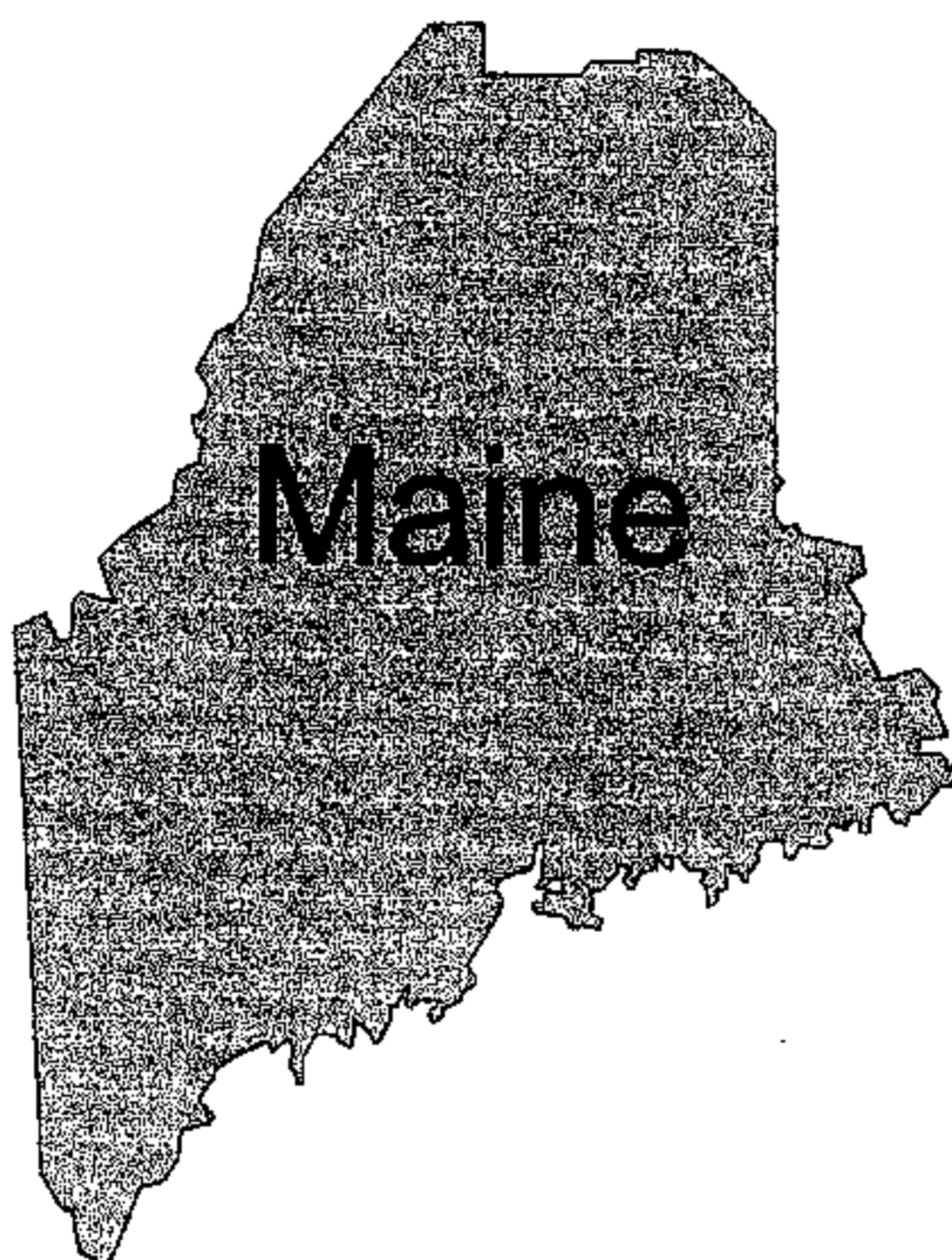


The Presby Maze™ For Septic Tanks

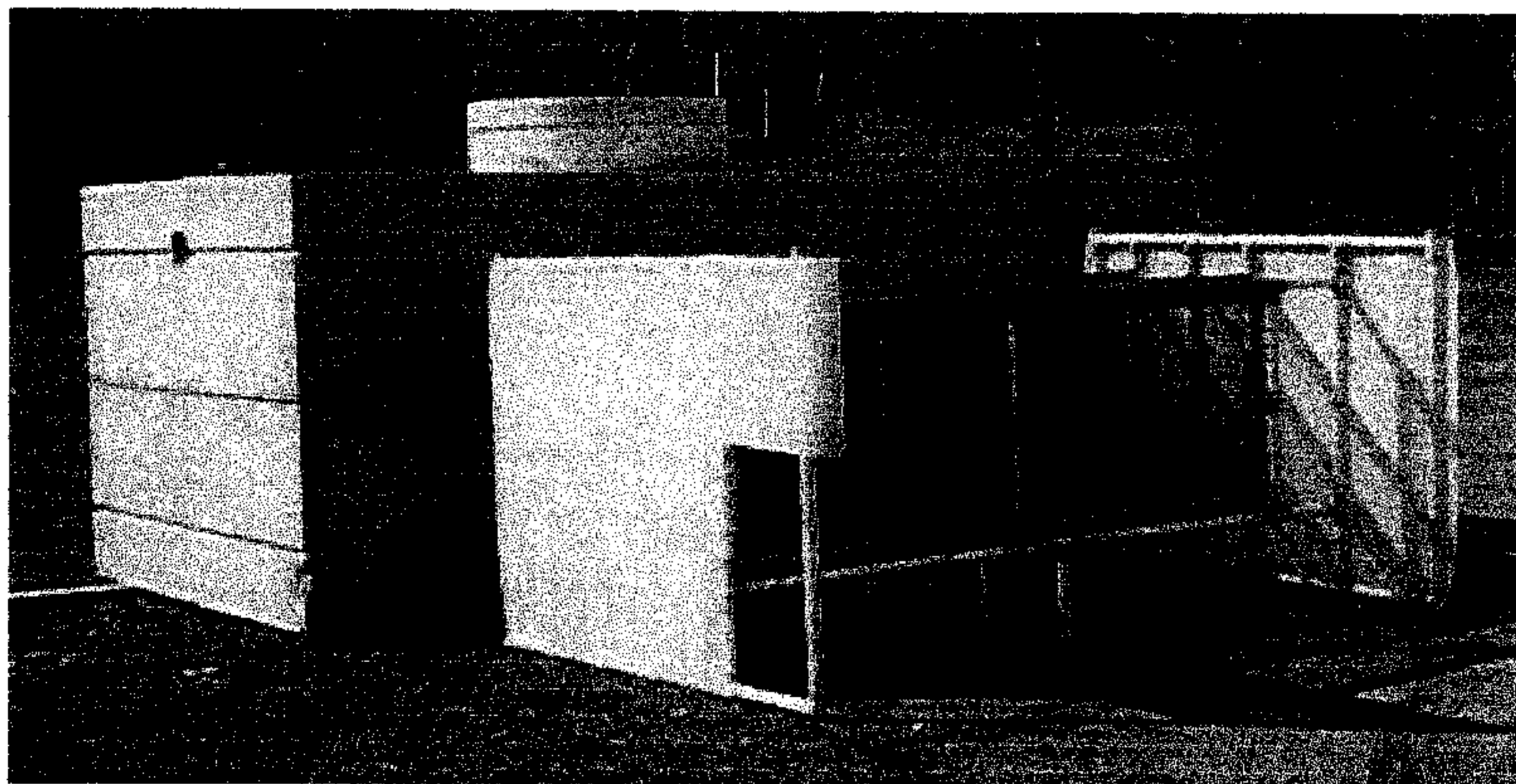
Design and Installation Handbook For The State of

Reduces Leach Area Size

- Commercial up to 35%
- Residential 10%



- Traps Suspended Solids
- Pretreats Effluent
- Saves Money
- Extends Leach Area Life
- Easy to Install
- No Moving Parts
- No Special Maintenance



Patent No. 5,429,752

To Learn More
About Septic Systems
Visit Our Web Site



PRESBY ENVIRONMENTAL, INC.
INNOVATIVE SEPTIC TECHNOLOGIES

Tel: 1-800-473-5298 • Fax: (603) 823-8114

PO Box 617 • Route 117 • Sugar Hill, NH 03585

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Enviro-Septic™ mfg. under Patent No. 5,606,786 Other Patents Pending. Enviro-Septic™ Trademark of Presby Environmental, Inc. © 1998



STATE OF MAINE
DEPARTMENT OF HUMAN SERVICES
11 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0011

ANGUS S. KING, JR.
GOVERNOR

KEVIN W. CONCANNON
COMMISSIONER

March 25, 1998

Presby Environmental, Inc.
Attn: David Presby
Box 617
Sugar Hill, New Hampshire 03585-0617

Subject: Product Registration, *Presby Maze*

Dear Mr. Presby:

Thank you for your visit to this office on February 18, 1998 regarding the *Presby Maze*, the manufacturing literature and accompanying engineering data, and model you provided. It is our understanding that the *Presby Maze* is a serpentine series of plastic mesh panels, on a plastic frame, which is inserted into a conventional septic tank. You indicate that the panels allow suspended solids in the septic tank to flocculate and adhere to the panels, thereby reducing the amount of suspended solids in the effluent. You supplied supporting information gathered from a test installation in New Hampshire, where the *Presby Maze* was installed in a secondary septic tank.

