



STATE OF MAINE
DEPARTMENT OF HUMAN SERVICES
DIVISION OF HEALTH ENGINEERING
10 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0010

ANGUS S. KING, JR.
GOVERNOR

KEVIN W. CONCANNON
COMMISSIONER

January 30, 2001

PSA Inc.
Attn: Dick Bachelder
71 Orchard Farm Road
York, Maine 03909

Subject: Product Registration, BioDiffuser Bio 2 and Bio 3

Dear Mr. Bachelder:

Thank you for your letter dated January 19, 2001 regarding your company's product. Under provisions of Section 1802 of the Maine State Plumbing Code, Subsurface Wastewater Disposal Rules, 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.

According to the information you provided, BioDiffuser Bio 2 and Bio 3 have effective infiltrative areas of 9.05 square feet (sq. ft.) and 13.3 sq. ft. each in cluster configuration, respectively; and 20.5 sq. ft. and 24.7 sq. ft. each in trench configuration, respectively. You have requested that the BioDiffuser Bio 2 and Bio 3 be rated at 9 sq. ft. and 13 sq. ft. per unit for cluster installations, respectively; and 14.4 sq. ft. and 21.6 sq. ft. per unit for trench installations, respectively. On that basis, the Division has determined that BioDiffuser Bio 2 and Bio 3 are acceptable for use in the State of Maine, provided that they are installed, operated, 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 BioDiffuser Bio 2 and Bio 3. 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, Environmental Specialist IV
Wastewater and Plumbing Control Program
Division of Health Engineering
e-mail: james.jacobsen@state.me.us

xc: Product File



PRINTED ON RECYCLED PAPER

PSA, Inc.
71 Orchard Farm Road
York, Maine 03909



January 19, 2001

Mr. James A. Jacobsen, Manager
State of Maine
Department of Human Services
Division of Health Engineering
Wastewater and Plumbing Control Program
10 State House Station
Augusta, ME 04333-0010

Re: BioDiffuser Bio 2 and Bio 3 Model Plastic Leaching Chambers
Request for Product Registration

Dear Mr. Jacobsen:

On behalf of PSA, Inc. I write to formally request DHE review and acceptance of our BioDiffuser Bio 2 and Bio 3 model plastic leaching chambers for use in Maine in accordance with the provisions of Section 1902 of the Maine Plumbing Code, Subsurface Wastewater Disposal Rules.

In support of this request, we furnish the following:

- a copy of a line drawing of each of the products (blueprint);
- a copy of our product specification sheets;
- a copy of our installation instructions;
- a copy of a memo relating to both products and recommended system sizing.

PSA, Inc. is a wholly-owned subsidiary of Advanced Drainage Systems, Inc. Advanced Drainage Systems, Inc. is a Columbus, Ohio based corporation that has been doing business in and with the State of Maine for many years. They purchased PSA, Inc. in February of 2000 and are continuing to operate it as an independent entity. We are excited about the prospects for growth as a result of the marriage of these two companies, and of expanding our involvement in the challenge of on-site wastewater management in Maine with the registration of the new Bio 2 and Bio 3 chambers. We look forward to hearing from you soon.

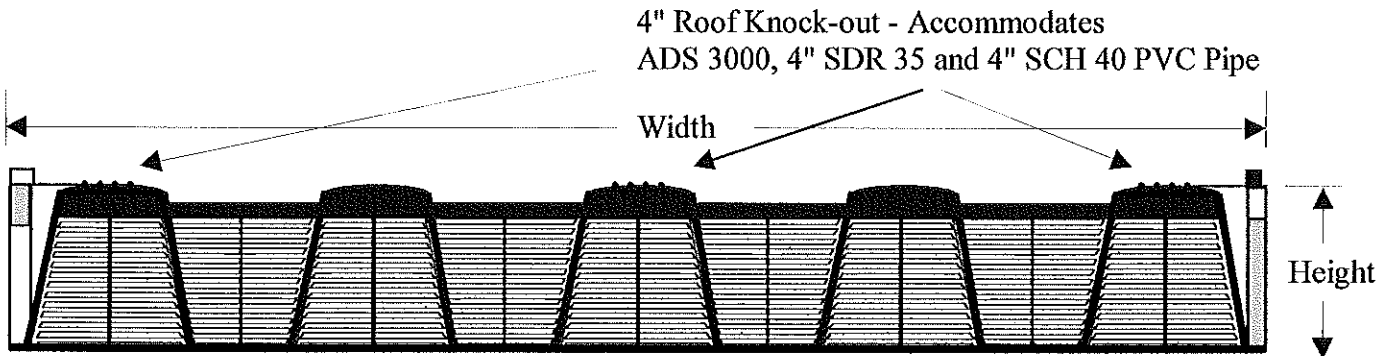
If you or others have questions or concerns about any aspect of this submittal, please know that I will welcome your call.

Sincerely,

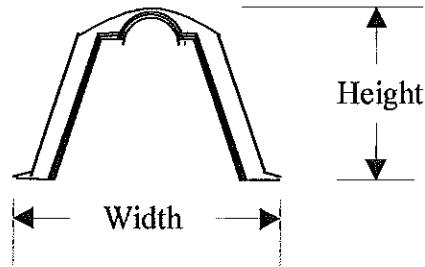
A handwritten signature in black ink that reads "Dick Bachelder".

Dick Bachelder
PSA, Inc.

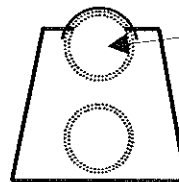
BioDiffuser™ Bio 2 & Bio 3 Chamber Specifications



Bio 2 and Bio 3 sizes can withstand H-10 loads when installed with properly graded and compacted soils. A minimum of 12" of cover is required for H-10 loads.



Universal End Cap



4" Knock-out Accommodates ADS 3000, 4" SDR 35 and 4" SCH 40

Available Sizes

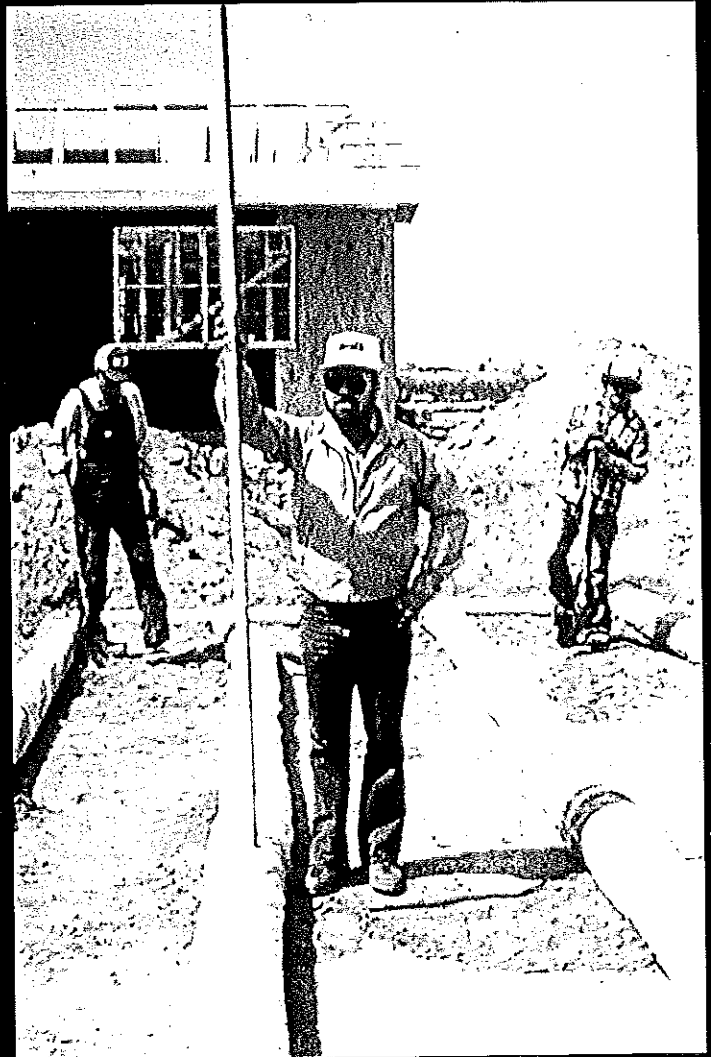
Chambers	Bio 2 15" x 12" x 87" H-10	Bio 3 22" x 12" x 87" H-10
ADS Prod. #	1500BD	2200BD
Width	15"	22"
Height	11.9"	11.9"
Length	86.9"	86.9"
Invert Height*	11.6"	11.6"
Invert / End Cap	6.87"	6.87"
Units / Pallet	90	80
Units / TL	1260	1120

*Based on inlet through top of chamber

ADS / PSA BioDiffuser Chambers can be ordered in pallet quantities. Contact your ADS Customer Service for ordering details - 1-800-821-6710

THE MOST
ADVANCED
NAME IN
DRAINAGE
SYSTEMS

On-Site Septic Systems



Providing solutions for
all on-site septic design
requirements.

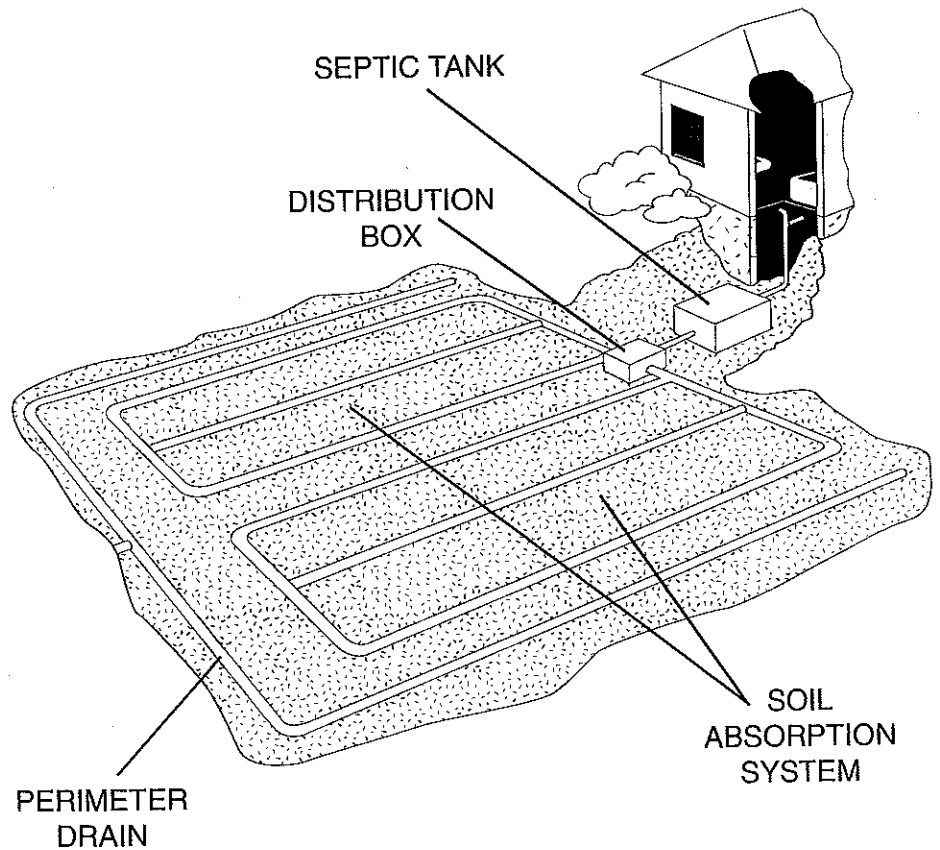
ADS

On-Site Septic Systems

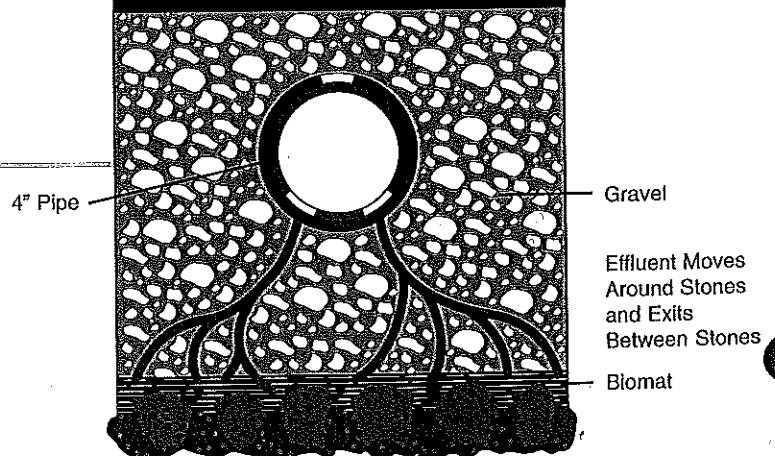
In the U.S. today, most people enjoy the comforts and peace of mind from living in a house served by a public sanitary sewer system. They never deal with disposing of septic waste unless a toilet overflows or a kitchen drain clogs.

However, it is estimated that 25% of the U.S. population live without access to a public sanitary sewer system. They depend upon on-site septic systems for the treatment and disposal of household sewage. Many of these systems consist of a septic tank and a soil absorption area where the effluent is absorbed into the soil.

The common factor in all soil absorption lines and/or fields is a type of conduit that distributes the effluent throughout the soil. The soil has the function of absorbing effluent. If the soil absorption system is designed properly, i.e., there is adequate soil absorption area for the gallons of effluent used per day by the household, the on-site septic system will function well with little maintenance.



Conventional Gravel System



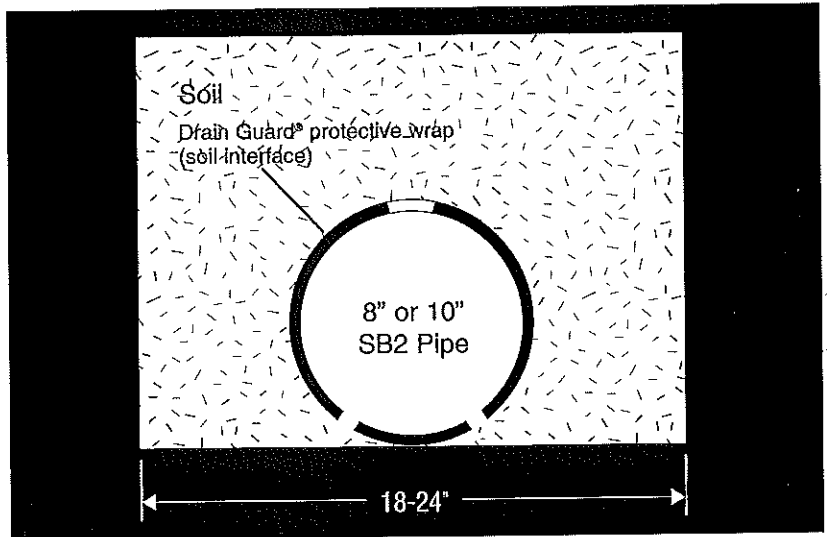
Soil Contact Area
(Area Where Effluent Meets Soil)

There are two basic types of soil absorption systems: gravel and gravel-less. In gravel systems, gravel is used to create an area with voids which allows storage for the effluent. The gravel also creates an interface contact area with the soil. The gravel does not digest or eliminate the effluent. In fact, the gravel causes a phenomenon called masking that blocks some effluent from leaching directly into the soil.

ADS is the largest manufacturer of polyethylene pipe in the world. Since 1967, ADS has supplied contractors with 4" corrugated pipe for septic systems. High density polyethylene septic products are inert and corrosion resistant to normal household effluents. ADS offers several different types of conduits that can be used in soil absorption areas.



The gravel-less systems incorporate larger pipe or structures in the soil absorption systems. Chambers and SB2® pipe are the most commonly used conduits in gravel-less systems.

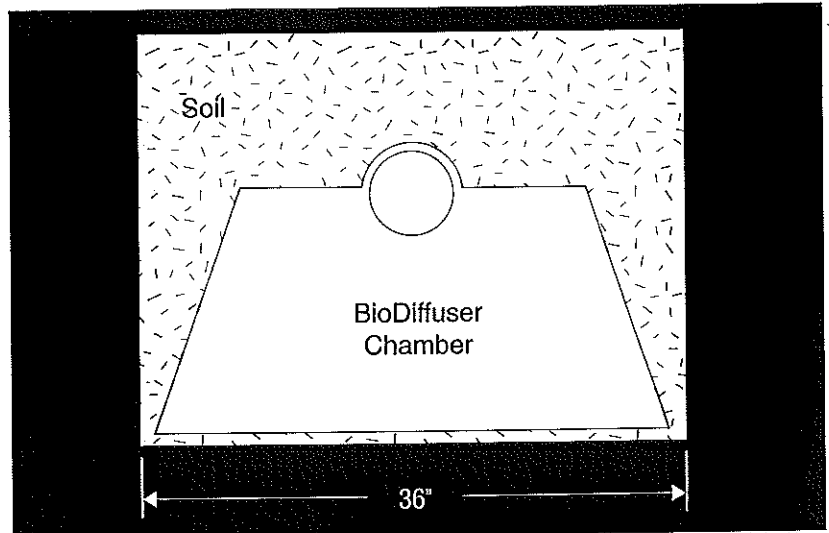


Commonly referred specifications in designing Septic Leach Fields:

ASTM D 5925 - Standard Practice for Preliminary Sizing and Delineation of Soil Absorption Field Areas for On-Site Septic Systems.

ASTM D 5921 - Standard Practice for Subsurface Site Characterization of Test Pits for On-Site Septic Systems.

ASTM F 481 - Standard Practice for Installation of Thermoplastic Pipe and Corrugated Pipe in Septic Tank Leach Fields.



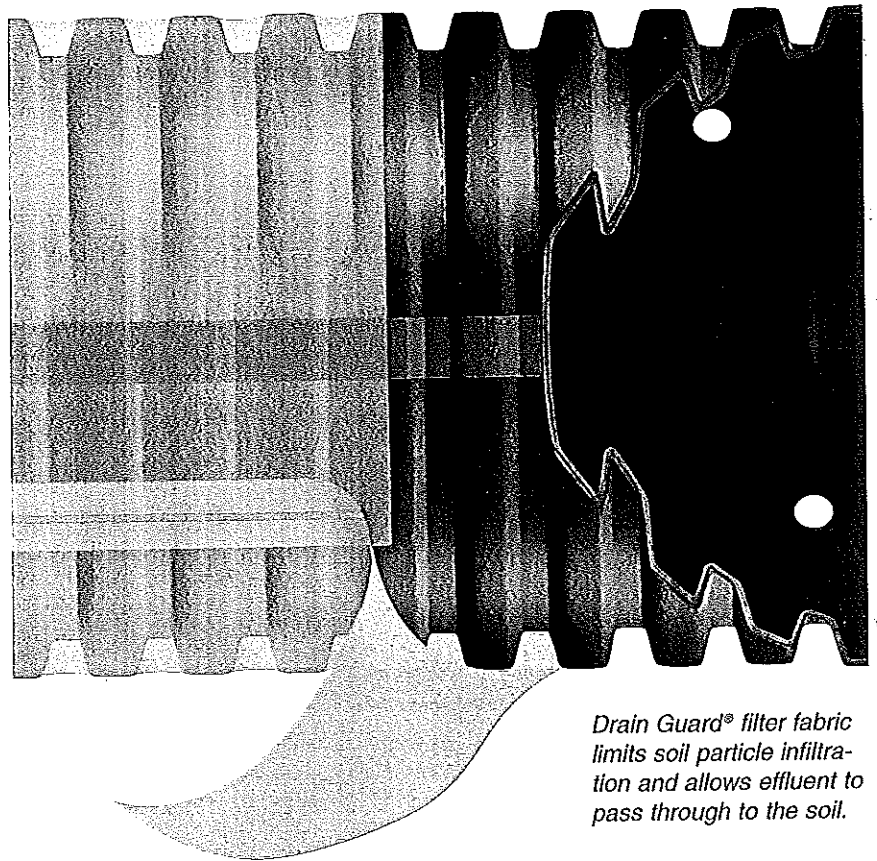
SB2® Pipe for On-Site Wastewater Disposal Gravel-less

During the 1970's, a building boom in Texas made gravel very scarce. Septic installers could not obtain gravel for their systems, and when they did, the quality was below many health department standards. Two professional sanitarians in Texas, John Scroff and John Barnes developed the SB2 gravel-less pipe to address this need.

