



Infiltrator AeroFin™

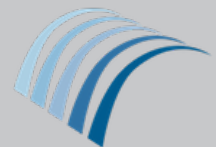
DESIGN AND INSTALLATION MANUAL



The purpose of this manual is to provide the minimum specifications for design and installation of the Infiltrator AeroFin™ in California. All state and local, ordinances, requirements, and procedures must be followed. Each revised version of this manual supersedes the previous version.

The configurations presented in this document are common designs and are provided for illustrative purposes. They are not intended to restrict the use of other configurations, which may be utilized provided the design conforms to state and local regulations, as applicable.

For more detailed design and installation information, please contact Infiltrator Water Technologies at 1-800-221-4436.



INFILTRATOR®
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INTRODUCTION

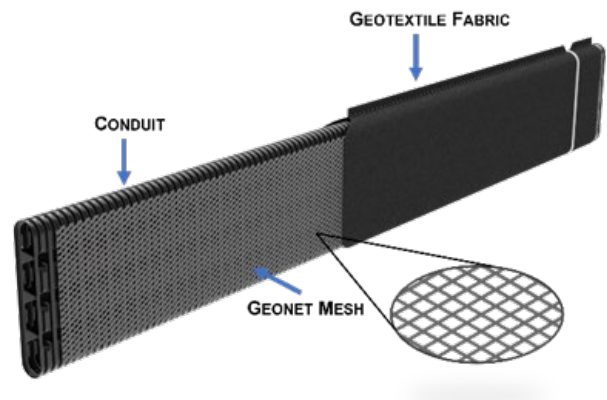
The Infiltrator AeroFin™

The Infiltrator AeroFin™ (AeroFin) is a proprietary combined treatment and dispersal (CTD) system that requires no external power source to achieve NSF 40 standard levels of wastewater treatment. AeroFin is comprised of four components. The first three components are fabricated in modules called “fins” that are installed within the fourth component, a tightly specified sand called “system sand.” Effluent passing from a septic tank is dispersed, filtered, and treated by the components of the system through a combination of biological, physical, and chemical processes. AeroFin operates as a media network to support colonized bacteria that treat organic waste. Use of AeroFin™ may allow for a reduction in distance from impaired waterways and vertical separation to limiting layers.

After exiting the septic tank or treatment unit, effluent progresses through each component as follows:

- 12.75-inch-tall conduit;
- Geonet mesh;
- Geotextile fabric; and
- Minimum 6-inch layer of system sand.

The AeroFin system produces average TSS and cBOD levels of 4.7 mg/L and 4.7 mg/L respectively when tested in accordance with the NSF/ANSI 40 protocol.



AeroFin Laterals

The AeroFin laterals (fins) are manufactured in 8-foot segments for ease of transport and installation. Individual segments connect to one another using the built-in snap-lock feature to create fin lengths as required by the system design. This snap-lock feature also connects the fins to the AeroFin Manifold and the AeroFin Endcaps.

AeroFin Manifold

The AeroFin Manifold is installed at the head of the fin rows and provides equal distribution of effluent into the system. The AeroFin manifold is comprised of individual AeroFin manifold units, connected in series. Each AeroFin manifold unit includes a snap-lock feature which facilitates interconnecting individual manifold units with other manifold units in series as well as connecting the manifold to the fin rows. AeroFin manifold units may also be installed at the distal end of individual fin rows when venting is specified or for serial distribution. The manifold is designed to accept up to Ø4" schedule 40 PVC. The Ø4" opening is cut with a hole saw by the installer.



AeroFin Endcap

AeroFin Endcaps are custom molded parts which function to contain flow in three places in the system: at the end of individual fin rows; on one of the two openings on a manifold unit if it is not in use in a given design (e.g., the number of fin rows is uneven); and at each end of the manifold. The Endcap has both a male and a female side, to allow for installation into both the fin rows and the manifolds.



System Sand

System sand is ASTM C33 (concrete sand), natural or manufactured sand, with 3% or less passing the #200 sieve.

The following minimum system sand dimensions are required for all AeroFin configurations:

- a minimum of 6 inches below the fin rows;
- a minimum of 6 inches between the fin rows;
- a minimum of 6 inches outside (on each side and each end) of the fin rows. No system sand is required over the top of the system.

Upon exiting the system sand, the treated wastewater is absorbed into the native soils. Typical AeroFin layouts for level and sloped sites are portrayed in the system layouts section of this Infiltrator AeroFin Design and Installation Manual (Manual).

Environmental Standards and Technical Support

This Manual is to be used in conjunction with the State Water Resources Control Board *Onsite Wastewater Treatment System Policy*, individual Local Agency Management Programs, and county regulations (collectively referred to herein as “regulatory requirements”). All AeroFin systems shall be designed and installed in compliance with the procedures and specifications detailed in this Manual and in accordance with local regulations. In the event of contradictions between this Manual and these regulatory requirements, contact Infiltrator Water Technologies’ Technical Services Department at 1-800-221-4436.

Training and Certification Requirements

Designers and installers are required to attend an in-person or online training/certification course on AeroFin presented by Infiltrator or its authorized representative. Infiltrator recommends that professionals involved in the review of AeroFin system designs and inspection of installed systems also become trained and certified. Certification training is often offered online for your convenience. Visit <https://www.infiltratorwater.com/online-training-programs/> for your state offerings.

Daily Design Flow

Daily design flow (DDF) is calculated in accordance with the regulatory requirements. The minimum DDF is recommended to be 150 GPD for any system. Contact Infiltrator Water Technologies’ Technical Services Department for recommendations when design flow does not meet this requirement.

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AeroFin Conduit Requirement

Residential applications require a minimum of 80 foot of AeroFin conduit per bedroom. Commercial applications receiving residential strength effluent require 1.88 linear feet of conduit for each gallon of daily design flow ($DDF \div 1.88$).

Effluent (Wastewater) Strength

The minimum total fin length required is based on use with residential strength effluent that has received primary treatment in a septic tank. When designing a system for use with higher strength wastewater, contact Infiltrator Water Technologies' Technical Services Department at 1-800-221-4456.

Septic Tank

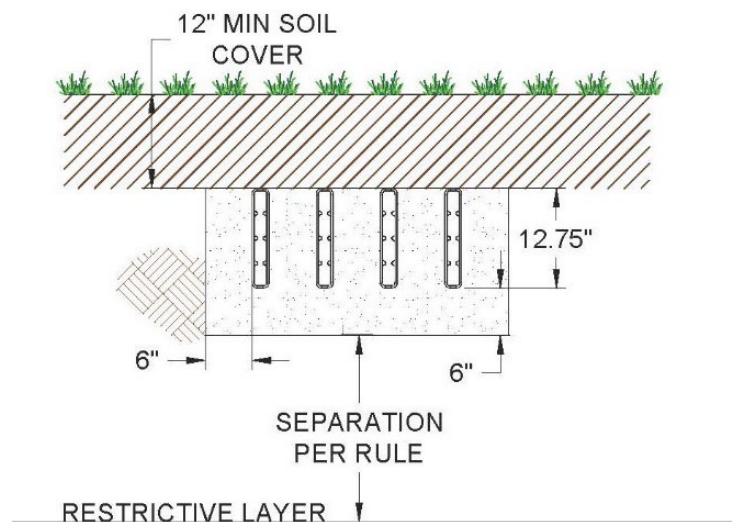
AeroFin is designed for use following a septic tank and/or an advanced treatment system. All septic tanks and/or advanced treatment systems shall meet and be sized according to regulatory requirements.

Water Purification Systems

Infiltrator does not recommend discharging water softer backwash into an AeroFin system. This "backwash" does not require treatment and the additional flow may overload the system. Regulatory requirements may allow for alternative means of disposal. If there is no alternative means of disposing of this backwash other than in an AeroFin system, then the system size shall be increased. Contact Infiltrator Water Technologies' Technical Services Department at 1-800-221-4456.

Separation Distances (Horizontal and Vertical)

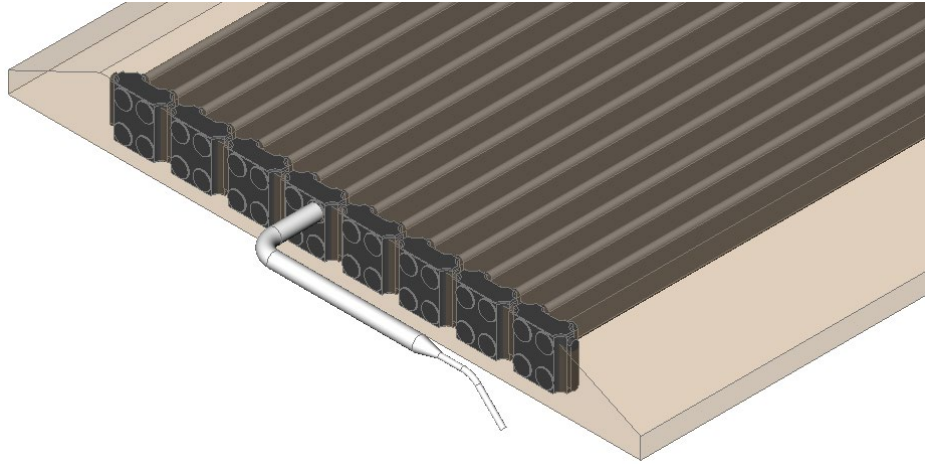
Horizontal setbacks are measured from the outermost edge of the system sand footprint area. Vertical separation distances are measured from 6 inches below the fin rows.



