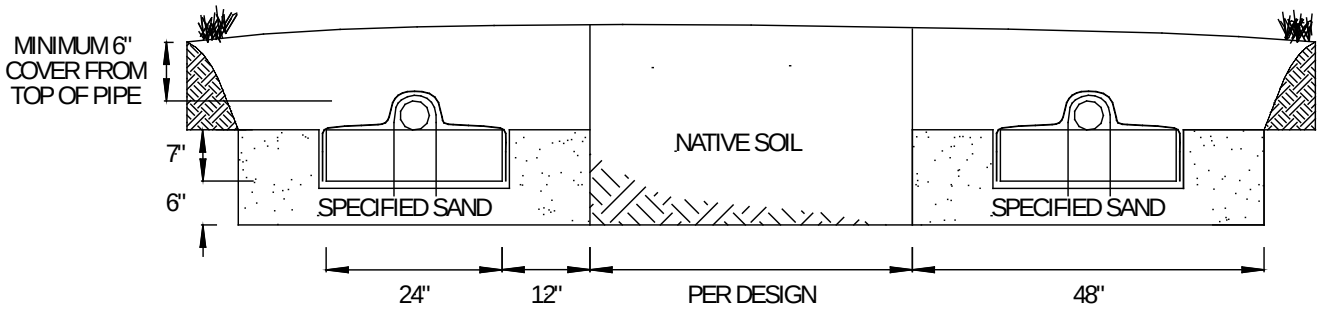
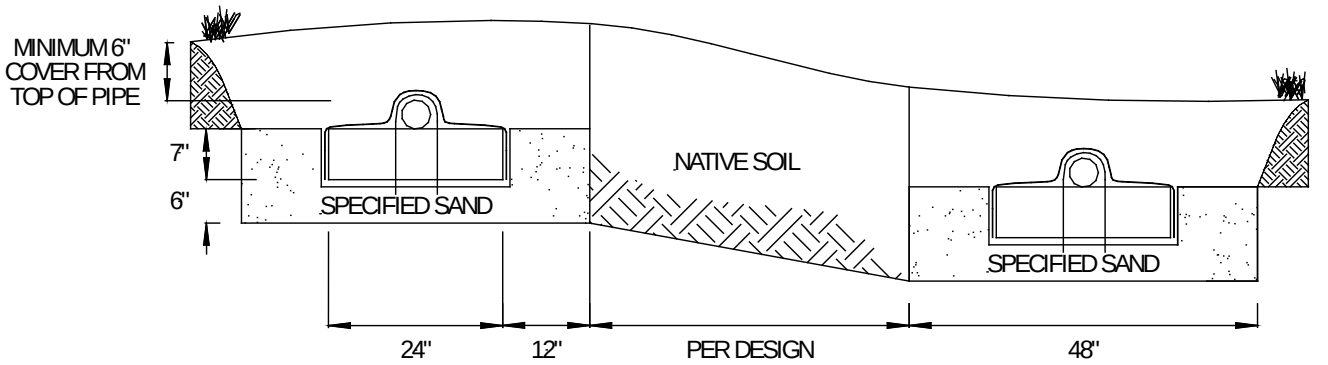


FIGURE 10: SECTION VIEW – 600 GPD – TRENCH SYSTEM – SLOPING SITE



10.0 Trench Installation Sizing and Guidelines

Determine the of Number Modules	Determine the number of GSF Modules required using the appropriate table in Appendix A.
Plan all Drainage Requirements	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.
Excavating the Trench Area	Scarify the receiving layer to maximize interface between the native soil and Specified Sand. Minimize walking in the trench prior to placement of the Specified Sand to avoid soil compaction.
Placing Specified Sand Base	Place 6 inches of Specified Sand in the basal area and compact. The compacted height below the GSF module must be level at 6 inches. A hand tamping tool or vibrating compactor is both acceptable.
Place GSF Modules	Place the GSF Modules, ***PAINTED STRIPE FACING UP***, on top of the Specified Sand along their 4-foot length with proper spacing.
Distribution Pipes Gravity & Lift Pump/Gravity Systems	A standard perforated pipe, SCH 40 or equivalent, is centered along the modules 4-foot length. Orifices are set at the 5 & 7o'clock position over the GSF. Spaces in between GSF modules are not perforated. All pipes are secured with manufacturers supplied wire clamps, one per module.
Place Geotextile Cover Fabric	***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 each GSF modules. Allow for one inch of overlap along the 4 foot length. Fabric should be neither too loose, nor too tight. The correct tension of the cover fabric is set by: • 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. • Place shovel full's 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.
Placing Specified Sand after Cover Fabric is in place	Place 6 – 12 inches of Specified Sand the edges of the modules edge. A minimum of 6 inches of Specified Sand is placed at the beginning and end of each trench.
Backfilling the System	Complete backfill with native soil 6 inches over the distribution pipe. Fill must be clean, porous and devoid of rocks. Do not use wheeled equipment over the system during backfill operation. A light track machine may be used with extreme caution, avoiding crushing or shifting of pipe assembly. Divert surface runoff. Finish grade to prevent surface ponding. Topsoil and seed to protect from erosion.

11.0 Bed Installation Sizing and Guidelines

Bed Example:

House size –	3 bedrooms
Soil Permeability min/in –	45 min/in
Design Flow – 150 gpd x 3 bedrooms =	450gpd
Separation Distance to Limiting Layer –	Greater than 2 ft
Design Flow – 150 gpd x 4 bedrooms =	600 gpd

Refer to Appendix A, locate the appropriate chart and retrieve the minimum number of units required for installation, and your application rate.

