The Presby Wastewater Treatment System

Advanced Enviro-Septic® Application Package

For a Permit to Construct

750 GPD or Less

Wyoming

- √ **Minimizes the Expense**
- √ **Protects the Environment**
- √ **Preserves the Site**

AES System Application Package

Presby Environmental, Inc.

An Infiltrator Water Technologies Company

The Next Generation of Wastewater Treatment Technology

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Introduction

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The following package is designed to assist you in submitting a completed application for a properly designed small wastewater treatment and disposal system using Presby Environmental's (PEI) Advanced Enviro-Septic® (AES) system. It is designed **only** for a system utilizing a state approved septic tank and gravity feed treatment field. The daily wastewater flow must be 750 gallons per day (GPD) or less. It has been prepared under the direction of Mitch Hardert, P.E, a registered professional engineer. A signed and sealed copy is maintained on file at the Lander offices of the Department of Environmental Quality (DEQ).

Using the information in this design package and accurately completing the necessary forms for the site-specific system design will ensure that the design will comply with the minimum requirements of the Wyoming Water Quality Rules and Regulations, Chapter 25 (Chapter 25). Only those pages which are applicable to your system need to be submitted.

This package is for a standard in-ground gravity bed type disposal system, using AES for daily design flows of 750 gallons per day or less (see separate high flow application for systems over 750 gpd). If the seasonal high groundwater, bedrock, or impervious clay layer is within three feet of the bottom of the proposed treatment field, then a mounded or partially mounded system may be required. Since these types of systems are more difficult to design and construct, **this package does NOT provide guidance in their design. Please contact your district engineer if you propose to use a non-conventional system.**

For systems exceeding 2,000 gallons per day or for wastewater that is not entirely domestic waste, contact the Underground Injection Control (UIC) Program at 307-777-5623 or refer to: http://deq.wyoming.gov/wqd/underground-injection-control/.

Wyoming Department of Environmental Quality Water Quality Division
Permit number **20-160**

Date of Issue: 8-20-20

Reviewed By_____App. No. _____

Small Wastewater Treatment Facility Application for Permit to Construct

Use this application **ONLY** for small wastewater treatment facilities treating 750 gallons per day or less. Not to be used for mound, evaporation ponds, or other non-conventional systems. For non-conventional system, contact the district engineer. For systems exceeding 2,000 gallons per day, contact the Underground Injection Control Program (UIC) at 307-777-7781 or refer to: http://deq.wyoming.gov/wqd/underground-injection-control/

For Converse (commercial systems only), Carbon, Niobrara, and Platte counties, submit completed packages to: DEQ/ Water Quality Division 200 W 17th Street Cheyenne, WY 82002 (307) 777-7781	**WQD Date Stamp**
For Campbell (commercial systems only), Crook, and Weston counties, submit completed packages to: DEQ/Water Quality Division 152 North Durbin Street, Suite 100 Casper, WY 82601 (307) 473-3465	**WQD Authorization Stamp**
For all other counties: contact the Small Wastewater Permitting Authority for the correct forms. http://deq.wyoming.gov/wqd/permitting-2/resources/small-wastewater-permitting-authority/	

Name of Project:	
Project Description:	

Location:

County:							
¼ ¼ Section:		Section:		Township:		Range:	
Decimal Latitude:		Decimal Longitude:					
Subdivision Name:		Lot and Block:					

Real Estate Owner		Engineer/Geologist	
Printed Name:		Printed Name:	
Title:		Title:	
Mailing Address:		Mailing Address:	
City, State:	Zip:	City, State:	Zip:
Phone Number:		Phone Number:	
Email:		Email:	
		WY P.E.#	WY P.G.#

Installer Information

Name:			
Mailing Address:			
City, State, Zip:			
Phone:		Email:	

Property Information		
	County:	
	Physical Address:	
	Lot Size:	_____ feet by _____ feet **OR** _____ acres
	Type of Building:	(single family dwelling, mobile home, commercial, etc.)
	Water Source: (Check One)	☐ Cistern
		☐ Private Well — SEO Well Permit Number: _____
		☐ Community Well — Name: _____
		☐ Municipal Well — Name: _____
	Is this a replacement small wastewater treatment facility? If yes, what are you replacing?	☐ Yes ☐ No — Type replaced:
	Will this small wastewater treatment facility be located within a delineated source water protection area?	☐ Yes ☐ No
	Does the county approved plat require enhanced septic systems? If yes, do NOT proceed with this application. Contact your district engineer to discuss other options.	☐ Yes ☐ No

Provide legal description of property (from sales contract or deed) below and attach a copy of the county approved plat.

Access Route

As part of this application, the applicant shall certify under penalty of perjury that the applicant has secured and shall maintain permission for DEQ personnel and their invitees to access the permitted site, including (i) permission to access the land where the site is located, (ii) permission to collect resource data as defined by Wyoming Statute § 6-3-414, and (iii) permission to enter and cross all properties necessary to access the site if the site cannot be directly accessed from a public road. A map of the access route(s) to the site shall accompany this application. **Attach map as a separate sheet.**

Signatures

All undersigned certify under penalty of perjury that the owner or applicant has secured and shall maintain permission for Department of Environmental Quality personnel and their invitees to access the permitted site, including (i) permission to access the land where the site is located, (ii) permission to collect resource data as defined by Wyoming Statute § 6-3-414, and (iii) permission to enter and cross all properties necessary to access the site if the site cannot be directly accessed from a public road. All undersigned agree to comply with all applicable Wyoming Statutes and Regulations and to allow the activities described in this application.

Real Estate Owner (Signature Required)	Engineer/Geologist
Signature:	**Signature:**
Printed Name:	**Printed Name:**
Title:	**Title:**

Site Suitability

The owner must be aware of the depth of any impermeable soil layers, high groundwater levels, and slope when considering the septic system location. The septic system must meet the criteria listed in the Introduction (Page 2) for a conventional system to work properly. **If your site does not meet these criteria, stop filling out this form and contact your district engineer to discuss other options.** The questions below will ensure you have gathered the information necessary to determine if a conventional septic system is appropriate.