System Dosing

System dosing volume is calculated at 0.25 gallons maximum multiplied by the total feet of AeroFin conduit in the system.

NOTE: it is acceptable to pump directly into the AeroFin Manifold header with an increase in pipe diameter for velocity reduction as shown in the following illustration:



System Soil Cover Material

A minimum of 12 inches of suitable earth cover (topsoil or loam), with a texture similar to the soil at the site and capable of sustaining plant growth, must be placed above the installed system. The addition of filtration fabric on top of the AeroFin system is not required before placing cover material.

AeroFin System Definitions

In this document minimum system sand footprint area refers to the surface onto which the fin rows are placed and the 6 inches of system sand between and around the fins. Maintaining this minimum system sand footprint area is required to ensure adequate treatment. Minimum System Sand Bed Area (SSBA) refers to the minimum basal area required based upon the soil loading rate for a given DDF. Maintaining this SSBA is required to ensure long-term hydraulic performance. System sand extension (SSE) refers to the 6-inch system sand layer(s) added to the system sand footprint to make up the difference in area required between the minimum system sand footprint area and the minimum SSBA, see next page for illustrations. Not all systems will require SSE(s). Systems sloping greater than 10% require a minimum 2.5-foot-wide SSE on the downslope side of the bed including design SSEs.

AeroFin in Beds or Trenches

Throughout this manual the use of the term “bed” and “trench” are interchangeable. AeroFin may be designed and installed as a bed or trench using the soil application rates from Table 3. Bed bottoms may be sloped with the existing terrain to minimize impact to a site. Bed bottoms may also be terraced at various widths to accommodate stepped system design. Multiple beds may be designed if site conditions do not allow for a single bed. A recommended design procedure, which shows equal spacing is provided in this Manual. However, modified spacing is

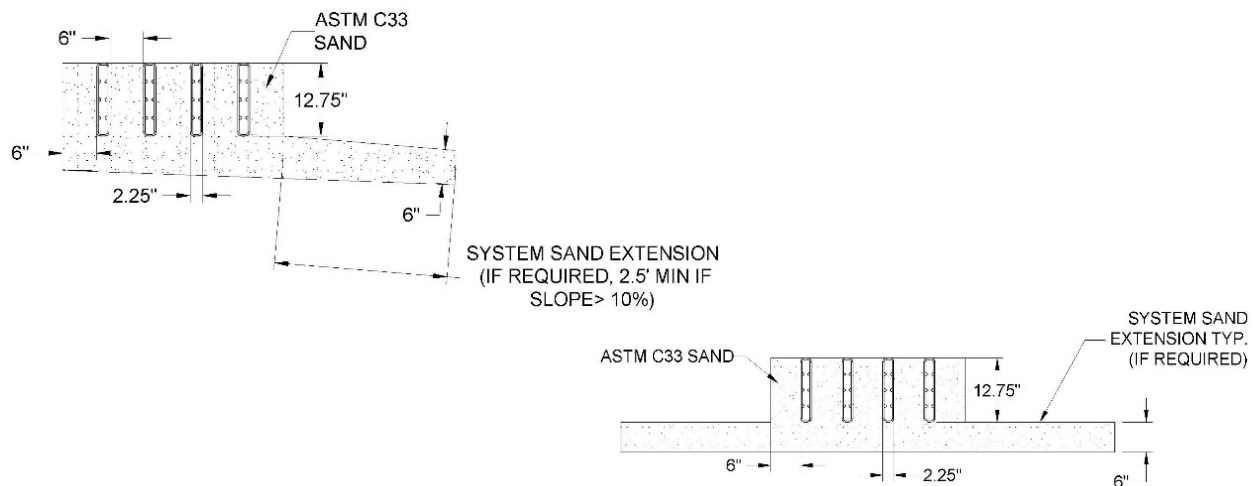
INTRODUCTION

allowed provided minimum and maximum criteria for bed length and width are met. Infiltrator Water Technologies' Technical Services Department is available for consultation on unique site designs.

System Sand Extension

AeroFin will treat the wastewater in a properly designed system sand footprint, based on the design flow to the system, without regard for the soils the system is placed in or upon. To ensure long-term hydraulic performance, it may be necessary to increase the system sand bed footprint beyond what is needed to accommodate the flow-based design treatment area. This additional area is made up with the use of system sand extensions (SSE). A SSE is a minimum of 6 inches deep. In systems sloping more than 10%, a minimum 2.5-foot-wide SSE is required.

SSEs are placed entirely on the downslope side of the SSBA for sloping AeroFin systems and equally divided on each side of the SSBA for level AeroFin systems as shown below.



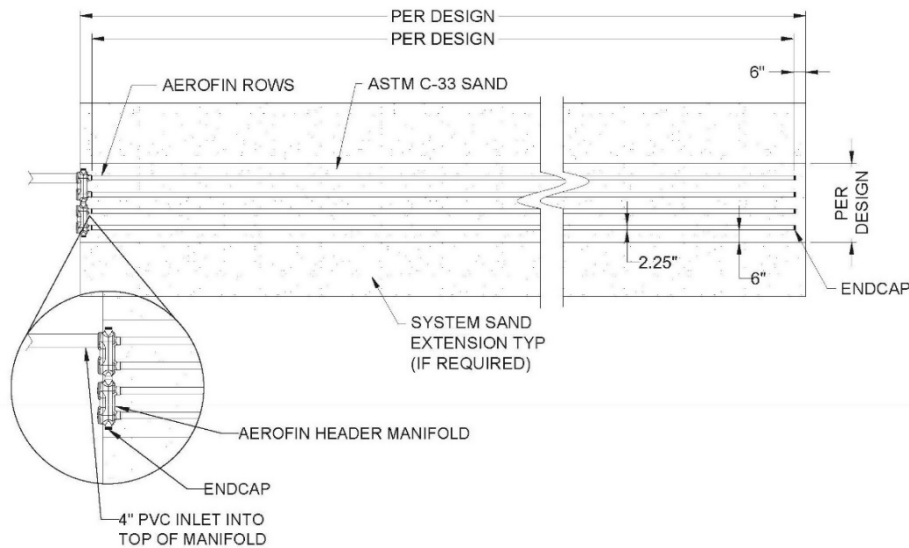
Row Requirements

- Minimum center-to-center spacing is 8.25 inches to accommodate the minimum 6 inches of system sand required between rows.
- For beds on level terrain (5% slope or less) the AeroFin rows shall be centered in the middle of the SSBA, and any system sand extensions (SSEs) shall be divided evenly on both sides.
- For level beds on sloping terrain (greater than 5% site slope) all rows shall be grouped 6 inches from the up-slope edge of the SSBA with any SSE placed entirely on the downslope side.
- For sloping beds on sloping terrain: all rows shall be grouped 6 inches from the up-slope edge of the SSBA with any SSE placed entirely on the downslope side. If the slope of the system exceeds 10% a 2.5-foot minimum SSE is required.
- For sloping beds, the elevations for each AeroFin row must be provided on the drawing.
- Each row shall be installed level to within $\pm 1/2$ inch (total of 1 inch) of the specified elevation and preferably should be parallel to the contour of the site.
- It is most convenient if fin-row lengths are designed in 8-foot increments to accommodate the length of the product as manufactured. However, individual fin segments can be cut to any length (with a knife) from the narrow end of the segment.