Minimum Number of Units Required – 21 A42 Modules

Application Rate – 0.840 GPD/ft^2

Determine the Minimum Bottom Area for the Bed:

Design Flow ÷ Application Rate = 450 GPD ÷ 0.840 GPD/ft^2 = 535.7 ft^2, round to 536 ft^2

For This Example Assume the Number of Bed Rows Equals Three:

Minimum Bed Width – Rows x 3 ft (2ft for the unit + 6 inches of sand on the sides) 9 ft

Required Bed Length:

Minimum Bottom Area ÷ Minimum Bed Width
536 ft^2 ÷ 9 ft = 59.55, round to 60 ft

Determine Module Spacing:

Minimum Bed Width ÷ Rows = 9 ÷3 = Center to Center Row Spacing 3 ft
Center to Center Row Spacing ÷ 2 = 3 ÷ 2 = Edge to Center Row Spacing 1.5 ft

Modules per Row = Modules Needed ÷ Rows = 21 Modules ÷ 3 Rows 7 Modules per Row

Spacing of A42s in Each Row:

Bed Length – 5 ft (6" sand at each end of the bed + 1 Unit) ÷ (Number of Units per Row – 1)

(60 – 5) ÷ (7 – 1) = 55 ft ÷ 6 =	9.16 ft center to center spacing
Edge to Edge Spacing – Center to Center spacing – 4 = 7 ft – 4 ft	5.16 ft edge to edge spacing

Bed Bottom Area (width x length) – 9 ft x 60 ft = 540 ft^2

Bed Dimensions:	
Length =	60 ft
Width =	9 ft
Rows =	3
Modules =	21A42s
Total Area =	540 ft^2

FIGURE 11: PLAN VIEW – 450 GPD – BED SYSTEM – LEVEL SITE

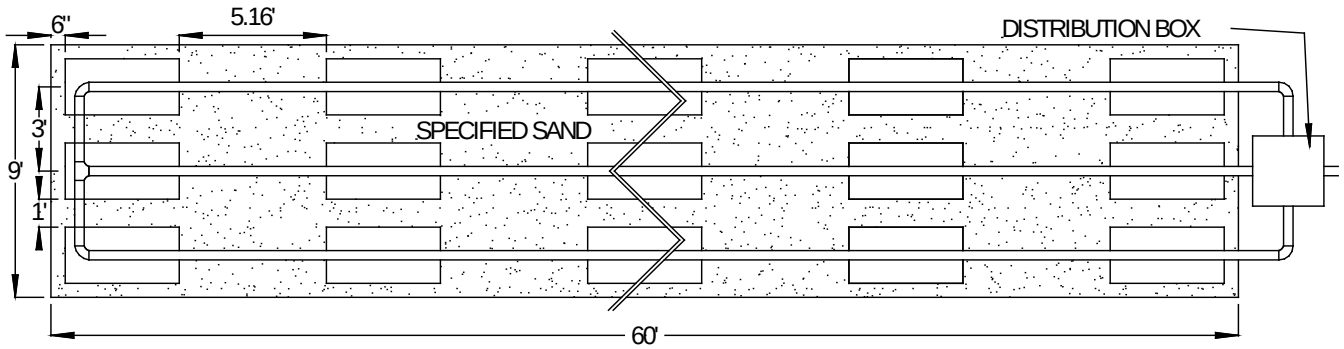
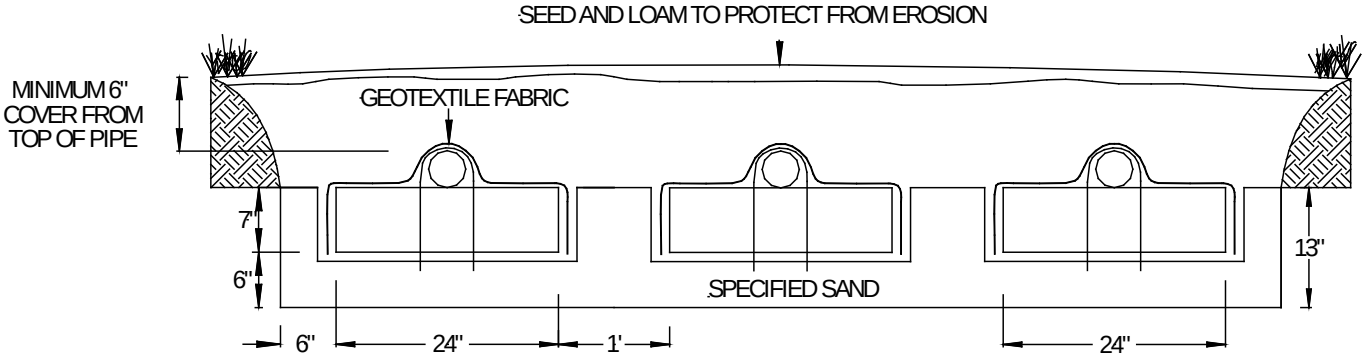


