

LAYOUT \_\_\_\_\_ INSP 4 \_\_\_\_\_

INSP 2 \_\_\_\_\_ INSP 5 \_\_\_\_\_

INSP 3 \_\_\_\_\_ INSP 6 \_\_\_\_\_

ISSUE DATE: 4/21/05

# PERMIT

APPROVAL DATE: 8/22/11

P 522416  
TANK REPL  
\$165.00 Fee  
A 39731

TAX ID #04313976

**ON-SITE SEWAGE DISPOSAL SYSTEM  
HOWARD COUNTY HEALTH DEPARTMENT  
BUREAU OF ENVIRONMENTAL HEALTH**

JENKINS BROS. SEPTIC SERVICE

IS PERMITTED TO INSTALL ☒ ALTER ☐

ADDRESS: 7670 SMITH PRIVATE RD

PHONE NUMBER: 410-465-6647

SUBDIVISION: \_\_\_\_\_

LOT NUMBER: \_\_\_\_\_

ADDRESS: 631 Beetz Road

PROPERTY OWNER: Sandy Shane

SEPTIC TANK CAPACITY (GALLONS): 1500

OUTLET BAFFLE FILTER REQUIRED ☐

PUMP CHAMBER CAPACITY (GALLONS): N/a

COMPARTMENTED TANK REQUIRED ☒

NUMBER OF BEDROOMS: 5

SQUARE FEET PER BEDROOM: \_\_\_\_\_

LINEAR FEET OF TRENCH REQUIRED: \_\_\_\_\_

HOUSE SERVED BY PUBLIC WATER ☐

TRENCHES:	No trenches currently, property has a drywell system.
LOCATION:	Pump and collapse old septic tank, relocate new 1500 gallon septic tank. During new tank installation inspection must be done of drywell to determine functionality.
NOTES:	The purpose of this permit is in support of Building Permit # B00152227, house currently has 5 bedrooms and current tank is not sufficient.

PLANS APPROVED: Kevin J. Bell

Reviewed by: \_\_\_\_\_

DATE: 3/9/05

NOTES: PERMIT VOID AFTER 2 YEARS

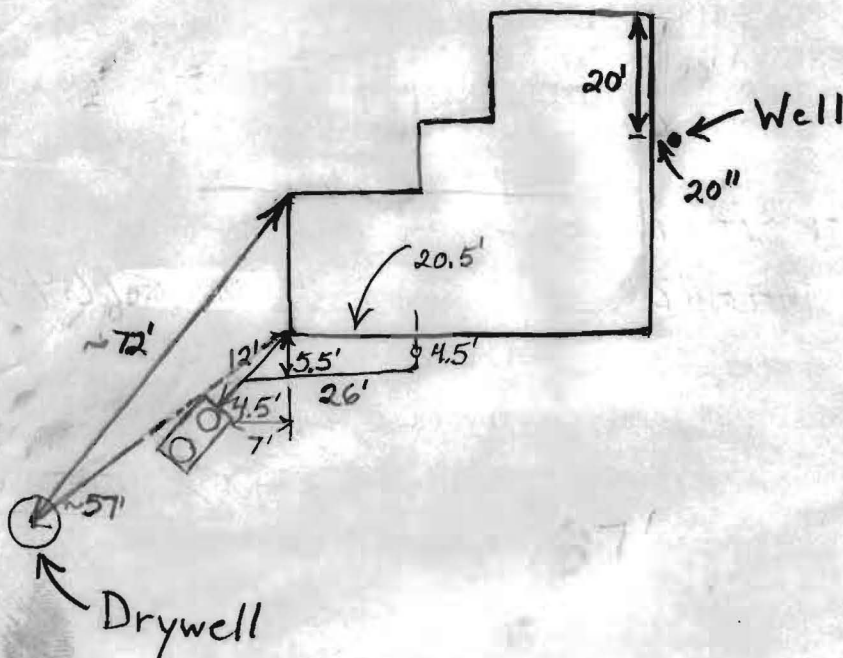
CONTRACTOR IS RESPONSIBLE FOR SCHEDULING A PRE-CONSTRUCTION INSPECTION FOR ALL INSTALLATIONS  
WATERTIGHT SEPTIC TANKS REQUIRED

ALL PARTS OF SEPTIC SYSTEM SHALL BE 100 FEET FROM ANY WATER WELL UNLESS SPECIFICALLY AUTHORIZED  
MANHOLE RISERS REQUIRED ON ALL SEPTIC TANKS AND PUMP CHAMBERS UNLESS SPECIFICALLY AUTHORIZED

CONTRACTOR RESPONSIBLE FOR COMPLIANCE WITH APPLICABLE REGULATIONS, GUIDELINES AND THE TERMS OF THIS PERMIT

**NEITHER THE HOWARD COUNTY COUNCIL NOR THE HEALTH DEPARTMENT IS  
RESPONSIBLE FOR THE SUCCESSFUL OPERATION OF ANY SYSTEM  
PERMITTEE RESPONSIBLE FOR OBTAINING FINAL APPROVAL ON THIS PERMIT  
ALL 410-313-1771 FOR INSPECTION OF SEPTIC SYSTEM**

NOT TO SCALE



**TRENCH/DRAINFIELD DATA**

WIDTH \_\_\_\_\_ INLET \_\_\_\_\_ BOTTOM \_\_\_\_\_

NUMBER OF TRENCHES \_\_\_\_\_

TOTAL LENGTH \_\_\_\_\_

ABSORPTION AREA \_\_\_\_\_

DISTRIBUTION BOX LEVEL \_\_\_\_\_

DISTRIBUTION BOX BAFFLE \_\_\_\_\_

DISTRIBUTION BOX PORT \_\_\_\_\_

**SEPTIC TANK DATA**

SEPTIC TANK 1 LEVEL Yes

CAPACITY 1500 GAL

SEAM LOC Top

TANK LID DEPTH \_\_\_\_\_

BAFFLES Yes

BAFFLE FILTER No

MANHOLE LOC Front+Rear

6" PORT LOC None

WATERTIGHT TEST No

SEPTIC TANK 2 LEVEL Yes

CAPACITY 1500 GAL

SEAM LOC Top

TANK LID DEPTH 2'-3'

BAFFLES \_\_\_\_\_

BAFFLE FILTER \_\_\_\_\_

MANHOLE LOC \_\_\_\_\_

6" PORT LOC \_\_\_\_\_

WATERTIGHT TEST No

PRE-CONSTRUCTION \_\_\_\_\_

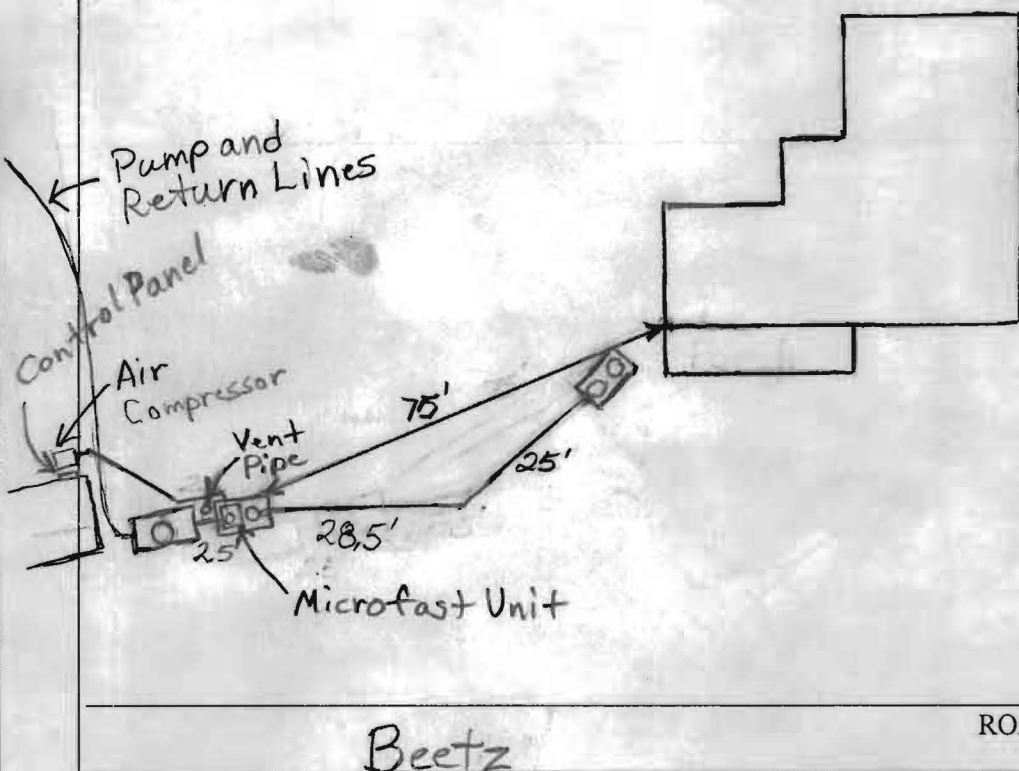
INSTALLATION 4/22/05 Existing drywell is 40+ years old and full to lid. Repair required. Site not easy to work with and will require perc. testing. Test fee to be waived. Replacement tank O.K. Although it will only be about 8' from porch. (BB)

FINAL INSPECTOR \_\_\_\_\_

DATE OF APPROVAL \_\_\_\_\_



NOT TO SCALE



TRENCH/DRAINFIELD DATA		
WIDTH	INLET	BOTTOM
_____	_____	_____
NUMBER OF TRENCHES _____		
TOTAL LENGTH _____		
ABSORPTION AREA _____		
DISTRIBUTION BOX LEVEL _____		
DISTRIBUTION BOX BAFFLE _____		
DISTRIBUTION BOX PORT _____		

SEPTIC TANK DATA		
SEPTIC TANK ②	LEVEL	Yes
CAPACITY	1500	GAL
2-Comp	SEAM LOC	Top
Turned	TANK LID DEPTH	25'-35'
Backwards	BAFFLES	Front 2
Babylon	BAFFLE FILTER	No
	MANHOLE LOC	Middle
	6" PORT LOC	Front
	WATERTIGHT TEST	No
SEPTIC TANK ③	LEVEL	Yes
CAPACITY	1500	GAL
One Comp.	SEAM LOC	Top
Babylon	TANK LID DEPTH	2'-3'
	BAFFLES	Front
	BAFFLE FILTER	No
	MANHOLE LOC	Front & Rear
	6" PORT LOC	None
	WATERTIGHT TEST	No

PRE-CONSTRUCTION \_\_\_\_\_

INSTALLATION 9/16/05 Two 1" schedule 40 pump lines have been routed up the hill. (BB) 9/19/05 Second tank set and drip bed scraped with backhoe teeth. Approximately 6" of sand put on scraped area and raked flat. (BB) 9/20/05 Drip lines and manifolds installed. Pump chamber set. O.K. to cover middle of drip network with sand and soil. Leave end connections open to check for leaks. (BB) See Other Sheet for More Notes

FINAL INSPECTOR \_\_\_\_\_

DATE OF APPROVAL \_\_\_\_\_

Septic tank with microfast unit set. 10/10/05 Tried to startup system. Pump would not work automatically but lines flushed. Blower not working. See punch list for other problems. (BB)

Inspection Date/Inspection Notes/Inspector's Initials & Others Present:

9/21+9/22/05 Tank with microfast unit set. Plumbing out to this tank done. Valve box, water meter and solenoids installed and lines run to manifolds. Last tank with microfast unit set. 9/28/05 Blower hooked up but not working (blown fuse?). Pump vault installed and pump wired up. Float tree put in middle of pump tank and not in pump vault. Control panel wired up. Alarm works. Pump won't turn on automatically but lines flushed out by manually turning on pump. All fittings at drip field show no signs of leaking. One connection in valve box leaking. O.K. to cover rest of drip field. Need to remove some dirt from top and sides of valve box and water meter area to allow runoff to flow around them. Check manhole cleanouts on septic tanks for same thing. Microfast tank needs a 3" vent pipe instead of the 2" vent pipe that is installed. (BB)

9/30/05 Required flow and pressure not getting to drip bed. Pump now working - one of floats wasn't working properly. Everything else still needs to be addressed. Engineer miscalculated static head (~65'), but pump should still work. (BB)

10/3/05 Freeman Associates showed up to check microfast unit. They fixed blower and put a 3" vent on unit. Still not getting correct pressure to drip lines. Could very possibly be a solenoid in the headworks. (BB) 10/10/05 Sandra says that she has fixed solenoids by adjusting them. Says she is getting correct pressure. (BB) 10/27/05 Barry is meeting with Geoflow representatives on site to check system. (BB)

DATE SYSTEM  
APPROVED

8/22/11 - I confirmed that Barry from MDE met w/ Geoflow onsite on 10/27/05 and approved the system at that time. Health approval granted as of 10/27/05. (JW)

MARYLAND STONE, INC.  
FREDERICK QUARRY  
P O BOX 266  
BUCKETSTOWN MD 21717

Operator of truck allowed maximum  
of 15 minutes to unload. Trucks  
held at jobsite longer will be  
billed at current holding time rate.

(301) 662-0972 (800) 733-3714

A SUBSIDIARY OF FLORIDA ROCK INDUSTRIES, INC.

TICKET NO: 0025510719

SOLD TO: AAA CASH SALES FREDERICK PLT

FRI ORDER: 1073

SHIP TO: AAA CASH SALES FREDERICK  
FOB - MULTI CONTR HAULERS/TAXABLE

PURCHASE ORDER: FOB

PROJECT: FOB - MULTI CONTR HAULERS/TAXA

CONTRACT:

PRODUCT: MOUND SAND (624T)

RELEASE:

GROSS: 62760 LBS 28467 kg

LOADS TODAY: 1

TARE: 25140 LBS 11403 kg

SHIPPED TODAY: 10.81 TONS

DATE: 09/19/2005

NET: 37620 LBS 17.06 Mg  
10.81 TONS

QUANTITY ORDERED:

TIME: 08:53 AM

BALANCE ON ORDER:

CERTIFIED WEIGHER: DEBI CARROLL

SCALE: 1

DRIVER'S SIGNATURE

CUSTOMER'S SIGNATURE

"Read Health Hazard Warnings on Reverse Side. Material Safety Data sheets are available upon request."

CARRIER: AAA CASH SALES FREDERICK PLT

TRUCK: 1209

LGW: 70000

COMMENTS:

UNIT PRICE: 13.85

NET PRICE: 260.52

DELIVERY CHARGE:

CHECK NO: 2490

SUB-TOTAL: 260.52

5.000

TAX:

13.03

CASH SALE ONLY 273.55

TOTAL CHARGES:

1629760

PURCHASER AGREES TO TERMS AND CONDITIONS ON REVERSE S





## MARYLAND DEPARTMENT OF THE ENVIRONMENT

1800 Washington Boulevard • Baltimore MD 21230

410-537-3000 • 1-800-633-6101

Robert L. Ehrlich, Jr.  
Governor

Kendl P. Philbrick  
Secretary

Michael S. Steele  
Lt. Governor

Jonas A. Jacobson  
Deputy Secretary

August 31, 2005

Mr. Dale Gray  
Innova, Ltd.  
PO Box 363  
New Windsor MD 21776

RE: Sandra Shane Property  
Howard County

Dear Mr. Gray:

We have reviewed the plans for the innovative drip disposal system with advanced pretreatment to serve the above referenced property. We offer the following comments:

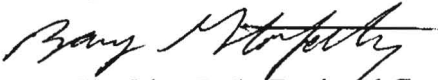
1. The force main drains back to prevent freezing. However, it is not clear that freezing protection is provided for the field supply piping. Should this pipe be installed below frost line or is there a draining provision for this section of piping as well as for the field flush piping?
2. Indicate that all access to tanks where surface water could enter the the system must terminate a minimum of 6 inches above final grade.
3. Regarding the friction loss calculation you indicate that 280 ft. is the distance from the pump to the field. Based on your site plan this distance is 400 ft. Also the friction loss of 4.57 ft per hundred feet of 4-inch pipe is about a foot lower than indicated in some references. Taking these into account, I calculated TDH of the system to be 116 ft. This is still within the performance range of the pump indicated in your plan.
4. Three to 4 inches of sand covering the drip tubing should be adequate and this would reduce somewhat the materials required for the job.
5. All plowing should be done prior to system construction.
6. Install an observation port at the low and high edges of the sand bed.