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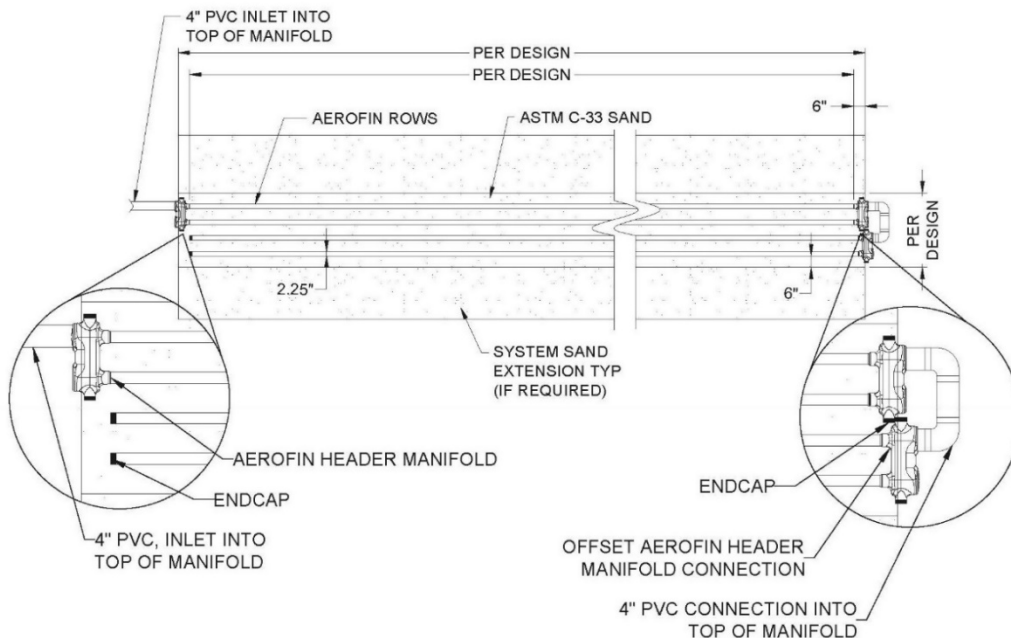
Parallel Distribution

AeroFin systems may be designed using parallel distribution by interconnecting AeroFin manifolds as shown below. The inlet pipe may be connected to any manifold segment as needed.



Serial Distribution

AeroFin systems may be designed using serial distribution. To maintain 6-inch fin spacing, offset the manifold at the ends as shown below. To maintain alignment at the fin ends, system width must be adjusted by increasing the spacing between manifolds to allow the AeroFin Manifolds to maintain alignment. The manifolds may be touching as illustrated below. The serial section loading limit is 3-bedrooms for residential systems and 450 GPD for commercial applications. Serial sections must have equal lengths of conduit for balanced flow. Systems exceeding these limits must be designed using multiple serial sections or parallel distribution.

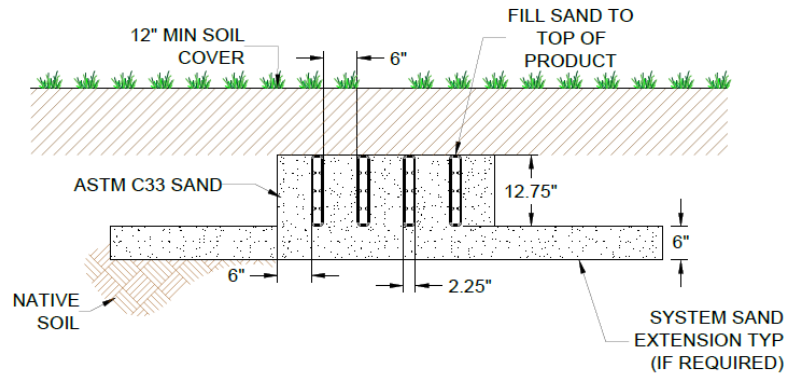


SYSTEM LAYOUTS

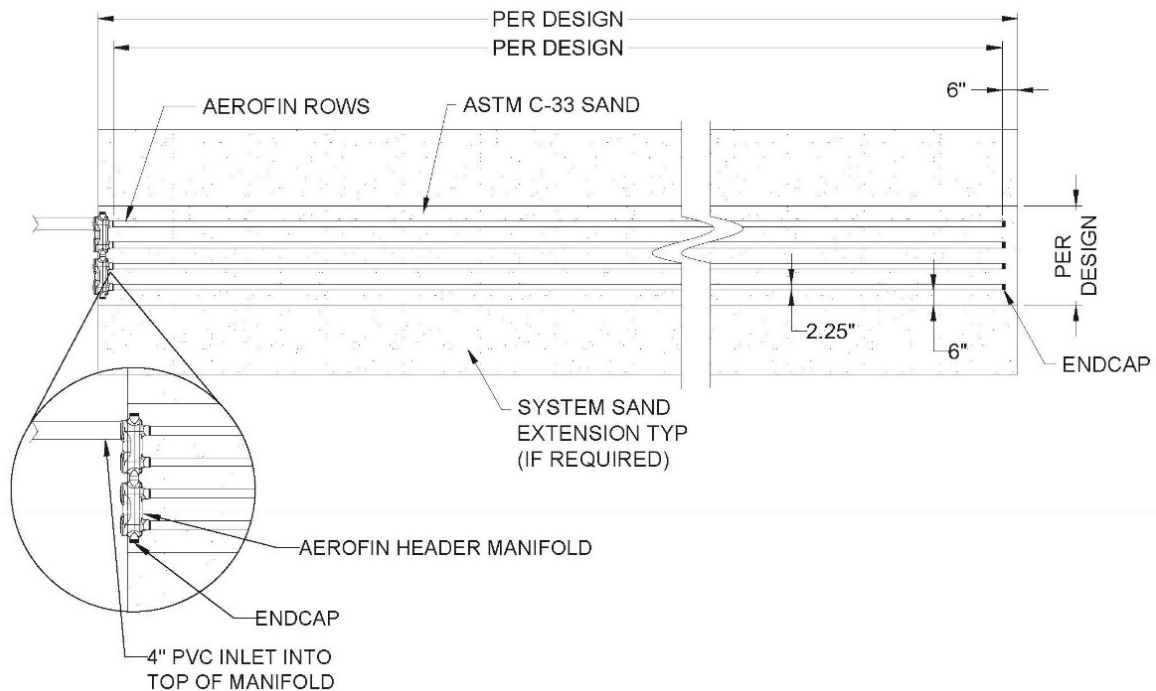
The system layouts presented in this section of the Manual are intended as general guidance. These designs are in no way intended to restrict design flexibility.

Level Subsurface Systems

Cross-Section View



Plan View

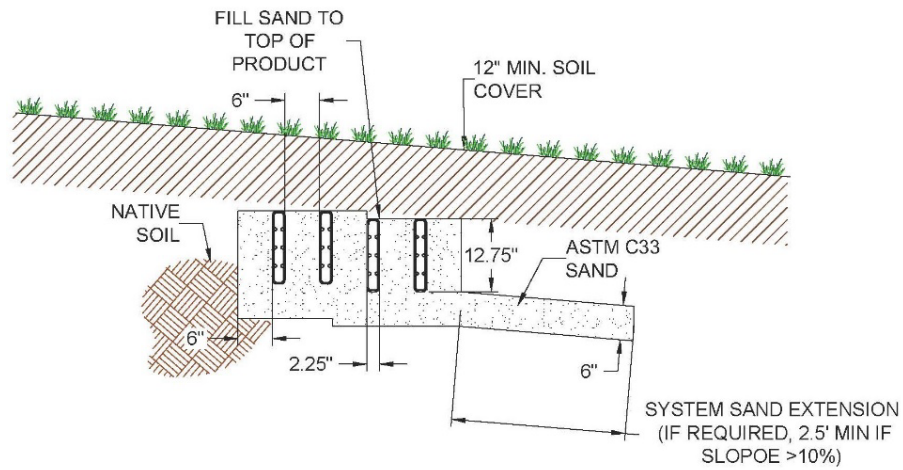


NOTES:

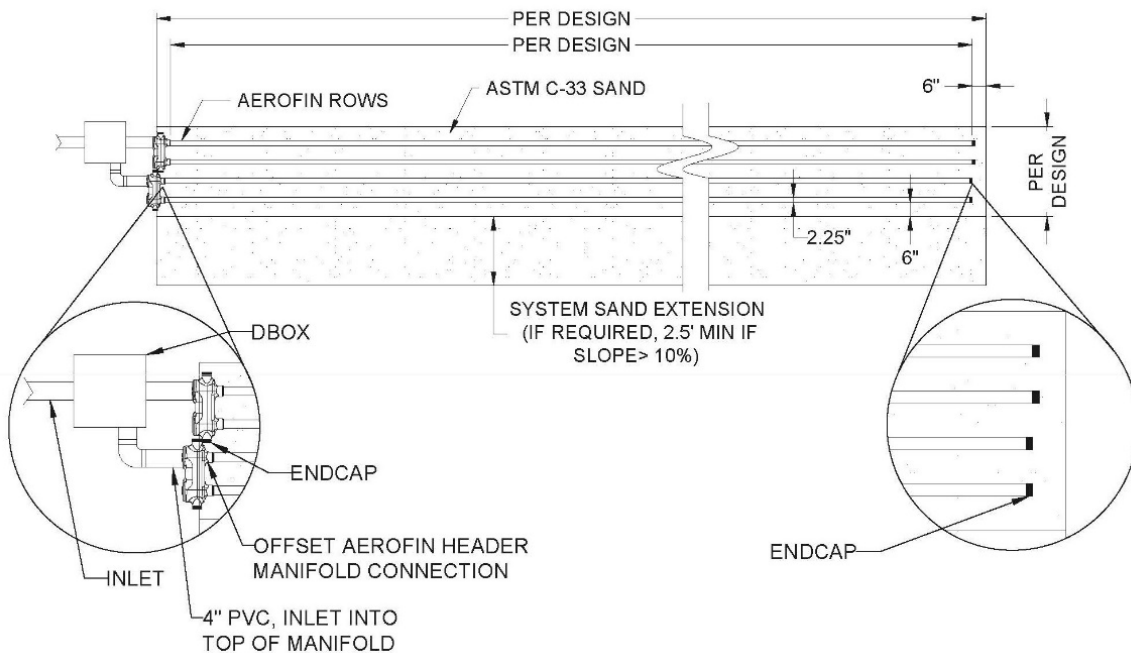
1. Number and length of fin rows shall be per the design.
2. Venting is not required but is optional at the discretion of the designer. Contact Infiltrator Water Technologies' Technical Services Department for assistance at 1-800-221-4456.
3. Parallel distribution is shown, but AeroFin may be installed with either serial or parallel distribution.