FIGURE 12: SECTION VIEW – 450 GPD – BED SYSTEM – LEVEL SITE



11.0 Bed Installation Sizing and Guidelines

Determine the Number Modules	Determine the number of GSF Modules required using the appropriate table in Appendix A.
Plan all Drainage Requirements	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.
Excavating the Bed Area	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.
Placing Specified Sand Base	Place 6 inches of Specified Sand in the basal area and compact. The compacted height below the GSF module must be level at 6 inches. A hand tamping tool or vibrating compactor is both acceptable.
Place GSF Modules	Place the GSF Modules, ***PAINTED STRIPE FACING UP***, on top of the Specified Sand along their 4-foot length with proper spacing.
Distribution Pipes Gravity & Lift Pump/Gravity Systems	A standard perforated pipe, SCH 40 or equivalent, is centered along the modules 4-foot length. Orifices are set at the 5 & 7o'clock position. All pipes are secured with manufacturers supplied wire clamps, one per module. All bed systems are dosed with equal distribution.
Place Geotextile Cover Fabric	***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: • 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. • Place shovel full's 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.
Placing Specified Sand after Cover Fabric is in place	Place 6 inches minimum of Specified Sand around the modules and a minimum of 6 inches of Specified Sand is placed at the beginning and end of each row.
Backfilling the System	Complete backfill with native soil to 6 inches over the distribution pipe. Fill must be clean, porous and devoid of rocks. Do not use wheeled equipment over the system during backfill operation. A light track machine may be used with extreme caution, avoiding crushing or shifting of pipe assembly. Divert surface runoff. Finish grade to prevent surface ponding. Topsoil and seed to protect from erosion.

12.0 Pressure Mound Installation Sizing and Guidelines

12.1 PRESSURE MOUND REFERENCE: The following sizing and guidelines provide the dimensions of the distribution cell for your pressure mound. Consult the Georgia Department of Public Health manual for On-site Sewage Management Systems for more information on the construction of the pressure mound.

12.2 PRESSURE MOUND EXAMPLE:

House size –	4 bedrooms
Slope of site –	4%
Soil Structure –	Loam/Sandy Clay Loam Moderately Blocky and Granular (2)
Design Flow – 150 gpd x 4 bedrooms =	600 gpd

12.3 DETERMINE THE MAX HYDRAULIC LINEAR LOADING RATE: The hydraulic linear loading rate (HLLR) is defined as the amount of effluent (gallons) applied per day per linear foot of the system (gpd/lf). The design linear loading rate is a function of effluent movement rate away from the system and the direction of movement away from the system. If the movement is primarily vertical, then the linear loading rate is not as critical as if the flow is primarily horizontal. Other factors such as gas transfer from beneath the absorption area suggests that the absorption area width be relatively small (Tyler et al, 1986). It is difficult to estimate the linear loading rate for a variety of soil and flow conditions but based on the authors' experience "good estimates" can be given. If the flow away from the system is primarily vertical, then the linear loading rate can be high but should be in the range of 8 to 10 gpd/lf otherwise the absorption area is excessively wide, especially for the slower permeable soils such as silt loams. However, if the flow is shallow and primarily horizontal then the linear loading rate should be in the range of 3 -4 gpd/lf. This approach will result in long and narrow systems.

HLLR –	3.0 gpd/lf

FIGURE 13: CROSS SECTION – PRESSURE MOUND SYSTEM

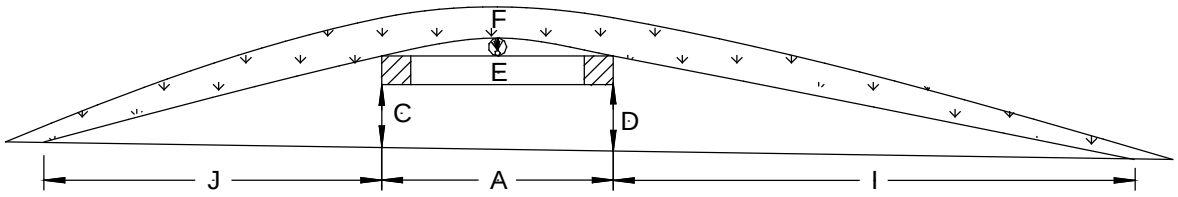
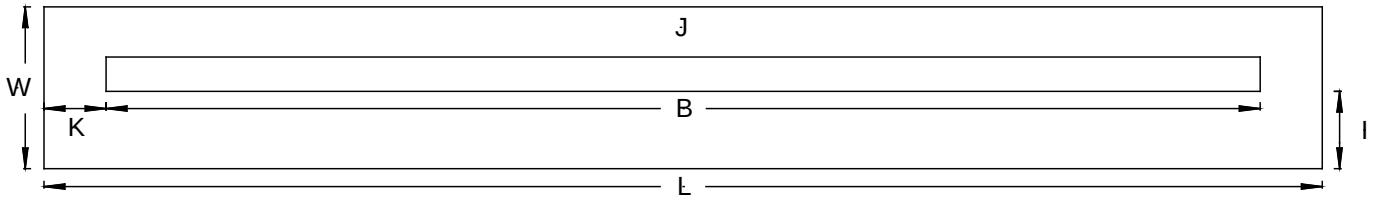


FIGURE 14: PLAN VIEW – PRESSURE MOUND SYSTEM



A – Distribution cell width (accounts for sand) –**Minimum 3 ft for A42**
B – Distribution cell length
C – Up slope fill depth under distribution cell – **Minimum 1 ft**
D – Down slope fill depth under distribution cell – **Minimum 1 ft**
E – Distribution cell depth – **Constant 7 in**
F – Depth of final cover – **Minimum 6" Cover**
I – Distance from edge of distribution cell to down slope edge of fill
J – Distance from edge of distribution cell to up slope edge of fill
K– Distance from end of distribution cell to edge of fill
L – Overall mound fill length
W – Overall mound fill width

12.4 CALCULATE VARIABLES: The following equations are from the Regulation.

A – Distribution cell width = Linear Loading Rate ÷ Sand Fill Loading Rate 1.0 gpd/ft^2

Linear Loading Rate = 3.0 gpd/lf ÷ 1.0 gpd/ft^2 = **3ft**
(***NOTE:*** For this example, the minimum width of distribution cell is **3 ft** when using A42 Modules.)