****REQUIRED****

Cut/dig a soil and groundwater exploration pit near or within the area of the proposed leachfield until you reach water, solid rock or 10 feet (whichever comes first). Then answer the following questions:

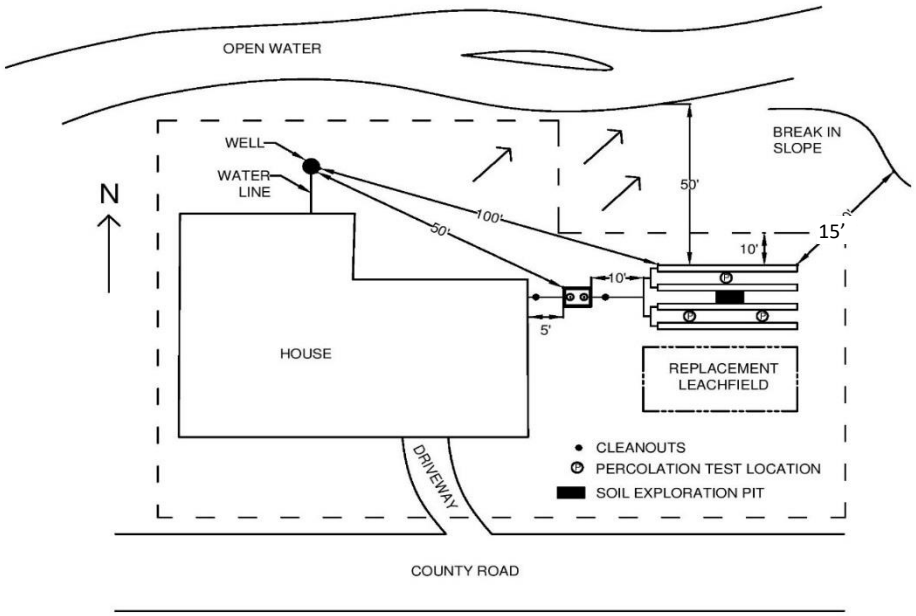
Excavation	Was the bottom of the required soil exploration pit at least 4 feet below the bottom of the proposed leachfield, usually a minimum of 8-10 feet total depth?			☐ Yes ☐ No
	Take a color photograph of the excavation, showing a tape measure against the sidewall of the trench. Submit a color copy of the photograph as a separate sheet. **Photo included in packet?**			☐ Yes ☐ No
	Who conducted the excavation?			
	Date of excavation:		Depth of the excavation:	
Impermeable Layers	Did the excavator observe a rock layer below the surface? If yes, at what depth below the ground surface?			☐ Yes ☐ No
	Did the excavator observe a clay layer below the surface? If yes, at what depth below the ground surface?			☐ Yes ☐ No
High Groundwater	Was groundwater present in the excavation? If yes, at what depth below the ground surface?			☐ Yes ☐ No
	Does the soil have an alkali crust at the surface, a rotten egg smell, or a blue-gray or greenish-gray (gley) color that may indicate frequent/continuous saturation? If yes, at what depth below the ground surface?			☐ Yes ☐ No
	Does the soil have a mottled appearance with areas around roots or cracks that look like rust, or is the soil stained a dark red-black or red-brown color, which may indicate periods of saturation? If yes, at what depth below the ground surface?			☐ Yes ☐ No
Slope	What is the estimated % slope of the leachfield area? **Include a color photograph of the proposed leachfield area in your packet.**			_____% slope
	Is there a break in slope (the side of a hill or where slope becomes abruptly steeper) within 15-20 feet of the leachfield area?			☐ Yes ☐ No

Site Plan Drawing

Attach a sketch of your site as a separate sheet, showing each of the items in the table below if applicable.

Check Box if Shown on Site Plan	Element	Required Setback Distance (feet) to Septic Tank	Required Setback Distance (feet) to Leachfield	Is the Setback Distance Satisfied?
	Property lines	10	10	☐ Yes ☐ No
	All buildings, roads, and driveways		—	
	Setback to buildings w/out a foundation drain	5	10	☐ Yes ☐ No
	Setback to buildings with a foundation drain	5	25	☐ Yes ☐ No
	Private wells (including neighbors)	50	100	☐ Yes ☐ No
	Public water supply wells	100	200	☐ Yes ☐ No
	Potable water supply lines	25	25	☐ Yes ☐ No
	Surface water (ditch, pond, Intermittent waterways, etc.)	50	50	☐ Yes ☐ No
	Septic tank	—	10	☐ Yes ☐ No
	Break in slope (where slope gets abruptly steeper)	15	15	☐ Yes ☐ No
	Cisterns	25	25	☐ Yes ☐ No
	Leachfield & Replacement Leachfield	10	—	☐ Yes ☐ No
	North arrow		—	
	Slope (arrow pointing downslope)		—	
	Location of percolation test holes (numbered)		—	
	Location of soil exploration pit		—	
	Location of flow dividers, d-boxes and cleanout ports		—	

Example site plan:



Percolation Test Instructions

In order for a septic system to perform properly, the wastewater must move through the soil at an ideal rate, neither too fast nor too slow. A percolation test estimates the rate at which the water will percolate, or move, through the soil. The information provided by percolation tests is necessary to design a leachfield correctly. Follow the steps below to complete a percolation test.

1. Location of Percolation Test Holes. The percolation (perc) test holes must be spaced uniformly over the proposed leachfield site. A minimum of three (3) test holes are required, although you can use more if desired.

2. Test Hole Preparation. Dig or bore each hole 12 inches wide and as deep as the proposed depth of the leachfield (usually between 30 and 40 inches). Make sure the sides are vertical and scrape the sides and bottom of the hole with a sharp pointed instrument to restore a natural soil surface. Remove loose soil from the hole and place 2 inches of course sand, washed gravel, or crushed stone in the bottom in order to prevent scouring or sealing.