Sloped Subsurface Systems

Cross-Section View



Plan View



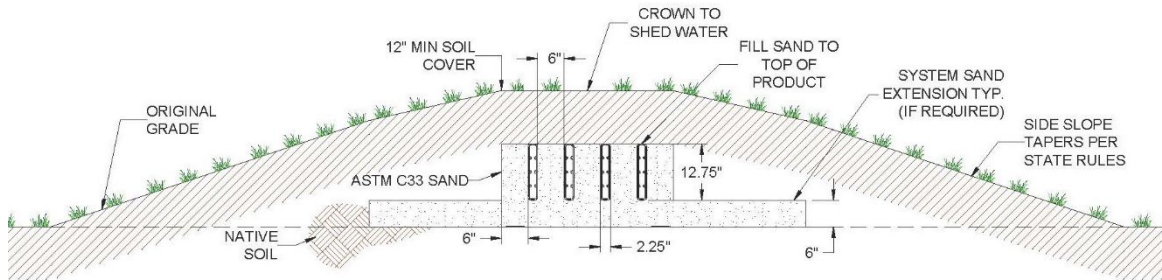
NOTES:

1. Number and length of fin rows shall be per the design.
2. Venting is not required but is optional at the discretion of the designer. Contact Infiltrator Water Technologies' Technical Services Department for assistance at 1-800-221-4456.
3. Parallel distribution is shown, but AeroFin may be installed with either serial or parallel distribution.
4. Sloping systems may be designed with all fin rows level, or they may be stepped as shown using AeroFin sections comprised of fin rows in multiples of two.

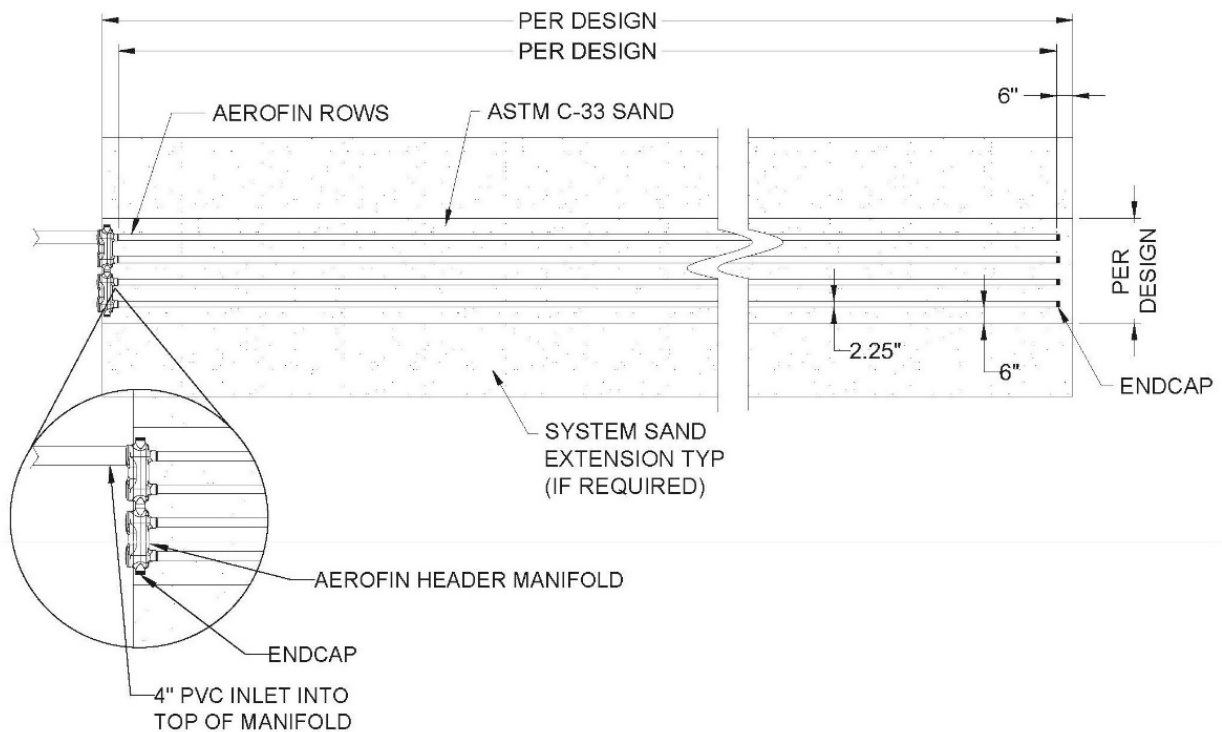
SYSTEM LAYOUTS

Level Above-Grade (Mound) Systems

Cross-Section View



Plan View

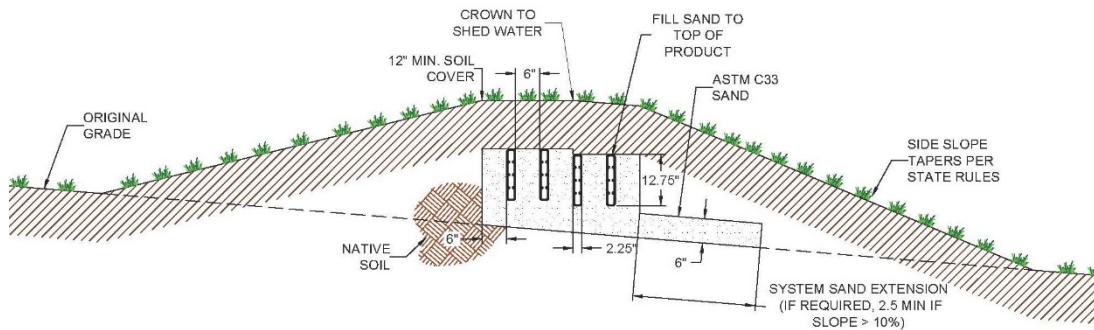


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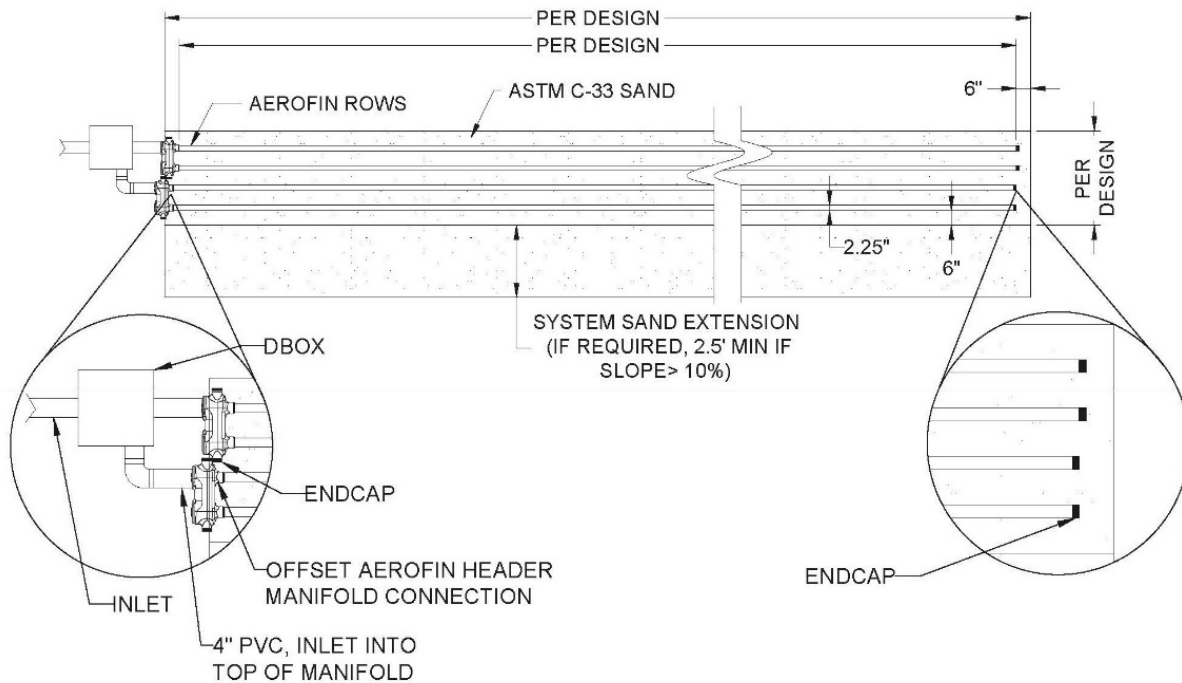
1. Number and length of fin rows shall be per the design.
2. Venting is not required but is optional at the discretion of the designer. Contact Infiltrator Water Technologies' Technical Services Department for assistance at 1-800-221-4456.
3. If the infiltrative surface of the AeroFin bed must be elevated to achieve minimum vertical separation requirements, the area between the original grade and the AeroFin system shall be comprised of sand meeting the system sand requirements outlined on page 3.