B – Distribution cell length = Design Flow ÷ Linear Loading Rate

600 ÷ 3.0 gpd/lf = **200 ft**

C – Up slope fill depth under distribution cell = **Minimum 1 ft**
(***NOTE:*** For this example, assume the depth of fill at the up slope edge of the distribution cell is **1.5 ft**.)

D – Down slope fill depth under distribution cell = **Minimum 1 ft**

C + (Slope of site x Distribution cell width)

1.5 ft + (0.04 x 3 ft) = **1.62 ft**

E – Distribution cell depth – Constant 7 in., convert to feet – **0.583 ft**

F – Depth of final cover = **Minimum 6 in, we are using 1 ft in this example.**

(***NOTE:*** For the slope of the mound, we are using a **recommended 4:1 slope)**

I – Distance from edge of distribution cell to down slope edge of fill:

Down slope correction factor = 100 ÷ [100 – (side slope x % ground slope)]

100÷ [100 – (4 x 4)] = **1.19**

4 x (D + E + F) x Down slope correction factor

4 x (1.62 + 0.583 + 1) x 1.19 = **15.25 ft**

J – Distance from edge of distribution cell to up slope edge of fill

Up slope correction factor – 100 ÷ [100 + (side slope x % ground slope)]

100 ÷ [100 + (4 x 4)] = **0.86**

4 x (C + E + F) x Up slope correction factor
4 x (1.62 + 0.583 + 1) x 0.86 = **11.02 ft**

K – Distance from end of distribution cell to edge of fill
4 x [{(C + D)/2} + E +F]

4 x [(1.5 + 1.62)/2 + 0.583 + 1] = **12.57 ft**

L – Overall mound fill length
B + 2(K)
200 + 2(12.57) = **225.14 ft**

W – Overall mound fill width
A + I + J
3 + 15.25 + 11.02 = **29.27 ft**

12.5 DISTRIBUTION CELL CONSTRUCTION –
Width – 3 ft
Length – 200 ft

Mound System Sizing Guidance					
Number of Bedrooms	2	3	4	5	Additional Bedrooms
A42s per System	21	24	32	40	8

A42 Modules needed for this system: 32 A42 Modules

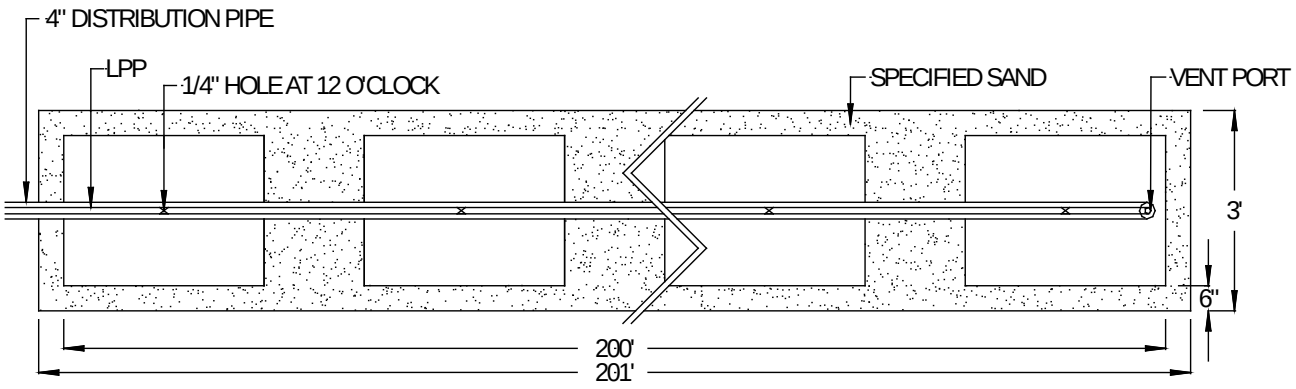
Spacing of A42s inside the trench:

Trench Length – 5 ft (6" sand at each end of trench+ 1 Unit) ÷ (Number of Units per Row – 1)

(200 – 5) ÷ (32 – 1) = 195 ft ÷ 31 modules = 6.29 ft 6.29 ft Center to Center spacing

Center to Center spacing – Edge to Edge spacing = 6.29 ft – 4 ft 2.29 ft Edge to Edge spacing

