GeoMat IN GROUND AND PRESSURE DISTRIBUTION COMPONENT DESIGN

March 2017

INSTRUCTIONS

This GeoMat Design Application (GMDA) was designed to meet most standard system designs for residential and small commercial systems up to seven bedrooms or a 1,500 gpd design flow rate. Higher flows could be used but the file has limitations that may be exceeded.

Persons familiar with in ground and pressure distribution system design will find this file very helpful. Even though all calculations should be correct and a code compliant in ground system would be

designs are just about always best if the site will accommodate it and high orifice density (< 6.0 ft^2 per orifice) is highly recommended for optimal treatment performance.

This file is protected and therefore the designer may not change formulas and may not enter or change data in most cells of the worksheet. Protected cells simply will not allow you to enter data. The best way to navigate about on a sheet is to use the tab key to jump to the next unprotected cell where data can be entered. Unprotected cells are either underlined with red or are a red box. You can use the mouse to click on red boxes to enter data too but don't forget to change old data when doing a new design. Tabbing to each cell ensures that you have considered each input.

Instructions are generally in blue font and warnings are in red. Most cells where data is entered have a red triangle in the corner of a cell. These are design comments that pop up when you put the mouse cursor on it. There are also a few drop down menus for certain inputs that have limits.

Printing should always be done using the print buttons on each page or the print entire project on the index page. Using your computer's print button will likely print many pages you don't need or want. You need to accept "macros" when the file first opens in order for the print buttons to work.

A second common warning is that the dose volume is large and there is < 5 doses per day. This is fixed by reducing lateral size by choosing a central manifold, smaller orifices, or fewer orifices (i.e. greater spacing). Keep in mind that a high orifice density is good so don't spread the holes out too much.

Due to uniform surface that distribution pipe will lay on, and the desire to have more doses at a smaller volume, try to choose smaller distribution lateral diameters. This will increase wet/dry cycles, which in turn will increase oxygen transfer.

Every effort has been made to provide a file without any errors in calculations and design concepts. The user of the file assumes all responsibility for the design produced by this GMDA file.

GeoMat IN GROUND AND PRESSURE DISTRIBUTION COMPONENT DESIGN

Residential Application

INDEX AND TITLE PAGE

Owner Info

Project Name:

Owner's Name:

Owner's Address:

Property Info

Property Address:

Legal Description: S T N R

Township County:

Subdivision Name:

Lot Number: Block Number: CSM#:

Parcel I.D. Number:

Plan Transaction No.:

Index Pages

Date: 12/23/25

License Number:

Phone Number:

Signature:

Designer Stamp:

State of Wisconsin Approval Stamp:

Designed Pursuant to the
GeoMat In Ground Component Manual Ver. March 20, 2017,
SSWMP Publication 9.6 Design of Pressure Distribution Networks for ST-SAS (01/81) and
Pressure Distribution Component Manual Ver. 2.0 SBD-10706-P (N. 01/01, R. 10/12)

In Ground and Pressure Distribution Component Design

Design Worksheet

Site Information

R	Residential or Commercial Design
300.00	Estimated Wastewater Flow (gpd)
1.50	Peaking Factor (e.g. 1.5 = 150%)
450.00	Design Flow (gpd)
1.00	Site Slope (%)
94.60	Installation Elevation (ft)
53.00	Depth to Limiting Factor (in)
1.00	In-situ Soil Application Rate (gpd/ft^2)
120.00	Contour Length Available (ft)

96.50	Lowest Original Grade Ele. In System Area (ft)
97.00	Finished Grade Elevation (ft)
0.63	Depth Below Original Grade (ft)
1.13	Depth of cover over pipe (Min 1', Max 42"')
Y	24" Separation from bottom of component to limiting factor
N	ISD Required?