Under provisions of Section 1802 of the Maine State Plumbing Code, Subsurface Wastewater Disposal Rules (copy enclosed), any manufacturer or distributor submitting a new product for code registration needs to demonstrate that:

1. The product is designed to protect public health, prevent the creation of any nuisance, and prevent environmental pollution to the same extent as comparable products presently authorized by Department for use in this code, and
2. The product is based on sound engineering principles and can be expected to provide the same level of protection to public health and the environment as offered by the authorized products presently authorized by the Department for use in this code.

Such demonstration may be achieved by submitting a letter to the Division of Health Engineering from: a) a certifying organization, such as the International Association of Plumbing and Mechanical Officials (IAPMO), Building Officials and Code Administrators (BOCA), or other suitable organization stating their approval of the product, or b) the American Society for Testing and Materials (ASTM) indicating the requested product (used as indicated in the request) meets the ASTM standard as specifically listed in the appropriate section of any nationally recognized plumbing code, such as BOCA, IAPMO (same as International Plumbing Code), or equal. In certain instances, testing and empirical data can be used instead.

According to the information you provided, the *Presby Maze* has received approval from the State of New Hampshire. Further, the Division issued preliminary approval for the *Presby Maze* in July of 1993. On that basis, and based upon the information you provided, the Division has determined that the *Presby Maze* is acceptable for use in the State of Maine, provided that it is installed and maintained in conformance with the manufacturer's directions.

Because installation and owner maintenance has a significant effect on the working order of onsite sewage disposal systems, including their components, the Division makes no representation or guarantee as to the efficiency and/or operation of the *Presby Maze*. Further, registration of this product for use in the State of Maine does not represent Division preference or recommendation for this product over similar products.

If you have any questions please feel free to contact me at (207) 287-5695.

Sincerely,

James A. Jacobsen, Manager
Wastewater and Plumbing Control Program
Division of Health Engineering
e-mail: james.jacobsen@state.me.us

xc: File

Introduction

The Presby Maze™ is a patented product inserted inside most standard septic tanks. It is made from PVC plastic pipe, high-density plastic mesh and heavy-duty sheet plastic. The Presby Maze is a simple device designed to trap suspended solids inside the septic tank to extend leach area life and protect the environment.

Suspended solids are those solids that neither sink nor float inside a septic tank. Instead they remain suspended in the effluent and escape the septic tank. Too many suspended solids overload the bacterial surface of the leaching system causing costly, premature failure and polluting soil and ground water. Standard septic tanks allow as much as 60% of the suspended solids to escape. Advanced cleaners and changing lifestyles using large quantities of water are causing suspended solids to be an increasingly common problem for on site septic systems.

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, which 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 provide an immense bacterial surface area inside the tank for solids to be more efficiently broken down. In addition, the panels direct liquid on the longest possible path through the tank to provide more time for solids to naturally separate from the effluent.

The Presby Maze has no moving parts and requires no special maintenance. A septic tank with a Presby Maze installed is maintained just like an ordinary tank, as the liquid is pumped out solids separate from the mesh and are removed.

The Presby Maze simply and inexpensively provides for smaller, less expensive, longer lasting, and environmentally safer leach areas.

The information contained in this handbook is intended to be used in conjunction with current State of Maine Rules and Regulations and is subject to change without notice.

To Learn More About
Septic Systems Visit
Our Web Site:



www.PresbyEnvironmental.com

PRESBY ENVIRONMENTAL, INC.
INNOVATIVE SEPTIC TECHNOLOGIES

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Presby Maze™ Patent # 5,429,752
Presby Maze™ and Enviro-Septic™
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Publication Date: February, 1993

Revision Date: February, 1998
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The Presby Maze Advantage

The Presby Maze traps most suspended solids in the septic tank, preventing them from entering the leach area. Trapping solids prolongs leaching area life and reduces the size of the leach area in commercial and residential use.

The Presby Maze provides for an environmentally safer system by reducing the amount of solids entering the leach area that can contaminate soil or ground water.

The Presby Maze increases the efficiency of the common septic tank. It is easily inserted at the time of septic tank installation. It may be used in both commercial and residential applications in new or existing installations.

The Presby Maze unit does not require any special maintenance. It has no moving parts and is never removed from the tank. All that is required is to have the septic tank pumped regularly.

Terms and Definitions

Presby Maze Septic Tank - An ordinary septic tank with a Presby Maze inserted (Fig. 3).

Inlet End Wall - A solid plastic wall with a lower left or right corner cut out to control the incoming flow (Figs. 2,3).

Outlet End Wall - A solid plastic wall with a notch cut out of either the left or right side to control the outgoing flow of effluent (Figs. 2,3).

PVC Plastic Pipe Frame - The frame, made of plastic pipe that supports the end walls and mesh panels (Figs. 2,3).

Mesh Panel - High-density plastic mesh strapped to a PVC plastic pipe frame (Figs. 2,3).

Mesh Panel Opening - The open end of a mesh panel that controls the general direction of flow of liquids and solids passing through the Presby Maze (Figs. 2,3).

Primary Septic Tank - The first septic tank in a tank setting with or without a Presby Maze installed (Fig. 4).

Daily Flow Volume - Total gallons of sewage to be handled by the septic system in a 24-hour period.

Inlet Baffle - Located on the inlet end of a septic tank (Fig. 3).

Outlet Baffle - Located on the outlet end of a septic tank (Fig. 3).

Equalizer™ - A plastic insert used in a distribution box outlet line(s) to control the flow of effluent through a

specially designed slot, providing more equal distribution to each outlet line (Fig. 16).

Time Period of Flow - Time period in a day during which the septic system receives the bulk of its Daily Flow Volume.

Velocity Reducing Tank - A tank used to slow the velocity of incoming liquids prior to entry into the Presby Maze Septic Tank to prevent disruption of suspended solids on the mesh (Fig. 4).

Parallel Tank Settings - Tanks installed to receive a portion of the effluent flow from a primary tank. These tanks normally have Presby Mazes installed (Figs. 4,13).

Serial Tank Settings - Tanks that are serially connected, one tank to the next (Fig. 4)

Presby Maze Septic Tank System - Consists of all the septic tanks used within a septic system, including the primary tank and all Presby Maze septic tanks (Fig. 4).

Radiator Effect - The cooling of effluent in the septic tank, common with multiple tank settings where greater tank surface area contacts surrounding ground.

General Direction of Flow - The direction of the liquids and solids as they pass through the Presby Maze (Fig.3).

1. Basic Design Information

1.1 In commercial and residential systems using the Presby Maze septic tank system a reduction in leach area is permitted only when using **The Enviro-Septic Leaching System**. We believe Enviro-Septic is the most efficient leaching system available and far superior to any other. Enviro-Septic's layers of randomly orientated fibers and fabric collect solids and provide an immense bacterial surface area. Although the Presby Maze may be used with other types of leach areas no reduction in leach area is permitted. (See sections 2 and 3 for leach area reduction information.)

1.2 Presby Maze tanks can not be connected to each other in series, they must be used in parallel. The only exception is when, for added leach area protection, a primary tank has a Presby Maze installed and is connected to a second tank with a Presby Maze which in turn is connected to the leach area. All Presby Maze Septic Tanks used in parallel settings must be the same size (volume). Presby mazes are available to fit septic tanks from 1,250 gallons to 3,000 gallons.

1.3 Reducing effluent velocity and cooling effluent to ground temperature are important concepts that allow the Presby Maze to function properly. Parallel tank settings are preferable to serial tank settings because they more efficiently reduce effluent velocity in the tank. For example, if a system is treating 1500 gallons per

day and the tanks are set in serial there is still 1500 gallons per day traveling through each tank. However, if the flow were split between two tanks set in parallel each would only receive 750 gallons per day.

1.4 Engineers and Site Evaluators should note on plans that tanks with a Presby Maze installed should be cleaned as required in section 6.1 of this handbook. The primary septic tank should be inspected and cleaned as required by DHS Rule 1009.1. If all septic tanks are not cleaned as required, the life expectancy of the leaching area will be reduced.

1.5 The Septic tank volume and type (primary or Presby Maze) as calculated in this handbook takes into consideration state of Maine regulations and is intended to be **used in place of and not in addition to** the normal septic tanks required by the state.

1.6 The end walls of the Presby Maze increase the septic tank's efficiency by dividing it into partitioned sections and directing flow (Figs. 2,3).

1.7 Always connect grease traps into the primary septic tank.

1.8 It is important to control velocity of effluent entering a Presby Maze Septic Tank to prevent the disruption of solids on the mesh panels.

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

1.10 Disposal of toxic and hazardous waste materials in a septic tank system is not allowed.

1.11 Presby Mazes may be custom built for unusual applications.

2. Design Information for Commercial Systems

2.1 Daily flow volumes are calculated as stated in Chapter 9 of The Maine Sub Surface Waste Water Disposal Rules.

2.2 To derive the total septic tank volume required for a specific installation you will need two pieces of information: The Daily Flow Volume and Time Period of Flow. Use this information to determine the required total septic tank volume for the system from the Commercial Septic Tank Volume chart (Fig. 1).