Please resolve the comments and transfer the enclosed signed signature block to the plans. Two copies of the approved plans must be provided to the local health department and my office.

Letter to: Mr. Dale Gray  
Re: Sandra Shane Property  
Page: 2

If you have any questions or comments please call me at (410) 537-3778.

Sincerely,



Barry Glotfelty, R.S., Regional Consultant  
On-Site Systems Division  
Wastewater Permits Program

BG:je

cc: Eric Dougherty  
Bob Weber

2005 SP-7 PM 2:54

**AGREEMENT AND EASEMENT FOR  
INSTALLATION OF AN ALTERNATIVE/ INNOVATIVE  
ON-SITE SEWAGE DISPOSAL SYSTEM**

THIS AGREEMENT is made this Ninth day of September 2005, among Betty & Sandra Shane, hereinafter referred to as "Owner", The Howard County Health Department hereinafter referred to as the "County", and the Department of the Environment, hereinafter referred to as the "Department".

WHEREAS, Owner owns a tract of land located on 631 Beetz Road, in the 4th Election District of Howard County, Maryland, and the deed to same is recorded among the Land Records of Howard County, Maryland, in Liber 1383 Folio 75.

WHEREAS, Owner's land is improved and the traditional means of sewage disposal has been found to be potentially prejudicial to the environment and/or public health.

WHEREAS, Owner has requested the Department's approval to install an innovative/alternative pretreatment device on the sewage system.

NOW, THEREFORE, the parties hereto agree as follows:

- 20.00  
20.00  
BRC
- A. Owner must install and maintain a water meter on the incoming side of the water system or event counter on the sewage pumping system.
  - B. Owner hereby grants to the County the right to enter upon the Property at any reasonable time for access to the system to make periodic inspections and the Owner agrees to provide any information and data requested and needed by the Department to develop accurate and thorough test results.
  - C. Owner acknowledges and agrees that the proposed alternative/ innovative pretreatment system is experimental and that his or her participation is voluntary. Owner agrees that there shall be no liability on the part of the County or Department to Owner if this innovative /alternative system fails, and that the County and the Department do not warrant or guarantee that the system will adequately or properly function.



D. Owner acknowledges and agrees that neither the County nor the Department nor any of its employees, either officially or individually, underwrites the operation of any system approved by them.

E. Owner will devote such care and effort to the maintenance of the system so that a system malfunction is not the result of poor maintenance, faulty operation, or neglect.

F. Owner agrees, should the system be determined by the County to pose a threat to the public health, safety or comfort, the County may order any reasonable changes or corrections and Owner agrees to pay for all such changes or corrections. System modifications may include requirements for holding of sewage waste in tanks and regular pumping from the holding tanks. Upon the Department's request, the Owner agrees to enter into a contract acceptable to the Department to allow and pay a private entity to pump on a regularly scheduled basis an approved holding tank system.

G. Owner agrees to contact the Water Management Administration, Groundwater Permits Program and the Department at least forty-eight (48) hours prior to system installation, so that the Department may lay out the system in the field with the contractor. Owner shall install this system according to the plans and specifications approved by the Department and any changes reasonably required by the Department as a result of the field layout. If installation deviates substantially from the approved plans or changes such that experimental data will be materially compromised, Owner agrees to pay for all reasonably necessary corrections.

H. This agreement shall run with the land and binds the Owner, his heirs, successors, assigns except that the provisions of paragraph A & B shall be binding for a period of 5 years only after installation of the system and occupation of the home. Owner further agrees that he or she shall inform in writing any purchaser or lessee of the property that the system may require maintenance or other attention. The Owner agrees to record this agreement in the land records of Howard County.

D. Owner acknowledges and agrees that neither the County nor the Department nor any of its employees, either officially or individually, underwrites the operation of any system approved by them.

E. Owner will devote such care and effort to the maintenance of the system so that a system malfunction is not the result of poor maintenance, faulty operation, or neglect.

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I. This agreement shall not be construed to limit any authority of the Department to protect the public health, safety or comfort or to issue any other orders to take any other action which is now or may hereafter be within its authority.

J. This agreement may be voided at the discretion of the County if the system construction is not completed within six (6) months of the effective date of this agreement.

K. This agreement contains the entire agreement and understanding between the County and the Owner and the Department. There are no additional terms other than as contained in this agreement. This agreement may not be modified, except in writing signed by each of the parties or by their authorized representatives.

L. The laws of the State of Maryland govern the provisions of all transactions pursuant to this agreement.

IN WITNESS WHEREOF, the parties have signed and sealed this agreement on the date indicated above.

DATE: 9-28-05

✓ Betty S. Shane  
(Owner) Betty S. Shane

IMP FD SURE \$	20.00
RECORDING FEE	20.00
TOTAL	40.00
Rec'd CHES	Rec'd \$ 39959
NDR FOR	Bk \$ 4658
Sep 30, 2005	06:46 am

DATE: 9-28-05

✓ Sandra S. Shane  
(Owner) Sandra Denise Shane

DATE: 27 Sept 2005

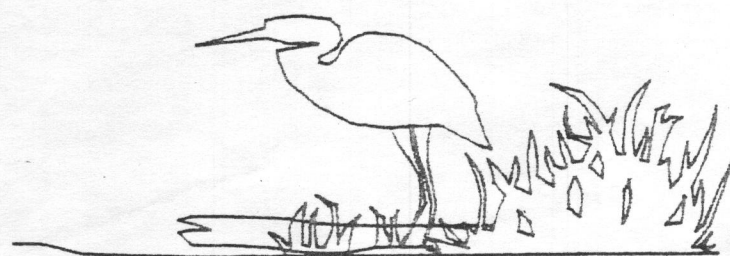
Eric Dougherty  
Eric Dougherty, Chief, On-Site Systems Division  
Water Management Administration  
Department of the Environment

DATE: 9/29/2005

Best Refer for Robert J Weber  
Howard County Health Department







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P.O. BOX 363, NEW WINDSOR, MD 21776

(410) 875-9370 Office

(410) 635-2883 Fax

H. Dale Gray, Principal

# GEOFLOW TREATED DRIP IRRIGATION WASTEWATER DISPOSAL SYSTEM

Project Title: Sandra Shane Property

Address: 631 Beetz Road, Howard County, Mt Airy, MD 21771-3511

MARYLAND DEPARTMENT OF THE ENVIRONMENT

ON-SITE SYSTEMS DIVISION

Reviewed by: Bryce Hapley Date: 8/30/05  
Sandra Shane

Approved by: BWG Date: 8/30/05

*Revised Plan*

FILE #

NOTE

Approval of final field layout is required by the Division of Residential Sanitation at least 48 hours prior to system installation

Approved By \_\_\_\_\_

Date \_\_\_\_\_

This approval is not valid for more than 2 years from the date of issuance, but may be renewed at the discretion of the Approving Authority.



August 15, 2005

Property of Mrs. Sandra Shane  
Howard County Bureau of Environmental Health File #  
COMPONENTS (Continued)

The Designed system, using a BIOMICROBICS®, MicroFAST® 0.75 (aeration) treatment unit [ fixed media, activated sludge ] will remove organic contaminants (98%) for distribution of the treated wastewater evenly, over the elevated disposal field using a GEOFLOW dripline irrigation (pressure compensating) tubing system with an emitter flow rate of 1 gallon of water, per perforation, per hour. The system uses a 12 timed events (every two hours) plan to apply a total of 0.62 gallons of treated effluent to each square foot of disposal bed over 24 hours [about 0.05 gallons each dose event]. Pump run time is short [every two hours, for 7.1 minutes], and provides 11 rest periods of about 1.8 hours duration, each, between doses.

LAYOUT - (see plan view, and profile drawings pgs. 2&3)

The building sewer exits the home from the front foundation wall of the home, beneath the porch, and connects to the recently installed, 1500 gallon, two compartment, top seam, primary septic tank. The primary tank discharged to the failed seepage pit 45' across the driveway. The pit is to be emptied [no pumping clean out is evident], and properly abandoned (filled with gravel/stone/soil material). The 4" sewer line, to the pit (type of existing 4" pipe material not known) tank will be reconnected to the 1000 gallon treatment tank inlet. The BIOMICROBICS®, MicroFAST® 0.75 treatment unit reduces organic contaminants and directs the flow of treated water to a 1500 gallon pump/modulation tank containing the multi stage turbine pump that will, as directed, (control panel with programmable logic unit), lift the treated effluent by 1" PVC Force Main, about 26' vertically, to the Initial, at-grade disposal bed.

The 95' wide, 12' 9" long, elevated disposal bed is designed to specifications outlined by the Maryland Department of the Environment. Before entering the field the effluent passes from the 1" PVC Force Main to a final filtration stage [Headworks], through a water meter, then into the Lateral supply manifold. Elevation of the common manifold connections eliminates opportunity for drain down of residual effluent from higher to lower laterals following a dose event. Flush cycle. The flush manifold does not operate until the programmed flush return solenoid valve, in the Headworks box, is started by program command from the control panel. The programmable logic unit enables system adjustments, and keeps a record of the system functions. Water meter is an MDE specified item. This meter does not require a power feed. It does permit a direct read out of water flow to the field.

PRETREATMENT [BIOMICROBICS™, Micro FAST® 0.75 (see drawings, pages 4&5 )

Assuming a medium strength sewerage (influent) flow from the home @ 220 mg/L BOD[Biological Oxygen Demand], and five bedroom hydraulic flow of 750 gallons/day, an organic (BOD) loading of about 1.3 lbs. BOD/ per day must be managed. A BOD discharge (effluent) level of about 10mg/L from the 0.75 FAST unit is anticipated at that strength. Total Nitrogen reduction, with no further processing will fall to approximately 70% of the influent level TN strength.

SDA - DISPOSAL FIELDS [see Drawings, pages 2, 3 & 10] Based on Wisconsin At-Grade Soil Absorption System configuration for restricted conditions.

Septic Disposal Area (SDA) available: **INITIAL FIELD**, elevated bed 95 feet wide, 12 feet 9 inches long (perpendicular to contour) with a basal area perimeter (similar to a sand mound) 113 feet wide and 22 feet nine inches long. The elevation of the bed with sand is to provide a positive interface with the organic and "A" soil horizons, or existing horizons exposed at the surface. Plow the absorption bed area first, to a depth of about six inches, then cover the plowed bed area with mound sand to a depth of about six inches. The bed follows the contour and is not level along the length (perpendicular to contour). After laying the drip tubing laterals on the sand, pin them down with plastic landscape staples to hold them in alignment, and cover the laterals with a minimum of six inches of mound sand.

The elevated area beyond the bed dimensions is placed to support the supply and flush manifolds, and blank tubing that supply the drip irrigation laterals. Following installation of the absorption bed, laterals, and the manifolds install the supply and field flush lines then, plow the basal area footprint to a depth of about six inches then cover the entire foot print [bed included] with 12 inches of reasonably soft local soil.

**FUTURE - REPLACEMENT FIELD**, a specified elevated bed 93 feet wide, 13 feet 4 inches long (perpendicular to contour) is shown on the plan. The Headworks/Watermeter boxes are placed to serve that Field, also.

## Wastewater Disposal submittal Plan

Property of Mrs. Sandra Shane

613 Beetz Road

Mt. Airy , Maryland 21771

Ref. Howard County Bureau of Environmental Health (HCHD) File #

## CONDITIONS

The on-site wastewater needs of the five bedroom property have been served by disposal to a circular seepage pit structure, next to the entrance driveway below the home. The seepage pit has displayed signs of hydraulic failure, and collapse of the pit cover. The owner sought guidance of the Howard County Health (HCHD), this included the County's Regional Consultant from the Department of the Environment (MDE). The Consultant would also review the site, and assist in defining the appropriate repair requirements.

## EVALUATION/REQUIREMENTS

Following site testing and soil profiling (taken May 4, 2005), the collected information was reviewed by Mr. Barry Glotfelty, R.S. Maryland Department of the Environment. Data was examined for location and type of new disposal field (s) on the site. The existing, failed seepage pit location, lacks sufficient area for an effective repair. Sloping topography, and thin soil mantle present obstacles to the use of conventional wastewater disposal methods. A form, suitable to the conditions was determined. That form is called the at-grade system, referring to a disposal point at the surface of the soil as opposed to sub-surface trenches, or the elevated sand mound absorption bed

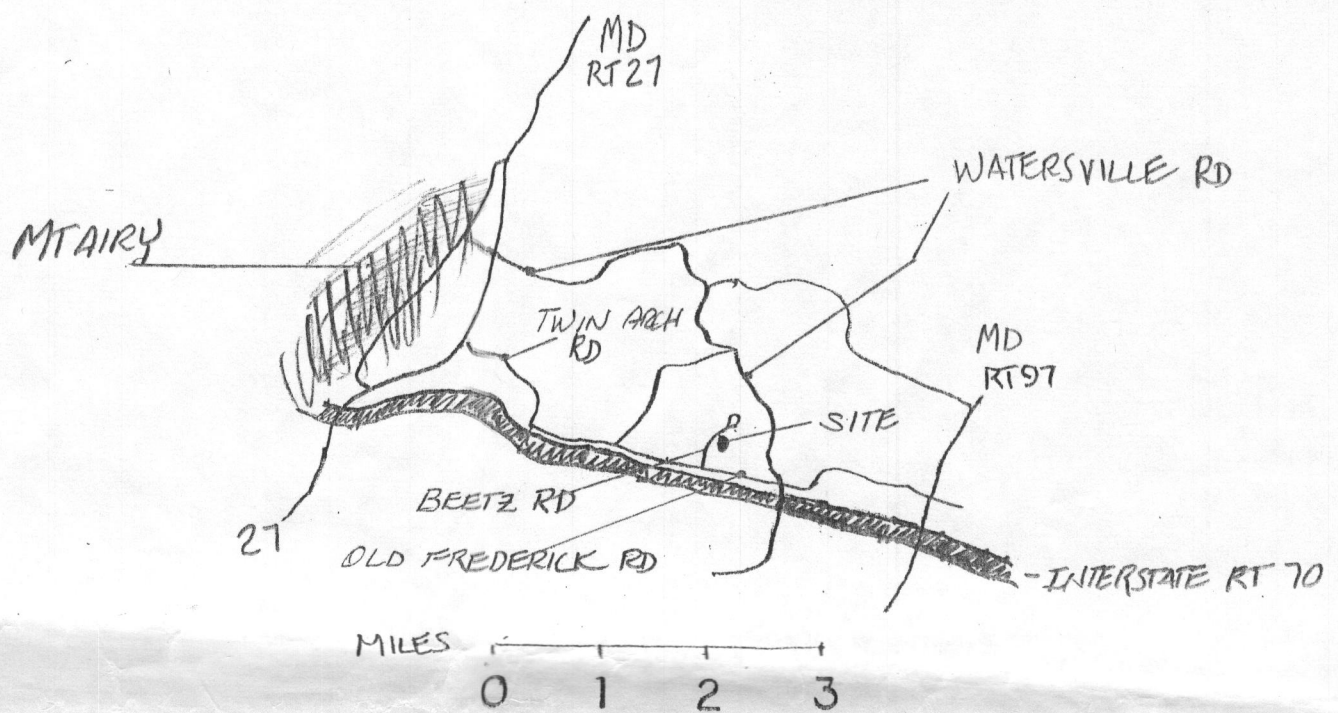
A septic disposal area (SDA) approximately 250 feet from the home, and about 25 feet above the level of the current disposal area was identified as viable. Consistent, unsaturated soil depths of four feet, or more below a wastewater introductory point is not available. To mitigate a lack of suitable soil depth Mr. Glotfelty specified improvement of effluent quality, before disposal. Pre-treatment of the wastewater would enable use of the area defined by test pits "G" (5021), "H" (5018), and "K" (5019). Mr. Glotfelty's assessment of the soils in the new disposal area, and application of site condition profiles, from the authoritative works of Professors Converse, and Tyler [University of Wisconsin-Madison], outlined parameters. A soil loading rate of 0.7 gpd/ft<sup>2</sup> and a linear loading rate [disposal bed, along contour length] not exceeding 9gpd/ per linear foot along the contour, are suitable guides for an at-grade disposal system.

