

# Basic Pump Systems for Septic Tanks

## Our Presenter

# Triston Garnett

**Triston Garnett** is a Technical Sales Representative with Orenco Systems,® Inc., a wastewater equipment manufacturing firm based in Sutherlin, Oregon. In this role, he handles residential sales and technical support for Orenco's Northwest Territory. He also participates in sales of smaller commercial projects and asset management of existing projects.

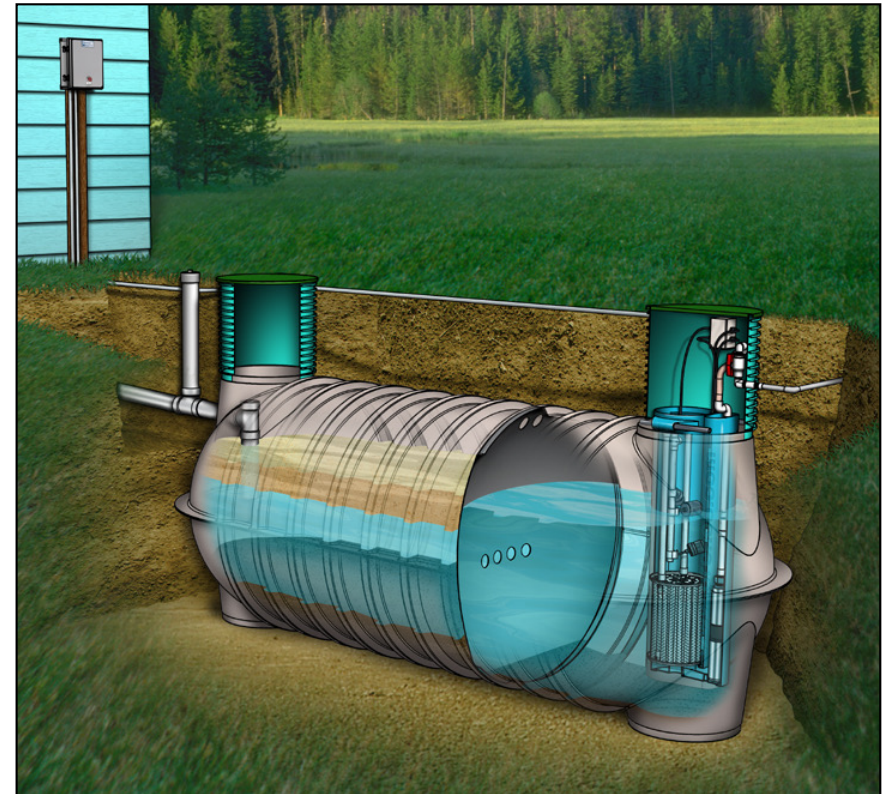
Triston has an associate's degree from Umpqua Community College and is close to finishing a bachelor's degree in business administration from Eastern Oregon University. He's an avid outdoorsman who enjoys hunting, fishing, and hiking in his spare time. He's also a do-it-yourself homeowner and car and truck enthusiast.