FIGURE 15: PLAN VIEW – 600 GPD – DISTRIBUTION CELL MOUND SYSTEM



12.6 MOUND CONSTRUCTION–
Overall Width (with slopes) – 29.27 ft
Overall Length (with slopes) – 225.14 ft

FIGURE 16: SECTION VIEW – 600 GPD – MOUND SYSTEM

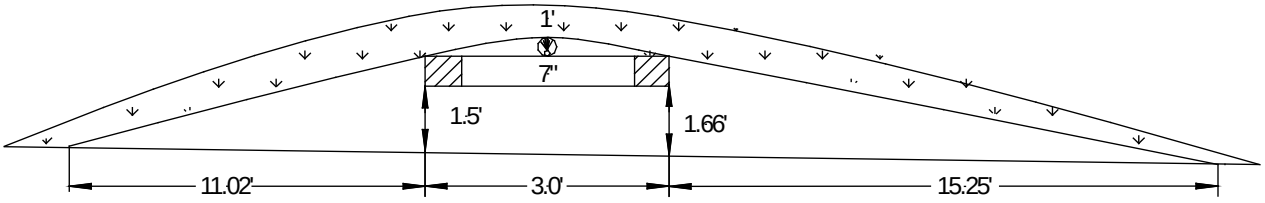
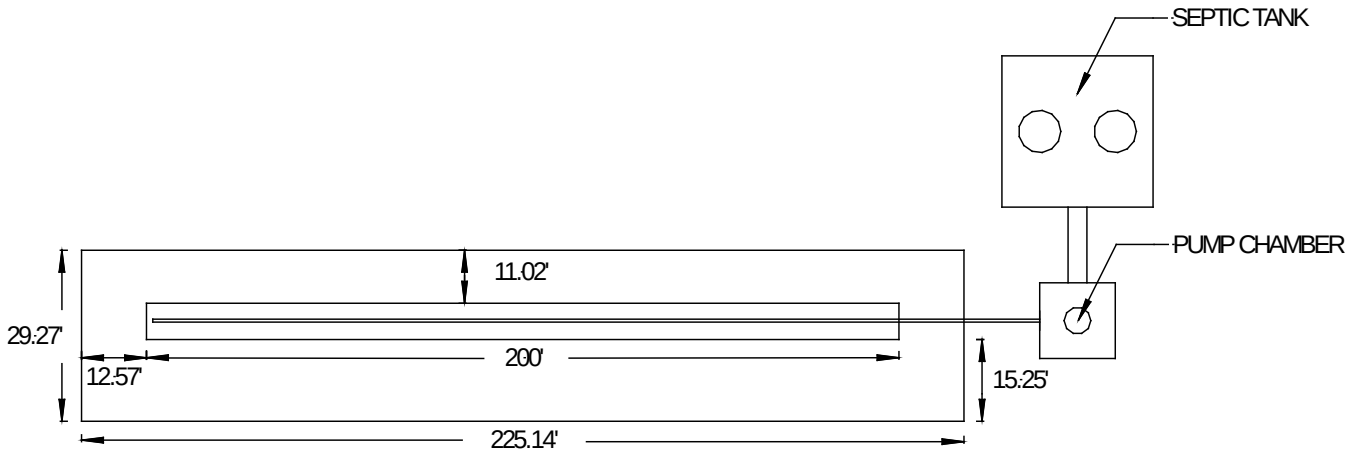


FIGURE 17: SECTION VIEW – 600 GPD – MOUND SYSTEM



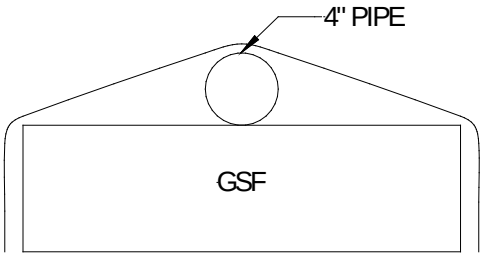
Determine the Number Modules	Determine the number of GSF Modules required using the mound sizing guidelines in section 12.4.
Excavating the Bed Area	Scarify the receiving layer to maximize the interface between the native soil and Specified Sand. Minimize walking in the absorption area prior to placement of the Specified Sand to avoid soil compaction.
Placing Specified Sand Base	Place 6 inches of Specified Sand in the basal area and compact. The compacted height below the GSF module must be level at 6 inches. A hand tamping tool or vibrating compactor is both acceptable.
Place GSF Modules	Place the GSF Modules, ***PAINTED STRIPE FACING UP***, end to end on top of the Specified Sand along their 4-foot length.
Distribution Pipes: • Lift Pump/Gravity • Siphons • Pressure	A standard 4-inch perforated pipe, SCH40 or equivalent, is centered along the modules 4-foot length. Orifices are set at the 5 & 7o'clock position. Insert a pressure pipe *(size per design and regulation)* into the standard 4-inch perforated pipe. The pressure pipe orifices are set at the 12 o'clock position as shown in Figure 6. Each pressure lateral will have a drain hole at the 6 o'clock position. All 4-inch pipes are secured with manufacturers supplied wire clamps, one per module.
Pump Chamber to the GSF System	Refer to local regulations for guidance · Lift Pump/Gravity Guidance · Pressure Distribution Guidance · Pump Controls
Place Geotextile Cover Fabric	***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: • 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. • Place shovel full's 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.
Backfilling the System	Complete backfill with native soil to 6 inches over the distribution pipe. Fill must be clean, porous and devoid of rocks. Do not use wheeled equipment over the system during backfill operation. A light track machine may be used with extreme caution, avoiding crushing or shifting of pipe assembly. Divert surface runoff. Finish grade to prevent surface ponding. Topsoil and seed to protect from erosion.