## SOLUTION

### DESIGN

Several methods of disposal distribution to an at-grade system were referred to by Mr. Glotfelty. The Distribution method selected for the Shane property is accomplished by drip irrigation with timed dosing application. Pretreated wastewater (effluent) will be spread evenly over the entire bed area by dripline release of water into the sand bed and vertical flow into the soil. Six inch deep rips are plowed into the soil occupied by the elevated bed structure and fill with bedding sand. Drip irrigation tubing placed upon the sand provides even application of the effluent, and the sand that filled the plowed surface, will hold that soil interface open, promoting continued movement of effluent into the soil. The drip irrigation format gives a highly controlled even distribution, and a volume application (rate) not featured by other forms of distribution.





## SITE LOCATION

Project #: S. SHANE  
631  
BEETZ RD MT AIRY, MD  
Sheet Title: LOCATION  
WASTEWATER  
SYSTEM  
PLAN  
Sheet#  
WWT-1  
1 of 12 Sheets



**INNOVA, LTD**  
**INNOVATIVE WASTEWATER TREATMENT SYSTEMS**

P.O. BOX 363, NEW WINDSOR, MD 21776

(410) 875-9370 Office

(410) 635-2883 Fax  
H. Dale Gray, Principal

date: 8/15/05

scale: 1" = 1 mile



# MARYLAND DEPARTMENT OF THE ENVIRONMENT

ON-SITE SYSTEMS DIVISION

Reviewed by: Bryce Lofsky Date: 8/30/05

Sandra Shene

Approved by: BWG Date: 8/30/05

## NOTE

Approval of final field layout is required by the Division of Residential Sanitation at least 48 hours prior to system installation

Approved By \_\_\_\_\_

Date \_\_\_\_\_

Project #: S. SHANE  
631  
BEEZ RD. MT. AIRY MD  
Sheet Title: PLAN  
WASTEWATER VIEW  
SYSTEM  
PLAN  
Sheet#  
WWT-1  
2 of 2 Sheets

AREA SHOWN ON PROFILE VIEW



### TEST RESULTS

Infiltration tests and soil profile analysis conducted by Howard County Bureau of Environmental Health, and confirmed 5/18/2005 by Maryland Department of the Environment, Regional Consultant. (Area "G" - "H" designated Alternative)

TEST	DEPTH	TIME [2" INCH]	
"G" (#5021)	2'	12.5 min.	Hard rock 6'
	4"	8 minutes	" "
"H" (#5018)	2.5'	11 minutes	Hard rock 7'
"K" (#5019)	2.75'	3.5 minutes	@5' rate acceptable

Rock @6'  
Too much rock, 6'+  
Hard rock @6'  
No data  
"F"  
"J"  
"E"

This approval is not valid for more than 2 years from the date of issuance, but may be renewed at the discretion of the Approving Authority.

Most holes demonstrated loam- sandy clay loam soils with good, physical soil structure at depths of 2' - 2.5'

INNOVA, LTD



INNOVATIVE WASTEWATER TREATMENT SYSTEMS

P.O. BOX 363, NEW WINDSOR, MD 21776

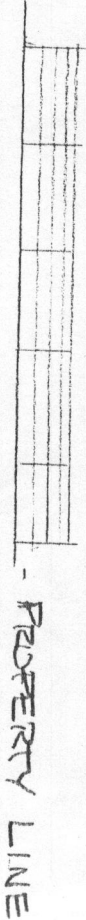
(410) 875-9370 Office

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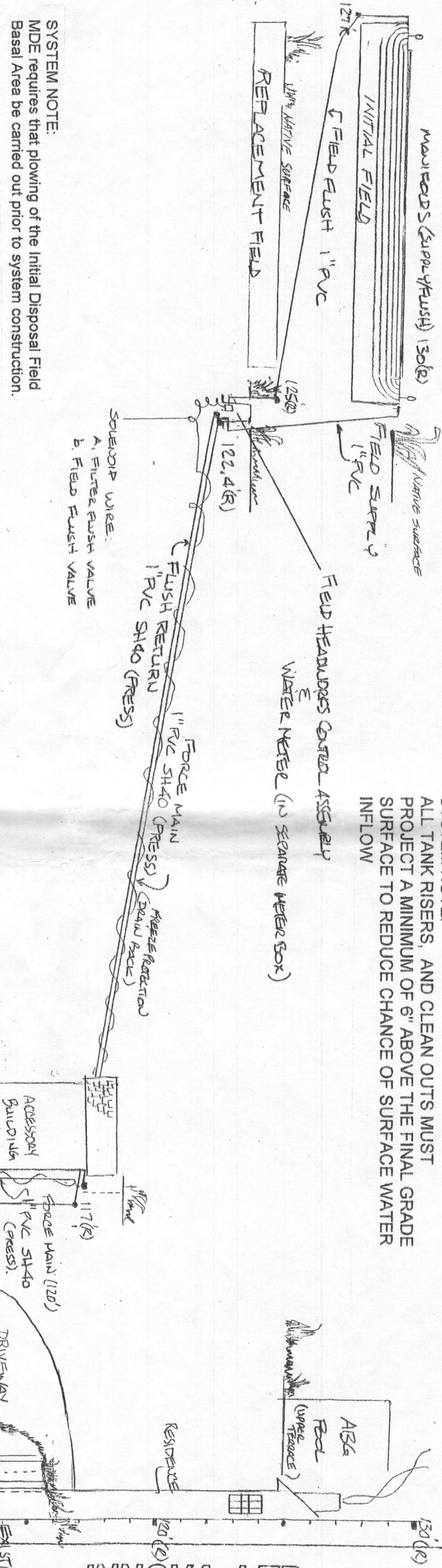
1" = 50'

8/15/05



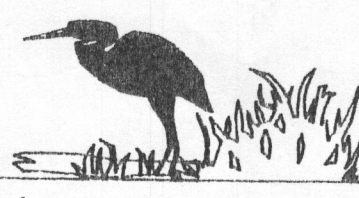


SYSTEM NOTE:  
\*  
ALL TANK RISERS, AND CLEAN OUTS MUST PROJECT A MINIMUM OF 6" ABOVE THE FINAL GRADE SURFACE TO REDUCE CHANCE OF SURFACE WATER INFLOW



Project #: S. SHANE	
631 BEETZ RD MT. AIRY MD	
Sheet Title: PROFILE	
WASTEWATER VIEW	
SYSTEM	
PLAN	
Sheet#	WWT-1
3 of 12	Sheets

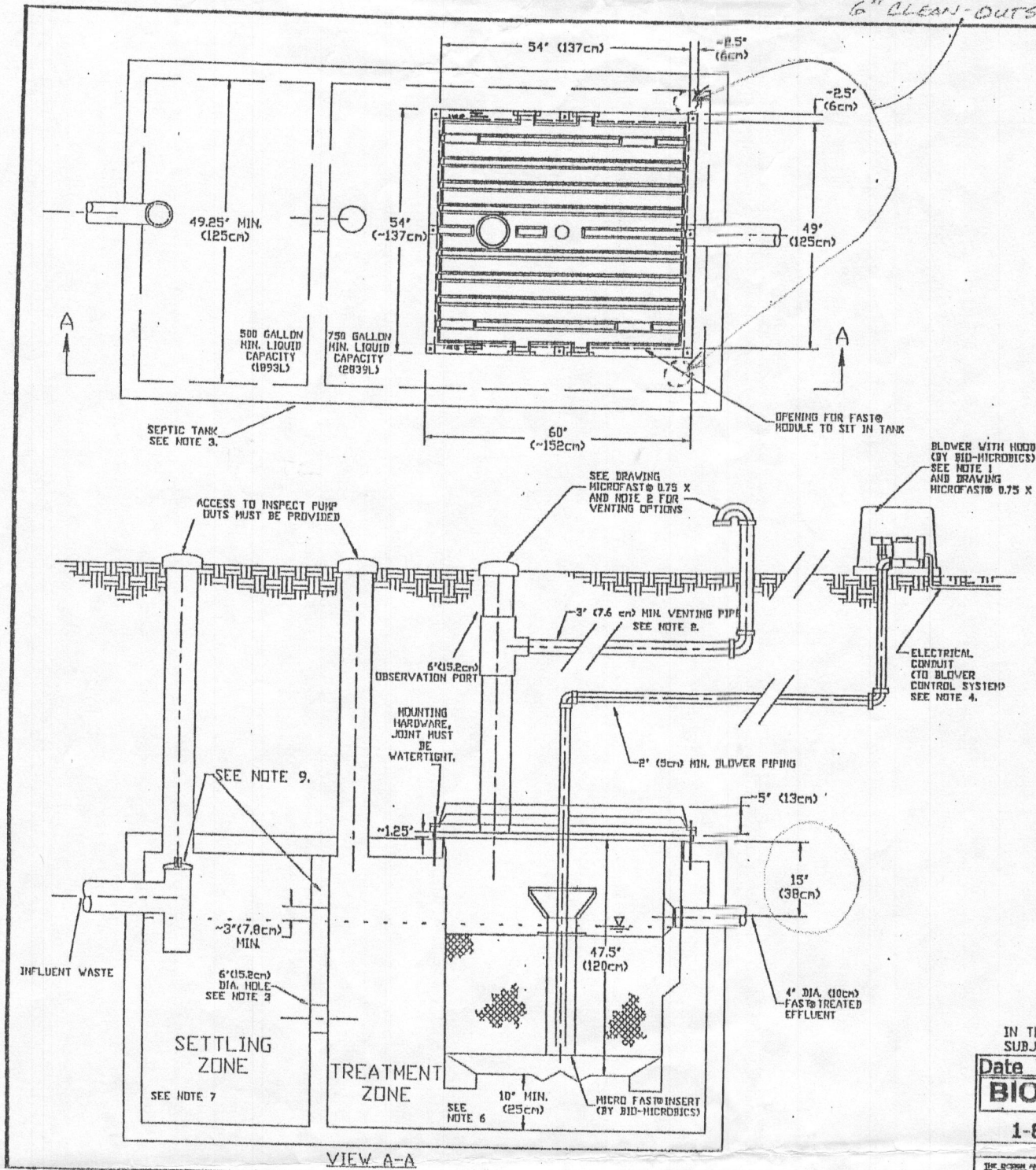
SCALE  
HORIZ. 1"=30'  
VERT. 1"=1'



**INNOVA, LTD**  
**INNOVATIVE WASTEWATER TREATMENT SYSTEMS**  
P.O. BOX 363, NEW WINDSOR, MD 21776  
(410) 875-9370 Office  
(410) 635-2883 Fax  
H. Dale Gray, Principal



RECOMMENDED  
6" CLEAN-OUTS (CAST COUPLINGS IN LID)



#### NOTES

1. BLOWER MUST BE WITHIN 100 FEET (30.5m) OF FAST@UNIT AND USE A MAXIMUM OF 4 ELBOWS IN THE PIPING SYSTEM (2 100 FT). FOR DISTANCES GREATER THAN 100 FT--CONSULT FACTORY. BLOWER MUST BE LOCATED ABOVE NORMAL FLOOD LEVELS.
2. VENT TO BE LOCATED ABOVE FINISH GRADE OR HIGHER TO AVOID INFILTRATION. CAP WITH 6" VENT GRATE W/AT LEAST 7.1 SQ. IN. OPEN SURFACE AREA. SECURE WITH STAINLESS STEEL SCREWS (SEE MCF 0.75 X DRAWING).  
OR  
RUN VENT TO DESIRED LOCATION AND COVER OPENING WITH 3" VENT GRATE W/AT LEAST 7.1 SQ. IN. OPEN SURFACE AREA. SECURE WITH STAINLESS STEEL SCREWS. VENT MUST NOT ALLOW EXCESS MOISTURE BUILDUP OR BACK PRESSURE.
3. ALL APPURTENANCES TO FAST@ (e.g. SEPTIC TANK, PUMPOUTS, ETC.) MUST CONFORM TO ALL COUNTRY, STATE, PROVINCE, AND LOCAL CODES.
4. BLOWER CONTROL SYSTEM BY BIO-MICROBICS, INC.
5. COPYRIGHT (C) 2003, BIO-MICROBICS, INC.
6. MUST INCREASE TANK SIZE BY 20% IF MINIMUM OF 10 INCHES IS USED BETWEEN THE UNIT AND THE BASE OF TANK. CONSULT FACTORY FOR APPROVAL.
7. THE PRIMARY COMPARTMENT MAY BE A SEPARATE TANK.
8. FOUR LEG EXTENSIONS MAY BE USED TO STAND UNIT IN TANK ELIMINATING NEED FOR LID. SEE DWG MCF 0.75 X & F AND REFER TO INSTALLATION MANUAL FOR MORE DETAILS.
9. EITHER THE INFLUENT PIPE TEE SHALL BE FITTED WITH A PIPE CAP OR THE BAFFLE SEPARATING THE TWO ZONES SHALL BE EXTENDED ALL THE WAY TO THE TOP OF THE CONCRETE TANK. IF CHOOSING TO USE THE PIPE CAP, THEN THE BAFFLE SHALL BE AT LEAST 3" HIGHER THAN THE WATER LEVEL AS SHOWN ON THE DRAWING.

IN THE INTEREST OF TECHNOLOGICAL PROGRESS, ALL PRODUCTS ARE SUBJECT TO DESIGN AND/OR MATERIAL CHANGE WITHOUT NOTICE.

Date 2-21-03

**BIO-MICROBICS**  
INCORPORATED  
1-800-753-FAST (3278)

MicroFAST® 0.75 L

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Drawn by BMI

## Specifications For MicroFAST 0.75 Wastewater Treatment System

### 1. GENERAL

The contractor shall furnish and install (1) MicroFAST 0.75 treatment system as manufactured by Bio-Microbics, Inc. The treatment system shall be complete with all needed equipment as shown on the drawings and specified herein.

The principal items of equipment shall include FAST System Insert, Insert lid (or leg extensions if that option is chosen), blower assembly, blower controls and alarms. The MicroFAST 0.75 unit shall be situated within a 750 gallon minimum compartment in a two compartment tank as shown on the plans, or in a 1250 gallon one compartment tank. Tank(s) must conform to local, state, and all other applicable codes. The contractor shall provide coordination between the FAST system and tank supplier with regard to fabrication of the tank, installation of the FAST unit and delivery to the job site.

### 2. OPERATING CONDITIONS

The MicroFAST 0.75 treatment system shall be capable of treating the wastewater produced by typical family activities (bath, laundry, kitchen, etc.) ranging from (1) one to (11) eleven persons and not to exceed 750 US Gallons per day (2842.5 LPD).

### 3. MEDIA

The FAST media shall be manufactured of rigid PVC, polyethylene or polypropylene and it shall be supported by the polyethylene insert. The media shall be fixed in position and contain no moving or wearing parts and shall not corrode. The media shall be designed and installed to ensure that sloughed solids immediately descend through the media to the bottom of the septic tank.

### 4. BLOWER

The MicroFAST 0.75 unit shall come equipped with a regenerative type blower capable of delivering 17-25 CFM. The blower assembly shall include an inlet filter with metal filter element.

### 5. REMOTE MOUNTED BLOWER

The blower shall be mounted remote, up to 100 feet (30.5 M) maximum with no more than four elbows, from the MicroFAST unit on a contractor supplied concrete base. The blower must not set in standing water and its elevation must be higher than the normal flood level. A two-piece, rectangular housing shall be provided with tamper-proof screws. The discharge air line from the blower to the MicroFAST shall be provided and installed by the contractor.

### 6. ELECTRICAL

The electrical source should be within 150 feet of the blower. Consult local code for longer wiring distances. All wiring must conform to code. The input power required for the blower is 115/230 Volts, Single Phase, 60/50 Hertz, 3.8/1.9 Full Load Amps, minimum wire size is 16 A.W.G. (Locked Rotor Amps are 18.6/9.3). All conduit and wiring between the electrical control panel (optional), the power supply, and the blower shall be furnished and installed by the contractor.

### 7. ALARMS

The alarm system shall consist of a visual and audible alarm to indicate loss of power to the blower and/or high water level. A manual silence switch is included.

