

SOSYSTEMS



Operations and Maintenance Manual

LooLoop Wastewater Treatment System

An SOSystems Technologies Product

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Operations and Maintenance Manual: LooLoop Treatment System

Overview

The LooLoop wastewater treatment system has been designed to be the most robust, effective, easy to operate and maintain, yet technically simple onsite wastewater treatment system on the market today. We have developed, field tested, and manufactured this system to written specifications and a quality review prior to shipping. The LooLoop system has successfully completed the testing and is listed under NSF/ANSI 40 Class 1 treatment systems and NSF/ANSI 245 for nutrient removal systems. If you find any component of this system does not meet expectations, please contact the LooLoop representative.

As you know, onsite waste treatment systems require regular servicing to ensure that onsite systems are a long term, effective, sustainable technology. SOSystems has designed the LooLoop treatment system and its components to be trouble-free and with ease of service in mind.

This O&M manual provides information, including:

- LooLoop treatment system configuration, components, and process
- Treatment process performance standards
- Routine cleaning and maintenance schedule for system components
- Cleaning and maintenance procedures
- Methods for effluent sampling
- Troubleshooting methods and tips

Typical System Configuration and Treatment Process

As an enhancement to an existing septic system, the LooLoop system (see Figure 1) requires one additional standard 1500 gallon underground two chamber septic tank placed adjacent to the existing septic tank (Tank 1) and the installation of the LooLoop BioFilter Cabinet. The BioFilter Cabinet is a 4' X 4' x 6' tall pre-assembled cabinet that can be placed at any location on the property that drains by gravity back to the septic tank.

The existing septic tank (Tank 1) continues to be where solids are settled and anaerobically digested. Waste- water from the existing septic tank flows into the LooLoop tank through the inlet tee. The LooLoop tank is like a reservoir along a river. It is a large slowly moving body of water. Because the water moves so slowly, the bacteria settle to the bottom of the tank and become sludge. Additional treatment takes place and the recirculating pump sends effluent to the LooLoop BioFilter Cabinet inlet plumbing

where the effluent is sprayed directly onto the filter media through the spray nozzle. The BioFilter Cabinet is an ultrahigh rate recirculating trickling filter containing highly porous plastic filter media. Vents at the top and bottom of the BioFilter Cabinet ensure that an oxygen rich environment is maintained.

After the wastewater trickles through the BioFilter Cabinet, the wastewater flows by gravity back to the second compartment of the first septic tank (Tank 1). Note: if the existing septic tank (Tank 1) has only one chamber, the wastewater return line from the BioFilter Cabinet connects to the inlet tee of the LooLoop tank. The operation of the recirculating pump is controlled by a repeat cycle timer in the control panel.

The wastewater continues to recirculate to the BioFilter Cabinet and back to the septic tanks at the rate of about 7,000 gallons per day. The LooLoop tank pump chamber's final feature is an overflow pipe that allows the clean recirculating effluent water to flow to the drain field

