

# Presby Maze<sup>®</sup> Design and Installation Manual



**PRESBY ENVIRONMENTAL, INC.**  
*INNOVATIVE SEPTIC TECHNOLOGIES*

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The information in this manual is subject to change without notice. Your suggestions and comments are welcome. Please contact us at

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Enviro-Septic® U.S. Patent Nos. 6,461,078; 5,954,451; 6,290,429 with other patents pending. Canadian Patent Nos. 2185087; 2187126 with other patents pending. Simple-Septic® U.S. Patent No. 5,606,786. Presby Maze® U.S. Patent No. 5,429,752. Enviro-Septic®, Simple-Septic®, and Presby Maze® are registered trademarks of Presby Environmental, Inc. Multi-Level™, is a trademark of Presby Environmental, Inc. © 2004 Presby Environmental, Inc. All rights reserved. Publication date: January 2004.

# The Presby Maze<sup>®</sup> Design and Installation Manual

## Preview

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**Purpose** The purpose of this manual is to provide guidance in the design and installation of septic systems using the Presby Maze<sup>®</sup>.

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**Presby Environmental, Inc., standards** All systems using a Presby Maze<sup>®</sup> must be designed and installed in compliance with the procedures and specifications described in this manual.

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**State and Provincial standards** Attachments to this manual include information specific to different States and Provinces and should be used in conjunction with the information in this manual.

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**In this manual** This manual contains the following subjects.

| <b>Section</b>                                    | <b>Page</b> |
|---|-------------|
| A – Introduction                                  | 2           |
| B – Definitions of Terms                          | 4           |
| C – Basic Design Criteria                         | 7           |
| D – Commercial System Design Criteria             | 9           |
| E – Residential or Non-Commercial Design Criteria | 11          |
| F – Installation Guidelines                       | 12          |
| G – Pump System Guidelines                        | 14          |
| H – Cleaning and Maintenance Guidelines           | 15          |

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**Use of attachment required** This manual requires the use of an attachment specific to your State or Province in order to properly design and install systems using the Presby Maze<sup>®</sup>. Should conflicts occur, the information in State and Provincial attachments takes precedence over that found in this manual.

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**Technical support** Presby Environmental, Inc., provides technical support to all individuals using our products. For questions about our products or the information contained in this manual, please contact us at 1-800-473-5298.

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## Section A Introduction

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**Definition:  
suspended solids**

Suspended solids are those minute particles in septic tank liquid that neither sink nor float inside a septic tank. They remain suspended in the liquid and escape in the effluent that exits the septic tank.

Suspended solids can overload the bacterial surface of a leaching system causing premature failure and groundwater pollution. A standard septic tank allows as much as 60% of the suspended solids it receives to escape into a leaching system.

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**What the Presby  
Maze® is**

The Presby Maze® is a simple device that is sized to be inserted inside most standard septic tanks and is designed to trap suspended solids. This patented product is made from PVC plastic pipe, high-density plastic mesh, and heavy-duty sheet plastic. It has no moving parts and requires no special maintenance. A septic tank with a Presby Maze® installed requires no special maintenance.

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**What the Presby  
Maze® does**

The Presby Maze® simply and inexpensively provides for smaller, less expensive, longer lasting, and environmentally safer leaching systems.

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**How the Presby  
Maze® works**

The Presby Maze® uses a network of vertical mesh panels to break down the boundary layer and create a large surface area for naturally sticky, suspended solids to collect on. Solids on the mesh attract other solids that form globules of varying densities and sizes. Globules become either more dense and slither down the mesh to the bottom of the tank or more buoyant and creep up the mesh to the liquid surface.

The mesh panels serve two other functions. They provide an immense bacterial surface area inside the tank on which solids are more efficiently broken down, and they form a “maze” directing the liquid on the longest and slowest possible path through the tank. This lengthy journey provides more time for solids to separate naturally from the effluent.

