The Presby Wastewater Treatment System

Florida



Advanced Enviro-Septic®

Alternative Drainfield System

Design, Installation, Operation & Maintenance Manual



✔ Minimizes the Expense ✔ Protects the Environment ✔ Preserves the Site

Presby Environmental, Inc.

The Next Generation of Wastewater Treatment Technology

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Approved
Florida Department of Health
Onsite Sewage Programs
January 22, 2021

The information in this manual is subject to change without notice. We recommend that you check your state's page on our website on a regular basis for updated information. Your suggestions and comments are welcome. Please contact us at: 800-473-5298

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IMPORTANT NOTICE: This Manual is intended ONLY for use in designing and installing Presby Environmental's Advanced Enviro-Septic® Wastewater Treatment Systems in Florida. The use of this Manual with any other product is prohibited. The processes and design criteria contained herein are based solely on our experience with and testing of Advanced Enviro-Septic®. Substitution of any other large diameter gravelless pipe will result in compromised treatment of wastewater and other adverse effects.

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NEW for 2021

Use of Advanced Enviro-Septic® following ATUs and PBTS

Background

The Florida Department of Health (DOH) has approved the Advanced Enviro-Septic® (AES) for use as an alternative drainfield product following a DOH-approved aerobic treatment unit (ATU) or performance-based treatment system (PBTS) which meets at least baseline treatment standards with secondary treatment standards for CBOD5 and TSS. There are only two specification changes between use of the AES as previously approved and use of the AES as an alternative drainfield product following a qualified ATU or PBTS. These changes relate to:

- minimum pipe length requirements; and
- venting requirements.

Specific guidance with respect to minimum pipe lengths and venting when the AES is designed for use as an alternative drainfield product following a qualified ATU or PBTS is detailed below. All other design and installation instructions for use of the AES as an alternative drainfield product remain unchanged. For all design, installation and use information, with the exception of only those listed below, please reference the specifications provided throughout this manual.

Minimum AES Pipe Requirement:

The minimum pipe length requirement for use of AES following a qualified DOH-approved ATU or PBTS is 40 feet per 100 gpd of daily sewage flow (2.5 gpd per foot of AES pipe). Use in all other applications remains at a minimum of 50 feet per 100 gpd of daily sewage flow.

Venting:

Venting is always required with use of the AES, including when designed for use as an alternative drainfield product following a qualified ATU or PBTS. In the event that venting the AES through the ATU or PBTS is not allowed or feasible, by-pass venting or pump system venting options can be utilized. Please see Section 16 Venting Requirements on pages 22-24 in this manual for more information.

Minimum Standards for ATU and PBTS:

The AES may be used as an alternative drainfield product following only a DOH-approved ATU or PBTS designed to meet at least baseline treatment standards with secondary treatment standards for CBOD5 and TSS (20 mg/L/20 mg/L).

Use of the AES following a qualified ATU or PBTS has no impact on the requirements applicable to the ATU or PBTS, including but not limited to venting and sampling.

If there are any questions about use of the AES when following a qualified ATU or PBTS in Florida please contact Presby Environmental, Inc. technical assistance at (800)473-5298.

January 22, 2021

Mr. Dick Bachelder
Senior Regulatory Specialist
Infiltrator Water Technologies
4 Business Park Road
Old Saybrook, Connecticut 06475

RE: Updated Reclassification Approval for the Advanced Enviro-Septic® System

Dear Mr. Bachelder:

This letter updates the Florida Department of Health's (Department) approval of the Presby Environmental Products' Advanced Enviro-Septic® System (AES System) as a Florida-approved alternative drainfield product. The AES System was approved as an alternative drainfield product on July 18, 2018. The updated approval allows for a minimum AES pipe length of 40 ft/100 gpd estimated sewage flow when it follows a Florida-approved aerobic treatment unit (ATU) or performance-based treatment system (PBTS) which meets at least baseline treatment standards with secondary treatment standards for carbonaceous biochemical oxygen demand (CBOD5) and total suspended solids (TSS). In all other applications, a minimum AES pipe length of 50 feet/100 gpd estimated sewage flow continues to be required. Options for venting the AES System after the ATU or PBTS are described in the manual. This approval is subject to the manual clarifications and approval terms outlined in Attachment 1.

A list of the systems that were permitted under PEI's innovative system permit was enclosed in Attachment 2 of the original approval letter dated July 18, 2018. As stated in that approval, systems that were permitted as meeting better than baseline treatment standards, usually CBOD5 and TSS ATU treatment standards will continue to be PBTS and therefore require operating permits, maintenance entities and maintenance contracts as required by Rule 64E-6, of the *Florida Administrative Code*. Those systems that could be permitted as a performance-based treatment system (PBTS) meeting only baseline standards were allowed to be recategorized as conventional systems and then no longer require an operating permit or maintenance contract, sampling or monitoring for PBTS.

All AES Systems must be designed and installed in accordance with the Florida AES manual dated January 2021. For further assistance, please call or email Debby Tipton at 850-901-6944.

Sincerely,

Eberhard Roeder, PhD, PE, CPM
Environmental Administrator
Onsite Sewage Programs

ER/dt
Enclosure

Attachment 1

AES System Design, Installation, and Maintenance Manual Clarifications and Approval Terms

Approval Terms

1. All AES Systems must be installed in accordance with the annotated Florida AES manual dated January 2021, the detailed system design and construction plans and Rule 64E-6 FAC.
2. Sizing criteria for the AES System will be in accordance with the manual. Drainfield dimension requirements relative to mineral aggregate size will be determined using PEI's manual. Florida's requirements based on drainfield size refer to mineral aggregate size. Due to the combined treatment and disposal nature of the AES system, and the approved comparability ratings relative to mineral aggregate, shown in Table A of the manual, no further drainfield size reductions for systems installed as an ATU or PBTS as described in Rule 64E-6.012 (2)(h) or Rule 64E-6.028(4), FAC, are applicable.
3. A construction inspection by the Department will occur after installation of AES System sand and pipes and before the system is covered with soil or fill, unless an excavation inspection is conducted. All inspections beyond the first construction inspection shall be considered and charged as a re-inspection.
4. Any AES System installed as an aerobic treatment unit (ATU) must comply with the requirements for ATUs in Rule 64E-6.012, FAC, and Florida Statute, Section 381.0065.

Manual Clarifications

1. Section 2.0: The system diagrams refer to "loam" as the cover material for the installed AES system. In the context of cover material for the AES, "loam" shall mean material that meets the requirements of Rule 64E-6.009(3)(g), FAC, requiring a "soil cap of slightly or moderately limited soil material" for filled or mound systems or Rule 64E-6.014(5)(f), FAC, requiring "earth cover", for subsurface systems.
2. Section 7.3: While the system sand bottom area will be constructed level end to end within +/- 1 inch of the specified elevation, the lowest point of system sand must meet the required separation from the water table or other restrictive feature.
3. Section 7.7(c): This section is not applicable in Florida, as Rule 64E-6.008(1)(a), FAC, does not allow for water records to be used for sizing food operations.
4. Section 7.8: As it relates to AES systems, "other media capable of being compacted" shall mean solid ground or in mineral aggregate allowable under Rule 64E-6.014(1)(d), FAC.
5. Section 7.12: New systems require outlet filters per Rule 64E-6.008(2), FAC. Existing systems not originally permitted with an outlet filter device, do not require outlet filter devices, but are required to have the outlet device fitted with an approved solids deflection device per Rule 64E-6.0013(2), FAC.
6. Section 7.13 The installer will ensure that flow equalizers are limited to a maximum of 20 gpm per equalizer, and 40 gpm per distribution box feeding a single AES line (Section 14.7).
7. Section 7.20: As it relates to the AES system, the term "normal strength effluent" has the same meaning as "domestic strength effluent. The minimum requirement of 50 feet of Presby pipe/100 gpd estimated sewage flow will also apply to high strength effluent.
8. Section 7.21: A variance was granted for AES from Rule 64E-6.009(3)(j), FAC, which requires low pressure dosing in mounds constructed with moderately limited soil. The requirement of Rule 64E-6.014(3), FAC for low pressure dosing systems for total mineral aggregate absorption surface of more than 1000 square feet, except for Rule 64E-6.014(3)(a), FAC, remains in effect, and precludes installation of AES systems in such situations where an LPDS is required due to drainfield size.
9. Section 7.23: Setback distances are measured from the edge of the system sand.
10. Section 7.25 (b) and (c): See comments for section 7.12 above.
11. Section 7.26: The requirements of Rule 64E-6.009, FAC, require side slopes steeper than 5:1 to be sodded or hydroseeded.
12. Section 14.0: Dosing siphons are not commonly used in Florida.
13. Section 14.3: As it relates to the AES system, the term" firmly compacted soil, sand, or pea gravel base" means the same as "other media capable of being compacted" described in Section 7.8, and "solid ground or in mineral aggregate", allowable under Rule 64E-6.014(1)(d), FAC.
14. Section 14.5(c): An "equivalent receptacle" that is not a distribution box, must be a Florida-approved treatment receptacle.
15. Sections 15.1-15.3: The installer will document to the inspector that the system sand, a coarse sand, is acceptable by providing a bill of lading showing type (ASTM C-33, Ticket for FDOT-certified F01 sand, or

other sand), source, and amount of delivered system sand, and a sieve analysis of the material conducted within one year of delivery date, showing: not more than 3% of the sample passing the #200 sieve (C-33 and FDOT sand); or showing the sample meeting system sand specifications reference in section 15.1 If the system sand documentation is not available, a PEI representative must be notified for evaluation of the sand to determine if the material meets the requirements of section 15.1 of the manual.

16. Section 15.4: Sand fill used to raise the elevation of the system to allow for the required separation distance from the SHWT or another restrictive feature must comply with Rule 64E-6.009(3), FAC.
17. Section 16.9 diagram: Any vent piping from the tanks must enter the tank through a riser or through an approved opening, inlet or outlet, using the requirements of Rule 64E-6.013(9)(c), FAC.
18. Sections 17.3-5: Specifics for these sections are part of the setback requirements and prohibitions in Rule 64E-6.
19. Section 17.8: As noted in Section 19.2.3 in the manual, a repair permit is required.
20. Sections 18.15: refers to “soil material free of organics having a texture like the soil at the site…” See comment on Section 2.0 on requirements for system cover material.
21. Section 18.16: As noted for 7.26, side slopes steeper than 5:1 shall be sodded or hydroseeded.
22. Section 18.17 refers to “suitable earth cover (for subsurface systems), with a texture similar to the soil at the site…” See comment on Section 2.0 on requirements for system cover material.
23. Section 18.18: Rule 64E-6.009(3)(f), FAC specifies for mound systems, that wildflower and perennials would need to be reviewed as alternative vegetative cover. Presby’s requirement for native vegetation is not enforceable.
24. Section 21.4: Perimeter drains will be considered groundwater interceptor drains according to Rule 64E-6.005(2)(c), FAC.
25. Appendix A: If Rule 64E-6.008, FAC were to change in the future, the manual must be updated to require the updated rule.

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1.0 Background

Liquid that exits from a septic tank ("effluent") contains suspended solids and high concentrations of dissolved organic matter that can cause traditional systems to fail prematurely. These common wastewater constituents can overstimulate bacteria, use up the air required for aerobic bacterial activity, and/or seal the underlying soil, interfering with its ability to absorb liquid.

1.1 What Our System Does

By utilizing simple yet effective natural processes, the Advanced Enviro-Septic® (AES) treatment system treats septic tank effluent in a manner that prevents suspended solids from sealing the underlying soil, increases system aeration, and provides a more permeable bacterial treatment area ("biomat") than traditional systems.

1.2 Why Our System Excels

The AES system retains solids in its pipe and provides multiple bacterial surfaces to treat effluent prior to its contact with the soil. Passive air flow through all the pipes in the system and the surrounding interstitial pores in the system sand layer are assured through a unique venting configuration. The continual cycling of effluent (the rising and falling of liquid inside the pipe) enhances aerobic conditions in the drainfield and aerobic bacterial growth. This all combines to create a unique eco-system that no other passive wastewater treatment system is designed to offer. The result is a system that excels by being more efficient, lasting longer, with minimal routine operation and maintenance and a minimal environmental impact.

1.3 System Advantages

a) Costs less than traditional systems.
b) Eliminates the need for coarse aggregate.
c) Often requires a smaller area.
d) Installs more easily and quickly than traditional systems.
e) Ongoing operation and maintenance tasks are simple and easy to perform.
f) Adapts easily to residential and commercial sites of virtually any size.
g) Adapts well to difficult sites.
h) Develops a protected receiving surface preventing sealing of the underlying soil.
i) Blends mound systems into sloping terrain.
j) Increases system performance and longevity.
k) Tests environmentally safer than traditional systems.
l) Recharges groundwater more safely than traditional systems.
m) Made with a significant percentage of recycled plastic.

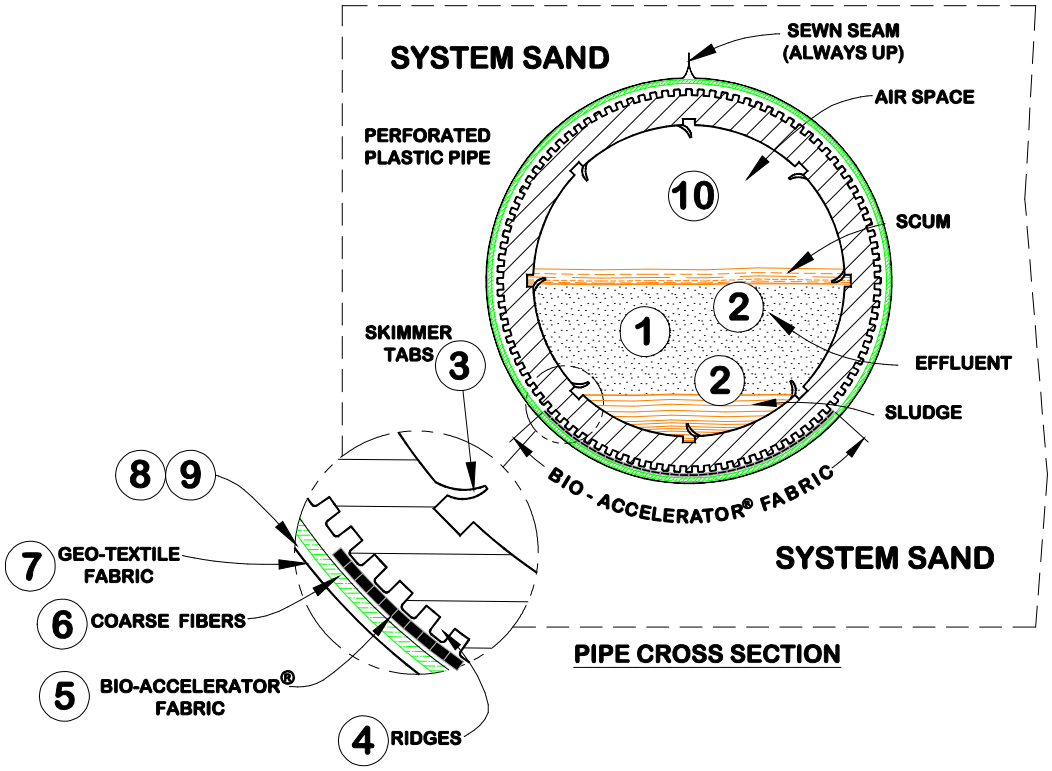
1.4 Patented Advanced Enviro-Septic® Technology

The Advanced Enviro-Septic® (AES) is an onsite wastewater treatment system consisting of a patented configuration of ridged, corrugated, perforated plastic pipe with interior skimmer tabs, surrounded by a mat of random plastic fibers and geo-textile fabrics. The AES pipe is assembled into an onsite wastewater treatment system that has been successfully tested and certified to NSF 40, Class I (a certification typically given to mechanical aeration devices), BNQ of Quebec, Class I, II, III and Cebedeau, Belgium standards. The system is designed to simultaneously purify and disperse effluent after primary treatment by a septic tank. The system is completely passive, requiring no electricity, motors, alarms, computers, etc. AES is the "next generation" of our Enviro-Septic® technology. The AES product incorporates Bio-Accelerator®, a proprietary enhancement that screens additional solids from effluent, accelerates treatment processes, assures even distribution and provides additional surface area. Each foot of AES provides over 100 sq ft of total surface area for bacterial activity.

