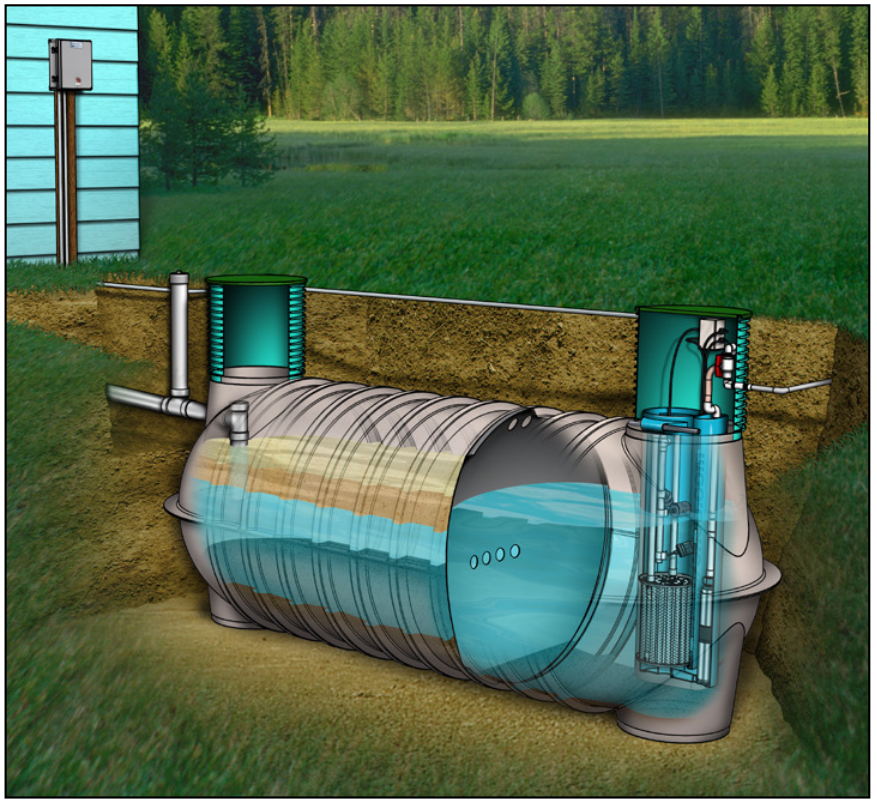
Basic Pump Systems
for Septic Tanks

Overview

- Septic Tanks / Pump tanks
- Timed Dose vs Demand Dose
- High Head effluent pumps
- Pump applications
- Hydrosplitter
- Float Settings / Timer Settings
- Installation Tips
- Troubleshooting Tips

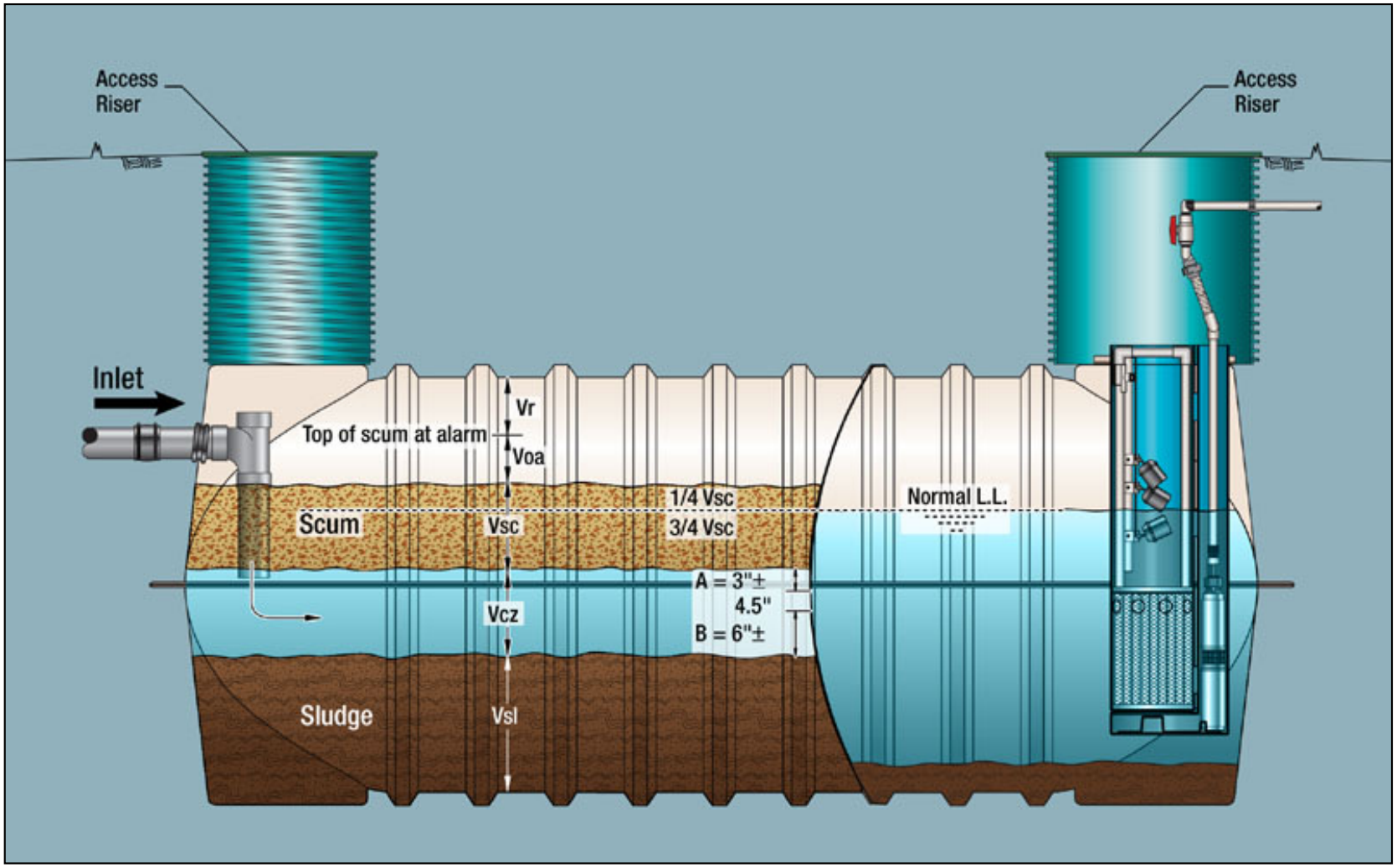
Orenco Pumping Package

- Tank
- Riser, lid, accessories
- High-head effluent pump
- Pump vault
- Control panel
- Discharge assembly
- Float assembly
- Splice box



