TECHNOLOGY SHEET

SUBSURFACE TREATED WATER DISCHARGE SYSTEM

Treated water from the SludgeHammer™ treatment system, provided by NextGen Septic, LLC, is discharged subsurface into the ground using an NSF 40-approved system consisting of several 12-inch-diameter pipes. These pipes disperse the treated water evenly into the sand bed below. Infiltrator Water Technologies currently markets these sub-surface pipes.

Advantages

1. **Can be installed in sloping ground – Site evaluation shows slopes between 7 – 15 degrees; the proposed system can be installed in any of these areas.**

2. **Weathered rock is 21 – 34" deep; the proposed treatment system can be installed with a minimum of 6 inches of soil below the distribution pipes.**

3. **The proposed treated water dispersal system offers a soil drain field reduction of at least 40% compared to conventional soil drain fields and**

4. **The proposed treatment system offers a significantly better level of wastewater treatment and can be scaled up for communities, buildings, etc.**

Comparison with Conventional Methods of Water Dispersal

The main advantages of the proposed treatment system compared to the conventional septic tank and soil drain field design are as follows:

- more efficient
- longer lasting
- more quickly installed.
- less costly
- better suited for complex sites
- smaller in area (40% less than conventional septic fields)
- disperses wastewater more evenly than pipe and stone.
- distributes cleaner water, allowing a smaller system footprint than conventional drain fields.
- more environmentally friendly

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The land area required for the proposed treatment system is at least 40% less than that of a conventional soil drain field, which is a significant savings in installation costs.

But the benefits of this powerful solution don't stop there:

- **The proposed treatment system is smaller than conventional systems, making it ideal for a wide range of applications, especially in difficult terrain.**
- **It is easy to install and maintain, making it more affordable than most wastewater treatment options.**
- **Because it has no mechanical devices, the proposed treatment system benefits from unmatched durability and longevity.**
- **The proposed treatment system doesn't rely on toxic chemicals or other additives, making it an environmentally friendly way to treat wastewater.**

In addition, the proposed product has undergone rigorous testing to ensure that it meets treatment requirements throughout the US and Canada.

This powerful treatment technology is NSF-40 Class I Certified by the NSF. And it is also certified for Secondary and Advanced Septic Treatment by the Bureau de Normalisation du Quebec (BNQ).

The passive treatment and dispersal system consists of the following components:

a) **Plastic pipe made with a significant percentage of recycled material**

b) **10 ft. sections (can be cut to any length)**

c) **Ridged and perforated, with skimmer tabs on the interior**

d) **Supplied with Bio-Accelerator along the bottom of the pipe (the sewn seam indicates "this side up").**

e) **Surrounded by a mat of randomly oriented plastic fibers**

f) **Wrapped in a non-woven geo-textile fabric stitched in place**

g) **Exterior diameter of 12 in.**

h) **Each ten (10) ft. section has approximately a liquid holding capacity of 58 gallons**

i) **A 10 ft. length of pipe is flexible enough to bend up to 90°**

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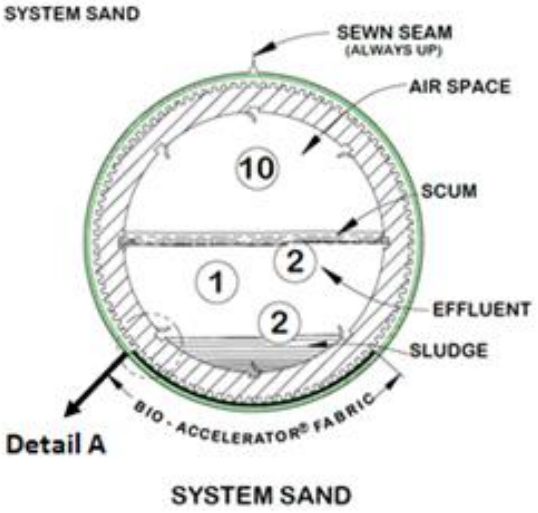

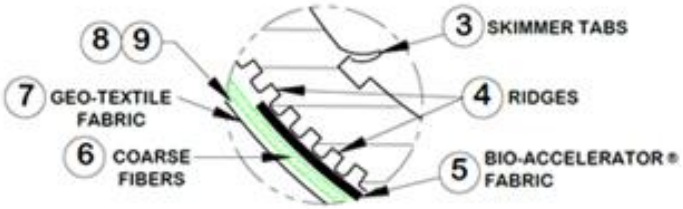

Stage 1: Warm effluent enters the pipe and is cooled to ground temperature.