1.5 Ten Stages of Wastewater Treatment

ADVANCED ENVIRO-SEPTIC®
WASTEWATER TREATMENT SYSTEM
WITH BIO-ACCELERATOR®

TEN STEPS OF WASTEWATER TREATMENT: ADVANCED ENVIRO-SEPTIC® TREATS EFFLUENT MORE EFFICIENTLY TO PROVIDE LONGER SYSTEM LIFE AND TO PROTECT THE ENVIRONMENT.



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® geo-textile fabric filters additional suspended solids from the effluent, enhances and accelerates treatment, facilitates quick start-up after periods of non-use, provides additional surface area for bacterial growth, prevents point loading of effluent, promotes even distribution, and further protects outer layers and the receiving surfaces so they remain permeable.

Stage 6 A mat of coarse random fibers separates additional suspended solids from the effluent.

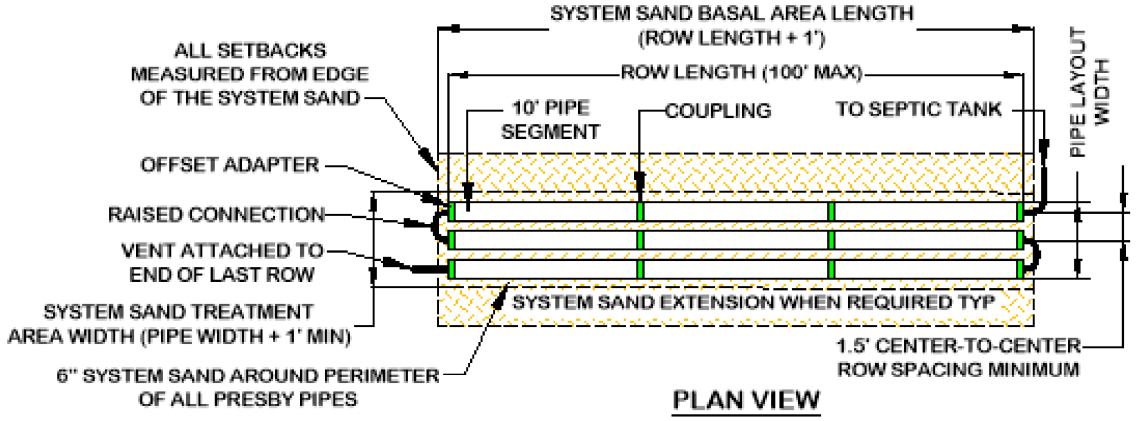
Stage 7 Effluent passes into the geo-textile fabric and grows a protective bacterial surface.

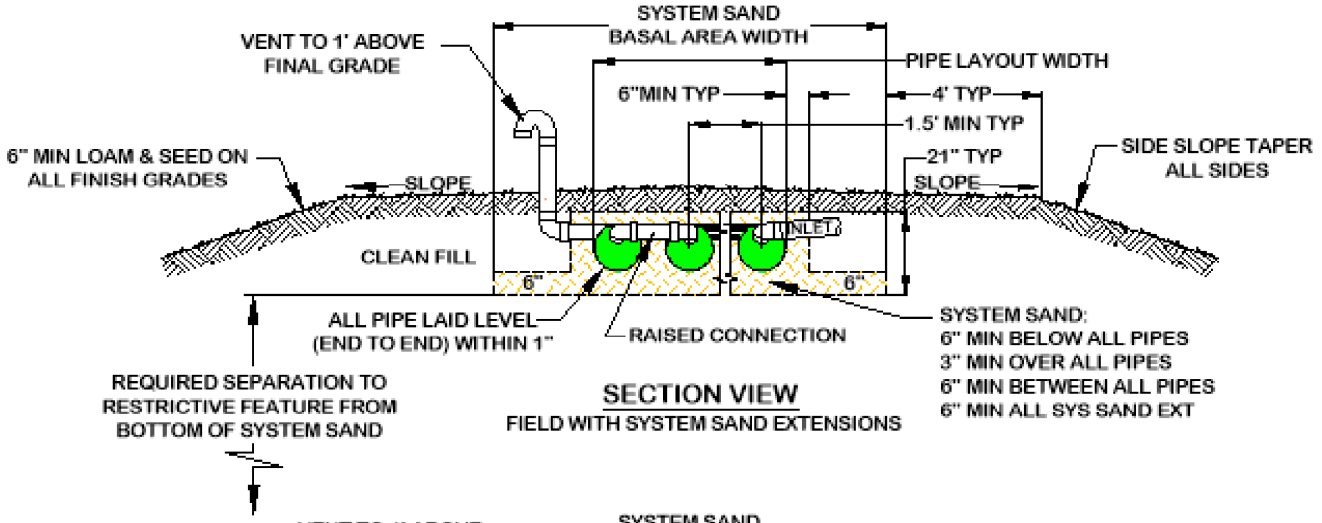
Stage 8 Sand wicks liquid from the geo-textile fabric and enables air to transfer to the interstitial spaces in the system sand layer.

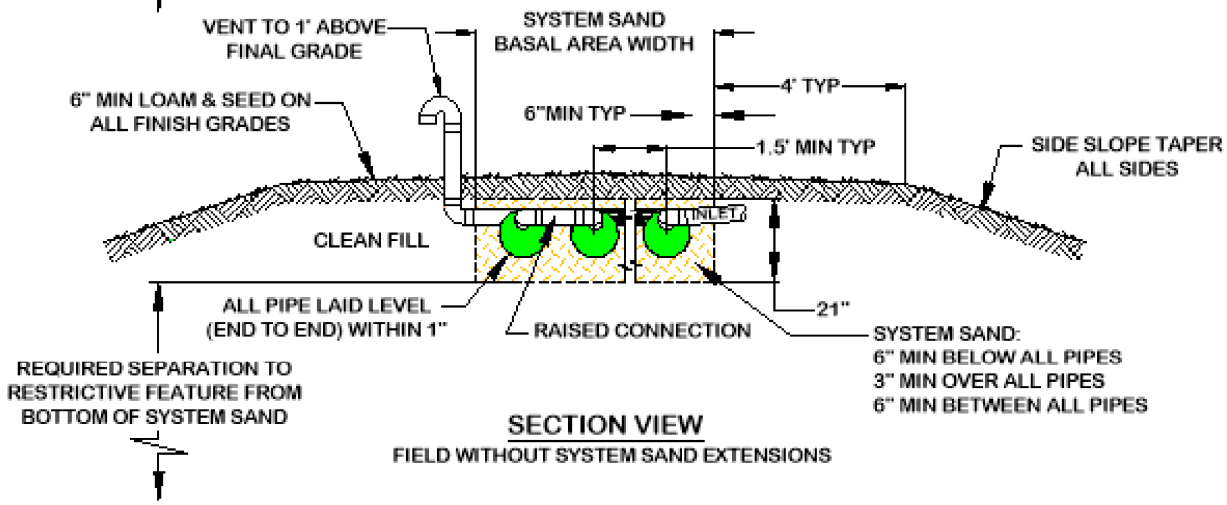
Stage 9 The fabrics and fibers provide extensive surface area for bacterial attachment.

Stage 10 An ample air supply and fluctuating liquid levels increase aerobic bacterial growth; air spaces are refreshed by passive venting from low vent on distal row of pipe to rooftop vent of building plumbing or high vent in other suitable location.

2.0 System Diagrams







Notes:
- All rows spaced 1.5 ft minimum center-to-center.
- Rows centered in system sand within six inches.
- Venting required for all AES system configurations.
- See sect. 7.26 on page 17 for side slope taper requirements.
- No deep-rooted vegetation on final grades.

3.0 Presby System Components

3.1 Advanced Enviro-Septic® (AES) Pipe



a) Plastic pipe made with a significant percentage of recycled material.
b) 10 ft sections (can be cut to desired length).
c) Ridged and perforated, with skimmer tabs on interior.
d) Bio-Accelerator® along bottom of pipe (sewn seam is always placed 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 10 ft section has a liquid holding capacity of approx. 58 gallons.
i) A 10 ft length of AES pipe is flexible enough to bend up to 90°.

3.2 Offset Adapter



An offset adapter is a plastic fitting 12 in in diameter with an inlet hole designed to accept a 4-in sewer line, raised connection or vent pipe. The hole is to be installed in the 12 o'clock position. The distance from the bottom of the offset adapter to the bottom of its inlet hole is 7 in. When assembling pipes into rows, note that the geo-textile fabrics are placed over the edges of the offset adapter and couplings.

3.3 Double Offset Adapter



A double offset adapter is a plastic fitting 12 in in diameter with two 4-in holes designed to accept a 4-in inlet pipe, raised connection, vent or vent manifold, depending upon the particular requirements of the design configuration. The 4-in holes are to be aligned in the 12 o'clock and 6 o'clock positions. The holes are positioned 1 in from the outside edge of the double offset adaptor and 2 in from each other.

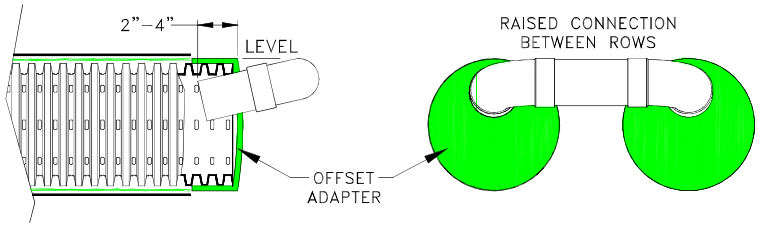
3.4 Coupling



A coupling is a plastic fitting used to create a connection between two pieces of AES pipe. Note that the couplings are wide enough to cover 1 or 2 pipe corrugations on each of the two pipe ends being joined. 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 fabric back, install coupling, and then pull fabric over coupling. Also note, during installation in cold weather, couplings are easier to work with if stored in a heated location (such as a truck cab) before use.

3.5 Raised Connection

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



RAISED CONNECTION

4.0 Table A: Soil Loading Rate

Texture	Texture Rating	*Loading Rate (gpd/sq ft)	Comparability Rating (ft² required mineral aggregate / ft² system sand)	
			Subsurface/Fill	Mound
Coarse Sand, Sand, Loamy Coarse Sand	Slightly Limited	1.25	2.08	2.08
Fine Sand	Slightly Limited	1.25	2.08	2.08
Loamy Sand	Slightly Limited	1.25	2.08	3.13
Coarse Sandy Loam, Sandy Loam	Slightly Limited	1.25	2.08	3.13
Very Fine Sand, Loamy Very Fine Sand	Moderately Limited	0.60	1.71	2.40
Fine Sandy Loam	Moderately Limited	0.60	1.71	2.40
Very Fine Sandy Loam	Moderately Limited	0.60	1.71	n/a
Loam	Moderately Limited	0.50	1.43	n/a
Silt Loam	Moderately Limited	0.43	1.23	n/a
Sandy Clay Loam	Moderately Limited	0.43	1.23	n/a
Clay Loam, Silty Clay Loam	Moderately Limited	0.27	1.35	n/a
Sandy Clay, Silty Clay	Moderately Limited	0.27	1.35	n/a
Clay	Severely Limited	n/a	n/a	n/a

* Loading rates reflect state approved reduction in System Sand Basal Area size (increased loading rates)

5.0 Table B: Row Length and Pipe Layout Width

		Total Linear Feet of AES Pipe														
Row Length (ft)	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300
	25	50	75	100	125	150	175	200	225	250	275	300	325	350	375
	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450
	35	70	105	140	175	210	245	280	315	350	385	420	455	490	525
	40	80	120	160	200	240	280	320	360	400	440	480	520	560	600
	45	90	135	180	225	270	315	360	405	450	495	540	585	630	675
	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750
	55	110	165	220	275	330	385	440	495	550	605	660	715	770	825
	60	120	180	240	300	360	420	480	540	600	660	720	780	840	900
	65	130	190	260	325	390	455	520	585	650	715	780	845	910	975
	70	140	210	280	350	420	490	560	630	700	770	840	910	980	1050
	75	150	225	300	375	450	525	600	675	750	825	900	975	1050	1125
	80	160	240	320	400	480	560	640	720	800	880	960	1040	1120	1200
	85	170	255	340	425	510	595	680	765	850	935	1020	1105	1190	1275
	90	180	270	360	450	540	630	720	810	900	990	1080	1170	1260	1350
	95	190	285	380	475	570	665	760	855	950	1045	1140	1235	1330	1425
	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
# of Rows		**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
	1.50	2.50	4.00	5.50	7.00	8.50	10.00	11.50	13.00	14.50	16.00	17.50	19.00	20.50	22.00
	Pipe Layout Width ft at 1.50 ft Row Spacing														

To use Table B: select a row length and move right until the minimum amount of pipe is found (more is allowed). Then move down to find the number of rows required. Continue downward in the same column until adjacent to the row spacing and find the pipe layout width. Example: 200 ft of pipe required, using row length of 40 and 1.50 ft spacing will require (5) rows resulting in a pipe layout width of 7.00 ft. Note: Pipe layout width is always (1) ft less than the System Sand Basal Area width.

6.0 Design Procedure and Examples

Task 1: Using the daily design flow from FAC 64E-6.008 Table I (see Appendix A) and loading rate from Table A. Calculate the minimum System Sand Basal Area (SSBA) and total minimum AES pipe required (50 ft AES pipe/100 gpd design flow, more pipe is always allowed).

Task 2: Selected a row length suitable for the site (longer narrower treatment & dispersal areas are preferred). Calculate the number of rows to meet the minimum pipe requirement and find the pipe layout width from Table B. Add six inches of system sand around the perimeter of the AES pipes when calculating the System Sand Basal Area.

Task 3: Verify the System Sand Basal Area (SSBA) meets or exceeds the SSBA required by Task 1. Adjust the SSBA if needed. This may require increasing the system sand area width or by making the rows longer.

Design Example #1: *New construction, single family residence, four bedrooms with a building area of 3000 sq ft (400 gpd per Table I of 64E-6.008, FAC), fine sand, slightly limited.*

Task 1: Maximum Loading Rate from Table A = 1.25 gpd/sq ft.
a) Four bedrooms (400 gpd daily flow) ÷ 1.25 gpd/sq ft = 320 sq ft.
b) (400 gpd ÷ 100 gpd) x 50 ft of AES pipe = 200 ft total.