Example: A 4500 gallon per day system for an office building occupied eight hours daily uses the 8-hour Time Period of Flow

Total Daily Flow Volume = 4,500 gals
Time Period of Flow = 8 hours

Total septic tank volume required by chart (figure 1)
= 7,875 gals

Multiply total septic tank volume by the appropriate ratio for the given Time Period of Flow from the chart below to determine the minimum sizes of primary and Presby Maze Septic Tanks.

RATIO OF PRIMARY SEPTIC TANK TO PRESBY MAZE SEPTIC TANK(S) FOR DIFFERENT TIME PERIODS				
	TIME PERIODS OF FLOW			
	4 hrs	8 hrs	16 hrs	24 hrs
Primary Septic Tank	40%	46%	50%	58%
PRESBY MAZE Septic Tanks	60%	54%	50%	42%

Primary septic tank volume required
 $7,875 \times 46\% = 3,622.5$ gals

Presby Maze Septic Tank volume required
 $7,875 \times 54\% = 4,252.5$ gals

2.3 The correct ratio between Presby Maze Septic Tank(s) and primary septic tank(s) must be maintained to maximize performance.

2.4 You can interpolate Daily Flow Volume and Time Period of Flow values to determine required tank sizes (Fig. 1). These tank sizes are minimums; larger is better. Always round required tank volumes up to the next larger available size.

2.5 In parallel tank settings with Presby Maze septic tanks, the effluent from the primary tank travels to a distribution box. Each distribution box outlet line must have Equalizers™ installed to evenly divide the flow to the Presby Maze Septic Tanks. After passing through Presby Maze Septic Tanks effluent can flow to individual leaching areas or be connected together and feed a single leach area. Each Presby Maze Septic Tank in parallel tank settings must be of equal size (Figs. 4,16).

2.6 In smaller commercial systems it may be possible to design the system with a primary septic tank that incorporates a Presby Maze. Keep in mind that the largest Presby Maze currently available is designed to fit a 3000 gallon tank. When using the Presby Maze in the primary septic tank of a commercial system increase the tank volume required in this handbook by 20%.

Example:

Daily Flow Volume 1000 GPD

Time Period of Flow 16 hours

Required Septic tank volume 2,070 gals.

$2,070 \text{ gals.} \times 120\% = 2,484 \text{ gals.}$ required (always round required tank volume up to the nearest available tank size)

This system could use a 2500 gallon septic tank with a Presby Maze installed.

2.7 Commercial leach area reduction is permitted using The Presby Maze in combination with The Enviro-Septic Leaching System.

Example:

Design Criteria

Total Daily Flow Volume = 5000 gals.

Soil Profile # 3

Waste Water Strength of 240 mg/L

1) Consult Linear Footage chart (Fig. 1, pg. 10) of the Enviro-Septic Leaching System Design and Installation handbook for Maine.

2) Use soil profile #3 to determine that 66 linear feet of Enviro-Septic is required per 100 gallons of flow per day.

3) 5000 gallons / 100 gallons = 50 x 66 = 3300 linear feet of Enviro-Septic pipe.

4) For the reduction in leach area consult the Adjustment Factor (AF) Chart below. In the Presby Maze AF column of the chart find the AF that corresponds to 240 mg/L = 0.75

Multiply the (AF) 0.75 x 3300 linear feet of Enviro-Septic pipe = **2475 linear feet of Enviro-Septic pipe required.**

2.8 Calculation of waste water strength to determine the appropriate adjustment factor (AF) is to be performed as stated in the Maine Subsurface Waste Water Disposal Rules. Be sure all waste water strength calculations are based on systems with the normal, state required, septic tank volume and configuration. Never use waste water test results from septic tanks that have any type of additional treatment means installed, (including a Presby Maze) to determine the AF.

3. Design Information for Residential Systems

3.1 The Presby Maze offers substantial advantages for residential installations. The Presby Maze is ideally suited to installations with a history of leach area problems or that have severe site limitations. In addition the Presby Maze offers an added measure of environmental protection and assists in obtaining variances.

3.2 To determine required tank size for one to three family dwelling units refer to the following chart.

One to three family dwelling unit septic tank capacity	
Number of Bedrooms	Minimum septic tank liquid capacity
1 Bedroom	1250 Gallons
2 Bedrooms	1250 Gallons
3 Bedrooms	1500 Gallons
4 Bedrooms	2000 Gallons
5 Bedrooms	2500 Gallons
For each additional bedr.	Add 500 Gals. per bedr.

3.3 For up to four bedrooms the system must use a single primary septic tank with a Presby Maze installed. For seven bedrooms or more the minimum septic tank volume in the chart above must be divided 40% primary septic tanks and 60% Presby Maze Septic Tanks. Five and six bedroom systems have the option of using a single tank with a Presby Maze installed or using the 40/60 ratio above.

Example: A four bedroom system would require only one septic tank, a 2000 gal. tank with a Presby Maze installed.

A seven bedroom system would require 3500 gallons of total septic tank volume. 60% of the volume (2100 gallons) must be Presby Maze Septic Tanks and 40% of the volume (1400 gallons) must be primary septic tanks. Always round septic tank volumes up to the next larger available size.

Strength of waste water entering the disposal field (BOD5 plus TSS)	Adjustment Factor (AF)	Presby Maze Adjustment Factor *
30 or less mg/L	0.5	0.5
52	0.6	0.6
82	0.7	0.65
122	0.8	0.7
175	0.9	0.7
240	1	0.75
320	1.1	0.8
420	1.2	0.85
530	1.3	0.9
660	1.4	0.95
810	1.5	1
985	1.6	1.05
1180	1.7	1.1
1400	1.8	1.15
1645	1.9	1.25
1920	2	1.3

* The Presby Maze adjustment factor is only to be used with the Enviro-Septic leaching system and only when the Presby Maze is designed and installed in strict accordance with this handbook

3.4 Using the Presby Maze in combination with Enviro-Septic Leaching System provides for a reduction in residential leach area size. This reduction is calculated by using a 0.9 Adjustment factor (AF). A larger AF may be used but no AF less than 0.9 is permitted in residential use without a variance.

Example: Leach Area reduction for one to three family dwelling units:

Design Criteria:

Number of Bedrooms = 6

Soil Profile #3

1) Find Enviro-Septic linear footage chart (Fig. 1, pg. 10) in the Enviro-Septic Design and Installation Handbook for Maine.

2) 6 bedrooms with soil profile #3 = 356 linear feet of Enviro-Septic.

3) Multiply 356 linear feet x 0.9 (AF) = 321 linear feet of Enviro-Septic pipe required.

4. Pump Installations

4.1 Effluent from primary tank(s) may be pumped to Presby Maze Septic Tank(s) when site conditions prohibit gravity systems. Never pump effluent directly into a Presby Maze Septic Tank. Effluent must always be pumped into a velocity reducing tank prior to entering a Presby Maze Septic Tank to control effluent velocity and prevent the disruption of solids collected on the mesh panels.

4.2 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. Vent height should be a minimum of 15 feet above grade in order to "draw" air through the system.

5. Installation Information

5.1 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.

5.2 To install a Presby Maze: 1) Set the bottom section(s) of the septic tank. 2) Unfold the Presby Maze until it forms a perfect rectangle. 3) Center the Presby Maze inside the bottom section of the tank making sure the flexible edges of the Presby Maze end walls are touching the sides of the tank. 4) Install the remaining section(s) of the tank. Be sure that the septic tank baffles do not crush the Presby Maze during installation.

5.3 The inlet and outlet end of the Presby Maze must correspond with the inlet and outlet end of the Septic Tank. Do not install the Presby Maze upside down by mistake. Each Presby Maze 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 (Fig. 2).

5.4 Be aware that septic tanks with a Presby Maze installed require larger center, inlet and outlet covers to provide for easier pumping between the mesh panels and behind the end walls. Presby Maze dealers should already have these details worked out with their tank suppliers.

5.5 Be sure all septic tanks are properly sealed to prevent infiltration of ground water.

5.6 Do not modify the inlet or outlet of a septic tank with a Presby Maze installed.

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

6. Cleaning and Maintenance

6.1 The maximum combined depth of scum and sludge in a Presby Maze septic tank is not to exceed one-quarter of the total liquid depth of the tank before cleaning. Primary septic tanks should be cleaned as required by DHS Rule 1009.1 or more frequently. All septic tanks should be inspected a minimum of yearly.

6.2 The Presby Maze is never removed from the tank during cleaning. Since the mesh panels are submerged in the liquid, solids do not dry or "cake" onto the mesh. As liquid is pumped from the tank, solids are no longer buoyant and easily separate from the mesh. It is not necessary to completely clean the mesh panels. 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 during cleaning.