### 8. INSTALLATION AND OPERATING INSTRUCTIONS

All work must be done in accordance with local codes and regulations. Installation of the MicroFAST 0.75 shall be done in accordance with the written instructions provided by the manufacturer. Operation manuals shall be furnished which will include a description of installation, operation, and system maintenance procedures. There shall be a separate manual for the installer, service provider, and owner, tailored to each.

### 9. WARRANTY

The manufacturer of the MicroFAST 0.75 treatment system shall warrant for three years from the date of shipment or two years from the date of start-up, whichever occurs first, that the equipment they provide will be free from defects in material and workmanship.

In the event a mechanical component fails to perform as specified or is proven defective in service during the warranty period, the manufacturer shall repair or replace such defective parts. (Cost of labor on repair/replacement is not covered, under this warranty.) The replacement or repair of those items normally consumed in service such as air filter, etc., shall be considered as part of routine maintenance and upkeep.

It is not intended that the manufacturer assume responsibility for contingent liabilities or consequential damages of any nature resulting from defects in design, material or workmanship, or delays in delivery, replacement, or otherwise.

### 9. FLOW AND DOSING

Wastewater treatment systems work best when influent flow is delivered as consistently as possible. FAST systems have been successfully designed, tested and certified receiving gravity, demand-based influent flow. However when influent flow is controlled (either by pump or other means) to the FAST system to help with highly variable flow conditions, then multiple feeding events should be used to help assure even flow, optimum performance, and reliability.

IN THE INTEREST OF TECHNOLOGICAL PROGRESS, ALL PRODUCTS ARE SUBJECT TO DESIGN AND/OR MATERIAL CHANGE WITHOUT NOTICE.

Date 2-21-03

**BIO-MICROBICS**  
INCORPORATED  
1-800-753-FAST (3278)

MicroFAST® 0.75 S

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BMI

Project #: S. SHANE  
631  
BEETZ RD. MT AIRY, NC

Sheet Title:

WASTEWATER  
SYSTEM  
PLAN

Sheet#

WWT-1

4 of 12 Sheets



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(410) 875-9370 Office

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H. Dale Gray, Principal

8/15/05



WORKSHEET:

The following worksheet is available on an Excel spreadsheet and can be downloaded from Geoflow's homepage at [www.geoflow.com](http://www.geoflow.com). If you would like a copy sent to you at no charge phone 800-828-3388.

To calculate the area required for your drip dispersal system you must know:

1. the quantity of effluent to be disposed of (in gallons per day) and
2. the soil acceptance rate (i.e. gallons per day per square foot).

Make a sketch of the dispersal area with contour lines.

S. SHANE  
631 BEETZ RD  
MT. AIRY, MD

WORKSHEET 1 - DISPERSAL FIELD DESIGN FOR SINGLE ZONE SYSTEM

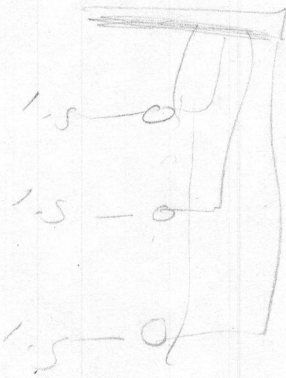
Worksheet	Formula
A) Quantity of effluent to be dispersed per day <u>750</u> gpd	$\frac{150 \text{ GAL (BEDROOM)}}{\times 5 \text{ BEDROOMS}} = 750 \text{ GAL - DESIGN FLOW}$
B) Soil type or hydraulic loading rate <u>0.7</u> loading rate (gal/sq. ft./day)	Based on soil analysis / MDE SPECIFIED. LINEAR LOADING RATE: 19 GAL/FT
C) Determine the total area required INITIAL <u>95' x 12.75'</u> <u>1212</u> square ft	Refer to State or Local regulations. AT-GRADE SYSTEM BED SPECIFIED If none, refer to Table 1, page 8 and INITIAL: <u>95' x 12.75'</u> Divide gpd by loading rate. (A)/(Bii) REMAINT: <u>93' x 13.4'</u>
D) Choose the spacing between each WASTEFLOW line and each WASTEFLOW emitter i) <u>2.13</u> ft. between WASTEFLOW lines ii) <u>2</u> ft. between WASTEFLOW emitters	Standard spacing is 2 ft. LATERAL SPACING SET @ 2.1' TO FIT 6-95' LATERALS TO THE ABSORPTION BED $1212 \text{ ft}^2 \div 2.13 = 569.01' \text{ by } 570'$
E) How many linear feet of dripline in the total area? <u>570</u> ft	(Area / 2 ) for 2ft. line spacing. (C)/2.0 or (Area / 1) for 1 ft. line spacing. (C)/1.0 or (Area / 0.5) for 6" line spacing. (C)/0.5
F) Calculate the number of emitters <u>570 ÷ 2</u> <u>285</u> emitters	(Linear ft. of dripline/2) for 2 ft emitter spacing. (E)/2 or (Linear ft. of dripline/1) for 1 ft emitter spacing. (E)/1 or (Linear ft. of dripline/0.5) for 6" emitter spacing (E)/0.5
G) Choose pressure compensating or Classic dripline <input type="checkbox"/> WASTEFLOW Classic dripline or <input checked="" type="checkbox"/> WASTEFLOW PC dripline	See page 4 and Appendix 1, page 28 WFFC 16-4-24
H) Determine dripfield pressure <u>20</u> psi	Standard pressure is 20 psi. WASTEFLOW Classic systems need between 15 and 45 psi (34.7 and 104 ft.) at the start of the dripfield. WASTEFLOW PC systems need between 10 and 45 psi (23.1 ft. to 104 ft.) at the start of the dripfield.
I) Determine feet of head required at dripfield <u>46.2</u> ft. of head	Multiply pressure above by 2.31 to get head required. (H) x 2.31
J) What is the flow rate per emitter? <u>1</u> gph / emitter	See WASTEFLOW flow rates in Appendix 1.
K) Determine total flow for the area <u>285</u> gph <u>8.77</u> gpm (INCLUDES FLUSHING)	Number of emitters multiplied by the emitter flow rate at the design pressure. FLUSH: REYNOLDS 4000* .55" (OD) TUBING = .67 GPM Gph = (F)x(J) Gpm = gph/60 6 COMMS. K. 67 = 4.02 GPM FIELD FLOW 4.75 GPM + FLUSH FLOW 4.02 = 8.77 TOTAL FIELD FLOW
L) Select pipe diameters for manifolds and submains <u>1"</u> inches FORCE MAIN	Based on total flow from (K) above, in gpm. See schedule 40 friction loss charts on page 44 Optimum velocity is between 2 and 5 ft. per second.
M) Select size of Vortex filter or WASTEFLOW Headworks <u>WHW.75</u> Aut/man Vortex filter or WASTEFLOW Headworks	Based on total flow from (K) above, in gpm. See minimum and maximum flow requirements for each filter in Appendix 2.
N) Sketch a layout of the WASTEFLOW lines in the dispersal plot to make sure that the maximum lateral length of each WASTEFLOW line is not exceeded.	See Maximum Length of Run table in Appendix 1. 265'/RUN

WORKSHEET 2 - SELECT PUMP

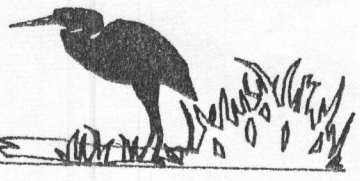
Worksheet	Formula
O) Minimum pump capacity <u>8.77</u> gpm	From (K) above
P) Header pipe size <u>1"</u> inches	From (L) above
Q) Pressure loss in 100 ft. of pipe <u>1.98</u> psi	Refer to PVC charts on page 34.
R) Friction head in 100 ft. of pipe <u>4.57</u> ft. of head	Multiply psi from (Q) above by 2.31
S) Static head i) Height from pump to tank outlet. <u>1.44</u> ft. ii) Elevation increase or decrease <u>24.5</u> ft.	Number of ft. Height changes from pump to dripfield.
T) Total static head <u>25.94</u> ft.	Add (Si) + (Sii)
U) Friction head i) Equivalent length of fittings (1") <u>18'</u> ft. ii) Distance from pump to field. <u>380</u> ft. iii) Total equivalent length of pipe. <u>398</u> ft. iv) Total effective feet. <u>18.2</u> ft. v) Head required at dripfield <u>46.2</u> ft. vi) Head loss through filter or Headworks <u>20.79</u> ft.	2-90° ELBS - 36' / 14-CONDUITS - 12.6' 1-8" EQUAL - 1.8' TOTAL = 18' Estimate loss through fittings - usually inconsequential for small systems. Measure length of sub-main Add (Ui) + (Uii) (Uiii) / 100 x (R) $3.98 \times 4.57$ See line (I) in Worksheet 1 above. See pressure loss for filters in Appendix 2 or see pressure loss for Headworks box in Appendix 7. Multiply pressure by 2.31 to get head loss.
vii) Head loss through zone valves	<u>NA</u> ft. See pressure loss in Appendix 4 for electric valves. For manual or index valves check with the manufacturer. Multiply pressure loss in psi by 2.31 to get head loss.
V) Minimum Total friction head <u>85.2</u> ft.	Add (Uiv) + (Uv) + (Uvi) + (Uvii)
W) Minimum Total Dynamic Head <u>111.14</u> ft.	Add (T) + (V) From line item (O) above
X) Minimum pump capacity <u>8.77</u> gpm	NOTE: Some States and Counties require additional flow for flushing. Please check your local regulations. If you need help on flushing design, see Geoflow's flushing worksheet at <a href="http://www.geoflow.com">www.geoflow.com</a> or call Geoflow at 800-828-3388.
Y) Choose the pump. <u>BLASTER 12 EB</u> Model Number <u>GOULD</u> Manufacturer	Based on pressure from line (W) above and flow from line (X) above. 8.77 GPM @ TDH of 111.14

CONTROL PANEL - GEOI 230V 1Ø SIM/AUT

January 2004 v. II



Project #:	S. SHANE 631 BEETZ RD MT. AIRY MD
Sheet Title:	WASTEWATER SYSTEM PLAN
Sheet #	WWT-1 6 of 12 Sheets



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H. Dale Gray Principal



# Biotube® Pump Vault

## Applications

Orenco's patented Biotube Pump Vaults are ideal for filtering and transporting effluent from septic tanks or separate dosing tanks in effluent pumping systems. They prevent large solids from leaving the tank, dramatically improving wastewater quality and extending the life of downstream treatment systems. Each pump vault houses either one (Simplex) or two (Duplex) High Head Effluent Pumps, discharge assembly(ies), Biotube filter cartridge, float switch assembly, and float stem bracket. Pump(s), float switch assembly, and discharge assembly(ies) are ordered separately.

## Standard Features & Benefits

- Installs quickly in new or existing tanks
- Easy access design allows filter cartridge removal without pulling the pump or vault; simplifies filter inspection and maintenance
- Patented Biotube filter has several times the filtering capacity of other pump vaults
- Removes approximately two-thirds of suspended solids, on average
- Accommodates Simplex or Duplex configuration, for use with one or two pumps
- Float stem bracket allows easy removal and adjustment of float assembly
- Sturdy, molded polyethylene and corrosion-proof construction ensure long life

## Biotube Filtering Process

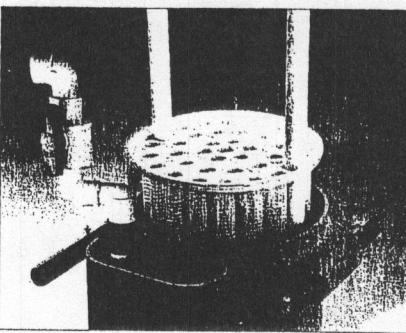
Effluent from the relatively clear zone of the septic tank, between the scum and sludge layers, enters the Biotube Pump Vault through inlet holes in the housing. Effluent then

enters the annular space between the housing and the Biotubes, utilizing the Biotubes' entire surface for filtering. Particles larger than the Biotube's mesh are prevented from leaving the tank.

## Model Code for Ordering

### Biotube® Pump Vault

PVU ☐ ☐ ☐  
Indicates inlet hole height: (inches)  
Cartridge height: 18", 24", 36" standard  
Vault height: 57", 66", 96" in 6" increments  
Universal Pump Vault



Easy access design allows filter cartridge removal without pulling the pump or vault; simplifies filter inspection and maintenance

### Biotube Cartridge Effective Filter Surface Area

Cartridge Height	12" Diameter
18"	15.5 ft²
24"	20.6 ft²
36"	30.9 ft²

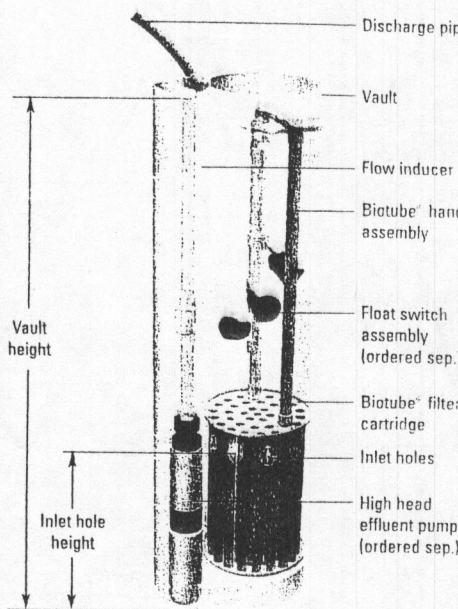
Orenco's Biotube Pump Vault is available in standard and customized configurations. Contact Orenco or your nearest distributor for sizing recommendations.

## Tank Access and Riser Diameter

Biotube Series	Tank Access Dia. Minimum	Tank Access Dia. Recommended	Riser Dia. Minimum
PVU w/Simplex Pump	19"	20"	24"
PVU w/Duplex Pumps	19"	20"	30"

Distributed By:

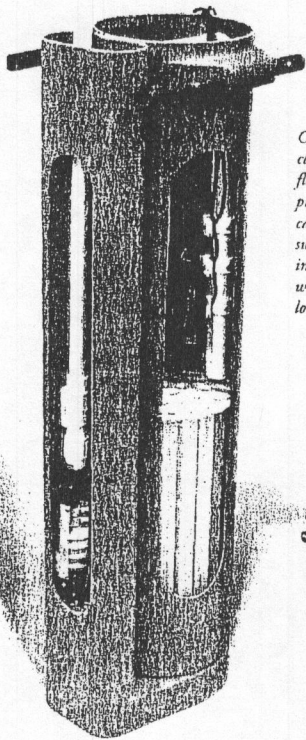
## Biotube Pump Vault Components



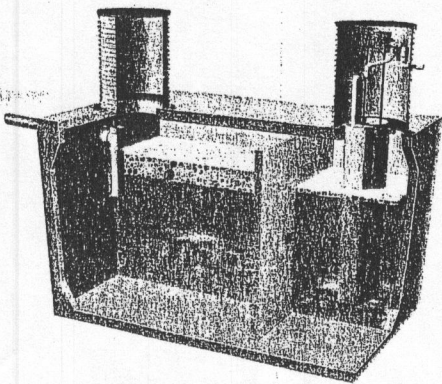
## To Order

Call your nearest Orenco Systems®, Inc. distributor. For nearest distributor, call Orenco at 1-800-348-9843 or go to [www.orenco.com](http://www.orenco.com) and click on "Distributor Locator."

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Orenco's Biotube Pump Vault comes with Biotube filter cartridge, float stem bracket, and support pipes. The unique Biotube filter cartridge provides a large filter surface area (see specs. on back) in a small space, to resist clogging while providing maximum long-term protection.