The keys to the excellent performance of SB2 pipe are the size of the pipe and the location of the drain holes. The outside diameters of the 8" and 10" SB2 pipe provide an equivalent of 2 and 3 square feet, respectively, of soil absorption area per linear foot. The location of the drain holes, 60° off the bottom center line, provides additional sludge storage capacity, which increases retention time.

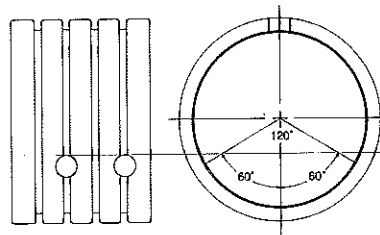
Drain Guard® protective wrap

Drain Guard®, a spunbonded nylon wrap that is overlapped and sonically welded over the pipe, provides an excellent soil interface for passage of effluent into the soil. The valleys of the corrugations function as additional storage capacity since the fabric bridges the corrugations and allows for the free movement of the effluent out and around the pipe.

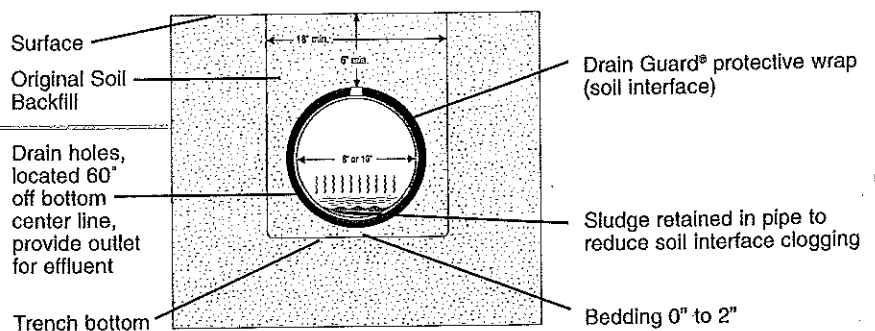


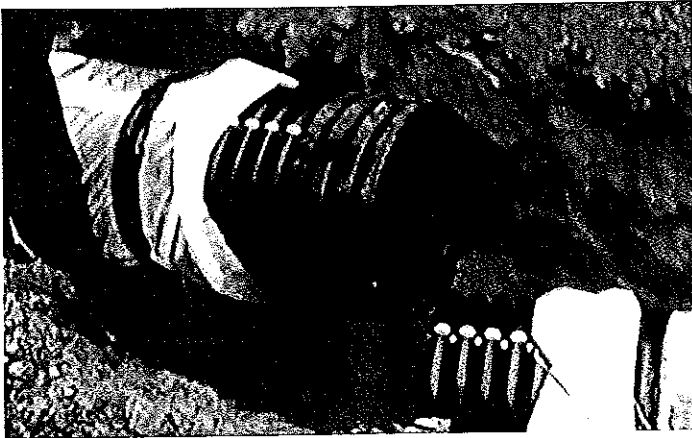
Drain Guard® filter fabric limits soil particle infiltration and allows effluent to pass through to the soil.

Locating holes 60° off the bottom center line creates additional sludge storage space.

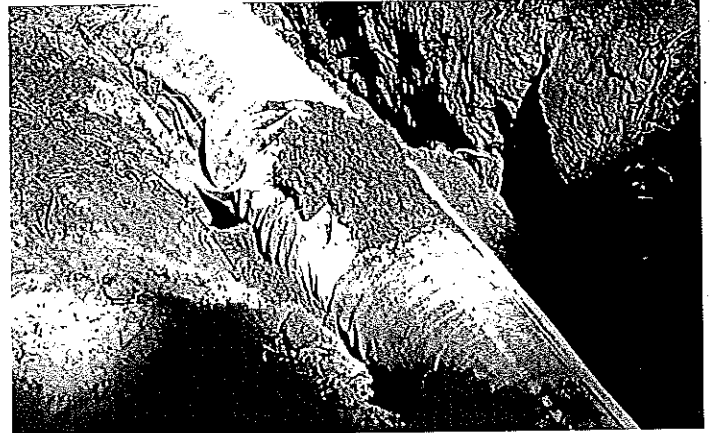


Recommended trench width for the SB2 pipe gravel-less drainfield is 18"-24". Tight soils may require a 24" wide trench to insure proper backfill around the bottom and sides of the SB2 pipe.





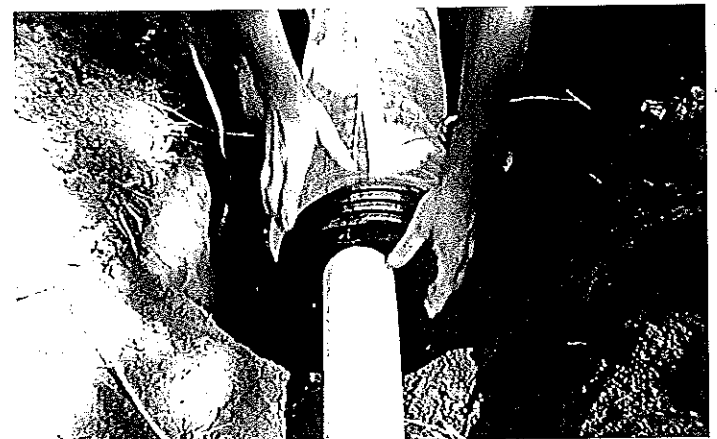
SB2 pipe must be placed in the trench with the green stripe up and joined with ADS couplers.



The Drain Guard® should then be pulled over the joint to reduce soil infiltration.



At the end of each line, place an ADS end cap and pull the Drain Guard over.



Insert the 4" distribution pipe in the ADS offset end cap with the hole positioned at the top.



The trench bottom should be level with a maximum slope of 1" per 100 linear feet.

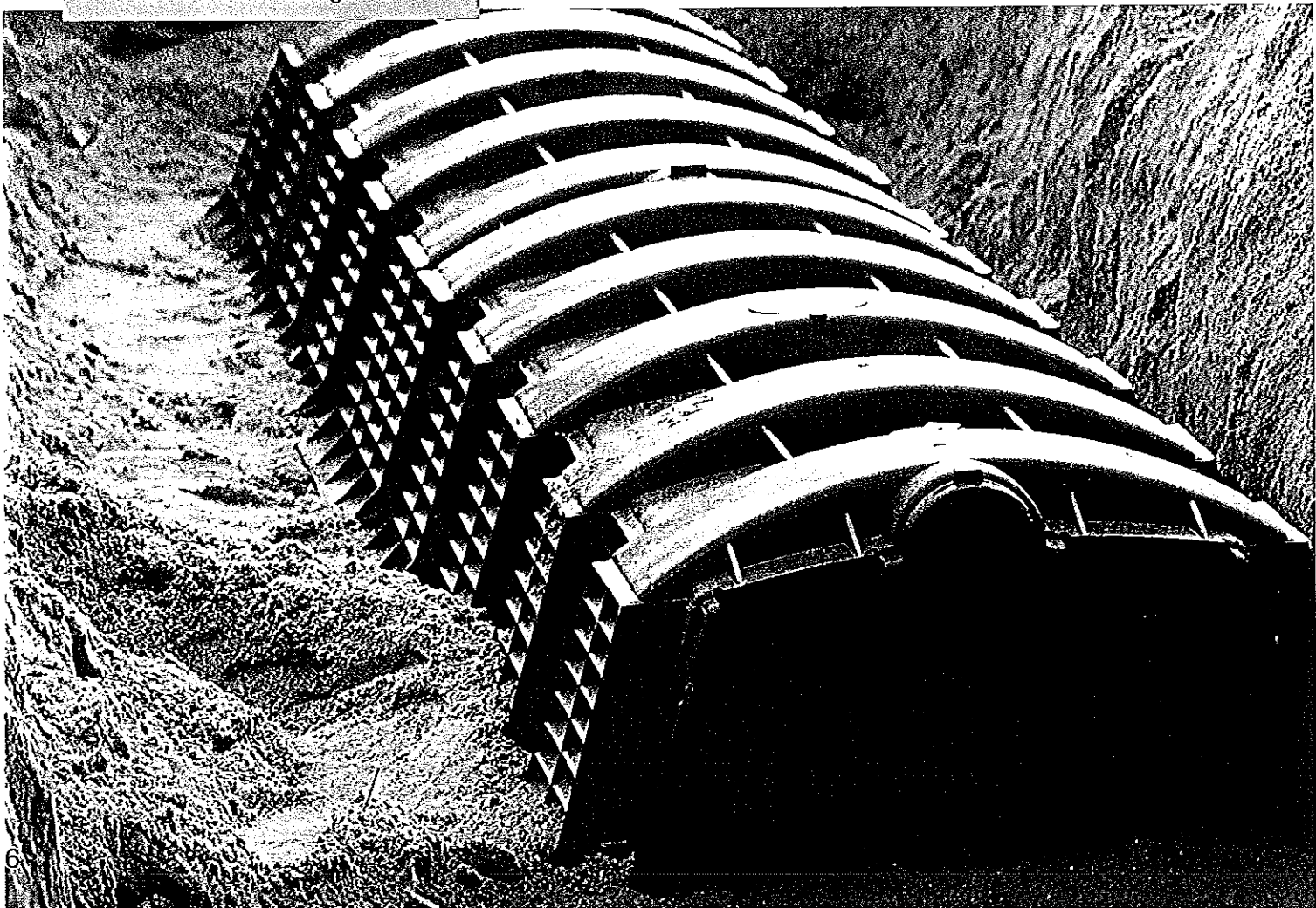
Note: Systems which utilize SB2 pipe are subject to the same limitations and site criteria as are systems which utilize conventional gravel leach beds. Any septic system must be properly designed, installed, and utilized in order to perform properly. ADS does not warrant the performance of a septic system in which SB2 pipe is a component, since the design, installation, and use of the septic system are beyond our control. See Product Note 3.111 SB2 Pipe Installation Guidelines.

Bio-Diffuser Leaching Chambers

Gravel-less

The Bio-Diffuser chamber is a gravel-less alternative for septic systems. The design objective is to provide an open bottom and unmasked sidewall to allow effluent to flow in all directions. This has been achieved by combining the traditional, open bottom with a series of louvers along the sides. The louvers are designed to allow effluent to pass into the backfill while preventing backfill from migrating into the chamber. BioDiffuser is constructed of high density polyethylene which is inert to sewage.

- › No gravel means greater storage volume, no damage to soil from heavy equipment and no concerns about “dirty” gravel.
- › Open bottom eliminates masking or shadow effect caused by gravel.
- › Louver openings increase infiltrative surface and minimize masking effect along the side walls.
- › The lightweight units, available in 11”, 14” and 16” heights, are easy to handle. Standard 76” lengths make installation quick and easy.

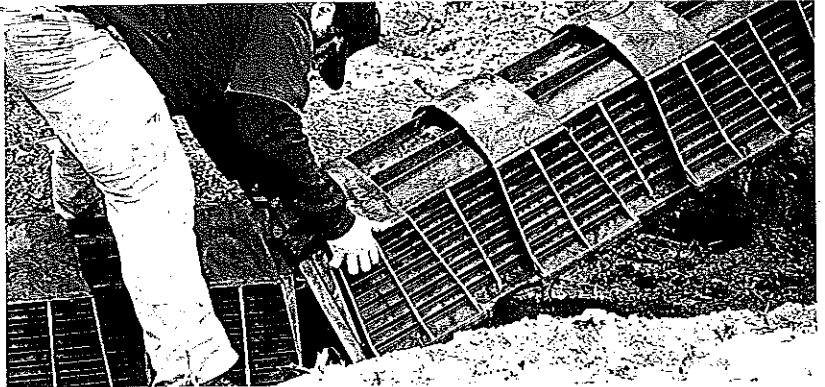


INSTALLATION GUIDELINES

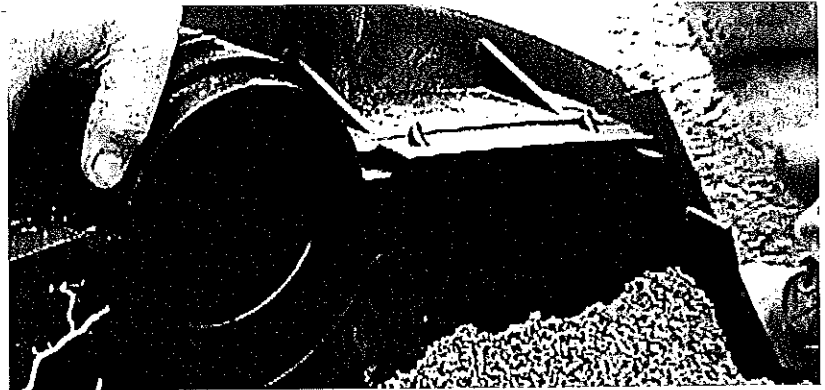
Excavate bed or 3' trench. Smooth irregularities and level the surface.



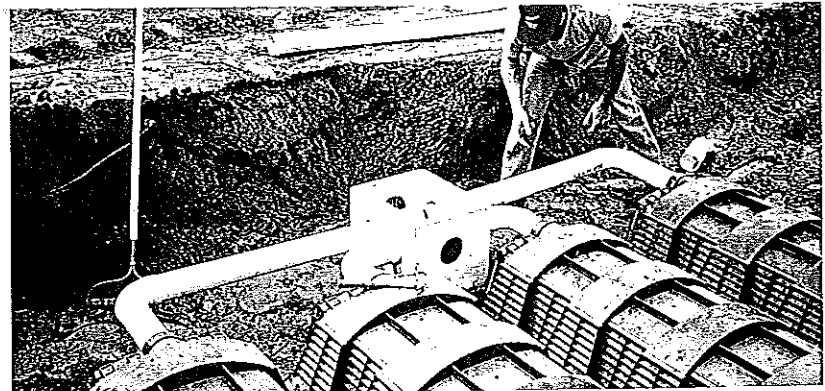
Assemble BioDiffuser chambers by snapping the units together end to end. No screws are required.



The universal end cap can be used as a solid end cap (as shown) or the 4" inlet form can be knocked out to accept a 4" distribution pipe.



Insert the 4" distribution pipe into the ends of the universal end caps.



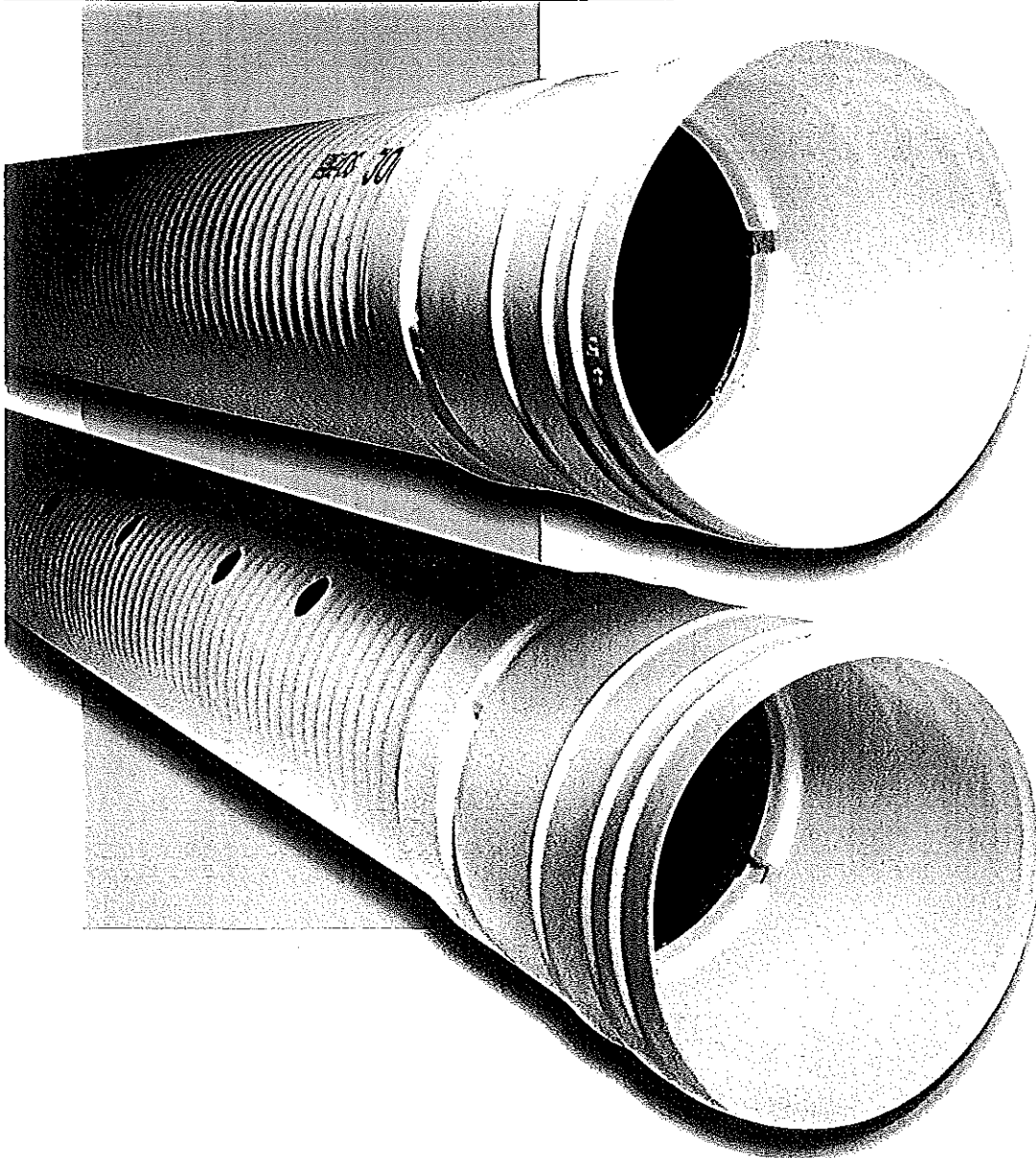
Fill side wall area to top of chambers with native soil (coarse sand or fine gravel may also be used; no heavy clay, silt, or debris). "Walk in" fill to compact soil along the sides.