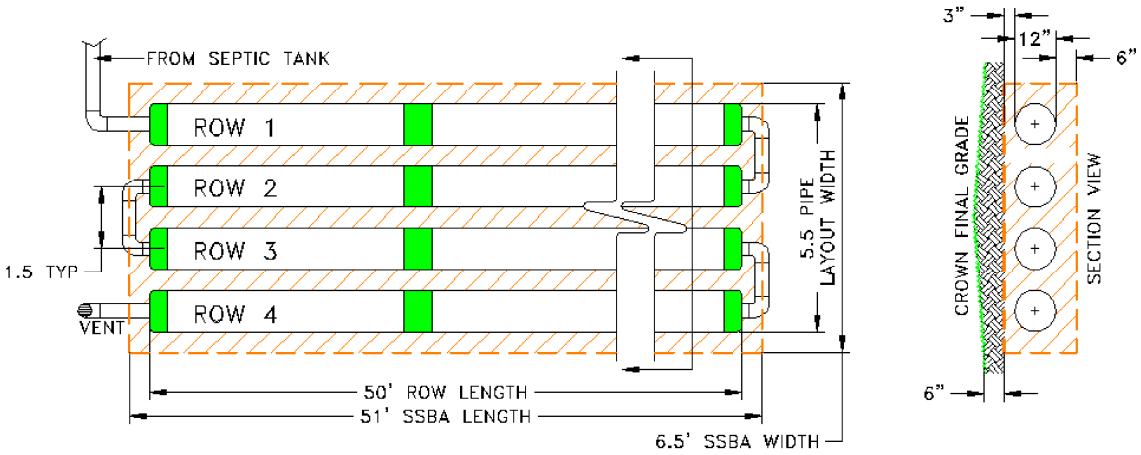
Task 2: The site will allow a row maximum length of 50 ft which will require four rows (200 ft ÷ 50 ft).

Task 3: The System Sand Basal Area (SSBA) for the system @ 1.5 ft row spacing = 51 ft (50 ft row length + 1 ft for sand) x 6.5 ft (5.5 ft layout width @ 1.5 ft spacing + 1 ft) = 331.5 sq ft, which exceeds the minimum 320 sq ft calculated in Task 1. No adjustment to the system is required.

Table B: Row Length and Pipe Layout Width

	Total Linear Feet of Presby Pipe									
20	40	60	80	100	120	140	160	180	200	22
25	50	75	100	125	150	175	200	225	250	275
30	60	90	120	150	180	210	240	270	300	330
35	70	105	140	175	210	245	280	315	350	38
40	80	120	160	200	240	280	320	360	400	44
45	90	135	180	225	270	315	360	405	450	49
50	100	150	200	250	300	350	400	450	500	55
55	110	165	[illegible]	275	330	385	440	495	550	60
90	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
95	190	285	380	475	570	665	760	855	950	104
100	200	300	400	500	600	700	800	900	1000	110
# of Rows	2	3	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1.5' Spacing	2.5	4.0	5.5	7.0	8.5	10.0	11.5	13.0	14.50	16.0
	Pipe Layout Width ft.									

Illustration of Example #1:



Alternate configurations for Example #1: (2 rows of pipe 100 ft long) or (5 rows of pipe 40 ft long).
Note: for complete description of basic serial distribution (see sect. 8.0, p 17).

Design Example #2: *New construction, single family residence, six bedrooms with a building area of 4650 sq ft (520 gpd per Table I of 64E-6.008, FAC), very fine sandy loam.*

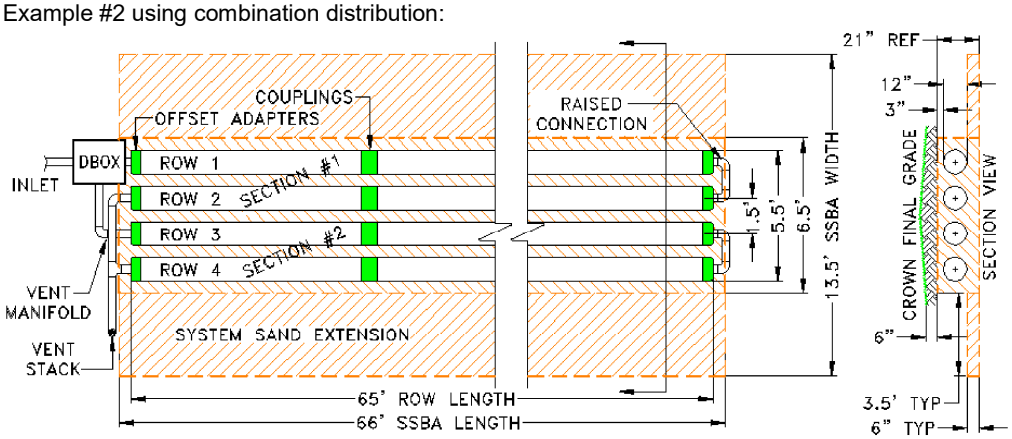
Task 1: Loading rate required from Table A = 0.6 gpd/sq ft.
a) Six bedrooms (520 gpd daily flow) ÷ 0.6 gpd/sq ft = 867 sq ft.
b) Serial sections required = 520 gpd ÷ 500 gallons/section = 1.04 (round up to 2 sections minimum).
c) (520 gpd ÷ 100 gpd) x 50 ft of AES pipe = 260 ft total.

Task 2: The site will allow a row length of 65 ft (six, ten-foot pieces and one piece cut in half to 5 feet per row) which will require four rows (combination system with 2 rows per serial section).

Task 3: The System Sand Basal Area (SSBA) for the system as designed = (65 ft row length + 1 ft for sand) x (5.5 ft layout width + 1 ft) = 429 sq ft which is less than the minimum of 867 sq ft calculated in Task 1. To find the minimum System Sand

Basal Area (SSBA) width: 867 sq ft ÷ 66 ft = 13.2 ft (round up to 13.5 ft). The additional sand will be placed symmetrically in system sand extensions on both sides of the AES pipes.

Illustration of Example #2 using combination distribution:



Alternate configuration for Example #2: 6 rows of pipe, 45 ft long, 2 sections of 3 rows each.
Note: for complete description of combination distribution (see sect.10.0, p 18).

7.0 General Design Requirements

The following requirements apply to all configurations unless otherwise noted.

7.1 Advanced Enviro-Septic® Requirements

a) Sewn seam must be oriented in the 12 o'clock position. This correctly orients the Bio-Accelerator® fabric in the 6 o'clock position.
b) Venting is always required.
c) Vertical separation distances are measured to the bottom of the system sand.

7.2 Barrier Materials over System Sand

No barrier materials (hay, straw, woven geotextiles, etc.) are to be placed between the system sand and cover material; such materials may cut off necessary oxygen supply to the system.

7.3 Treatment & Dispersal Field Constructed Level

System sand bottom area and AES pipe rows will be constructed level end to end within ±1 in. (2 in. total) of the specified elevation.

7.4 Long and Narrow Treatment & Dispersal Fields

Long and narrow treatment & dispersal fields are preferred in soils with loading rates under 0.6 gpd/sq ft.

7.5 Certification Requirements

Any designers and installers who have not previously attended a Presby Environmental, Inc. (PEI) Certification Course are required to obtain PEI Certification. Certification is obtained by attending a Certification Course presented by PEI or its sanctioned representative and successfully passing a short online assessment test. Certification can also be obtained by viewing tutorial videos on our website (high speed connection required) or by requesting and viewing a DVD from PEI and then successfully passing the assessment test. All professionals involved in the inspection, review or certification of AES systems should also become PEI Certified.

7.6 Converging Flows Restriction

AES systems must not be located where surface or ground waters will converge, causing surface water flow to become concentrated or restricted within the soil absorption field.

7.7 Minimum Daily Design Flow for Residences and Commercial Establishment

Design flow for residential and commercial systems are calculated using Table I of the Florida Administrative Code (FAC), 64E-6.008 (see Appendix A at the end of this manual). PEI requires a minimum estimated design flow of 200 gpd for both residential and commercial systems. Use Table I, 64E-6.008, FAC, for determining flows for any establishment not mentioned in this paragraph.

a) PEI recommends that certain fixtures, such as jetted tubs, may require an increase in the size of the septic tank.
b) PEI recommends that the 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 (200 gpd).

c) When using metered flow for non-residential or food operations, PEI recommends taking the average daily use from a peak month and multiply it by a minimum peaking factor of 2.
d) Note that estimated wastewater flows are calculated to assume occasional “peak” usage and a factor of safety; AES systems are not expected to receive continuous loading at full daily design load.

7.8 Distribution Box

A distribution box, also called a D-box, is a device used to evenly distribute effluent coming from a septic tank to more than one AES pipe row, serial section (combination system) or more than one treatment & dispersal area. D-boxes are also sometimes used to reduce the velocity of effluent before entering the AES pipes (see Velocity Reduction, sect.14.5, page 20). Concrete or plastic D-boxes may be used, however concrete boxes are preferred due to their increased resistance to movement over time. All D-boxes must be placed on firmly compacted soil or other media capable of being compacted. Flow equalizers are placed in all used D-box outlets where the D-box is used to divide flow, except outlets feeding vent stacks, and help ensure equal distribution in the event the D-box settles or otherwise becomes out of level. Unused openings in the D-box are to be left unopened, capped or mortared.

7.9 Elevated AES Systems (Mounds)

Elevated AES systems are designed for sites with soil, depth to groundwater or restrictive feature constraints that do not allow for in-ground treatment & dispersal systems. An elevated treatment & dispersal system is a soil absorption field with any part of the AES system above original grade.

7.10 End-to-End Configurations Preferred Over Side-to-Side

If site conditions permit, multiple end-to-end configurations are preferable to side-to-side configurations (see sect. 11.0, page 19).

7.11 Fill Extensions for Elevated (Mound) Systems

If any portion of the field extends above the original grade the fill covering the field cannot begin the side slope taper for a distance of 4 ft minimum from the outmost edge of the system sand area (see illustration in sect. 2.0, page 10).

7.12 Filters, Alarms & Baffles

a) Effluent filters are not required nor are they recommended for use with AES systems.
b) Effluent filters, if installed despite (a) above, **must** be maintained on at least an annual basis. Follow manufacturer’s instructions regarding required inspections, cleaning and maintenance of the effluent filter.
c) Effluent filters must allow the free passage of air to ensure the proper functioning of the system. A blocked filter in any on-site septic system will interfere with venting, causing the system to convert to an anaerobic state and result in a shortened lifespan.
d) All pump chambers are to have a high-water alarm float or sensor installed.
e) All septic tanks must be equipped with baffles to prevent excess solids from entering the AES system.
f) Charcoal filters in vent stacks (for odor control) are not recommended by PEI. They can block air flow and potentially shorten system life. Contact PEI for recommendations to correct odor problems.

7.13 Flow Equalizers Required

All distribution boxes used to divide effluent flow require flow equalizers in their outlets. Flow equalizers are limited to a maximum of 20 gpm per equalizer.

7.14 Garbage Disposals (a.k.a. Garbage Grinders)

PEI does not recommend a garbage disposal be used on residences. No additional AES pipe is required when using a garbage disposal (grinder). If a garbage disposal is utilized, multiple compartment septic tanks or multiple tanks are preferred and should be pumped as needed.

7.15 Graywater Systems

AES pipe may be used to treat and disperse graywater. Septic tank shall be sized per rule 64E-6.008 FAC. AES pipe and field shall be sized with same comparability rating as blackwater.

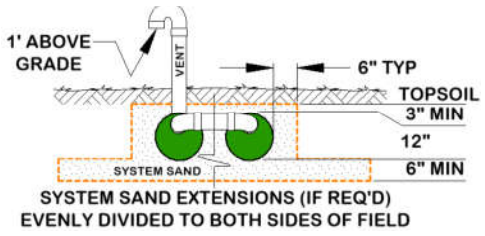
7.16 In-Ground Treatment & Dispersal Systems

AES systems are installed below existing grade for sites with no soil restrictive features to limit placement. System sand extensions (when required) evenly divide to both sides of field.

7.17 Interceptor Drains

Interceptor drains, if used, must be upslope of the AES system and a minimum of 15 ft away from all parts of the system. AES pipe is excellent for use in constructing interceptor drains.

In-ground system illustration:



7.18 PEI Standards and Technical Support

All AES systems must be designed and installed in compliance with the procedures and specifications described in this Manual and in the product's Florida approval. This Manual is to be used in conjunction with the State of Florida's rules and/or local ordinances. In the event of contradictions or conflicts PEI should be contacted for technical assistance at (800) 473-5298. Exceptions to any Florida rules other than those specifically discussed in this Manual may require state and/or local approval.

7.19 AES Pipe Required for Residential Systems

Residential design flow is calculated using Table I of FAC 64E-6.008 (see Appendix A). A minimum of 50 ft of AES pipe per 100 gpd of estimated sewage flow for single or multi-family residences is required (more is always allowed). AES pipe requirements were developed assuming normal, domestic strength effluent which has received primary treatment in a septic tank (see sect. 7.7, p. 14 for minimum daily design flow). When designing a system that will treat unusual or high strength wastewater consult our Technical Staff at (800) 473-5298 for guidance.

7.20 AES Pipe Required for Commercial Systems

Commercial design flow is calculated using Table I of FAC 64E-6.008 (see Appendix A). A minimum of 50 ft of AES pipe per 100 gpd of estimated sewage flow are required for non-residential systems treating normal strength effluent. Contact PEI for recommendations when designing for high strength effluent.

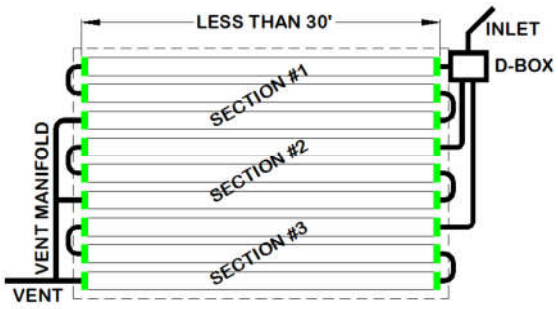
7.21 Pressure Dosing

The use of pressure dosing lines in AES systems is prohibited. Pumps may be utilized only when necessary to gain elevation (lift dosing) and to feed a distribution box which then distributes effluent by gravity to the AES system.

7.22 Row Requirements

a) All AES treatment & dispersal fields must have at least 2 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 ft of AES pipe (calculated by adding the length of each serial sections first rows), a minimum of two D-box outlets must be used and the field must be vented. Ex: row length 10 ft requires (3) serial sections (3 rows x 10 ft = 30 ft of pipe directly connected to the D-box.
e) Row lengths less than 30 ft may be used in all soil types allowed by Table A.
f) Row center-to-center Spacing is 1.5 ft minimum for all systems.

Illustration of row lengths less than 30 ft:



g) Rows shall be grouped in the middle of the system sand area when system sand extensions are required (see illustration in sect. 2.0, page 10).
h) All rows must be laid level to within +/- ½ in. (total of 1 in.) of the specified elevation and preferably parallel to the contour of the site, although alternate orientations are allowed with proper construction. Contact Technical Support for recommendations.
i) It is easier if row lengths are designed in exact 10 ft increments since AES pipe is sold in 10 ft sections. However, if necessary, the pipe is easily cut to any length to meet site constraints.