# 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

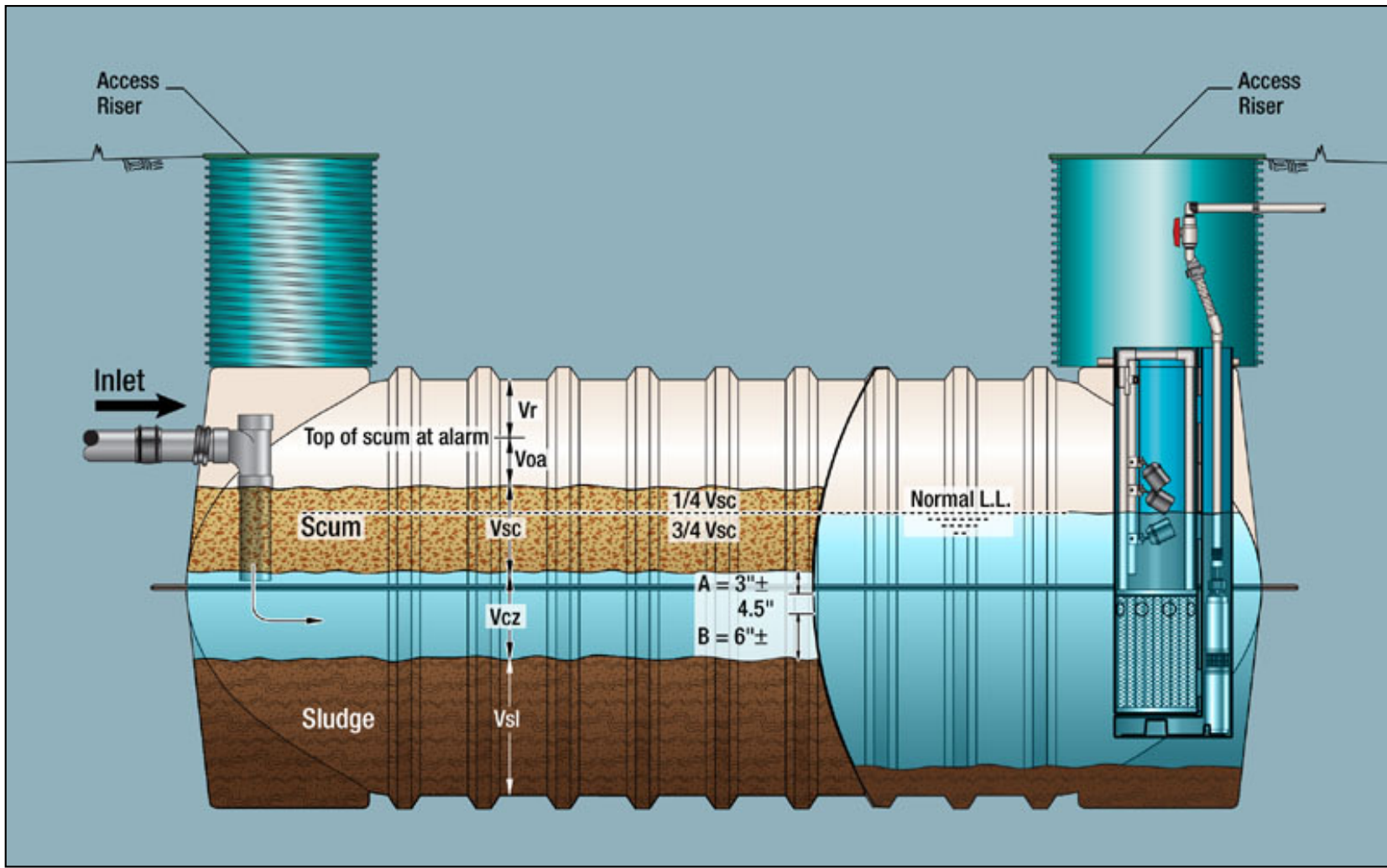
# Orengo Pumping Package

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



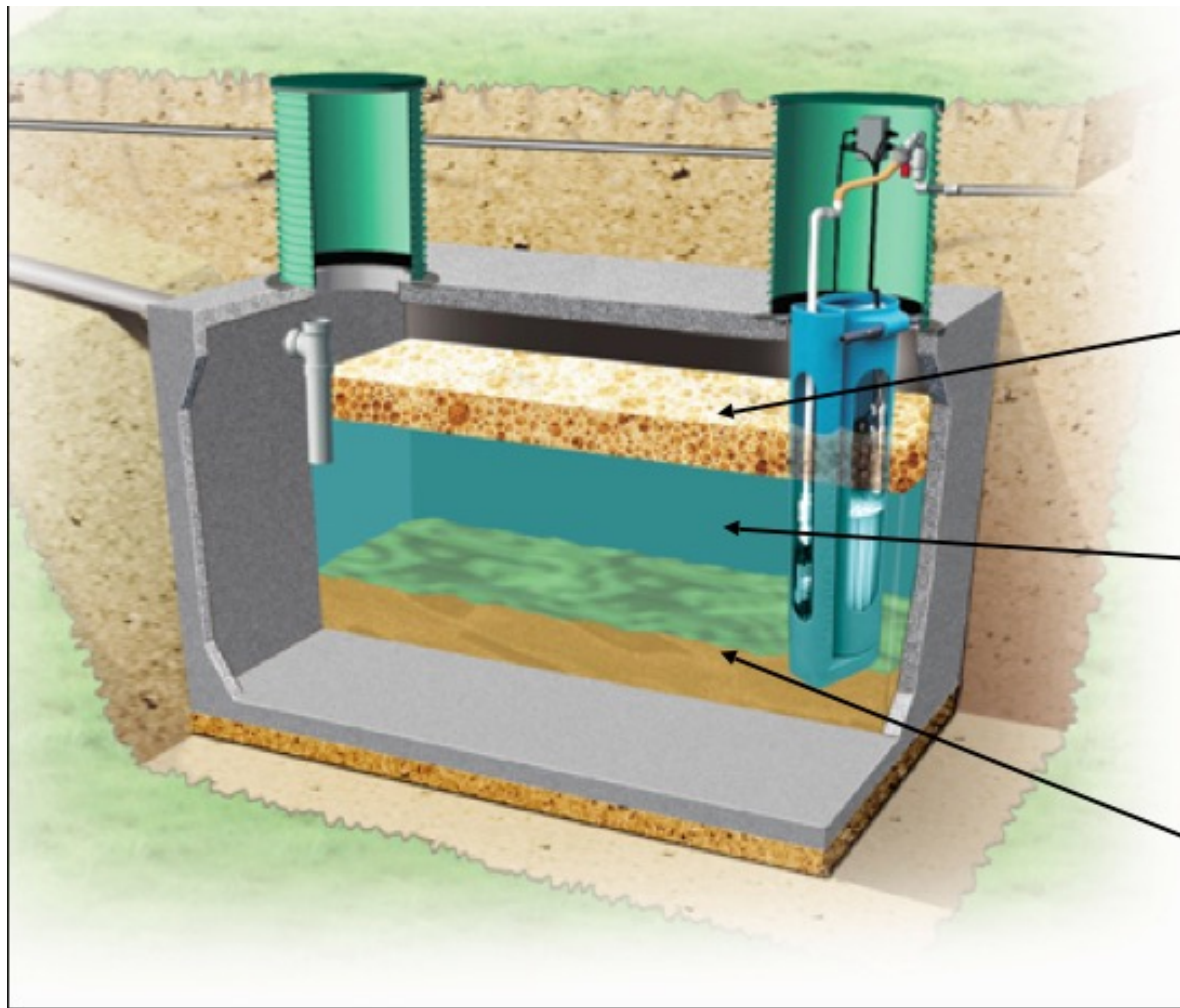