BioDiffuser chambers can be used in TRENCH, BED, MOUND AND PRESSURE DOZING systems. See Product Note 3.121 BioDiffuser Chamber Installation Guidelines for H-10 and H-20 loads.

ADS-3000 TripleWall® Pipe

The Strongest and Stiffest Sewer and Drain Pipe



STRONG

ADS TripleWall HDPE pipe WILL NOT CRACK or flatten under typical loads.

DURABLE

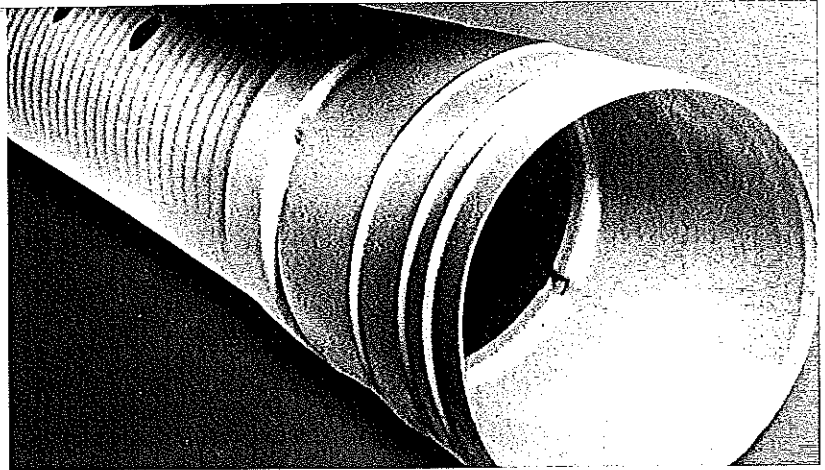
HDPE has unmatched corrosion and abrasion resistance.

Minimum Pipe Stiffness per ASTM D 2412

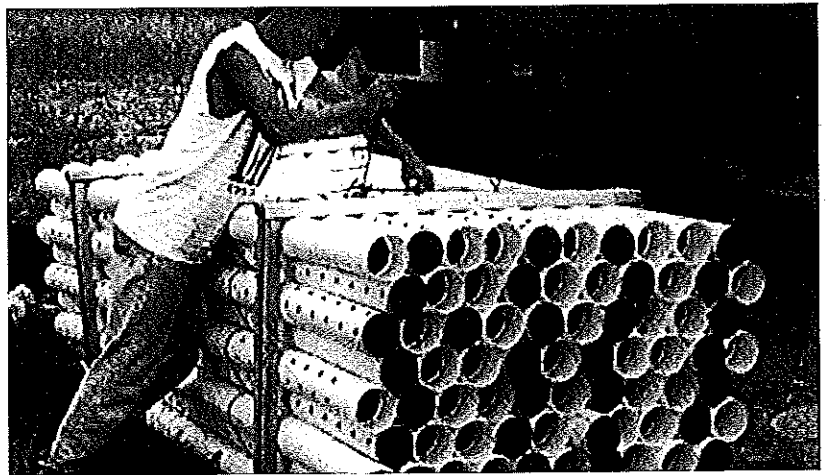
	4" Diameter	3" Diameter
ADS TripleWall Pipe	22 psi	40 psi
ASTM D 2729 PVC	11 psi	19 psi
ASTM F 810 PE	11 psi	19 psi

3" diameter TripleWall pipe is available in select areas.

Superior joint injection molded HDPE coupling is spin welded to the pipe.



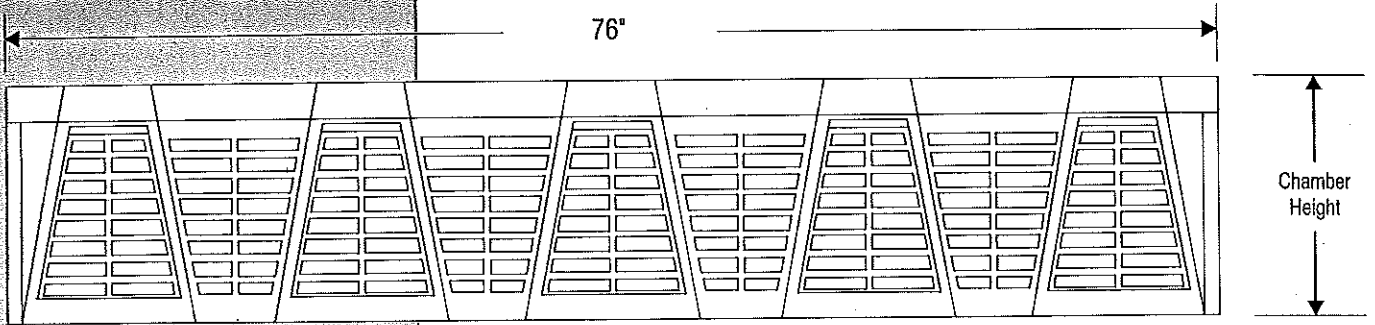
- Standard 5/8" leach hole perforations.
- 10' lengths with one spin welded coupling.
- 5 pieces per bundle.
- 90 pieces per pallet.



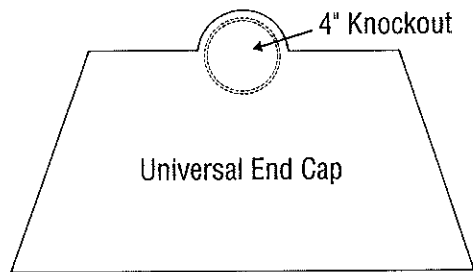
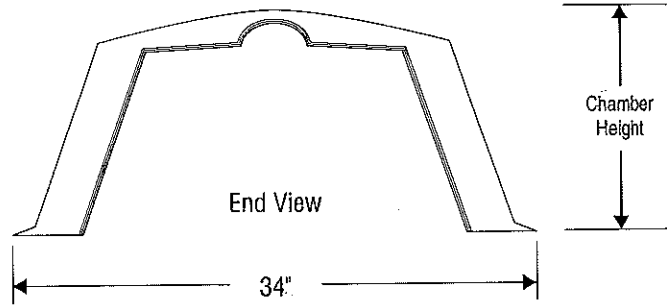
ADS TripleWall pipe is used for septic leach fields, perimeter drains and foundation drains.



BioDiffuser Specifications



All three BioDiffuser sizes can withstand H-10 loads when installed with properly graded and compacted soils. A minimum of 12" of cover is required for H-10 loads. The 14" High Capacity BioDiffuser is designed for H-20 loads. A minimum of 18" of cover is required for H-20 loads.

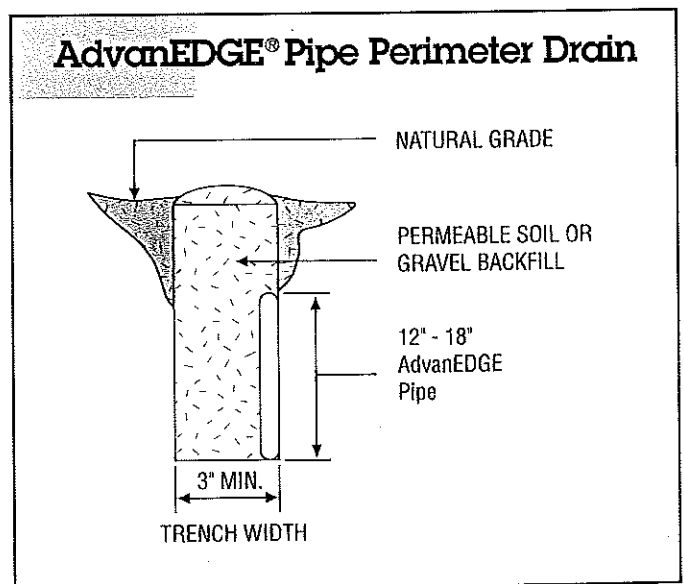
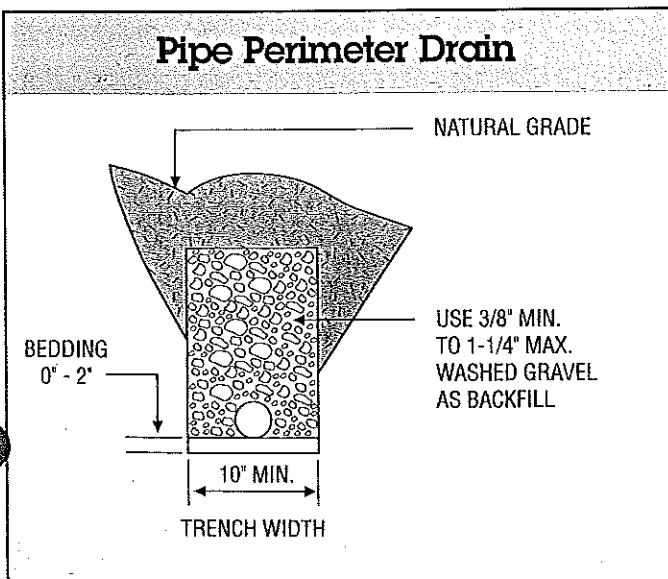
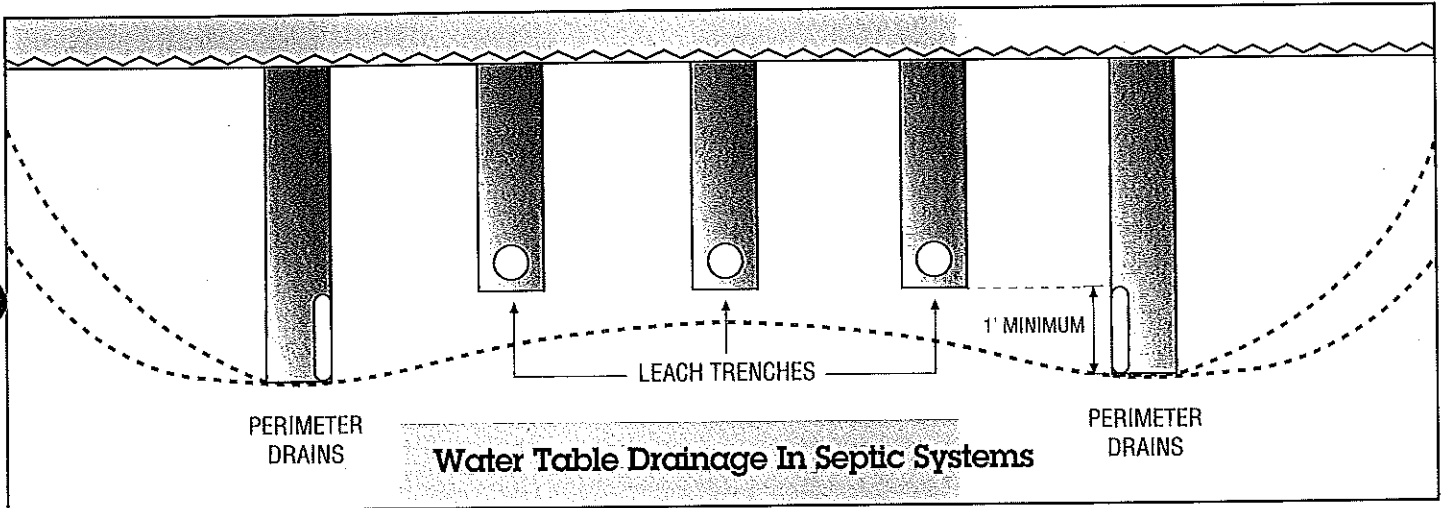


Available Sizes






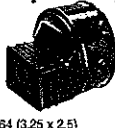







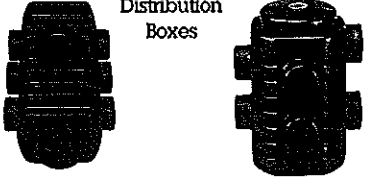
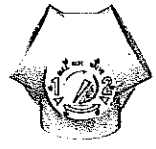


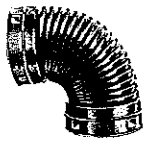






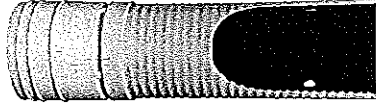

Chamber Dimensions	11" Standard	14" High Capacity	16" High Capacity
Length	76"	76"	76"
Width	34"	34"	34"
Height	11"	14"	16"
Invert	6.5	9	11.3

Perimeter Drains

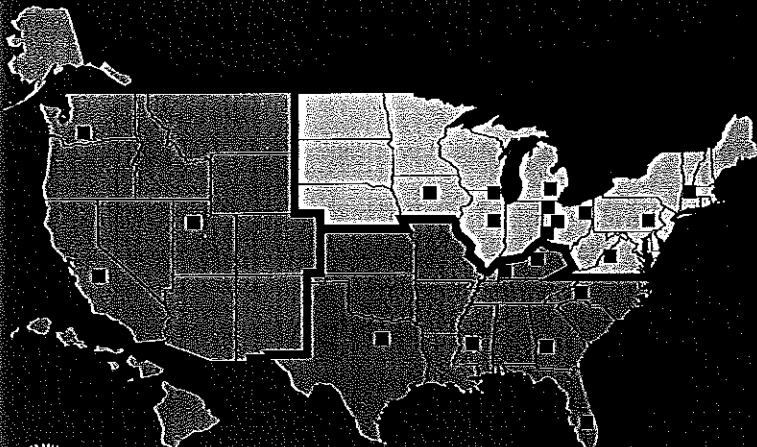
High water tables can cause flooding of the soil absorption septic system. Perimeter drains, also called curtain drains, are installed to prevent water seepage into the leach field area.



Easy-to-use heavy duty ADS fittings

Split Coupling  3" - 311 8" - 811 4" - 411 10" - 1011 5" - 511 12" - 1211 6" - 611 15" - 1511	Snap Tee  3" - 321 5" - 525 4" - 421 6" - 626	Blind Tee  3" - 341 5" - 541 8" - 841 4" - 441 6" - 641 10" - 1045	Reducing Tee (Multiple)  844 - 8" to 8 7/8" to 6" 8" to 5 7/8" to 4" 1044 - 10" to 10 7/16" to 6" 10" to 6"	Multiple Cross Tee  6" - 654	Tap Tee  410 - 10" and 12" pipe 450 - 6" and 8" pipe
Downspout Adapter  3" - 364 (3.25 x 2.5) 4" - 464 (3.25 x 2.5) 4" - 465 (4.25 x 3) 4" - 466 (2.56 x 2.56) RANGO 6" - 664 (4 x 6 x 6)	Septic Tee No. 494  4" straight end fits ADS adapter 463 for ADS Plastic Pipe	Septic Tee No. 495  Adapts to cast iron	Septic Tee No. 496  Adapts to clay	Septic Vented Ell No. 497 	Split End Cap  3" - 331 8" - 831 4" - 431 10" - 1031 5" - 531 12" - 1231 6" - 631 15" - 1531
Septic Tank Adapter  4" - 463	Offset Connector  8" - 840 10" - 1040	45° "Y"  3" - 322 6" - 622 4" - 422 8" - 822 5" - 522	Distribution Boxes  1369 - Regular 1370 - Hillside		Bull Run Distribution Valve 
Snap Coupling  3" - 312 6" - 612 4" - 412 8" - 812 5" - 512 10" - 1012	Internal Coupler  4" - 415 5" - 515 6" - 615 8" - 815	90° Ell  3" - 390 4" - 490	Snap Adapter  3" - 362 6" - 662 4" - 462 8" - 862 5" - 562	4" Sewer and Drain Adapter  4" - 467	AdvanEDGE® Pipe  Available in 12" and 18" heights
Solid/Perforated Pipe  3" - 300' Coils 4" - 250' Coils 5" - 165' Coils 6" - 100' Coils 8" - 20' Lengths 10" - 20' Lengths 12" - 20' Lengths 15" - 20' Lengths 18" - 20' Lengths (3" and 4" also available in bundles of ten-10' lengths)	Septic System Leach Field Pipe (1/2" to 3/4" dia. hole)  4" - 402 - 10' Lengths (402 also available in coils)	SB2 Gravel-less Leach Bed Pipe  Filter wrapped, 1/2" holes, 8" and 10" diam., 20' lengths.	ADS-3000 TripleWall® Septic Drain Pipe  462 - 4" x 10', perforated 465 - 4" x 10', solid		Septic Fabric  2600 or 2700 Series

ADS Sales and Service Locations



ZONE OFFICES

- **MIDWEST/NORTHEAST ZONE**
LONDON, OH 1-800-733-9554
- **SOUTHERN ZONE**
FRANKLIN, TN 1-800-733-9987
- **WESTERN ZONE**
WASHOUGAL, WA 1-800-733-8523
- **MANUFACTURING FACILITY LOCATIONS**



ADVANCED DRAINAGE SYSTEMS, INC.
 3300 RIVERSIDE DRIVE, COLUMBUS, OHIO 43221
 1-800-821-6710 • WWW.ADS-PIPE.COM

Product Notes

Product Note 3.121A

Re: BioDiffuser Bio-2 and Bio 3 Chamber Installation Guidelines

Date: August 10, 2000

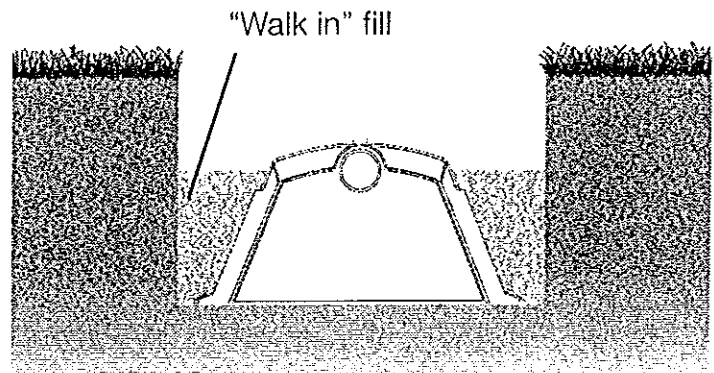


Bio 2 and Bio 3 represent the latest in the line of BioDiffuser plastic leaching chamber products. In Product Note 3.121 guidelines for the installation of BioDiffuser chambers were outlined. This document is intended to complement those instructions. Several modifications incorporated into the Bio 2 and Bio 3 parts create installation procedures which differ slightly from those described in 3.121. When installing the Bio 2 and Bio 3 chamber products, please refer to the following:

DRAFT

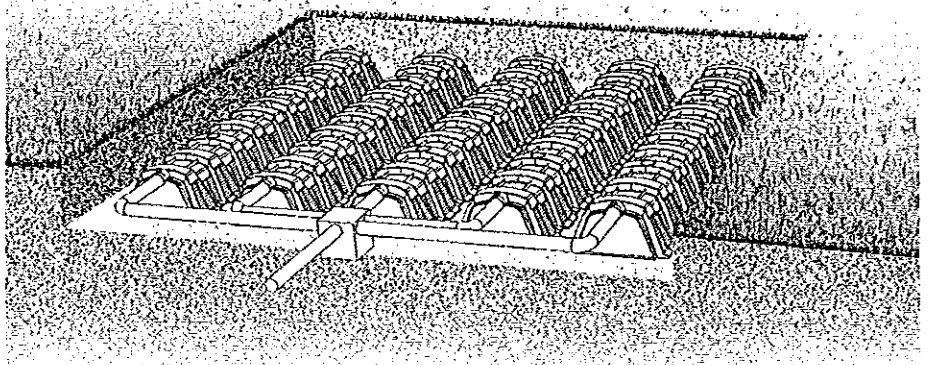
Trench Installation Guidelines

1. Excavate trench to proper width and depth as described in the design and as required by state and local code. The Bio 2 and Bio 3 require minimum trench widths of 18 inches and 24 inches respectively.
2. Scarify the bottom and sidewall surfaces to remove any smearing which may have occurred during excavation. Smooth irregularities in the excavation. A level, flat surface is necessary.
3. Assemble the Bio parts in the trench excavation by engaging the "dome" end of the installing unit over the "post" end of the chamber already in place. No screws are required.
4. Place end plates on each end of the Bio chamber line. Secure in place with backfill — again, no screws are required.
5. Knock out the scribed holes in the roof aspect of the first chamber unit and install distribution pipe from the distribution box or septic tank as described in the plan. Knock-outs will accommodate either SDR 35 or Sch 40 pipe. Score the appropriate groove in the knock-out with a knife before removing plug with shovel handle in order to create a 42" or 45" hole as required.
6. Connect serial lines of chambers in same manner where called for.
7. Fill sidewall area to top of the chamber units with native soil (or select fill where required.) Coarse sand or gravel is recommended, no heavy clay, silt, or debris should be included in the backfill.
8. "Walk in" fill to compact soil along the sides of the chamber. This is important to achieve full weight/load rating.