Distribution Cell Information

3.25	Cell Width (ft)
2.00	Dispersal Cell Design Loading Rate (gpd/ft^2)
2	Influent Wastewater Quality (1 or 2)

70.00	Designer Input Cell Length
69.23	= Dispersal Cell Length (ft)
1	Number of Cells

Pressure Distribution Information

E	Center or End Manifold
1	Number of Laterals
0.00	Cell Spacing (S) (ft)
3.25	Lateral Spacing Between Cells (V)
2.75	Forcemain Drainback (gal)
0.50	Forcemain Filter Loss (ft)
1.50	Forcemain Diameter (in)
30.00	Forcemain Length (ft)
90.00	Inside Pump Tank Elevation (ft)
0.156	Orifice Diameter (in) (e.g. 0.25)
3.00	Estimated Orifice Spacing (ft) =
4.55	System Head (ft) x 1.3
8.70	Vertical Lift (ft)
0.46	Friction Loss (ft)
14.21	Total Dynamic Head (ft)
55.62	5x Void Volume (gal)
58.38	Minimum Dose Volume (gal)
12.39	System Demand (gpm)

Are the laterals the highest point in the distribution network? **Y**

If N above, enter the elevation (ft) of the highest point.

Does the forcemain drain back? **Y**

9.89 ft^2/orifice

Diameter Selection

Lateral Diameter Selection		
in. dia.	options	choice
0.75		
1.00		
1.25		
1.50	x	
2.00	x	x
3.00	x	

Manifold Diameter Selection		
in. dia.	options	choice
1.25		
1.50		
2.00		
3.00		

Manufacturer Information

Treatment Tank Information

1000.00 Septic Tank Capacity (gal)

Effluent Filter Information

Polylok Inc./Zabel — Filter Manufacturer

	Manufacturer	3014-525-1/16-10,000 GPD	Filter Model Number

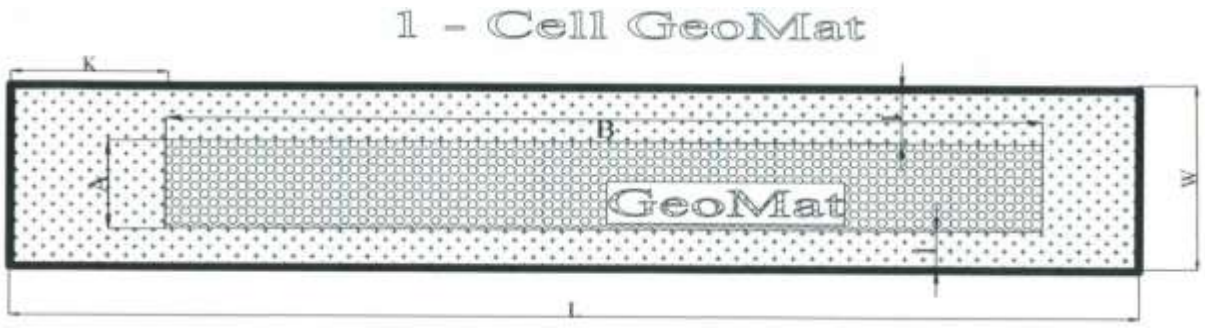
Dose Tank Information

653.60	Dose Tank Capacity (gal)
17.20	Dose Tank Volume (gal/in)
	Manufacturer

Gallons/Inch Calculator (optional)

	Total Tank Capacity (gal)
	Total Working Liquid Depth (in)
	gal/in (enter result in cell DoseTankVolume)