Sloped Above-Grade (Mound) Systems

Cross-Section View



Plan View



NOTES:

1. Number and length of fin rows as per the design.
2. Sloping systems may be designed with fin rows level, or they may be stepped as shown using AeroFin sections comprised of fin rows in multiples of two.
3. Venting is not required but is optional at the discretion of the designer. Contact Infiltrator Water Technologies' Technical Services Department for assistance at 1-800-221-4456.
4. If the infiltrative surface of the AeroFin bed must be elevated to achieve minimum vertical separation requirements, the area between the original grade and the AeroFin system shall be comprised of sand meeting the system sand requirements outlined on page 3.

New System Design Requirements

AeroFin systems for new construction are designed in a bed configuration with a 0.7 multiplier (30% reduction of the system sand bed area as allowed in the OWTS Policy). Allowance of the 30% reduction factor, in all or part, is at the discretion of each Local Agency and their local requirements. Please consult with the Local Agency prior to submitting design plans and the permit application. The minimum system sand bed area (SSBA) for AeroFin is calculated by dividing the design flow by the conventional application rate in Tables 3 and 4 and multiplying by 0.7 (30% reduction):

$$\text{(Design Flow} \div \text{Application Rate)} \times 0.7 = \text{Minimum System Sand Bed Area (SSBA)}$$

For example, a design flow of 500 GPD, a percolation rate of 33 minutes/inch (mpi) and application rate of 0.5 GPD/square foot is calculated as $500 \text{ GPD} \div 0.5 \text{ GPD/square foot} \times 0.7 = 700 \text{ square feet minimum SSBA}$.

Other critical specifications include:

- a. Maximum site and system slopes are determined by local regulations.
- b. Minimum AeroFin conduit amount per Table 1.
- c. Minimum AeroFin fin spacing is 8.25 inches center-to-center.

Replacement System Design Requirements

AeroFin systems for replacement applications are designed using a “best-fit” bed configuration, depending on site constraints. If site conditions allow, the minimum SSBA for replacement systems should be calculated using Tables 3 and 4 with the 30% reduction (as in new system designs) as detailed above. For replacement systems with site constraints that preclude use of the minimum SSBA for new systems, contact Infiltrator Water Technologies’ Technical Services Department for design assistance at 1-800-221-4456. The SSBA should be sized according to the specifications in this Manual to the greatest extent practicable. At its discretion, the Local Agency may allow decreased sizing requirements to accommodate the existing size of the site or setback conditions. Please consult with the Local Agency as to what they will allow prior to submitting design plans and a permit application.

The AeroFin system can be designed in five simple steps. The sizing tables and design procedure are provided below, followed by several design examples for typical system configurations.

Design Procedure

Step 1: Determine Daily Design Flow (DDF)

Determine the DDF. In accordance with regulatory requirements, DDF is 150 GPD per bedroom.

Step 2: Determine Minimum Length of Fin Required

Determine the minimum length of fin required from Table 1 based on the number of bedrooms. For commercial applications treating residential strength effluent, calculate the minimum length

of fin required at 1.88 gallons/foot of fin ($DDF \div 1.88$). Round up to an even number. When designing a system for use with higher strength wastewater contact, Infiltrator Water Technologies' Technical Services Department for design assistance at 1-800-221-4456

Table 1. Minimum Length of Fin Required

Number of Bedrooms	Minimum Length of Fin (foot)
2	160
3	240
4	320
5	400
Each Additional	80

Step 3: Design the System Configuration

Determine the minimum system sand footprint area using the minimum length of fin required as determined from Step 2 and the number of fin rows into which the minimum length of fin required will be divided. Consider the following for system sand footprint area design:

- Determine the fin row length that best fits the site.
- Determine the number of fin rows required to meet the minimum length of fin from Step 2.
 - The serial section loading limit is 3-bedrooms for residential and 450 GPD for commercial systems.
 - Serial sections must have equal lengths of conduit for balanced flow.
- Use Table 2 to determine the minimum system sand bed width based on the number of fin rows needed. Systems sloping greater than 10% may require a bed width adjustment in Step 5 to accommodate the minimum SSE requirement of 2.5 foot.

Table 2: Minimum System Sand Bed Width

Number of Fin Rows	Minimum Width Per Number of Fin Rows											Each Additional
	2	3	4	5	6	7	8	9	10	11	12	
Minimum Width (feet)	1.88	2.57	3.25	3.94	4.63	5.32	6.00	6.69	7.38	8.07	8.75	0.69
Minimum Width (inches)	22.5	30.8	39.0	47.2	55.5	63.8	72.0	80.2	88.5	96.8	105.0	8.3

NOTE: Values in Table 2 have been rounded, however the fractional values may be used. For calculating sand bed widths longhand: (# Rows x 0.1875 foot) + (# Rows x 0.5 foot) + 0.5 foot.

Step 4: Determine the Minimum System Sand Bed Area (SSBA)

Using common practice and in accordance with regulatory requirements, determine the soil percolation rate for the site. Given the soil percolation rate and the DDF from Step 1,

determine the minimum required SSBA using Table 3.

$$(\text{Design Flow} \div \text{Application Rate}) \times 0.7 = \text{Minimum System Sand Bed Area (SSBA)}$$

Table 3: Application Rates as Determined from Stabilized Percolation Rate

Percolation Rate (minutes/inch)	Application Rate (GPD/square foot)	Percolation Rate (minutes/inch)	Application Rate (GPD/square foot)	Percolation Rate (minutes/inch)	Application Rate (GPD/square foot)
<1	Requires Local Management Program	36	0.467	64	0.187
1-5	1.2	37	0.456	65	0.184
6-10	0.8	38	0.445	66	0.18
11	0.786	39	0.434	67	0.177
12	0.771	40	0.422	68	0.174
13	0.757	41	0.411	69	0.17
14	0.743	42	0.4	70	0.167
15	0.729	43	0.389	71	0.164
16	0.714	44	0.378	72	0.16
17	0.7	45	0.367	73	0.157
18	0.686	46	0.356	74	0.154
19	0.671	47	0.345	75	0.15
20	0.657	48	0.334	76	0.147
21	0.643	49	0.323	77	0.144
22	0.629	50	0.311	78	0.14
23	0.614	51	0.3	79	0.137
24	0.6	52	0.289	80	0.133
25	0.589	53	0.278	81	0.13
26	0.578	54	0.267	82	0.127
27	0.567	55	0.256	83	0.123
28	0.556	56	0.245	84	0.12
29	0.545	57	0.234	85	0.117
30	0.533	58	0.223	86	0.113
31	0.522	59	0.212	87	0.11
32	0.511	60	0.2	88	0.107
33	0.5	61	0.197	89	0.103
34	0.489	62	0.194	90	0.1
35	0.478	63	0.19	>91-120	0.1

NOTE: Values extracted from the OWTS Policy, Table 3 (page24). Contact Infiltrator Water Technologies' Technical Services Department for sites with percolation rates over 120 or for guidance on designing replacement systems.

Table 4: Application Rates as Determined from Soil Characteristics

Soil Texture	Soil Structure Shape	Grade	Maximum Soil Application Rate (GPD/square foot)
Coarse Sand, Sand, Loamy Coarse Sand, Loamy Sand	Single grain	Structureless	0.8
Fine Sand, Very Fine Sand, Loamy Fine Sand, Loamy Very Fine Sand	Single grain	Structureless	0.4
Coarse Sandy Loam, Sandy Loam	Massive	Structureless	0.2
		Weak	0.2
	Platy	Moderate, Strong	Prohibited
		Prismatic, Blocky, Granular	Weak
Fine Sandy Loam, very fine Sandy Loam	Massive	Structureless	0.2
		Weak, Moderate, Strong	Prohibited
	Platy	Weak	0.2
		Moderate, Strong	0.4
Loam	Massive	Structureless	0.2
		Weak, Moderate, Strong	Prohibited
	Platy	Weak	0.4
		Moderate, Strong	0.6
Silt Loam	Massive	Structureless	Prohibited
		Weak, Moderate, Strong	Prohibited
	Platy	Weak	0.4
		Moderate, Strong	0.6
Sandy Clay Loam, Clay Loam, Silty Clay Loam	Massive	Structureless	Prohibited
		Weak, Moderate, Strong	Prohibited
	Platy	Weak	0.2
		Moderate, Strong	0.4
Sandy Clay, Clay, or Silty Clay	Massive	Structureless	Prohibited
		Weak, Moderate, Strong	Prohibited
	Platy	Weak	Prohibited
		Moderate, Strong	0.2

NOTE: Soils listed as prohibited may be allowed under the authority of the Regional Water Board, or as allowed under an approved Local Agency Management Program per Tier 2.