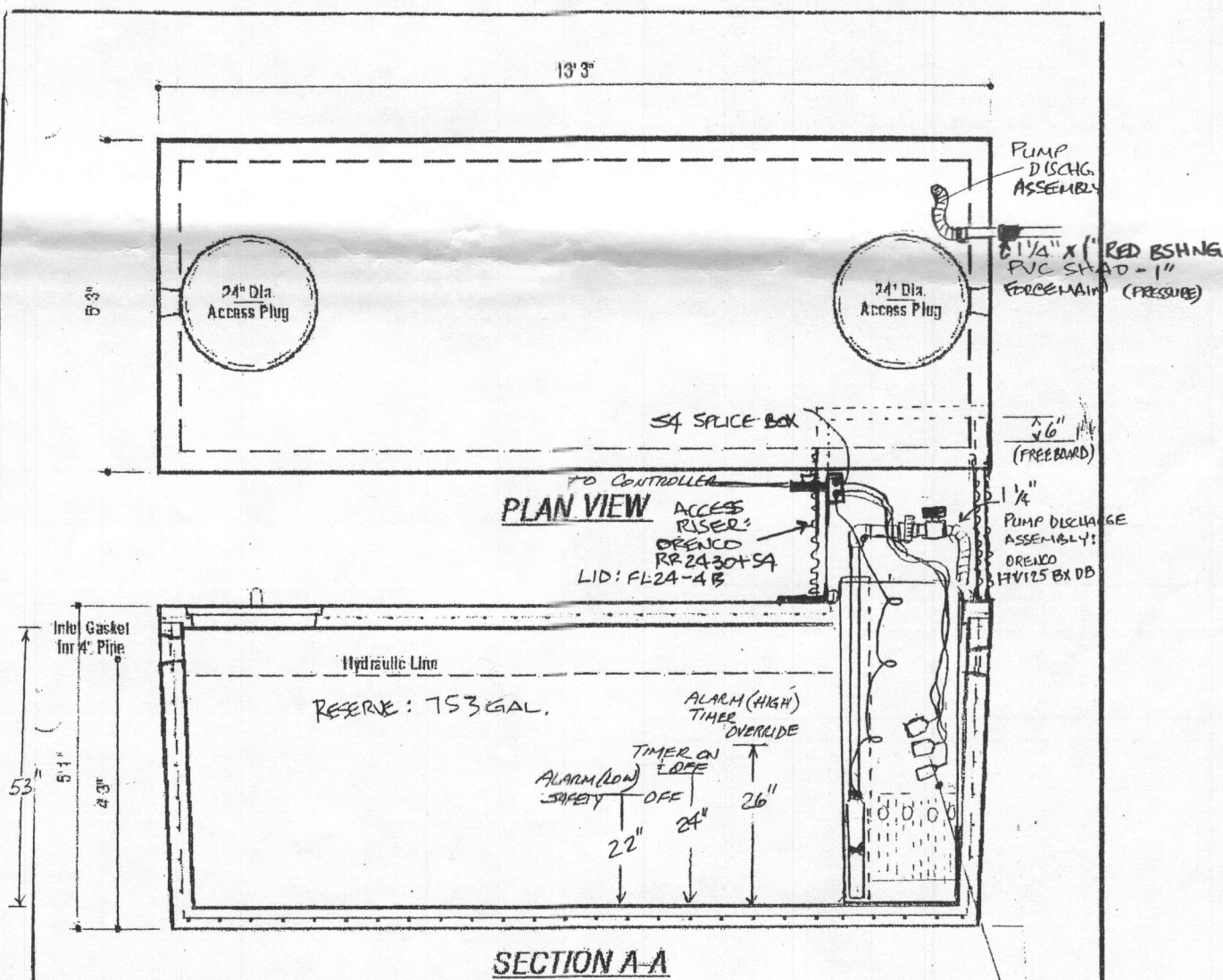


Orenco Systems® Incorporated

Changing the Way the World Does Wastewater  
[www.orenco.com](http://www.orenco.com)

\*Covered by patent numbers 5,992,635 and 6,439,325

APS-BPV-1  
Rev. 2.2 © 9/01



## DESIGN DATA & GENERAL NOTES

- [1] Concrete strength  $f_c = 4,000$  p.s.i. @ 28 days. Density = 150 pcf.
- [2] Cement - Portland Type I/II per ASTM C 150-92.
- [3] Admixtures & plasticizers per ASTM C 260-86 & C 494-92.
- [4] Reinforcing per ASTM A185. Min. 1-1/2" cover.
- [5] Top slab sealed with butyl rope mastic.
- [6] 4" wall, base, & top thickness.

**MBI**  
Mayer Bros., Inc.

6264 Race Road  
Florida, Maryland 21075  
Tel. 410.796.1434  
Fax. 410.796.1438

[www.mayerbrosprecast.com](http://www.mayerbrosprecast.com)

1,500 GALLON SEPTIC/PUMP TANK  
1-Compartment

NON-TRAFFIC MAX 3 IL. OF COVER

Dwg. No. 1500-1C

No Scale

Jan 1, 2000

Project #: S. SHANE  
631  
BEETZ RD. MT. AIRY MD

Sheet Title:

WASTEWATER  
SYSTEM  
PLAN

Sheet#

WWT-1

7 of 12 Sheets

8/15/05

1" =

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H. Dale Grav. Principal



# Filtered Effluent Pump

## SPECIFICATIONS

Model	Flow Range GPM	Horsepower Range	Best Eff. GPM	Discharge Connection	Maximum Solids Size	Rotation①
8EB	1.5 - 10	½ - 1	7	1½"	¼" dia.	CCW
12EB	3 - 16	½ - 1½	10	1½"	¼" dia.	CCW
20EB	6 - 28	½ - 1½	18	1½"	⅜" dia.	CCW

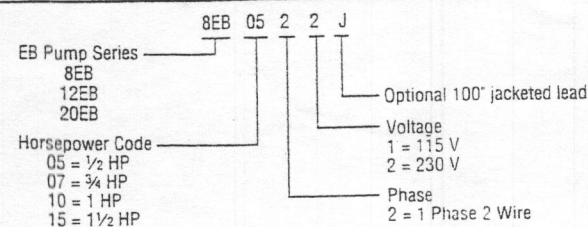
① Rotation is counterclockwise when observed from pump discharge end.

## "EB" SERIES MATERIALS OF CONSTRUCTION

Part Name	Material
Discharge Head	Glass Filled Ultrathane
Check Valve Poppet	Ultrathane
Check Valve O-ring	E P Rubber
Bearing Spider – Upper	Glass Filled Polycarbonate
Bearing	Urethane
Klipring	AISI 301 SS
Diffuser	Glass Filled
Impeller	Polycarbonate
Bowl	AISI 304 SS
Shim	AISI 304 SS
Spacer	AISI 304 SS, Powder Metal
Inlet Strainer	Glass Filled Ultrathane
Motor Adapter	Glass Filled Ultrathane
Casing	AISI 304 SS
Shaft	
Coupling	AISI 304 SS, Powder Metal



## ORDER NUMBER CODE



## FEATURES

■ Designed for pumping filtered effluent from processed septic systems only.

■ **Field Serviceable:** Pump can be rebuilt in the field to like new condition with common tools and readily available spare parts.

**NOTE:** The Model EB has left hand casing threads.

■ **Powered for Continuous Operation:** All ratings are within the working limits of the motor as recommended by the motor manufacturer. Pump can be operated continuously without damage to the motor.

■ **Metal Parts are Stainless Steel:** AISI types 301 and 304 are corrosion resistant.

■ **Non-Metallic Parts are Effluent Compliant:** Impellers, diffusers and bearing spiders constructed of glass filled polycarbonate, an engineered composite. This material is corrosion resistant.

■ **Discharge Head:** State of the art engineered composite material for superior strength and corrosion resistance. Loop for safety line molded into head.

■ **Motor Adapter:** State of the art engineered composite material with high rigidity to provide accurate alignment of liquid end to motor. Generous space for removal of motor mounting nuts with regular open-end wrench.

■ **Bowls:** Stainless steel for strength and abrasive resistance.

■ 100" 3 wire motor lead standard.

- Consult factory for recommendations involving long run cycles followed by short off cycles to assure proper motor cooling flows.

- **Check Valve:** Built-in check valve assembly on all models.
- **Warranted for one year** against failure due to workmanship and materials. **Solids plugged pumps are not covered. Pumps used for liquids other than filtered effluent are not covered.**

■ **Stainless Steel Casing:** Polished stainless steel is attractive and durable in the most corrosive effluent.

- **Hex Shaft Design:** Six sided shafts for positive impeller drive.
- **Inlet Strainer:** Molded suction strainer built into motor adapter.

■ **Urethane Upper Bearings:**  
Fluted design for free passage  
of abrasives.

- Corrosion resistant stainless steel construction.

- Built-in surge arrester is provided on single phase motors.

- Stainless steel splined shaft.
- Hermetically sealed windings.
- Replaceable motor lead assembly.

- UL 778 and CSA recognized.
- NEMA mounting dimensions.
- Optional 100" jacketed power cord available.

■ **Agency Listings:** All complete pump/motor assemblies are UL778 and CSA listed. All Franklin Electric Motors are UL778 recognized.

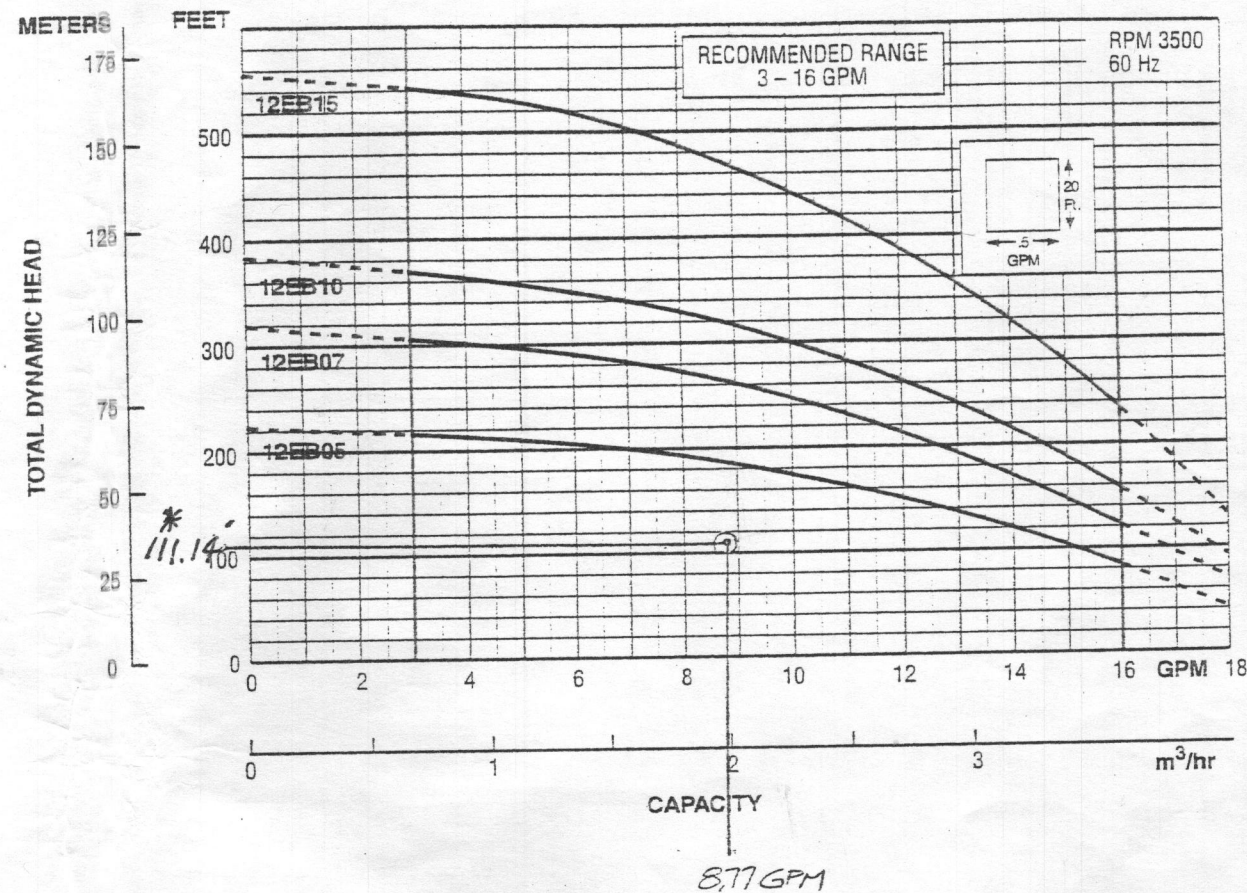
■ All models have 1/8" diameter bypass in discharge head to ensure venting on start up.



Underwriters Laboratories  
File no. E174426  
Canadian Standards Association  
File no. 38549

Model 12EB

## FILTERED EFFLUENT BLASTER.

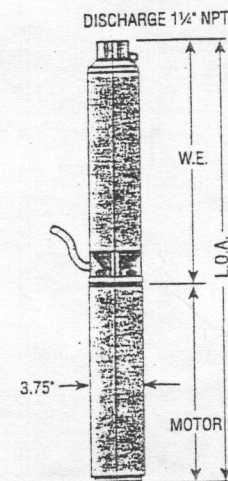


## DIMENSIONS AND WEIGHTS

Order Number	HP	Phase	Stages	Length (inches)			Weight (lbs.)		
				W.E.①	Motor	L.O.A.②	W.E.	Motor	Total
12EB0522, 12EB0521	½	1	7	11.0	9.5	20.5	4	18	22
12EB0722	¾	1	10	13.0	10.7	23.7	5	20	25
12EB1022	1	1	12	14.4	11.8	26.2	6	23	29
12EB1522	1½	1	17	17.9	15.1	33.0	8	31	39

① W.E. = water end or pump without motor.

② L.O.A. = length of assembly - complete pump - water end and motor.



Project #: S. SHANE  
631  
DEETZ RD. MT. AIRY MD  
Sheet Title:  
WASTEWATER  
SYSTEM  
PLAN  
Sheet#  
WWT-1  
8 of 12 Sheets

INNOVA. LTD

# INNOVATIVE WASTEWATER TREATMENT SYSTEMS

P.O. BOX 363. NEW WINDSOR, MD 21776

(410) 635-2883 Fax

H. Dale Gray, Principal

(410) 875-9370 Office

9/2/05 \*



# BLASIER®

## Filtered Effluent Pump

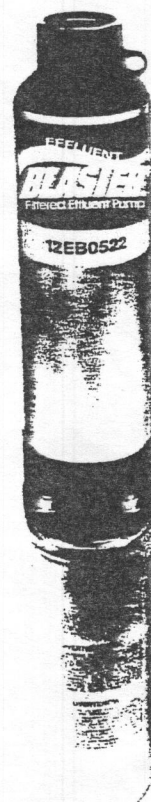
### SPECIFICATIONS

Model	Flow Range GPM	Horsepower Range	Best Eff. GPM	Discharge Connection	Maximum Solids Size	Rotation <sup>①</sup>
8EB	1.5 - 10	1/2 - 1	7	1 1/4"	1/4" dia.	CCW
12EB	3 - 16	3/4 - 1 1/2	10	1 1/4"	1/4" dia.	CCW
20EB	6 - 28	1 1/2 - 2	18	1 1/4"	1/4" dia.	CCW

① Rotation is counterclockwise when observed from pump discharge end.