In Ground Plan View



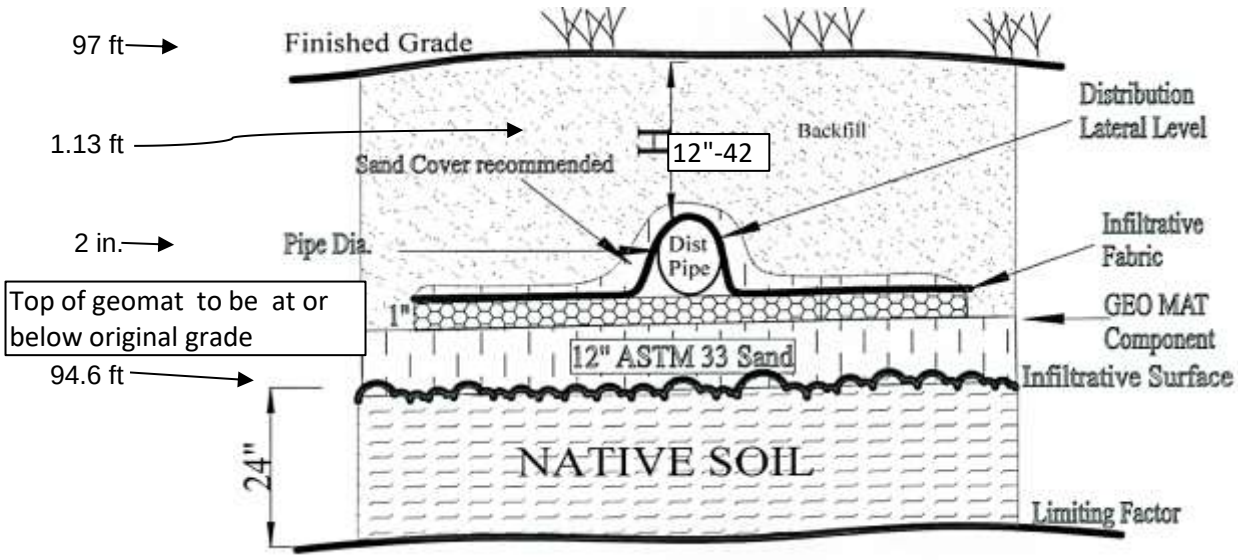
In Ground Component Dimensions

3.25	A (ft)
70.00	B (ft)
72.00	L (ft)
5.25	W (ft)
1.00	S (ft)
1.00	Side Dimension (I) (ft)
1.00	End Dimension (K) (ft)
1.13	Depth of Cover (in)

367.50	Basal Area Available (ft^2)
450.00	Basal Area Required (ft^2)
	Observation Pipes Placed @ End of GeoMat
225.00	Required GeoMat Area (gpd/ft^2)
227.50	Proposed GeoMat Area (gpd/ft^2)
6.43	Linear Loading Rate (gpd/ft)

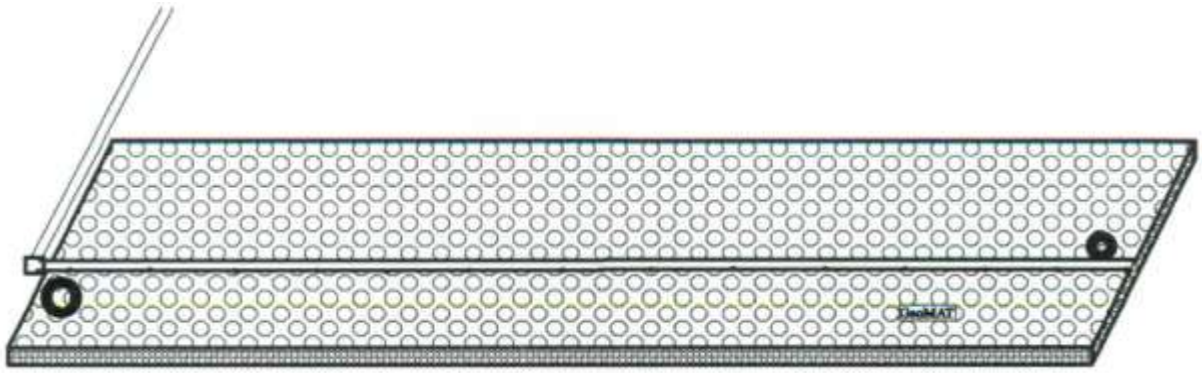
In Ground Cross Section View

GeoMat Dispersal Area



See details on page 4 for number, size, and spacing of laterals.