# Tanks

# Simple Yet Complex



*Properly sized and configured tanks ensure optimum performance..*

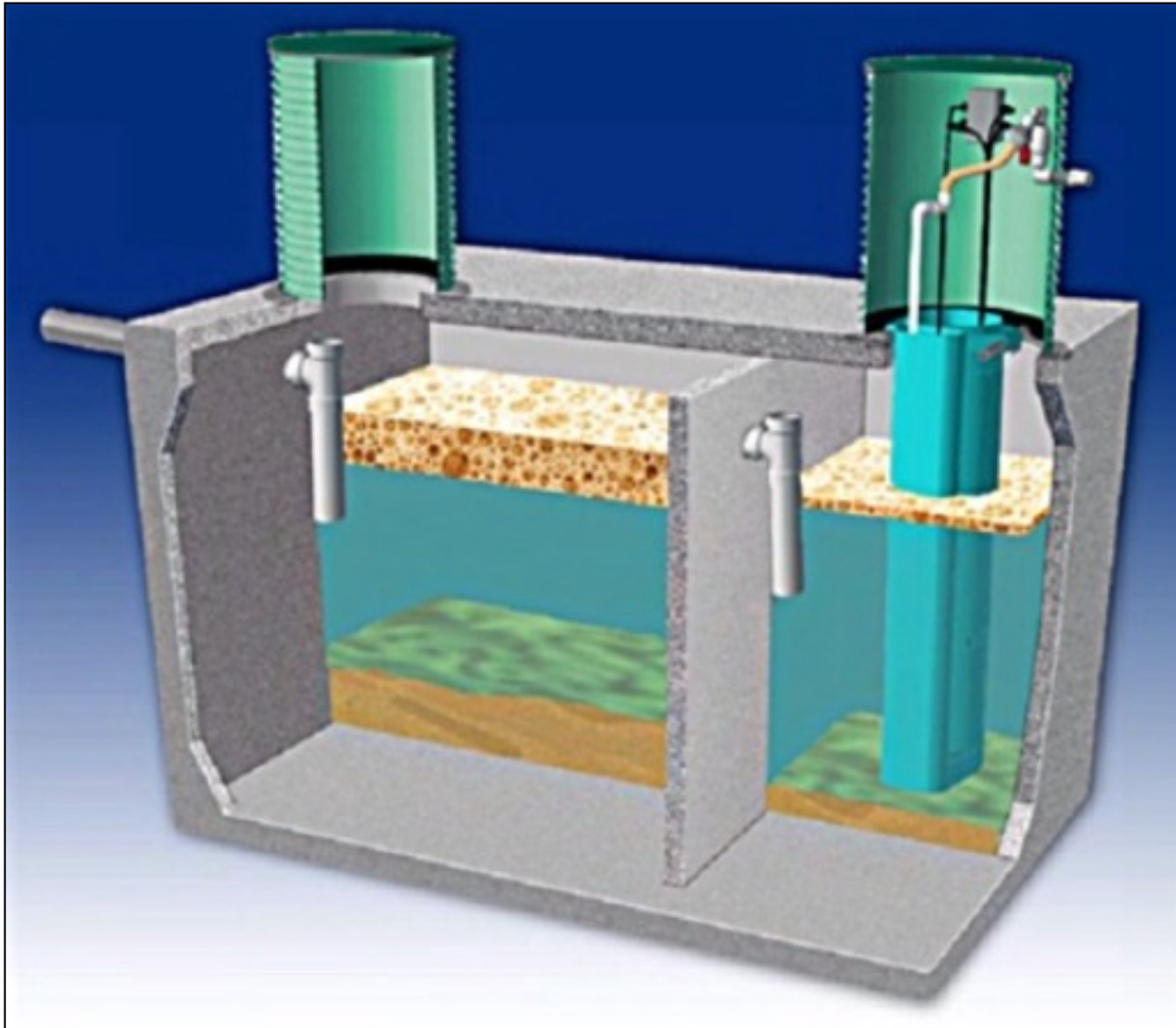
# The Septic Tank



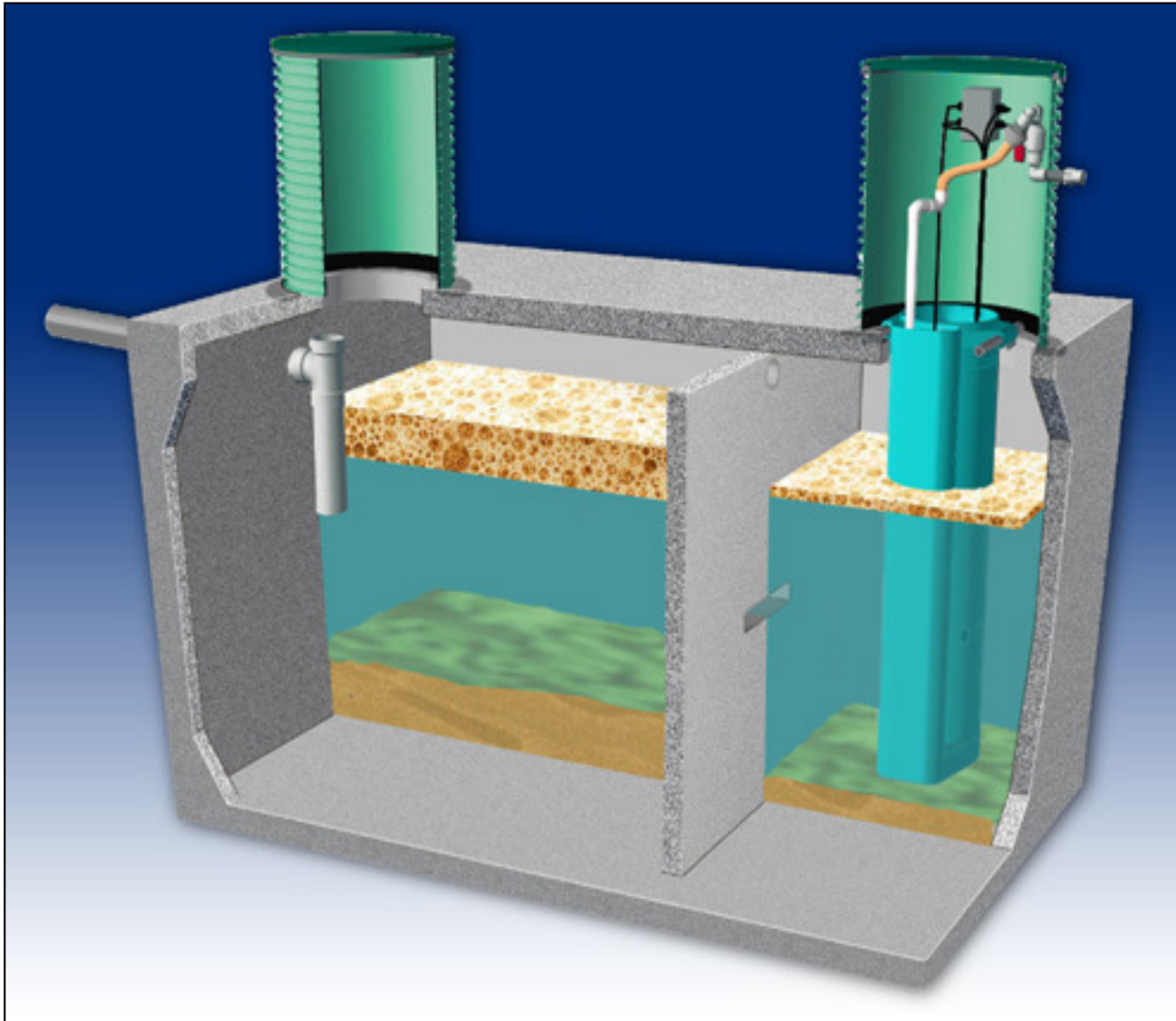