### "EB" SERIES MATERIALS OF CONSTRUCTION

Part Name	Material
Discharge Head	Glass Filled Ultrathane
Check Valve Poppet	Ultrathane
Check Valve O-ring	E P Rubber
Bearing Spider - Upper	Glass Filled Polycarbonate
Bearing	Urethane
Klipring	AISI 301 SS
Diffuser	Glass Filled
Impeller	Polycarbonate
Bowl	AISI 304 SS
Shim	AISI 304 SS
Spacer	AISI 304 SS, Powder Metal
Inlet Strainer	Glass Filled Ultrathane
Motor Adapter	Glass Filled Ultrathane
Casing	AISI 304 SS
Shaft	AISI 304 SS
Coupling	AISI 304 SS, Powder Metal



### ORDER NUMBER CODE

EB Pump Series	8EB	05	2	2	J
	8EB				
	12EB				
	20EB				
Horsepower Code	05 = 1/2 HP				
	07 = 3/4 HP				
	10 = 1 HP				
	15 = 1 1/2 HP				
					Optional 100" jacketed lead
					Voltage
					1 = 115 V
					2 = 230 V
					Phase
					2 = 1 Phase 2 Wire

### FEATURES

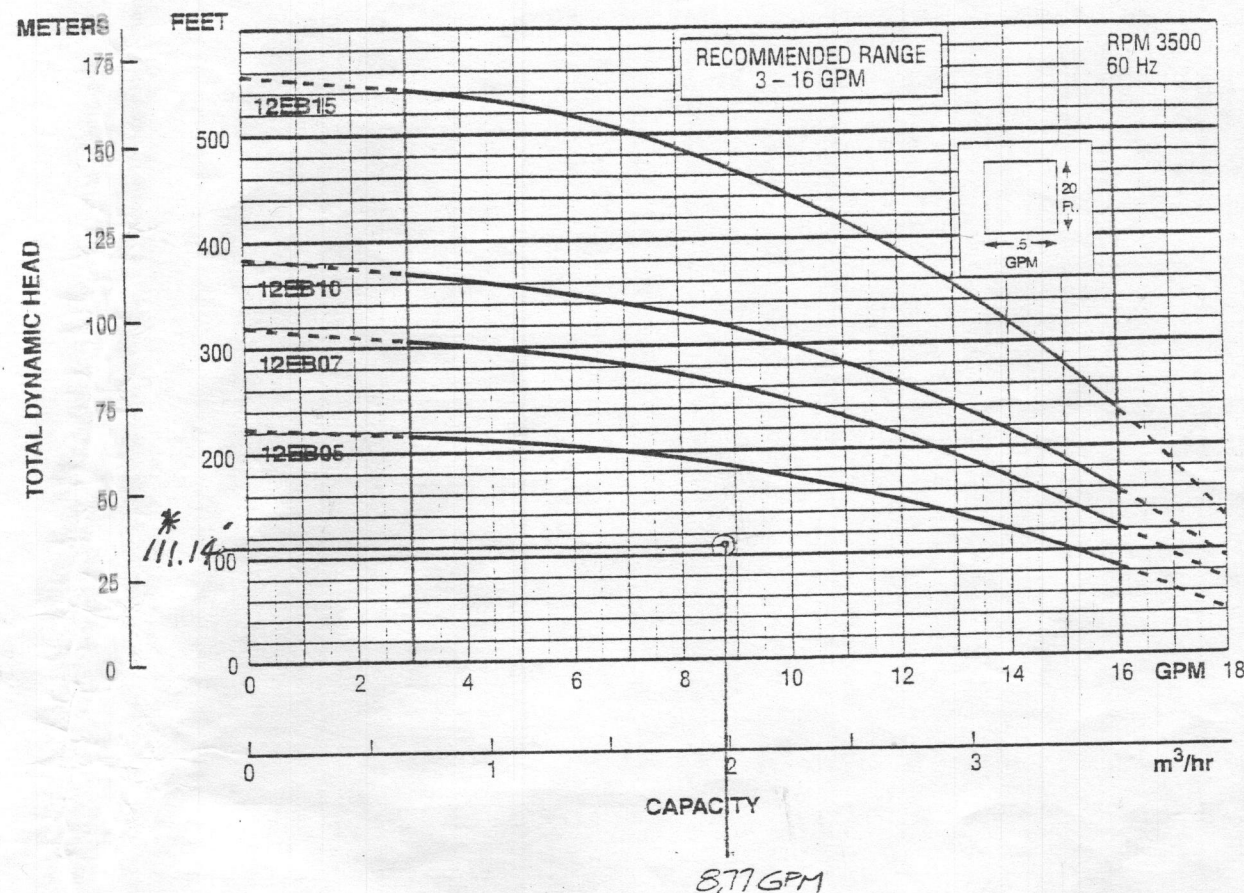
- **Designed for pumping filtered effluent from processed septic systems only.**
- **Field Serviceable:** Pump can be rebuilt in the field to like new condition with common tools and readily available spare parts.
- **NOTE: The Model EB has left hand casing threads.**
- **Powered for Continuous Operation:** All ratings are within the working limits of the motor as recommended by the motor manufacturer. Pump can be operated continuously without damage to the motor.
- **Metal Parts are Stainless Steel:** AISI types 301 and 304 are corrosion resistant.
- **Non-Metallic Parts are Effluent Compliant:** Impellers, diffusers and bearing spiders constructed of glass filled polycarbonate, an engineered composite. This material is corrosion resistant.
- **Discharge Head:** State of the art engineered composite material for superior strength and corrosion resistance. Loop for safety line molded into head.
- **Motor Adapter:** State of the art engineered composite material with high rigidity to provide accurate alignment of liquid end to motor. Generous space for removal of motor mounting nuts with regular open-end wrench.
- **Bowls:** Stainless steel for strength and abrasive resistance.
- **100" 3 wire motor lead standard.**
- **Consult factory for recommendations involving long run cycles followed by short off cycles to assure proper motor cooling flows.**

- **Check Valve:** Built-in check valve assembly on all models.
- **Warranted for one year against failure due to workmanship and materials. Solids plugged pumps are not covered. Pumps used for liquids other than filtered effluent are not covered.**
- **Stainless Steel Casing:** Polished stainless steel is attractive and durable in the most corrosive effluent.
- **Hex Shaft Design:** Six sided shafts for positive impeller drive.
- **Inlet Strainer:** Molded suction strainer built into motor adapter.
- **Urethane Upper Bearings:** Fluted design for free passage of abrasives.
- **Franklin Electric Motor:**
  - Corrosion resistant stainless steel construction.
  - Built-in surge arrestor is provided on single phase motors.
  - Stainless steel splined shaft.
  - Hermetically sealed windings.
  - Replaceable motor lead assembly.
  - UL 778 and CSA recognized.
  - NEMA mounting dimensions.
- **Optional 100" jacketed power cord available.**
- **Agency Listings:** All complete pump/motor assemblies are UL778 and CSA listed. All Franklin Electric Motors are UL778 recognized.
- **All models have 1/2" diameter bypass in discharge head to ensure venting on start up.**

UL Underwriters Laboratories  
File no. E174426  
Canadian Standards Association  
File no. 38549

Model 12EB

**FILTERED EFFLUENT BLASTER.**

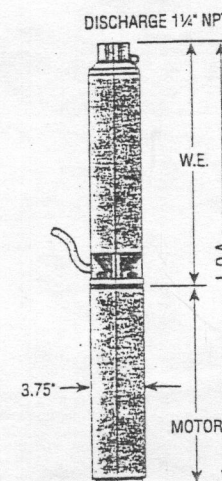


### DIMENSIONS AND WEIGHTS

Order Number	HP	Phase	Stages	Length (inches)			Weight (lbs.)		
				W.E.①	Motor	L.O.A.②	W.E.	Motor	Total
12EB0522, 12EB0521	1/2	1	7	11.0	9.5	20.5	4	18	22
12EB0722	3/4	1	10	13.0	10.7	23.7	5	20	25
12EB1022	1	1	12	14.4	11.8	26.2	6	23	29
12EB1522	1 1/2	1	17	17.9	15.1	33.0	8	31	39

① W.E. = water end or pump without motor.

② L.O.A. = length of assembly - complete pump - water end and motor.



Project #: S. SHANE  
631 BEEZ RD. MT. AIRY, MD  
Sheet Title: WASTEWATER SYSTEM PLAN  
Sheet #: WWT-1  
8 of 12 Sheets

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H. Dale Gray, Principal

9/2/05



SYSTEM INSTALLATION

1. INSTALLATION GUIDELINES

All Geoflow drip systems require:  
100 micron / 150 mesh filter  
Filter flush valve  
Field flush valve and  
Air vent in each zone

All Wasteflow Classic drip systems require pressure regulation

Handle your dripline and components with care. ROOTGUARD® is temperature sensitive. To assure a long life store the drip line out of direct sunlight in a cool place. This should be a consideration when installing the system in very hot and sunny areas. Your system life span will be increased if it is buried an extra two or three inches below the soil surface, to avoid the warm temperature extremes.

- a) All dripfield construction shall be done in accordance with Local rules and regulations.
- b) No utilities, cable wire, drain tile, etc shall be located in dripfield.
- c) Fence off entire dripfield prior to any construction.
- d) System is not to be installed when ground is wet or frozen.
- e) Divert all downspouts and surface waters away from dripfield or into curtain drains.
- f) Excavation, filling and grading should have been finished before installation of the subsurface drip system.
- g) Be sure you have everything required for the installation before opening trenches. Pre-assemble as many sets of components as practical above ground and in a comfortable place. Compression or Lockslip adapters should be glued to PVC tees, riser units should be pre-assembled, the sub-main manifold with tees can be pre-assembled and used to mark the beginning and end of WASTEFLOW lines.
- h) For particularly tough soil conditions moisten the soil the day before opening trenches or installing WASTEFLOW. Remember it is much easier to install the system in moist soil. The soil should be moist but still should allow the proper operation of the installation equipment and not cause smearing in the trenches. The soil surface should be dry so that the installation equipment maintains traction.
- i) Mark the four corners of the field. The top two corners should be at the same elevation and the bottom two corners should be at a lower elevation. In freezing conditions the bottom dripline must be higher than the supply and return line elevation at the dosing tank.
- j) Install a watertight dosing tank. In freezing conditions the dosing tank should be at the lowest elevation of the entire system. Install a watertight riser on the dosing tank if necessary.
- k) Determine the proper size for the supply and return manifolds. See Worksheet line (L).
- l) Install the PVC supply line from the dosing tank, up hill through one lower and one upper corner stake of the dispersal field. Please refer to your State guidelines for depth of burial.
- m) Paint a line between the two remaining corner stakes.

- n) Install the Geoflow WASTEFLOW dripline from the supply line trench to the painted line, approximately 6" to 10" deep as specified. Upon reaching the painted line, pull the plow out of the ground and cut the dripline 1' above the ground. Tape the end of the dripline to prevent debris from entering. Continue this process until the required footage of pipe is installed. Geoflow dripline must be spaced according to specification (2 ft. is standard). Depth of burial of dripline must be consistent throughout the field. Take care not to get dirt into the lines.
- o) Install the supply header with tees lined up at each Geoflow line. Hook up the Geoflow lines to the supply header. Do not glue WASTEFLOW dripline.

Installing Lockslip fittings

- a) Hold the fitting in one hand and position the tubing with the other hand.
- b) Move the sleeve back, and push the tubing onto the exposed stem as far as possible.
- c) Push the sleeve out over the tubing and thread the sleeve onto tubing, as though tightening a nut to a bolt. Hand tighten. Do not use tools.
- p) Install the Vortex filter and filter flush valve, or install the pre-assembled Headworks between the field and the pump tank on the supply line. \*Insulate the box in freezing conditions.
- q) If using a pressure regulator, install it downstream of the filter or Headworks, just ahead of the dispersal field, on the supply line. Although the pressure regulator can be buried directly into the soil, it is preferable to install it inside a small valve box for easy access. \*Insulate the box in freezing conditions.
- r) Install the floats in the dosing tank and wire up to the timer control. The timer control should be set to pump no more than the design flow, do not set to match the treatment capacity.
- s) Install the pump. Fill the dosing tank with fresh water and turn on the pump. Check for flow out the ends of all of the Geoflow lines. Let the pump run for about five minutes to flush out any dirt. Shut off the pump and tape the ends of the lines.
- t) Dig the return header ditch along the line painted on the ground and back to the pre-treatment tank. Start the return header at the farthest end from the dosing tank. The return line must have slope back to the treatment tank or septic tank.
- u) Install the return header and connect all of the Geoflow lines. Care must be taken not to kink the dripline.
- v) Install air vacuum breakers at the highest points in the dispersal field. Use pipe dope or Teflon tape and hand tighten.
- w) Install a ball or solenoid field flush valve on the return line to the pretreatment or pump tank unless a pre-assembled Wasteflow Headworks is being used. If a Headworks was installed on the supply line, connect the return line back through the Headworks box. Open the field flush valve and turn on the pump to flush lines then close the valve and check the field and all piping and connections for leaks. Turn off the system
- x) Turn on the pump and check the pressure at the air vacuum breaker(s). It should be between 15 to 45 PSI. Check the pressure in the WASTEFLOW Headworks if used. It should be five psi or higher. If using a manual valve for field flushing, crack it open until at least one PSI is lost or design pressure is reached and leave in that position.
- y) Check the filter for construction debris and clean.
- z) Provide owner with final as-built diagrams, flow measurements and pressure readings at startup.

WASTEFLOW PC 1.02 GPH

WFPC16-4-24 WASTEFLOW PC 24" / 1.02gph  
WFPC16-4-12 WASTEFLOW PC 12" / 1.02gph  
Alternate spacing available upon request.

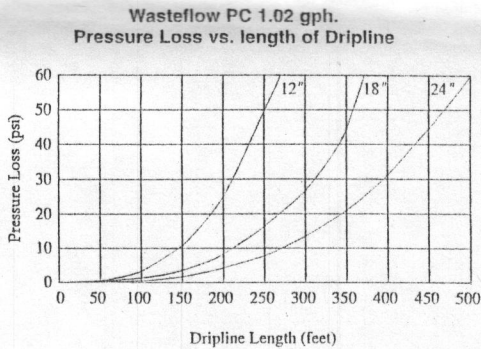
- Valve Installation and Operation
- a) Wrap male adapters with 2 wraps of Teflon tape and thread the adapters into the valve inlet and outlet 1 turn past hand tight. CAUTION: over tightening may cause damage to the valve. The solenoid is located on the downstream side of the valve.
  - b) Using watertight connectors, connect the valve common and an individual output wire to the solenoid leads.
  - c) Flush the laterals by opening the internal manual bleed lever on the downstream side of the solenoid. Turn the flow control stem fully open (counterclockwise) for flow control models.
  - d) Close the internal manual bleed after flushing the system.

Flow Rate vs. Pressure		
Pressure	Head	Dripline
		WFPC16-4-24 WFPC16-4-12
7 - 60 psi*	16 - 139 ft.	1.02 gph

Maximum Length of Run vs. Pressure  
Allows a minimum of 10 psi at the end of the line  
\* Recommended operating pressure is 10 - 45 psi

Pressure	Head	WFPC 16-4-24	WFPC 16-4-18	WFPC 16-4-12
10 psi	23.10 ft.	—	—	—
15 psi	34.65 ft.	211 ft.	172 ft.	115 ft.
20 psi	46.20 ft.	265 ft.	210 ft.	146 ft.
25 psi	57.75 ft.	315 ft.	242 ft.	171 ft.
30 psi	69.30 ft.	335 ft.	266 ft.	180 ft.
35 psi	80.85 ft.	379 ft.	287 ft.	199 ft.
40 psi	92.40 ft.	385 ft.	305 ft.	211 ft.
45 psi	103.95 ft.	429 ft.	321 ft.	222 ft.
50 psi*	115.50	431 ft.	334 ft.	232 ft.
55 psi*	127.05	449 ft.	347 ft.	240 ft.
60 psi*	138.60	465 ft.	360 ft.	249 ft.

Kd = 2.070



WASTEFLOW PC 1.02 GPH Specification


The dripline shall consist of nominal sized one-half inch linear low density polyethylene tubing, with turbulent flow, drip emitters bonded to the inside wall. The drip emitter flow passage shall be 0.032" x 0.045" square. The tubing shall have an outside diameter (O.D.) of approximately .64-inches and an inside diameter (I.D.) of approximately .55-inches. The tubing shall consist of three layers; the inside layer shall be a *UltraFresh*® protection, the middle layer shall be black and the outside layer shall be purple striped for easy identification. The dripline shall have emitters regularly spaced 24" (or 12") apart. The pressure compensating emitters shall be molded from virgin polyethylene resin with a silicone rubber diaphragm. The pressure compensating emitters shall have nominal discharge rates 1.02 gallons per hour. The emitters shall be impregnated with Treflan® to inhibit root intrusion for a minimum period of ten years and shall be guaranteed by the manufacturer to inhibit root intrusion for this period. 1.02 gph WASTEFLOW PC pressure compensating dripline shall be Geoflow model number WFPC16-4-24 (or WFPC16-4-12).