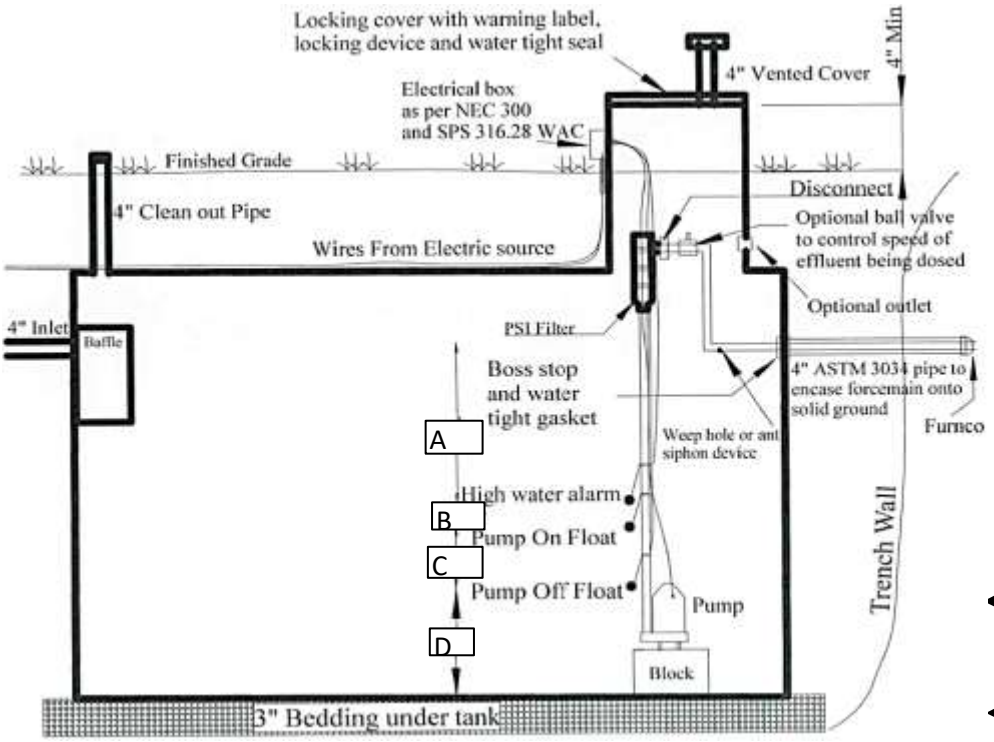
End Connection Lateral Layout Diagram



Number of Laterals	1		Orifice Diameter	0.156	in
Lateral Diameter	2.00	in	Orifice Spacing (X)	3.10	ft
Lateral Length (P)	69.10	ft	Orifices per Lateral	23	
Lateral End (Z)	0.90	ft	Orifice Density	9.89	ft^2/orifice
Cell Spacing (S)	0.00	ft	Manifold Length	0.00	ft
Lateral Spacing Between Cells (V)	3.25	ft	Manifold Diameter	NA	in
Lateral Flow Rate	12.39	gpm	Forcemain Velocity	2.25	ft/sec
System Flow Rate	12.39	gpm			
Total Dynamic Head	14.21				

Project:

Dose Tank Information



Forcemain diameter
1.5 in.

Pump off elevation (ft)
91.00

Dose tank elevation (ft)
90.00

Dimension	Inches	Gallons
A	20.61	354.42
B	2.00	34.40
C	3.39	58.38
D	12.00	206.40
Total	38.00	653.60

Capacity	653.60
Volume	17.20 gal/inch

Filter Manufacturer	Sim / Tech Filter
Filter Model Number	STF 100 1/16
Alarm Manufacturer	SJE Rhombus
Alarm Model Number	AB
Pump Manufacturer	Little Giant
Pump Model Number	6ec

Pump Must Deliver 12.39 gpm at 14.21 ft TDH

Note: Switches containing mercury may not be used in this system.