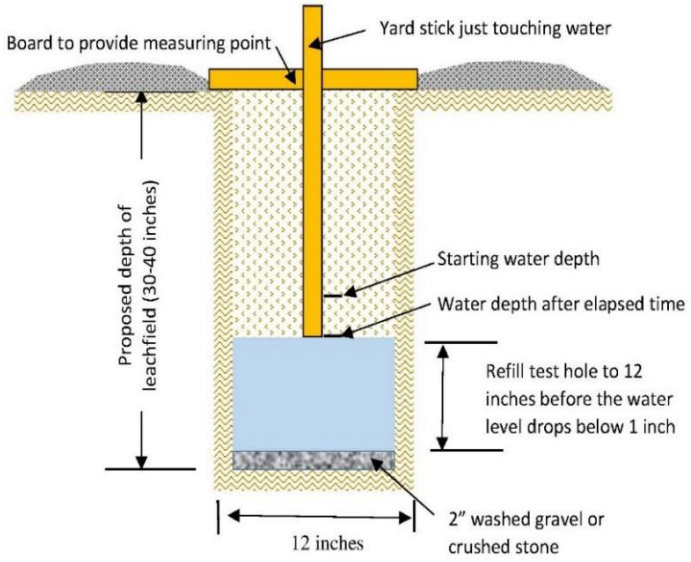
3. Presoaking. Presoaking is ***absolutely*** required to get valid percolation test results. Presoaking allows the water conditions in the test hole to reach a stable condition that is similar to a leachfield. Presoaking time varies with soil conditions, but presoak holes for at least 4 hours. Maintain at least 18 inches of water in the test holes for at least 4 hours, then allow the soil to swell for 12 hours (overnight is good) before starting the perc test.

For sandy or loose soils, add 18 inches of water above the gravel or coarse sand. If the 18 inches of water seeps away in 18 minutes or less, add 18 inches of water a second time. If the second filling of 18 inches of water seeps away in 18 minutes or less, the soil is excessively permeable and the site is unsuitable for a conventional disposal system. If this is the case, contact your county small wastewater permitting authority or DEQ district office.

4. Perc Rate Measurements. Fill each hole with 12 inches of water and let the soil re-hydrate for 15 minutes prior to taking any measurements. Establish a fixed reference point such as a flat board placed across the top of the hole to measure the incremental water level drop at the constant time intervals. Measure the water level drop to the nearest 1/8 of an inch with a minimum time interval of 10 minutes. Common time intervals are 10 or 15 minutes.

Refill the test hole to 12 inches above the gravel before starting the measurements. Measure down to the water from the fixed reference point. Record this value on the first line in the perc test data sheet on Page 8. Take another measurement after the time interval has elapsed and record on the second line of the table. Calculate the water level drop and record in the table.

Continue the test until the water level drop rate has stabilized, i.e. three consecutive measurements within 1/8 inch of each other. Before the water level drops below 1 inch above the gravel, refill the test hole to 12 inches. Some test holes may take longer to stabilize than others. If the drop rate continues to fluctuate, use the smallest drop rate out of the last six intervals for your calculations.



Percolation Test Data Sheet

Owner/Project Name: _____ **Date:** _____

Test holes were pre-soaked for: _____ (hours/minutes) **Time Interval:** _____ min

Do not perform percolation test if ground is frozen or if groundwater is present in holes. Holes must be 12 inches in diameter and evenly spaced over the leachfield area. Roughen sides and bottoms of holes and place 2 inches of gravel in each hole.

		Hole #1 (Required)		Hole #2 (Required)		Hole #3 (Required)		Hole #4 (Optional)		Hole #5 (Optional)		Hole #6 (Optional)	
Depth of Hole:													
Time of Day	**Elapsed Time (Min)**	**Measure to nearest 1/8 inch**		**Measure to nearest 1/8 inch**		**Measure to nearest 1/8 inch**		**Measure to nearest 1/8 inch**		**Measure to nearest 1/8 inch**		**Measure to nearest 1/8 inch**	
		Water Level	**Drop**	**Water Level**	**Drop**	**Water Level**	**Drop**	**Water Level**	**Drop**	**Water Level**	**Drop**	**Water Level**	**Drop**
			—		—		—		—		—		—
Time Interval (minutes)													
Final Interval Drop (inches)													
Perc Rate (min/inch)													
Design Perc Rate (min/inch)													

To calculate drop: Subtract the water level measurement at the start of your time interval from the water level measurement at the end. The "Drop" is how far the water level went down during the stated time interval. Time intervals must be consistent for each hole throughout the test.

Leachfield percolation (Perc) rate: If 3 to 5 holes were tested, use the slowest (highest number) rate of the holes tested. If six or more holes were tested, use the average rate.

Helpful Conversions: 1/8 = 0.125 1/4 = 0.25 3/8 = 0.375 1/2 = 0.50 5/8 = 0.625 3/4 = 0.75 7/8 = 0.875

To calculate perc rate (minutes per inch): Time Interval (min) ÷ Final Interval Drop (in)

Example Perc Rate = Time Interval (min)/Final Interval Drop (in) = 10min/1.125in = 8.9min/in

I certify that this perc test was done in accordance with WQRR Chapter 25, Appendix A and the instructions on the previous page.