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**Why use a  
Presby Maze®**

Using a Presby Maze®

- increases the efficiency of the common septic tank
  - dramatically reduces suspended solids in effluent
  - may allow substantial leaching system size reductions
  - installs easily in both new and existing systems
  - contains no moving parts
  - requires no special maintenance
  - applies to both commercial and residential systems
  - increases system performance and longevity.
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# Introduction, Continued

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**What a Presby Maze<sup>®</sup> looks like**

Here's a picture of a Presby Maze<sup>®</sup>.



## Section B

### Definitions of Terms

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**Introduction** As you read through the information in this manual, you will encounter common terms, terms that are common to our industry, and terms that are unique to the Presby Maze<sup>®</sup>. While alternative definitions may exist, this section defines these terms as they are used in this manual.

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**List of terms** Here's a list of the terms defined in this section.

- Daily Flow Volume
  - Design Flow
  - Equalizer<sup>™</sup>
  - General Direction of Flow
  - Grease Trap
  - Inlet Baffle
  - Inlet End Wall
  - Manifold D-Box
  - Mesh Panel
  - Mesh Panel Opening
  - Outlet Baffle
  - Outlet End Wall
  - Parallel Tank System
  - Presby Maze<sup>®</sup> Septic Tank
  - Presby Maze<sup>®</sup> Septic Tank System
  - Primary Septic Tank
  - PVC Plastic Pipe Frame
  - Radiator Effect
  - Serial Tank Settings
  - Time Period of Flow
  - Velocity Reducing Tank
- 

**Daily flow volume** Daily flow volume is the total gallons of sewage to be handled by the septic system in a 24-hour period.

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**Design flow** Design flow is the determined flow used in the system design and governed by individual state regulations. Design flow takes into account peak flow and waste strength.

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**Equalizer<sup>™</sup>** An Equalizer<sup>™</sup> is a plastic insert installed in the outlet lines of a distribution box to provide more equal effluent distribution to each outlet.

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**General direction of flow** The general direction of flow is the direction of the liquids and solids as they pass through the Presby Maze<sup>®</sup>.

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*Continued*

## Definitions of Terms, Continued

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|   |  |
|---|--|
| <b>Grease trap</b>                                | A <u>grease trap</u> is a septic tank with modified baffles that trap grease and scum that float to the surface of the tank. Grease traps are most often used on the waste lines of commercial kitchens. |
| <b>Inlet baffle</b>                               | The <u>inlet baffle</u> is a plastic or concrete barrier or a PVC tee and pipe baffle that slows down and forces fluid and/or solids downward to the center of the tank.                                 |
| <b>Inlet end wall</b>                             | The maze <u>inlet end wall</u> is a solid plastic wall with a lower left or right corner cut out to direct the incoming flow.  |
| <b>Manifold D-Box</b>                             | A <u>manifold D-Box</u> is a distribution box in which several outlet lines are connected into a single line to evenly divide flow.  |
| <b>Mesh panel</b>                                 | The maze <u>mesh panel</u> is a high-density plastic mesh strapped to a PVC plastic pipe frame.  |
| <b>Mesh panel opening</b>                         | The maze <u>mesh panel opening</u> is the opening at the end of a mesh panel that controls the general direction of the flow of the liquids and solids passing through the Presby Maze <sup>®</sup> .    |
| <b>Outlet baffle</b>                              | The <u>outlet baffle</u> is a plastic or concrete barrier or a PVC tee and pipe baffle that traps scum and sludge, allowing effluent to exit the outlet.   |
| <b>Outlet end wall</b>                            | The maze <u>outlet end wall</u> is a solid plastic wall with a notch cut out of either the left or right side to direct the outgoing flow of effluent.   |
| <b>Parallel tank system</b>                       | A <u>parallel tank system</u> uses tanks installed to receive an equally divided portion of the effluent flow from a primary tank.   |
| <b>Presby Maze<sup>®</sup> septic tank</b>        | A <u>Presby Maze<sup>®</sup> septic tank</u> is a standard septic tank with a Presby Maze <sup>®</sup> inserted.   |
| <b>Presby Maze<sup>®</sup> septic tank system</b> | A <u>Presby Maze<sup>®</sup> septic tank system</u> consists of all the septic tanks used within a septic system, including the primary tank and all Presby Maze <sup>®</sup> septic tanks.              |
| <b>Primary septic tank</b>                        | A <u>primary septic tank</u> is the first septic tank in a Presby Maze <sup>®</sup> septic tank system with or without a Presby Maze <sup>®</sup> installed.   |
| <b>PVC plastic pipe frame</b>                     | The maze <u>PVC plastic pipe frame</u> is a frame made of plastic pipe that supports the end walls and mesh panels.  |