GeoMat Distribution Cell Media Layout

3.25	Cell Width (ft)	2.63	Sidewall to Lateral (ft)

Distribution Cell Cross-section Arrangements

Component Legend

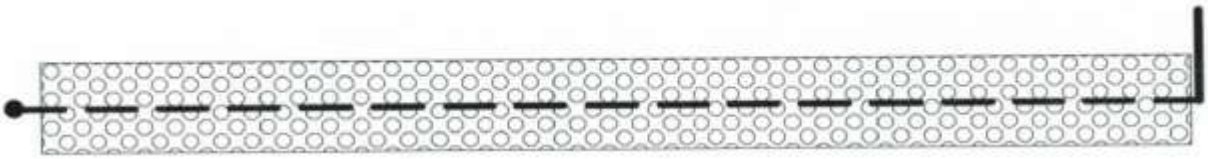
- Distribution Pipe With Pressure Lateral
- Turnup Enclosure
- Orifice Shield
- Pressure Lateral

GeoMat is covered with approved geotextile fabric as per the their product approval.

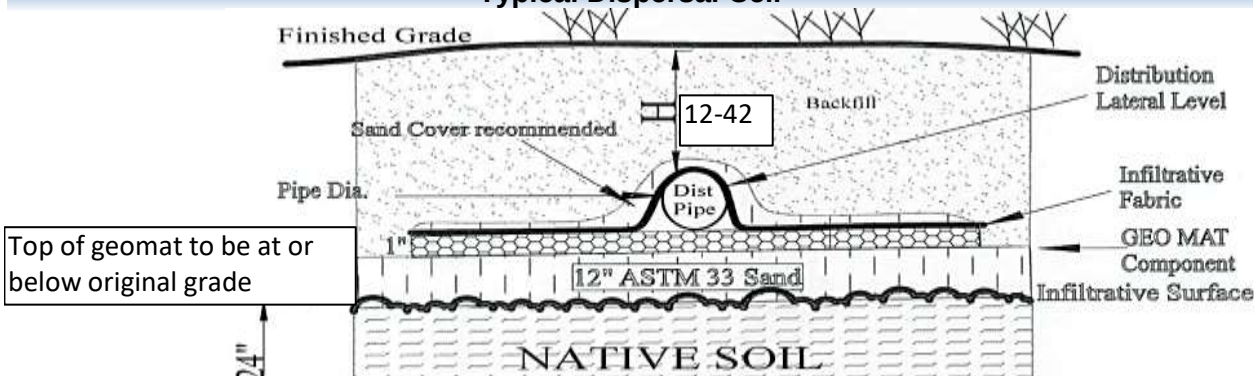
Distribution Cell Plan View Layout - Typical