Step 5: Make area adjustments, as necessary.

The minimum areas determined in Steps 3 and 4 cannot be reduced. These areas must be maintained to ensure adequate area for placement of the AeroFin system and infiltration of treated effluent into the native soil.

SYSTEM DESIGN

Area adjustments may be necessary as follows:

- If the minimum SSBA determined in Step 4 is smaller than the area of the system sand footprint determined in Step 3, no area adjustments are necessary.
- If the minimum SSBA determined in Step 4 is larger than the area of the system sand footprint determined in Step 3, the system sand footprint must be increased by adding SSE(s).
- In either case, if the system slope is greater than 10%, the system will require a 2.5-foot minimum SSE on the downslope side.

In most instances, the width of the system sand component is widened to increase the system sand footprint. When adjusting the width of the system sand footprint:

- In level system applications, additional width shall be evenly divided on each side of the AeroFin minimum basal area.
- In sloped system applications, additional width shall be entirely placed on the downslope side of the AeroFin minimum basal area.

NOTE: The length of the bed area may be altered, but only by extending the length of the fin rows. Fins are manufactured in lengths of 8-foot segments but may be cut to any length.

Design Example 1

Single-family residence; three-bedrooms; percolation rate of 5 minutes/inch, level site.

Step 1: Determine Daily Design Flow (DDF)

3 bedrooms x 150 GPD/bedroom = 450 GPD.

Step 2 Determine Minimum Length of Fin Required

Per Table 1, the minimum fin length required is 240 feet.

Step 3: Design the System Sand Configuration

Considering the site, a row length of 60 feet is selected.

60-foot-long rows will require 4 rows of fins providing 240

total feet of fin, which meets the 240-foot minimum length requirement from Step 2. Referencing Table 2, the system sand bed width required for 4 fin rows is 3.25 feet. (39 inches).

Number of Bedrooms	Minimum Length of Fin (foot)
2	160
3	240
4	320
5	400
Each Additional	80

Table 1. Minimum Length of Fin Required

Number of Fin Rows	Minimum Width Per Number of Fin Rows											
	2	3	4	5	6	7	8	9	10	11	12	Each Additional
Minimum Width (feet)	1.88	2.57	3.25	3.94	4.63	5.32	6.00	6.69	7.38	8.07	8.75	0.69
Minimum Width (inches)	22.5	30.8	39.0	47.2	55.5	63.8	72.0	80.2	88.5	96.8	105.0	8.3

Table 2: Minimum System Sand Bed Width

Step 4: Determine the Minimum System Sand Bed Area (SSBA)

Per Table 3, the soil application rate for soils with a percolation rate of 5 minutes/inch is 1.2 GPD/square foot. $(450 \div 1.2) \times 0.7 = 262.5$ square foot.

Step 5: Make area adjustments, as necessary.

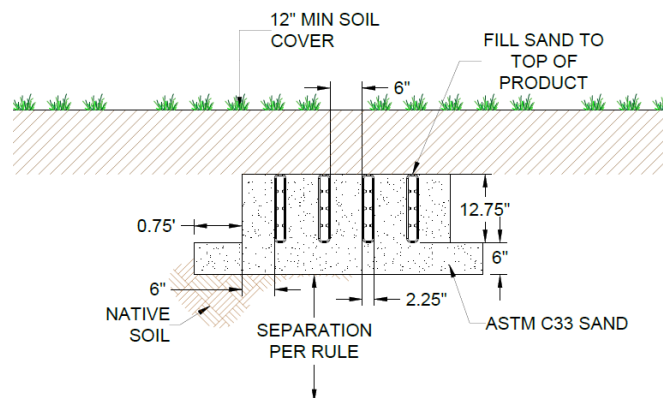
On a level system, the required SSEs are evenly divided on both sides of the system sand footprint.

From Step 3 the system sand configuration is 4 rows 60 foot long and a bed dimension of 3.25 foot wide by 61 foot long, which results in a total system sand footprint of 198.25 square foot.

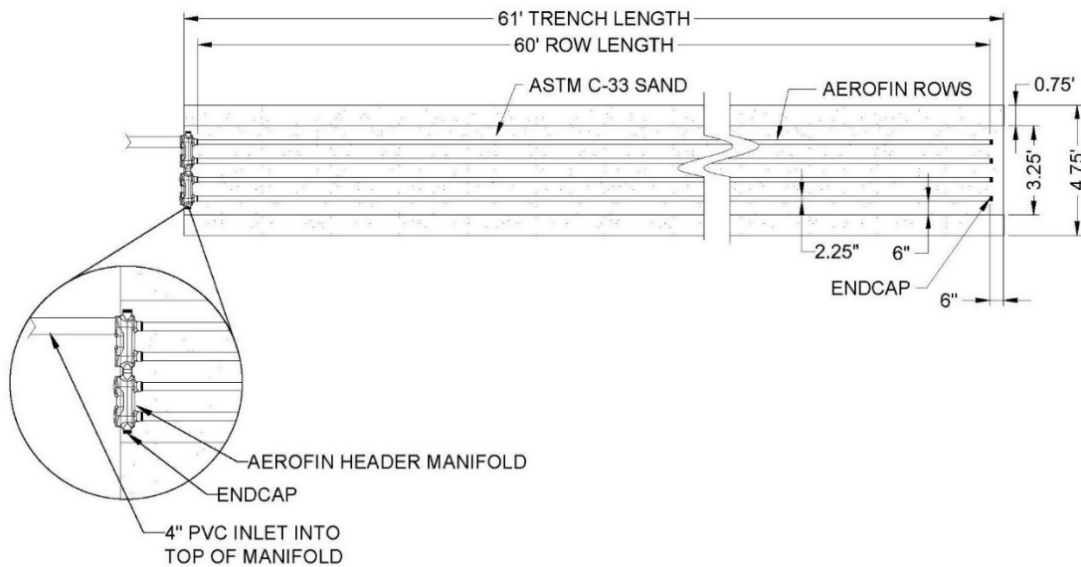
- From Step 4 a 3-bedroom system requires a minimum SSBA of 262.5 square foot. 262.5 square feet is greater than the 198.25 square feet system sand footprint. Therefore, an adjustment to the size of the system footprint is necessary by adding SSE(s).
 - Divide the minimum SSBA by the length of the system sand bed. $262.5 \text{ square feet} \div 61 \text{ foot} = 4.3 \text{ feet}$. The width of the 3.25-foot-wide system sand footprint must be increased to 4.3 feet minimum.
 - Subtract the original system sand footprint width from the required system width to determine the required SSE. $4.3 \text{ foot} - 3.25 \text{ foot} = 1.05 \text{ foot}$. SSE.
 - Divide the SSE width required by 2 to determine the width of the SSE to be added to each side of the system sand footprint. $1.05 \text{ foot} \div 2 = 0.52 \text{ foot}$. Round 0.52 foot up to 0.75 foot for ease of construction.

The system sand footprint must be widened by 1.5 foot in total, by adding 0.75 foot. of system sand to each side of the system sand footprint, resulting in a total bed width of 4.75 feet. The final SSBA measurement is $4.75 \text{ feet} \times 61 \text{ feet} = 289.75$ square feet, which exceeds the minimum 262.5 square feet SSBA requirement as calculated in Step 4.

Cross-Section:



Plan View:



Design Example 2

Single-family residence; three-bedrooms; percolation rate of 10 minutes/inch 11% sloping site.

Step 1: Determine Daily Design Flow (DDF)

3 bedrooms x 150 GPD/bedroom = 450 GPD.

Step 2 Determine Minimum Length of Fin Required

Per Table 1, the minimum fin length required is 240 feet.

Number of Bedrooms	Minimum Length of Fin (foot)
2	160
3	240
4	320
5	400
Each Additional	80

Table 1. Minimum Length of Fin Required

Step 3: Design the System Sand Configuration

Considering the site, a row length of 60 feet is selected. 60-foot-long rows will require 4 rows of fins providing 240 total feet of fin, which meets the 240-foot minimum length requirement from Step 2. Referencing Table 2, the system sand bed width required for 4 fin rows is 3.25 feet. (39 inches).