7.23 Separation Distances (Horizontal and Vertical)

a) Separation distances to the seasonal high-water table (SHWT) or other restrictive features are measured from the bottom of the system sand.
b) The separation distance between the bottom of the system sand and the seasonal high-water table (SHWT) is 24 in. min. for new construction. The separation distance between the bottom of the system sand and ledge, bedrock or impermeable soils is 42 in. min. for new construction.

7.24 Repair Standards

AES systems can be used in repair situations. Rule 64E-6.015 FAC recognizes that systems originally installed under earlier less-restrictive standards may have difficulty fully complying with today's construction standards.

a) For repair and replacement of drainfields for residential systems installed prior to 1983 (Rule 64E-6.015(6)(c), FAC), in place of the values in Table A for the corresponding soil texture, a comparability rating of 2.08 square feet of mineral aggregate per square foot of System Sand Basal Area for slightly limited soils (Table VI, Appendix B) and 1.46 square feet of mineral aggregate per square foot of System Sand Basal Area for moderately limited materials (Table VII, Appendix B) shall apply.
b) For repair and replacement of drainfields for commercial systems installed prior to 1983 (Rule 64E-6.015(6)(d), FAC) for the corresponding soil texture, a comparability rating of 2.08 square feet of mineral aggregate per square foot of System Sand Basal Area for slightly limited soils (Table VI, Appendix B) and 1.46 square feet of mineral aggregate per square foot of System Sand Basal Area for moderately limited soils (Table VII, Appendix B) shall

apply. Use Table VIII in Appendix B to calculate System Sand Basal Area using the applicable adjusted loading rate (derived from the comparability ratings stated above).

c) For repair and replacement of drainfields for residential systems installed prior to 1983 (64E-6.015(6)(c), FAC) the minimum amount of AES pipe required shall be 30 feet of pipe per bedroom.

7.25 Septic Tank

The AES system is designed to treat effluent that has received primary treatment in a standard, single or multi-compartment, septic tank. Septic tanks must also:

a) Meet the minimum size requirements of Table II of 64E-6.008, FAC.

b) Have an outlet baffle to prevent solids from entering the AES system in accordance with 64E-6.013(2)(e).

c) PEI does not recommend the use of effluent filters due to their tendency to clog when not properly maintained. When maintenance is withheld, the oxygen supply that is essential to the proper functioning of the system is restricted.

d) Septic tank sizing for graywater systems shall be sized in accordance with 64E-6.013(2), FAC.

7.26 Side Slope Tapers

Side slope tapering (as shown in sect. 2.0 illustration on page 10) begins 4 ft from the edge of the edge of the system sand and is to be no steeper than 2:1 for systems that do not extend more than 36 inches above the original grade or 3:1 for systems extending over 36 inches above the original grade.

7.27 System Sand Height Dimension

The height of a AES system sand treatment area measures 21 in minimum (not including cover material):

a) 6 in minimum of system sand below the AES pipe; and

b) 12 in diameter of the pipe; and

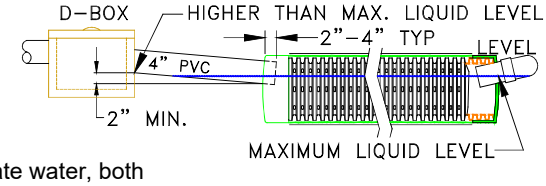
c) 3 in minimum of system sand above the AES pipe.

d) System sand extensions, if used, are required to be a minimum of 6 in thick (see illustration on page 15).

7.28 Two Inch Rule

The outlet of a septic tank or distribution box must be set at least 2 in. above the highest inlet of the AES pipe row, with the connecting pipe slope not less than 1% (approximately 1/8 in. per foot).

Illustration of 2 in rule:



7.29 Topographic Position Requirement

The system location must be located in an area that does not concentrate water, both surface and subsurface. If allowed by state and local authorities, altering the terrain upslope of a system may alleviate this requirement if the waters are sufficiently altered to redirect flows away from the field.

7.30 Wastewater Strength

Please contact PEI for design recommendations when dealing with high strength effluent.
High strength wastewater is septic tank effluent quality with a combined 30-day average carbonaceous 5-day biochemical oxygen demand ($CBOD_5$) in excess of three-hundred (300) mg/L and total suspended solids (TSS) in excess of two-hundred (200) mg/L in accordance with Florida 64E-6.002(15).

7.31 Water Purification Systems

a) Water purification systems and water softeners should **not** discharge into any AES system. This “backwash” does not require treatment and the additional flow may overload the system.

b) If there is no alternative means of disposing of this backwash other than in the AES system, then the system will need to be “oversized.” Calculate the total amount of backwash in gpd, multiply by 3, and add this amount to the daily design flow when determining the field and septic tank sizing.

c) Water purification systems and water softeners require regular routine maintenance; consult and follow the manufacturer’s maintenance recommendations.

8.0 Basic Serial Distribution

AES pipes are connected in series at the ends with raised connections, using offset adapters. Basic serial distribution systems are quick to develop a biomat in the first row, provide a longer flow route, improved effluent treatment, ensures air will pass through all the AES pipe rows and does not require the use of a D-box. Other criteria:

a) May be used for single treatment & dispersal fields of 500 gpd or less.

b) Basic serial distribution incorporates rows in serial distribution in a single treatment & dispersal field.

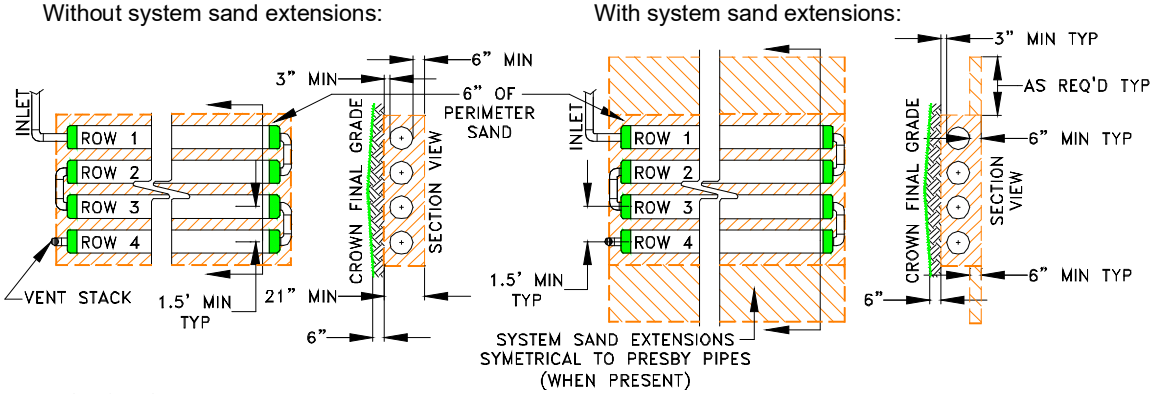
c) Maximum length of any row is 100 ft.

d) Flow equalizers are not required for basic serial systems. In pump systems, the D-box is only used for velocity reduction and the system is only feeding one row (flow is not being divided).

Illustrations of basic serial Systems:

Without system sand extensions:

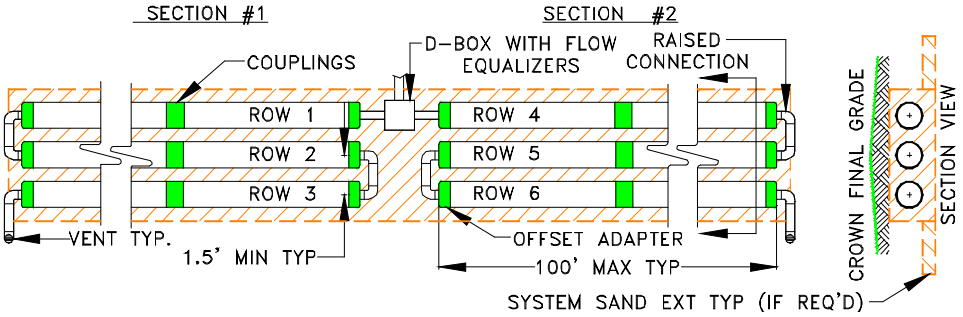
With system sand extensions:



9.0 Butterfly Configuration

a) A "butterfly configuration" is considered to be a single treatment & dispersal field with two or more sections (can also be combination configurations).
b) Maximum length of any row is 100 ft.
c) Serial section loading limit is 500 gpd.
d) AES treatment & dispersal fields can contain any number of serial sections.

Illustration of a butterfly configuration:



10.0 Combination Serial Distribution

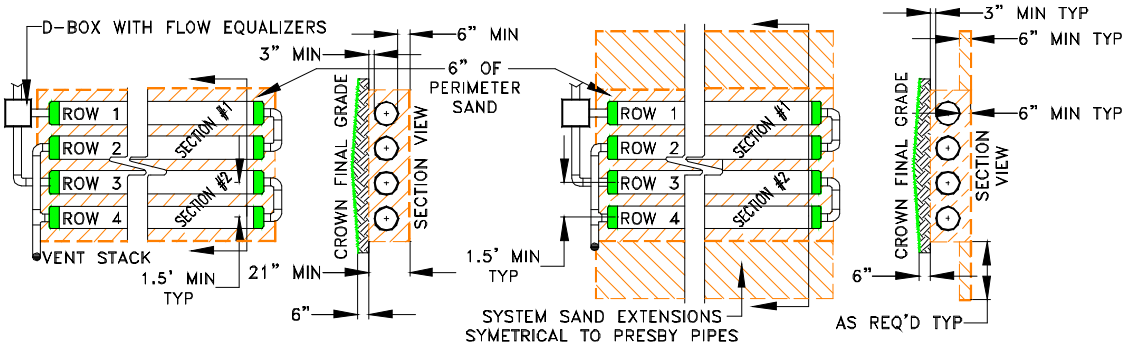
Combination serial distribution within one, or multiple, treatment & dispersal fields, is required for systems with daily design flows greater than 500 gpd. Combination serial distribution is quick to develop a strong biomat in the first row of each section, providing improved effluent treatment. Combination serial distribution consists of two or more serial sections installed in a single treatment & dispersal field.

a) Each section in a combination serial system consists of a series of AES pipe rows connected at the ends with raised connections, using offset adapters and PVC or polyethylene sewer and drain pipe.
b) Maximum length of any row is 100 ft.
c) Serial Section loading limit is 500 gpd.
d) There is no limit on the number of combination serial sections within a single treatment & dispersal field.
e) System sand extensions (if required) are divided symmetrically on both sides of the AES pipes.
f) When an even number of rows of pipe are used, the vent manifold is on the same side as the serial section inlet. The manifold runs above the top of these inlets.

Illustrations of combination serial systems:

Without system sand extensions:

With system sand extensions:



10.1 Section Loading

Each section in a combination serial system has a maximum daily design flow of 500 gpd. More than the minimum number of sections may be used. Ex: Daily design flow = 1,000 god requires (1,000 ÷ 500) = 2 sections minimum.

10.2 Section Length Requirement

a) Each section must have the same minimum linear feet of pipe.
b) The minimum linear feet of pipe per section is determined by dividing the total linear feet required in the AES system by the number of sections required.
c) A section may exceed the minimum linear feet required.
d) Rows within a section may vary in length to accommodate site constraints.

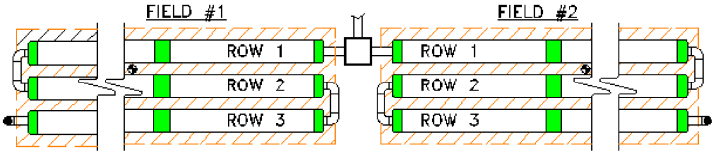
11.0 Multiple Treatment & Dispersal Field Distribution

Multiple treatment & dispersal field distribution incorporates two or more treatment & dispersal fields, each with basic serial or combination serial distribution, and each receiving an equal amount of effluent from a D-box. Multiple treatment & dispersal fields may be oriented along the contour of the site or along the slope of the site.

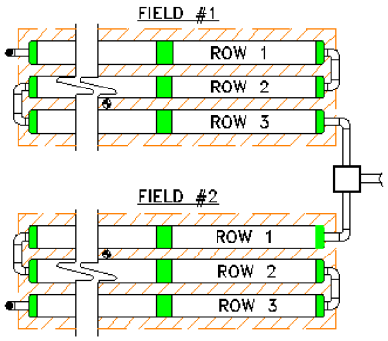
a) Each treatment & dispersal field must have the same minimum linear feet of pipe. The minimum linear feet of pipe per field is determined by dividing the total linear feet required in the AES system by the number of treatment & dispersal fields.
b) Rows within a treatment & dispersal field may vary in length to accommodate site constraints.
c) End-to-end configurations are preferred to side-to-side configurations.
d) In side-to-side configuration, one treatment & dispersal field is placed beside another or one field is placed down slope of another. Field separation distance is measure from edges of system sand.
e) Minimum field separation (measured from the edges of the system sand) is 10 ft per Florida rules.

Illustrations of multiple treatment & dispersal fields:

End-to-end:



Side-to-side:

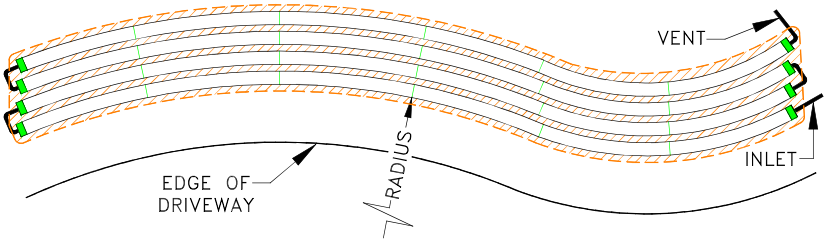


11.1 Total Linear Feet Requirement

a) Maximum row length is 100 ft.
b) Each section or AES field must have at least the minimum linear feet of pipe (total feet of pipe required divided by number of sections equals the minimum number of feet required for each section or field).
c) A section or AES field may exceed the minimum linear length.
d) Rows within a section or AES field shall be the same in length, near as practical, to accommodate site constraints.

12.0 Curved Treatment & Dispersal Fields

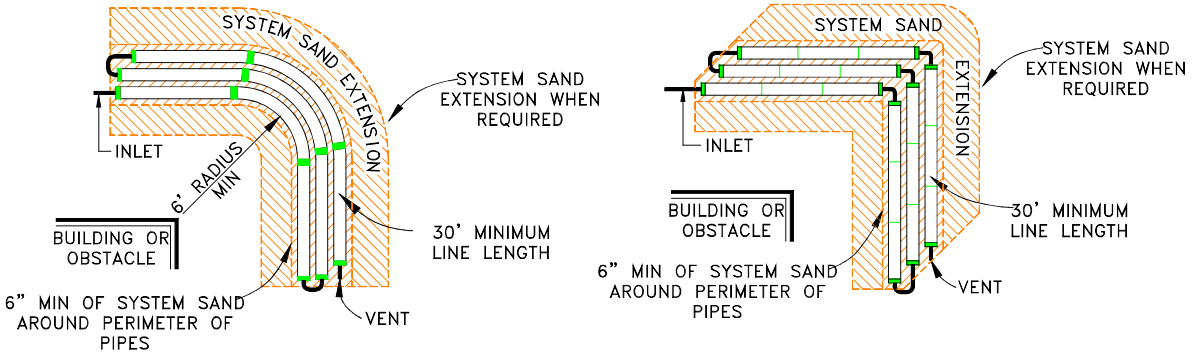
Curved configurations work well around structures, setbacks, and slopes. Multiple curves can be used within a system to accommodate various contours of the site.