Stage 2: Suspended solids separate from the cooled liquid effluent.

Stage 3: Skimmers further capture grease and suspended solids from the existing effluent.

Stage 4: Pipe ridges allow the effluent to flow uninterrupted around the circumference of the pipe and aid in cooling.

Stage 5: Bio-Accelerator fabric screens additional solids from the effluent, enhances and accelerates treatment, facilitates quick start-up after periods of non-use, provides additional surface area for bacterial growth, promotes even distribution, and further protects outer layers and the receiving surfaces so they remain permeable.

Stage 6: A mat of coarse, randomly-oriented fibers separates more suspended solids from the effluent.

Stage 7: Effluent passes into the geo-textile fabrics and grows a protected bacterial surface.

Stage 8: Sand wicks liquid from the geo-textile fabrics and enables air to transfer to the bacterial surface.

Stage 9: The fabrics and fibers provide a large bacterial surface to break down solids.

Stage 10: An ample air supply and fluctuating liquid levels increase bacterial efficiency.

Pipe

Offset Adapter

Coupling

An offset adapter is a plastic fitting 12 in. in diameter with a 4-in. hole designed to accept a 4-in. inlet pipe, raised connection, or vent pipe. The hole is to be in the 12 o'clock position, 7-in. above the bottom of the pipe. When assembling pipes into rows, note that the geotextile fabrics are placed over the edges of the Offset Adapter and Couplings.

A coupling is a plastic fitting used to create a connection between two pieces of pipe. Note that the couplings are wide enough to cover 1 or 2 pipe grooves on each joined pipe end. The couplings feature a snap-lock feature that requires no tools. When assembling pipes into rows, note that the geo-textile fabric does not go under couplings. Pull the fabric back, install the coupling, and then pull the fabric over the coupling.

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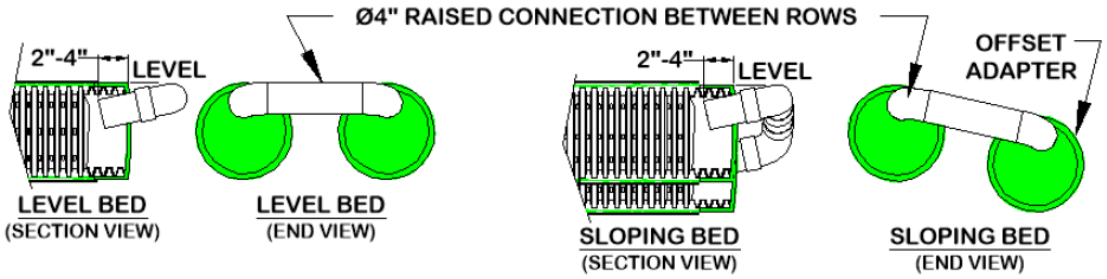
Also note, during installation in cold weather, couplings are easier to work with if stored in a heated location before use, such as a truck cab.

A raised connection is a PVC Sewer and drainpipe configuration used to connect pipe rows. Raised connections extend 2-in. to 4-in. into the pipe and are installed on an angle (as shown below). All PVC joints should be glued.



The minimum daily design flow for any single-family residential system on its lot is two bedrooms (220 GPD), and 300 GPD for any commercial system.

a) **Certain fixtures, such as jetted tubs, may require an increase in the size of the septic tank.**

b) **Daily design flow for a single-bedroom apartment with a kitchen connected to a residence (also sometimes referred to as a "studio" or "in-law apartment") shall be calculated by adding two additional bedrooms (220 GPD).**

c) **When daily design flow is determined by water meter use for commercial systems, refer to DEP Rules.**

d) **We recommend taking the average daily use from a peak month and multiplying it by a peaking factor of (2) times minimum.**

e) **Note that "daily design flows" are calculated to assume occasional "peak" usage and a factor of safety: Systems are not expected to receive continuous dosing at full daily design load.**

A distribution box is a device that divides effluent flow from more than one portion of the treatment pipe to a second pipe. A D-Box is required for all these Systems and cannot substitute for the Inspection Port.