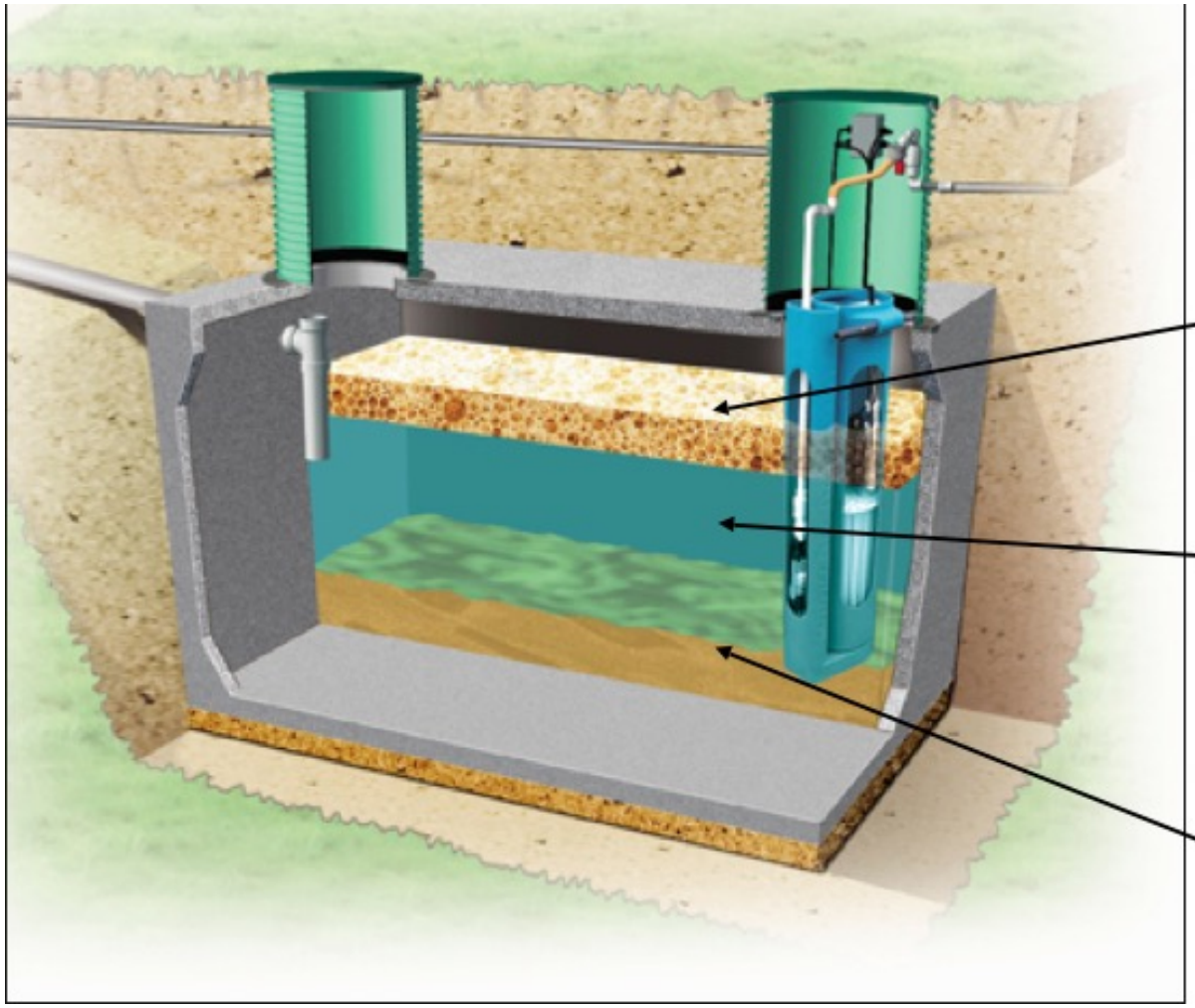
Tanks

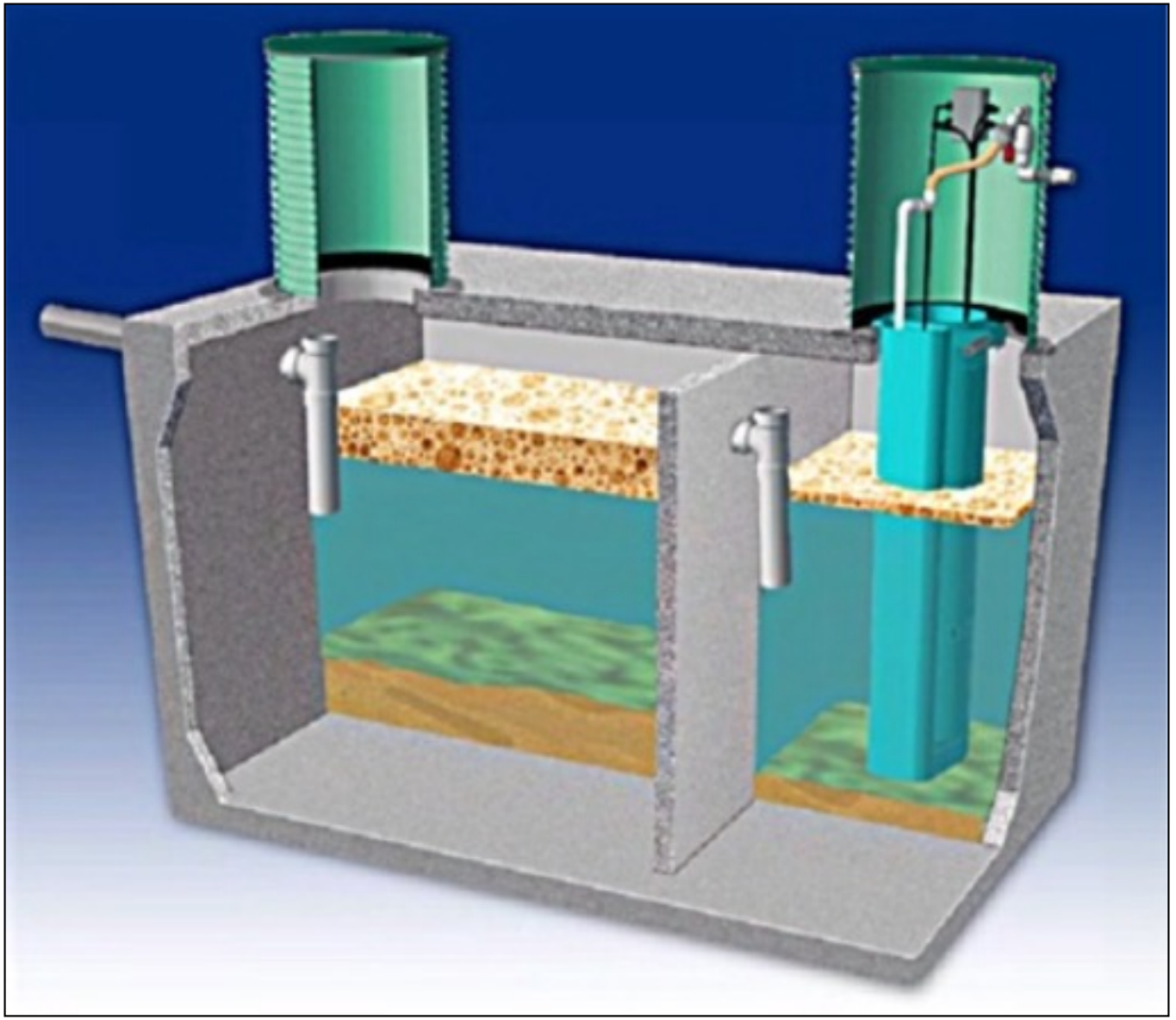
Simple Yet Complex

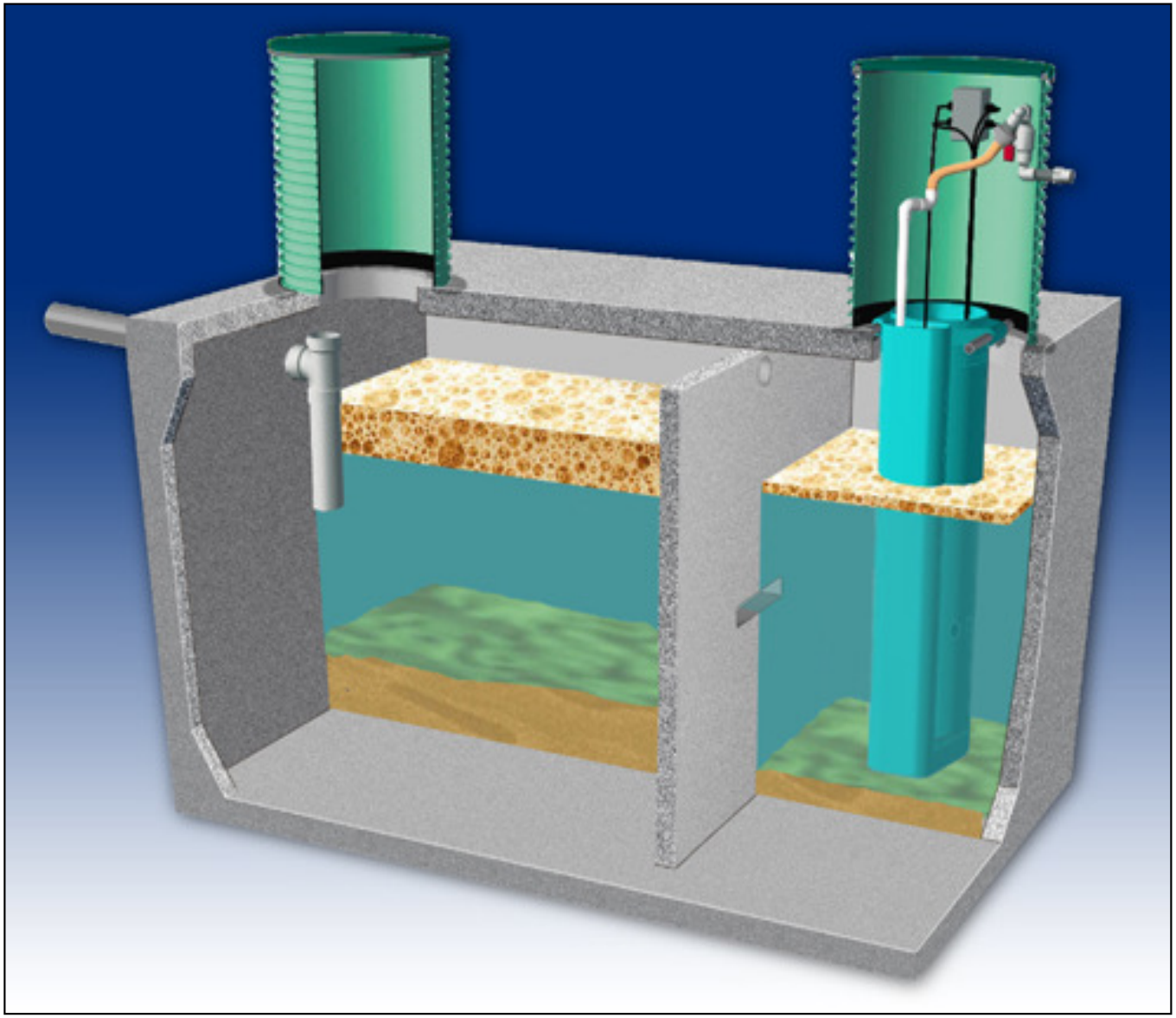


Properly sized and configured tanks ensure optimum performance..

The Septic Tank







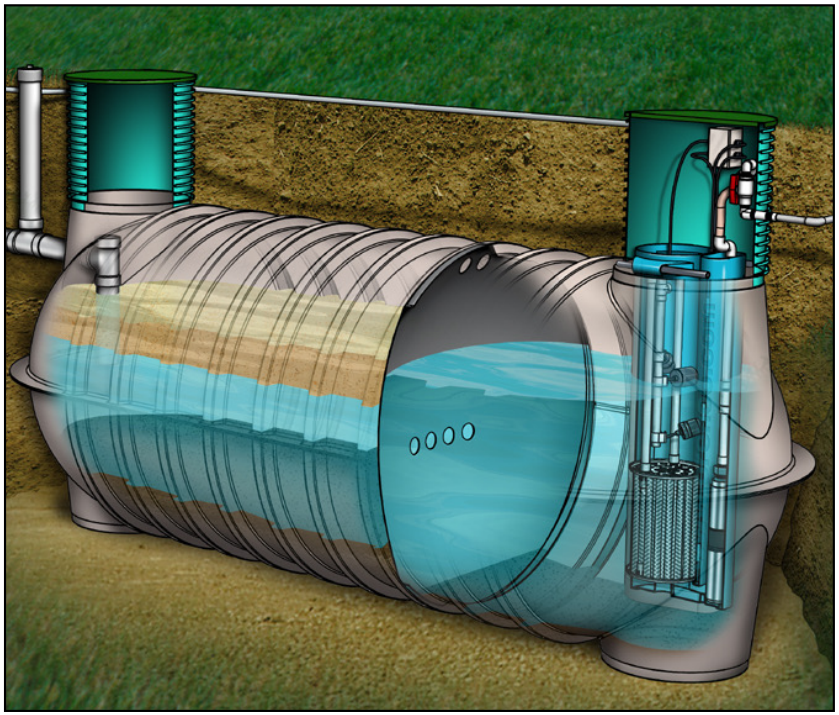
Tank Configuration

- Governed by state and local regulations
  - Check with your local state or county health department
- Common configurations include …
  - Single-compartment
  - Two-compartment
  - Partition flow-through tank

- 1000 Gallon Tank
- 1500 Gallon Tank

Onsite Systems Begin with a Watertight Tank

- Orenco insists that tanks are