13.0 Angled Treatment & Dispersal Fields

Angled configurations generally have one or more specific bends, but the rows should follow the contour of the site as much as possible. Rows are angled by bending pipes or through the use of offset adapters. A 10 ft length of AES pipe may be bent up to 90°. The angled system shown to the right requires 30 ft minimum row lengths.

Illustrations of angled configurations:



14.0 Pumped System Requirements

Lift-pumped systems supply effluent to the AES system using a pump and distribution box when site conditions do not allow for a gravity system. Dosing siphons are also an acceptable means of delivering effluent to the system.

14.1 Alarm

The Florida Department of Health requires all pump chambers to have a high-water alarm float or sensor installed.

14.2 Differential Venting

All lift dosing systems must use differential venting (see illustration, sect. 16.5, page 22).

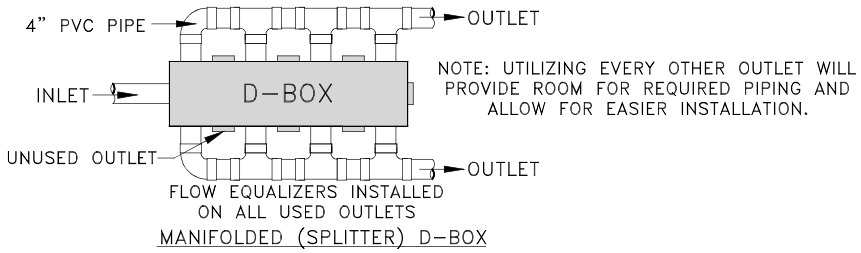
14.3 Distribution Box

A device used to divide effluent flow to the AES field must be placed on firmly compacted soil, sand, or pea gravel base. When dividing flow, flow equalizers are required on all D-box outlets. When using lift dosing provide some means of velocity reduction for the effluent entering the D-box.

14.4 Distribution Box Manifold (optional)

A distribution box manifold is an optional method of dividing large flows to the AES field(s) at the discretion of the system designer. If a distribution box manifold is utilized to divide large flows, velocity reduction of the incoming effluent is necessary.

Illustration of manifolded D-box:



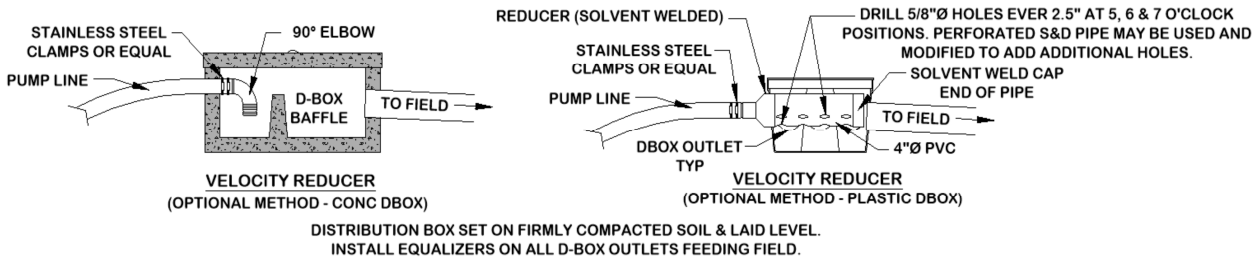
14.5 Velocity Reduction

In gravity system applications, the rate at which effluent enters the AES pipe must be controlled. Excessive effluent velocity can disrupt solids that settle in the pipes.

a) Effluent must never be pumped directly into AES pipe.

b) A distribution box or tank must be installed between the pumping chamber and the AES pipe to reduce effluent velocity.

c) Force mains must discharge into a distribution box (with or without a baffle), or equivalent receptacle, with a means of velocity reduction, such as: 90° elbow, inlet tee or equivalent (see illustrations below).



14.6 Dose Volume

a) Pump volume per dose must be no greater than 1-gallon times the total linear feet of AES pipe.

b) Lift dosing frequency should be designed per the requirements of Rule 64E-6.014(3)(e), FAC, as required by FL DOH. A maximum of 6 cycles per day are allowed for slightly limited soil and a maximum of 4 cycles per day are allowed for moderately limited soils.

14.7 Basic Serial Distribution Limit

Lift dosing to a basic serial distribution system is limited to a maximum dose rate of 40 gpm and does not require the use of a flow equalizer on the D-box outlet. Never pump directly into AES pipe.

14.8 Combination and Multiple Treatment & Dispersal Field Distribution Limit

All AES systems with combination serial distribution or multiple treatment & dispersal field distribution must use flow equalizers in each distribution box outlet that will convey effluent flow. Each field or section of combination serial distribution is limited to a maximum of 20 gpm, due to the flow constraints of the equalizers. Example: pumping to a combination system with 3 sections (using 3 D-box outlets). The maximum delivery rate is (3 x 20) = 60 gpm. Always provide a means of velocity reduction in these circumstances.

15.0 System Sand and Sand Fill Requirements

It is critical to the proper functioning of AES system's that the proper amount and type of system sand be installed.

15.1 AES System Sand

System sand must be clean, washed, granular sand free of organic matter and must adhere to the following percentage and quality restrictions:

Presby System Sand Specification

Sieve Size	Cumulative Percent Passing on Sieve (by weight)
3/4 in. (19 mm)	100
#10 (2 mm)	65 - 100
#35 (0.50 mm)	10 - 60
Note: not more than 3% allowed to pass the #200 sieve	

The Presby Spec-Check® is a device created to quickly and independently verify the suitability of material for use as system sand in the field. This device will not replace the need to verify and/or obtain a sieve analysis from the supplier when required. Go to www.PresbyEnvironmental.com for more details.

15.2 System Sand Acceptable Alternatives

Acceptable alternative specifications to the AES system sand specification include ASTM C-33 concrete sand, with not more than 3% passing the #200 sieve and FLDOT concrete sand (material code F-01). Sand meeting the gradation requirements of these specifications may consist of natural or manufactured materials and are acceptable for use as the system sand component of the AES wastewater treatment system.

15.3 Quantity of System Sand

System sand is placed a minimum of 6 in below, around the perimeter of and between the AES pipe rows. A minimum of 3 in of system sand is placed over all the AES pipe rows.

15.4 Sand Fill

Sand fill is used to raise the elevation of the system in order to meet the required separation distance from the SHWT or other restrictive feature. No organic material or stone over 6 inches in diameter are allowed.

16.0 Venting Requirements

An adequate air supply is essential to the proper functioning of AES systems. Venting is required for all systems.

16.1 General Rules

a) Vent openings must be located to ensure the unobstructed flow of air through the entire AES system.
b) The low vent inlet must be a minimum of 1 ft above final grade.
c) One 4-in vent is required for every 1,000 ft of AES pipe.
d) A single 6-in vent may be installed in place of up to three 4-in vents.
e) If a vent manifold is used, it must be at least the same diameter as the vent(s).
f) When venting multiple treatment & dispersal fields, it is preferred that each field be vented separately rather than manifolding multiple field vents together.
g) Remote venting may be utilized to minimize the visibility of vent stacks.

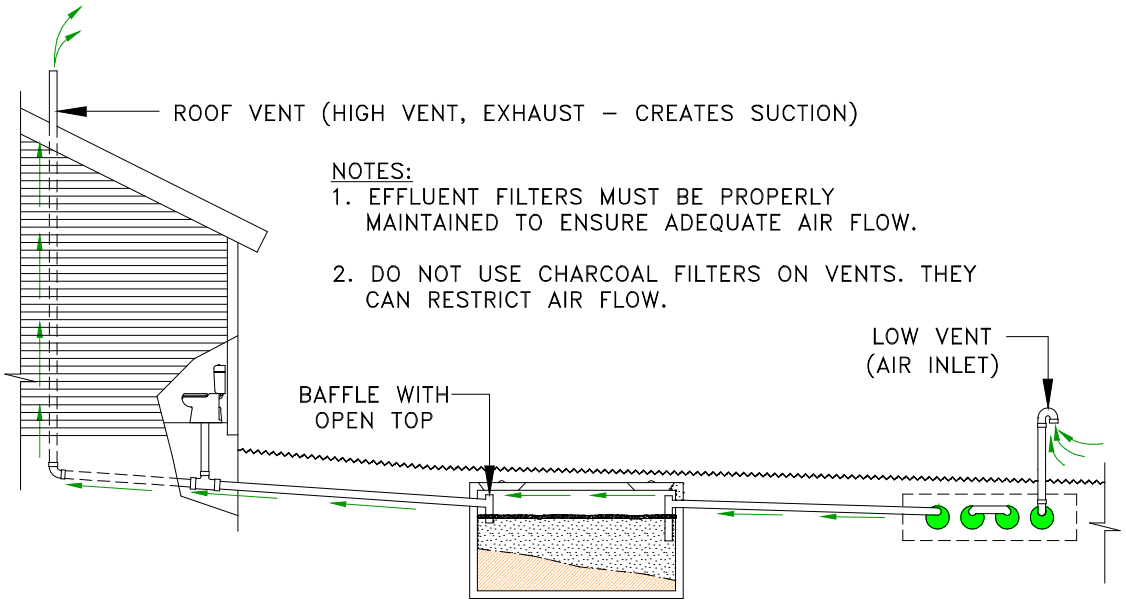
16.2 Differential Venting

a) Differential venting is the use of high and low vents in a system.
b) In a gravity system, the roof stack acts as the high vent.
c) High and low vent openings must be separated by a minimum of 10 vertical feet.
d) Vent openings (except the roof stack) should be protected from the entry of unwanted large objects, birds, rodents and insects by friction fitting circular ¼" hardware screen inserted a few inches inside the openings.
e) If possible, the high and low vents should be of the same capacity.
f) Sch. 40 PVC or equivalent is recommended for all vent stacks given the above ground location and exposure to the elements, lawn care machinery, etc. Other pipe products are allowed with the understanding that damage or deficiency over time may affect system performance and necessitate replacement.

16.3 Vent Locations for Gravity Systems

a) A low vent through an offset adapter is installed at the end of the last row of each section or the end of the last row in a basic serial treatment & dispersal field, or at the end of each row in a D-box distribution configuration system. A vent manifold may be used to 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) When the house (roof) vent functions as the high vent, there must be a minimum of a 10 ft vertical differential between the low and high (roof) vent openings.

Illustration of gravity system venting:

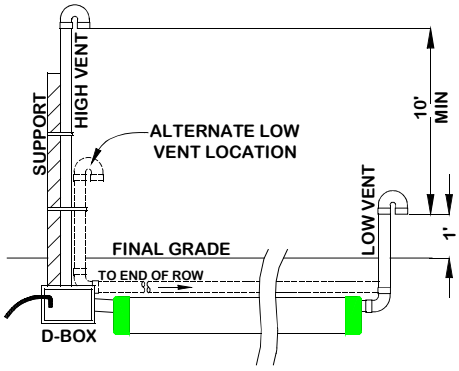


16.4 Venting Following ATU or PBTS

All AES systems must be vented, including those designed and installed following a Florida DOH approved ATU or PBTS. If venting through the ATU or PBTS is not allowed or feasible, the AES system may be vented by either pump system venting (see section 16.5 below) or by-pass venting (see section 16.9 below).

16.5 Pump System Vent Locations

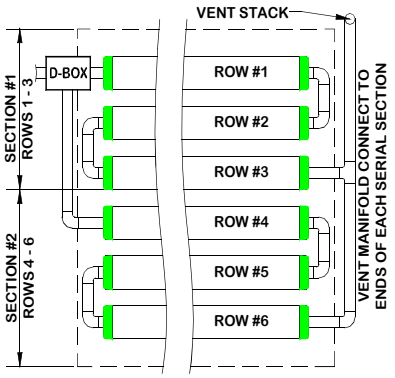
a) A low vent is installed through an offset adapter at the end of each section, basic serial treatment & dispersal field or attached to a vent manifold.
b) A high vent is installed through an unused distribution box outlet.
c) A 10 ft minimum vertical differential is required between high and low vent openings.
d) When venting multiple treatment & dispersal fields, it is preferred that each field be vented separately (have their own high and low vents) rather than manifolding separate field vents together.
e) The low vent may be attached to the D-box and the high vent attached to the end of the last row (or manifold).



16.6 Vent Manifolds

A vent manifold may be incorporated to connect the ends of a number of sections or rows of AES pipe to a single vent opening.

Illustration of system utilizing a vent manifold:



16.7 Vent Piping Slope

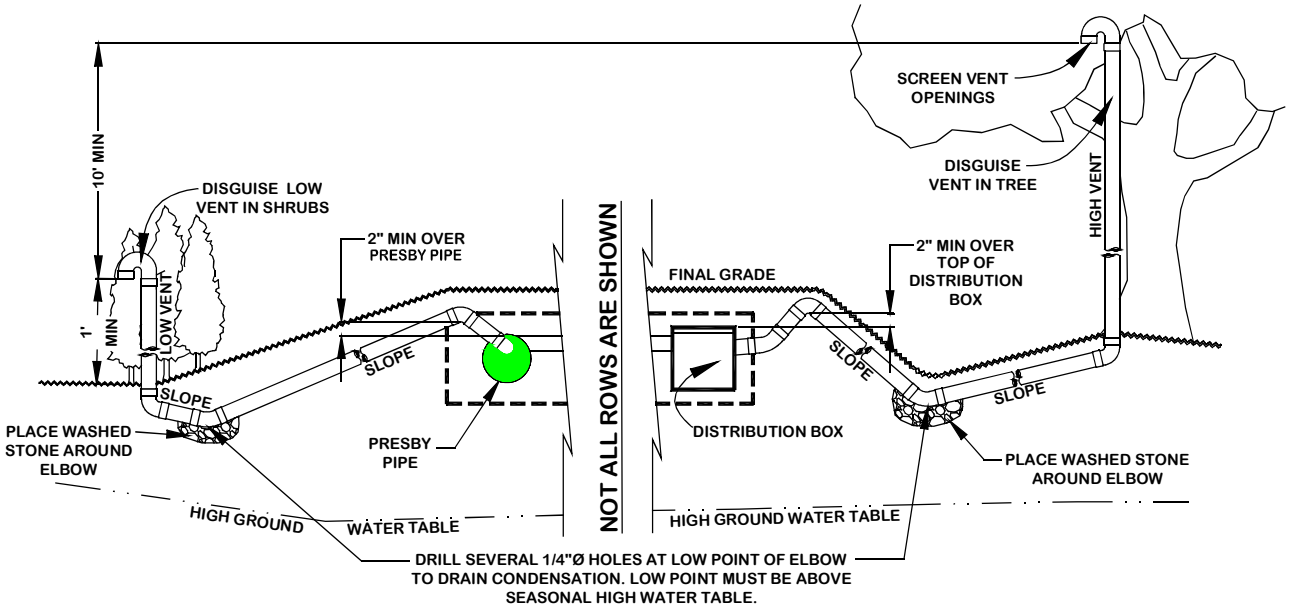
For standard venting, piping should slope downward toward the system to prevent moisture from collecting in the pipe and blocking the passage of air (see sect. 16.8 below for remote venting information).