Trench Detail

6. Fill sidewall area to top of chambers with native soil (or select fill where required). Coarse sand or fine gravel may also be used; no heavy clay, silt or debris should be included.
7. "Walk in" fill to compact soil along the sides of the chamber. This is important to achieve full weight / load rating.
8. Using a light tracked machine, cover the BioDiffuser chambers with native soil or select fill to the depth specified in the system design and as required by state and local codes. Avoid large rocks and debris in the backfill material. Do **not** drive equipment over the BioDiffuser chambers without bridging the excavation.

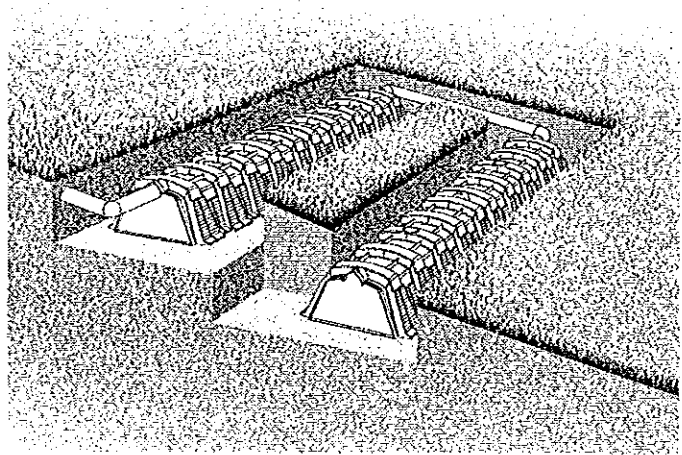


Bed System

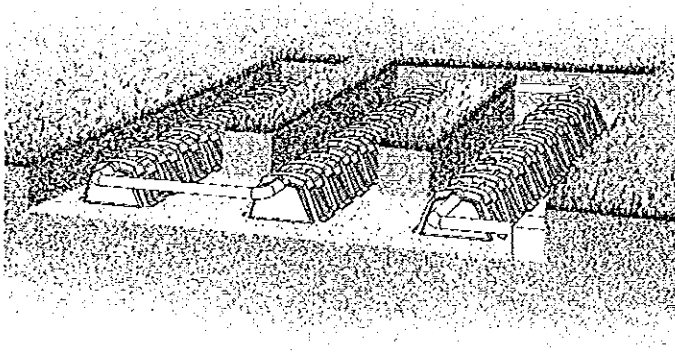
BIODIFFUSER LIMITED WARRANTY

1. PSA, Inc. ("PSA"), a subsidiary of ADS, Inc., warrants to the original purchaser that each BioDiffuser unit is free from defects in materials and workmanship for one year from the date of purchase, when installed in accordance with the manufacturer's instructions. This warranty will not apply to any units that have been subjected to abuse or mishandling, or that have been repaired or altered by anyone other than PSA. PSA's sole responsibility under this warranty shall be the replacement of the unit. PSA's obligation under this warranty shall not include any transportation charges or the costs of installation and **IN NO EVENT SHALL PSA BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES.**
2. **TO THE EXTENT ALLOWED BY LAW, THIS WARRANTY SHALL BE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES (WHETHER EXPRESS, IMPLIED OR STATUTORY), INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**
3. The purchaser shall be responsible for insuring that installation of the unit is completed in accordance with all applicable laws, codes, rules and regulations. In no event shall PSA be responsible for any loss or damage to the purchaser, the units, or any third party resulting installation or shipment.
4. No statements or representations made by any representative of PSA shall alter, vary or expand the provisions of this warranty. This warranty is applicable only to the original purchaser and there shall be no third-party beneficiaries to this warranty.
5. All claims made under this warranty shall be presented to PSA in writing no later than thirty (30) days after the discovery of any defect in the BioDiffuser unit. Any claim under this warranty that is not presented within 30 days upon discovery shall be deemed unconditionally waived.

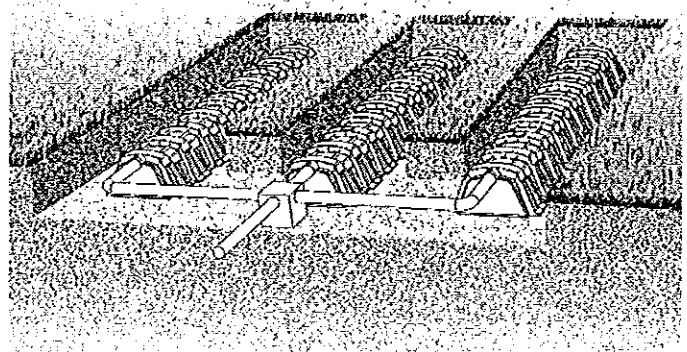
9. Complete the backfill of the system with native soil or select fill to the depth specified in the system design and as required by state and local codes. Avoid large rocks and debris in backfill material. Do not drive equipment over the Bio units without first bridging the excavation. A tracked vehicle is recommended.



Serial System



Series System



Trench System

Bed Installation

1. Excavate and level installation area.
2. Scarify surface to remove any smearing that may occur during excavation. Smooth irregularities in the excavation.
3. Assemble the BioDiffuser chambers in adjacent rows to cover the desired area by placing the "dome" end of the installing chamber over the "post" end of the chamber already in place. No screws required.
4. Place end plates on end unit of each row. Secure the end plates in place with backfill (no screws required).
5. Knock out scribed opening on roof aspect of each of the first units in each row as drawn in the plan and install distribution pipe. Knock-outs will accommodate both SDR 35 and Sch 40 pipe. Score the appropriate groove in the knock-out with a knife before removing plug with shovel handle in order to create a 42" or 45" hole as required.

MEMO

To: James A. Jacobsen Maine DHE
 From: Dick Bachelder PSA, Inc.
 Re: Sizing Criteria Rationale
 BioDiffuser Bio 2 & Bio 3 Product Registration Request

Date: January 21, 2001

Dear Mr. Jacobsen:

We respectfully submit the following information in support of our request that the DHE approve the Bio 2 and Bio 3 model plastic leaching chambers for use at our recommended sizing:

These two new chamber products are simply sister products to the previously approved BioDiffuser chamber units. Produced in the same manner (structural foam injection molding) and with the same materials (HDPE), the are structurally similar to their predecessors (see attached load testing report).

The BioDiffuser Bio 2 model plastic leaching chamber is 15" wide at the base. It is 11.9" high overall, with 9.55" of louvered sidewall available for effluent dispersion. It is 86.9" (7.2 feet) long when engaged. As the name implies, the Bio 2 is designed to offer functional infiltrative surface area and storage capacity in excess of that offered by a two-foot wide aggregate-laden trench. Our recommended sizing of the Bio 2 for use in Maine is 9.0 square feet per unit when installed in bed configurations (1.25 foot wide times 7.2 feet long – bottom area only), and 14.4 square feet per unit when installed in trench configurations (2.0 square feet per linear foot times 7.2 feet long).

9.55" / 2.9"

The BioDiffuser Bio 3 model plastic leaching chamber is 22" wide at the base. It is 11.9" high overall with 9.55" of louvered sidewall available for effluent dispersion. It is also 86.9" (7.2 feet) long when engaged. As it's name implies, the Bio 3 is designed to offer functional infiltrative surface area and storage capacity in excess of that offered by a three-foot wide aggregate-laden trench. Our recommended sizing of the Bio 3 for use in Maine is 13 square feet per unit when installed in bed configurations (1.8 feet wide times 7.2 feet long – bottom area only), and 21.6 square feet per unit when installed in trench configurations (3.0 square feet per linear foot times 7.2 feet long).

PSA, Inc.
PO. Box 218902
Columbus, OH, 43221
PH: 614-457-3051
Fax: 614-538-5204

A subsidiary of

Advanced Drainage Systems, Inc.

Manufacturers of **BioDiffuser** Leaching Chambers

Wednesday, January 17, 2001

Dick Bachelder
PSA
71 Orchard Farm Road
York, ME 03909

Fax: 207-363-4943
Phone: 207-363-2528

Via Overnight Mail

Dear Dick:

I've attached original copies of the Bio 2, Bio 3 and Angle Section stiffness comparison studies that you requested. These have been drafted for your use in obtaining local and state regulatory approval for these new products.

Please keep in mind that we do not believe any of our chambers (nor those promoted by Infiltrator and others) should be sold for any applications other than onsite waste water treatment, and they should never be promoted for burial under pavement. Good luck with the approvals - let me know if we can do anything further to help out.

Sincerely,



Bill Shaffer
Product Manager

cc: J. Goddard, B. Slicker, T. McElfresh, B. Arnold, S. Helmrich, J. Schweller, N. Williams, T. Gray, M. Sturgeon, T. King

PSA, Inc.
PO. Box 218902
Columbus, OH, 43221
PH: 614-457-3051
Fax: 614-538-5204

A subsidiary of
ADS
Advanced Drainage Systems, Inc.

Manufacturers of **BioDiffuser** Leaching Chambers

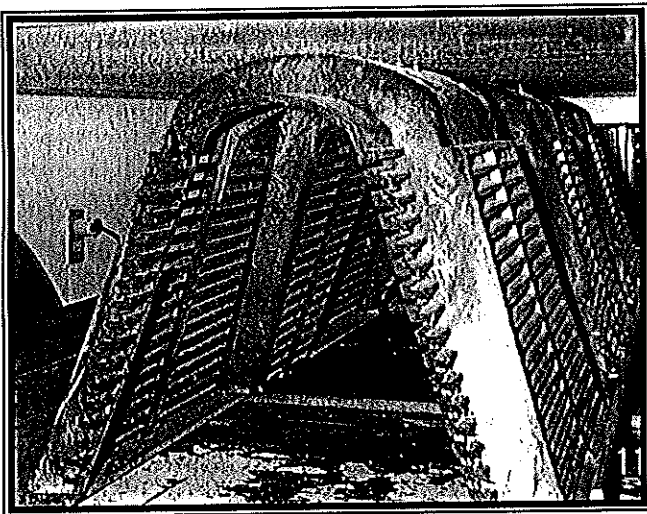
Chamber Stiffness Comparison Bio 2, Bio 3 and Standard Chambers

Date: January 16, 2001

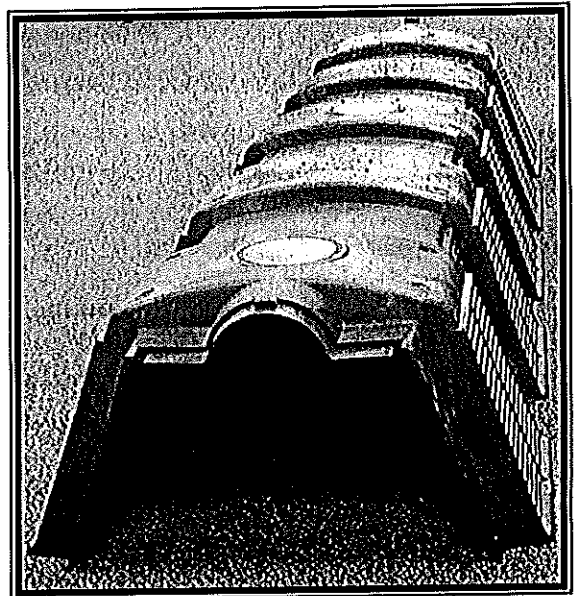
Location: ADS Quality Laboratory - Hamilton, OH

Parallel-Plate Test Method Summary

PSA recently introduced the Bio 2 (15" wide) and Bio 3 (22" wide) Narrow chambers to complement the existing line of Standard and High-Capacity chambers. The Standard Chamber has been utilized for more than 10-years and has proven to be structurally competent. The purpose of this evaluation was to compare the performance of the new Bio 2 and Bio 3 chambers to the baseline performance of the proven Standard Chamber. The results of the study demonstrate that the Bio 2 and Bio 3 chambers should have more than adequate structural integrity for use in onsite waste systems.



Bio 2 During Parallel Plate Testing



Bio 3 Chamber

The most widely accepted method for comparing the stiffness of plastic pipes has been the parallel-plate loading test described by ASTM D-2412. This test method is easily adapted to chambers by simply restraining the edges of the chambers to simulate the backfill that would be present at the base of the

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 Columbus, OH, 43221
 PH: 614-457-3051
 Fax: 614-538-5204

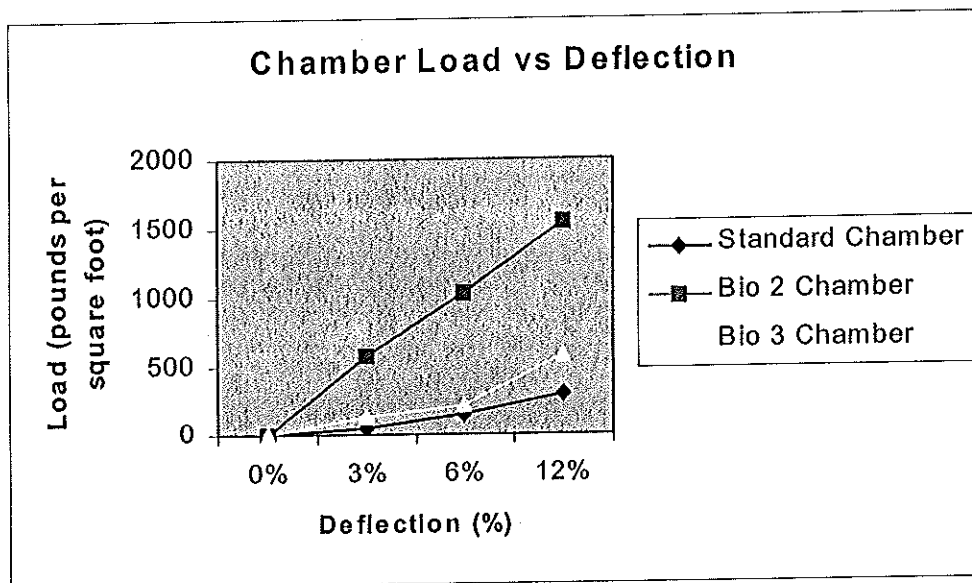


Manufacturers of **BioDiffuser** Leaching Chambers

chamber's "feet". The test is clearly more challenging than a field-loading situation with complete sidewall support, but it is a convenient way to quantitatively compare the stiffness of (2) or more similar products. Product characteristics are compared below:

	Standard	Bio2	Bio3
Weight	27 lbs	18 lbs	22 lbs
Nominal Wall Thickness	0.200 inches	0.200 inches	0.200 inches
Height	11 inches	12 inches	12 inches
Width	34 inches	15 inches	22 inches
Lay Length	75 inches	86 inches	86 inches
Test Sample Length	50 inches	50 inches	52 inches
Projected Test Area	11.8 square feet	5.2 square feet	7.9 square feet

To fit within the test apparatus, the chambers were cut to sections of 50" to 52" about their centerlines. The chambers were placed within the parallel plate testing apparatus and were compressed at a constant rate of 0.5 inches/minute generating a graph showing force vs. deflection. The raw test results are included in the appendix. In order to compare the load-bearing capabilities of these chambers with differing "footprints" (projected areas), it is necessary to divide the loads recorded into each chamber's projected area. This data is shown and plotted below:



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Fax: 614-538-5204



Manufacturers of **BioDiffuser** Leaching Chambers

Discussion of Parallel-Plate Test Results

Designers of flexible underground structures realize that small vertical deflections under load are beneficial because significant portions of the load can be transferred to the soil envelope. However, very large deflections are undesirable and normally indicative of improper installation. It is reasonable to assume that the "normal operating range" of septic chamber deflections would be between 0% and 10%. The graph shown above highlights the force per unit area required to deflect each chamber 3%, 6% and 12% of its initial (unloaded) height. The plot shows that the Bio 2 and the Bio 3 chambers support more load per unit area at all deflection levels when compared with the existing Standard chambers.

Conclusion

Structurally, the new PSA Bio 2 and Bio 3 chambers exhibit a similar to superior load-bearing capability when compared with the Standard chamber. The standard chambers have been utilized nationwide in leachfield applications for over 10-years and have proven to be structurally adequate. Therefore, the new Bio 2 and Bio 3 chambers should be structurally appropriate for the same applications with an even higher factor of safety.