  - ~ Watertight
  - ~ Structurally sound
- With well designed and constructed septic tanks:*
  - ~ BOD_5 removal greater than 65%
  - ~ TSS removal of 70% or more
  - ~ FOG removal of at least 85%



* *Small and Decentralized Wastewater Management Systems*, Crites & Tchobanoglous, 1998, p.183.

Pump Dosing

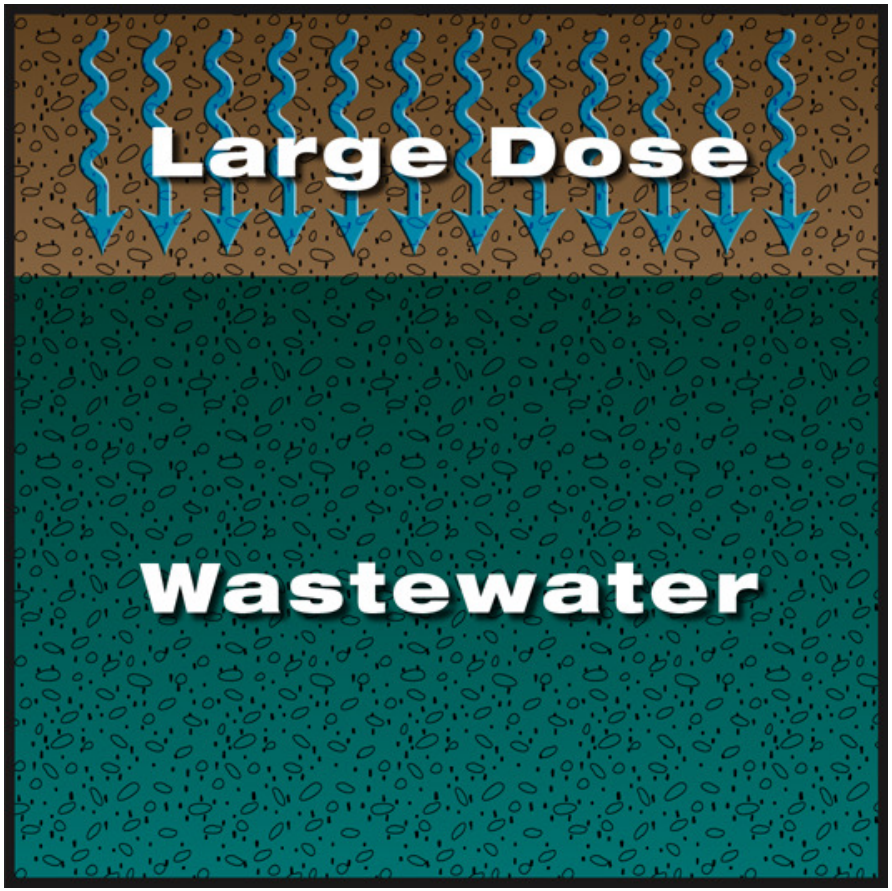
Demand Dosing

- The pump runs from the “on” to the “off” positions
- The pump runs when water is present to activate the float
- The dose volume varies if water enters the basin during the pump cycle
- The dose volume depends on the float drawdown or spacing