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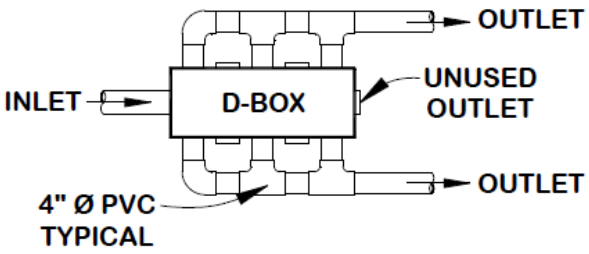

A D-Box manifold is utilized to divide flow to more than one field evenly and is especially useful when designing for sizeable daily design flows. Flow Equalizers are required on all used D-Box outlets.

The minimum total depth of cover on SS rows is 10 inches: 6" of system sand plus 4" of topsoil. SS pipe with 12" of structural cover is designed for H-10 loading, and SS pipe with 18" of structural cover and Stabilization Fabric is designed for H-20 loading (the only soil compaction that should occur is at the point of preparation for pavement).

The minimum lengths of the pipe are given in the table below.

Loading (# Bedrooms)	Gallons per Day (300 gpd minimum)	Advanced Enviro-Septic™ Minimum Pipe Required (ft)
2	300	140
3	360	210
4	480	280
5	600	350
6	720	420
7	840	490
8	960	560
9	1,080	630
10	1,200	700

Note: Based on 120 gallons/day/bedroom

Regarding the pipe rows, the following recommendations are given:

a) All beds must have at least two rows.
b) Maximum row length for any system is 100 ft.
c) Recommended minimum row length is 30 ft.
d) A combination (or D-Box) distribution system must be used if any row length is less than 30 ft.

The D-Box must feed at least 30 feet of Pipe (calculated by adding the length of each serial section's first rows), use a minimum of two D-Box outlets, and vent the field. For example, a row length of 10 feet requires (3) serial sections (3 rows x 10 feet = 30 feet of pipe directly connected to the D-Box).

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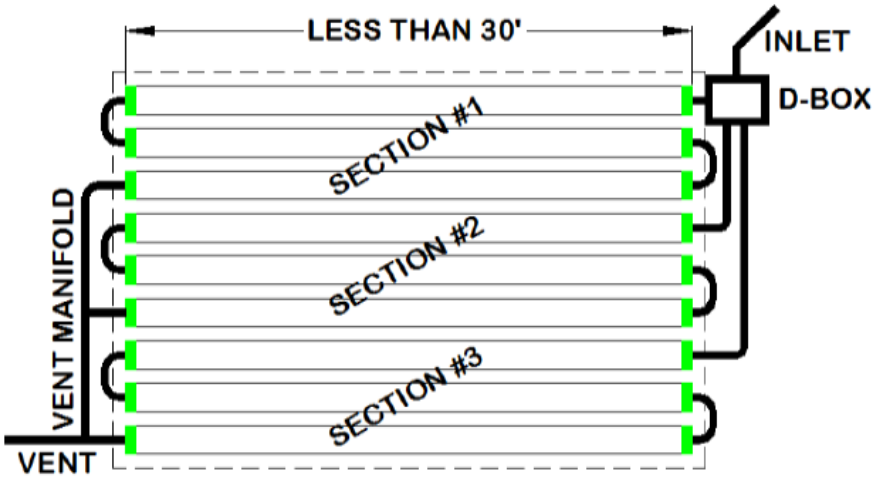
Illustration of row lengths less than 30 ft:



e) **Row Center-to-Center Spacing is 1.5 ft min. for all systems in 0-60 mpi (minutes per inch) soils, and 3.0 ft min. in 61- 90 mpi soils.**

f) **When System Sand Extensions are required, Rows shall be grouped in the middle of the sand bed area.**

g) **All rows must be laid level to within +/- ½ in. (total of 1 in.) of the specified elevation and preferably parallel to the site's contour. However, alternate orientations are allowed with proper construction. Contact Technical Support for recommendations.**

h) **It is easier if row lengths are designed in exact 10 ft increments since the Pipe comes in 10 ft sections. However, if necessary, the pipe is easily cut to any length to meet site constraints.**

The use of pressure distribution with SS Systems is not permitted. Pump systems to gain elevation are allowed.