Number of Fin Rows	Minimum Width Per Number of Fin Rows											Each Additional
	2	3	4	5	6	7	8	9	10	11	12	
Minimum Width (feet)	1.88	2.57	3.25	3.94	4.63	5.32	6.00	6.69	7.38	8.07	8.75	0.69
Minimum Width (inches)	22.5	30.8	39.0	47.2	55.5	63.8	72.0	80.2	88.5	96.8	105.0	8.3

Table 2: Minimum System Sand Bed Width

Step 4: Determine the Minimum System Sand Bed Area (SSBA)

Per Table 3, the soil application rate for soils with a percolation rate of 10 minutes/inch is 0.80 GPD/square foot. $(450 \div 0.80) \times 0.7 = 393.75$ square foot.

Step 5: Make area adjustments, as necessary.

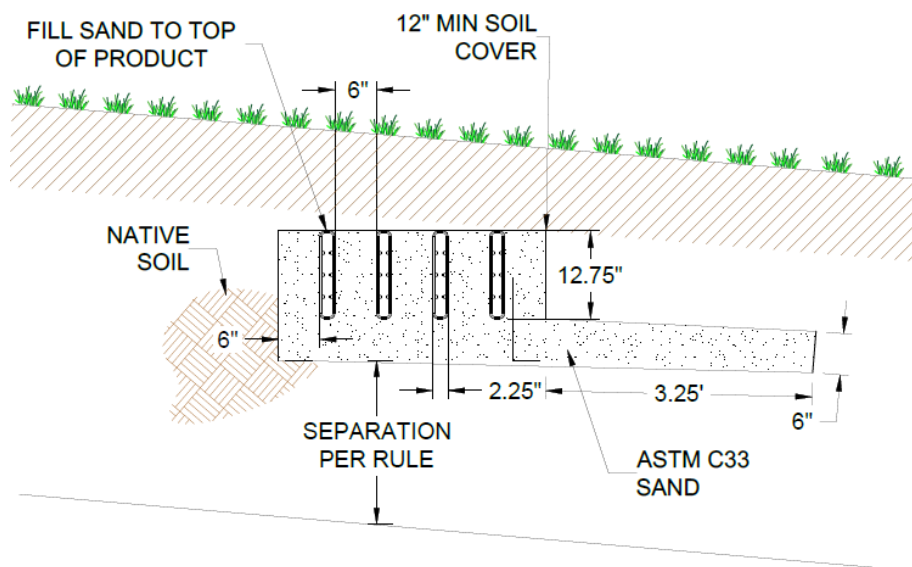
On a sloped system, the entire SSE is placed on the downslope side of the system sand footprint. Systems that slope over 10% require a minimum SSE of 2.5 foot.

From Step 3 the system sand configuration is 4 rows 60 foot long and a bed dimension of 3.25 foot wide by 61 foot long, which results in a total system sand footprint of 198.25 square feet.

- From Step 4 a 3-bedroom system requires a minimum SSBA of 393.75 square feet which exceeds the 198.25 square foot basal area provided by the system sand footprint. An adjustment to the size of the system footprint is necessary.
 - Divide the minimum SSBA by the length of the system sand bed. $393.75 \text{ square feet} \div 61 \text{ foot} = 6.46 \text{ feet}$. The width of the 3.25-foot system sand footprint must be increased to 6.46 feet.
 - Subtract the original system sand footprint width from the required system width to determine required SSE width. $6.46 \text{ feet} - 3.25 \text{ feet} = 3.21 \text{ feet}$. SSE. Round up to 3.25 feet. for ease of construction.

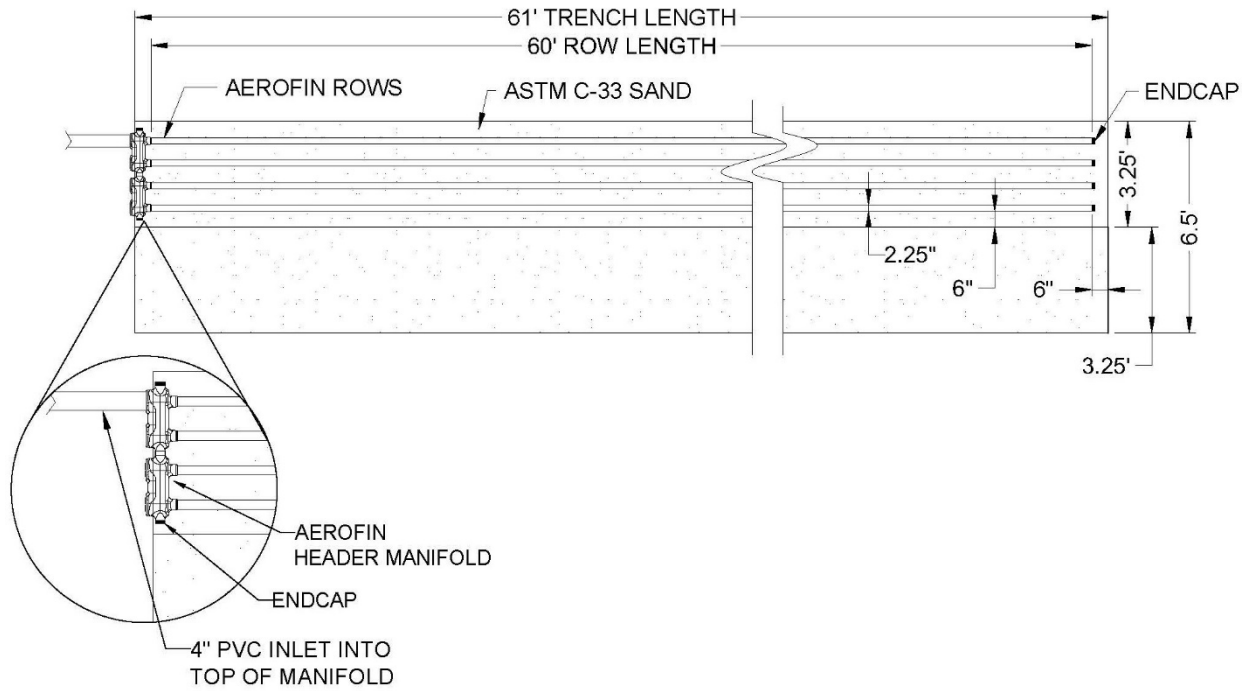
The system footprint must be widened by 3.25 foot by adding 3.25 feet of system sand to the downslope side of the system sand footprint, resulting in a total width of 6.5 feet (3.25 feet + 3.25 feet). The final SSBA measurement is 6.5 foot. x 61 foot. = 396.5 square feet which exceeds the 393.75 square foot SSBA requirement as calculated in Step 4. This system design slopes greater than 10% so the SSE must be 2.5 foot or greater. A 3.25-foot SSE meets this requirement.

Cross-Section:



SYSTEM DESIGN

Plan View:



Before You Begin

These installation instructions are for AeroFin. AeroFin may only be installed according to applicable state and local health permitting authority requirements.

If unsure of the installation requirements for a site, contact your permitting authority or system designer. If unsure of the applicability of AeroFin for a given site, contact Infiltrator Water Technologies. The soil and site evaluation and the design of the onsite system must be reviewed, approved and a construction permit obtained from the local permitting authority before installation.

Materials and Equipment Needed

- | | |
|---|---|
| <input type="checkbox"/> AeroFin | <input type="checkbox"/> Excavation equipment |
| <input type="checkbox"/> AeroFin Manifold | <input type="checkbox"/> Laser, transit, or level |
| <input type="checkbox"/> AeroFin Endcaps | <input type="checkbox"/> Shovel and rake |
| <input type="checkbox"/> System sand | <input type="checkbox"/> Tape measure |
| <input type="checkbox"/> AeroFin Installation Tool(s) | |
| <input type="checkbox"/> PVC pipe and couplings | |

Common practices shall apply to the installation of AeroFin. These include, but are not limited to:

- Avoid soil compaction on the infiltrative surface area, including all areas downslope of a sloped system.
- Use a tracked vehicle for material installation if possible.
- Avoid installation during wet periods; and
- Install the AeroFin components and system sand on the same day that the system footprint is excavated/exposed.

Handling Instructions

Compression of the AeroFin components during transport, storage, or construction shall be avoided.

Excavating and Preparing the Site

NOTE: Do not install the system during periods when the soil is sufficiently wet to exceed its plastic limit, as this causes construction machinery to smear the soil.

1. Stake out the locations of tank(s), pipes, and corners of the system to be tilled/excavated, per system design. Set the elevations as shown on the approved plan.
2. Install sedimentation and erosion control measures if required or needed.

NOTE: The installation of temporary drainage swales/berms (surface diversions) may be necessary to protect the site during rainfall events.

3. Excavate the system area or till the ground as per the design.

INSTALLATION INSTRUCTIONS

4. Rake the bottom and sides (when applicable) of the excavation if smearing has occurred during excavation. Remove large stones and protruding roots.