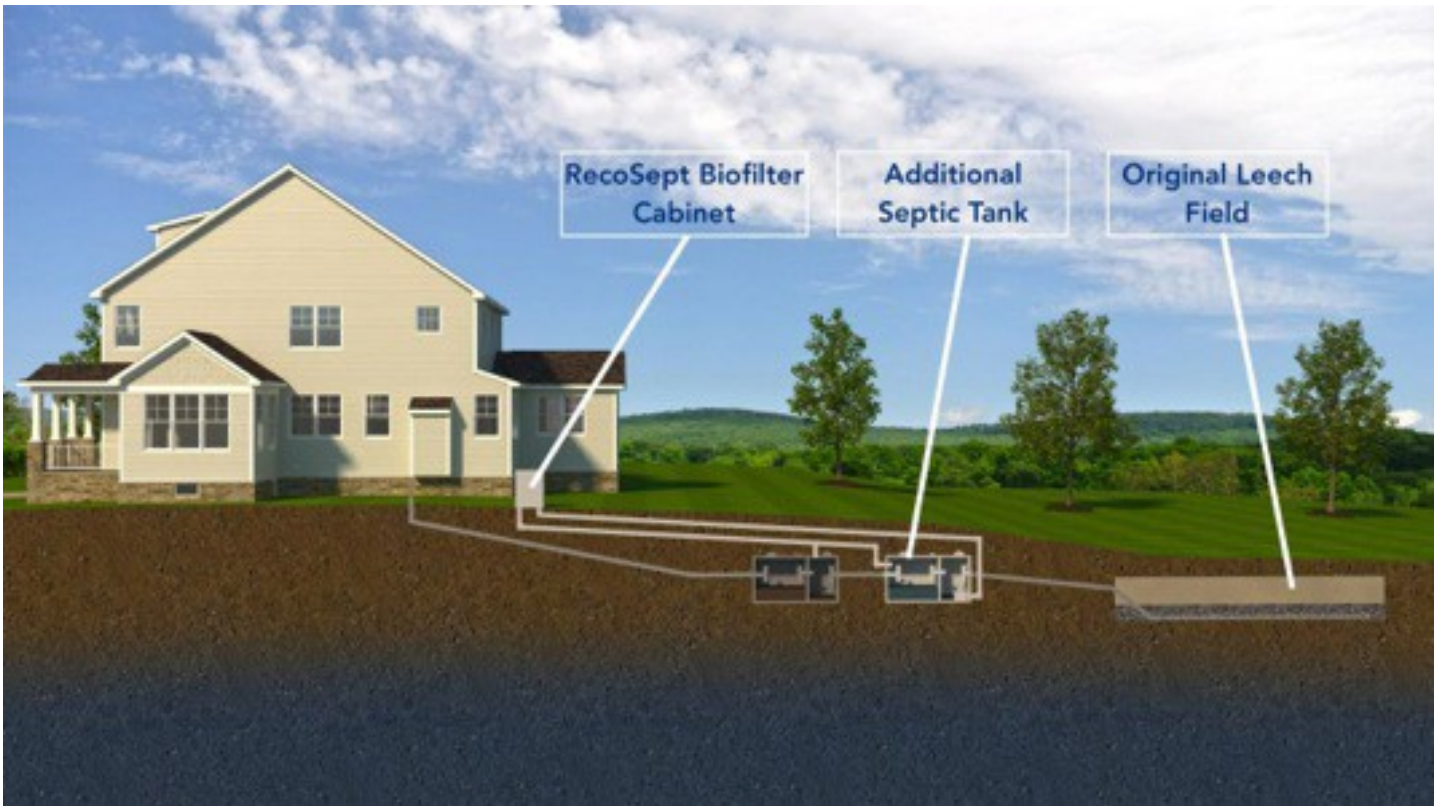
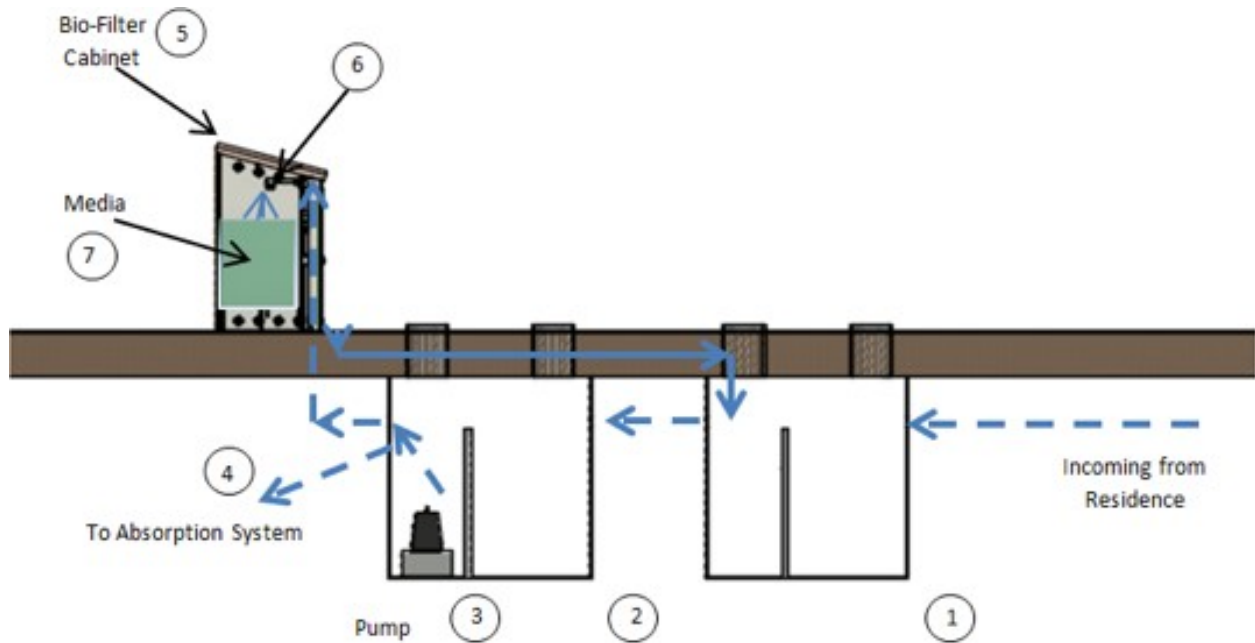