The depth to groundwater may be reduced by up to 2 feet, resulting in a minimum separation distance of two feet in soils with a recorded percolation rate of more than two minutes per inch and three feet in soils with a recorded percolation rate of two minutes or less per inch, measured from the bottom of the soil absorption system to the high groundwater elevation.

A distribution box's outlet must be at least 2 in. above the highest inlet of the SS row, with the connecting pipe slope not less than 1% (approximately 1/8 in. per foot).

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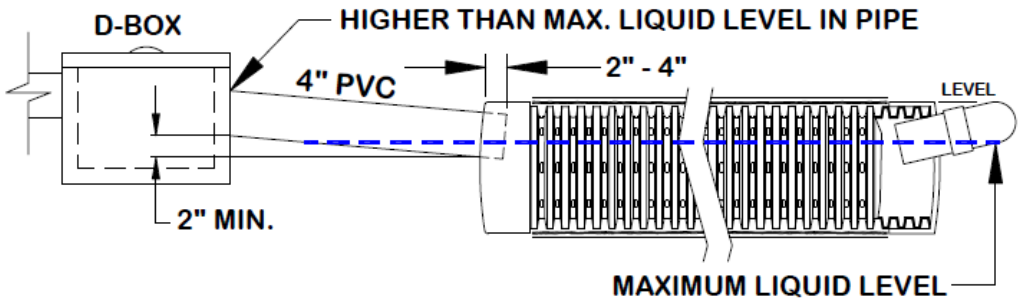
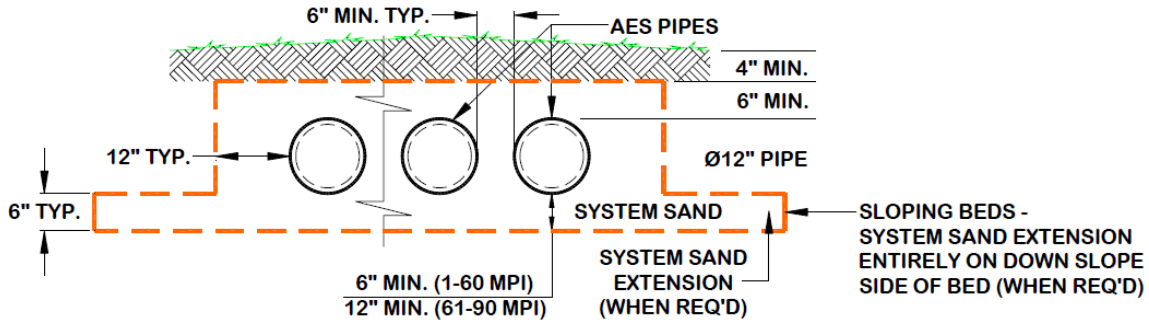


It is critical to the SS System to function properly and that the proper amount and type of System Sand be installed. System Sand is the material in direct contact with all Pipes. It must be clean, granular sand free of organic matter and must adhere to ASTM C-33 ("concrete sand"), providing that no more than 3% can pass a #200 sieve (verified by washing sample per requirements of ASTM C-117 as noted in the ASTM C-33 specification).

System Sand dimensions must meet the following minimum requirements:

- **a)** **6 in. of System Sand below the SS pipe for (1-60 MPI)**
- **b)** **12 in. of System Sand below the SS pipe for (61-90 MPI);**
- **c)** **6 in. of System Sand above the SS pipe (all percolation rates).**
- **d)** **6 in. of System Sand between all SS rows (1.5 ft. center-to-center row spacing minimum);**
- **e)** **12 in. of System Sand around the perimeter of the pipes;**
- **f)** **6 in. deep System Sand Extension (when required). The System Sand Extension is any part of the System Sand bed that is more than 1 ft. away from SS pipes.**
- **g)** **Illustration of System Sand Dimensions:**