Scum

Clear

Sludge





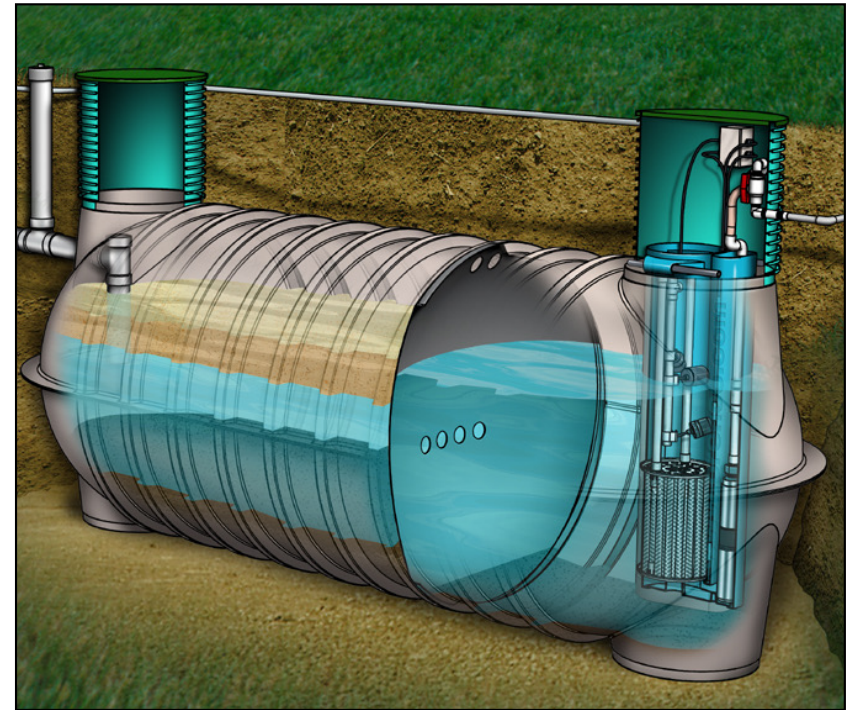


# Tank Configuration

- 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

- Orengo insists that tanks are
  - ~ Watertight
  - ~ Structurally sound
- With well designed and constructed septic tanks:<sup>\*</sup>
  - ~ BOD<sub>5</sub> removal greater than 65%
  - ~ TSS removal of 70% or more
  - ~ FOG removal of at least 85%