Test Performed by: _____ **Signature:** _____

Septic Tank and Piping Worksheet

Septic Tank	**Minimum Tank Capacity:** • Up to 4 bedrooms: 1,000 gallons • 5 Bedrooms: 1,150 gallons (*Add 150 gallons per each additional BR)		**Tank Size to be Used: (gallons)**	
	Manufacturer & Model Number:		**Number of Compartments in Tank:**	
	Tank Material:	☐ Concrete ☐ Fiberglass ☐ Thermoplastic ☐ Other (please describe): _____		
	Is this septic tank on the DEQ-approved list? If no, provide a tank diagram from the manufacturer. If you cannot locate a diagram from the manufacturer, complete "Basic Design Requirements for Septic Tanks Not on the DEQ-Approved List."			☐ Yes ☐ No ☐ Don't Know
	Does the tank have a 20-inch access opening in **EACH** compartment of the tank and a riser from the access opening that terminates at a max of six (6) inches below the ground surface?			☐ Yes ☐ No
	Do access openings have a locking device?			☐ Yes ☐ No
	Is septic tank installed on a level grade, with firm bedding to prevent settling, and without rock or other obstructions touching the tank as per WQRR Chapter 25, Section 10(a)(ii)?			☐ Yes ☐ No
	If installing two tanks in a series, install the downstream tank a minimum of 2 inches lower than the first to insure proper flow. Will the installer use a series of tanks as described?			☐ Yes ☐ No
	Depth of backfill to be placed over tank (minimum of 6" required):			☐ Yes ☐ No
Piping from Building to Tank	**Piping material to be used between the building and septic tank:**		**Proposed pipe size (diameter):**	
	Will the installer lay the pipe from the house to the septic tank in a straight line?			☐ Yes ☐ No
	- If no, will the installer include the **required** cleanout ports at any alignment change greater than 22.5 degrees?			☐ Yes ☐ No
	Will the pipe from the house to the septic tank be more than 100 feet long?			☐ Yes ☐ No
	- If yes, will **required** cleanout ports be spaced along the line every 100 feet or less?			☐ Yes ☐ No
	DEQ recommends a cleanout port facing each direction between the building and the tank. Which direction does your **required** cleanout port face?			☐ Toward Building ☐ Toward Tank ☐ Both Directions
	Will the piping have a minimum slope of ¼ inch per foot (2%)?			☐ Yes ☐ No
	If the installer uses more than one trench, they must use a distribution box or flow divider tee to equalize flow. Which will be used in your proposed system?			☐ Single Trench ☐ Flow Divider Tee(s) ☐ D-box

Leachfield Sizing Worksheet

Design Flow (gpd)

Select Building Type

☐	Residential Building (Includes Mobile Homes)	**# Bedrooms**	**Box A**
		Unfinished Basement?	☐Yes ☐No
		If yes, enter 2. **If no, enter 0.**	**Box B**
		Total # Bedrooms = Box A + Box B	**Box C**

Enter the number of gallons per day (gpd) of wastewater generated that corresponds with the total number of bedrooms (Box C) in Box 1 below.

1	bedroom	150 gpd
2	bedrooms	280 gpd
3	bedrooms	390 gpd
4	bedrooms	470 gpd
5	bedrooms	550 gpd
6	bedrooms*	630 gpd

*Add 80 gallons per day for each additional bedroom.

☐	Non-Residential Building	Refer to Chapter 25, Table 2 of the WQRR to determine design flow. Show calculations (attach a separate sheet if necessary).

Design Flow (gpd):
Enter value from cells above or Chapter 25, Table 2.

Box 1

Loading Rate (gpd/ft²)

Check Perc Rate Obtained from Perc Test Data (page 8)

Perc. Rate min/inch	Loading Rate gpd/ft²	Perc. Rate min/inch	Loading Rate gpd/ft²	Perc. Rate min/inch	Loading Rate gpd/ft²
○ 5	1.60	○ 16	1.00	○ 30-31	0.78
○ 6	1.50	○ 17	0.98	○ 32-33	0.76
○ 7	1.42	○ 18	0.96	○ 34-35	0.74
○ 8	1.36	○ 19	0.94	○ 36-37	0.72
○ 9	1.30	○ 20	0.92	○ 38-40	0.70
○ 10	1.24	○ 21	0.90	○ 41-43	0.68
○ 11	1.20	○ 22	0.88	○ 44-46	0.66
○ 12	1.16	○ 23-24	0.86	○ 47-50	0.64
○ 13	1.12	○ 25	0.84	○ 51-55	0.62
○ 14	1.08	○ 26 - 27	0.82	○ 56-60	0.60
○ 15	1.04	○ 28 - 29	0.80		

Loading Rate (gpd/ft²):
Enter loading rate for your percolation rate from above table.

Box 2

Leachfield Sizing (ft²)

Required Leachfield Area (ft²)
Divide design flow (Box 1) by the loading rate (Box 2).
Round **up** to the nearest whole number.

_____ ÷ _____ = _____

Design Flow (Box 1) Loading Rate (Box 2) Leachfield Area (ft²) (Box 3)

Example: 280 gpd ÷ 0.62 gpd/ft² = 451.61 or 452 ft²

Box 3

Leachfield Design Instructions

Arrange the AES system leachfield using a bed configuration. Use bed configurations where space for a leachfield is limited and only where soils have percolation rates of 60 minutes per inch (mpi) or faster. DEQ considers trenches spaced less than three (3) feet apart as bed layouts.

To design your leachfield, follow these steps:

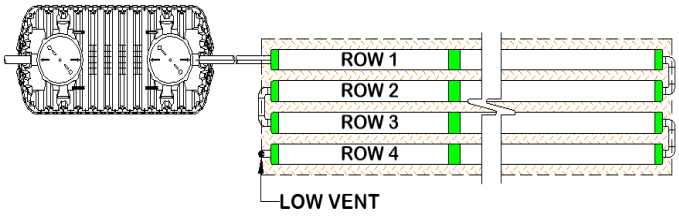
1) Fill out the layout worksheet and diagram. This worksheet will determine how many rows of AES pipe you need and how large to make your bed.
2) Submit **only** the worksheet and diagram that you completed.

If you feel it would be beneficial to learn more about the AES system prior to completing this package, please download a copy of our Wyoming Design and Installation Manual from our website at www.presbyeco.com. PEI provides free technical assistance to its customer. If at any point when designing an AES system you have questions or need additional assistance, please contact our Technical Advisers at (800) 473-5298.