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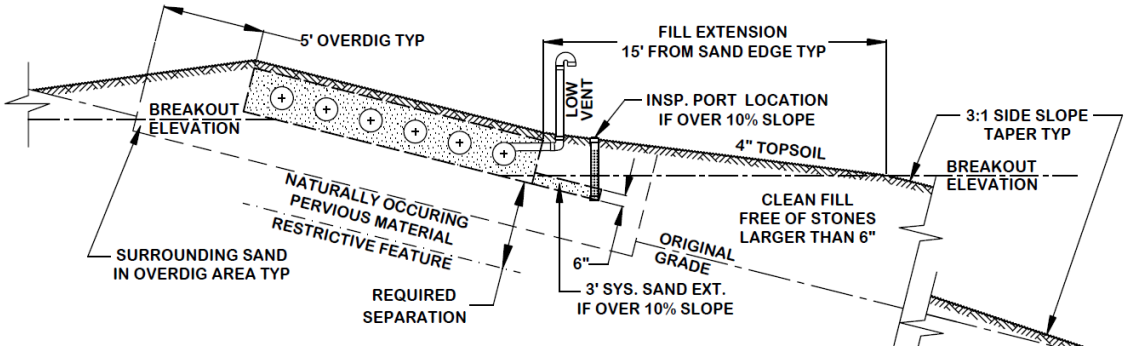
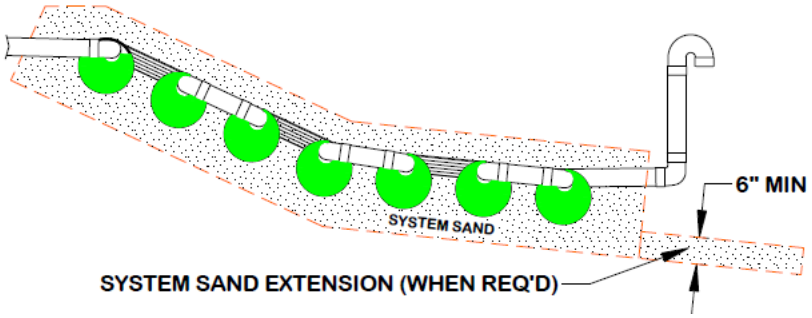
Sloping Land

A System Sand extension is required in systems sloping more than 10%. The System Sand Extension is any part of the System Sand bed that is more than one ft. away from SS pipes and added to the downslope side of the bed. The System Sand extension area is a minimum of 6 in. deep and extends a minimum of 3 ft. beyond the tall portion of the System Sand (4 ft. from the pipe) on the downslope edge of the bed.

- **a)** **The slope percentage in all system drawings refers to the slope of the SS System, not the existing terrain.**
- **b)** **Systems that slope greater than 10% require a 3 ft. System Sand Extension on the downslope side of the bed (see figure below);**
- **c)** **The system and site slope do not have to be identical.**
- **d)** **Maximum site slope is 33%, and maximum system slope is 25%.**
- **e)** **Center-to-center row spacing is 1.5 ft. minimum.**
- **f)** **The site and system's slope may contain more than one slope provided the maximum allowed slope is not exceeded.**



For multiple slope beds, a system sand extension is required if any portion of the bed has a system slope greater than 10%. Beds with multiple slopes (Inspection Port not shown):



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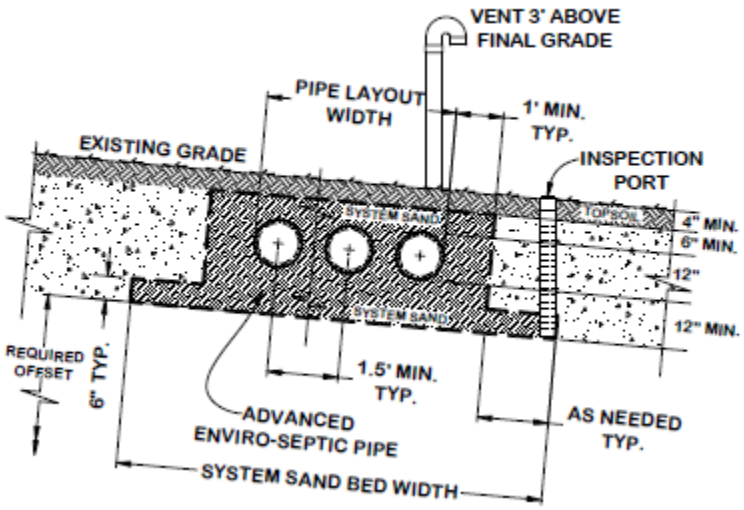
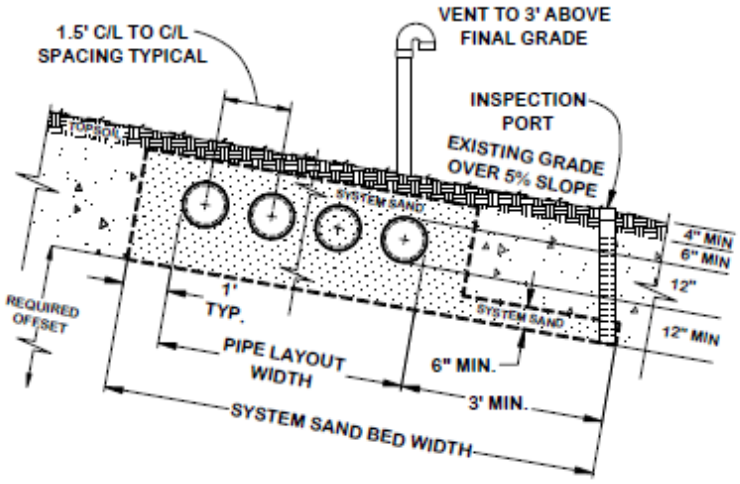
System Sloping 5% or less:



Systems Sloping over 5% - pipes are grouped to upslope side:



Infiltrative Loading Rate (ILR) gpd/sq.ft.	% System Slope Maximum	% Site Slope Maximum	Bed Configuration Limits
1.6 to 0.6	25	33	Any Configuration
0.5	15	20	
0.3 – 0.2	5	5	Basic Serial or Multiple Beds

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The detailed table for calculating the length of pipe required is given in the following table.

Soil Characteristics			Bed Area using Infiltrative Loading Rate (ILR) gpd/sq.ft.	Length Loading Rate (LLR) gpd/ft.								
	Structure			Site Slope %								
				0 – 4 % Infiltration Distance			5% – 9 % Infiltration Distance			10% & Over Infiltration Distance		
Texture	Shape	Grade		6" To 12"	>12" to 24"	>24"	6" To 12"	>12" to 24"	>24"	6" To 12"	>12" to 24"	>24"
Very Coarse Sand, Coarse Sand, Sand, Loamy Coarse Sand, Loamy Sand	Single Grain	Structureless	1.6	4.0	5.0	6.0	5.0	6.0	7.0	6.0	7.0	8.0
Fine Sand, Very Fine Sand, Loamy Very Fine Sand	Single Grain	Structureless	1.0	3.5	4.5	5.5	4.0	5.0	6.0	5.0	6.0	7.0
Coarse Sandy Loam, Sandy Loam	Massive	Structureless	0.6	3.0	3.5	4.0	3.6	4.1	4.6	5.0	6.0	7.0
	Platy	Weak	0.5	3.0	3.5	4.0	3.6	4.1	4.6	4.0	5.0	6.0
		Moderate	-	-	-	-	-	-	-	-	-	-
	Prismatic, Blocky, Granular	Weak	0.7	3.5	4.5	5.5	4.0	5.0	6.0	5.0	6.0	7.0
		Moderate, Strong	1.0	3.5	4.5	5.5	4.0	5.0	6.0	5.0	6.0	7.0
Fine Sandy Loam, Very Fine Sandy Loam	Massive	Structureless	0.5	2.0	2.3	2.6	2.4	2.7	3.0	2.7	3.2	3.7
	Platy	Weak, Moderate	-	-	-	-	-	-	-	-	-	-
	Prismatic, Blocky, Granular	Weak	0.6	3.0	3.5	4.0	3.3	3.8	4.3	3.6	4.1	4.6
		Moderate, Strong	0.8	3.3	3.8	4.3	3.6	4.1	4.6	3.9	4.4	4.9
Loam	Massive	Structureless	0.5	2.0	2.3	2.6	2.4	2.7	3.0	2.7	3.2	3.7
	Platy	Weak, Moderate	-	-	-	-	-	-	-	-	-	-
	Prismatic, Blocky, Granular	Weak	0.6	3.0	3.5	4.0	3.3	3.8	4.3	3.6	4.1	4.6
		Moderate, Strong	0.8	3.3	3.8	4.3	3.6	4.1	4.6	3.9	4.4	4.9
Silt Loam	Massive	Structureless	0.2	2.0	2.5	3.0	2.2	2.7	3.2	2.4	2.9	3.4
	Platy	Weak, Moderate	-	-	-	-	-	-	-	-	-	-
	Prismatic, Blocky, Granular	Weak	0.6	2.4	2.7	3.0	2.7	3.0	3.3	3.0	3.5	4.0
		Moderate, Strong	0.8	2.7	3.0	3.3	3.0	3.5	4.0	3.3	3.8	4.3
Sandy Clay Loam, Clay Loam, Silty Clay Loam	Massive	Structureless	-	-	-	-	-	-	-	-	-	-
	Platy	Weak, Moderate	-	-	-	-	-	-	-	-	-	-
	Prismatic, Blocky, Granular	Weak	0.3	2.0	2.5	3.0	2.2	2.7	3.2	2.4	2.9	3.4
		Moderate, Strong	0.6	2.4	2.9	3.4	2.7	3.0	3.3	3.0	3.5	4.0
Sandy Clay, Clay, Silty Clay	Massive	Structureless	-	-	-	-	-	-	-	-	-	-
	Platy	Weak, Moderate	-	-	-	-	-	-	-	-	-	-
	Prismatic, Blocky, Granular	Weak	-	-	-	-	-	-	-	-	-	-
		Moderate, Strong	0.3	2.0	2.5	3.0	2.2	2.7	3.2	2.4	2.9	3.4