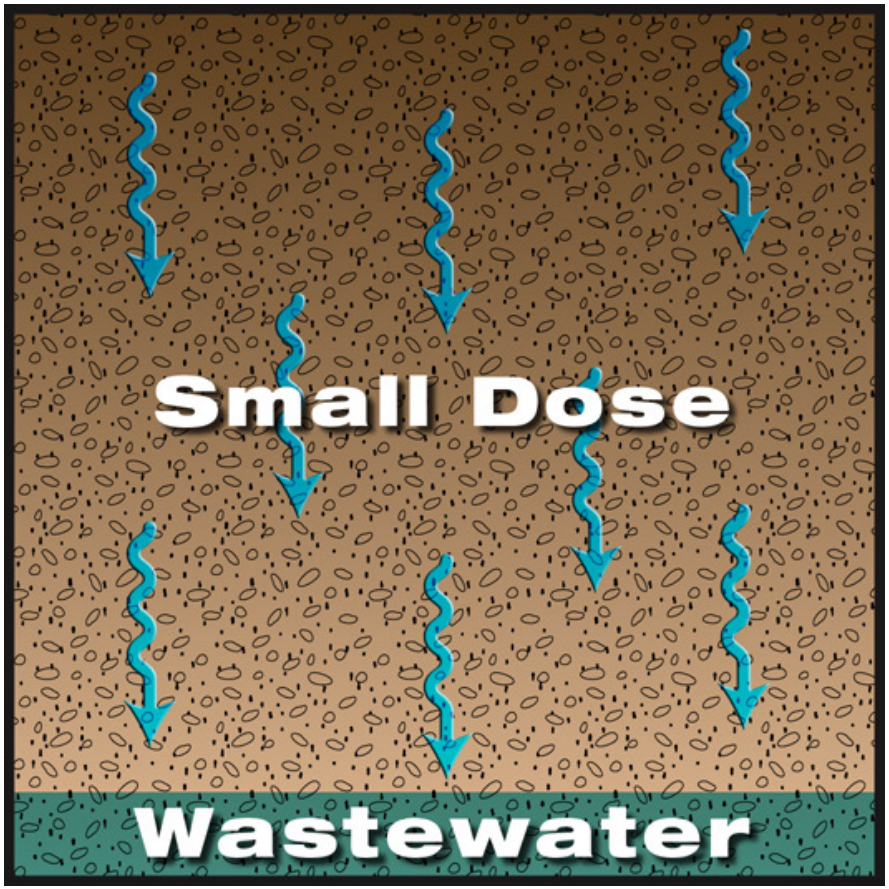
Timed Dosing

- The pump runs when ...
  - The float is in the on position
  - The timer is activated
- Timed dosing takes advantage of the surge volume in the tank
- The dose volume is controlled by ...
  - Flow rate
  - Time

Effect of a Large Dose In The Drainfield

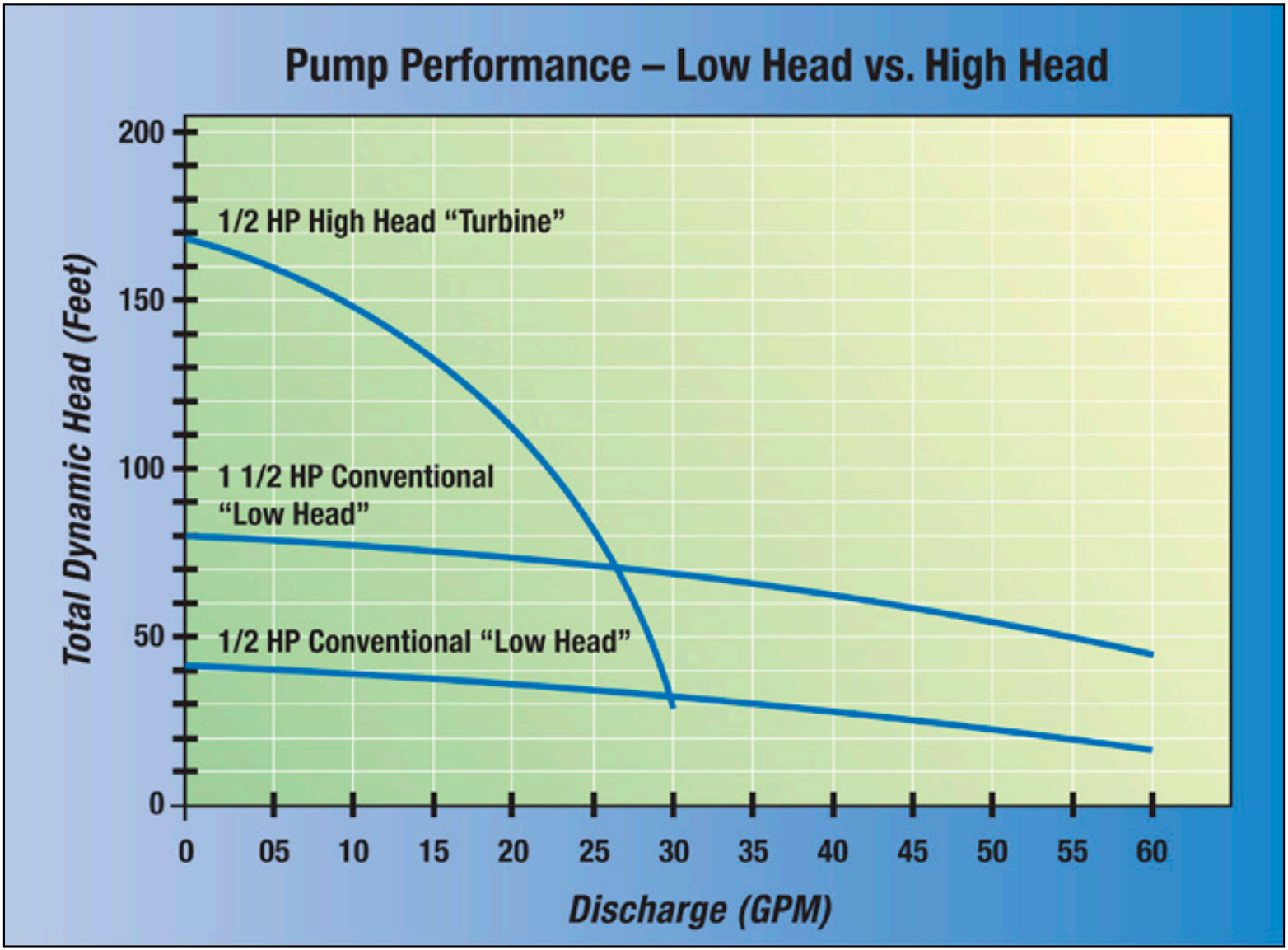


Large dose fills all of the voids in the trench, eventually clogging and surfacing



Small dose spreads over the bottom of the trench, allowing the wastewater to infiltrate into the soil before the next dose is applied