WASTEFLOW PC 1.02 DRIPLINE

Project #:	S. SHANE
631	BEETZ RD. MT. AIRY MD
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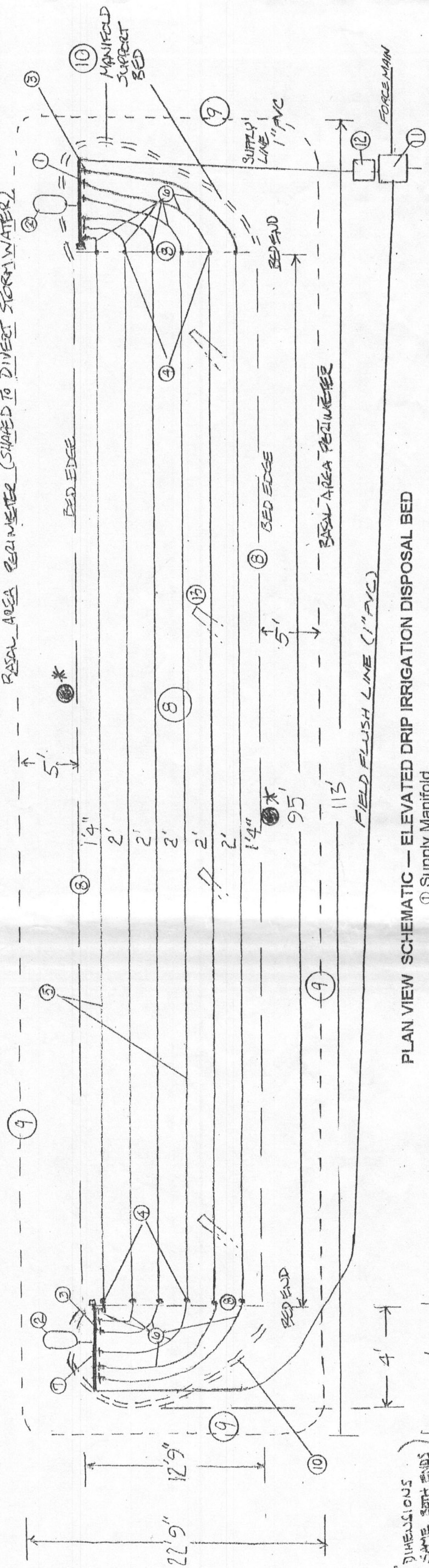
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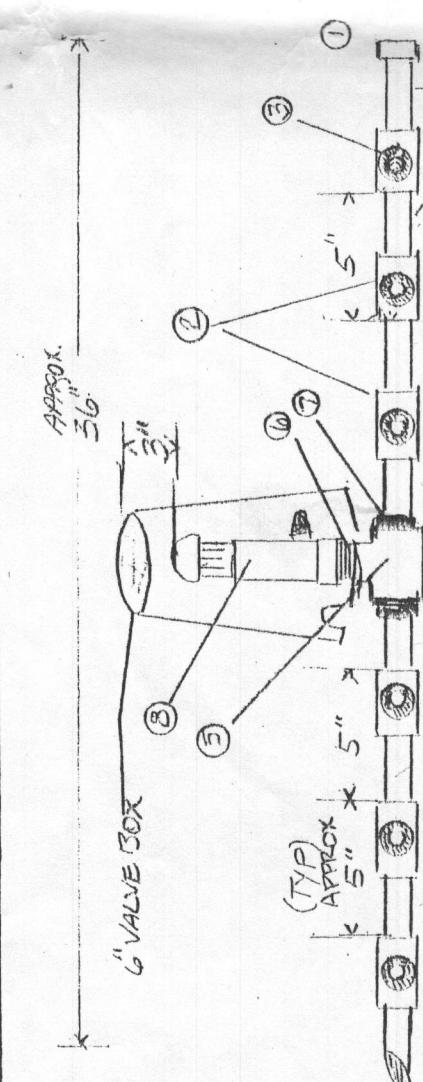
Basal Area Perimeter (Shaped to Direct Storm Water)



PLAN VIEW SCHEMATIC — ELEVATED DRIP IRRIGATION DISPOSAL BED

- 1 Supply Manifold
- 2 Air/Vacuum Relief Valve
- 3 Lockslip tubing adapter
- 4 Lockslip tubing coupler
- 5 Emitter Tubing Lateral
- 6 Blank Tubing
- 7 Flush Manifold
- 8 Absorption Bed
- 9 Disposal Basal Area Perimeter
- 10 Manifold sand bedding support area
- 11 Headworks Control
- 12 Water Meter
- 13 Landscape staples (plastic) 4/lateral

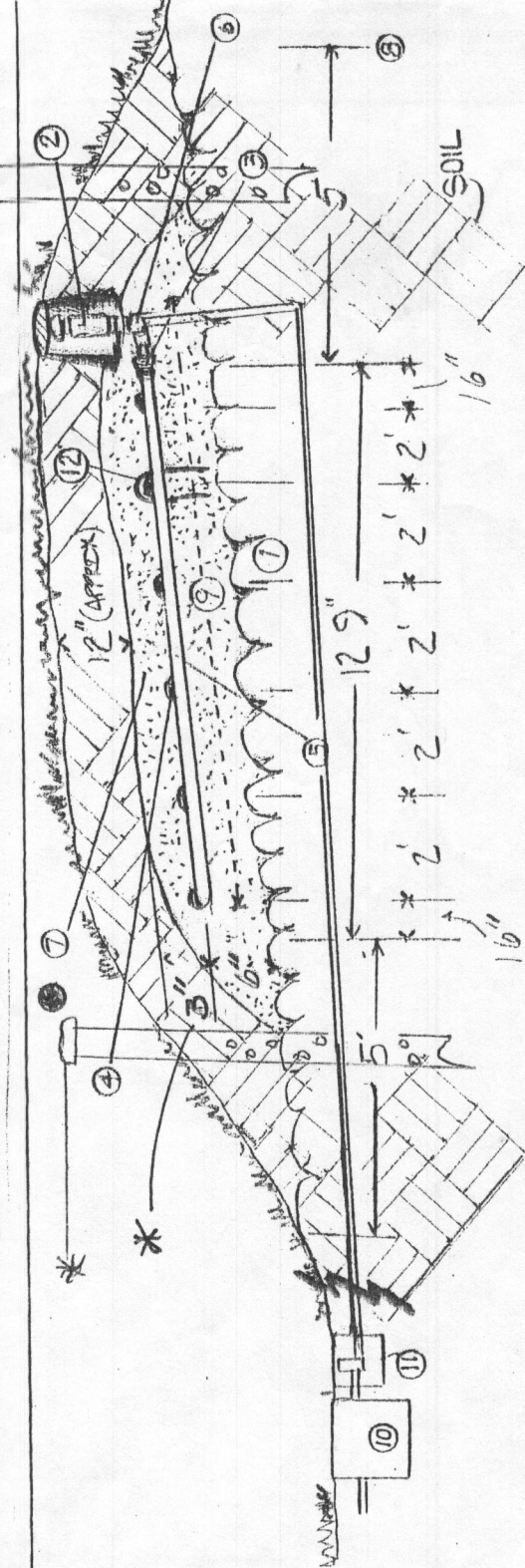
UPPER & LOWER OBSV.  
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SUPPLY/FLUSH MANIFOLD DETAIL — all parts are PVC Sh 40 (press.)

- 1 End Cap 3/4"
- 2 Tee 3/4" soc x soc x 1"
- 3 Lockslip tubing adapter 3/4" fitting
- 4 Nipple 3/4" (TYP)
- 5 Tee 1" soc x soc x soc
- 6 1" Adapter FPT
- 7 Reducer Bushing 3/4" X 1"
- 8 Air/Vacuum Relief Valve

NO SCALE



PROFILE VIEW SCHEMATIC — ELEVATED DRIP IRRIGATION DISPOSAL BED

- 1 Plowed/disrupted soil / bed interface
- 2 Air/Vacuum Relief Valve
- 3 Lockslip tubing adapter
- 4 Lockslip tubing coupler (blank tubing to Emitter Dripline Lateral)
- 5 Blank Tubing
- 6 Manifold
- 7 sand media
- 8 Disposal Basal Area Perimeter
- 9 Manifold sand bedding support area
- 10 Headworks Control
- 11 Water Meter
- 12 Landscape staples (plastic) 4 per Lateral

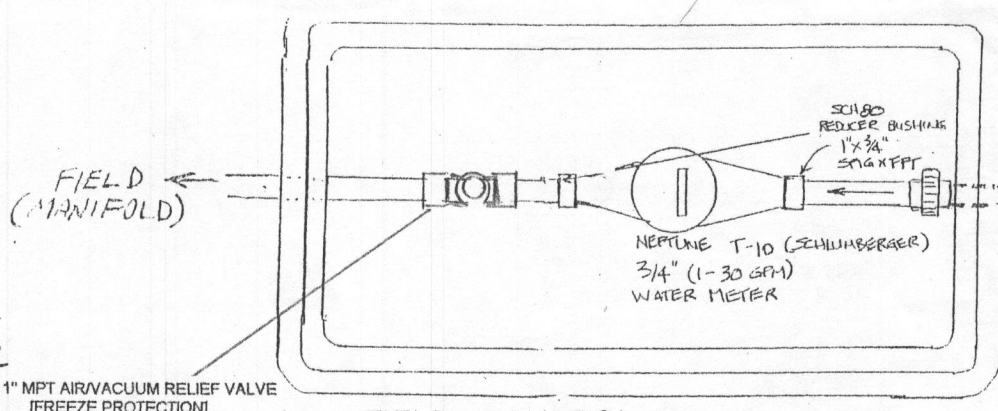
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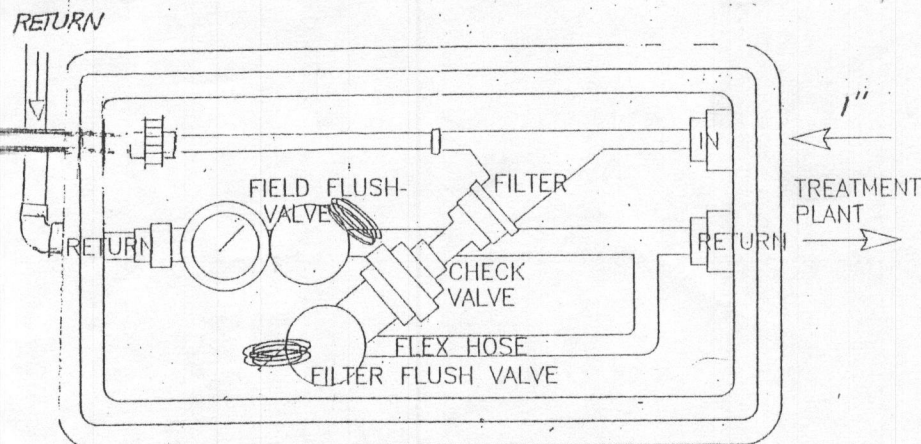


Project #: S. SHAM  
631  
BEEZ RD MT. AIRY M  
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WASTEWATER  
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FIELD CONTROL  
FLOW METER/SUPPLY VALVES



FIELD CONTROL UNIT (Top View)  
"HEADWORKS"

Not To Scale

Neptune®

NOTE  
T-10®

SPECIFY FROST PROTECTION

Water Meters  
Sizes: 3/8", 1/2" & 1"

### FEATURES & BENEFITS

#### Roll-Sealed Register

- Magnetic drive, low torque registration ensures accuracy
- New impact resistant register design with flat glass for legibility
- 1:1 Ratio, low flow indicator detects leaks
- Bayonet mount allows in-line serviceability
- Tamperproof seal pin deters theft
- Date of manufacture, size, and model stamped on dial face

#### Cast Bronze Maincase

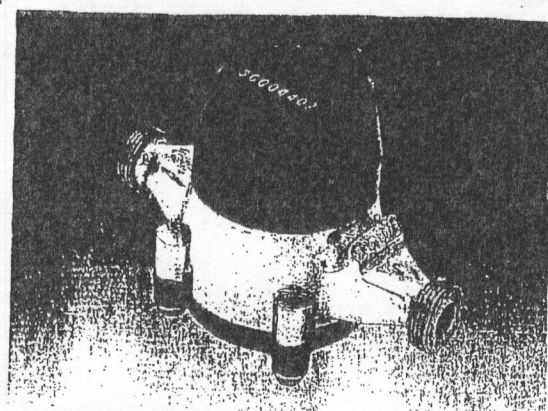
- Sturdy, durable, corrosion resistant
- Resists internal pressure stresses and external damage
- Handles in-line piping variations and stresses
- Residual value

#### Nutating Disc Measuring Chamber

- Positive displacement
- Widest effective flow range for greater utility revenue
- Extended low flow accuracy
- Corrosion resistant
- Floating chamber design is unaffected by meter position or in-line piping stress

#### Systems Compatibility

- Adaptability to all Neptune Systems provides flexibility



### PERFORMANCE

Every Neptune T-10 water meter meets or exceeds the latest AWWA Standard, C700-90. Its nutating disc, positive displacement principle is time proven for accuracy and dependability since 1892, ensuring maximum utility revenue.

### CONSTRUCTION

The Neptune T-10 water meter consists of three major assemblies: a roll-sealed register, a cast bronze maincase, and a nutating disc measuring chamber.

The roll-sealed register eliminates lens fogging, uses naturally lubricated molded gears, and contains a low flow indicator for leak detection. For reading convenience, the register can be mounted in any of four positions on the meter. All T-10 water meters can accommodate standard or remote reading registers for the Neptune ARB® (Automatic Reading and Billing) System, Pulsar-RM visual remote system, TRICON-S®, TRICON-E®, and FloSearch™ Systems.

The corrosion-resistant cast bronze maincase will withstand most service conditions: internal water pressure, rough handling and in-line piping stress. For frost protection, synthetic polymer or cast iron bottom caps are available.

The innovative floating chamber design of the nutating disc measuring element protects the chamber from frost damage while the unique chamber seal extends the low flow accuracy by sealing the chamber outlet port to the maincase outlet port. The nutating disc measuring element utilizes corrosion resistant materials throughout and a thrust roller to minimize wear.

### WARRANTY & MAINTENANCE

Neptune T-10 water meters are warranted by Schlumberger for performance, materials, and workmanship. Schlumberger further offers an optional post-warranty factory "Revenue Asset Maintenance" (RAM) program for extended service life.

When desired, owner maintenance is easily accomplished either by unitized replacement of major components or by repair of an individual component's parts.

### GUARANTEED SYSTEMS COMPATIBILITY

All Neptune T-10 meters are guaranteed adaptable to our Pulsar-RM, ARB, ProRead™ ARB, CMR®, TRICON-S, TRICON-E, FloSearch, NMR, Unigun™, and ADVANCE® Systems without removing the meter from service.