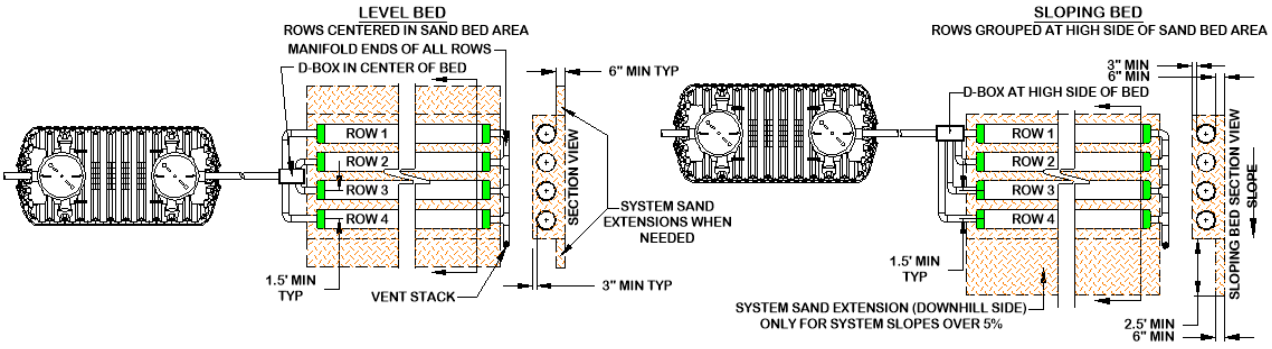
Use either basic serial or distribution box (D-box) distribution to distribute wastewater effluent to the leachfield. Basic serial distribution uses Schedule 40 PVC piping from the septic tank to the first row of the AES system. A less permeable biomat develops along the bottom of the AES pipe, where saturated conditions displace oxygen. This biomat development is assisted by the Bio-Accelerator fabric and promotes distribution of the effluent along the length of the AES pipe and field. Distribution from row to row is facilitated through raised connections as needed depending on the actual flows to the system. Basic serial distribution creates a single vent path, which provides air/oxygen to every row of AES pipe.

Example of Basic Serial Distribution:

D-box distribution (also referred to as parallel distribution) may also be used to distribute effluent by splitting the flows from the septic tank to every row of AES pipe. The discharge line from the septic tank connects to a d-box fitted with flow equalizers on each outlet that feeds into a distribution line. Distribution boxes are typically made of concrete or wastewater-grade plastics and are watertight with a single inlet set at a higher elevation than the outlets.



Example of D-box Distribution:



PEI and DEQ do not require installation of pipe rows in a straight line. In fact, it is always preferable to follow the contour of the land. Never install the leachfield in floodways, at the base of slopes, or in depressions where runoff water could flood the leachfield. Construct leachfields in areas with good surface drainage, where the water cannot pond over the leachfield.

AES System Bed Layout Worksheet

Design

Required Leachfield Area (Page 10, Box 3):			Box 1
Proposed Total Excavated Depth (ft):		Proposed Bed Width (ft):	Box 2
Proposed Depth Below Pipe (ft):		Proposed Bed Length (ft):	Box 3
Total Bed Area (ft^2)	_____ * _____ = _____ Bed Width (Box 2) Bed Length (Box 3) Total Bed Area		Box 4

Is Box 4 ≥ Box 1?

- If No, adjust Bed Width (Box 2) and Bed Length (Box 3) until Box 4 is greater than Box 1
- If Yes, complete the bottom of this page.

Pipe Layout

AES Pipe Required	**Residential:** ____# bedrooms x 70 ft/bedroom = _____ ft minimum **Non-Residential:** Daily design flow (Box #1) ÷ 2.14 gpd/ft _____ gpd ÷ 2.14 gpd/ft = _____ ft minimum	Box 5
Pipe Layout	Row Length: Bed length (Box 3) – 1(for 6" sand perimeter) =	Box 6
	Number Rows: _____ ÷ _____ = _____ Pipe Required (Box 5) Row Length (Box 6) # Rows	Box 7

Does the bed width (Box 2) allow for all pipe to fit within the bed? Calculate as follows PLW = [(# of rows – 1) x row center to center spacing (1.5 minimum)] + 1(perimeter sand). PLW = [_____ X _____] + 1 = _____ [(# of rows – 1) (ctc row spacing)]	Box 8	☐ Yes ☐ No

☐	If no, adjust bed width (Box 2) and total bed area (Box 4) to cover all pipe rows.
☐	If yes, determine if system sand extensions are needed.