6.3 When pumping Presby Maze 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™ are in place Figs. (4,16)

FIG. 1: COMMERCIAL SEPTIC TANK SIZING FOR USE WITH THE PRESBY MAZE
Minimum Total Tank Volume in Gallons for Time Periods of Flow

Total Daily Flow Volume in Gals.	Flow: 4 hrs.	Flow: 8 hrs.	Flow: 16 hrs.	Flow: 24 hrs.
500	1350	1250	1250	1250
750	1958	1688	1553	1350
1000	2610	2250	2070	1800
1250	3263	2813	2588	2250
1500	3915	3375	3105	2700
2000	4568	3938	3623	3150
2500	5438	4688	4313	3750
3000	5850	5250	4950	4500
3500	6475	6125	5775	5250
4000	7400	7000	6600	6000
4500	8325	7875	7425	6750
5000	9250	8750	8250	7500
5500	10175	9625	9075	8250
6000	11100	10500	9900	9000
6500	12025	11375	10725	9750
7000	12950	12250	11550	10500
7500	13875	13125	12375	11250
8000	14800	14000	13200	12000
8500	15725	14875	14025	12750
9000	16650	15750	14850	13500
9500	17575	16625	15675	14250
10000	18500	17500	16500	15000
11000	20350	19250	18150	16500
12000	22200	21000	19800	18000
13000	24050	22750	21450	19500
14000	25900	24500	23100	21000
15000	27750	26250	24750	22500
16000	29600	28000	26400	24000
17000	31450	29750	28050	25500
18000	33300	31500	29700	27000
19000	35150	33250	31350	28500
20000	37000	35000	33000	30000
21000	38850	36750	34650	31500
22000	40700	38500	36300	33000
23000	42550	40250	37950	34500
24000	44400	42000	39600	36000
25000	46250	43750	41250	37500
26000	48100	45500	42900	39000
27000	49950	47250	44550	40500
28000	51800	49000	46200	42000
29000	53650	50750	47850	43500
30000	55500	52500	49500	45000