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## Definitions of Terms, Continued

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**Radiator effect** The radiator effect is the cooling of effluent in the septic tank produced by cooler temperatures in the ground surrounding the tank. Multiple tank settings, where greater tank surface area contacts surrounding ground, generate greater cooling.

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**Serial septic tank systems** Serial septic tank systems are tanks that are connected one tank after the other.

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**Time period of flow** The time period of flow is that number of hours in a day during which the septic system receives the bulk of its “daily flow volume.”

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**Velocity reducing tank** A velocity reducing tank is a tank used to slow the velocity of incoming liquids prior to entering the Presby Maze<sup>®</sup> septic tank.

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## Section C Basic Design Criteria

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### Introduction

To maximize the efficiency of the Presby Maze<sup>®</sup>, the retention time of liquids within the septic tank must be greater than normal, and the velocity of incoming materials must be controlled. The maze itself forces liquid to travel a long, impeded course through the tank, thus reducing velocity, aiding cooling, encouraging suspended solids separation, and enhancing bacterial development.

The use of larger tanks and the radiator effect of multiple tanks in parallel configurations additionally maximize the efficiency of Presby Maze<sup>®</sup> tank systems.

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### Leaching system size reductions

Presby Maze<sup>®</sup> tank systems may allow for a reduction in the size of many types of leaching systems. Such reductions in both commercial and residential leaching systems are governed by State or Provincial rules.

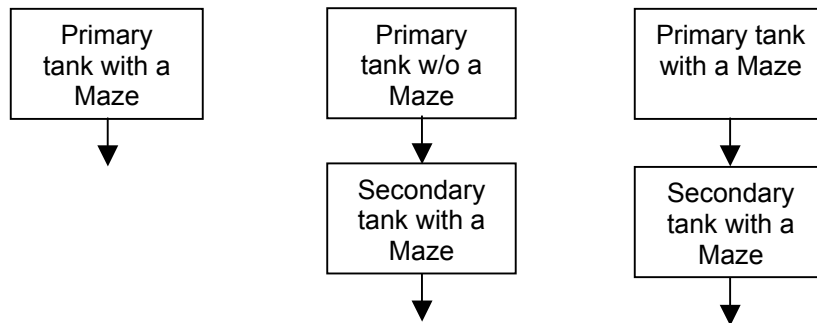
Reference: See “Leach Area Reductions” in your State attachment.

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### Single and serial tank systems

Here are three basic tank system configurations using the Presby Maze<sup>®</sup>. The second two illustrate serial configurations.

Examples:



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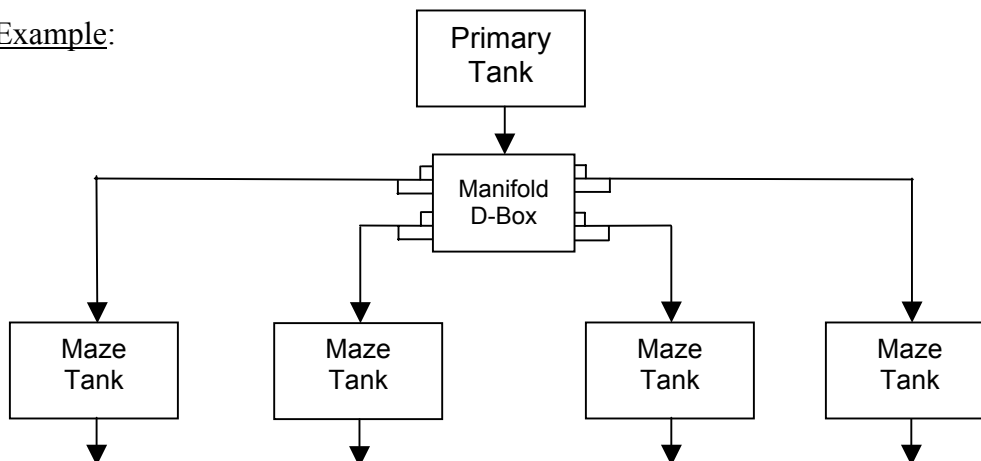
## Basic Design Criteria, Continued