System Sand Extensions

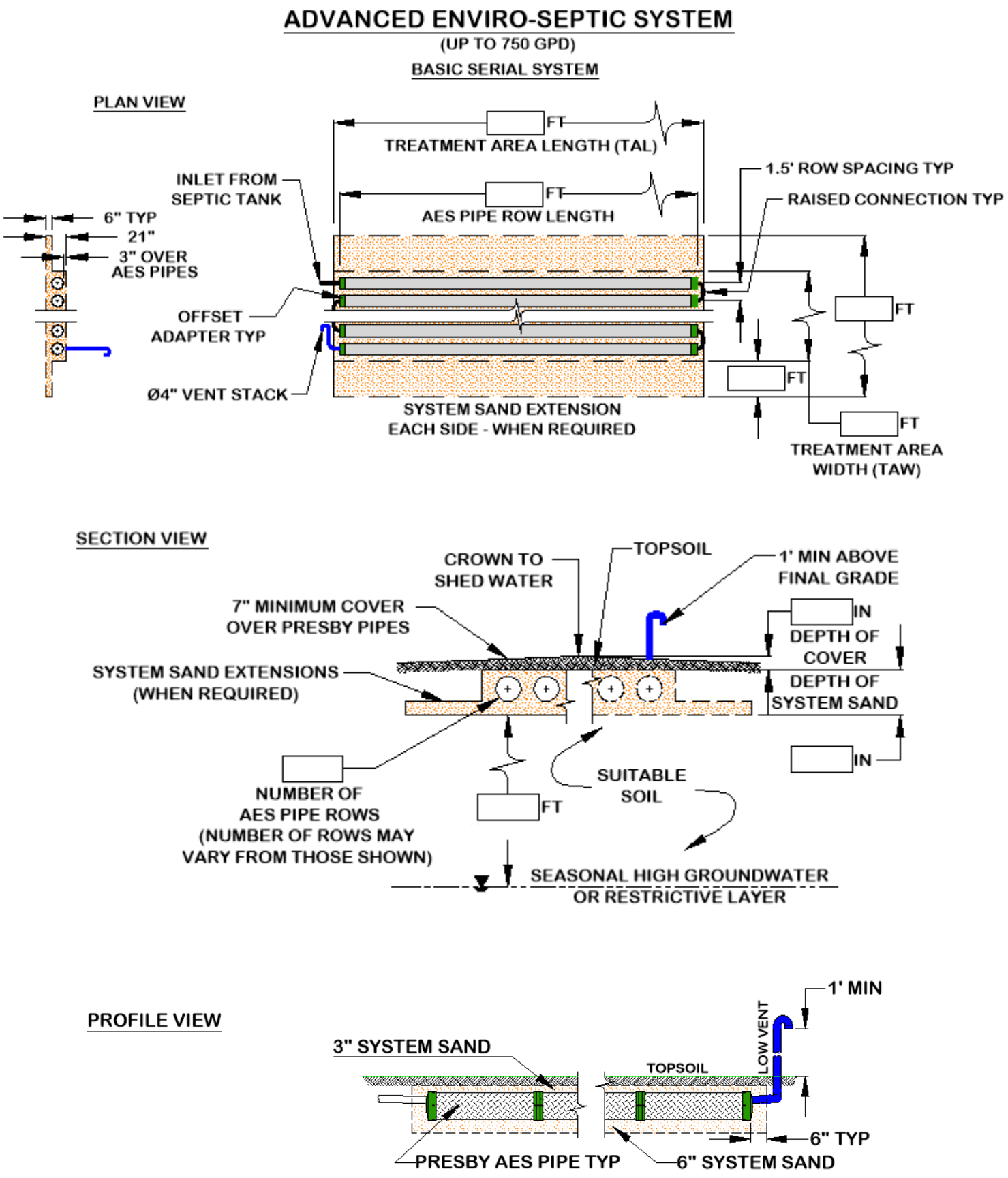
System Sand Extension (SSE)	Level beds: SSE are placed on each side of AES pipes _____ – _____ ÷ 2 = _____ on each side. [SSBW (Box 2)] [(PLW + 1)(Box 8)] *Note: There will be no SSE's if the SSBW = (PLW +1 ft).* Sloping beds: SSE placed entirely on the down slope side of the bed _____ – _____ = _____ on the downslope side. [SSBW (Box 2)] [(PLW + 1)(Box 8)] *Note: If bed slopes greater than 5%, SSE must be at least 2.5 ft (3 ft from the edge of the AES pipe). Bed width and SSBA may need to be increased to meet this requirement*	Box 9

Using the final calculations from boxes 1 – 9 above, complete the boxes in the diagrams on Page 13.

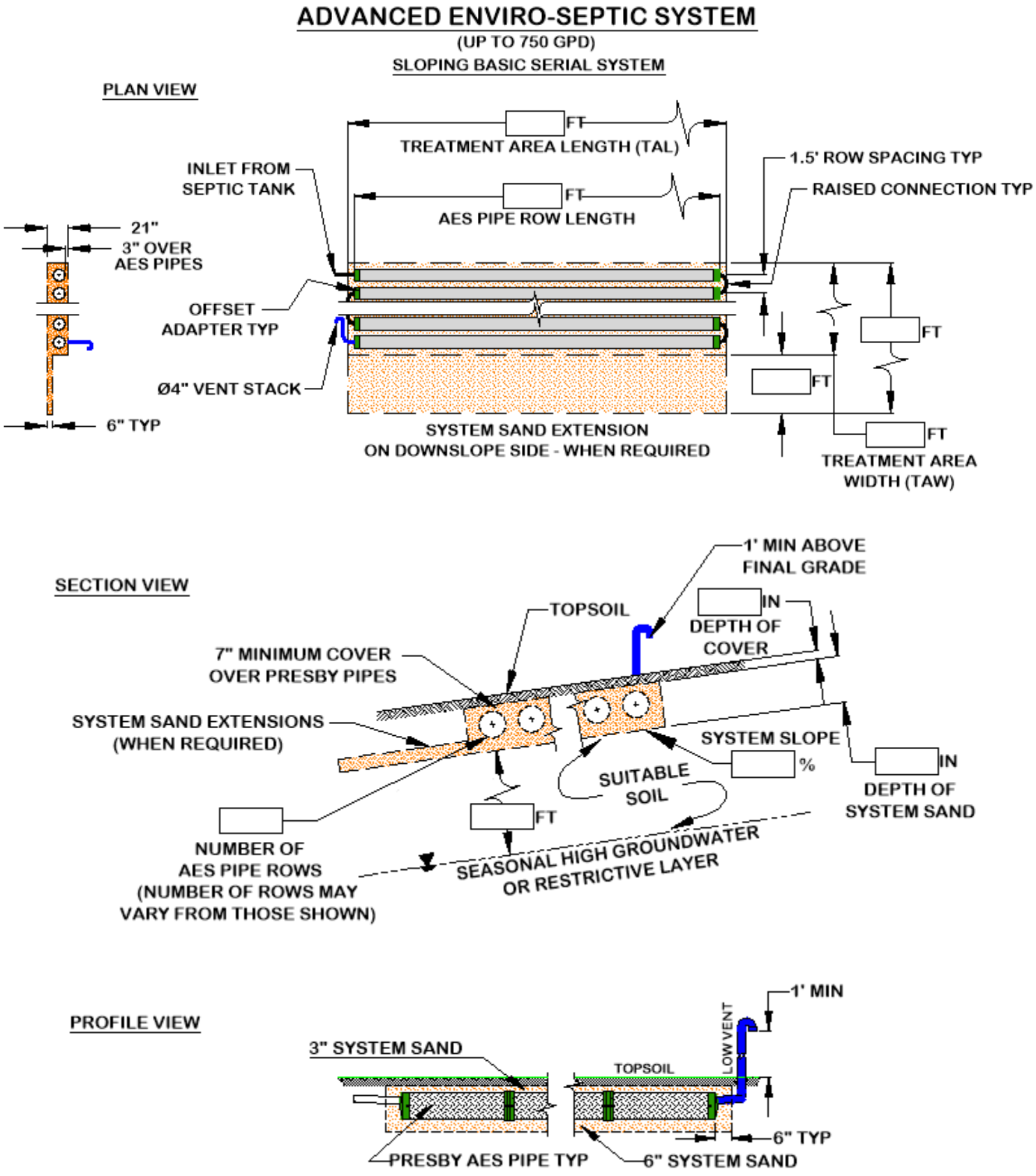
NOTES:

1. Basic serial systems do not require a distribution box.
2. System sand must meet requirements specified in Wyoming AES Design and Installation Manual.
3. A 4" diameter vent pipe must be attached to the end of the last row in the series.
4. Effluent filters are not recommended for use with AES systems, as they restrict air flow.
5. All PVC joints must be glued or mechanically fastened.
6. Consult the Wyoming AES Design and Installation Manual for complete system requirements.