Pump Selection



Effluent Pump

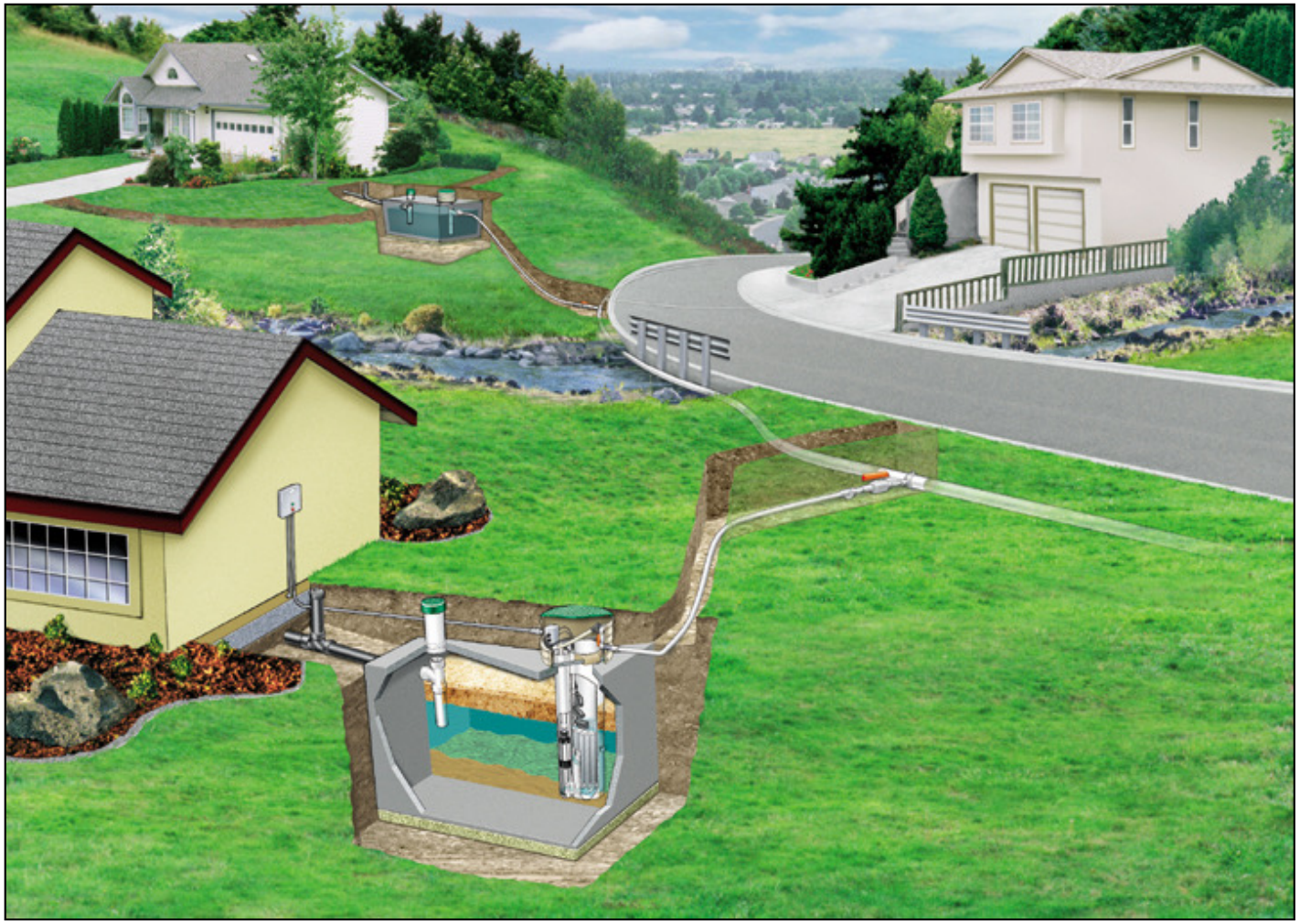
- UL/CSA Listed
- Corrosion resistant
- Lightweight
- Easy to service