3.25	Cell Width - A (ft)	70.00	Cell Length - B (ft)

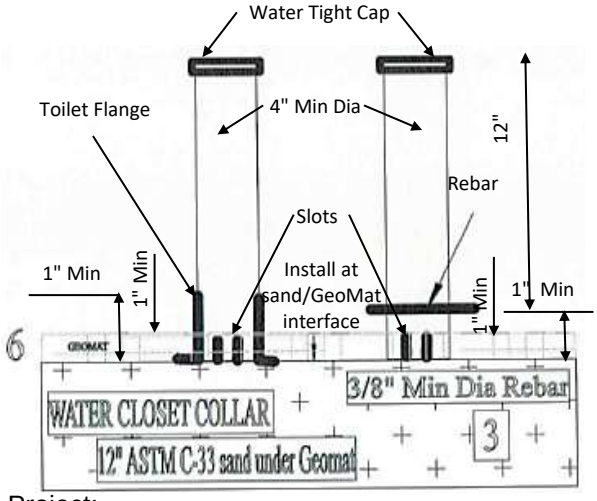
End Connection Lateral Layout Diagram



Typical Dispersal Cell



Observation Pipes



Shading Key

1 Topsoil Cap
2 Subsoil Cap
3 ASTM C 33 sand (F)
4 ASTM C 33 sand (D)
5 Tilled Layer
6 Geo Mat

In Ground System Maintenance and Operation Specifications

Service Provider's Name		Phone	
POWTS Regulator's Name		Phone	

Please enter Service Provider and POWTS Regulator Names

System Flow and Load Parameters

Design Flow - Peak	450	gpd	Maximum Influent Particle Size	1/8	in
Estimated Flow - Average	300	gpd	Maximum BOD5	30	mg/L
Septic Tank Capacity	1000	gal	Maximum TSS	30	mg/L
Soil Absorption Component Size	227.5	ft^2	Maximum FOG	10	mg/L
Type of Wastewater	Domestic		Maximum Fecal Coliform	10E4	cfu/100 mL

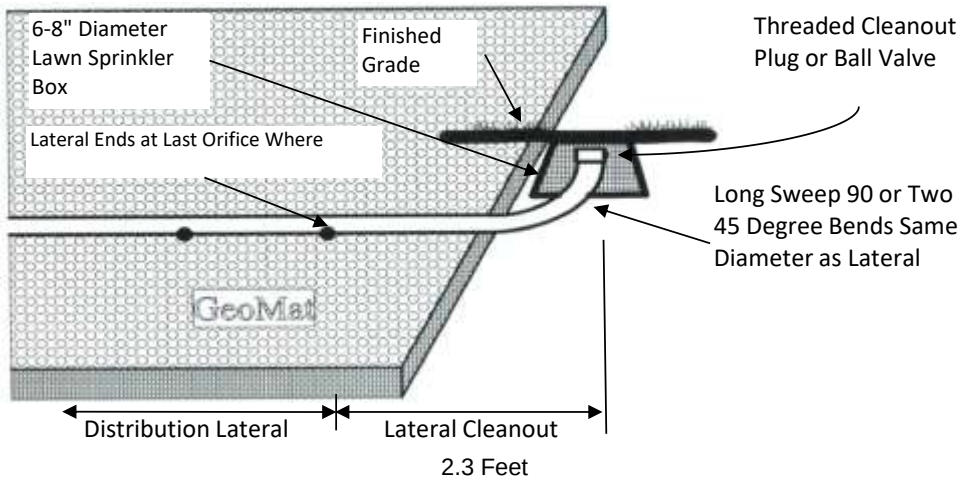
Service Frequency

Septic and Pump Tank	Inspect and/or service once every 3 years
Effluent Filter	Inspect and clean as necessary at least once every 3 years
Pump and Controls	Test once every 3 years
Alarm	Should test periodically
Pressure System	Laterals should be flushed and pressure tested every 3 years
In Ground	Inspect for ponding and seepage once every 3 years
Other	

Miscellaneous Construction and Materials Standards

1. Observation pipes are slotted and materials conform to Table SPS 384.30-1, have a watertight cap and are secured in as shown in the GeoMat In Ground Component Manual Ver. 1, 2017.
2. Dispersal cell media conforms to GeoMat products approved for use with the GeoMat In Ground Component Manual Ver. March 20, 2017. Media is covered with an approved geotextile fabric.
3. All gravity and pressure piping materials conform to the requirements in SPS 384, Wis. Adm. Code.

Lateral Turn-up Detail



Notes/ Maintenance Requirements

MANAGEMENT PLAN

This private onsite wastewater (POWTS) has been designed, and is to be installed and maintained in accordance with SPS 383, Wis. Admin. Code, the in-Ground Soil Absorption Component Manual for Private Onsite Wastewater Treatment Systems Version 2.0 SPS-10705-P (N.01/01). GeoMat in ground Component manual Version1.

1. This POWTS has been designed to accommodate a maximum daily flow of 450.00 gallons of wastewater per day. The quality of influent discharge into the POWTS treatment or dispersal component shall be equal to or less than all of the following.