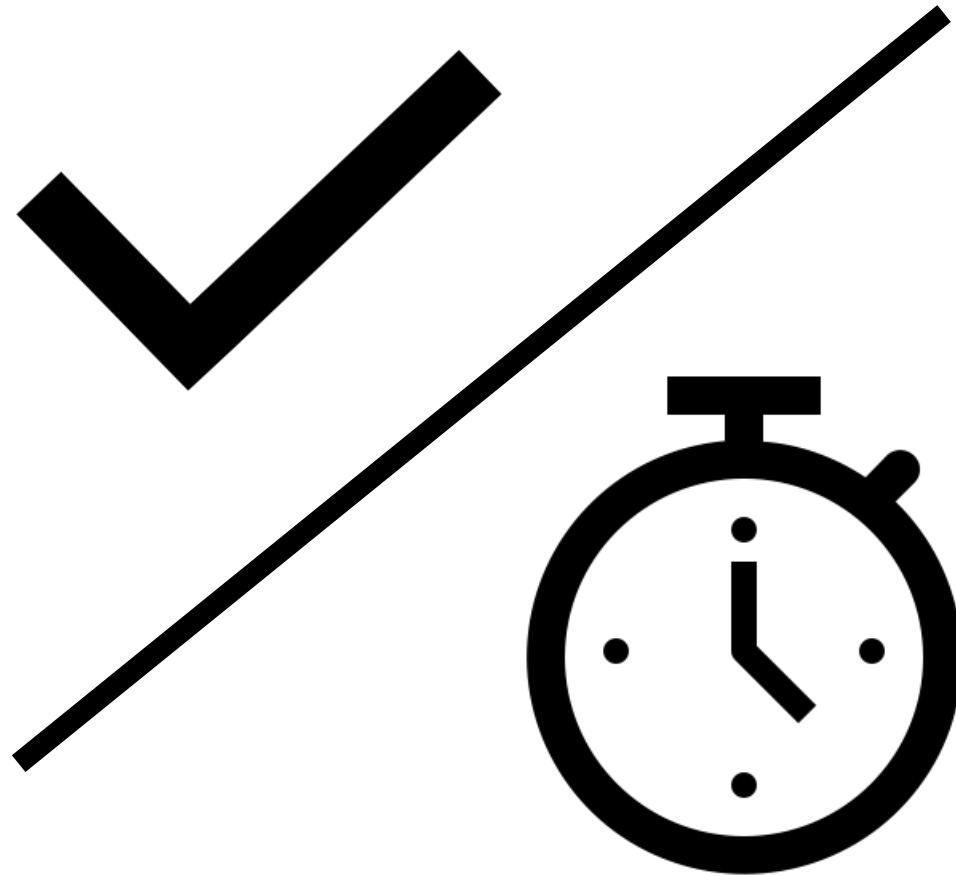


<sup>\*</sup> *Small and Decentralized Wastewater Management Systems*, Crites & Tchobanoglous, 1998, p.183.