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### Parallel tank system

Reducing effluent velocity and cooling effluent are important concepts that allow the Presby Maze<sup>®</sup> to function properly. Parallel tank systems are preferable to serial tank systems. Parallel Presby Maze<sup>®</sup> tank systems use a manifold distribution box with Equalizers<sup>™</sup> or the equivalent.

Example:



Special Note: All Presby Maze<sup>®</sup> septic tanks used in parallel configurations must be of the same size (volume).

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### Tank size limitation

The Presby Maze<sup>®</sup> is regularly produced to fit septic tanks from 1,250 gallons to 3,000 gallons. Customized sizes are available on a made-to-order basis.

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### Grease trap connections

Always connect grease traps into the primary septic tank. Grease traps may also contain a Presby Maze<sup>®</sup> for greater efficiency.

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### Other factors requiring consideration

The use of garbage grinders, hot tubs, Jacuzzis, chlorinators, water filters, and water softeners may have adverse effects on septic tanks due to the increased volume of liquids, solids, and chemicals. Be sure to consider these factors when designing a system.

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### Prohibited substances

Toxic and hazardous waste materials are prohibited from all Presby Maze<sup>®</sup> septic tank systems.

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### Inspection and Maintenance

Failure to follow proper inspection and maintenance procedures can affect the life expectancy of leaching systems. Presby Maze<sup>®</sup> tank system designs should include notes on State and local regulations regarding inspection and maintenance, abusive substances, use of additives, etc.

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### See State requirements

Local and State jurisdictions may require additional design specifications.  
Reference: See your State attachment to this manual.

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## Section D

### Commercial System Design Criteria

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**Summarized list of steps** Designing commercial systems involves determining the number and sizes of primary and Presby Maze<sup>®</sup> tanks required. This summarized list is explained in detail below.

- Calculate the design flow.
  - Determine the time period of flow.
  - Determine tank size(s).
  - Design a tank layout.
- 

**Calculate design flow** Design flow is calculated using State and local rules.

Reference: See “State Specific Information” in your State attachment.

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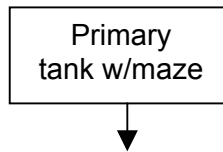
**Determine time period of flow** The time period of flow is that number of hours in a day during which the septic system receives the bulk of its “design flow.”

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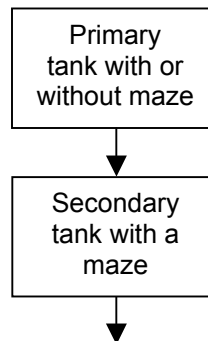
**Determine tank size(s)** Use the tables in “Tank Sizing” in your State attachment to determine the necessary tank size(s).

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**Single tank system** In single tank systems it may be possible to design a system with a primary septic tank that incorporates a Presby Maze<sup>®</sup>.



**Serial tank system** Where design flow permits, only two tanks in serial configuration may be necessary.



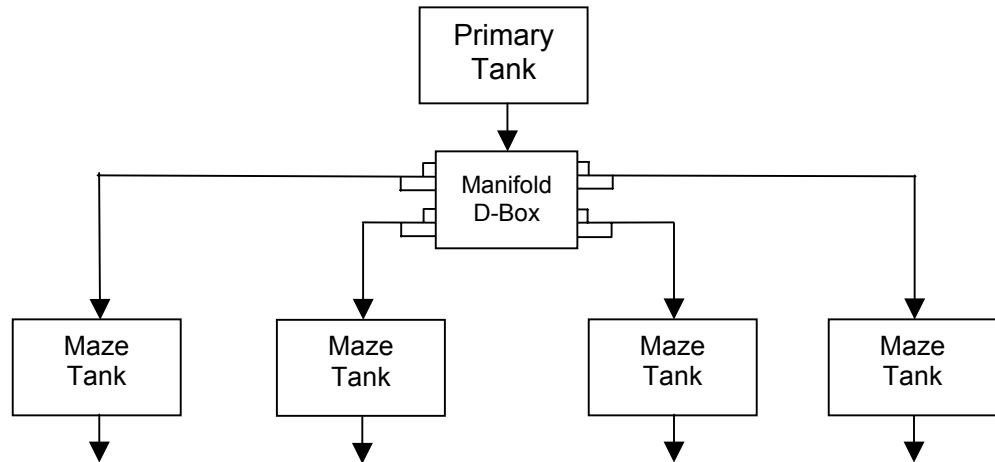
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## Commercial System Design Criteria, Continued