- PF Series
- PVA Series
- P Series

Applications

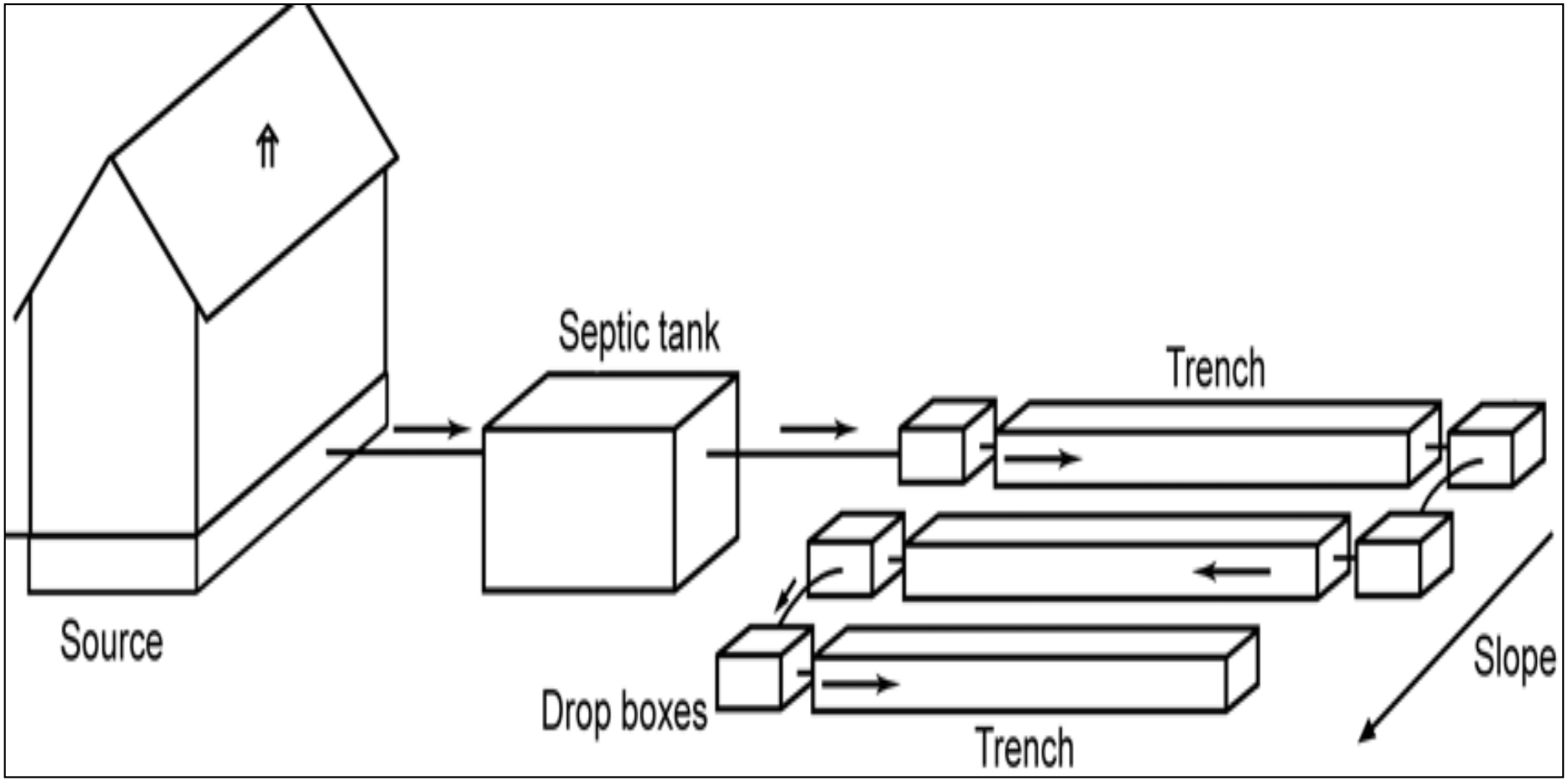
Pumping Systems

- Effluent sewer pumping collection systems



Pumping Systems

- Serial distribution utilizes drop boxes

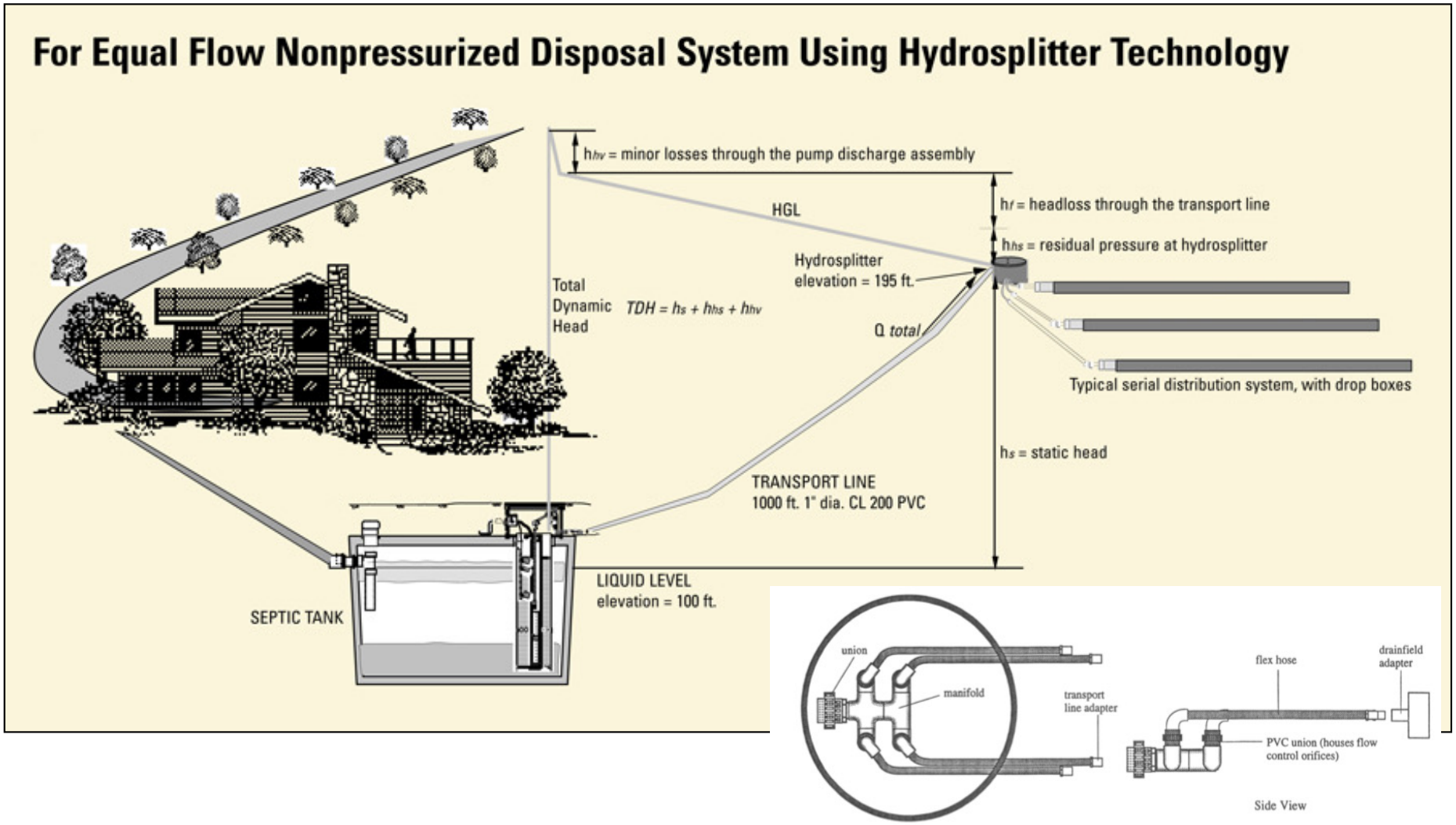


Pumping Systems

- Equal distribution box

Pumping Systems

- Hydrosplitter



Pump Curve

Parameters

Discharge Assembly Size	1.0FC	inches
Transport Length	100	feet
Transport Pipe Class	40	
Transport Line Size	1.00	inches
Distributing Valve Model	None	
Max Elevation Lift	10	feet
Design Flow Rate	8	gpm
Flow Meter	None	inches
'Add-on' Friction Losses	2	feet

Calculations

Transport Velocity	2.9	fps

Frictional Head Losses

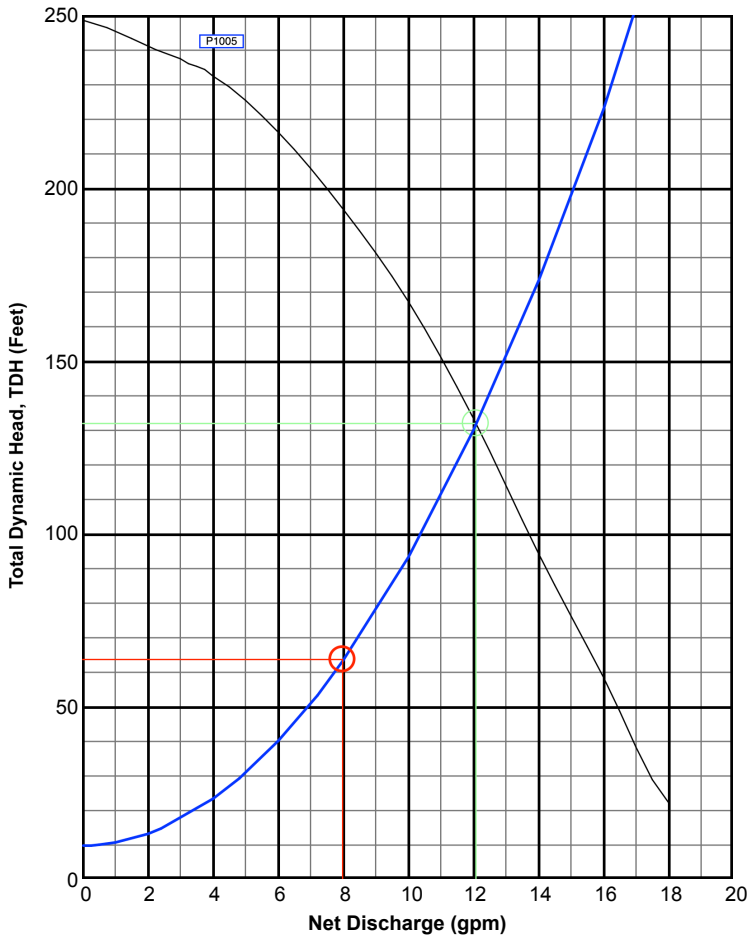
Loss through Discharge	48.0	feet
Loss in Transport	3.7	feet
Loss through Valve	0.0	feet
Loss through Flowmeter	0.0	feet
'Add-on' Friction Losses	2.0	feet

Pipe Volumes

Vol of Transport Line	4.5	gals

Minimum Pump Requirements

Design Flow Rate	8.0	gpm
Total Dynamic Head	63.7	feet



PumpData

P1005 HH Effluent
Pump Data
P1005 High Head Effluent Pump
10 GPM 1/2HP
115V 1Ø

Legend

System Curve:
Pump Curve:
Pump Optimal Range:
Operating Point:
Design Point:

Hydrosplitter Orifice Calculation

Company: Example

Project: Example

Phone:

Fax:

By:

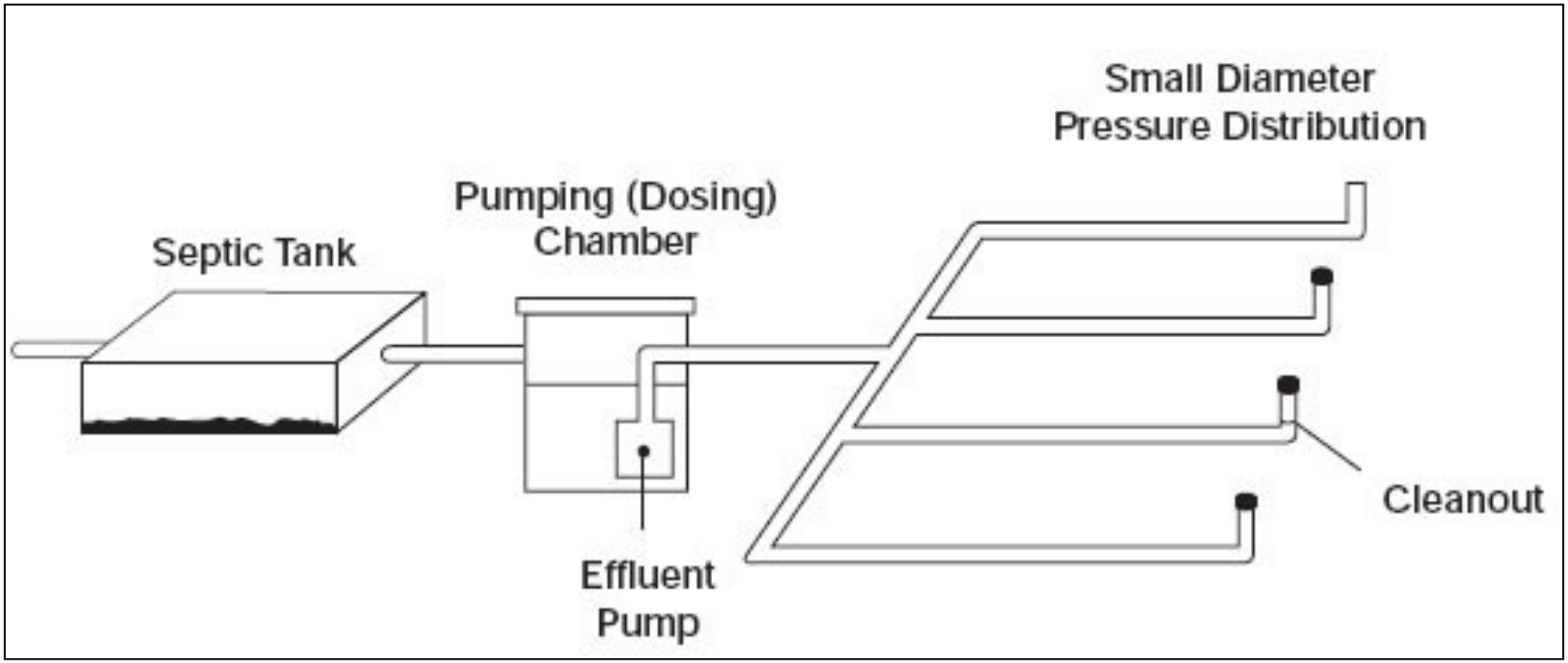
Flow Rate:	12	**Residual Pressure:**	2	**Pump/Siphon:**

Trench #	Length	% Flow	GPM	Orifice Size
1	100	33.3%	4.0	0.478"
2	100	33.3%	4.0	0.478"
3	50	16.7%	2.0	0.338"
4	50	16.7%	2.0	0.338"

Flow Control Disks

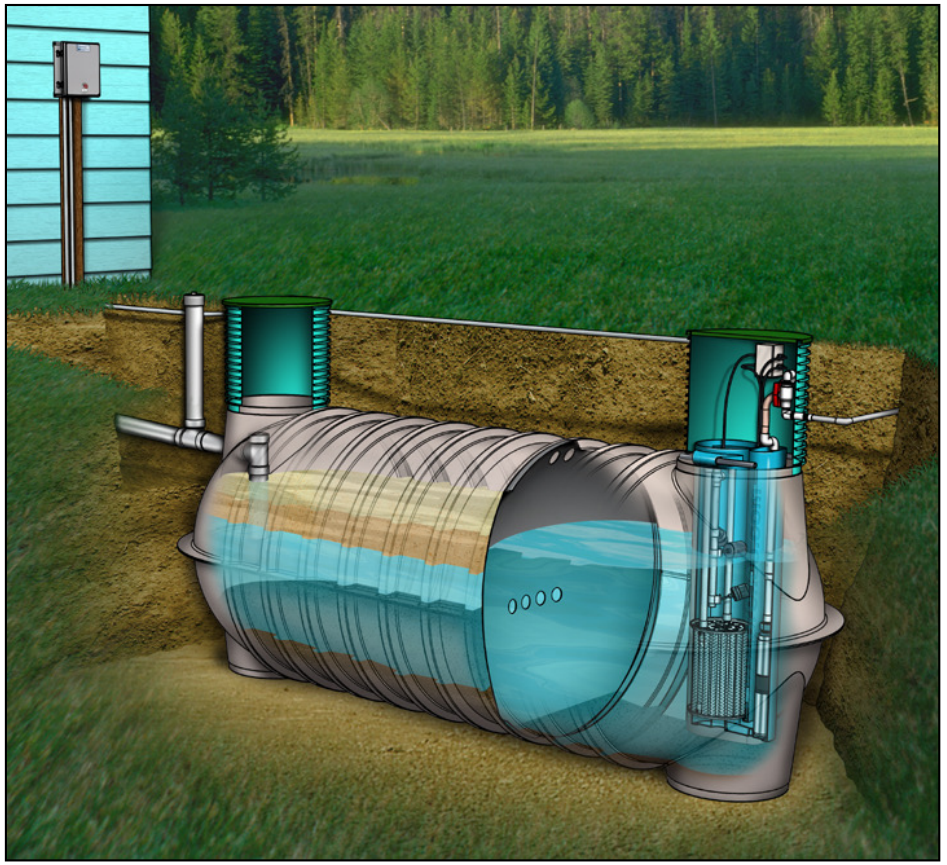
Pumping Systems

- Equal distribution – pressurized laterals



Installation

- Riser and Lid
- Pump package components
  - Pump Vault
  - Pump
  - H&V
  - Floats
  - Splice Box
  - Control Panel



Riser and Lid Installation

- Clean surfaces
- Use appropriate epoxy
- Orient penetrations to minimize pipe bends (or drill them yourself)

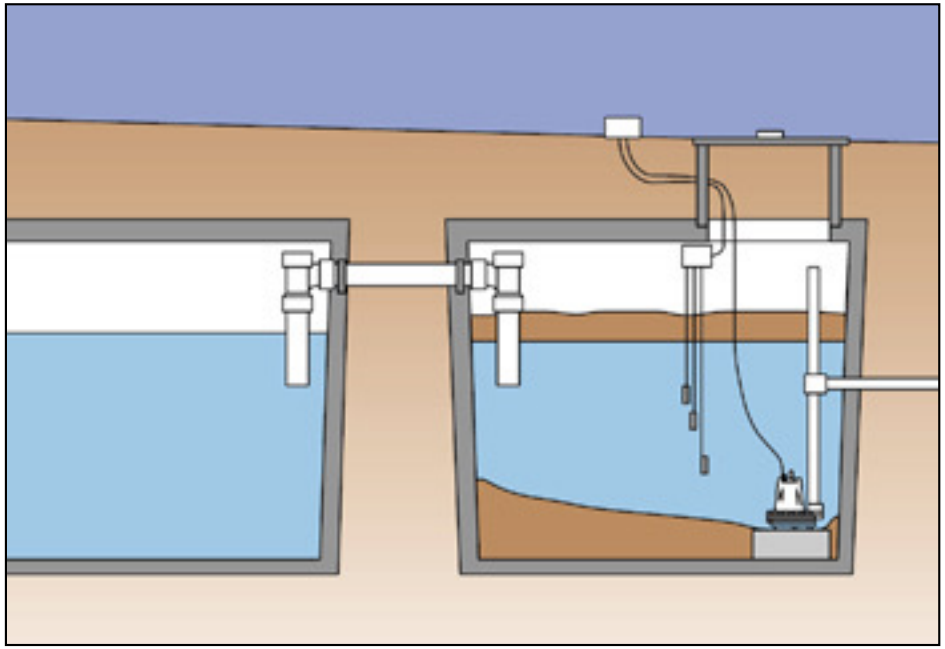
Bolt-Down Kit

Bolt-Down Kit, cont.