Figure 1: The LooLoop System



LooLoop Overview of System Components

1. Existing Septic Tank (Tank 1)
2. LooLoop Septic Tank (Tank 2)
3. Recirculation Pump
4. LooLoop Septic Tank Overflow Pipe
5. BioFilter Cabinet
6. Spray Piping and Nozzle
7. Trickling Filter Media

The standard LooLoop treatment system consists of the following components:

- The BioFilter Cabinet is the key component of the LooLoop system and has no moving or mechanical components other than three valves and operable vents at the top and bottom of the cabinet. Thus the BioFilter Cabinet is designed for long term performance and minimal maintenance. The BioFilter Cabinet is designed to resemble a small garden or pool equipment shed that can easily be placed adjacent to the house, similar to other mechanical systems, or on any other part of the property that drains by gravity to the septic tanks. The BioFilter Cabinet is constructed with water-resistant PVC board, polystyrene foam insulation, and stainless-steel vent louvers. All components of the system that contact wastewater are of stainless steel, PVC, or rubber construction for durability. The recirculating trickling filter media is a self-supporting PVC sheet media.

- The LooLoop tank is a 1,500-gallon, two compartment concrete or plastic septic tank. The standard tank is sized with 3/4 capacity for the first compartment and 1/4 for the second compartment. Compartment capacities may vary but in no instance shall the capacity of the first compartment be less than 2/3 total capacity and the second compartment no more than 1/3 of tank capacity. These criteria are flexible to accommodate local tank suppliers. A LooLoop sales agent will determine site-specific tank selection.
- The LooLoop tank submersible pump is 115V, 60 hertz, single phase, fractional horsepower motor of stainless steel and composite resin materials used in all wetted parts. The pump is expected to operate for at least 60,000 hours or about 9 years. The pump is the only electrically powered component of the LooLoop system.
- The LooLoop system is supplied with a prewired repeat cycle flow controller contained in a NEMA rated enclosure and is accessible through the door on the cabinet. The controller controls the recirculating pump cycle time from 5 minutes per hour of operation to 55 minutes per hour of operation. A LooLoop representative will determine the pump cycle time for the specific installation. The weather- proof controller is equipped with a fail to start detector, a visible alarm, an audible alarm and silencer switch. The controller contains a power switch and time clock that control the recirculating pump operation. A placard is attached to the inside wall of the BioFilter Cabinet with the local dealers name, address, and telephone number. A high level switch connected to the alarm circuit is provided to alert the user of blockages in the disposal system piping between the LooLoop and the leaching system components. The backup alarm is provided for the convenience of the owner and is not integral to the LooLoop system.
- The LooLoop treatment system is capable of treating 500 gallons per day of domestic wastewater from a single-family residence or 250 gallons per day from two single-family residences.