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### Parallel tank system

In parallel tank systems with Presby Maze<sup>®</sup> septic tanks, the effluent from the primary tank travels to a distribution box. Each distribution box outlet line must have Equalizers<sup>™</sup> installed to evenly divide the flow to the Presby Maze<sup>®</sup> septic tanks. After passing through Presby Maze<sup>®</sup> septic tanks, effluent can flow to individual leaching areas or be connected together and feed a single leach area.



Special note: Each Presby Maze<sup>®</sup> septic tank in parallel tank settings must be of equal size.

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### Leach area reductions

Commercial leach area reductions may apply when using the Presby Maze<sup>®</sup>. Reductions are controlled by State and local jurisdictions.

Reference: See “Leach Area Reductions” in your State attachment.

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## Section E

### Residential or Non-Commercial System Design Criteria

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**Introduction**      The Presby Maze<sup>®</sup> offers substantial advantages for non-commercial or residential installations. The Presby Maze<sup>®</sup> is ideally suited to installations with a history of leach area problems or that have severe site limitations such as seasonal high water tables, distance to ledge, distance to surface water, etc.

In addition the Presby Maze<sup>®</sup> offers an added measure of environmental protection and may be beneficial in obtaining variances or waivers.

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**Tank sizing**      State and local jurisdictions govern tank sizing for residential and/or non-commercial systems.

Reference: See “Tank Sizing” in your State attachment.

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**Leach area reductions**      Leach area reductions may apply when using the Presby Maze<sup>®</sup>. Reductions are controlled by State and local jurisdictions.

Reference: See “Residential or Non-Commercial Leach Area Reductions” in your State attachment.

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## Section F Installation Guidelines

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### Introduction

This page contains guidelines that must be observed while installing a Presby Maze<sup>®</sup> or a Presby Maze<sup>®</sup> tank system.

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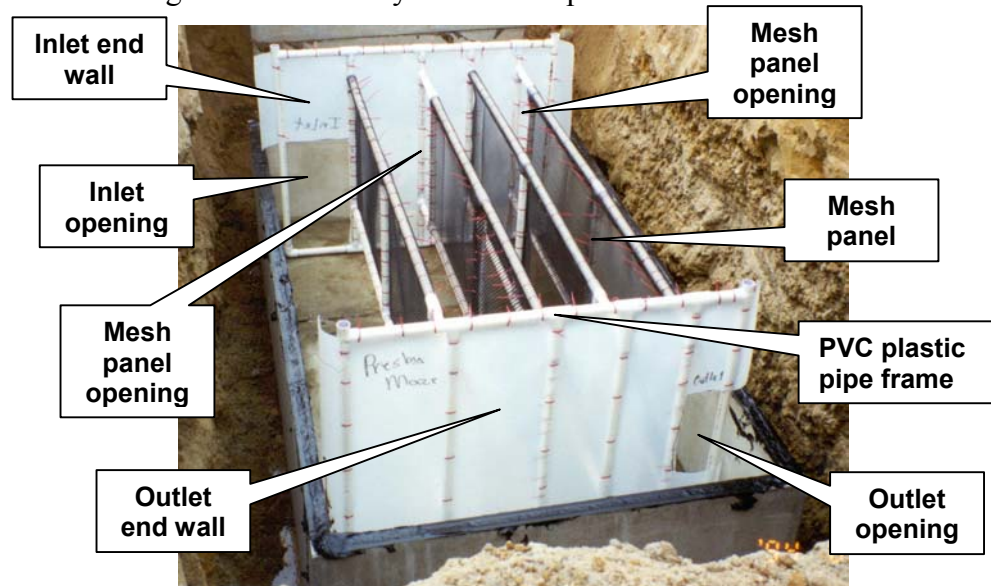
### Tank site preparation