Report Prepared By:

Bill Shaffer
Product Manager

January 16, 2001

PSA, Inc.
 PO. Box 218902
 Columbus, OH, 43221
 PH: 614-457-3051
 Fax: 614-538-5204



Manufacturers of **BioDiffuser** Leaching Chambers

Appendix - Test Data

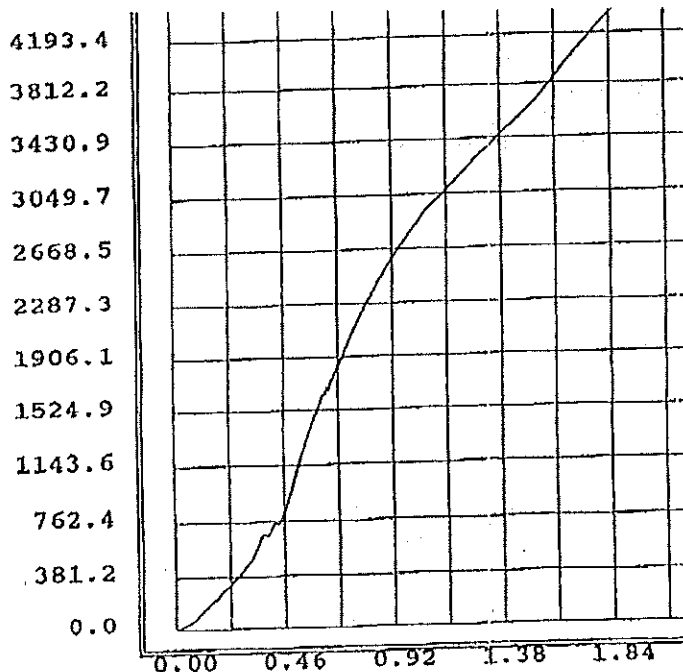
Data Conversion to Load per Square Foot

	Standard	Bio 2	Bio 3	Deflection	Standard	Bio 2	Bio 3
Proj Aron	11.8	5.2	7.9	0%	0	0	0
3%	604	3073	1025	3%	51	591	130
6%	1850	5339	1720	6%	157	1027	218
12%	3456	8060	4559	12%	293	1550	577

Standard Chamber Parallel Plate Test Raw Data

```

Sample Name      BIO-DIFFUSER
Sample Height *  11.50 in.
Sample Width     34.00 in.
Sample Length    50.00 in.
% points         3%    6%    12%
.F.....       604.1  1850  3456
Preload          20.00 lbs.
Max. Pressure    10000.00 lbs.
Travel Rate      0.50 in.p/m
  
```



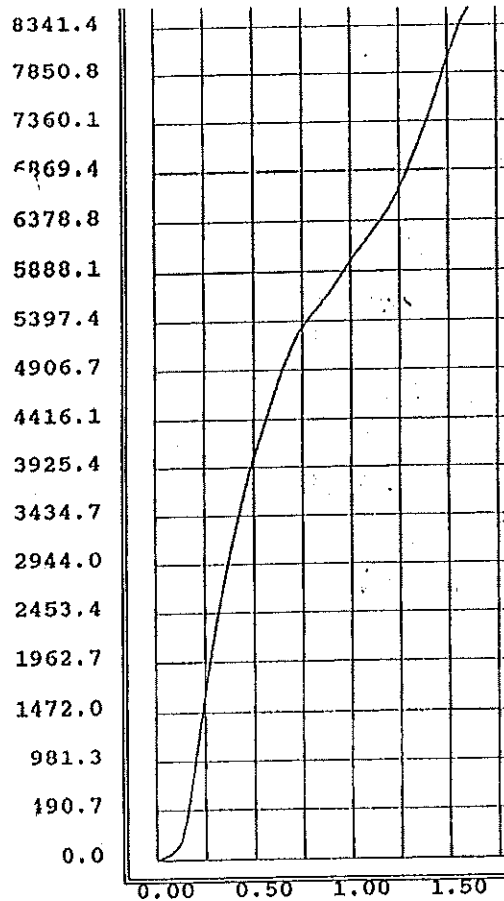
PSA, Inc.
 PO. Box 218902
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 Fax: 614-538-5204



Manufacturers of **BioDiffuser** Leaching Chambers

Bio 2 Chamber Parallel Plate Test Raw Data

Sample Name	BIO-DIFFUSER		
Sample Height *	12.50	in.	
Sample Width	15.00	in.	
Sample Length	50.00	in.	
% points	3%	6%	12%
.F.....	3073	5339	8060
Preload	20.00	lbs.	
Max. Pressure	10000.00	lbs.	
Travel Rate	0.50	in.p/m	



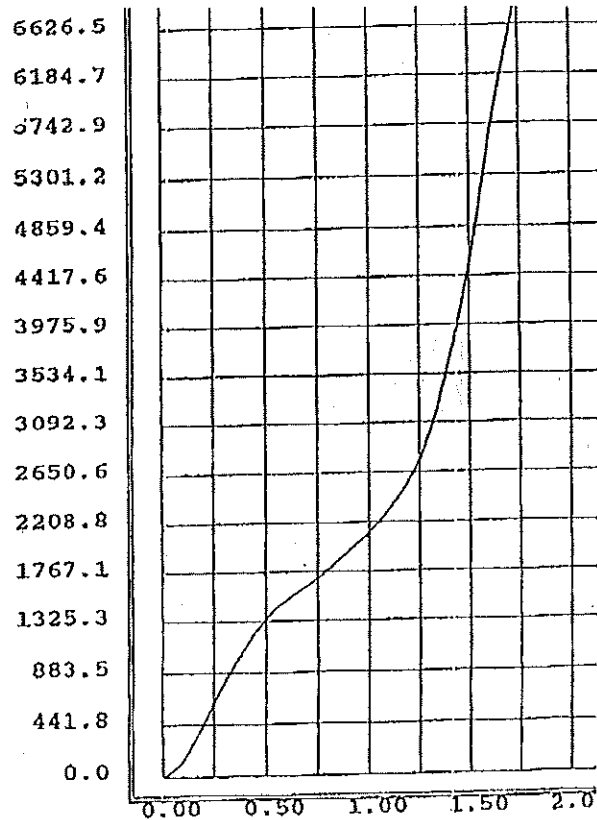
PSA, Inc.
 PO. Box 218902
 Columbus, OH, 43221
 PH: 614-457-3051
 Fax: 614-538-5204



Manufacturers of **BioDiffuser** Leaching Chambers

Bio 3 Chamber Parallel Plate Test Raw Data

Sample Name	BIO-DIFFUSER		
Sample Height *	12.50	in.	
Sample Width	22.00	in.	
Sample Length	52.00	in.	
‡ points	3‡	6‡	12‡
.F.....	1025	1720	4559
Preload	20.00	lbs.	
Max. Pressure	10000.00	lbs.	
Travel Rate	0.50	in.p/m	





STATE OF MAINE
DEPARTMENT OF HUMAN SERVICES
DIVISION OF HEALTH ENGINEERING
10 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0010

ANGUS S. KING, JR.
GOVERNOR

KEVIN W. CONCANNON
COMMISSIONER

March 9, 2001

PSA Inc.
Attn: Dick Bachelder
71 Orchard Farm Road
York, Maine 03909

Subject: Product Registration, BioDiffuser Bio 2 and Bio 3

Dear Mr. Bachelder:

Thank you for your electronic letter dated February 6, 2001 regarding your company's product. I apologize for my delayed response.

BioDiffuser Bio 2 and Bio 3 were approved for use in Maine by this office, in January of this year. BioDiffuser Bio 2 and Bio 3 were approved with ratings of 9 sq. ft. and 13 sq. ft. per unit for cluster installations, respectively; and 14.4 sq. ft. and 21.6 sq. ft. per unit for trench installations, respectively. However, I erroneously omitted the sizing adjustment factor allowed for chambers.

You have requested that the BioDiffuser Bio 2 and Bio 3 be rated at 18 sq. ft. and 26.4 sq. ft. per unit for cluster installations, respectively; and 28.8 sq. ft. and 43.2 sq. ft. per unit for trench installations, respectively.

The Division has determined that BioDiffuser Bio 2 and Bio 3 are acceptable for use in the State of Maine, sized as specified in the preceding paragraph, provided that they are installed, operated, 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 BioDiffuser Bio 2 and Bio 3. 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.

This approval supersedes all prior approvals.

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

Sincerely,

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

xc: Product File



PRINTED ON RECYCLED PAPER

From: bach@ime.net

Date: 2/6/01

hi jim,

thought this method of communication might work best... let me know if you would prefer otherwise (phone, fax, whatever). please be warned that i don't do capital letters in e-mail...

thanks for the fax of the infiltrator eq 24 letter dated april 30, 1997. what that letter gives the eq 24 product, as i read it, is 2 sq. ft. per linear foot, prior to the 50% reduction that chambers (open bottom devices) have gotten in the past. hence, the 4 sq ft per linear foot "rating" or 33.3 sq. ft. per 8.33 ft. long unit.

please consider:

as regards the bio 2:

our bio 2 device is designed and engineered to be functionally equivalent to the infiltrator eq 24 chamber. it is 15 inches wide at its base (as is the eq 24), and 11.9 inches tall overall (the eq 24 is 12 inches high overall). the bio 2 has louvered sidewalls up to a height of 9.55 inches, while the eq 24 has louvered sidewalls up to a height of 9.5 inches. none of this, as i am sure you understand, is coincidence.

my request for 9 sq. ft. per unit in cluster configuration and 14.4 sq.ft. per unit in trench configuration was intended to reflect the product's function BEFORE the 50% reduction would be applied. if the 50% were to be included in the request, what i really intended to ask for was 2.5 sq. ft. per linear foot in a cluster and 4 square foot per linear foot in a trench.; at 7.2 feet long per unit, that would be 18 sq. ft. per unit in cluster and 28.8 sq. ft. per unit in trench configuration respectively.

Such a "rating" would put us on a equal basis with the infiltrator eq 24 in terms of trench configurations (4 sq. ft. per linear foot of product), given the way i read their approval letter. what does that same letter say, as far as you are concerned, as regards the sizing of the eq 24 in cluster configuration? should it not be bottom area only - which is 1.25 feet wide at 50% reduction = 2.5 sq ft per linear foot? as i read it, the product is still getting 4 sq ft per linear foot...

that should be clarified, in my opinion.

as regards our bio 3 chamber:

the bottom is 22" wide. the height remains 11.9 inches with 9.55 inches of louvered sidewall. as the name implies, it is designed to compare to the 3 foot wide trench (for your information, the infiltrator folks make an "eq 36" chamber which is also 22" wide by 12" tall). as above, in my letter it was my intent to ask for a sizing which reflected the value of the chamber BEFORE reduction was applied. at 22" wide, the bio 3 offers 1.83 sq ft of bottom area, and at a 50% reduction should be rated at 3.66 sq ft per linear foot in cluster. at 7.2 feet long, it warrants a rating of 26.4 sq ft per unit in cluster configuration. in trench, it warrants a 3 ft per linear foot rating before reduction (hence, my request for 21.6 sq ft per unit). with a 50% reduction, we respectfully submit that the bio 3 should be rated at 43.2 sq ft per unit in trench configuration.

i am not clear on the numbers that you provide in the first sentence of the second paragraph of our January 30 letter to me. are the 9.05, 13.3 in cluster and 20.5 and 24.7 in trench all before the 50% is applied?

equal treatment of dimensionally similar devices, provided that the science warrants such treatment, is my goal here (as always). the eq 24 and the bio 2 warrant equal treatment - they are both 15 inches wide at their bases, stand about a foot tall, and have louvered sidewalls to a height of about 9.5 inches. can we work together to create such a situation? i ask that of you today.

with that goal in mind, i believe we need to (1) clarify the status of eq 24 sizing when installed in cluster configuration; (2) come to an agreement on the rating the bio 2 should carry in both applications; (3) come to an agreement on the rating the bio 3 should carry in both applications; and (4) table the January 30, 2000 letter until these issues are resolved.

what do you think? please let me know...

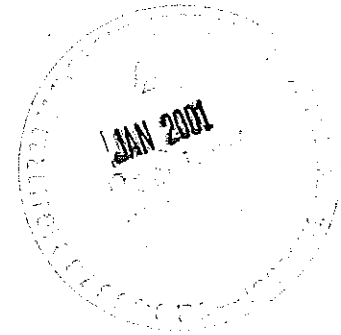
and thanks in advance for your consideration.

dick bachelder

FILE COPY

INFILTRATOR[®]
SYSTEMS INC

The world leader in chamber technology™



January 10, 2001

Clough Toppan P.E.
Director
Division of Health Engineering
157 Capitol Street
10 State House Station
Augusta, Maine 04333-0010

Dear Clough:

I am writing to express my concerns about the new ADS plastic leaching chamber, Bio2. Infiltrator Systems has a chamber, Equalizer 24, approved by the State with a rating of 4 square feet per linear foot. Our company has performed several tests and monitored numerous systems throughout the U.S. and Canada. The research indicates that the chambers are performing excellent at the rating of 4 square feet per linear foot. The factor that can be attributed the most to the success of this chamber and our other chambers, is the sidewinder sidewall. The sidewinder sidewall allows more infiltration area per linear foot than any other manufactured chamber.

Although these chambers look similar, the infiltrative surfaces are not equal and should not be approved as equal. I am enclosing a report that compares the two chambers. I can appreciate the sensitivity of this subject and the pressures that you and your staff are under. It is not my intent to suggest sizing requirements for other proprietary devices. However, I do wish to protect the research, support and approvals for Infiltrator Chambers.

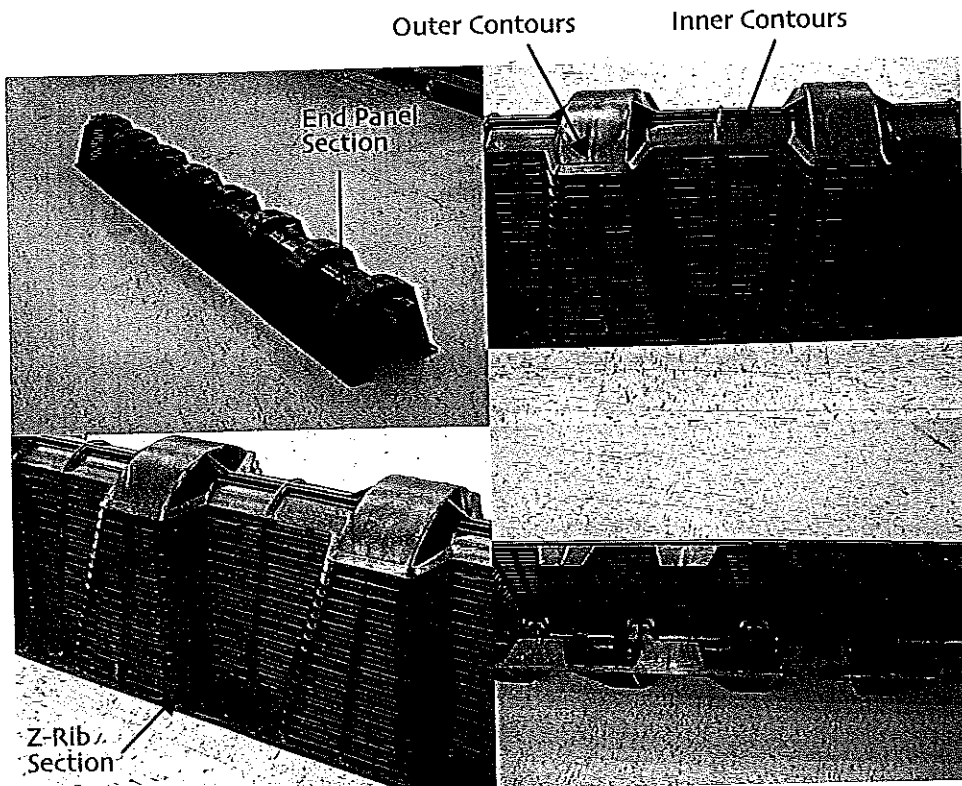
Please feel free to contact me if you have any questions.

Sincerely,

Chris Stewart
Northeast Zone Manager

Equalizer 24 Chamber

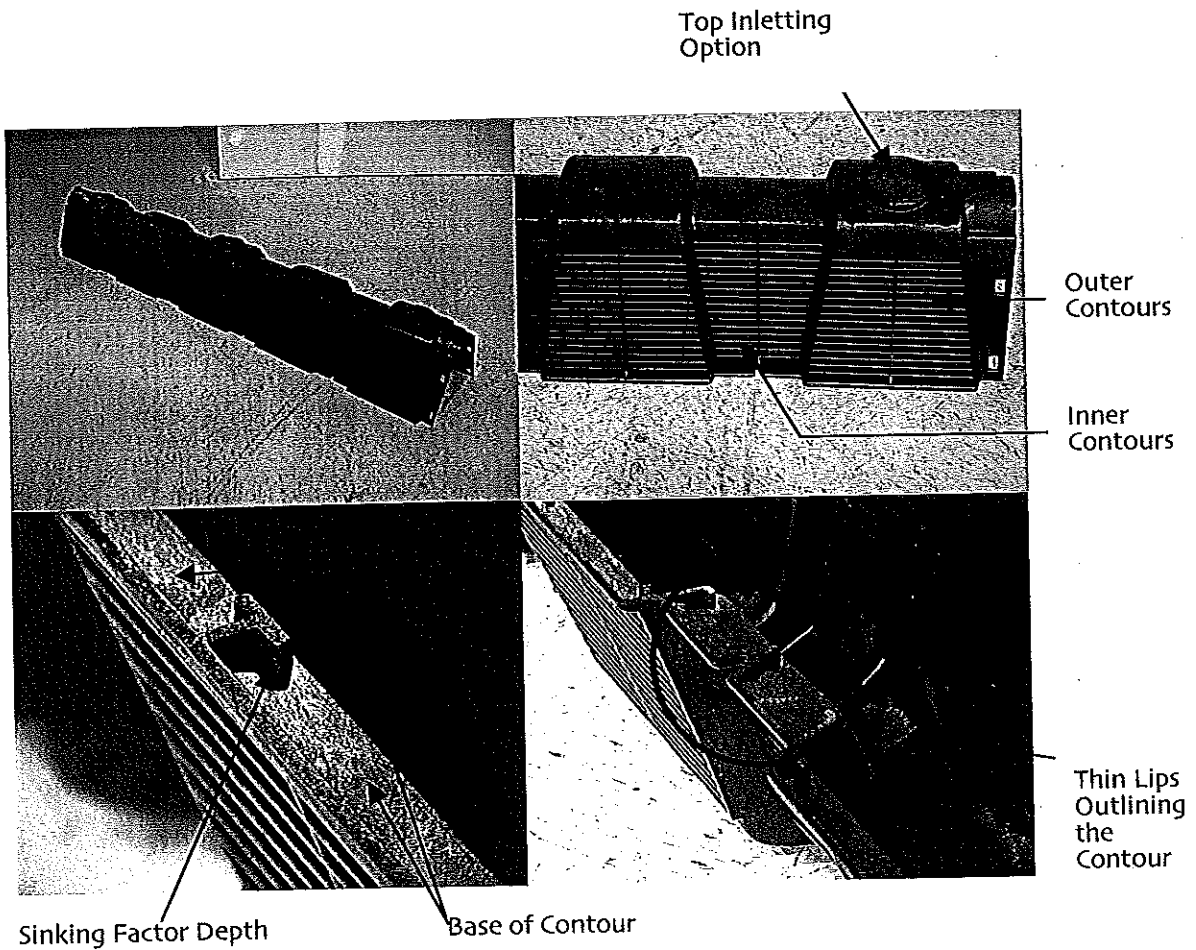
The Equalizer 24 Chamber is a louvered sidewall chamber. For the purpose of this test the types of louvers were divided into four groups. The first group is 14 inner contours with louvers. The second group is 12 outer contours with louvers. The third group is the 4 end panel sections. The fourth group is 28 sidewinder z-ribs.