The expected performance of the LooLoop system is summarized in Table 1.

Table 1. LooLoop System Expected Performance

	CBOD mg/L	TSS mg/L	TN mg/L
Septic Tank Effluent	175- 300	150- 300	40-60
LooLoop Effluent	<6	<7	<19 annual average

Actual performance results, based on six month testing, accumulative average from NSF (National Sanitation Foundation) on the LooLoop system at 500 gpd, composite sampling.

Maintenance - Tools and Equipment

The recommended maintenance and troubleshooting procedures use standard tools and equipment. Channel locks, small brush or old toothbrush, household cleaner

Hygiene and Clean-Up

- Eye Protection
- Paper Towels
- Protective Clothing
- Hand Cleaner
- Rubber Gloves
- Towels

Routine Cleaning and Maintenance

The LooLoop system is designed for minimal and ease of maintenance - four inspection/service visits are required during the first two years and annual visits after that. Completion of the required inspection/service visits are required to maintain the LooLoop system warranty. See Table 2 and Table 3 for maintenance schedule summary.

Table 2. LooLoop System Maintenance Schedule Years One and Two

LooLoop System Component	Maintenance Frequency
Spray Piping and Nozzle	Semi-annual inspection and cleaning
Pump/Controller/Alarms	Inspect Semi-annually
BioFilter Cabinet	Inspect Semi-Annually
Trickling Filter Media	Inspect Semi-Annually
Existing Septic Tank (Tank 1)	Inspect Semi-Annually

Table 3. LooLoop System Maintenance Schedule Year Three and Beyond

LooLoop System Component	Maintenance Frequency
Spray Piping and Nozzle	Annual cleaning
Pump/Controller/Alarms	Inspect Annually
BioFilter Cabinet	Inspect Annually
Trickling Filter Media	Inspect Annually
Existing Septic Tank (Tank 1)	Inspect Annually and Pump every 3 years
LooLoop Tank (Tank 2)	Pump every 3 years

LooLoop System Routine Maintenance Instructions

Spray Nozzle Cleaning and Checking the Trickling Filter Media

Note: The spray pattern should appear cone shape and uniform throughout the pattern.
Preparation: PPE required is limited to rubber gloves.

Step 1. Turn the pump off by opening the circuit breaker box (usually behind the door of the BioFilter Cabinet) and turning power to the pump and controller off.

Step 2. The spray nozzle is accessed by lifting the lid of the BioFilter Cabinet, and securing the lid in the open position with the stainless-steel bar located inside the top of the cabinet. The location of the nozzle (see Figure4) is at the end of the pipe that enters through the wall at the front of the BioFilter Cabinet.

Step 3. Remove the spray nozzle by unscrewing the nozzle from the piping.

Step 4. Clean the nozzle using an old tooth brush and household cleaner.

Step 5. Replace the nozzle and turn the pump on and observe the spray pattern. The spray should appear cone shaped and uniform throughout the pattern. A poorly formed spray may be due to low pressure. Adjust the pressure using the valve on the supply pipe.

Step 6. Visually check the trickling filter media. The media passageways should be clear. The media and the walls of the cabinet will have a thin film of brownish material. The presence of the film is a good indication that the system is working properly. Absence of the film is acceptable so long as the effluent is clear.

Step 7. Lower the stainless-steel bar that is keeping the lid in the up position, and lower the lid of the BioFilter Cabinet.

Controller/Pump/Alarms

Warning: Qualified/certified electricians or service providers should perform maintenance on electrical equipment.

Step 1: Access the controller inside the door of the BioFilter Cabinet (see Figure 2). Check pump operations - check voltage and motor run amps and record on the Maintenance Report Form. If the voltage drop exceeds National Electric Code Requirements, have an electrician check the service line and pump windings.

Step 2: Verify the recirculation pump repeat cycle timer is correct by using the controller display. Step 3. Confirm operation of the visible and audible alarms

Step 3a: Unplug the pump from its connection to the controller while the pump is running. This should start the audible and visible alarms.