Onsite Pumping Systems:

In the Beginning

- Unscreened pump rests on bottom of tank
- Pump discharges significant solids to drainfield
- Pump discharge exits through side of tank
- Floats hung without consideration for maintenance
- Unscreened pump requires additional dosing chamber



Orenco Revolutionizes Onsite Pumping*

1984
Screened vault

1996
Biotube® PVC vault

2000
Biotube® PVU vault

**Orenco introduced filtered pump vaults to the onsite industry.*

Orenco's Biotube® Pump Vaults

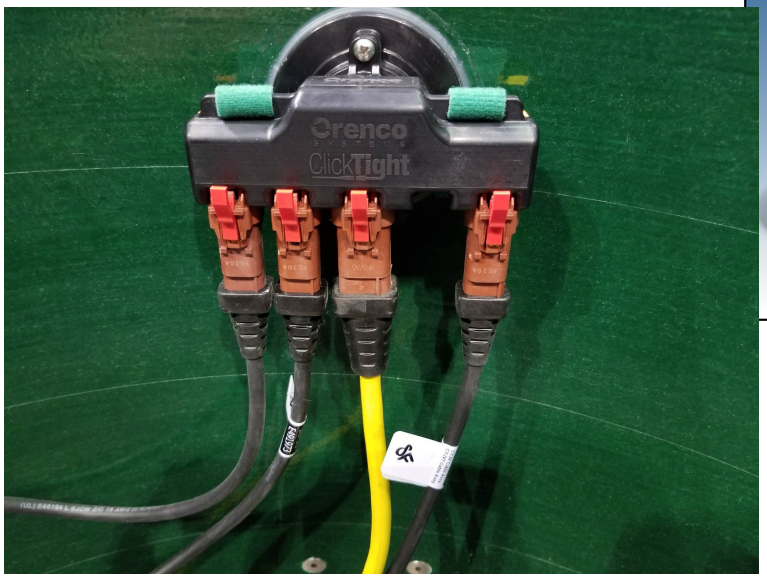
- For pumping applications
  - ~ More filtering capacity than other brands
  - ~ Longer cleaning intervals
  - ~ Easy to install
  - ~ Simplex or duplex
  - ~ Sturdy, molded polyethylene
  - ~ Filter cartridge easily removable w/o pulling pump

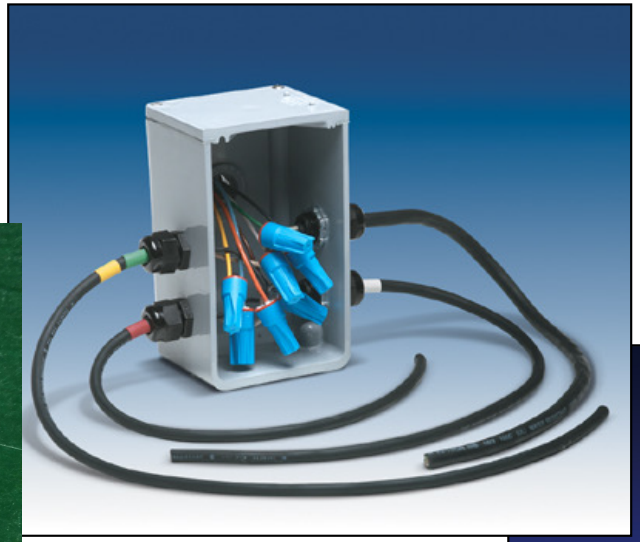
Pump Vault/Pump/H&V

- Hang from top of tank
- Sit on floor of tank
- Make sure to leave room to service pump and filter

Splice Box

- Keep the Splice Box out of the way of other components
- Use conduit seal
- Work with your electrician to simplify troubleshooting down the road (color coded wiring)





Discharge Assembly

- Take care to select the proper configuration
- Make sure the pump can be easily removed and serviced
- Position the discharge assembly to line up with the existing discharge hole in riser

High head style

Float Switches

- Operation
  - Normally Opened vs. Normally Closed
- Types
  - P: Normally open, 2” differential, mechanical
  - N: Normally closed, 2” differential, mechanical
  - B: Normally open, 4” differential (typ.), mechanical

Floats

- Double check your float settings and document
- Make sure the floats have a clear path to move up/down
- Get the cords out of the way

Float Functions (Demand Dose)

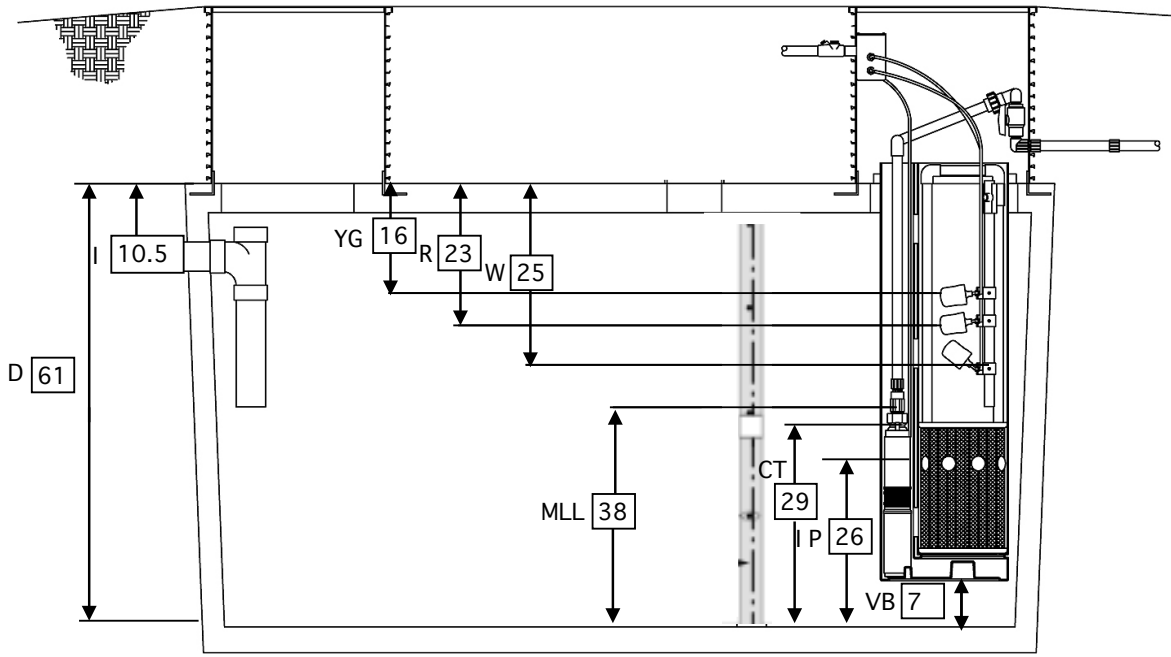
- High Water Alarm
- Pump On or Pump On/Off
- Pump Off
- Redundant Off / Low level Alarm

Float Functions (Timed Dose)

- High Water Alarm
- Timer Override
- Timer On/Off
- Redundant Off / Low level alarm

Float Settings

Application: Sand Filter
Design Flow = 450 gpd
32 Gallons/Inch
PVU57-1819
MVP-S1DM Control Panel
MF3A-YG,R,W
Enlet Hole Location = 68%
PF300511 MLL 20"



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Timer Settings

- Calculations
  - Determine dose to drainfield
    - Consult regulation
    - Be careful of “minimums” and “maximums”
  - Determine flow rate of pump
    - Pump curve
    - Drawdown test

- Calculate “On” time
  - Dose vs. flow rate
- Calculate “Off” time
  - Doses per day

Timer Settings

- Program Panel
  - Electromechanical
  - Siemens Logo PLC

Control Panel

- Don’t mount on a wall (especially a bedroom wall)
- Mount at least waist height
- Mount line of sight to pump riser
- Test all functions before commissioning

A Truly Integrated Pumping System

- Orenco's M1000 meander tank integrates perfectly with the most innovative effluent pumping system on the market.

Service

Effluent Filter Maintenance

- Remove and hold cartridge over inlet of tank
- Carefully spray buildup into tank
- Reinsert cartridge into effluent filter housing

Troubleshooting (Demand Dose)

- Isolate pump (Manually run)
- Test Floats individually
- Inspect Filter

Troubleshooting (Timed Dose)

- Isolate pump (Manually run)
- Test Floats individually
- Inspect Filter
- Take note of timer setting
- Ensure timer is operating properly

Questions ?