16.8 Remote Venting

If site conditions do not allow the vent pipe to slope toward the system, or the owner chooses to utilize remote venting for aesthetic reasons (causing the vent pipe not to slope toward the system), the low point of the vent line must be drilled creating several ¼-in holes to allow drainage of condensation. This procedure may only be used if the vent pipe connecting to the system has:

a) A **high point** that is above the highest point of all AES pipe rows or the distribution box; and,
b) A **low point** opened for drainage which is above the SHWT.

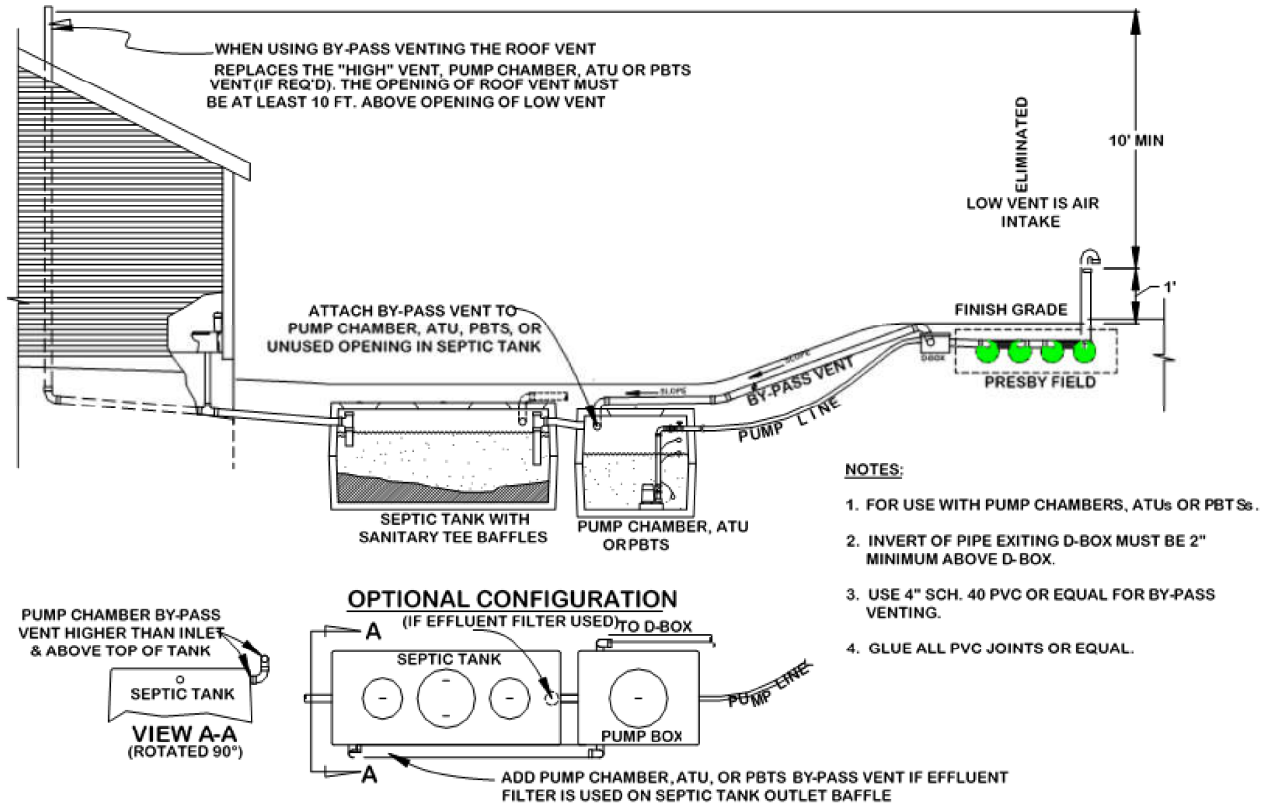
Illustration of remote venting:



16.9 By-Pass Venting

If effluent is pumped to the AES, it is necessary to provide air flow through the system by using either a high vent at the distribution box (see section 16.5 above) or “by-pass venting”. For by-pass venting, the system is plumbed by attaching Sch. 40 or SDR 35 PVC from the D-box back to the septic tank (or pump chamber if no effluent filter is present). This process “by-passes” the pump line and allows air to flow from the low vent to the roof vent which functions as the high vent. The bypass vent line invert must rise 2 inches above the D-box before dropping to the pump chamber or septic tank. In cases where an ATU or PBTS is not to be included in the vent system, vent piping shall “by-pass” this component and extend directly to the separate pretreatment tank, if present

Illustration of by-pass venting:



17.0 Site Selection

17.1 Determining Site Suitability

Refer to 64E-6.006, FAC regarding site suitability requirements.

17.2 Landscape Position

Locate systems on convex, hill, slope or level locations that do not concentrate surface or groundwater flows. Avoid swales, low areas, or toe-of-slope areas that may not provide sufficient drainage away from the AES system.

17.3 Surface Water Diversions

Surface water runoff must be diverted away from the system. Diversions must be provided up-slope of the system and designed to avoid ponding. Systems must not be located in areas where surface or groundwater flows are concentrated.

17.4 Containment

Systems should not be located where structures such as curbs, walls or foundations might adversely restrict the soil’s ability to transport water away from the system.

17.5 Hydraulic loading

Systems should not be located where lawn irrigation, roof drains, or natural flows increase water loading to the soils around the system.

17.6 Access

Systems should be located to allow access for septic tank maintenance and to at least one end of all AES pipe rows. Planning for future access will facilitate rejuvenation in the unlikely event the AES system malfunctions.

17.7 Rocky or Wooded Areas
Avoid locating systems in rocky or wooded areas that require additional site work, since this may alter the soil's ability to accept water. No trees or shrubs should be located within 10 ft of the system to discourage root infiltration.

17.8 Replacement System
In the event of system malfunction, contact PEI for technical assistance prior to attempting rejuvenation procedures. Florida requires a reserve area be available on the property in the unlikely event an AES system must be replaced.

18.0 Installation Requirements, Component Handling and Site Preparation

18.1 Component Handling
a) Keep mud, grease, oil, etc. away from all components.
b) Avoid dragging pipe through wet or muddy areas.
c) Store pipe on high and dry areas to prevent surface water and soil from entering the pipes or contaminating the fabric prior to installation.
d) The outer fabric of the AES pipe is ultra-violet radiation stabilized; however, this protection breaks down after a period of time in direct sunlight. To prevent damage to the fabric, cover the pipe with an opaque tarp if stored outdoors prior to installation.

18.2 Critical Reminder Prevent Soil Compaction
It is critical to keep excavators, backhoes, and other equipment off the excavated or raked/scarified surface of the treatment & dispersal area. Before installing the system sand, excavation equipment should be operated around the treatment & dispersal area perimeter; not on the area itself.

18.3 Site Preparation Prior to Excavation
a) Locate and stake out the system sand treatment area, extension areas and soil material cover extensions on the site according to the approved plan.
b) Install sediment/erosion control barriers prior to beginning excavation to protect the system from surface water flows during construction.
c) Do not travel across or locate excavation equipment within the portion of the site receiving system sand.
d) Do not stockpile materials or equipment within the portion of the site receiving system sand.
e) It is especially important to avoid using construction equipment down slope of the system to prevent soil compaction.

18.4 When to Excavate
a) Do not work wet soils. If a fragment of soil from about 9 in below the surface can easily be rolled into a wire shape, the soil moisture content is too high for construction.
b) Do not excavate the system area immediately after, during or before precipitation.

18.5 Tree Stumps
Remove all tree stumps and the central root system below grade by using a backhoe or excavator with a mechanical "thumb" or similar extrication equipment, lifting or leveraging stump in a manner that minimizes soil disturbance.
a) Do not locate equipment within the limits of the system sand basal area (treatment & dispersal area).
b) Avoid soil disturbance, relocation, or compaction.
c) Avoid mechanical leveling or tamping of dislodged soil.
d) Fill all voids created by stump or root removal with soil material similar to that already present on the site.

18.6 Organic Material Removal
Before the raking/scarification process, remove all grass, leaves, sticks, brush, topsoil and other organic matter or debris from the excavated system site. It is not necessary for the soil of the system site to be smooth when the site is prepared.

18.7 Raking/Scarification Procedures
All areas receiving system sand, sand fill and fill extensions should be raked to scarify the absorption area. The backhoe/excavator must remain outside of the proposed system sand area and extensions.
a) For in-ground treatment & dispersal systems, excavate the system sand basal area as necessary below original grade, then, using a landscape rake or equivalent, scarify the top ½ inch of the entire native soil infiltrative surface.
b) For elevated treatment & dispersal systems, remove the "A" or "O" horizons, then, using a landscape rake or equivalent, scarify the top ½ inch of the entire native soil infiltrative surface.

18.8 Install System Sand and/or Sand Fill Immediately After Excavation
a) To protect the native soil infiltrative surface (system sand treatment area and system sand extension area) from damage by precipitation, system sand should be installed immediately after raking.

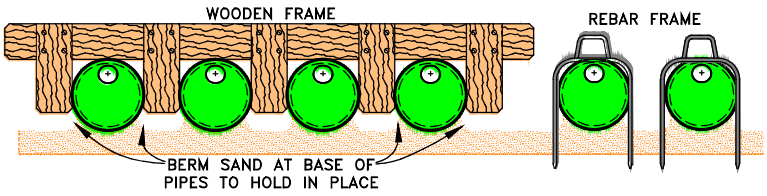
b) Work off either end or the uphill side of the system to avoid compacting soil downslope.
c) Keep at least 6 in of sand between the vehicle tracks and the native soil infiltrative surface of the site if equipment must work on receiving soil.
d) Tracked construction equipment should not travel over the installed system area until at least 12 in of cover material is placed over the AES pipes.
e) Heavy equipment with tires must never enter the receiving area due to likely wheel compaction of underlying soil structures.

18.9 Distribution Box Installation
To prevent movement, D-boxes should be placed level on compacted soil, sand, or pea gravel base.

18.10 Level Row Tolerances
Use a laser level or transit to install rows level. Variations beyond 1 in (±1/2") may affect system performance and are not acceptable.

18.11 Correct Alignment of Advanced Enviro-Septic® Bio-Accelerator® Fabric
The Bio-Accelerator® (white geo-textile fabric) is to be positioned centered along the bottom of the pipe rows (sewn seam up).

18.12 Row Spacers
System sand may be used to keep pipe in place while covering, but simple tools may also be constructed for this purpose. Two examples are shown. One is made from rebar, the other from wood. Center-to-center row spacing may be larger than specified by this manual.
Caution: Remove all tools used as row spacers before final covering. The pipe layout width (outermost edges of rows) must be centered on the system sand treatment area with a tolerance of six inches.



18.13 Connect Rows Using Raised Connections
Raised connections consist of offset adapters, 4 in PVC or equal sewer and drain pipe, and 90° elbows. They enable greater liquid storage capacity and increase the bacterial surfaces being developed. Use raised connections to connect the rows of the AES system (see sect. 3.5, page 11). Glue or mechanically fasten all pipe connections.

18.14 Backfilling Rows
a) Spread system sand between the rows.
b) Straddle each row of pipe and walk heel-to-toe its entire length, ensuring that system sand fills all void spaces beneath the AES pipe.
c) Spread system sand a minimum of 3 in over, 6 in between, 6 in below and a minimum of 6 in beyond all the AES pipes. Finish spreading system sand to 3 in above the top of the rows for inspection purposes. The inspector will temporarily brush system sand off selected areas of the pipe to check for levelness and proper elevation.

18.15 Final Grading
Spread soil material free of organics having a texture similar to the soil at the site, without causing compaction. Cover material should also be free of building debris and stones over 4 in. Tracked construction equipment should not travel over the installed system area until at least 12 in of cover material is placed over the AES pipes.

18.16 Fill Extensions Requirements
All AES systems with any portion of the system sand above original grade require fill extensions on each side beyond the outside edge of the system sand area. Side slope tapering begins 4 ft from the edge of the system sand and is to be no steeper than 2:1 for systems that do not extend more than 36 in above the original grade or 3:1 for systems extending over 36 inches above the original grade (see illustration on page 10).

18.17 System Soil Cover Material
A minimum of 6 in of suitable earth cover (for subsurface systems), with a texture similar to the soil at the site and capable of sustaining plant growth, must be placed above the installed system. Crown soil cover from the center of the treatment & dispersal field toward the edges to encourage rainfall runoff away from the system.

18.18 Erosion Control
To prevent erosion, soil cover above the system shall be planted with native, shallow-rooted vegetation such as grass, wildflowers and certain perennials or ground covers (see 64E-6009(3)(f) for stabilization requirements for mound and fill systems).

18.19 Trees and Shrubs
No trees or shrubs should be located within 10 ft of the system perimeter to discourage roots from growing into and damaging the system.

19.0 System Bacteria Rejuvenation and Expansion
This section covers procedures for bacteria rejuvenation and explains how to expand existing systems.
Note: PEI must be contacted for technical assistance prior to attempting rejuvenation procedures.

19.1 System Bacteria Rejuvenation
Bacteria rejuvenation is the return of bacteria to an aerobic state. Flooding, improper venting, alteration or improper depth of soil material cover, use of incorrect sand, sudden use changes, introduction of chemicals or medicines, and a variety of other conditions can contribute to converting bacteria in any system from an aerobic to an anaerobic state. This conversion severely limits the bacteria's ability to effectively treat effluent, as well as limiting liquids from passing through.

19.2 How to Rejuvenate the Bacteria in an AES System
System bacteria are "rejuvenated" when they return to an aerobic state. By using the following procedure, this rejuvenation can be accomplished in systems without costly removal and replacement.

1. Contact PEI before attempting rejuvenation for technical assistance.
2. Determine the problem causing the bacteria conversion.
3. An alternative-method repair permit is required before beginning any repair work. The location of the proposed excavation (see 5 below) shall be included in the application per Rule 64E-6.015(3) FAC.
4. Use a registered contractor to drain the septic tank and drainfield with a liquid vacuum truck. This may need to be done in conjunction with step 5 to gain access to the wastewater in the field. No effluent should be allowed to reach ground or surface waters.
5. Excavate a ditch at the far end of all the rows at a depth coinciding with the bottom of the AES pipes; remove the offset adapters; expose and open the distribution box (if present). NOTE: the proposed excavation shall not violate setbacks applicable to drainfields. As the excavation fills with effluent it must be pumped out by a permitted septage disposal service. The excavation shall be limed once it is drained.
6. If foreign matter has entered the system, flush and drain the pipes and contact PEI for recommendations.
7. Safeguard the open excavation.
8. Guarantee a passage of air through the system.
9. Allow all rows to dry for 72 hours minimum. The system sand should return to its natural color.
10. Re-assemble the system to its original design configuration. As long as there is no physical damage to the AES system components, the original components may be reused.
11. Any contamination on the site shall be limed and the site left in a nuisance-free condition.
12. Fill in the excavation and level the site.

20.0 System Expansion
AES systems are easily expanded by adding equal lengths of pipe to each row of the original design or by adding additional equal sections. All system expansions must comply with State and local regulations. Permits are required prior to expansion.