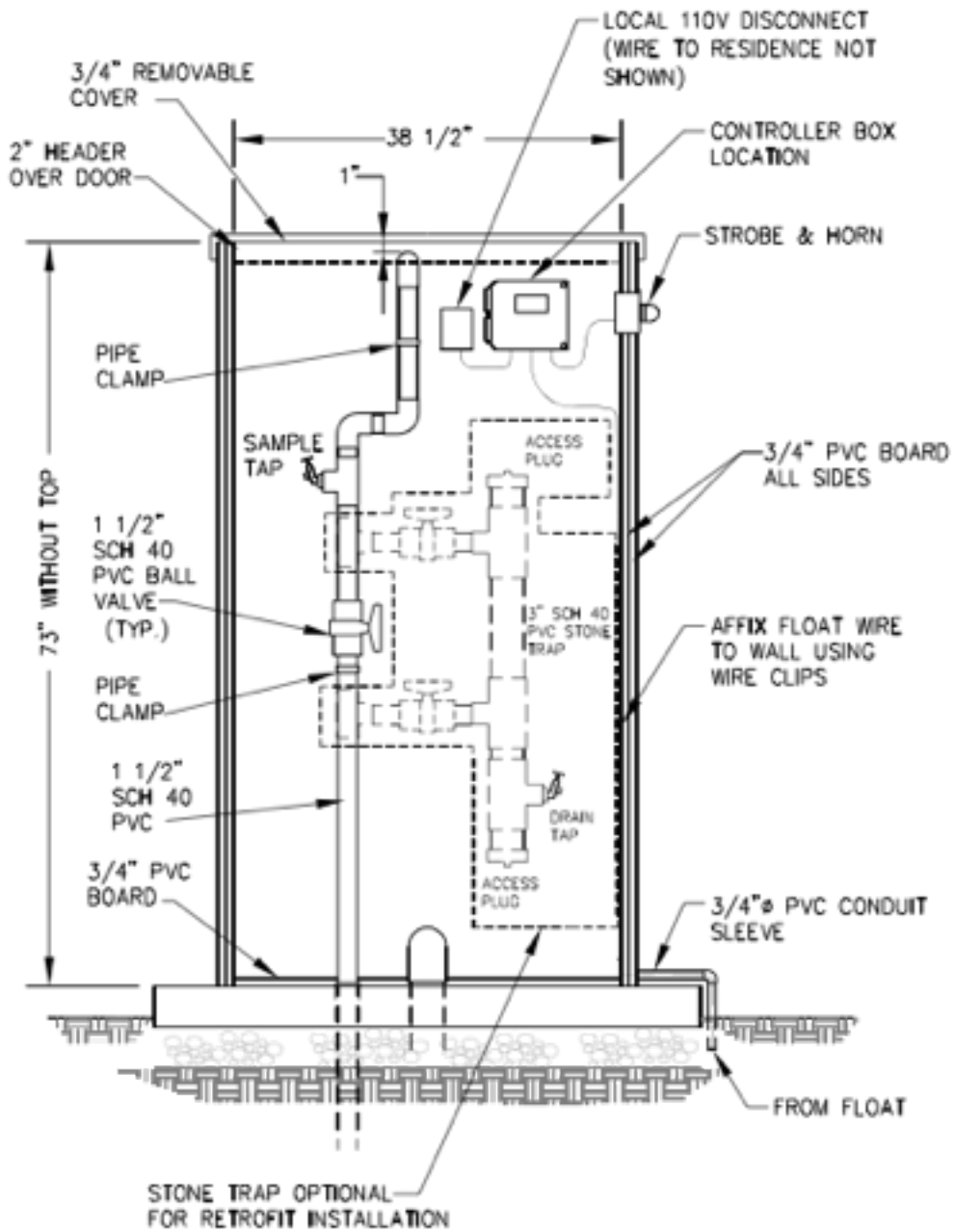


Figure 2: BioFilter Cabinet Front View Door

ELEVATION - FRONT VIEW OPENED
 ReoSept BIO-FILTER CABINET

NOT TO SCALE

GAF Projects\TricMieFaller\RTFilterAll16.Dwg\4/5/16=1/2/17Controller

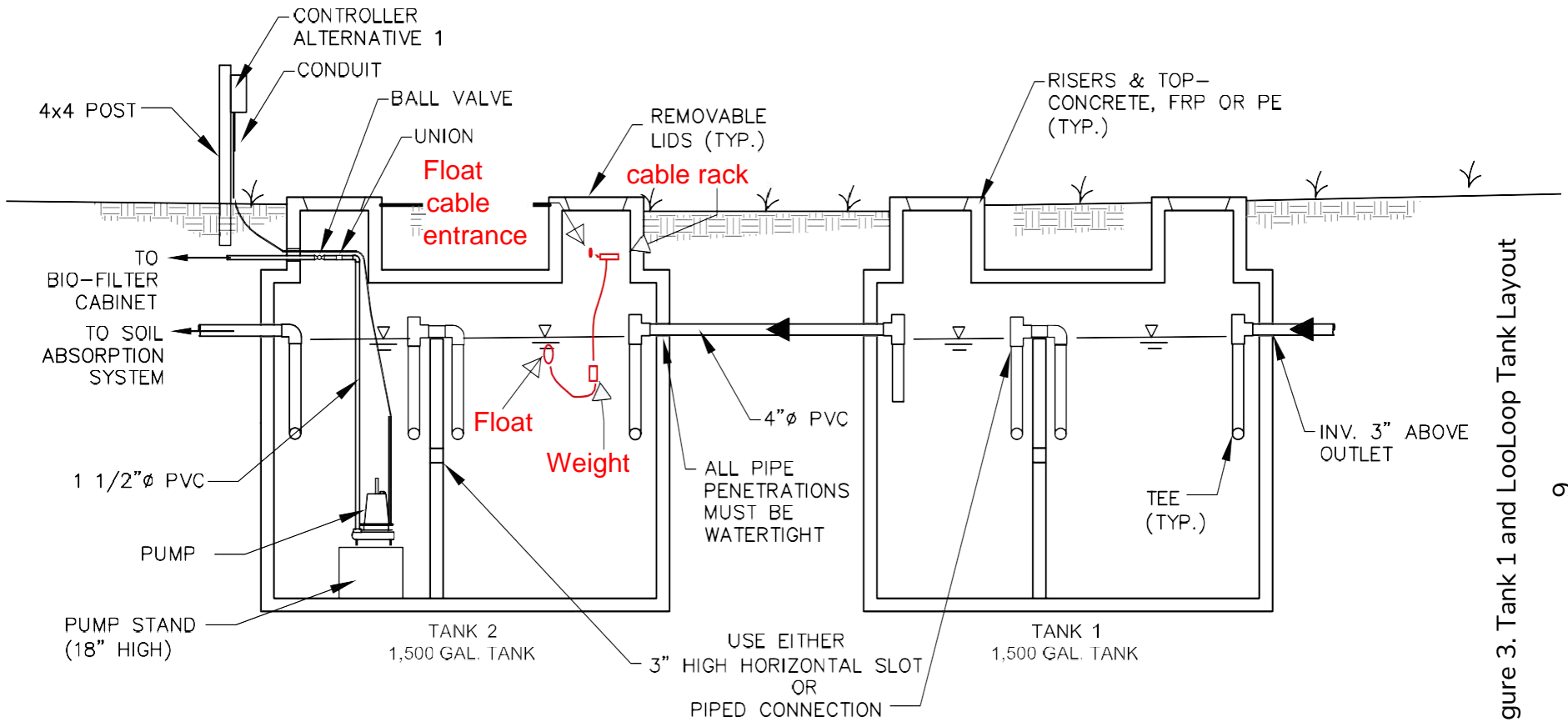


Figure 3. Tank 1 and LooLoop Tank Layout

SEPTIC TANK INSTALLATION

NOT TO SCALE

Step 3b: Test the alarm silence switch on the alarm box located on the outside of the BioFilter Cabinet. This switch will turn off the sound alarm. The light alarm will remain on until the fault (pump fails to start or high water level in LooLoop tank) is corrected. Plug the pump back in.