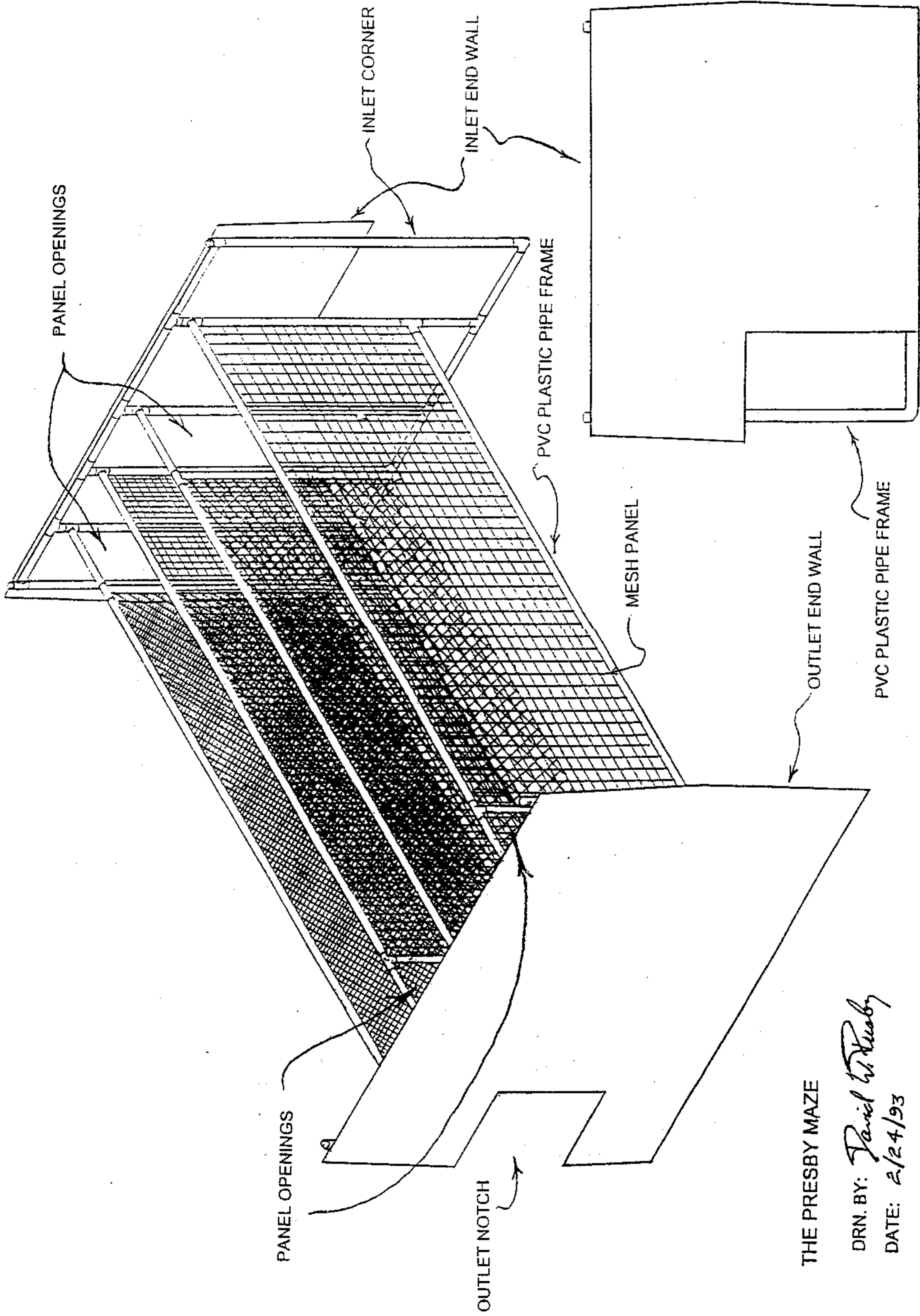


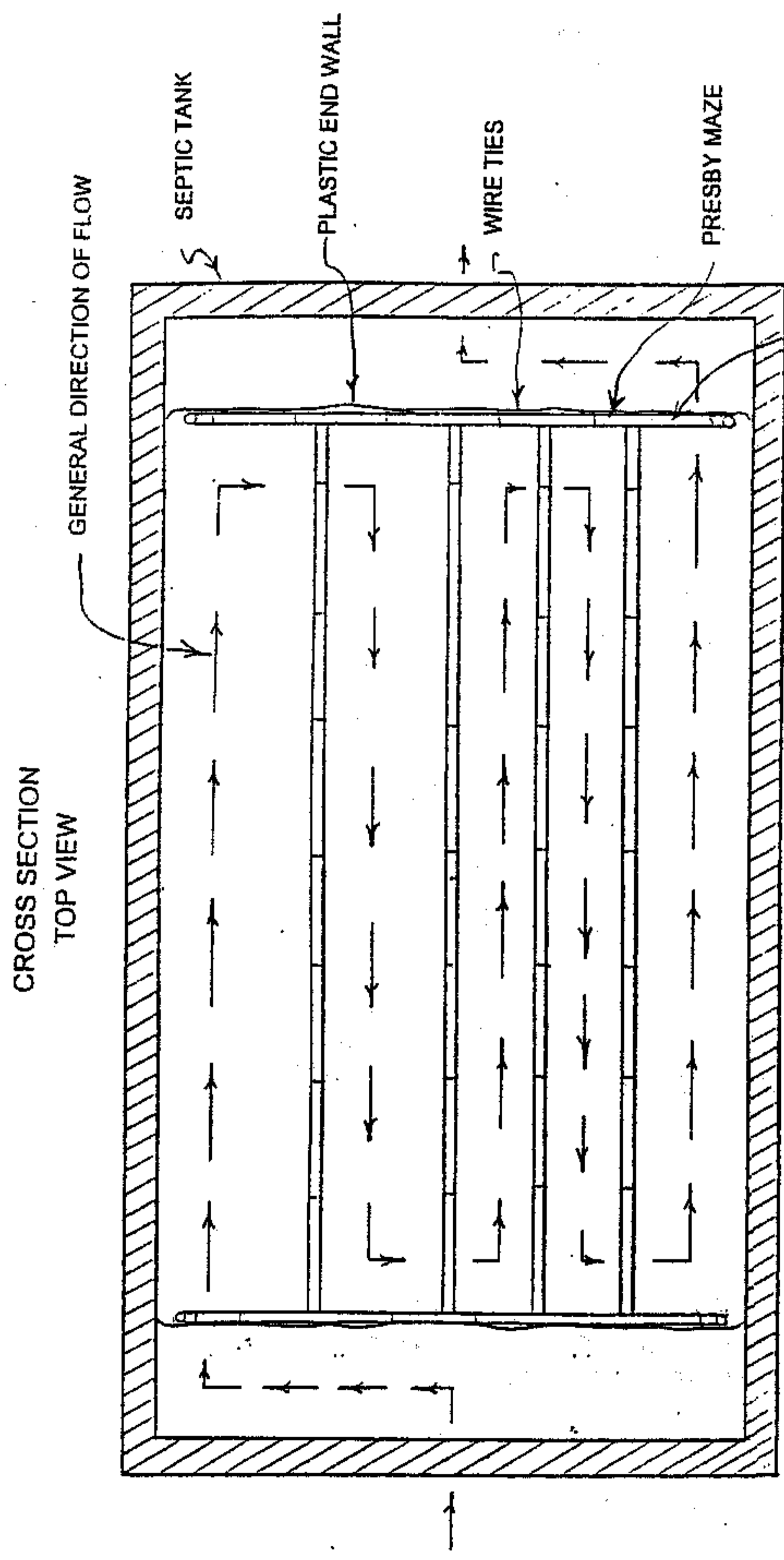
Fig. #2

THE PRESBY MAZE
 DRN. BY: *David W. Rusby*
 DATE: 2/24/93

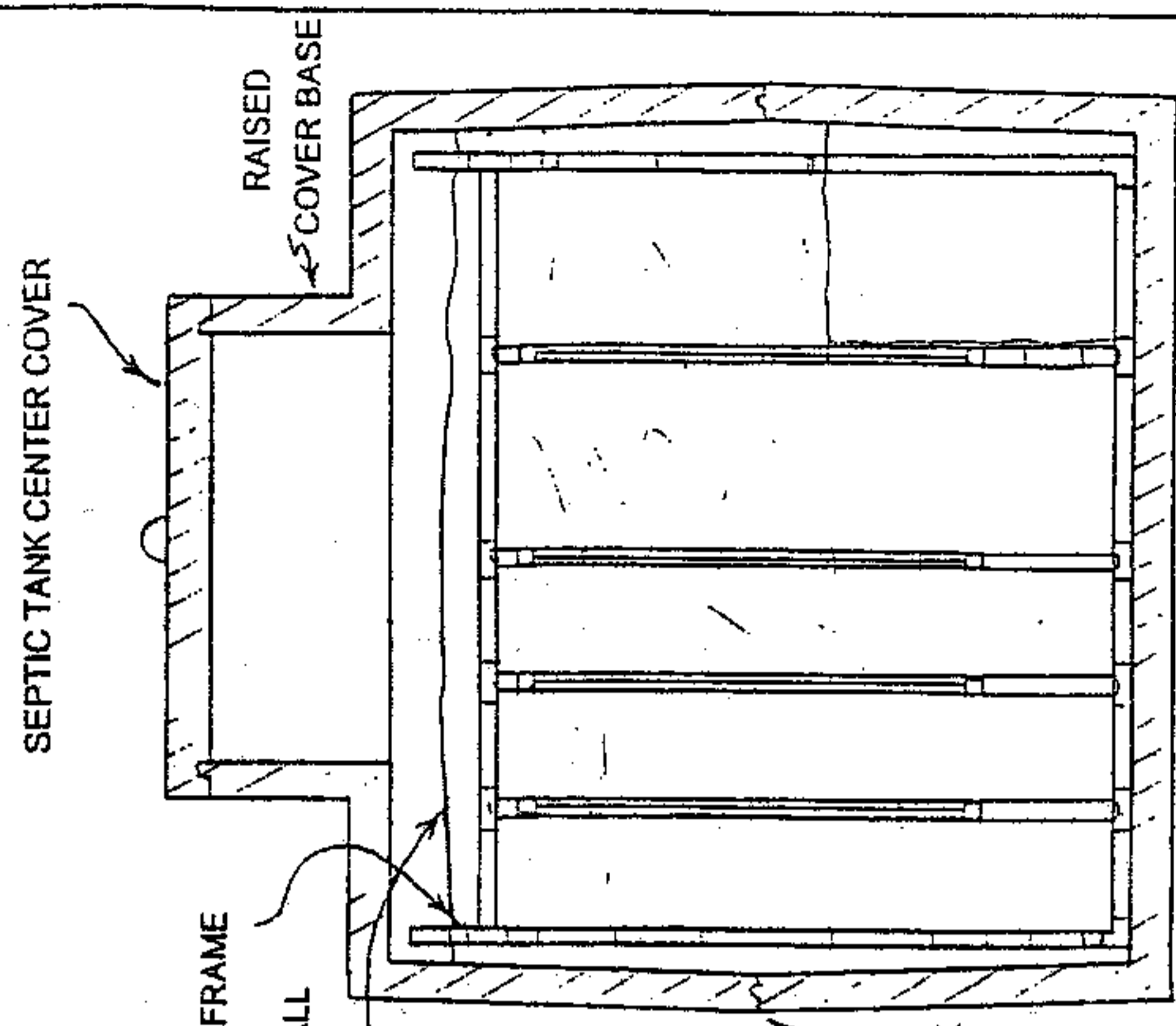
THE PRESBY MAZE INSIDE A SEPTIC TANK

DRN. BY: *David W. Freely*

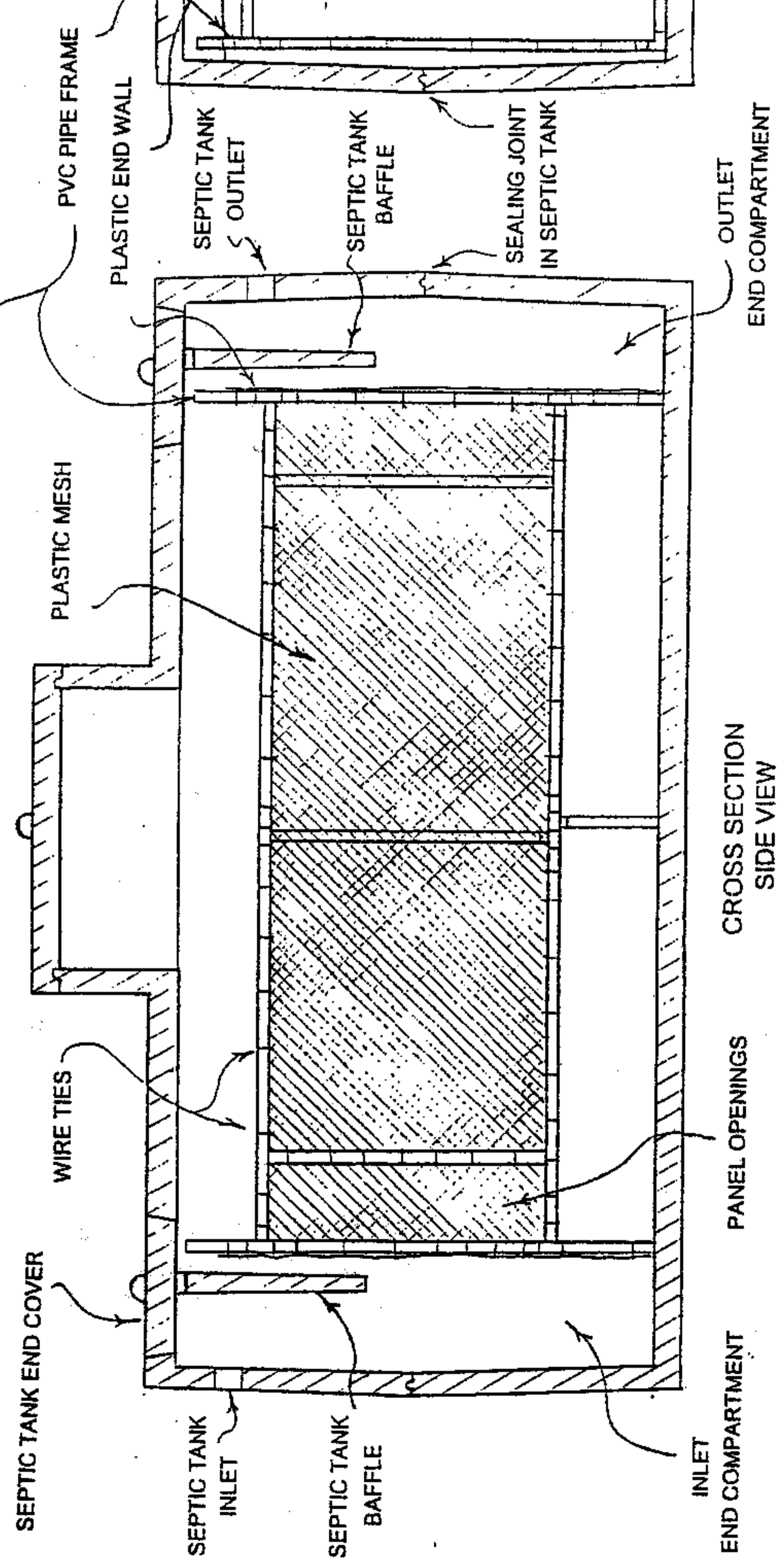
DATE: 1/27/93