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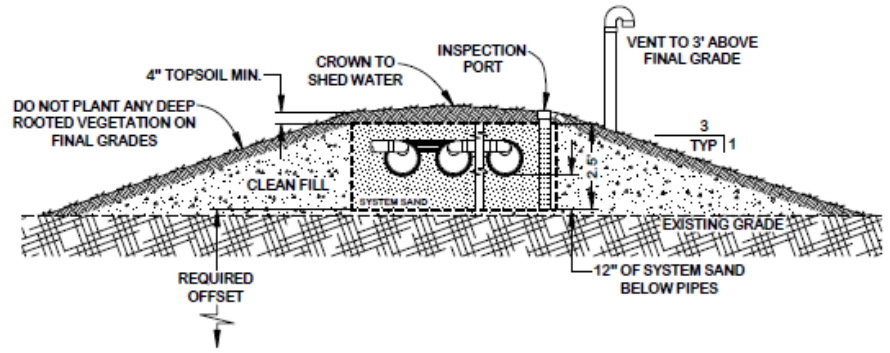
Depth of Pipes

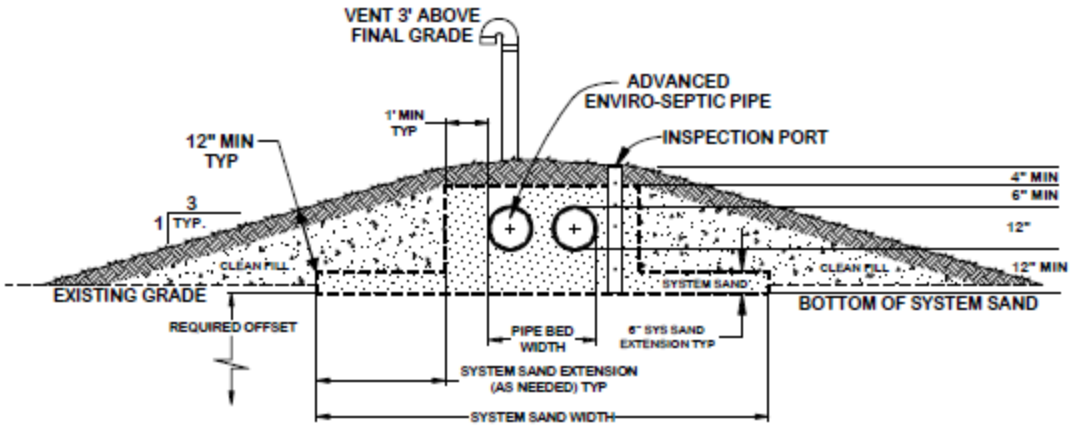
Suitable earth cover, similar to the naturally occurring soil at the site and capable of sustaining plant growth, is required as the uppermost layer over the entire system (including fill extensions, side slope extensions, and System Sand extensions). The topsoil layer should be a minimum of 4 in. deep and should be immediately seeded or mulched to prevent erosion.

Above ground system less than 5% slope and no System Sand extensions:
(Inspection port not shown.)