Photos of the Equalizer 24 Chamber

Bio2 Chamber

The Bio2 Chamber is a louvered sidewall chamber. For the purpose of this test the types of louvers were divided into two groups. The first group is 8 inner contours with louvers. The second group is 10 outer contours with louvers. Both the outside and inside dimensions of the louvers were measured and the open area of each is listed below.



Photos of the Bio2 Chamber

Equalizer 24 and Bio2 measurements

	Equalizer 24	Bio2
Length (Effective)	100.3 in	85.9 in
Sidewall Height	9.4 in	9.25 in
Overall Height	11.1 in	11.8 in
Overall Width	15.1 in	15.5 in
Storage Capacity	4.6 ft ³	4.88 ft ³
Weight	22.6 lbs	17.8 lbs
Sidewall (angled)	9.6 in	9.5 in
Sidewall (vertical)	9.4 in	9.25 in
Soil bearing surface area	325.3 in ²	51.1 in ²
Outside Louvers		

Sidewall open area	1852.0 in ²	840.4 in ²
Bottom open area	1190.3 in ²	1121.4 in ²
Total open area	3042.2 in ²	1961.8 in ²
Total open area	21.1 ft ²	13.6 ft ²
Open area per LF	2.5 ft ² /LF	1.9 ft ² /LF

*Chamber has thin lips (see photos) for the footing which outline the contours. These lips may tend to sink into the ground until the chamber reaches a stable position. The bearing footprint listed is for the thin lips only. It is assumed that the chamber will sink approximately 0.2 inches at which point the soil will come into contact with the base of the contour, thereby stabilizing the chamber. This will yield a bearing footprint of 158.8 in² resulting in the loss of open area. The open bottom area value above was determined using 158.8 in² as the footprint, not 51.1 in².

For values reflecting possible chamber sinking, (height, invert, sidewall height, and volume) see Bio2 chamber description.



STATE OF MAINE
 DEPARTMENT OF HUMAN SERVICES
 DIVISION OF HEALTH ENGINEERING
 10 STATE HOUSE STATION
 AUGUSTA, MAINE
 04333-0010

COPY

ANGUS S. KING, JR.
 GOVERNOR

KEVIN W. CONCANNON
 COMMISSIONER

April 30, 1997

Mr. Robert J. Slattery
 District Manager
 Infiltrator Systems Inc.
 38 Lowell Street
 Braintree, MA 02184

Subject: Approval, Equalizer 24 (EQ24) Infiltration Chamber - Infiltration Devices

This letter grants permission for the use in Maine of the Equalizer 24 (EQ 24) manufactured by Infiltrator Systems Inc. of Old Saybrook Connecticut. The EQ 24 is rated as follows:

1. One lineal foot of the chamber is considered to be equal to 4 square feet of stone disposal area, therefore one section which is 8 1/3 feet long is rated at 33.3 square feet/unit.
2. Two rows of chambers may be installed in a 36" wide trench with the chambers 6" edge to edge and the trenches no closer than 6 feet center to center (36" of undisturbed soil between trenches).
3. The chambers may be placed in a clustered configuration with the chambers 12" apart (27" center to center).

All installations must comply with the Subsurface Waste Water Disposal Rules of Maine and the manufacturer's recommendations as stated in the Design and Installation Manual for Maine. A permit is required for the installation and must be obtained from the Licensed Plumbing Inspector (LPI) before beginning construction.

Approvals by this office:

1. Are not recommendations for a product and must not be construed as such. This office does not represent any product as being better than, equal to, or inferior to any similar product.
2. Are based upon a desk review of a product, without field or lab testing by this office.
3. May be revised, based upon information received regarding the performance of the product, changes in the product or changes in the regulations or policy.
4. May be reproduced only in their entirety.

Please contact me at 207-287-5684 if you wish to discuss this further.

Sincerely,

Kenneth L. Meyer - Manager
 Wastewater & Plumbing Control Program

cc: Clough Toppan, P.E.
 Jay Hardcastle, State Site Evaluator
 Kerwin Keller, State Plumbing Inspector

Dick - This is all I could find for the EQ 24 chambers. No data on file for EQ 36. Jim

Post-it® Fax Note	7671	Date	2/5/01	# of pages	1
To	Dick Bachelder, ADS	From	Jim Jacobsen, ES IV		
Co./Dept.		Co.	DHS--DHE		
Phone #		Phone #	287-5695		
Fax #	363-4943	Fax #	287-3865		

Design and Installation Instructions for Equalizer® 24 Chambers in Maine.

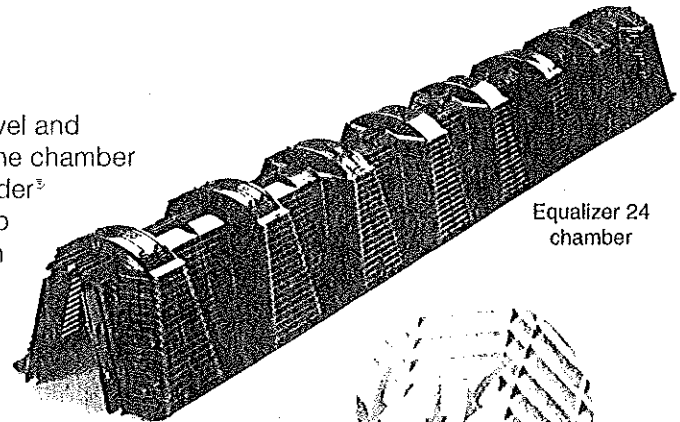
INFILTRATOR
SYSTEMS INC.



The purpose of this manual is to provide specific design and installation information pertinent to the use of Equalizer 24 chambers in Maine. In April 1997, the Department of Human Services approved the use of the Equalizer 24 chamber in Maine.

THE EQUALIZER 24 CHAMBER

The Equalizer 24 chamber is a direct replacement for gravel and pipe in septic leachfields. The pictures to the right show the chamber and its unique, fully-louvered sidewall, called the SideWinder[®] sidewall. This sidewall is serpentine, with louvers that wrap continuously around it for maximum infiltration. The design offers twice the leaching sidewall area below the invert than what exists in a same-length stone and pipe system. These chambers may be installed in a variety of different designs, including serial distribution, gravity-fed, elevated disposal fields, and side-by-side installations.



Equalizer 24 chamber



SideWinder Sidewall

The following list of information is related to the use of Equalizer 24 chambers in Maine:

1. The Equalizer 24 chamber has been approved by the Department of Human Services. Refer to Table 1 on page 4 for the appropriate number of chambers needed.
2. Filter fabric and septic stone are not used with the Equalizer 24 chambers.
3. Vents are not required. Therefore, venting is at the discretion of the designer/engineer.
4. When site conditions allow, systems should be long and narrow.
5. All fill must meet Maine DHS specifications.
6. When designing a gravity fed system, there should be at least a 2" drop from the septic tank to the invert of the Equalizer 24 chambers.
7. Equalizer 24 chambers may be installed in elevated disposal fields. See our Mound and Fill Guide for an example.
8. Equalizer 24 chambers meet H-10 wheel loading only (16,000 lbs./axle).

Nominal chamber specifications.

Size, W x L x H	1-1/4' x 8-1/3' x 11"
Weight	24 lb.
Storage	33.3 gal. (4.45 cu. ft.)
Invert	9"

Open sidewall area.

Unit	Ft. ² /Ft.	% of Stone
6" Pipe & Stone*	.35	100
Hi-Cap SideWinder	1.75	500
Side By Side EQ24	2.66	760

* Assumes 35% void in stone.

Inlet Methods.

In Maine, septic leachfields may be designed differently for level versus sloped systems. There are three common system designs: outside-in overflow, center inlet, and distribution box method. These designs are pictured in Figures 1 through 3.

NOTE: The number of rows in a system and the length of each trench will vary depending on size requirements and site conditions. See Table 1 on page 4 for guidance.

FIGURE 1: OUTSIDE-IN OVERFLOW

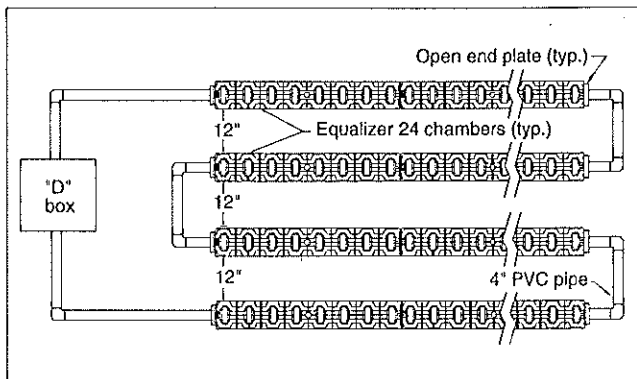


FIGURE 2: CENTER INLET

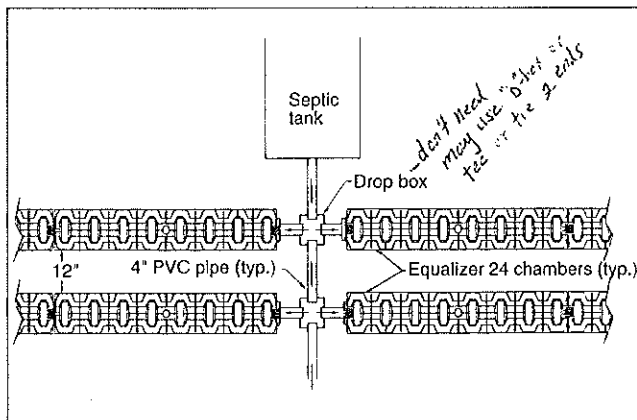
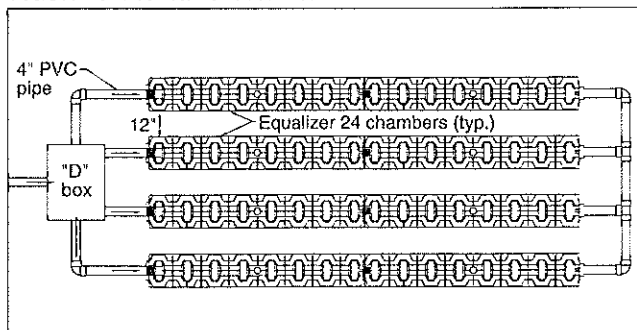


FIGURE 3: DISTRIBUTION BOX



Cluster Bed System on a Level Site.

A leachfield built on a level site in Maine may be constructed in a bed. The bed may be loaded either equally or as an overflow system, although distribution boxes which feed equally are more common. See Figures 4 and 5.

NOTE: A 1 foot minimum separation must be maintained between chamber rows. Bed widths and lengths vary.

FIGURE 4: EVEN CLUSTER BED (PLAN VIEW)

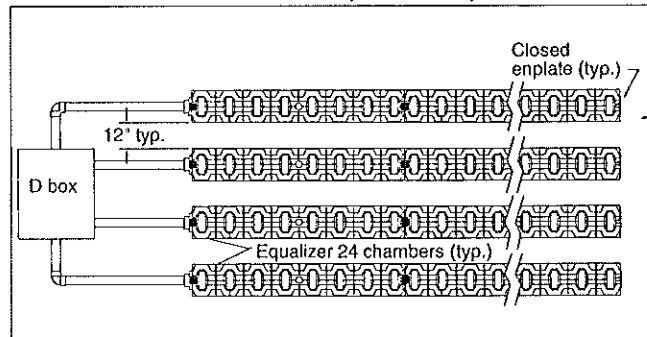
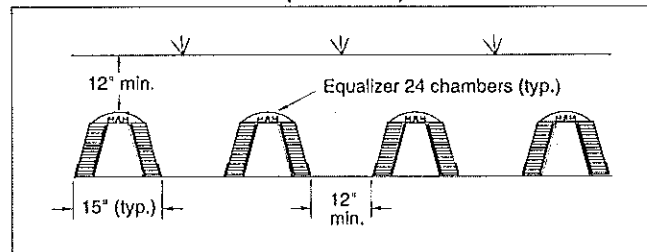


FIGURE 5: CLUSTER BED (SIDE VIEW)



NOTE: A minimum of 12" of compacted cover is necessary to maintain H-10 wheel loading (16,000 lb/axle). For non-traffic areas, a minimum of 6" of cover is required.

Multiple Side-By-Side Step Trenches for Sloped Sites.

A leachfield built on a sloped site may be designed differently than that of a level system. The effluent must be serially distributed from one trench to the next down the sloped area.

FIGURE 6: TWO SIDE-BY-SIDE STEP TRENCHES (PLAN VIEW)

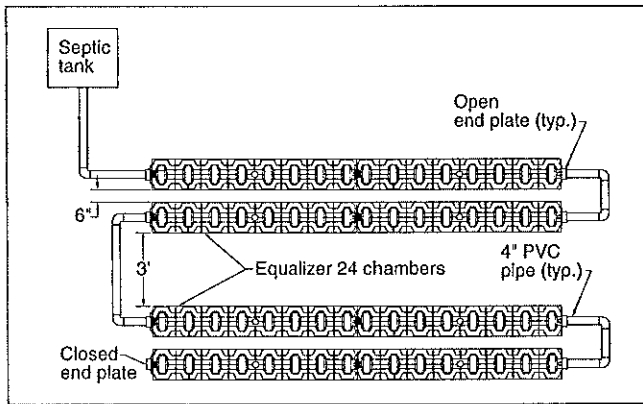
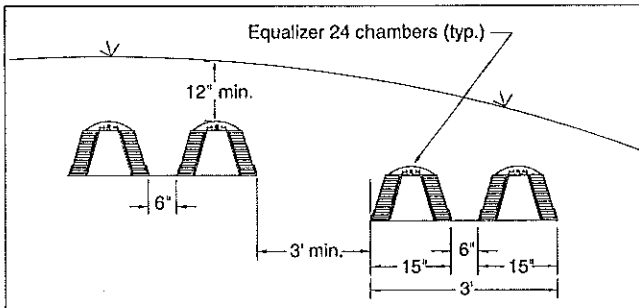


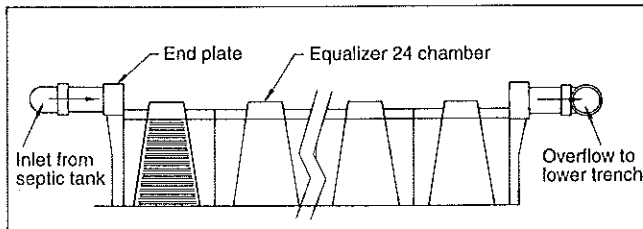
FIGURE 7: TWO SIDE-BY-SIDE STEP TRENCHES (CROSS SECTION)



NOTE: Trenches containing two chambers require 3' spacing between trenches.

NOTE: A minimum of 12" of compacted cover is necessary to maintain H-10 wheel loading (16,000 lb/axle). For non-traffic areas, a minimum of 6" of cover is required.

FIGURE 8: SIDE VIEW



NOTE: May be modified for use as center inlet (Figure 2).

NOTE: With alternate-end inlet systems, an opening is cut on the pre-marked circle at the top of each end plate to provide serial overflow.

Contours.

In addition, the Equalizer 24 chamber's versatility allows systems to be built with slight bends or contours and around obstructions. Each joint may be angled 0° to 10° from the center of the chamber to conform to the natural contour of the land on hilly terrain. Figure 9 illustrates this design.

FIGURE 9: CONTOUR BEND

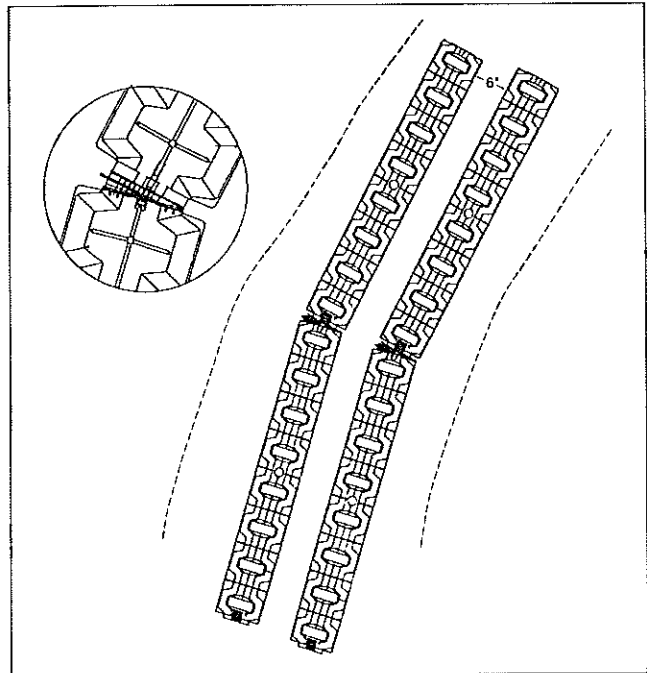


TABLE 1: MINIMUM NUMBER OF EQUALIZER 24 CHAMBERS (For Residential Use.)

Soil Profile (From Table 700.1)	Number of Bedrooms							Each Add'l Bedroom
	Soil Profile	1	2	3	4	5	6	
		180 GPD	180 GPD	270 GPD	360 GPD	450 GPD	540 GPD	
1		22	22	33	44	55	66	11
2		18	18	27	36	45	54	9
3		18	18	27	36	45	54	9
4		14	14	21	28	35	42	7
5		14	14	21	28	35	42	7
6		14	14	21	28	35	42	7
7		18	18	27	36	45	54	9
8		22	22	33	44	55	66	11
9		27	27	41	54	68	81	14

Minimum permitting conditions and design requirements still apply.

This chart is based on one lineal foot of the Equalizer 24 chamber being equal to 4 square feet of stone disposal area. $33.3 \frac{ft^2}{unit}$

Excavating and Preparing the Site.

1 Plan the site excavation by staking out the location of all trenches and lines. Set the elevations of the tank, piping, and trench bottom.

2 Excavate and level the trenches which are 18"-36" in width and have proper center-to-center separation. Be sure the trenches are level.

NOTE: For bed systems, excavate the bed to the prescribed width and length.

For fill systems, the fill must meet state specifications and be compacted to 92% standard Proctor in order to provide proper structural support.

NOTE: A minimum of 12" of compacted cover is necessary to maintain H-10 wheel loading (16,000 lb/axle). For non-traffic areas, a minimum of 6" of cover is required.

3 Rake the bottom and sides of the trench or bed if smearing has occurred while excavating. Remove any large stones and other debris.

4 Check to be sure that the trench or bed is level using a 4-foot level, transit or laser.

Attaching the End Plates.

The same Equalizer 24 end plate is used on both the inlet and outlet ends of the chamber. It's designed with two sets of nubs, one set for each chamber end. Use these guidelines to attach the end plates.

- 1 Cut an opening for the inlet pipe on one of the pre-marked circles on the end plate shown in Figure 10, depending on the type of pipe being used. The inner, pre-marked circle fits a typical 4" SDR35 pipe snugly. The outer, pre-marked circle fits a 4" SCH40 pipe or a 4" corrugated pipe snugly. Refer to Figure 11 for inletting options.