Level and compact any loose soil in the bottom of the septic tank excavation to prevent settling. Be sure to install the septic tank as level as possible to ensure maximum efficiency of the Presby Maze<sup>®</sup>.

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### Presby Maze<sup>®</sup> diagram

Here's a diagram of the Presby Maze<sup>®</sup> components.



### Customized tank design

Be aware that a septic tank with a Presby Maze<sup>®</sup> installed may require larger center, inlet, and outlet covers and risers to provide for easier pumping between the mesh panels and behind the end walls of the maze.

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### Presby Maze<sup>®</sup> alignment in septic tank

The inlet and outlet end of the Presby Maze<sup>®</sup> must correspond with the inlet and outlet end of the septic tank. Do not mistakenly install the Presby Maze<sup>®</sup> upside down or reversed.

Each Presby Maze<sup>®</sup> is clearly marked “inlet”, “outlet” and “top.” An easy way to double check is to look at the end walls. The inlet end wall always has the lower (bottom) corner cut out.

Note: See Diagram above.

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*Continued*

## Installation Guidelines, Continued

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**Do not modify septic tank**

Changes made to a Presby Maze<sup>®</sup> septic tank may interfere with the proper functioning of the maze. Do not modify the inlet or outlet of a septic tank with a Presby Maze<sup>®</sup> installed.

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**Presby Maze<sup>®</sup> installation procedure**

Follow these steps to install a Presby Maze<sup>®</sup> into a septic tank.

1. Set the bottom section of the septic tank.
2. Unfold the Presby Maze<sup>®</sup> until it forms a perfect rectangle.
3. Center the Presby Maze<sup>®</sup> inside the bottom section of the tank making sure the flexible edges of the Presby Maze<sup>®</sup> end walls are touching the sides of the tank.
4. Install the remaining section of the tank.

Caution: Be sure that the septic tank baffles do not crush the Presby Maze<sup>®</sup> during installation.

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**Seal tank and grade surface**

Be sure all septic tanks are properly sealed to prevent infiltration of ground water. Grade the surface over the tank to shed surface water.

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**Record tank location**

Record the location of inlet, outlet, and center covers for all septic tanks for maintenance purposes.

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## Section G

### Pump System Guidelines

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**Introduction** Effluent from a primary tank may be pumped to a Presby Maze<sup>®</sup> septic tank when site conditions prohibit gravity systems.

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**Velocity control required** Never pump effluent directly into a Presby Maze<sup>®</sup> septic tank. Velocity control is imperative to keep collected solids from being prematurely removed from the mesh.

If the system pump is between the primary tank and the Presby Maze<sup>®</sup> septic tank(s), a velocity reducing tank is required.

Reference: See “Tank layout diagrams” below.