Elevated Bed Systems, Level and Sloping, continued

Centered pipe configuration with System Sand extensions:



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Venting Requirements

Venting is required for all Systems. Charcoal filters in vent stacks (for odor control) are not recommended. They can block airflow and potentially shorten system life.

- **a)** **Adequate air supply is essential to properly functioning the SS System.**
- **b)** **Venting, as described below, is required for all systems.**
- **c)** **Vent openings must be located to ensure unobstructed airflow throughout the SS System.**
- **d)** **The low vent inlet must be a minimum of 3 ft. above the final grade.**
- **e)** **One 4-in. vent is required for every 1,000 feet of SS pipe.**
- **f)** **A single 6-in. vent may be installed in place of up to three 4-in. vents.**
- **g)** **If a vent manifold is used, it must be at least the same diameter as the vent(s).**
- **h)** **When venting multiple beds, it is preferred that each bed be vented separately rather than manifolding bed vents together.**
- **i)** **Remote Venting may be utilized to minimize the visibility of vent stacks.**

Differential venting can also be used.

- **a)** **Differential venting is using high and low vents in a system.**
- **b)** **the roof stack acts as the high vent in a gravity system.**
- **c)** **At least 10 vertical feet must separate high and low vent openings.**
- **d)** **If possible, the high and low vents should be of the same capacity.**
- **e)** **Sch. 40 PVC or equivalent should be used for all vent stacks.**

Vent locations for gravity systems can be used.

- **a)** **A low vent through an offset adapter is installed at the end of each section's last row, the last row in a Basic Serial bed, or the end of each row in a D-Box Distribution Configuration system. A vent manifold may connect the ends of multiple sections or rows.**

- **b)** **The house (roof) vent functions as the high vent as long as there are no restrictions or other vents between the low vent and the house (roof) vent.**

- **c)** **There must be a minimum of a 10-ft. vertical differential between the low and high vent openings.**

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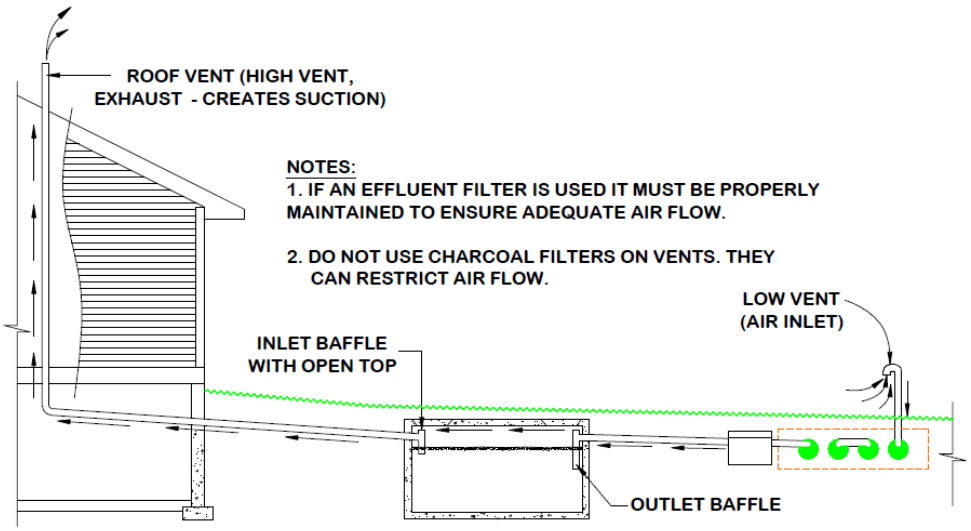

VENTING IS ESTABLISHED THROUGH SUCTION (CHIMNEY EFFECT) CREATED BY THE DRAW OF AIR FROM THE HIGH VENT, WHICH DRAWS AIR FROM THE LOW VENT, THROUGH THE LEACH FIELD, THROUGH THE SEPTIC TANK, AND EXHAUSTED THROUGH THE (HIGH) ROOF VENT.

Velocity Reduction

Reduce the velocity of liquid entering the SS pipe to reduce turbulence. A distribution box with a baffle or inlet tee may be adequate for velocity reduction in most systems. When pumping to gain elevation, pump to an oversized distribution box or equivalent with proper baffles or tee at the end of the delivery line.

Contact

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