CROSS SECTION
1' END VIEW



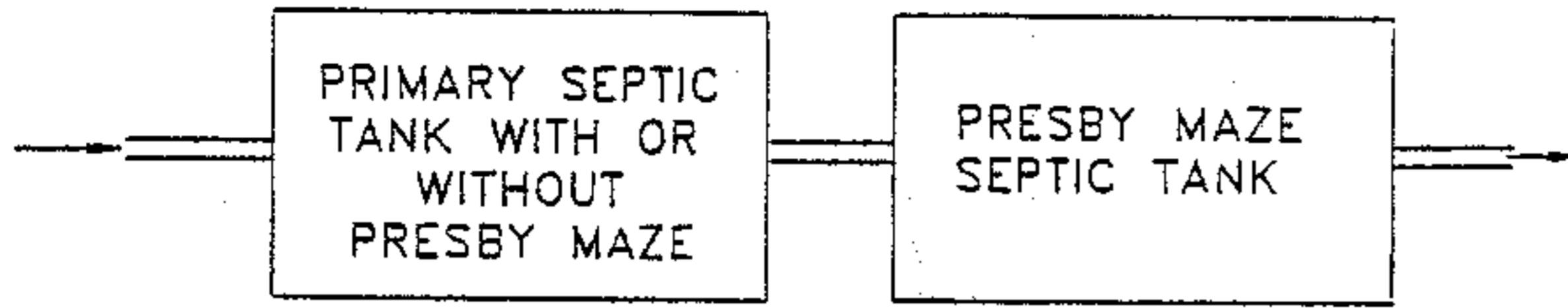
SEPTIC TANK CENTER COVER



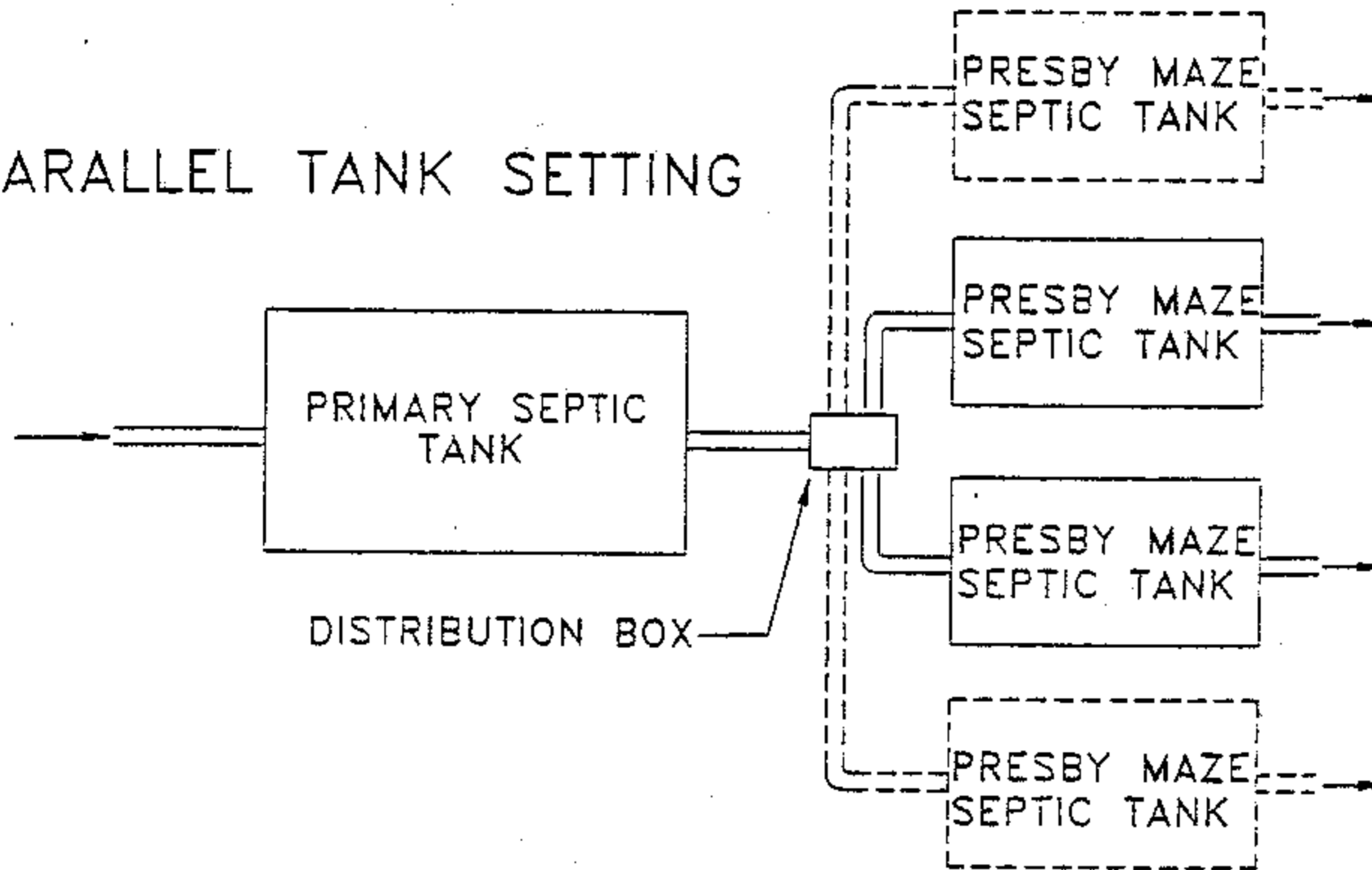
CROSS SECTION
SIDE VIEW

VARIOUS TANK SETTING LAYOUTS

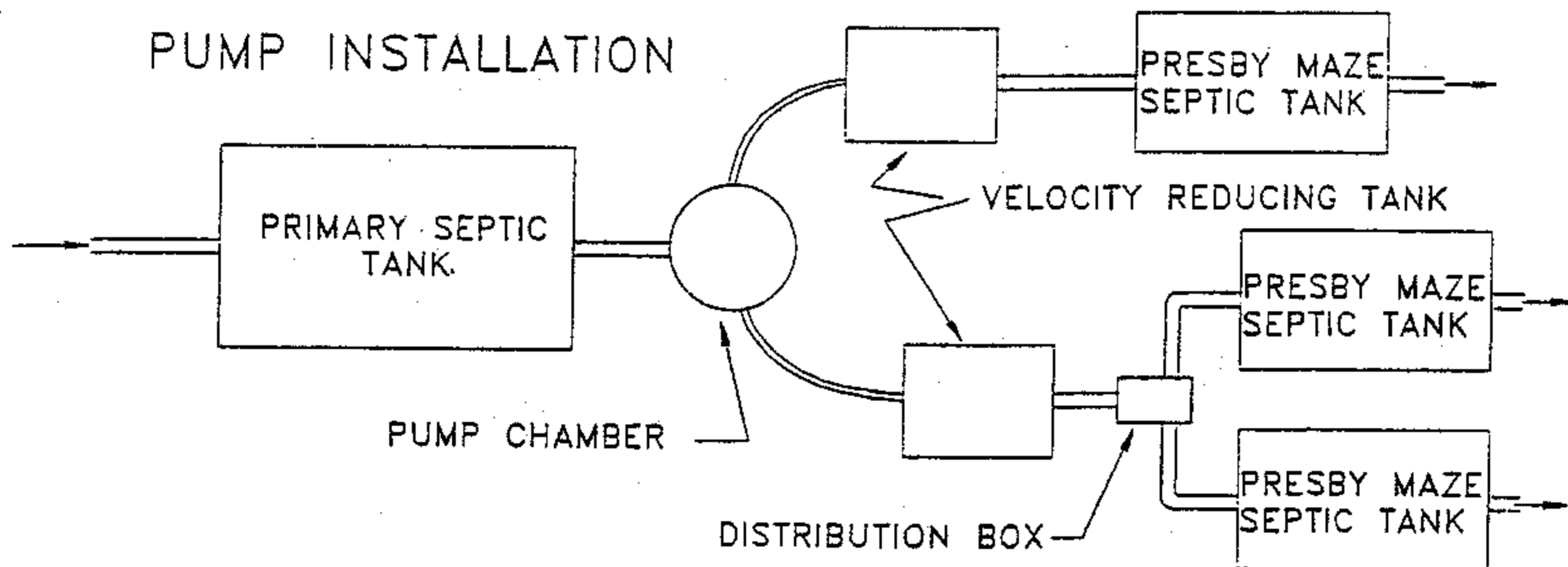
SERIAL TANK SETTING



PARALLEL TANK SETTING



PUMP INSTALLATION