Step 3c: Attach the float switch to a cord and raise and lower the float switch. Adjust the ON level by changing the position of the weight provided with the switch. The alarm will activate at the ON (high) level. The alarm will remain on until the float switch is lowered in the tank.

Existing Tank 1 and LooLoop Tank 2 (see Figure 3)

Preparation: PPE can include Tyvek or other protective outer garment and rubber gloves.

Step 1: Confirm, if possible, no inlet flow to Tank 1 when all household appliances are off. Visually verify no flow through the tank inspection port. If the inspection port is not accessible, verify a no flow condition by listening for water flow at the access port. If it appears water flow is present, sources include leaking plumbing or fixtures. If it appears the fixtures or plumbing are not the source, then ground or surface water infiltration or inflow could be the source. If this is the case, it is necessary to take further steps to identify the cause.

Step 2: Visually inspect the LooLoop tank (Tank 2). Remove the manway covers for both the inlet side and the pumping section. Check that the liquid surface elevation is at or below the invert of the gravity drain to the soil absorption system. There may or may not be a detectable odor. If there is odor it should have a slightly septic smell. There may or may not be a scum layer. The scum will normally be grey and is of no consequence. Observable water should be clear.

The septic system tank (Tank 1) and LooLoop tank (Tank 2) should be pumped every three years.

BioFilter Cabinet

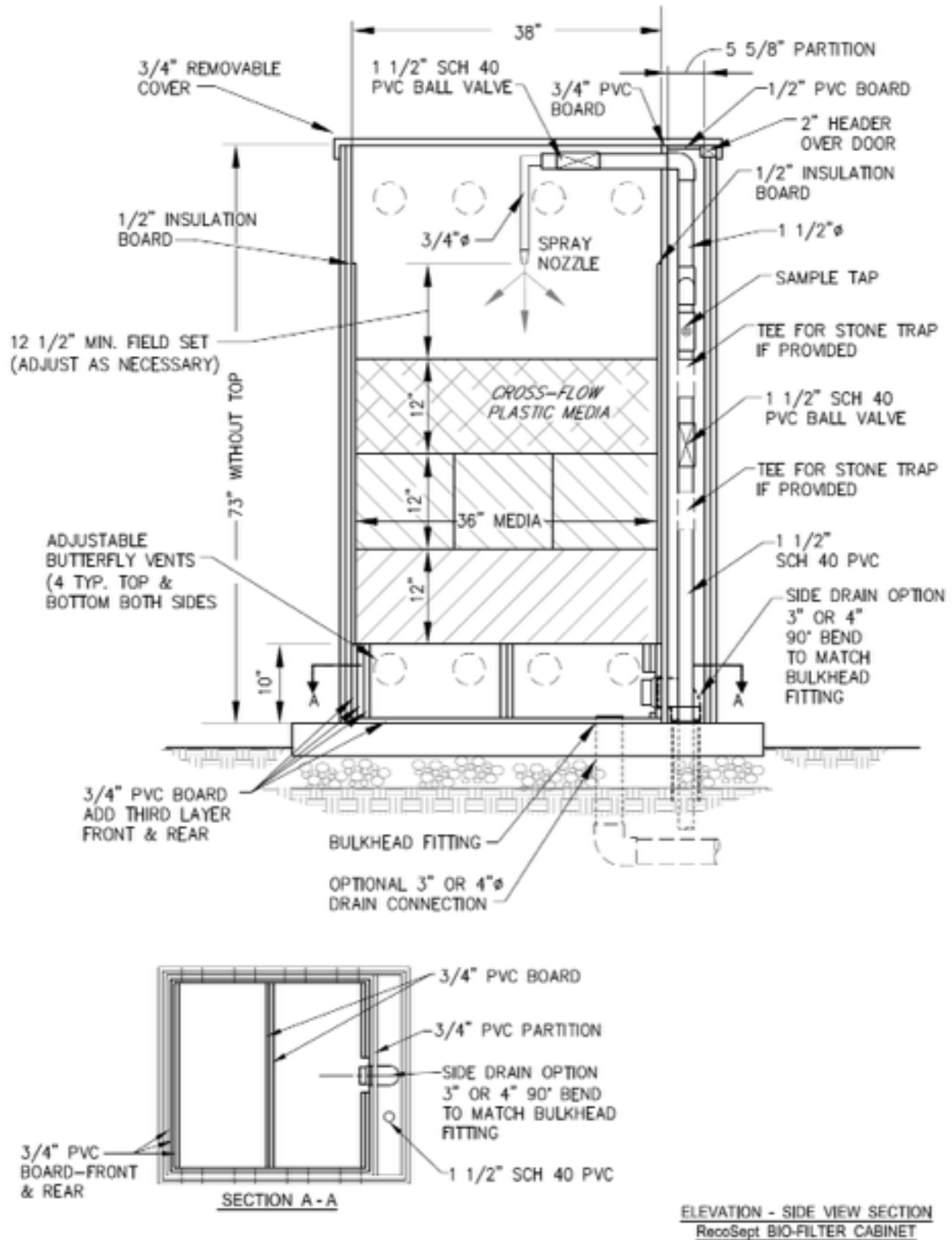
Seasonal Adjustment of BioFilter Cabinet Vents - The BioFilter Cabinet has 16 vents (see Figure 4), eight on the upper part of the cabinet and eight on the lower. The vents can be opened or closed using the toggle attached to the movable closure of each vent. All vents should be open from April 1 through October 31. From November 1 through March 31, one vent each side both top and bottom should be open and the others closed.