NOTE: The end plate is designed so the effluent will flow into it and spill out the opening on the other side.

- 2 Attach the cut end plate to the end of the chamber marked "Inlet". Do this by inserting the innermost nubs on the end plate into the notches in the chamber's end. Secure the placement with one screw on each side of the end plate.

- 3 Engage another end plate into the outlet end of the last chamber for the closed end plate, by snapping the outermost nubs on the plate into the notches in the chamber.

FIGURE 10: FRONT VIEW OF END PLATE

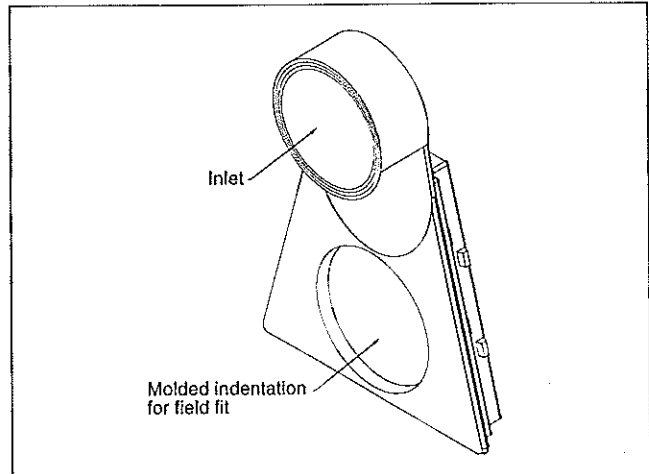


FIGURE 11 INLET OPTIONS ON END PLATE

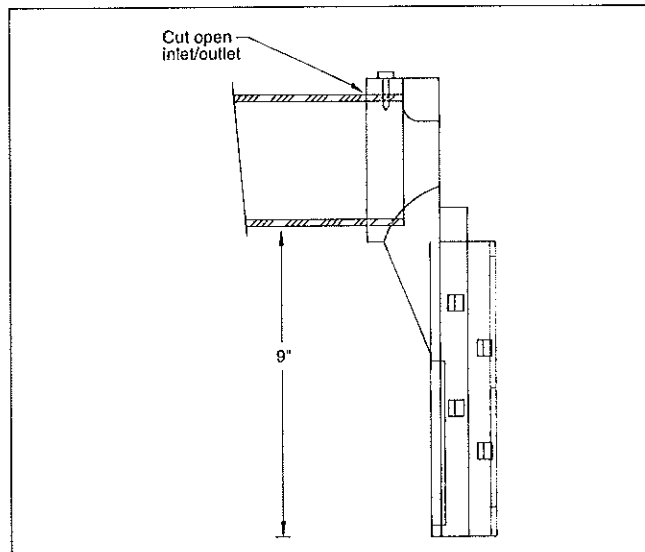
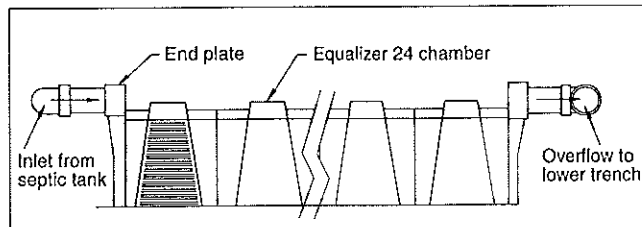


FIGURE 12: SIDE VIEW



NOTE: May be modified for use as center inlet (Figure 2).

NOTE: With alternate-end inlet systems, an opening is cut on the pre-marked circle at the top of each end plate to provide serial overflow.

Installing the Chambers.

- 1** Check the header pipe to be sure that it is level.
- 2** Set the inlet pipe invert at 9" from the bottom of the trench to the bottom of the inlet when installing the Equalizer 24 chambers.
- 3** Place the first chamber with the open end plate at the beginning of the trench.
- 4** Insert the inlet pipe into the end of the end plate. The pipe will only go into the end plate one inch before it reaches a stop.
- 5** Check this first chamber to be sure it is level.
- 6** Secure the inlet pipe to the chamber with a screw.
- 7** Place the next chamber onto the previous chamber at a 45° angle. Line up the hook on the center end of the chamber and lower the chamber to the ground, engaging the patented interlocks.
- 8** Continue interlocking the chambers until you have installed the correct number of chambers. As you install the chambers, check to be sure that they are level.

- 9** Fill the sidewall area to the top of the louvers from trench sides with a shovel. Be sure the fill covers the louvers.

NOTE: In bed systems, carefully place fill between chamber rows making sure not to dislodge the units. This may be accomplished by either ladling with the backhoe bucket or by hand with a shovel. Stakes may be used to stabilize the chamber feet.

- 10** Fill the sidewall area to the top of the louvers from trench sides with a shovel. Be sure the fill covers the louvers.
- 11** Pack down the fill by walking along the edges of the trench. This is an important step that assures correct structural support.
- 12** Proceed to the next trench and begin with step 1 again.

NOTE: For side-by-side configurations, chamber rows will be installed next to each other in the same trench. Take care to backfill the trench evenly to assure that the system is level.

Installing Inspection Ports or Vents.

Equalizer 24 chambers use a 2" pipe for inspection ports.

- 1** Using a hole saw, cut a 2 1/2" diameter opening in the pre-marked area located in the center of the chamber. Be sure to use a saw that matches the type of pipe being installed.
- 2** Glue a 6" long PVC pipe into a coupling.
- 3** Insert the pipe into the opening at the top of the chamber. Notice the coupling sits on top of the chamber.

- 4** Insert another piece of pipe into the coupling, cutting pipe at or above grade.
- 5** Attach a threaded cleanout assembly onto the protruding pipe for inspection port access.
- 6** A small valve-cover box may be used if the inspection port is below the desired grade.

Covering the System.

Before backfilling, the system must be inspected by the local plumbing inspector.

1 Backfill the trench by pushing the cover onto the units perpendicular to the chambers with a backhoe or small track dozer. Keep a minimum of 12" of compacted cover over the chambers before driving over the system. Do not drive over the chambers while backfilling in sand since sand does not give adequate support in any septic system. When finishing the system, it is best to leave soil mounded above the trenches to allow for settling and be sure that runoff water is diverted away from the system.

*NOTE: For bed systems, backfill the bed by pushing the cover on to the units parallel to the chambers with a small track dozer. Keep a minimum of 12" of compacted cover over the chambers. **No wheeled machinery is allowed on top of the bed during backfilling.***

2 When the system is completely covered, the site should be seeded or sodded to prevent erosion.

NOTE: A minimum of 12" of compacted cover is necessary to maintain H-10 wheel loading (16,000 lb/axle). For non-traffic areas, a minimum of 6" of cover is required.

For design and technical assistance,
call Infiltrator Systems' technical resource department at 1-800-221-4436.



Leading the way in septic and stormwater chamber systems™

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GOVERNOR

KEVIN W. CONCANNON
COMMISSIONER

June 28, 2000

PSA, Inc.
Attn.: Dick Bachelder
71 Orchard Street
York, Maine 03909

Subject: Product Registration, 16 Inch High Capacity BioDiffuser

Dear Mr. Bachelder:

Thank you for your letter dated June 19, 2000 regarding your company's product. Under provisions of Section 1902 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.

According to the information you provided, the Division has determined that the 16 Inch High Capacity BioDiffuser is acceptable for use in the State of Maine, provided that it is installed, operated, 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 16 Inch High Capacity BioDiffuser. 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: Product File



PRINTED ON RECYCLED PAPER

PSA, Inc.

Dick Bachelder
71 Orchard Farm Road
York, Maine 03909
Tel 207-363-2528 Fax. 207-363-4943
bach@ime.net



June 19, 2000

Mr. James Jacobsen
State of Maine
Department of Human Services
157 Capitol Street
Augusta, Maine 04330

Re: 16" High Capacity BioDiffuser Chamber Approval Request

Dear Jim:

We respectfully request the Department's review and consideration for approval for use our new 16" High Capacity Model BioDiffuser plastic leaching chamber.

We have possessed approval for use and have been marketing the 11" Low Profile Model BioDiffuser and the 14" Standard Model BioDiffuser chamber systems for many years in the State. The new 16" High Capacity Model has been developed to address two specific criticisms of the 14" Standard Model unit: first, that with so many on-site wastewater drainfield designs by the site evaluator community being drawn for our competitor's proprietary 16" high unit, the 2" difference in height of our 14" Standard Model has occasionally been found by the installers (and occasionally by the local plumbing inspectors) to be cumbersome with which to work; also, the difference in invert height of our 14" Model (9") has been cited intermittently as a shortcoming as compared to our competitor's 16" high model, which has a 10 1/2" invert height.

The new 16" High Capacity Model BioDiffuser will allow for installation against a proprietary design with absolutely no field adjustments. Also, this new chamber offers an 11 1/3" high invert, which creates an advantage in comparison to the industry leading product presently being marketing throughout the country.

We provide for your review the enclosed materials: a copy of a blueprint of the line drawings of the part, which illustrate the dimensions of the chamber and the end cap; a copy of our installation guidelines specific to the new product line; and a copy of our revised sales brochure. We respectfully request that the department list our product as approved for use in the appropriate Plumbing Code Appendix, and we will immediately work to obsolete the 14" Standard Model and its use in Maine.

Thank you in advance for your consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "Dick Bachelder".

Dick Bachelder
PSA, Inc.

cc: Steve Helmrich, ADS.

Jay Hardcastle, ME DHS

Product Notes



Product Note 3.121

Re: BioDiffuser Chamber Installation Guidelines

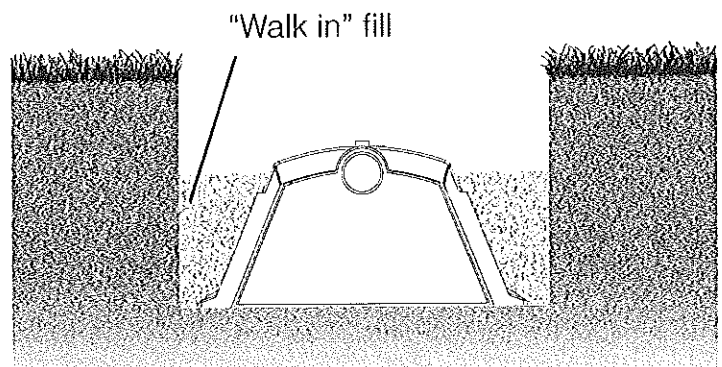
Date: June 1, 2000

The BioDiffuser chamber is an economical, easy to install alternative to the conventional on-site leachfield system. In a conventional system, 4" pipe and gravel are used to fill the excavation. Chamber units reduce or eliminate the gravel, thereby eliminating many of the problems inherent in gravel systems: compaction, loss of storage, fines clogging the gravel, and masking.

The BioDiffuser chamber may be used on any site suitable for conventional gravel on-site systems.

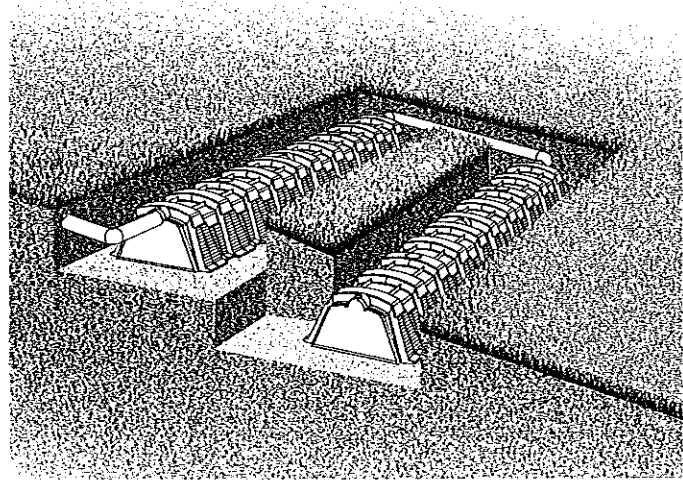
Trench Installation Guidelines

1. Excavate trench to 3' wide and proper depth as specified in the system design and as required by state and local codes.
2. Scarify the surface to remove any smearing that may occur during excavation. Smooth irregularities in the excavation. A level, flat surface is necessary.
3. Assemble the BioDiffuser chambers in the trench excavation by engaging the "dome" end of the installing chamber over the "post" end of the chamber already in place. No screws required.
4. Prepare end caps for the distribution pipe as needed by punching out the provided knock-outs with a shovel handle. (End caps come with knock-out grooves to accommodate SDR 35, Schedule 40 or ADS-3000 TripleWall® pipe. Score the appropriate groove with a knife before knocking out with a shovel handle to create 4.2" or 4.5" diameter hole.)
5. Place end plates on end units of the chamber line. Secure in place with backfill (no screws required). Connect distribution pipe in the knock-outs as required by plan.
6. Fill sidewall area to top of chambers with native soil (or select fill where required). Coarse sand or fine gravel may also be used; no heavy clay, silt or debris should be included.
7. "Walk in" fill to compact soil along the sides of the chamber. This is important to achieve full weight/ load rating.

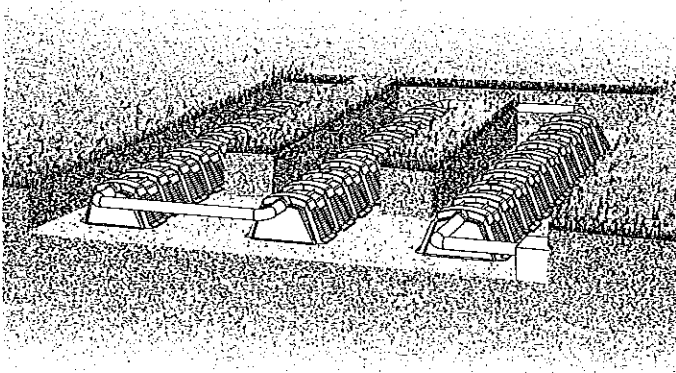


Trench Detail

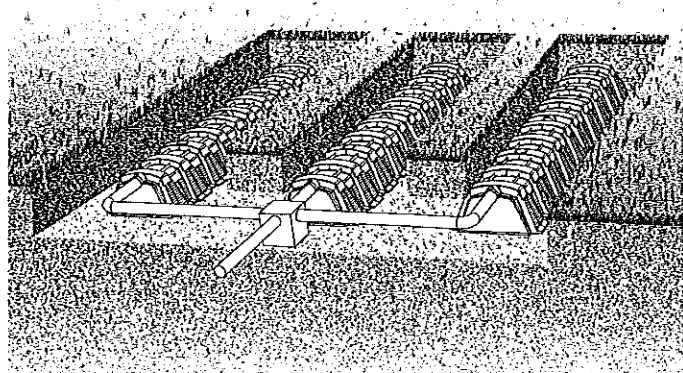
8. Complete the backfill of the system with native soil or select fill to the depth specified in the system design and as required by state and local codes. Avoid large rocks and debris in backfill material. Do **not** drive equipment over the BioDiffuser chambers without bridging the excavation. For vehicular loading applications, all BioDiffuser chambers are approved for H-10 loading when installed with a minimum of 12" of cover after consolidation. **Only the 14" High Capacity Model is approved for H-20 load installations. H-20 loads require a minimum of 18" of cover after consolidation.** Well-graded gravel and careful compaction is recommended for H-20 load installations.



Serial System



Series System

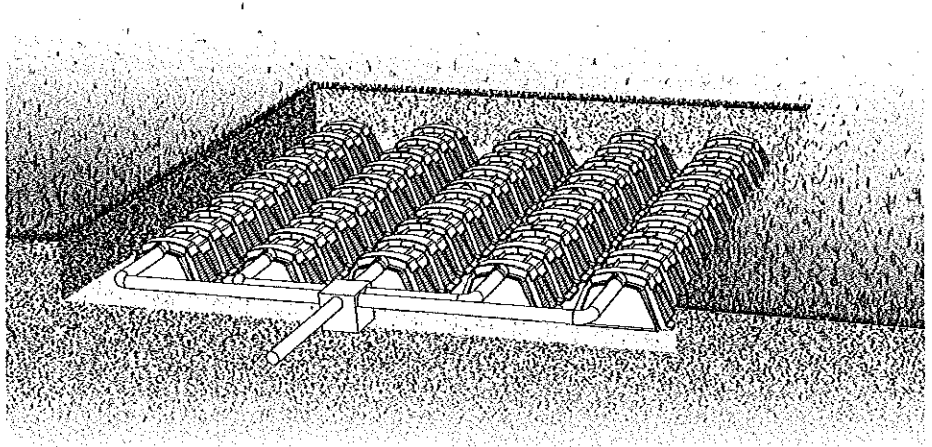


Trench System

Bed Installation

1. Excavate and level installation area.
2. Scarify surface to remove any smearing that may occur during excavation. Smooth irregularities in the excavation.
3. Assemble the BioDiffuser chambers in adjacent rows to cover the desired area by placing the "dome" end of the installing chamber over the "post" end of the chamber already in place. No screws required.
4. Prepare the end caps for the distribution pipe as needed by punching-out the provided knock-outs with a shovel handle. (End caps come with knock-out grooves to accommodate SDR 35, Schedule 40 or ADS-3000 TripleWall® pipe. Score the appropriate groove with a knife before knocking out with a shovel handle to create a 4.2" or 4.5" diameter hole.)
5. Place end plates on end units of the chamber line. Secure the end caps in place with backfill (no screws required). Connect distribution pipe in the knock-outs as required by plan.

6. Fill sidewall area to top of chambers with native soil (or select fill where required). Coarse sand or fine gravel may also be used; no heavy clay, silt or debris should be included.
7. "Walk in" fill to compact soil along the sides of the chamber. This is important to achieve full weight / load rating.
8. Using a light tracked machine, cover the BioDiffuser chambers with native soil or select fill to the depth specified in the system design and as required by state and local codes. Avoid large rocks and debris in the backfill material. Do not drive equipment over the BioDiffuser chambers without bridging the excavation. For vehicular loading applications, all BioDiffuser chambers are approved for H-10 loading when installed with a minimum 12" of cover after consolidation. **Only the 14" High Capacity Model is approved for H-20 load installations. H-20 loads require a minimum of 18" of cover after consolidation.** Well graded gravel and careful compaction is recommended for H-20 load installations.