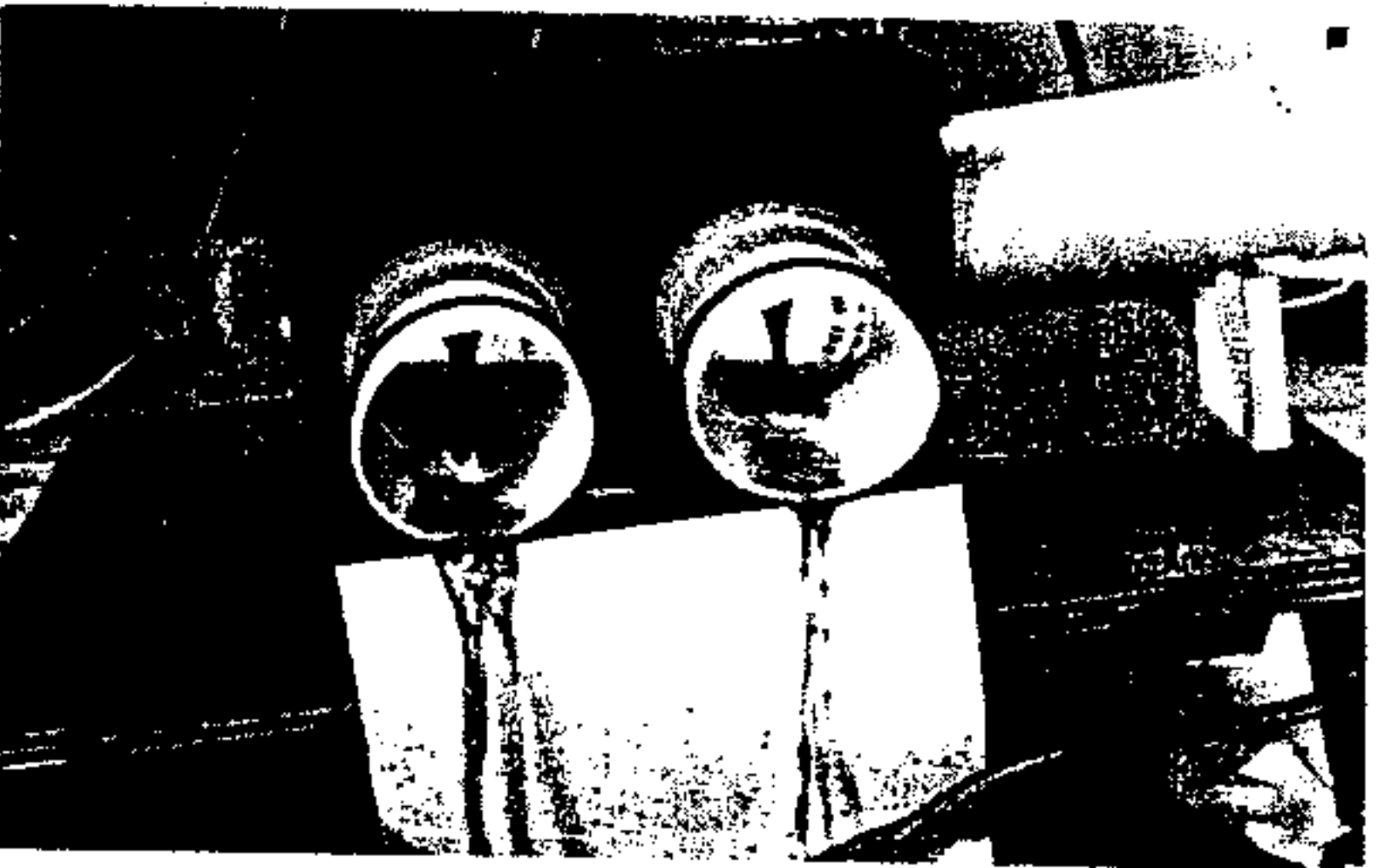


AFTER LEAVING THE PRESBY MAZE SEPTIC TANKS, THE OUTLET LINES MAY LEAD TO INDIVIDUAL LEACH AREAS OR BE RECONNECTED TOGETHER AND CONTINUE TO A PUMP CHAMBER OR LEACH AREA.

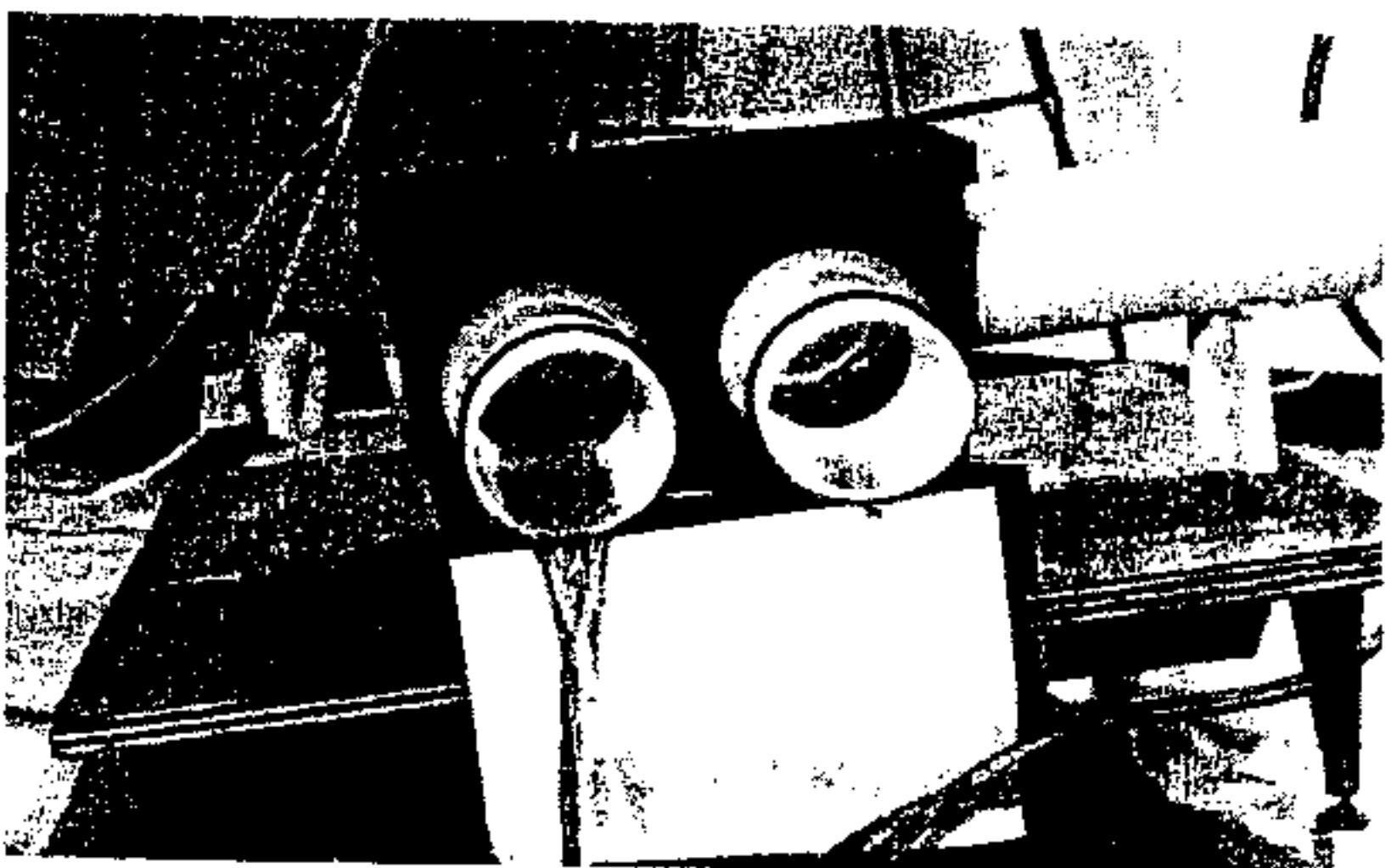
Fig # 4

Distribution Boxes Don't Work...

... (unless you use EQUALIZERs)