Fully close and open all valves, located inside the door of the BioFilter Cabinet (see Figure 2), to make sure they operate correctly.

Note: When performing operation and maintenance services, wear the proper personal protection equipment and use proper personal hygiene when finished.

Documentation

Complete all documentation and submit as required to the appropriate agency or authorities, the homeowner, and forward a copy to the LooLoop representative.



NOT TO SCALE

Figure 4. LooLoop BioFilter Cabinet Side View Section

Effluent Testing Procedures

Effluent samples can be collected by opening the sample tap located on the feed pipe to the Biofilter Cabinet which is located behind the door to the cabinet (see Figure 2). Prior to sampling, the tap should be open and the flow discharged to the ground for one minute or more to remove attached biomass that will tend to grow on all wetted components and especially on components that are not used often like the sample tap. Samples should be collected in containers supplied by the analyzing laboratory. The various analytical tests require that the collected samples be preserved in different ways. Care and planning are required to assure that the proper preservative procedures are followed. If sampling is performed for government reporting requirements, many states have requirements that the sample collector be certified. Certified sample collectors may be required in your state.

Sampling and Storage Methods

Sample size, sampling equipment, and storage methods for collected samples should follow the guidelines recommended in the most current edition of *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association (APHA).

Samples can be obtained using the sample tap located inside the BioFilter Cabinet (see Figure 5). The laboratory supplying samples should provide containers with the proper preservative already inside. The laboratory will also provide instructions for sample storage, transportation, and packaging.

Samples should be gathered and analyzed annually for cBOD, Suspended Solids, and Total Nitrogen.

Analytical Methods

Analytical methods should follow the *Standard Methods* as listed above or by using EPA approved commercially available testing procedures. Hach is a recognized manufacturer and vendor of such equipment.

Techniques for system effluent visual evaluation

Parameter	Methodology	Typical Value
Clarity ¹	Visual	Clear
Odor ²	Sniff	Non-offensive (musty is OK, rotten egg is not OK)

1 Service representative can check clarity using a sample bottle containing "typical effluent" to compare the field sample against. The field sample should be drawn into a clear glass container.

2 Odor can be checked by sniffing the effluent sample.

For effluent samples and color/turbidity values significantly different than expected, contact the LooLoop representative.