13.0 Instructions for Proper Installation of Cover Fabric

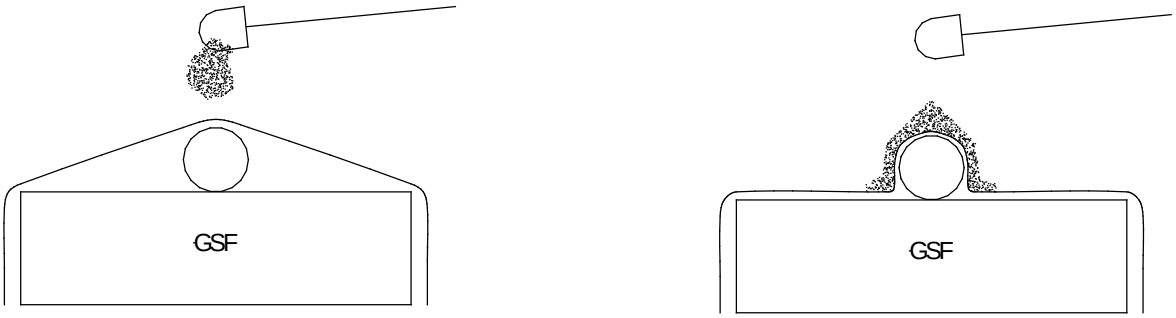
13.1 COVER FABRIC: Geotextile cover fabric is provided by Eljen Corporation for all GSF systems. It is placed over the top and the sides of the module rows to prevent long term siltation and failure. Cover fabric substitution is not allowed.

13.2 COVER FABRIC INSTALLATION TRENCH/BED IN A UNIFORM ROW: Installation is similar for both Trenches and Beds.

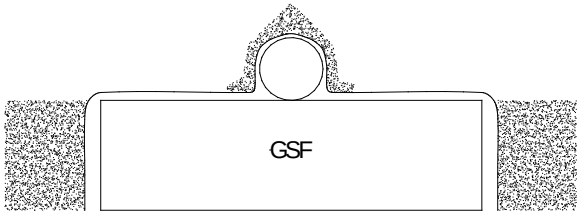
Roll the Eljen supplied cover fabric along the length of the module row, leaving a few inches of extra material before the first module and after the last module. Center the fabric over the GSF Modules.



Place small shovelfuls of Specified sand on top of the pipe and along the length of the trench. The sand will overflow naturally and place the GSF fabric correctly around the pipe. The fabric should be almost vertical on the sides of the pipe. Ensure you do not tuck the fabric underneath the pipe.

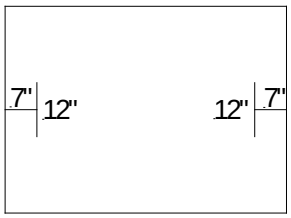


Fill in sides around GSF module. This will hold the fabric in place and will be ready for inspection.

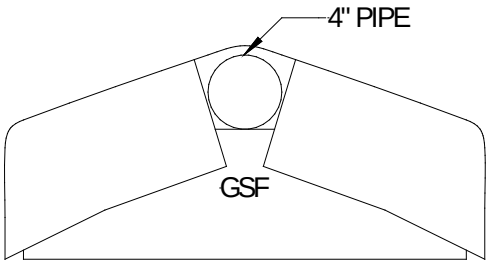


13.4 COVER FABRIC INSTALLATION TRENCH/BED IN A NON-UNIFORM ROW: Installation is similar for both Trenches and Beds. Another method not described in the next steps is to place a 12 inch slit in the same place as shown below.

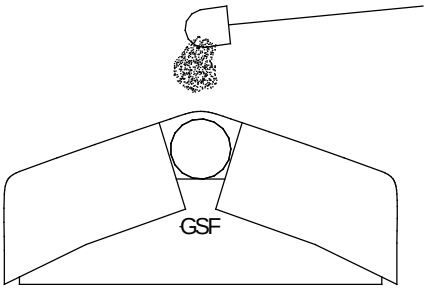
Cut a piece of fabric for each module, 62” long. Fold in half widthwise, and cut a 7” slit along the seam for both sides. From the end of that cut, make a 6 inch cut in each direction.

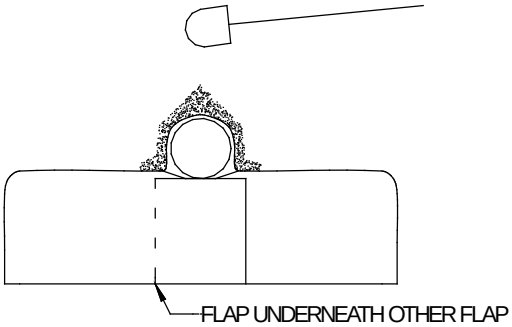


Place fabric on top of module and place flaps along the side of the modules. The distribution fabric should not be pulled tightly, but allowed to drape around the GSF.

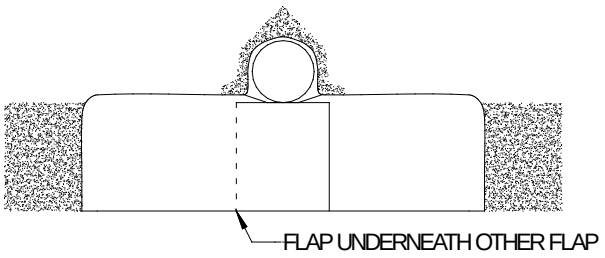


Place small shovelfuls of Specified Sand on top of the pipe. The sand will overflow naturally and place the GSF fabric correctly around the pipe. The fabric should be almost vertical on the side of the pipe. Ensure you do not tuck the fabric underneath the pipe. Gently wrap and place the flaps around the sides of the GSF Module.