20.1 Reusable Components
AES pipe and components are not biodegradable and may be reused. In cases of improper installation, it may be possible to excavate, clean, and reinstall system components.

21.0 Operation & Maintenance

21.1 Proper Use
AES systems require minimal maintenance, provided the system is not subjected to abuse. An awareness of proper use and routine maintenance will guarantee system longevity. We encourage all system owners and service providers to obtain and review a copy of our Owner's Manual, available from our website www.PresbyEnvironmental.com or via mail upon request to (800) 473-5298 or info@presbyeco.com.

21.2 System Abuse Conditions
The following conditions constitute system abuse:

a) Liquid in high volume (excessive number of occupants and use of water in a short period of time, leaking fixtures, whirlpool tubs, hot tubs, water softening equipment or additional water discharging fixtures if not specified in system design).
b) Solids in high volume (excessive number of occupants, paper products, personal hygiene products, garbage disposals or water softening equipment if not specified in system design).
c) Antibiotic medicines in high concentrations.
d) Cleaning products in high concentrations.
e) Fertilizers or other caustic chemicals in any amount.
f) Petroleum products in any amount.

g) Latex and oil paints.
h) System suffocation (compacted soils, barrier materials, etc.) without proper venting

Note: PEI and most regulatory agencies do not recommend the use of septic system additives.

21.3 System Maintenance/Pumping of the Septic Tank

a) Pump the tank periodically on an as-needed basis.
b) If a garbage disposal is used, the septic tank will likely require more frequent pumping.
c) After pumping, inspect the septic tank for integrity to ensure that no groundwater is entering it. Also check the integrity of the tank baffle(s) and repair if needed.
d) Inspect the system to ensure that vents are in place and free of obstructions.
e) Effluent filters require ongoing maintenance and are not recommended for use due to their tendency to clog and cut off oxygen to the system. Follow filter manufacturer's maintenance instructions and inspect filters frequently if an effluent filter is used despite these warnings.

21.4 Site Maintenance

It is important that the system site remain free of shrubs, trees, and other woody vegetation to within a minimum of 10 ft of the system, including the entire system sand basal area, and areas impacted by side slope tapering and perimeter drains (if used). Roots can infiltrate and cause damage or clogging of system components. If a perimeter drain is used, it is important to make sure that the outfall pipes are screened to prevent animal activity. Also, check outfall pipes regularly to ensure that they are not obstructed in any way.

22.0 Glossary

This Manual contains terminology which is common to the industry and terms that are unique to AES systems. While alternative definitions may exist, this section defines how these terms are used in this Manual.

22.1 Advanced Enviro-Septic® (AES) Pipe

A single unit comprised of corrugated plastic pipe, Bio-Accelerator® fabric along its bottom which is surrounded by a layer of randomized plastic fibers and a sewn geo-textile fabric, is 10 ft in length, with an outside diameter of 12 in and a storage capacity of approximately 58 gallons. Each foot of AES provides over 100 sq ft of total surface area for bacterial activity. The sewn seam is always oriented up (12 o'clock position) within the field. A white tag is sewn into the seam indicating the product is AES pipe. AES pipes are joined together with couplings to form rows. AES is a combined wastewater treatment and dispersal system.

22.2 Bio-Accelerator®

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, prevents point loading, promotes even distribution, and further protects outer layers and the receiving surfaces so they remain permeable. Bio-Accelerator® is exclusive to AES.

22.3 Basic Serial Distribution

Basic serial distribution incorporates AES pipe rows in serial distribution in a single treatment & dispersal field. See Basic Serial Distribution in section 8.0, on page 17.

22.4 Butterfly Configuration

A variation of a standard, single treatment & dispersal field with the D-box located in the center, with rows oriented symmetrically on either side, and with each side or section receiving an equal volume of flow from the D-box. See Butterfly Configuration, sect. 9.0, on page 18.

22.5 Center-to-Center Row Spacing

The distance from the center of one AES pipe row to the center of the adjacent row.

22.6 Coarse Randomized Fiber

A mat of coarse, randomly-oriented fibers which separates more suspended solids from the effluent protecting the bacterial surface in the geo-textile fabric (see illustration on page 9).

22.7 Combination Serial Distribution

Incorporates two or more sections of AES pipe in a single treatment & dispersal field, with each section receiving a maximum of 500 gpd of effluent from a distribution box. Combination distribution is not required for daily flows of 500 gpd or less. See Combination Serial Distribution, sect. 10.0, on page 18.

22.8 Cooling Ridges

Pipe ridges that allow the effluent to flow uninterrupted around the circumference of the pipe and aid in cooling (see illustration on page 9).

22.9 Coupling
A plastic fitting that joins two AES pipe pieces in order to form rows (see sect. 3.4, page 11).

22.10 Daily Design Flow
The peak daily flow of wastewater to a system, expressed in gpd; systems are typically sized based on the daily design flow. Design flow calculations are set forth in the Florida Rules. In general, actual daily use is expected to be one-half to two-thirds less than "daily design flow."

22.11 Differential Venting
A method of venting an AES system utilizing high and low vents (see sect. 14.2, page 20).

22.12 Distribution Box or "D-box"
A device designed to divide and distribute effluent from the septic tank equally to each of the outlet pipes that carry effluent into the AES system. D-boxes are also used for velocity reduction (see Velocity Reduction, sect. 14.5, page 20).

22.13 Distribution Box Manifold
A PVC or equal pipe configuration which connects several distribution box outlets together in order to equalize effluent flow. Refer to drawing in sect. 14.4, on page 20.

22.14 End-to-End Configuration
Consists of two or more treatment & dispersal fields constructed in a line (i.e., aligned along the width of the fields). See sect.11.0, page 19.

22.15 Fill Extension
Utilized in constructing elevated (mound) systems and blend the raised portion of the system with side slope tapering to meet existing grade (see illustration on page 10).

22.16 Flow Equalizer
An adjustable plastic insert installed in the outlet pipes of a D-box to equalize effluent distribution to each outlet.

22.17 GPD and GPM
An acronym for gallons per day and gallons per minute respectively.

22.18 High and Low Vents
Pipes used in differential venting. Detailed information about venting requirements can be found in Venting Requirements, sect. 16.0, page 22.

22.19 High Strength Effluent
High strength wastewater is septic tank effluent quality with combined 30-day average carbonaceous 5-day biochemical oxygen demand ($CBOD_5$) in excess of three-hundred (300) mg/L and total suspended solids (TSS) in excess of two-hundred (200) mg/L in accordance with 64E-6.002(15), FAC.

22.20 Multiple Treatment & Dispersal Field Distribution
Incorporates two or more treatment & dispersal fields, each field with basic serial or combination serial distribution and receiving effluent from a distribution box (see section 11.0, page 19).

22.21 Offset Adapter
A plastic fitting with a 4-in hole installed at the 12 o'clock position which allows for connections from one row to another and for installation of venting (see sect. 3.2, page 11).

22.22 Pump Systems
Utilizes a pump to gain elevation (lift dosing) in order to deliver effluent to a D-box (see sect. 14.0, page 20).

22.23 Raised Connection
A U-shaped, 4" diameter, PVC pipe configuration which is used to connect rows oriented in a serial configuration and to maintain the proper liquid level inside each row. See drawing in sect. 3.5, page 11.

22.24 Raking/Scarification
Refers to methods of preparing the native soil that will be covered with system sand or sand fill, creating a transitional layer between the sand and the soil. See Installation Requirements sect. 18.7, page 25.

22.25 Row
Consists of a number of AES pipe sections connected by couplings with an offset Adapter on one end and an Offset Adapter on the opposite end. Rows are typically between 30 ft and 100 ft long.

22.26 Sand Fill
Clean sand, free of organic materials and meeting the specifications set forth in sand fill, sect. 15.4, page 21. Sand fill is used to raise the elevation of the system to meet required separation distance or in side-slope tapers.

22.27 Section / Serial Section
A group of interconnected rows receiving effluent from one distribution box outlet. Sections are limited to 500 gpd estimated sewage flow.

22.28 Serial Distribution
Two or more AES rows connected by a raised connection. Basic serial distribution is described in detail in sect. 8.0, page 17. Combination serial distribution is described in detail in sect. 10.0, on page 18.

22.29 SHWT
An acronym for seasonal high-water table.

22.30 Skimmer Tabs
Projections into the AES pipe that help to capture grease and suspended solids from the existing effluent (see illustration on page 9).

22.31 Side-to-Side Configuration
Consist of two or more treatment & dispersal fields arranged so that the rows are parallel to one another (see sect. 11.0, page 19).

22.32 Side Slope Taper
Side slope tapering begins 4 ft from the outermost edge of the system sand basal area (see illustration on page 10).

22.33 Slope as a Ratio
In this Manual's illustrations, slope is expressed as a ratio of run to rise. Example: A slope with a grade of (3:1) is the difference in horizontal distance of three (3) horizontal feet (run) over an elevation difference of one (1) ft (rise).

22.34 Slope as Percent (%)
Expressed as a **percent**, is the difference in elevation divided by the difference in horizontal distance between two points on the surface of a landform. Example: A site slope of one (1) percent is the difference in elevation of one (1) foot (rise) over a horizontal distance of one hundred (100) feet (run).

22.35 Smearing
The mechanical sealing of soil air spaces along an excavated or compressed surface. This is also referred to as "compacting." In all installations, it is critical to avoid smearing or compacting the soils under and around the field.

22.36 Surface Diversion
A natural or manmade barrier that changes the course of water flow around an onsite system's soil absorption field.

22.37 System Sand
System sand must be washed clean, granular sand free of organic matter and must adhere to the AES system sand specification with no more than 3% passing the #200 sieve (see complete details in sect. 15.0, page 21).

22.38 System Sand Basal Area (SSBA)
Total area of system sand including treatment area and system sand extension area(s).

22.39 System Sand Treatment Area Minimum Dimensions
The system sand treatment area required/used in AES systems extends a minimum of 6 in below, 3 in above and 6 in horizontally from the outside edges of the AES pipes.

22.40 System Sand Extension Area
The system sand extension area is a minimum of 6 in thick (see illustration in sect.2.0, page 10).

22.41 Topsoil (a.k.a. Loam or Soil Cover Material)
Topsoil, also known as Loam, is soil material cover capable of sustaining plant growth which forms the topmost layer of cover material above the system. No topsoil is allowed under the AES field.

22.42 Treatment Area
Area of system sand (tall portion) immediately surrounding the AES pipes, not including the system sand extension area(s).

22.43 Velocity Reducer
Velocity reducer refers to any of the various components whose purpose is to reduce the velocity of effluent flow into the AES pipes. A distribution box (with or without a baffle) and inlet tee, 90° elbow or equivalent, is sufficient for velocity reduction in

most systems (see illustration in sect. 14.5, page 20).

23.0 Appendix A - Florida Administrative Code, Rule 64E-6.008 System Size Determinations:

64E-6.008 System Size Determinations.

(1) Minimum design flows for systems serving any structure, building or group of buildings shall be based on the estimated daily sewage flow as determined from Table I or the following:

(a) The DOH county health department shall accept, for other than residences and food operations, metered water use data in lieu of the estimated sewage flows set forth in Table I. For metered flow consideration, the applicant shall provide authenticated monthly water use data documenting water consumption for the most recent 12 month period for at least six similar establishments. Similar establishments are those like size operations engaged in the same type of business or service, which are located in the same type of geographic environment, and which have approximately the same operating hours. Metered flow values will not be considered to be a reliable indicator of typical water use where one or more of the establishments utilized in the sample has exceeded the monthly flow average for all six establishments by more than 25 percent or where the different establishments demonstrate wide variations in monthly flow totals. When metered flow data is accepted in lieu of estimated flows found in Table I, the highest flow which occurred in any month for any of the six similar establishments shall be used for system sizing purposes. Except for food operations which exceed domestic sewage waste quality parameters as defined in subsection 64E-6.002(15), F.A.C., where an existing establishment which has been in continuous operation for the previous 24 months seeks to utilize its own metered flows, the applicant shall provide authenticated monthly water use data documenting water consumption for the most recent 24 month period. The highest monthly metered flow value for an existing establishment shall be used for system sizing purposes.

(b) When onsite systems use multiple strategies to reduce the total estimated sewage flow or the drainfield size, only one reduction method shall be credited.

TABLE I
For System Design
ESTIMATED SEWAGE FLOWS

TYPE OF ESTABLISHMENT COMMERCIAL:	GALLONS PER DAY
Airports, bus terminals, train stations, port & dock facilities, Bathroom waste only	
(a) Per passenger	4
(b) Add per employee per 8 hour shift	15
Barber & beauty shops per service chair	75
Bowling alley bathroom waste only per lane	50
Country club	
(a) Per resident	100
(b) Add per member or patron	25
(c) Add per employee per 8 hour shift	15
Doctor and Dentist offices	
(a) Per practitioner	250
(b) Add per employee per 8 hour shift	15
Factories, exclusive of industrial wastes gallons per employee per 8 hour shift	
(a) No showers provided	15
(b) Showers provided	25
Flea Market open 3 or less days per week	
(a) Per non-food service vendor space	15
(b) Add per food service establishment using single service articles only per 100 Square feet of floor space	50
(c) Per limited food service establishment	25
(d) For flea markets open more than 3 days per week estimated flows shall be doubled	
Food operations	
(a) Restaurant operating 16 hours or less per day per seat	40

(b) Restaurant operating more than 16 hours per day per seat	60
(c) Restaurant using single service articles only and operating 16 hours or less per day per seat	20
(d) Restaurant using single service articles only and operating more than 16 hours per day per seat	35
(e) Bar and cocktail lounge per seat	20
add per pool table or video game	15
(f) Drive-in restaurant per car space	50
(g) Carry out only, including caterers	
1. Per 100 square feet of floor space	50
2. Add per employee per 8 hour shift	15
(h) Institutions per meal	5
(i) Food Outlets excluding deli's, bakery, or meat department per 100 square feet of floor space	10
1. Add for deli per 100 square feet of deli floor space	40
2. Add for bakery per 100 square feet of bakery floor space	40
3. Add for meat department per 100 square feet of meat department floor space	75
4. Add per water closet	200
Hotels & motels	
(a) Regular per room	100
(b) Resort hotels, camps, cottages per room	200
(c) Add for establishments with self service laundry facilities per machine	750
Mobile Home Park	
(a) Per single wide mobile home space, less than 4 single wide spaces connected to a shared onsite system	250
(b) Per single wide mobile home space, 4 or more single wide spaces are connected to a shared onsite system	225
(c) Per double wide mobile home space, less than 4 double wide mobile home spaces connected to a shared onsite system	300
(d) Per double wide mobile home space, 4 or more double wide mobile home spaces connected to a shared onsite system	275
Office building	
per employee per 8 hour shift, or	15
per 100 square feet of floor space, whichever is greater	15
Transient Recreational Vehicle Park	
(a) Recreational vehicle space for overnight stay, without water and sewer hookup per vehicle space	50
(b) Recreational vehicle space for overnight stay, with water and sewer hookup per vehicle space	75
Service stations per water closet	
(a) Open 16 hours per day or less	250
(b) Open more than 16 hours per day	325
Shopping centers without food or laundry per square foot of floor space	0.1
Stadiums, race tracks, ball parks per seat	4
Stores per bathroom	200
Swimming and bathing facilities, public	10
per person	
Theatres and Auditoriums, per seat	4
Veterinary Clinic	
(a) Per practitioner	250
(b) Add per employee per 8 hour shift	15
(c) Add per kennel, stall or cage	20
Warehouse	
(a) Add per employee per 8 hour shift	15
(b) Add per loading bay	100
(c) Self-storage, per unit (up to 200 units)	1

add 1 gallon for each 2 units or fraction thereof, for over 200 units, and shall be in addition to employees,

offices or living quarters flow rates.	
INSTITUTIONAL:	
Churches per seat which includes kitchen wastewater flows unless meals prepared on a routine basis	3
If meals served on a regular basis add per meal prepared	5
Hospitals per bed which does not include kitchen wastewater flows	200
add per meal prepared	5
Nursing, rest homes, adult congregate living facilities per bed which does not include kitchen wastewater flows	100
add per meal prepared	5
Parks, public picnic	
(a) With toilets only per person	4
(b) With bathhouse, showers & toilets per person	10
Public institutions other than schools and hospitals per person which does not include kitchen wastewater flows	100
add per meal prepared	5
Schools per student	
(a) Day-type	10
(b) Add for showers	4
(c) Add for cafeteria	4
(d) Add for day school workers	15
(e) Boarding-type	75
Work/construction camps, semi-permanent per worker	50
RESIDENTIAL:	
Residences	
(a) Single or multiple family per dwelling Unit	
1 Bedroom with 750 sq. ft. or less of building area	100
2 Bedrooms with 751-1,200 sq. ft. of building area	200
3 Bedrooms with 1,201-2,250 sq. ft. of building area	300
4 Bedrooms with 2,251-3,300 sq. ft. of building area	400
For each additional bedroom or each additional 750 square feet of building area or fraction thereof in a dwelling unit, system sizing shall be increased by 60 gallons per dwelling unit.	
(b) Other per occupant	50

Footnotes to Table I:

1. For food operations, kitchen wastewater flows shall normally be calculated as 66 percent of the total establishment wastewater flow.