Fill in the boxes on the diagram below.



Fill in the boxes on the diagram below.



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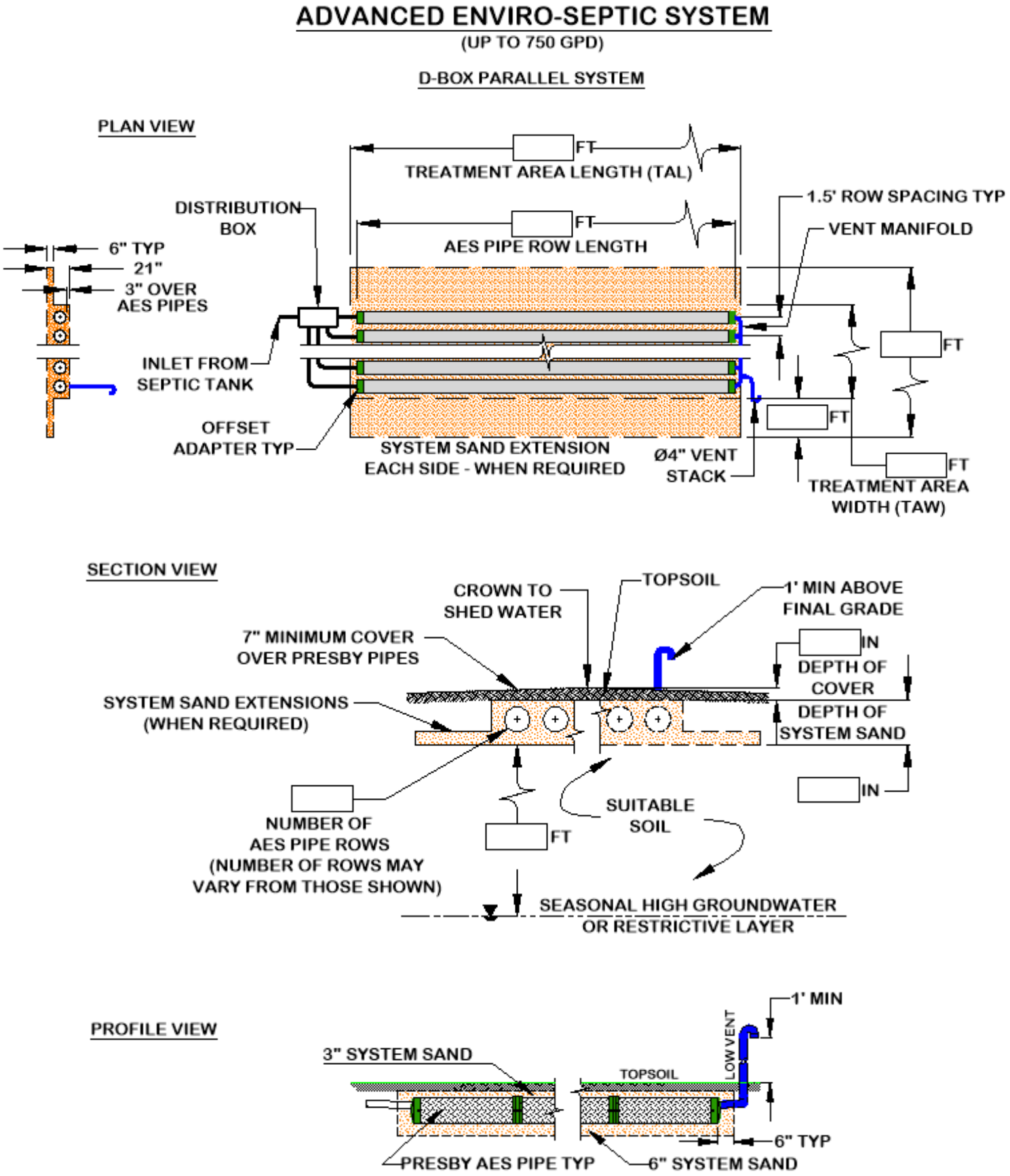