A monthly average of 30 mg/L fats, oil and grease
A monthly average of 220 mg/L BOD5
A monthly average of 150 mg/L TSS

Wastewater shall not discharge to the POWTS in quantities or qualities that exceed these limits or that result in exceeding the enforcement standards and preventative action limits specified in ch. NR 140Tables 1 & 2 at a point of standards application, except as provided in DSPS 383.03 (4), Wis Admin. Code.
2. The owner of this POWTS is responsible for system operation and maintenance.
3. Defects or malfunctions identified during maintenance described above shall be repaired in conformance with SPS383 Wis. Admin. Code, and the pertaining county Private Sewage Systems Ordinance. The user's manual, provided to the owner of the POWTS includes the names and telephone numbers of the properly licensed individuals to contact for such repairs.
5. No product for chemical or physical restoration or chemical or physical procedures for POWTS may be used unless approved by the Dept. of Commerce in accordance with SPS. 384, Wis. Admin. Code.
6. If the POWTS is replaced, or its use discontinued, it shall be abandoned in accordance with SPS 383.33, Wis. Admin. Code.

NOTES

Two Effluent Filters to be installed where possible 1 to be installed in ST, and or 1 in pump tank in order to insure particle size less than or equal to 1/8". Filters should be cleaned once in spring, and once in fall. Also, strainers in sinks in the building shall be maintained, so that solids and fats are minimized to flow into system.
A minimum of 2 observation pipes per cell shall be installed. These pipes shall be located approximately at the end of each cell.
The plumber, or county shall see to it that a copy of these plans including this page, maintenance folder, and maintenance agreement is given to the homeowner.
This system may contain a dose chamber. If a pump, float, electrical outage causes the dose tank to fill, the homeowner should see to it that the effluent level in the tank is brought down gradually and not all dosed to the system at once. One large dose could cause damage. Contact a pumper or your installer if this problem occurs.
The homeowner is responsible for formulating a water conservation plan that will ensure the system is rarely overloaded. I.E. spread laundry out over time, not 6 loads in 2 hours, while everybody showers, and uses the toilet, ETC.

CONTINGENCY PLAN FOR COMPONENT FAILURE

A. Septic Tank. Any structural failure resulting in cracks or leaks in the tank must be corrected by replacement of the septic tank component. Leaks in the joints between manhole risers or covers shall be repaired by replacing faulty seals with approved materials to make joints water-tight.
B. Outlet Filter. The outlet filter shall be replaced or repaired when it is either no longer capable of preventing the discharge of particles larger than 1/8 inch or when it has become permanently degraded by clogging so as to interfere with the design flow out of the septic tank.
C. Dosing chamber and pump. The dosing chamber shall be replaced if any structural failure is found. Leaks in joints between manhole risers or covers shall be repaired by replacing faulty seals with approved materials to make joints water-tight. The pump and controls shall be replaced when they are no longer capable of functioning according to the design plan.
D. Pressure Distribution Piping. Partial clogging of the distribution network may result in unduly long dosing cycles. The ends of the distribution laterals may be exposed and the threaded end caps removed. The piping can be disconnected on the outlet end of the pump. The distribution piping may then be back flushed to cleanse any accumulated matter from the piping. It is recommended that the dosing chamber then be pumped by a licensed plumber.
E. Soil Absorption Cell. The discharge of sewage or wastewater to the ground surface is strictly prohibited due to the human health hazard created by the effluent. All failures created by surface discharge shall immediately be reported to the appropriate county. The pump shall then be immediately disconnected to prevent further discharge to the ground surface via the soil absorption cell. The existing septic tank and dosing chamber shall be used as a temporary holding tank until the necessary repairs to the soil absorption cell can be achieved. The replacement shall be initiated only after any necessary plan approvals have been obtained from the appropriate plan review authority and the required sanitary permit is obtained from the county.