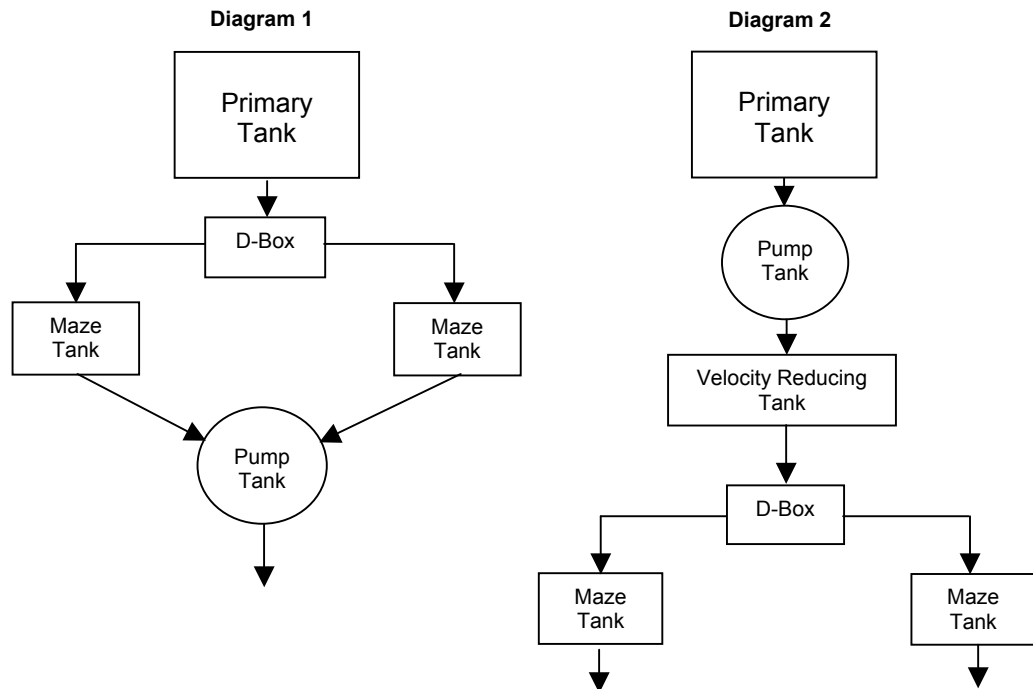
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**Venting required** If a pump is incorporated in the system, vent all tanks after the pump-pressure line. Venting is required for septic tanks to function properly.

The vent height differential should be a minimum of 10 feet in order to “draw” air through the tank and leaching system.

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**Tank layout diagrams** Here are two diagrams of typical tank setting layouts. Diagram 1 is the preferred layout. Diagram 2 uses a velocity reducing tank which is required whether using one or more maze tanks.