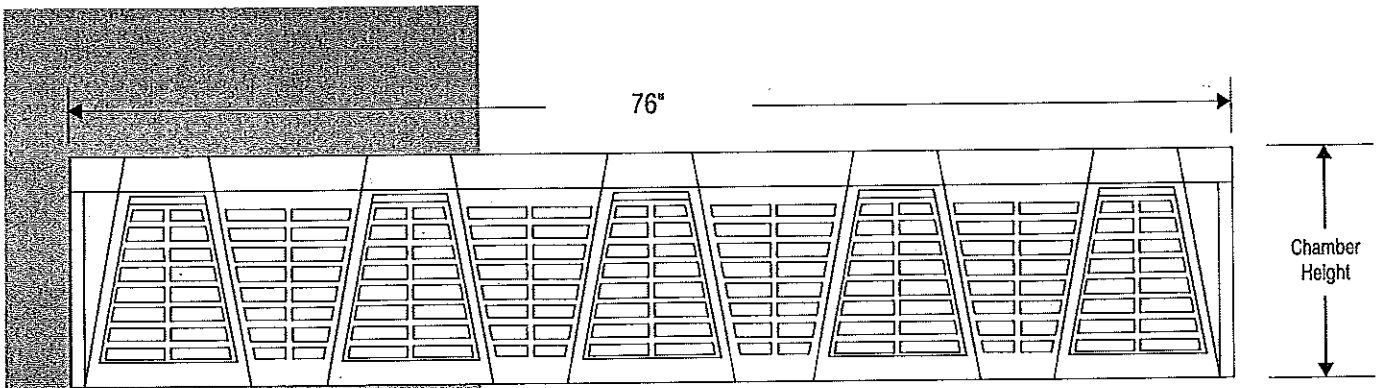


Bed System

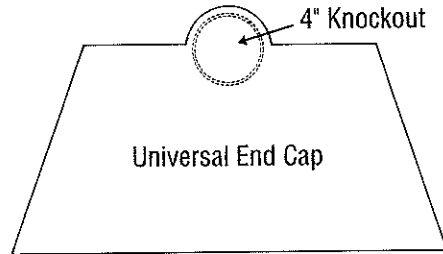
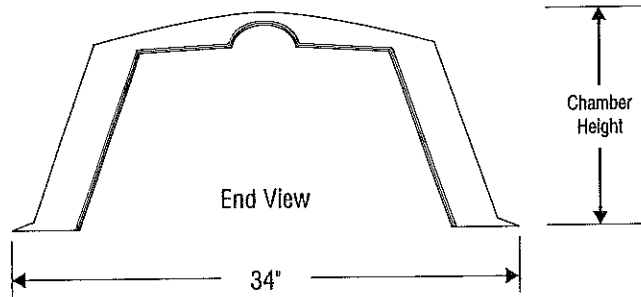
BIODIFFUSER LIMITED WARRANTY

1. PSA, Inc. ("PSA"), a subsidiary of ADS, Inc., warrants to the original purchaser that each BioDiffuser unit is free from defects in materials and workmanship for one year from the date of purchase, when installed in accordance with the manufacturer's instructions. This warranty will not apply to any units that have been subjected to abuse or mishandling, or that have been repaired or altered by anyone other than PSA. PSA's sole responsibility under this warranty shall be the replacement of the unit. PSA's obligation under this warranty shall not include any transportation charges or the costs of installation and **IN NO EVENT SHALL PSA BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES.**
2. **TO THE EXTENT ALLOWED BY LAW, THIS WARRANTY SHALL BE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES (WHETHER EXPRESS, IMPLIED OR STATUTORY), INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**
3. The purchaser shall be responsible for insuring that installation of the unit is completed in accordance with all applicable laws, codes, rules and regulations. In no event shall PSA be responsible for any loss or damage to the purchaser, the units, or any third party resulting installation or shipment.
4. No statements or representations made by any representative of PSA shall alter, vary or expand the provisions of this warranty. This warranty is applicable only to the original purchaser and there shall be no third-party beneficiaries to this warranty.
5. All claims made under this warranty shall be presented to PSA in writing no later than thirty (30) days after the discovery of any defect in the BioDiffuser unit. Any claim under this warranty that is not presented within 30 days upon discovery shall be deemed unconditionally waived.

BioDiffuser Specifications



All three BioDiffuser sizes can withstand H-10 loads when installed with properly graded and compacted soils. A minimum of 12" of cover is required for H-10 loads. The 14" High Capacity BioDiffuser is designed for H-20 loads. A minimum of 18" of cover is required for H-20 loads.



Available Sizes

Chamber Dimensions	11" Standard	14" High Capacity	16" High Capacity
Length	76"	76"	76"
Width	34"	34"	34"
Height	11"	14"	16"
Invert	6.5	9	11.3



STATE OF MAINE
DEPARTMENT OF HUMAN SERVICES
DIVISION OF HEALTH ENGINEERING
10 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0010

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KEVIN W. CONCANNON
COMMISSIONER

January 23, 2001

Infiltrator Systems, Inc.
Attn.: Chris Stewart
223 P Ridge Road
Readfield, Maine 04355

Subject: ADS Biodiffuser Bio2 and Bio3 Chambers

Dear Mr. Stewart:

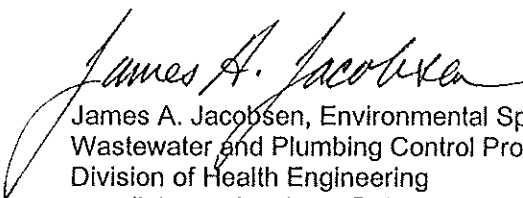
Thank you for your letter dated January 10, 2001 regarding your company's concerns about sizing of the referenced product.

As I am sure you know, 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.

Any manufacturer's or distributor's product which can meet these criteria is eligible for registration for use in Maine, including those of your competitors. If you have any further questions please feel free to contact me at (207) 287-5695.

Sincerely,


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

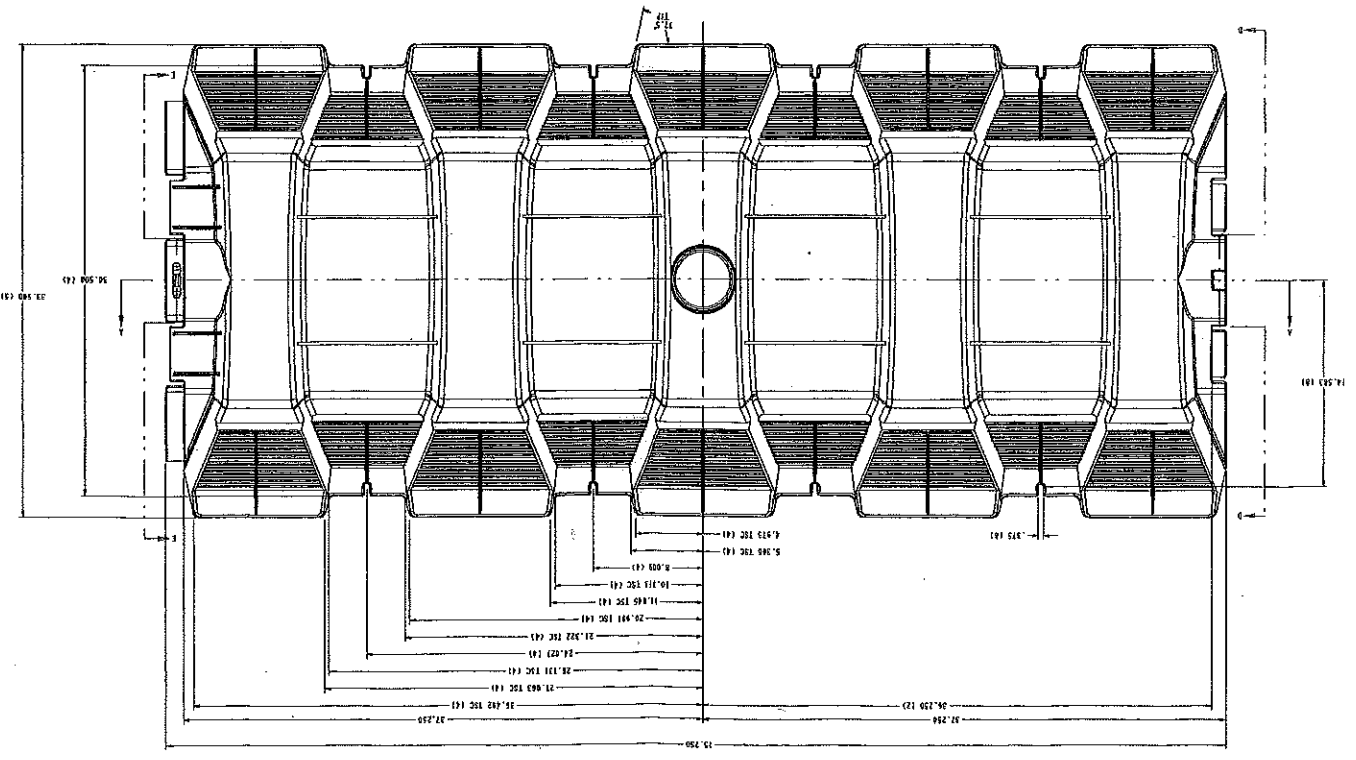
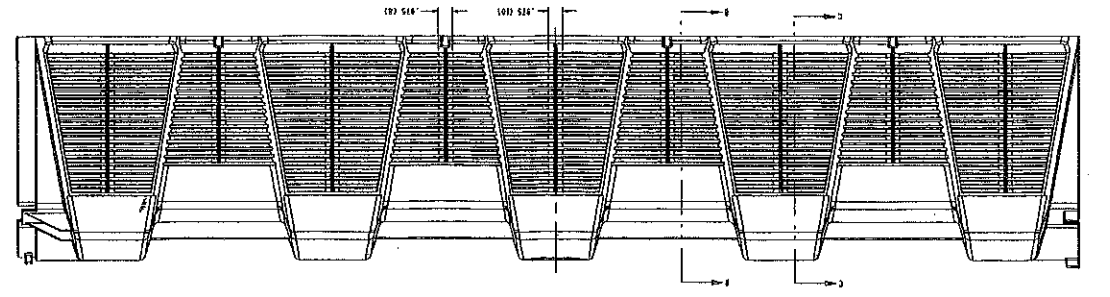
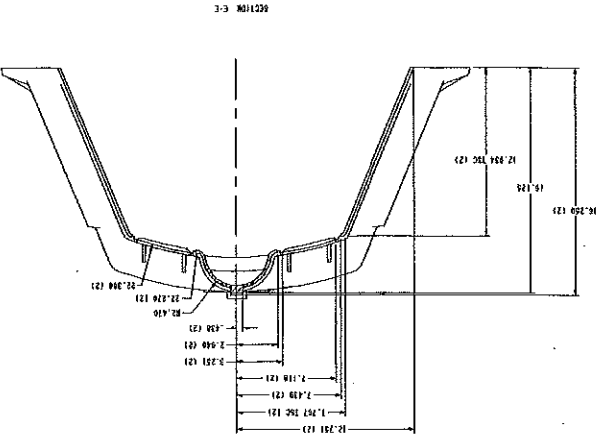
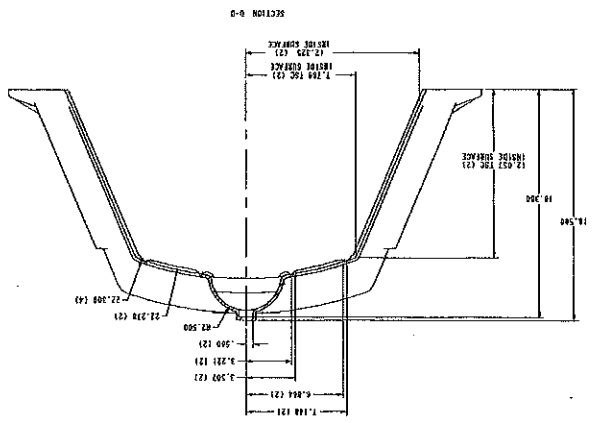
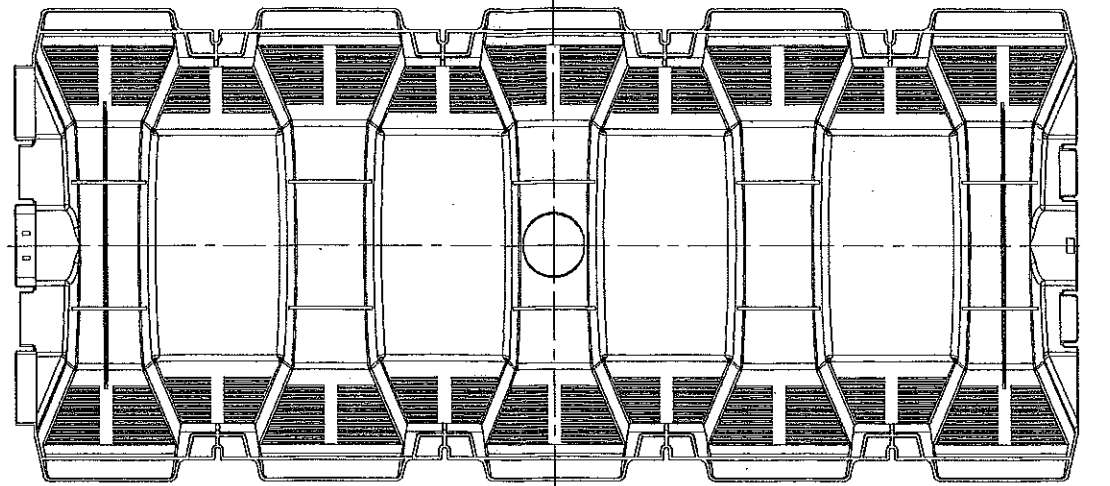
xc: ADS File
Dick Bachelder



RECYCLED PAPER

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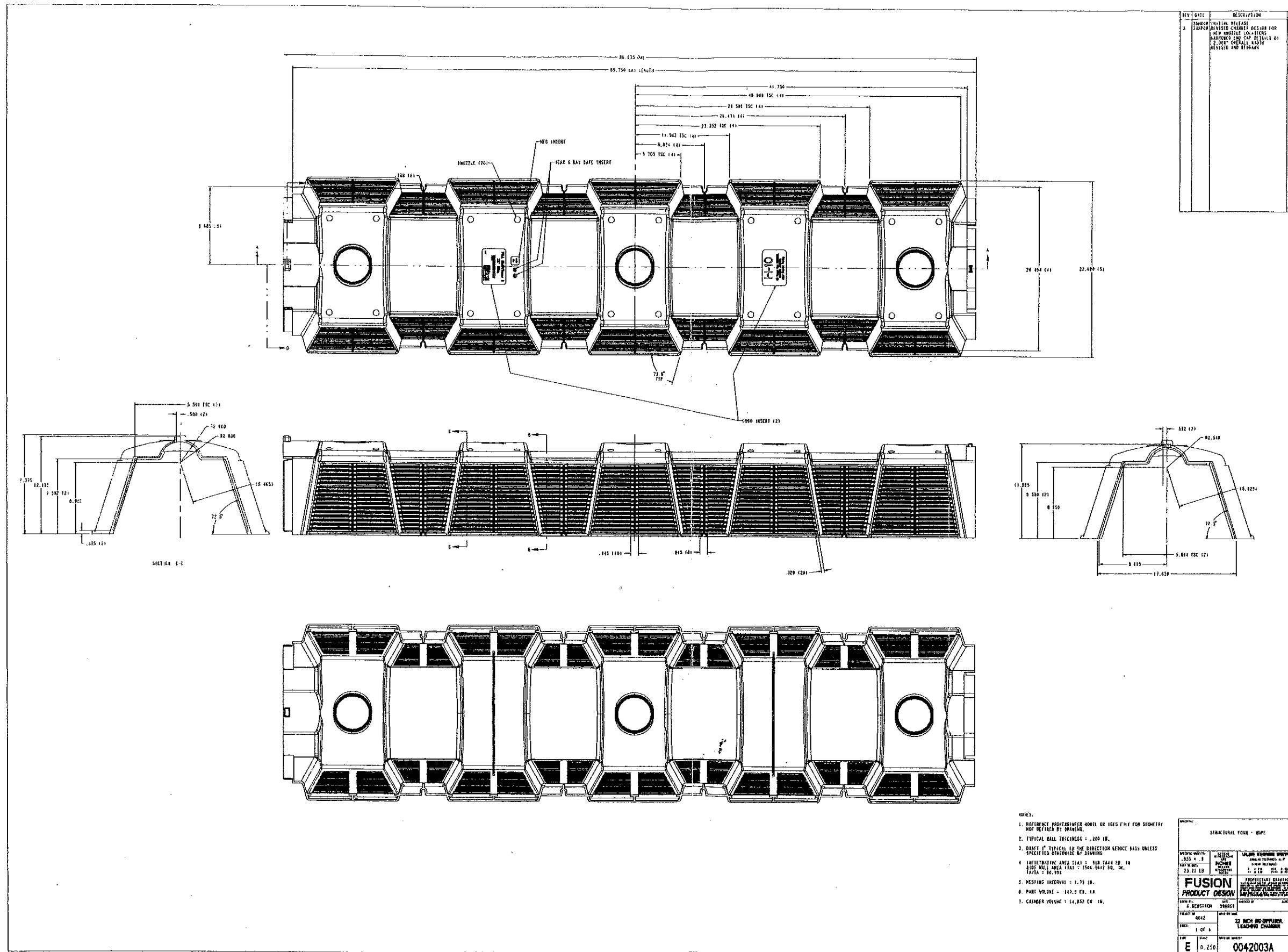
1. BENDING PROCESSING MODEL ON THIS FILE FOR CONSTRUCTION NOTATION BY BENTON
2. TYPICAL WALL THICKNESS = .040 IN.
3. TYPICAL WALL STIFFNESS = 1.75 IN.
4. BENDING RADIUS (R) = 1.75 IN.
5. PART NUMBER = 100-2 02 16



REVISIONS

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1	11/14/80	INITIAL RELEASE	ARR
2	12/20/80	REVISED CHARGE DESIGN FOR NEW NOZZLE LOCATIONS	ARR
3		REMOVED THE CAP DETAILS BY 2.08" CLEARANCE	ARR
4		REVISED AND REWORK	ARR

- NOTES:
- REFERENCE PROVISIONAL MODEL OR ISES FILE FOR GEOMETRY NOT REFERRED BY DRAWING.
 - TYPICAL WALL THICKNESS = .200 IN.
 - RAUNT r TYPICAL TO THE DIRECTION REDUCE WALLS UNLESS SPECIFIED OTHERWISE BY DRAWING.
 - INTERNAL AREA: 51A1 = 919.7444 SQ. IN.
51B: WALL AREA: 17A1 = 1564.5412 SQ. IN.
DATA = 86.925
 - WEIGHT INTERVAL = 1.70 LB.
 - PART VOLUME = 147.3 CU. IN.
 - CAMBER VOLUME = 14,852 CU. IN.

PART:		STRUCTURAL TOY - HOPE	
QUANTITY:	1	UNIT WEIGHT:	1.70 LB
WEIGHT:	1.70 LB	VOLUME:	147.3 CU. IN.
FUSION		PROPRIETARY DRAWING	
PRODUCT DESIGN		NOT TO BE REPRODUCED OR COPIED WITHOUT PERMISSION	
DATE:	11/14/80	DESIGNED BY:	ARR
DRW:	2	CHECKED BY:	ARR
REV:	1 OF 1	20 CELL LEAD-ACID BATTERY LEACHING CHAMBER	
REV:	0.250	REVISED BY:	ARR
E		0042003A	