NOTE: Smearing does not occur in sandy soils, so raking is not necessary. In fine textured soils (silts and clays), avoid walking on the excavation bottom to prevent compaction and loss of soil structure.

5. Verify that the system area is at the proper elevation and slope from side-to-side and from end-to-end using a level, transit, or laser.

Installing AeroFin

1. Install the 6-inch-deep system sand basal layer over the entire bed area as per the design. System sand should be leveled and stabilized prior to placement of the AeroFin system. The installer should retain records certifying that system sand meets ASTM C33 requirements.

2. Assemble the AeroFin Manifold and place it in the proper location(s) on the system sand basal area. Connecting the required manifold sections together outside the bed area before setting them in place can make the installation process easier.



3. Insert the bottom of each AeroFin conduit into the manifold at a 45-degree position engage all conduits and the manifold together at once. Using the snap-lock feature ensure each conduit is securely fastened in place.



4. Next, working down the length of the bed begin connecting conduits end to end using the integrated snap lock joints to create rows to the specified bed length.
5. Fin rows shall be installed level to within +/- 1/2 inches (total 1 inch tolerance) of the specified elevation. A laser level or transit is recommended to ensure proper alignment.

INSTALLATION INSTRUCTIONS

6. Fin rows shall be:
 - installed parallel to the contours; and
 - separated by a minimum of 6 inches of system sand.

AeroFin Installation Tool

Infiltrator offers an installation aid for installing fin rows, ensuring the minimum 6 inches of system sand between fin rows is maintained throughout the system and fins do not move during installation. The AeroFin row spacer is to be removed after backfilling. The AeroFin Installation Tool is reusable and available where AeroFin components are sold.



7. Once the fins are placed on the surface of the system sand and the distal end manifold system and/or end caps are connected to the fins per design, additional system sand shall be ladled between and to the top of each of the fin rows and lightly compacted by walking in the sand after placement for fin stabilization and support. Backfilling in a progressive process down the length of the bed moving the AeroFin Installation Tools as you progress will yield the best results. Providing spacing support with the AeroFin Installation Tool every 4-feet will provide the best results. System sand shall also be installed on each side and at each end of the backfilled fin rows, per the design. The system sand shall be stabilized between and around each AeroFin conduit by walking it in.
8. Remove AeroFin row spacers and store for next system installation.



Covering the System

NOTE: Before covering, the system shall be inspected and approved by a representative of the local permitting authority, in compliance with state and local regulations and procedures.

1. Material placed around the system sand and above the fins may be additional system sand or material meeting state and local requirements. However, the final 6 inches placed above or adjacent to the fins shall be comprised of material that will sustain plant growth.
2. Backfill the system by pushing material over the AeroFin system. It is best to mound several extra inches of soil over the finish grade to allow for settling. This also ensures that runoff is diverted away from the system. Keep a minimum of 12 inches of consolidated cover over the fins before driving over the system with tracked equipment. It is important to avoid all traffic over the AeroFin Manifold during the backfill procedure. The manifold is not rated for vehicular traffic.
3. After the system is covered, the site should be seeded or sodded to mitigate the potential for erosion.

NOTE: If the system is for new home construction, it is important to leave marking stakes along the boundary of the system. This will notify contractors of the system location so they will not cross it with equipment or vehicles. Vehicles and equipment should remain clear of the downslope side of the system.

An AeroFin system may be out of sight, but it should not be out of mind. With proper standard maintenance and by being more aware of daily living habits, homeowners will improve the life and health of the system. Here are guidelines to help you protect your investment.

Inside the Home

1. Large volumes of water over a short period of time will flush untreated solids out of the septic tank into the leachfield.
 - Practice conservation every day.
 - Space out heavy water-using activities such as washing clothes and taking showers.
 - Repair leaky faucets and valves. Consider replacing old fixtures with new low-flow fixtures.
2. Remember that an onsite wastewater treatment system uses natural biological processes so only biodegradable waste should go in it.
 - No cigarette butts, tissues, sanitary napkins, disposable diapers, cat litter, coffee grounds, or cotton swabs, etc.
 - No paints, oils, chemical drain cleaners, thinners, solvents, poisons, or pesticides. These toxic chemicals not only kill helpful bacteria but may contaminate the groundwater.
 - No grease or cooking oils. Grease may harden in the septic tank's scum layer and accumulate until it blocks the inlet or outlet. Hot grease poured down the drain may run through the septic tank and then harden, clogging the system.
 - Minimize garbage disposal use. A garbage disposal typically doubles the rate of solids buildup in the septic tank. To avoid frequent pump outs, compost your food scraps or put it in the trash.
 - Be cautious with household chemicals. Disinfectants, ammonia, bathroom cleaners, bleach, etc. can kill the bacteria the system needs to operate properly. Allow the system to dilute and neutralize them a little at a time.

Outside the Home

1. Have your tank checked for sludge and scum accumulation by a licensed contractor or registered qualified professional every two to three years. If you have high water usage or a garbage disposal, the inspections should be more frequent.
2. Keep surface water away from the AeroFin installation area. Divert downspouts, roof drainage, driveway runoff, and sump pump discharge away from the system. Landscape the yard to channel rainwater away.
3. Encourage the right plants. Remove trees such as willows that like "wet feet." Their roots may penetrate and damage the dispersal area. Grow grass or native ground cover over the system to prevent soil erosion.
4. Avoid physical damage. Don't drive over the system or compact the soil with heavy equipment. Don't dig in or build anything on the system.

Troubleshooting

OPERATION AND MAINTENANCE

In the event of a system malfunction, contact a licensed contractor or registered qualified professional. Indications the system may need service include persistent septic odor; unusually wet area atop and/or around the system; “ponding” of effluent on the surface; or “breakout” of effluent along the side of a slope.

Repair

The licensed contractor or registered qualified professional shall be contacted when there are indications of malfunction with the system. When visiting the site, the licensed contractor or registered qualified professional shall do the following:

- Assess the present condition of the AeroFin system, and the surrounding area.
- Research the history of use, including:
 - water volume use
 - contaminants
- Evaluate site for groundwater intrusion and surface water drainage patterns.
- Inspect septic tank.
- Inspect the fins.
- Check the home for leaks.

Upon completion of the site visit, the licensed contractor or registered qualified professional can contact the Infiltrator Water Technologies Technical Services Department for assistance if necessary.

WARRANTY

INFILTRATOR WATER TECHNOLOGIES STANDARD LIMITED WARRANTY

(a) The structural integrity of each unit, end cap and other accessory manufactured by Infiltrator (collectively referred to as “Units”), when installed and operated in an onsite wastewater system in accordance with Infiltrator’s installation instructions, is warranted to the original purchaser (“Holder”) against defective materials and workmanship for one year from the date upon which a septic permit is issued for the septic system containing the Units; provided, however, that if a septic permit is not required for the septic system by applicable law, the one (1) year warranty period will begin upon the date that installation of the septic system commences. In order to exercise its warranty rights, Holder must notify Infiltrator in writing at its corporate headquarters in Old Saybrook, Connecticut within fifteen (15) days of the alleged defect. Infiltrator will supply replacement Units for those Units determined by Infiltrator to be defective and covered by this Limited Warranty. Infiltrator’s liability specifically excludes the cost of removal and/or installation of the Units.

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

(c) This Limited Warranty shall be void if any part of the AeroFin system (unit, end cap or other accessory) is manufactured by anyone other than Infiltrator. The Limited Warranty does not extend to incidental, consequential, special or indirect damages. Infiltrator shall not be liable for penalties or liquidated damages, including loss of production and profits, labor and materials, overhead costs, or other losses or expenses incurred by the Holder or any third party. Specifically excluded from Limited Warranty coverage are damage to the Units due to ordinary wear and tear, alteration, accident, misuse, abuse or neglect of the Units; the Units being subjected to vehicle traffic or other conditions which are not permitted by the installation instructions; failure to maintain the minimum ground covers set forth in the installation instructions; the placement of improper materials into the system containing the Units; failure of the Units or the septic system due to improper siting or improper sizing, excessive water usage, improper grease disposal, or improper operation; or any other event not caused by Infiltrator. This Limited Warranty shall be void if the Holder fails to comply with all of the terms set forth in this Limited Warranty.

Further, in no event shall Infiltrator be responsible for any loss or damage to the Holder, the Units, or any third party resulting from installation or shipment, or from any product liability claims of Holder or any third party. For this Limited Warranty to apply, the Units must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and Infiltrator’s installation instructions.

(d) No representative of Infiltrator has the authority to change this Limited Warranty in any manner whatsoever, or to extend this Limited Warranty. No warranty applies to any party other than the original Holder.

The above represents the standard Limited Warranty offered by Infiltrator. A limited number of states and counties have different warranty requirements. Any purchaser of Units should contact Infiltrator’s corporate headquarters in Old Saybrook, Connecticut, prior to such purchase, to obtain a copy of the applicable warranty, and should carefully read that warranty prior to the purchase of Units.



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