Fill in sides around GSF Module and under the solid pipe between GSF Modules. This will hold the fabric in place and will be ready for inspection.



14.0 Commercial Systems

Commercial systems require different sizing and design criteria as compared to residential systems. Please contact Eljen's Technical Resource Department at 1-800-444-1359 for more information on commercial systems. If the system you are designing has a TSS and BOD of less than 200 mg/l, then use the sizing charts located in Appendix A. There are sizing charts for trench and bed systems. After you find the appropriate sizing, use the trench, bed or mound installation guidelines to install the system.

15.0 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				

15.0 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
Is there evidence of surcharging or effluent ponding in the D-Box? If yes, describe and measure:	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:	
I certify I have inspected the system at the above address, completed this report, and the information reported is true, accurate, and complete.	

TABLE 2: RESIDENTIAL 3 & 4 FOOT TRENCH APPLICATION RATE CHART WITH 1 FOOT SEPARATION TO LIMITING CONDITION

Soil Type	Perc Rate (min/in)	Application Rate (GPD/Ft²)	GSF A42 Modules / Bedroom				
			2	3	4	5	Add
Group I	5	1.200	21	21	28	35	7
	10	0.909	21	21	28	35	7
	15	0.789	21	21	28	35	7
	20	0.714	21	21	28	35	7
	25	0.652	21	21	28	35	7
Group II	30	0.600	21	21	28	35	7
	35	0.566	21	21	28	35	7
	40	0.536	21	21	28	35	7
	45	0.500	21	21	28	35	7
	50	0.484	21	21	28	35	7
	55	0.462	21	21	28	35	7
Group III	60	0.448	21	24	32	40	8
	65	0.435	21	24	32	40	8
	70	0.423	21	27	36	45	9
	75	0.411	21	27	36	45	9
	80	0.405	21	27	36	45	9
	85	0.400	21	30	40	50	10
	90	0.395	21	30	40	50	10
Group IV	95	0.390	21	30	40	50	10
	100	0.385	21	30	40	50	10
	105	0.380	21	30	40	50	10
	110	0.375	21	30	40	50	10
	115	0.370	21	30	40	50	10
	120	0.366	21	30	40	50	10

TABLE 3: RESIDENTIAL 3 & 4 FOOT TRENCH APPLICATION RATE CHART WITH 2 FOOT SEPARATION TO LIMITING CONDITION

Soil Type	Perc Rate (min/in)	Application Rate (GPD/Ft²)	GSF A42 Modules / Bedroom				
			2	3	4	5	Add
Group I	5	2.400	21	21	28	35	7
	10	1.818	21	21	28	35	7
	15	1.579	21	21	28	35	7
	20	1.429	21	21	28	35	7
	25	1.304	21	21	28	35	7
Group II	30	1.200	21	21	28	35	7
	35	1.132	21	21	28	35	7
	40	1.071	21	21	28	35	7
	45	1.000	21	21	28	35	7
	50	0.968	21	21	28	35	7
	55	0.923	21	21	28	35	7
Group III	60	0.896	21	24	32	40	8
	65	0.725	21	24	32	40	8
	70	0.704	21	27	36	45	9
	75	0.685	21	27	36	45	9
	80	0.676	21	27	36	45	9
	85	0.667	21	30	40	50	10
	90	0.658	21	30	40	50	10
Group IV	95	0.649	21	30	40	50	10
	100	0.641	21	30	40	50	10
	105	0.633	21	30	40	50	10
	110	0.625	21	30	40	50	10
	115	0.617	21	30	40	50	10
	120	0.610	21	30	40	50	10

TABLE 4: COMMERCIAL 3 & 4 FOOT TRENCH APPLICATION RATE CHART

Soil Type	Perc Rate (min/in)	1 - 2 ft Separation Application Rate (GPD/Ft²)	> 2 ft Separation Application Rate (GPD/Ft²)	Non- Residential Use (< 200 mg/l BOD+TSS) Gallons/GSF A42 Module
Group I	5	1.200	1.500	18
	10	0.909	1.500	18
	15	0.789	1.500	18
	20	0.714	1.430	18
	25	0.652	1.300	18
Group II	30	0.600	1.200	18
	35	0.566	1.130	16
	40	0.536	1.070	16
	45	0.500	1.000	16
	50	0.484	0.970	16
	55	0.462	0.920	16
Group III	60	0.448	0.900	16
	65	0.435	0.720	15
	70	0.423	0.700	15
	75	0.411	0.680	15
	80	0.405	0.680	15
	85	0.400	0.670	15
	90	0.395	0.660	15
Group IV	95	0.390	0.650	13
	100	0.385	0.640	13
	105	0.380	0.630	13
	110	0.375	0.630	13
	115	0.370	0.620	13
	120	0.366	0.610	13