## Section H

### Cleaning and Maintenance Guidelines

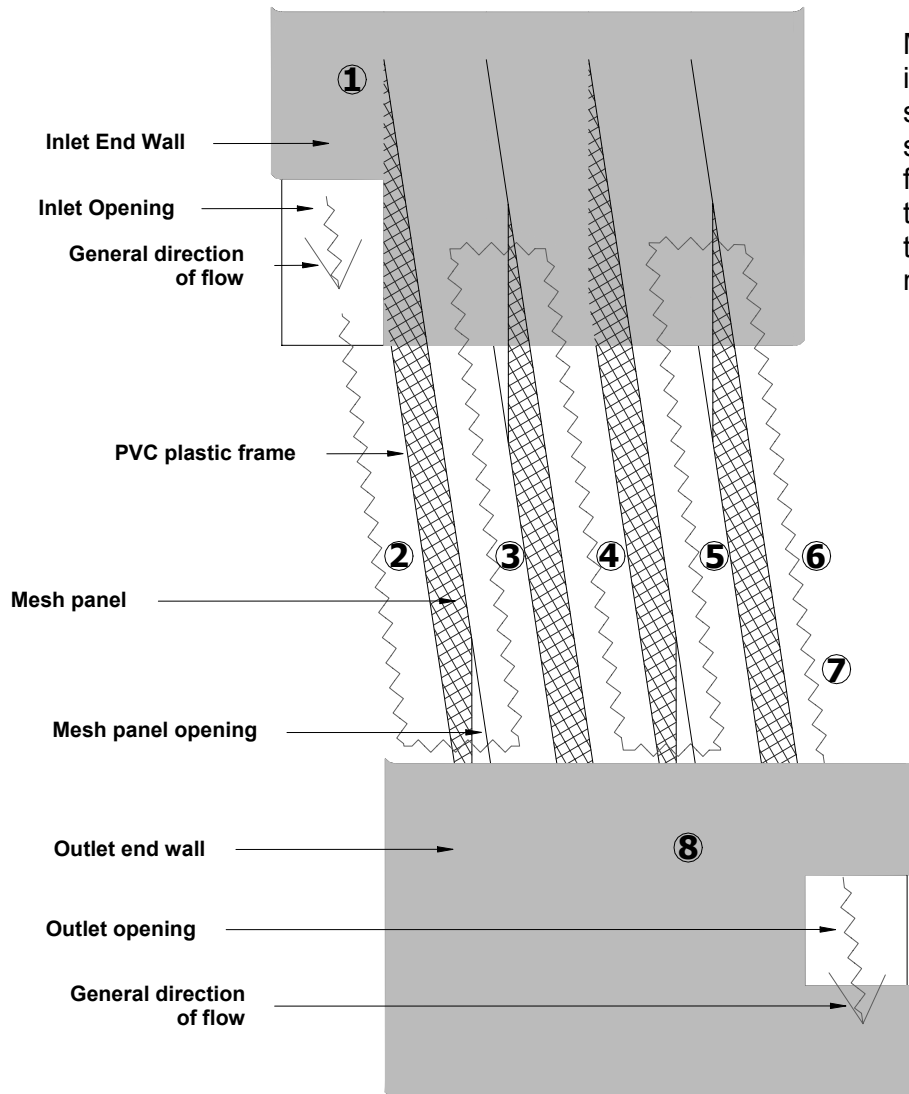
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|                                    |  |
|------------------------------------|--|
| <b>Introduction</b>                | If all septic tanks are not cleaned as required, the life expectancy of the leaching system will be reduced.   |
| <b>Tank cleaning requirements</b>  | <p>A Presby Maze<sup>®</sup> septic tank must be cleaned when or before the combined depth of scum and sludge reaches one-quarter the total liquid depth of the tank. State and local jurisdictions may impose additional cleaning requirements.</p> <p><u>Reference:</u> See “State Specific Information” in your State attachment.</p>                                     |
| <b>Uncovering tank covers</b>      | When digging up septic tank covers, keep the surrounding soil from falling in the tank.  |
| <b>Clean the tank</b>              | No part of the Presby Maze <sup>®</sup> should be removed from the tank, and care should be taken not to damage the mesh or the pipe frame during cleaning. Since the mesh panels are submerged in the liquid, solids do not dry or “cake” onto the mesh panels. When the liquid is removed the solids, no longer buoyant, easily separate from the mesh and are pumped out. |
| <b>Clean the end compartments</b>  | <p>The inlet and outlet covers must be removed so that the compartments behind each end wall may be pumped. Use care not to damage the Presby Maze<sup>®</sup> during cleaning.</p> <p><u>Note:</u> It is not necessary to wash the mesh panels. Particles remaining on these panels help re-new the septic tank processes.</p>  |
| <b>Checking distribution boxes</b> | When pumping Presby Maze <sup>®</sup> septic tanks in a parallel setting if any one tank appears to have more solids than the other(s), check the distribution box to be sure it is level and Equalizers <sup>™</sup> are in place and properly adjusted.  |
| <b>Covering tank</b>               | Re-install all covers and properly grade the area to prevent surface water and soil from entering the septic tank.   |

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# ***PRESBY MAZE<sup>®</sup>*** SEPTIC TANK INSTALLATION OVERVIEW

ISOMETRIC VIEW - NOT TO SCALE



Most septic tanks are required to have interior baffles to improve the tank's ability to remove suspended solids from sewage. The Presby Maze<sup>®</sup> facilitates further removal of solids from sewage by providing surface areas and additional flow length to collect solid particles. The retained solids can then decompose and sink to the bottom as sludge or float to the surface as scum to be removed during regular maintenance pumping of the septic tank.

### How the Presby Maze<sup>®</sup> works

- Stage 1:** Inlet end wall provides an initial direction of flow.
- Stage 2:** Mesh panels break down the boundary layer to collect solids.
- Stage 3:** Mesh panels provide a large total surface area to collect solids.
- Stage 4:** Mesh panels increase the length of sewage flow through the septic tank.
- Stage 5:** Mesh panels increase the retention time for treatment of sewage.
- Stage 6:** Solids on the mesh panels decompose and float to the surface as scum.
- Stage 7:** Dense solids on the mesh decompose and sink to the bottom as sludge.
- Stage 8:** Outlet end wall provides containment of scum and sludge.