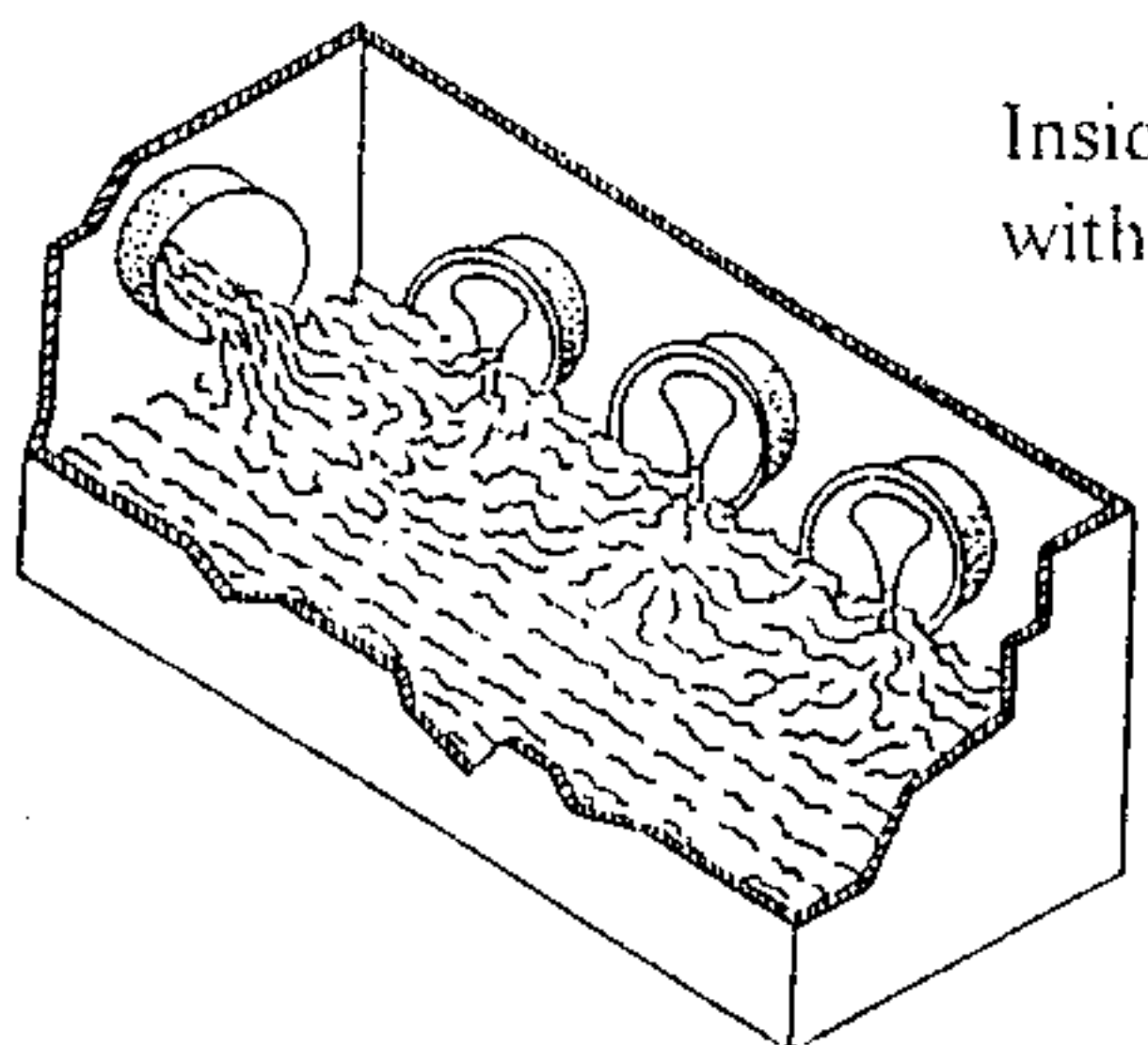
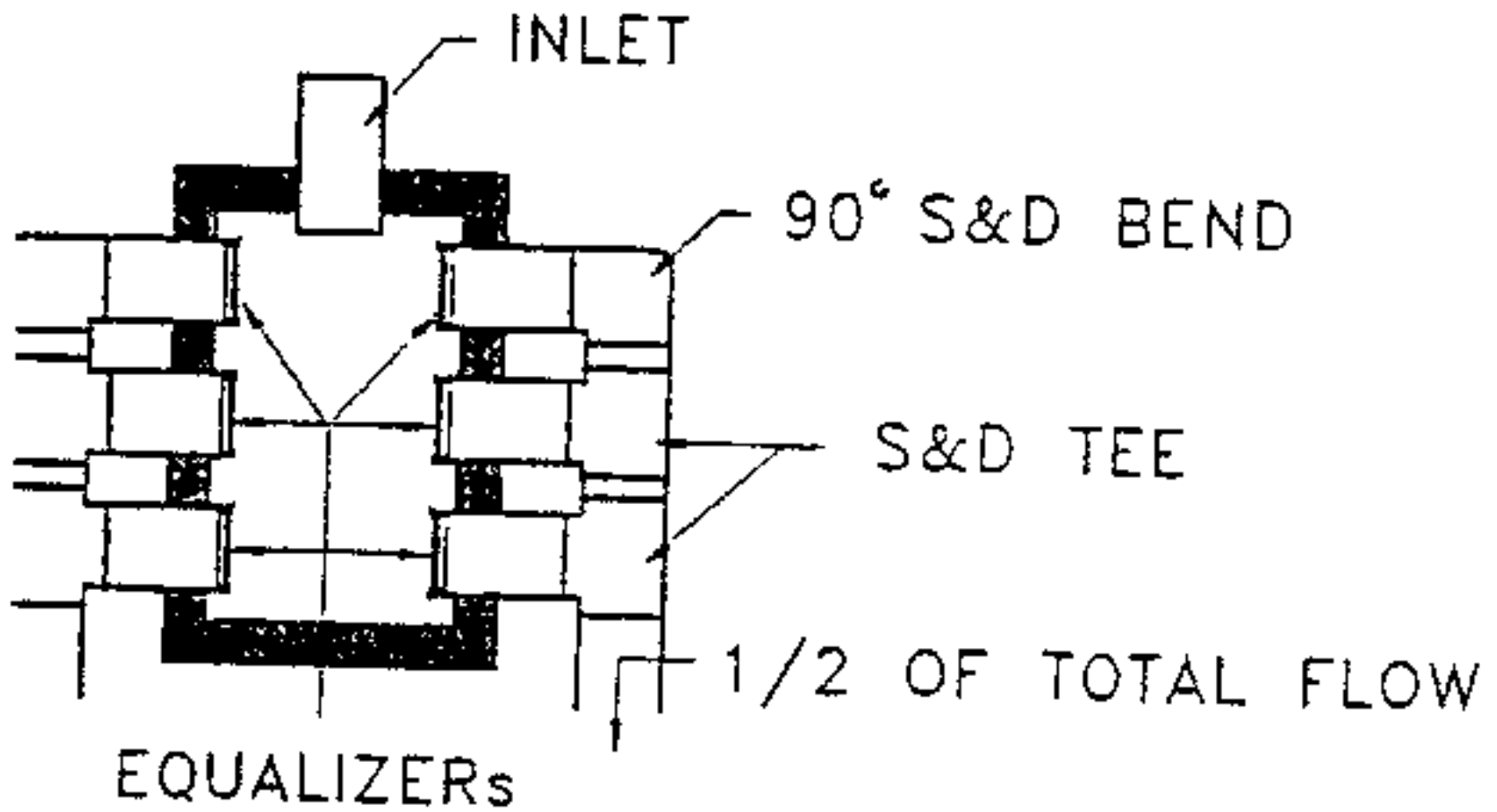
WITH EQUALIZERs



WITHOUT EQUALIZERs

The distribution boxes above are positioned with the left outlet 3/4" lower than the right. With equalizers flow is fairly well distributed to both outlets. Without equalizers the left outlet receives the entire flow. Unequal flow division to a leach area causes premature failure. Protect yourself and your customers by using equalizers.

- When using equalizers in a leaching system that is not vented you should limit your design to a maximum effluent flow of ten gallons per minute per equalizer to allow air to pass through the top of the equalizer slot. When equalizers are used in a vented leaching system the maximum effluent flow is 20 gallon per minute per equalizer.
- Large effluent flows can be divided to meet the above requirements by using a distribution box as shown below. This method also works well to divide effluent flow from a primary septic tank into individual Presby Maze septic tanks set in parallel.



Inside of distribution box with EQUALIZERs

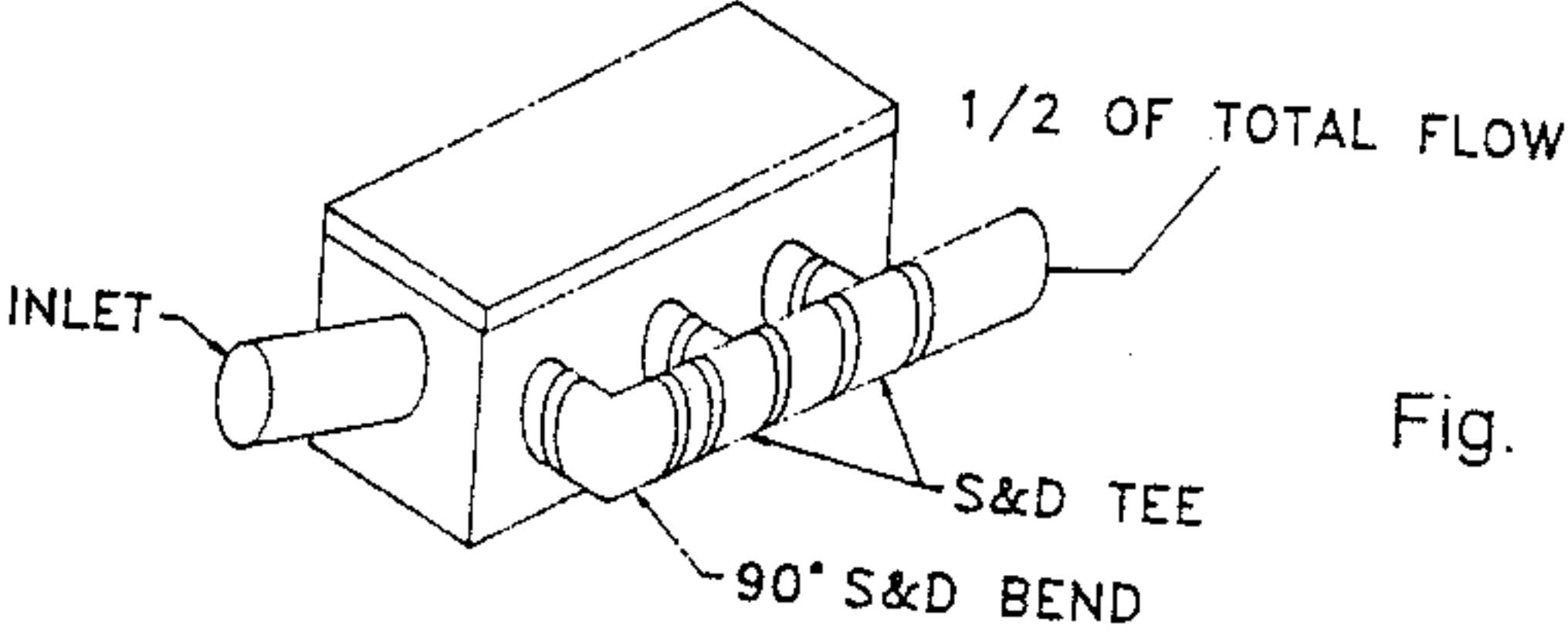


Fig. #16

EQUALIZERs are available from Enviro-Septic/Presby Maze dealers