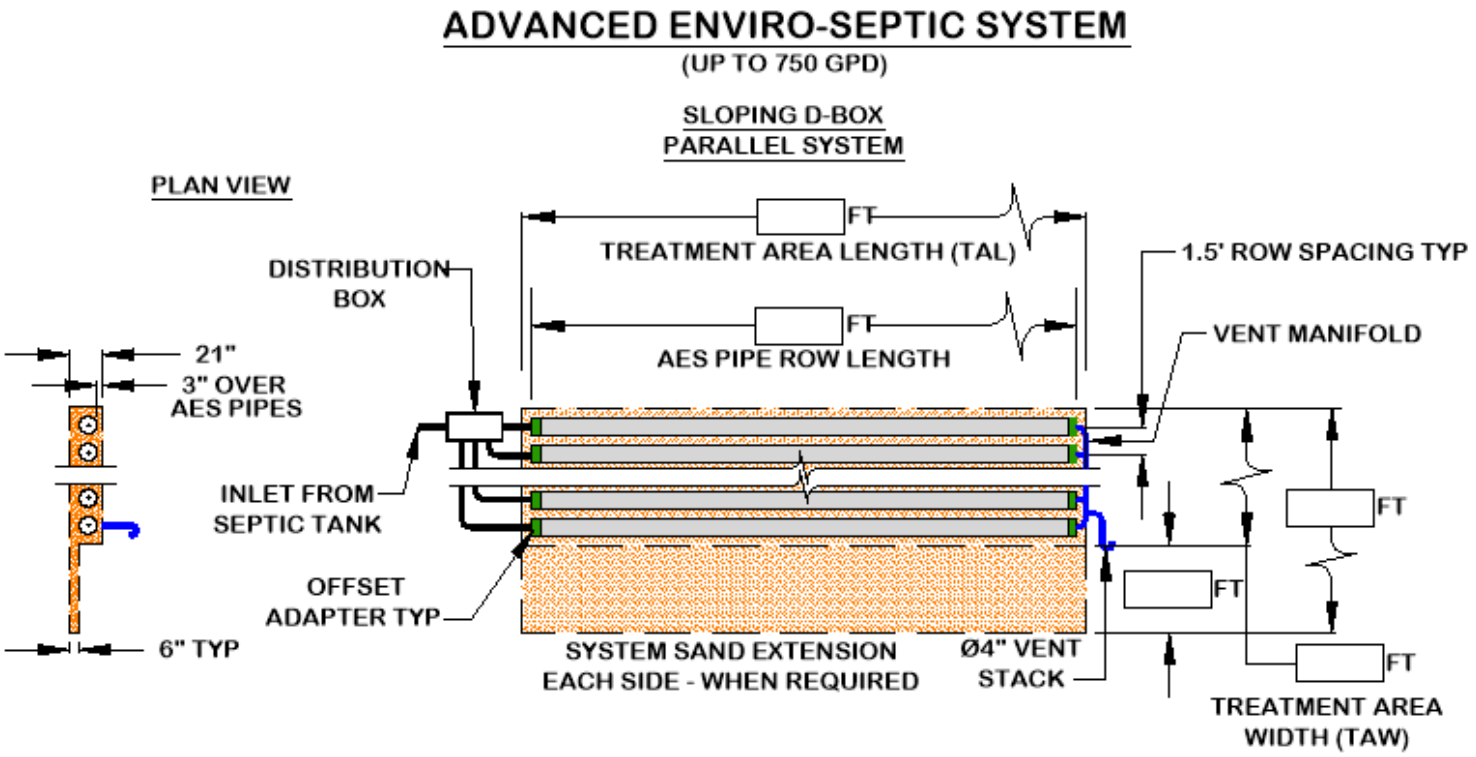
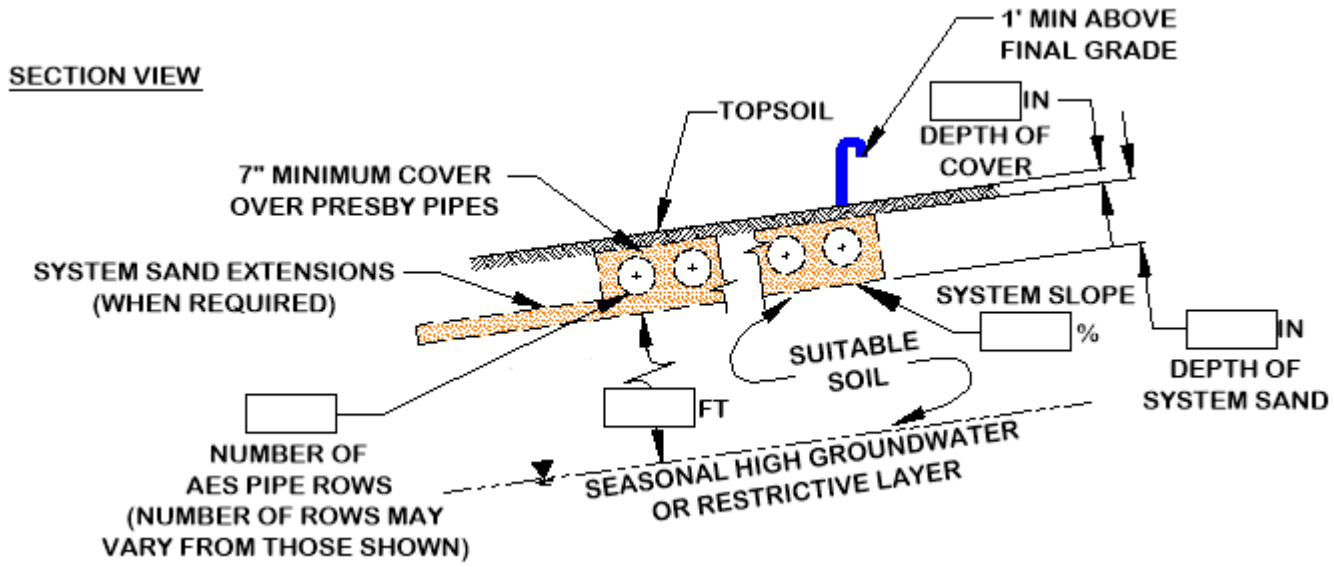
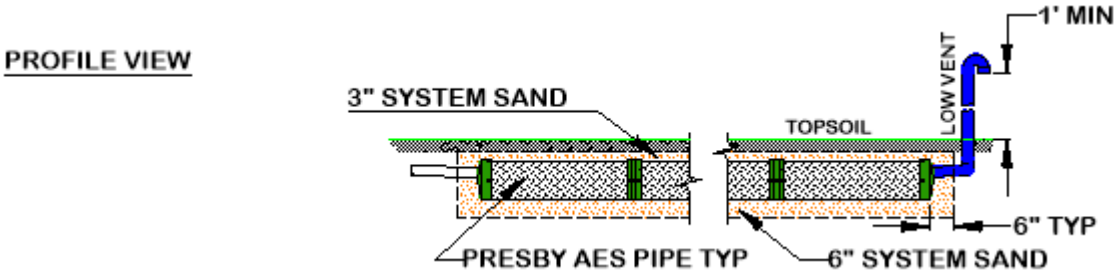


Fill in the boxes on the diagram below.







Draw your layout below or attach a separate sheet