### SPECIFICATIONS

**Application**  
Cold water measurement of flow direction

**Maximum Operating Pressure**  
150 psi (1034 kPa)

**Register**  
Direct reading, center sweep, roll-sealed, magnetic drive with low flow indicator

**Measuring Chamber**  
Nutating disc, synthetic polymer

### OPTIONS

#### Sizes

3/8", 1/2" x 1/2"  
1/2", 3/4" SL, 1/2" x 1"  
1", 1" x 1 1/2"

#### Units of Measure

U. S. Gallons      Cubic Feet  
Imperial Gallons      Cubic Metres

#### Register Types

**Direct Reading:**  
Synthetic polymer box and cover  
Bronze box and cover

**Remote Reading:**  
ARB, ProRead ARB      TRICON-S  
Pulsar-RM      TRICON-E

#### Bottom Caps

Synthetic Polymer (1/2" only)  
Cast Iron  
Bronze

#### Connections

Bronze, straight or bent

### Operating Characteristics

Meter Size	Normal Operating Range @ 100% Accuracy (±1.5%)	AWWA Standard	Low Flow @ 95% Accuracy
3/8"	1/4 to 20 US gpm 0.11 to 4.85 m³/h	1 to 20 US gpm 0.23 to 4.5 m³/h	1/4 US gpm 0.03 m³/h
1/2"	1/2 to 30 US gpm 0.17 to 6.82 m³/h	2 to 30 US gpm 0.45 to 6.8 m³/h	1/4 US gpm 0.03 m³/h
1"	1 to 50 US gpm 0.23 to 11.35 m³/h	3 to 50 US gpm 0.68 to 11.4 m³/h	1/4 US gpm 0.03 m³/h

### Registration

Registrations (per sweep hand revolution):

	3/8"	1/2"	1"
10 US Gallons	✓	✓	✓
10 Imperial Gallons	✓	✓	✓
1 Cubic Foot	✓	✓	✓
0.1 Cubic Metre	✓	✓	✓
0.01 Cubic Metre	✓	✓	✓

### Register Capacity (6-wheel odometer):

	3/8"	1/2"	1"
10,000,000 US Gallons	✓	✓	✓
10,000,000 Imperial Gallons	✓	✓	✓
1,000,000 Cubic Feet	✓	✓	✓
100,000 Cubic Metres	✓	✓	✓
10,000 Cubic Metres	✓	✓	✓

### Dimensions

Meter Size	A	B	Std.	ARB	Pul	Threads	OD	E	F	Approx. Weight
	in/mm	in/mm	in/mm	in/mm	in/mm	per inch	in/mm	in/mm	in/mm	lb/kg
3/8"	7 1/2 191	3 1/4 92	4 1/4 124	5 1/4 137	6 1/4 171	14	1.030 26	1 1/4 41	2 1/4 64	3 1/2 17
1/2" x 1/2"	7 1/2 191	3 1/4 92	4 1/4 124	5 1/4 137	6 1/4 171	11 1/4	1.290 33	1 1/4 41	2 1/4 64	4 1.8
1/2"	9 229	4 1/4 111	5 1/4 140	5 1/4 148	7 1/4 187	11 1/4	1.290 33	1 1/4 41	2 1/4 64	5 2.3
1/2" SL	7 1/2 191	4 1/4 111	5 1/4 140	5 1/4 148	7 1/4 187	11 1/4	1.290 33	1 1/4 41	2 1/4 64	5 1/4 2.5
1/2" x 1"	9 229	4 1/4 111	5 1/4 140	5 1/4 148	7 1/4 187	11 1/4	1.626 41	2 1/4 48	2 1/4 70	6 1/2 2.9
1"	10 1/2 273	6 1/4 165	6 1/4 162	6 1/4 168	8 1/4 208	11 1/4	1.626 41	2 1/4 54	2 1/4 70	9 1/4 4.4
1" x 1 1/2"	10 1/2 273	6 1/4 165	6 1/4 162	6 1/4 168	8 1/4 208	11 1/4	1.865 47	2 1/4 54	2 1/4 71	10 1/4 4.8

**CUSTOMER SERVICE/DIRECT TO FACTORY**  
Highway 229 South  
Tallapoosa, AL 36078  
Telephone: (205) 283-6555  
Toll Free 1-800-645-1892  
FAX (205) 283-7299

**NORTHEAST:** 230 Gardner St., Suite 4  
Hingham, MA 02043  
(617) 749-5060 FAX (617) 740-4576

**CENTRAL:** 4251 Plymouth Road, Suite 2200  
Ann Arbor, MI 48106-0986  
(313) 995-6770 FAX (313) 995-6773

**SOUTHEAST:** 1000 Holcomb Bridge Road  
Suite 255, Building 200  
Roswell, GA 30076  
(404) 552-3192 FAX (404) 552-8303

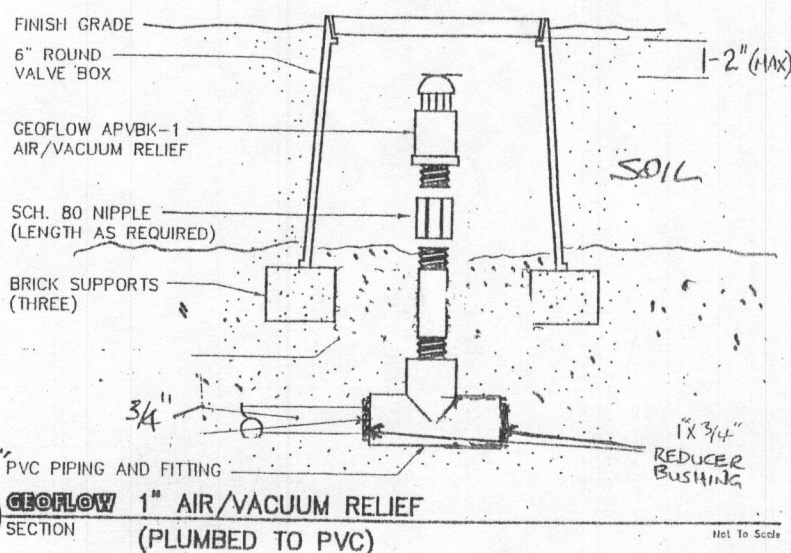
**SOUTHWEST:** 14285 Midway Road, Suite 170  
Dallas, TX 75244  
(214) 404-8251 FAX (214) 991-3970

**WEST:** 25283 Cabot Road, Suite 221  
Laguna Hills, CA 92653  
(714) 859-2320 FAX (714) 859-3107

**CANADA OFFICE**  
Schlumberger Canada, LTD.  
Measurement Division  
7275 West Credit Ave.  
Mississauga, Ontario L5N 1L9  
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122 **GEOFLOW 1" AIR/VACUUM RELIEF**  
SECTION  
(PLUMBED TO PVC)

Not To Scale  
[57-10-84] P. 22

Project #: S. SHANE  
631  
BEETZ RD. MT. AIRY MD  
Sheet Title:  
WASTEWATER  
SYSTEM  
PLAN  
Sheet#  
WWT-1  
11 of 12 Sheets



**INNOVA, LTD**  
INNOVATIVE WASTEWATER TREATMENT SYSTEMS  
P.O. BOX 363, NEW WINDSOR, MD 21776

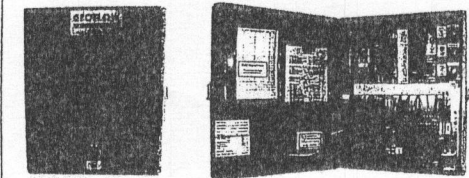
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## GEO CONTROLLERS





Geo controllers are the brain in the system, utilizing a programmable logic controller (PLC) to activate the pumps cycles, zone valves and flush valves when needed. See the table below for the control panel that fits your application.

All Geo controllers have the following built-in log functions:

- Elapsed time meter (ETM)
- Pump events
- Peak timer events
- High level alarm events
- Power failure events

Note: ETM and pump events are recorded whenever contactor is energized.

### Float Functions GEO Controllers

Floors	Functions
 High Level Alarm Float	Float raised - Alarm enable. Activates the audible and visual alarm when lifted. Audible alarm may be silenced by pressing the illuminated "PUSH TO SILENCE" button. The audible alarm reactivates after 12 hours if the alarm condition is not resolved. The alarm light will remain on until the float is lowered.
 Secondary Timer On/Off Float	Float raised - Peak Timer enable. The Peak timer will cycle the pump(s) more frequently. The Peak Timer function will remain active until the Primary Timer enable float lowers. When the Peak Timer function has been completed and the Primary Timer enable float is reactivated, normal timer operation will resume.
 Primary Timer On/Off Float	Float raised - Timer enable. The Primary Timer will control pump cycles, beginning with the off cycle. Note: On duplex panels the pumps will alternate with each timer cycle.
 Redundant Off & Low Level alarm float	Float raised - Pump enable. Float lowered - Pump disable. Flashing visual & audible alarm enable. This is a secondary off float that will prevent the operation of the pump if the water level in the tank gets too low. Pumping will be disabled in both the automatic and manual modes. This float also activates the visual and audible alarms. Audible alarm may be silenced by pressing the illuminated "PUSH TO SILENCE" button. The audible alarm reactivates after 12 hours if the alarm condition is not resolved. The flashing alarm light will remain on until the float is raised. When raised, this float will enable operation of the pump.

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### GEO AUTOMATIC CONTROLLERS

The Primary Timer (float 2 activated) controls the pump dose cycle during normal operating conditions. During high flow conditions the pump dosing cycles will be controlled by the Peak Timer (float 3 activated).

If duplex pump option is chosen, the pumps are alternated every pump cycle and never operate simultaneously. There is a selection switch for pump 1, pump 2 or alternation. This allows one pump to be taken out of service for maintenance without affecting the operation of the system. The Vortex Filter flush valve will open for 15 seconds (field adjustable) at the end of the pump cycle to allow the filter to self-flush. When the vortex filter flush is complete, the filter flush valve will close and the system drain function will begin.

Pump dosing cycles are controlled by the timers when the H-O-A switch is in the auto position. Under normal conditions the Primary Timer (float 2) will control the pump. During high flow conditions, the Peak Timer (float 3) will control the pump. The Peak Timer will cycle the pump more frequently than the Primary Timer. The pump will dose for the same amount of time as it does when operated by the Primary Timer but the time in between doses, or the Peak Timer "off time", will be 75% that of the Primary Timer "off time". Factory settings (field adjustable) are 1 hr 55 minutes off and 5 minutes on for Primary Timer and Peak Timer is set to 1 hr 25 minutes off (1 hr 55 mins x 75%) and 5 minutes on.

Zone valve(s) will open when the PLC calls for a dose or flush. These can be electrically operated solenoid valves (requires GEO4 or GEO8) or hydraulically activated index valves (used with GEO1). Each time the pump is called for another zone is dosed. The controller does not dose all zones sequentially as "one" dose but rather ignores the fact that there are multiple zones for the purpose of dosing. The total doses of all zones in a 24-hour period must be considered when setting the "off" timer(s). After the pump is deactivated the electrically activated solenoid flush valve will remain open for five minutes (field adjustable) to allow for drainage of the supply line and return line.

If hydraulically activated index valve is used, be sure to drain the supply line in freezing climates.

### Choose a GEO controller:

#### Step 1: Number of zones in dispersal field.

- Single zone. - Go to GEO1 table below.
- Two to four zones. - Zones activated hydraulically with indexing valves. Go to GEO1 table. - Zones activated electrically with solenoid valves. Go to GEO4 table.
- Five to eight zones. - Zones activated hydraulically with indexing valves. Go to GEO1 table. - Zones activated electrically with solenoid valves. Go to GEO8 table.
- More than 8 zones. - Zones activated hydraulically with indexing valves. Go to GEO1 table. - Zones activated electrically with solenoid valves. Special order. - Zones activated with index & solenoid valve combinations can be accommodated. Please call Geoflow, Inc.

#### Step 2: Voltage.

Determine the required pump voltage.  
115vac (max 3/4hp; 1phase pump) or 230vac (max 2hp; 1phase pump).  
Pumps must have internal capacitors. Any pumps requiring external capacitor kits will be special order. Capacitor kits and dimensions must be provided by pump manufacturer.

#### Step 3: Number of pumps.

Choose one pump (simplex) or two pumps (duplex).

#### Step 4: Flushing operation.

Choose manual or electronic field and filter flushing. Geoflow requires all direct septic systems use electronic flushing. (Manual flushing not available on GEO4 or GEO8 panels).

#### GEO 1 Table

Step 1	Step 2	Step 3	Step 4	Part Number
GEO1	115vac	Simplex	Manual	Geo1-115v-Sim-Man
			Auto	Geo1-115v-Sim-Aut
		Duplex	Manual	Geo1-115v-Dup-Man
			Auto	Geo1-115v-Dup-Aut
	230vac	Simplex	Manual	Geo1-230v-Sim-Man
			Auto	Geo1-230v-Sim-Aut
		Duplex	Manual	Geo1-230v-Dup-Man
			Auto	Geo1-230v-Dup-Aut

#### GEO 4 Table

Step 1	Step 2	Step 3	Step 4	Part Number
GEO4	115vac	Simplex	Auto	Geo4-115v-Sim-Aut
		Duplex	Auto	Geo4-115v-Dup-Aut
	230vac	Simplex	Auto	Geo4-230v-Sim-Aut
		Duplex	Auto	Geo4-230v-Dup-Aut

#### GEO 8 Table

Step 1	Step 2	Step 3	Step 4	Part Number
GEO8	115 vac	Simplex	Auto	Geo8-115v-Sim-Aut
		Duplex	Auto	Geo8-115v-Dup-Aut
	230 vac	Simplex	Auto	Geo8-230v-Sim-Aut
		Duplex	Auto	Geo8-230v-Dup-Aut

Geoflow Design and Installation Manual

If hydraulically activated index valves are used in combination with a solenoid field flush valve, a field setting for number of zones and number of zone valves is available.

Field flush valve will open at the end of the dosing cycle. The pump will continue to run for 5 seconds (field adjustable) to accommodate the opening of this valve. After the pump is deactivated the field flush valve will remain open for five minutes (field adjustable) to allow for drainage of the return line in freezing conditions. It is best to clock the length of time it takes the return flush line to drain and use this to set your drain time.

The activated zone valve remains open at the end of the dose for same " # " minutes as return flush and filter flush valves to accommodate drainage of supply line.

To periodically flush the dripfield, after 10 dosing cycles (field adjustable) the pump will operate for 5 minutes (field adjustable) with the field flush valve open. The field flush cycle will repeat until all zones have been flushed. This operation will also occur after a power outage. This is achieved by correctly inputting number of zone valves (if applicable) and number of zones during setting of the controller values.

### GEO Panel Components:

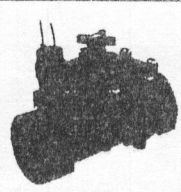
- Siemen's Logo programmable logic module for timing and controls.
- Contactor and circuit breaker for pump (115VAC; max 3/4hp; 1 phase pump or 230VAC; max 2hp; 1 phase pump). Pumps must have built in capacitors. (External capacitor kits are special order).
- Hand-Off-Auto (H-O-A) switches for pump(s) and valve(s) operation.
- Connections/contacts for normally closed 24 VAC valves. (Contacts for normally open valves may be special ordered.)
- Elapsed time meter and cycle counter for pump monitoring built in to PLC.
- Circuit breaker for control power.
- Surge arrestor.
- NEMA 4 X fiberglass enclosure.
- UL listed control panel.

### GEO Wiring

- Control voltage input is 115 VAC for all GEO1 and GEO4 panels.
- Output to valve(s) is 24 VAC.

Telemetry and SCADA control systems available. Please contact Geoflow for custom panel information.

## GEO CONTROLLERS



## VALVES (PROVIDED IN HEADWORKS) ASSEMBLY

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### ELECTRICAL

Wiring requires a single lead from the controller to each solenoid valve, plus a common neutral to all solenoids. Type UF wire, UL listed, is recommended for all hookups.

24 VAC/60 Hz  
Inrush: 9.86 VA  
Holding: 5.69 VA

24 VAC/50 Hz  
Inrush: 10.7 VA  
Holding: 7.5 VA

### Pressure loss through Valves (in psi)

GPM	SVLV-100	SVLV-150	SVLV-200
0-4	1.2 max		
6	1.4 psi		
8	1.6		
10	1.7		
12	1.8		
14	1.9		
16	2.0		
18	2.1		
20	2.3	1.3 psi	
22	2.5	1.4	
24	2.8	1.5	
26	3.2	1.6	
28	3.7	1.7	
30	4.3	1.9	
32	4.9	2.1	
34	5.6	2.3	
36	6.3	2.5	
38	7.0	2.8	
40	7.7	3.0	2.3 psi
42	8.4	3.3	2.3
44	9.1	3.6	2.4
46	9.9	3.9	2.4
48	10.7	4.2	2.5
50	11.5	4.6	2.6
52		5.0	2.6
54		5.4	2.7
56		5.8	2.7
58		6.2	2.8
60		6.7	2.9
70		9.5	3.3
80		13.0	3.4
90			4.3
100			5.2
110			6.7
120			7.7
130			8.8

Note. Wire sizes that are too small can cause voltage to drop below the minimum required to operate controllers and valves.  
Do not use nominal voltage ratings listed above for sizing of valve wire. See wire-sizing tables below based on operating pressure and wire length.

Wire Size—1 valve per station.  
Input to controller is 115 V.a.c.

Maximum length of wire run in feet from control to valve

AWG size		Static pressure not exceeding				
Diameter No.	in.	75 psi	85 psi	100 psi	125 psi	160 psi
18	0.040"	2200'	2000'	1600'	1,100'	760'
16	0.051"	3600'	3200'	2500'	1800'	1100'
14	0.064"	5700'	5000'	4000'	3000'	1700'
12	0.081"	9000'	8000'	6400'	4700'	2800'
10	0.102"	14000'	12700'	10200'	7400'	4400'
8	0.129"	22700'	20200'	16200'	11800'	7000'
MULTIPLYING FACTOR: 2 valves per station *		0.43	0.40	0.41	0.38	0.31

\* Use this multiplying factor only in the event two valves will be operating simultaneously.

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SHANE PROPERTY  
ONSITE WASTEWATER SYSTEM REPAIR  
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