TABLE 5: RESIDENTIAL BED APPLICATION RATE CHART WITH 1 FOOT SEPARATION TO LIMITING CONDITION

Soil Type	Perc Rate (min/in)	Application Rate (GPD/Ft²)	GSF A42 Modules / Bedroom				
			2	3	4	5	Add
Group I	5	0.970	21	21	28	35	7
	10	0.710	21	21	28	35	7
	15	0.610	21	21	28	35	7
	20	0.590	21	21	28	35	7
	25	0.540	21	21	28	35	7
Group II	30	0.500	21	21	28	35	7
	35	0.470	21	21	28	35	7
	40	0.450	21	21	28	35	7
	45	0.420	21	21	28	35	7
	50	0.370	21	21	28	35	7
	55	0.350	21	21	28	35	7
Group III	60	0.340	21	24	32	40	8
	65	0.330	21	24	32	40	8
	70	0.320	21	27	36	45	9
	75	0.310	21	27	36	45	9
	80	0.310	21	27	36	45	9
	85	0.300	21	30	40	50	10
	90	0.300	21	30	40	50	10

TABLE 6: RESIDENTIAL BED APPLICATION RATE CHART WITH 2 FOOT SEPARATION TO LIMITING CONDITION

Soil Type	Perc Rate (min/in)	Application Rate (GPD/Ft²)	GSF A42 Modules / Bedroom				
			2	3	4	5	Add
Group I	5	1.940	21	21	28	35	7
	10	1.420	21	21	28	35	7
	15	1.220	21	21	28	35	7
	20	1.180	21	21	28	35	7
	25	1.080	21	21	28	35	7
Group II	30	1.000	21	21	28	35	7
	35	0.940	21	21	28	35	7
	40	0.900	21	21	28	35	7
	45	0.840	21	21	28	35	7
	50	0.740	21	21	28	35	7
	55	0.700	21	21	28	35	7
Group III	60	0.680	21	24	32	40	8
	65	0.550	21	24	32	40	8
	70	0.530	21	27	36	45	9
	75	0.520	21	27	36	45	9
	80	0.520	21	27	36	45	9
	85	0.500	21	30	40	50	10
	90	0.500	21	30	40	50	10

TABLE 7: COMMERCIAL BED APPLICATION RATE CHART

Soil Type	Perc Rate (min/in)	1 - 2 ft Separation Application Rate (GPD/Ft²)	> 2 ft Separation Application Rate (GPD/Ft²)	Non- Residential Use (< 200 mg/l BOD+TSS) Gallons/GSF A42 Module
Group I	5	0.970	1.940	18
	10	0.710	1.420	18
	15	0.610	1.220	18
	20	0.590	1.180	18
	25	0.540	1.080	18
Group II	30	0.500	1.000	18
	35	0.470	0.940	16
	40	0.450	0.900	16
	45	0.420	0.840	16
	50	0.370	0.740	16
	55	0.350	0.700	16
Group III	60	0.340	0.680	16
	65	0.330	0.550	15
	70	0.320	0.530	15
	75	0.310	0.520	15
	80	0.310	0.520	15
	85	0.300	0.500	15
	90	0.300	0.500	13

Appendix B – Site Plan Checklist

A site plan may be required when more information and detail is needed to determine compliance with the regulations. Sites with marginal soil conditions, restrictive topographic features or other factors that limit the amount of suitable area available for the installation and replacement of an on-site sewage management system may require an engineered plan from a State registered engineer. Site plans will be reviewed for the following requirements to determine compliance with the state regulations.

The site plan shall be drawn to a minimum 1" to 40' scale and include the following:

_____ Lot designation and property lines dimensions shown.

_____ Topographic delineations on 2 foot contours showing existing and/or finish grades.

_____ Location and dimensions of residence(s) or building(s), including setback distances from property lines.

_____ Location of driveway(s), paved areas, pools or other structures.

_____ Location of underground utility lines, water lines or wells (on or within 100 feet of property).

_____ Location of streams, lakes, bodies of water, drainage ways, easements, wetlands or flood plains on property.

_____ Finish floor elevations, including basement.

_____ Elevation and location of plumbing stub out.

_____ Scaled drawing of the on-site sewage management system including replacement area. Drawing to include primary treatment (septic tank or aerobic treatment unit), dosing/pump tank (if applicable), and absorption field layout (including type and size). Pump size and manufacturer, including pump calculations (if applicable). All components must be listed and labeled.

_____ A level III or IV soil report (as applicable) and map overlaid on the site plan. Absorption fields within 20 feet of soil transition lines shall be verified by the soil classifier for accuracy.

_____ Plans shall include Peak Daily Flow calculations, Dosing calculations (if applicable), and Disposal Field Sizing calculations.

_____ Site plans shall have the signature of the designer and include the following statement: "I certify this on-site sewage management system meets the minimum design requirements established by the Department of Human Resources. I have made a site visit to verify the system can be installed as designed in accordance with these regulations."

Comments:

Environmental Health Specialist: Date:

(Site plans with deficiencies shall be returned to the designer within 3 working days with the deficiencies noted and the process of appeal.)

NOTES:

COMPANY HISTORY

Established in 1970, Eljen Corporation created the world's first prefabricated drainage system for foundation drainage and erosion control applications. In the mid-1980s, we introduced our Geotextile Sand Filter products for the passive advanced treatment of onsite wastewater in both residential and commercial applications. Today, Eljen is a global leader in providing innovative products and solutions for protecting our environment and public health.

COMPANY PHILOSOPHY

Eljen Corporation is committed to advancing the onsite industry through continuous development of innovative new products, delivering high quality products and services to our customers at the best price, and building lasting partnerships with our employees, suppliers, and customers.

eljen CORPORATION

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