2. Systems serving high volume establishments, such as restaurants, convenience stores and service stations located near interstate type highways and similar high-traffic areas, require special sizing consideration due to expected above average sewage volume. Minimum estimated flows for these facilities shall be 3.0 times the volumes determined from the Table I figures.

3. For residences, the volume of wastewater shall be calculated as 50 percent blackwater and 50 percent graywater.

4. Where the number of bedrooms indicated on the floor plan and the corresponding building area of a dwelling unit in Table I do not coincide, the criteria which will result in the greatest estimated sewage flow shall apply.

5. Convenience store estimated sewage flows shall be determined by adding flows for food outlets and service stations as appropriate to the products and services offered.

6. Estimated flows for residential systems assumes a maximum occupancy of two persons per bedroom. Where residential care facilities will house more than two persons in any bedroom, estimated flows shall be increased by 50 gallons per each additional occupant.

(2) Minimum effective septic tank capacity and total dosing tank capacity shall be determined from Table II. However, where multiple family dwelling units are jointly connected to a septic tank system, minimum effective septic tank capacities

specified in the table shall be increased 75 gallons for each dwelling unit connected to the system. With the exception noted in paragraph 64E-6.013(2)(a), F.A.C., all septic tanks shall be multiple chambered or shall be placed in series to achieve the required effective capacity. The use of an approved outlet filter device shall be required. Outlet filters shall be installed within or following the last septic tank or septic tank compartment before distribution to the drainfield. The outlet filter device requirement includes blackwater tanks, but does not include graywater tanks or grease interceptors or laundry tanks. Outlet filter devices shall be placed to allow accessibility for routine maintenance. Utilization and sizing of outlet filter devices shall be in accordance with the manufacturers' recommendations. The approved outlet filter device shall be installed in accordance with the manufacturers' recommendations. The Bureau of Onsite Sewage Programs shall approve outlet filter devices per the department's Policy on Approval Standards For Onsite Sewage Treatment And Disposal Systems Outlet Filter Devices, November 2008, which is herein incorporated by reference.

TABLE II
SEPTIC TANK AND PUMP TANK CAPACITY

AVERAGE SEWAGE FLOW GALLONS/DAY	SEPTIC TANK MINIMUM EFFECTIVE CAPACITY GALLONS	PUMP TANK MINIMUM TOTAL CAPACITY GALLONS	
		Residential	Commercial
0-200	900	150	225
201-300	900	225	375
301-400	1,050	300	450
401-500	1,200	375	600
501-600	1,350	450	600
601-700	1,500	525	750
701-800	1,650	600	900
801-1,000	1,900	750	1,050
1,001-1,250	2,200	900	1,200
1,251-1,750	2,700	1,350	1,900
1,751-2,500	3,200	1,650	2,700
2,501-3,000	3,700	1,900	3,000
3,001-3,500	4,300	2,200	3,000
3,501-4,000	4,800	2,700	3,000
4,001-4,500	5,300	2,700	3,000
4,501-5,000	5,800	3,000	3,000

(3) Where a separate graywater tank and drainfield system is used, the minimum effective capacity of the graywater tank shall be 250 gallons with such system receiving not more than 75 gallons of flow per day. For graywater systems receiving flows greater than 75 gallons per day, minimum effective tank capacity shall be based on the average daily sewage flow plus 200 gallons for sludge storage. Design requirements for graywater tanks are described in subsection 64E-6.013(2), F.A.C. Where separate graywater and blackwater systems are utilized, the size of the blackwater system can be reduced, but in no case shall the blackwater system be reduced by more than 25 percent. However, the minimum capacity for septic tanks disposing of blackwater shall be 900 gallons.

(4) Where building codes allow separation of discharge pipes of the residence to separate stubouts and where lot sizes and setbacks allow system construction, the applicant may request a separate laundry waste tank and drainfield system. Where an aerobic treatment unit is used, all blackwater, graywater and laundry waste flows shall be consolidated and treated by the aerobic treatment unit. Where a residential laundry waste tank and drainfield system is used:

(a) The minimum laundry waste trench drainfield absorption area for slightly limited soil shall be 75 square feet for a one or two bedroom residence with an additional 25 square feet for each additional bedroom. If an absorption bed drainfield is used the minimum drainfield area shall be 100 square feet with an additional 50 square feet for each additional bedroom over two bedrooms. The DOH county health department shall require additional drainfield area based on moderately limited soils and other site specific conditions, which shall not exceed twice the required amount of drainfield for a slightly limited soil.

(b) The laundry waste interceptor shall meet requirements of subsections 64E-6.013(2) and (8), F.A.C.

(c) The drainfield absorption area serving the remaining wastewater fixtures in the residence shall be reduced by 25 percent.

(5) The minimum absorption area for standard subsurface drainfield systems, graywater drainfield systems, and filled

systems shall be based on estimated sewage flows and Table III so long as estimated sewage flows are 200 gallons per day or higher. When estimated sewage flows are less than 200 gallons per day, system size shall be based on a minimum of 200 gallons per day.

TABLE III
For Sizing of Drainfields Other Than Mounds

U.S. DEPARTMENT OF AGRICULTURE SOIL TEXTURAL CLASSIFICATION	SOIL TEXTURE LIMITATION (PERCOLATION RATE)	MAXIMUM SEWAGE LOADING RATE TO TRENCH & BED ABSORPTION SURFACE INGALLONS PER SQUARE FOOT PER DAY	
		TRENCH	BED
Sand; Coarse Sand not associated with a seasonal water table of less than 48 inches; and Loamy Coarse Sand	Slightly limited (Less than 2 min/inch)	0.80	0.60
Loamy Sand; Sandy Loam; Coarse Sandy Loam; and Fine Sand Loam;	Slightly limited (2-4 min/inch)	0.80	0.60
Fine Sandy Loam; Silt Loam; Very Fine Sand; Very Fine Sandy Loam; Loamy Fine Sand; Loamy Very Fine Sand; and Sandy Clay Loam	Moderately limited (5-10 min/inch)	0.65	0.35
Clay Loam; Silty Clay Loam; Sandy Clay; Silty Clay; and Silt	Moderately limited (Greater than 15 min/inch but not exceeding 30 min/inch)	0.35	0.20
Clay; Organic Soils; Hardpan; and Bedrock	Severely limited (Greater than 30 min/inch)	Unsatisfactory for standard subsurface system	
Coarse Sand with an estimated wet season high water table within 48 inches of the bottom of the proposed drainfield; Gravel or Fractured Rock or Oolitic Limestone	Severely limited (Less than 1 min/inch and a water table less than 4 feet below the drainfield)	Unsatisfactory for standard subsurface system	

Footnotes to Table III:

1. U.S. Department of Agriculture major soil textural classification groupings and methods of field identification are explained in Rule 64E-6.016, F.A.C. Laboratory sieve analysis of soil samples may be necessary to confirm field evaluation of specific soil textural classifications. The USDA Soil Conservation Service “Soil Textural Triangle” shall be used to classify soil groupings based on the proportion of sand, silt and clay size particles.

2. The permeability or percolation rate of a soil within a specific textural classification may be affected by such factors as soil structure, cementation and mineralogy. Where a percolation rate is determined using the falling head percolation test procedure described in the United States Environmental Protection Agency Design Manual for Onsite Wastewater Treatment and Disposal Systems, October, 1980, incorporated by reference into this rule, the calculated percolation test rate shall be used with Table III and evaluated by the DOH county health department with other factors such as history of performance of systems in the area in determining the minimum sizing for the drainfield area.

3. When all other site conditions are favorable, horizons or strata of moderately or severely limited soil may be replaced with slightly limited soil or soil of the same texture as the satisfactory slightly limited permeable layer lying below the replaced layer. The slightly limited permeable layer below the replaced layer shall be identified within the soil profile which was submitted as part of the permit application. The resulting soil profile must show complete removal of the moderately or severely limited soil layer being replaced and must be satisfactory to a minimum depth of 54 inches beneath the bottom surface of the proposed drainfield. The width of the replacement area shall be at least 2 feet wider and longer than the drain trench and for absorption beds shall include an area at least 2 feet wider and longer than the proposed bed. Drainfields shall be centered in the replaced area. Where at least 33 percent of the moderately limited soils at depths greater than 54 inches below the bottom of the drainfield have been removed to the depth of slightly limited soil, drainfield sizing shall be based on the following sewage

loading rates. Where severely limited soils are being removed at depths greater than 54 inches below the bottom of the drainfield, 100 percent of the severely limited soils at depths greater than 54 inches shall be removed down to the depth of an underlying slightly limited soil. Maximum sewage loading rates for standard subsurface systems installed in replacement areas shall be 0.80 gallons per square foot per day for trench systems and 0.60 gallons per square foot per day for absorption beds in slightly limited soil textures. Where moderately limited soil materials are found beneath the proposed drainfield, and where system sizing is based on that moderately limited soil, soil replacements of less than 33% may be permitted.

4. Where coarse sand, gravel, or oolitic limestone directly underlies the drainfield area, the site shall be approved provided a minimum depth of 42 inches of the rapidly percolating soil beneath the bottom absorption surface of the drainfield and a minimum 12 inches of rapidly percolating soil contiguous to the drainfield sidewall absorption surfaces, is replaced with slightly limited soil material. Where such replacement method is utilized, the drainfield size shall be determined using a maximum sewage application rate of 0.80 gallons per square foot per day of drainfield in trenches and 0.60 gallon per square foot per day for drainfield absorption beds.

5. Where more than one soil texture classification is encountered within a soil profile and it is not removed as part of a replacement, drainfield sizing for standard subsurface drainfield systems and fill drainfield systems shall be based on the most restrictive soil texture encountered within 24 inches of the bottom of the drainfield absorption surface.

(6) All materials incorporated herein may be obtained from the Bureau of Onsite Sewage Programs at www.MyFloridaEH.com or 4052 Bald Cypress Way, Bin A08, Tallahassee, Florida 32399-1713.

Rulemaking Authority 381.0065(3)(a) FS. Law Implemented 381.0065 FS. History–New 12-22-82, Amended 2-5-85, Formerly 10D-6.48, Amended 3-17-92, 1-3-95, Formerly 10D-6.048, Amended 11-19-97, 3-22-00, 9-5-00, 11-26-06, 6-25-09, 7-16-13.

24.0 Appendix B – Comparability Ratings based upon Table III, Table VI, Table VII and Table VIII of the Florida Administrative Code 64E-6:

Absorption Bed Loading Rates and Comparability Ratings for Table III and Rule 64E-6.009(3)(d):

Texture	Texture Rating	*Loading Rate (GPD/ft²)	Comparability Rating (ft² required mineral aggregate per ft² System Sand)	
			Subsurface/Fill	Mound
Coarse Sand, Sand, Loamy Coarse Sand	Slightly Limited	1.25	2.08	2.08
Fine Sand	Slightly Limited	1.25	2.08	2.08
Loamy Sand	Slightly Limited	1.25	2.08	3.13
Coarse Sandy Loam, Sandy Loam	Slightly Limited	1.25	2.08	3.13
Very Fine Sand, Loamy Very Fine Sand	Moderately Limited	0.60	1.71	2.40
Fine Sandy Loam	Moderately Limited	0.60	1.71	2.40
Very Fine Sandy Loam	Moderately Limited	0.60	1.71	n/a
Loam	Moderately Limited	0.50	1.43	n/a
Silt Loam	Moderately Limited	0.43	1.23	n/a
Sandy Clay Loam	Moderately Limited	0.43	1.23	n/a
Clay Loam, Silty Clay Loam	Moderately Limited	0.27	1.35	n/a
Sandy Clay, Silty Clay	Moderately Limited	0.27	1.35	n/a
Clay	Severely Limited	n/a	n/a	n/a

*Loading rates reflect state approved reduction in System Sand basal area size (increased loading rates)

Comparability Ratings for Repairs of Absorption Beds:

Table VI - Slightly Limited Textures

# Bedrooms	Linear FT of AES Pipe	Mineral Aggregate Area (ft²)	Comparability Rating (ft² required mineral aggregate/ft² System Sand)	Presby System Sand Basal Area (ft²)
1	30	100	2.08	49
2	60	200	2.08	97
3	90	300	2.08	145
4	120	400	2.08	193
Add per additional bedroom	30	100	2.08	49

Table VII - Moderately Limited Textures

# Bedrooms	Linear FT of AES Pipe	Mineral Aggregate Area (ft²)	Comparability Rating (ft² required mineral aggregate/ft² System Sand)	Presby System Sand Basal Area (ft²)
1	30	125	1.46	86
2	60	250	1.46	172
3	90	375	1.46	257
4	120	500	1.46	343
Add per additional bedroom	30	125	1.46	86

Repairs for commercial systems according to Rule 64E-6.015(6)(d), FAC: Calculate System Sand Basal Area per Table VIII (below), using applicable adjusted loading rate (derived from comparability rating from Table VI or Table VII above).

Table VIII - Drainfield Sizing for Commercial Systems Installed Prior to 1983

	Absorption Beds Adjusted Soil Loading Rate (GPD/ft²)
Slightly Limited Textures	1.66
Moderately Limited Textures	0.73

Example: Commercial repair (system installed in 1980), 900 GPD, moderately limited soil texture – 900 GPD / 0.73 GPD/ft² = 1233 ft² minimum System Sand Basal Area for Presby AES system.