# Pump Dosing

# Two Ways to Control Doses

- Demand dosing
- Timed dosing



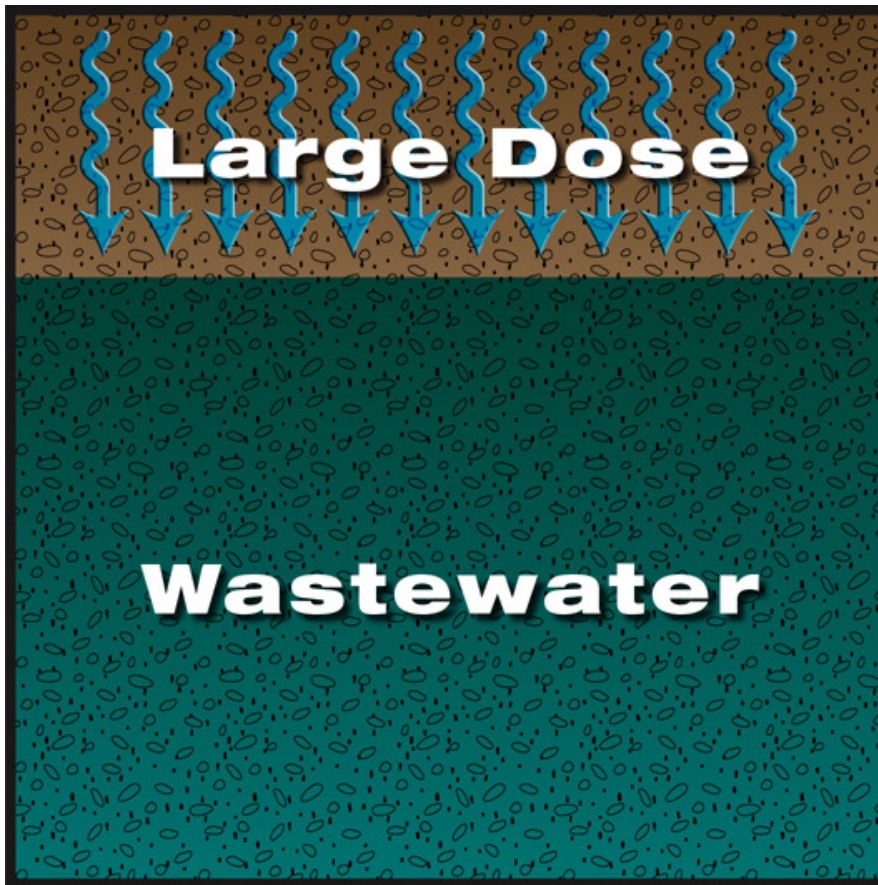
# Demand Dosing

- 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

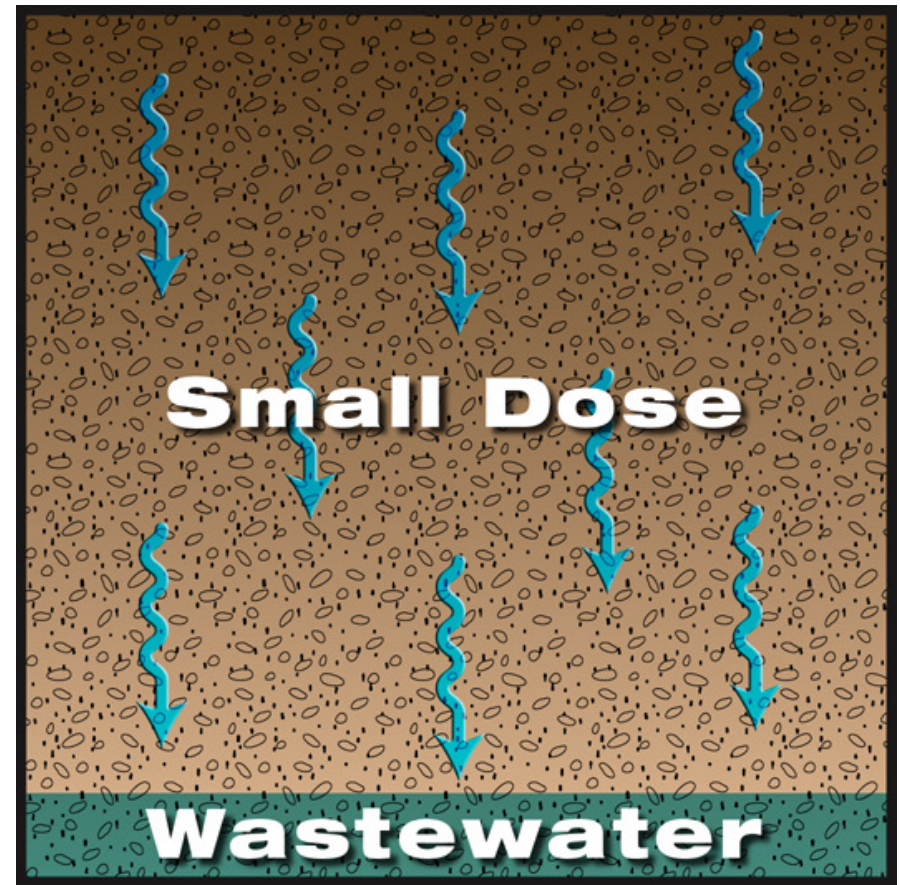
# Timed Dosing

- 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

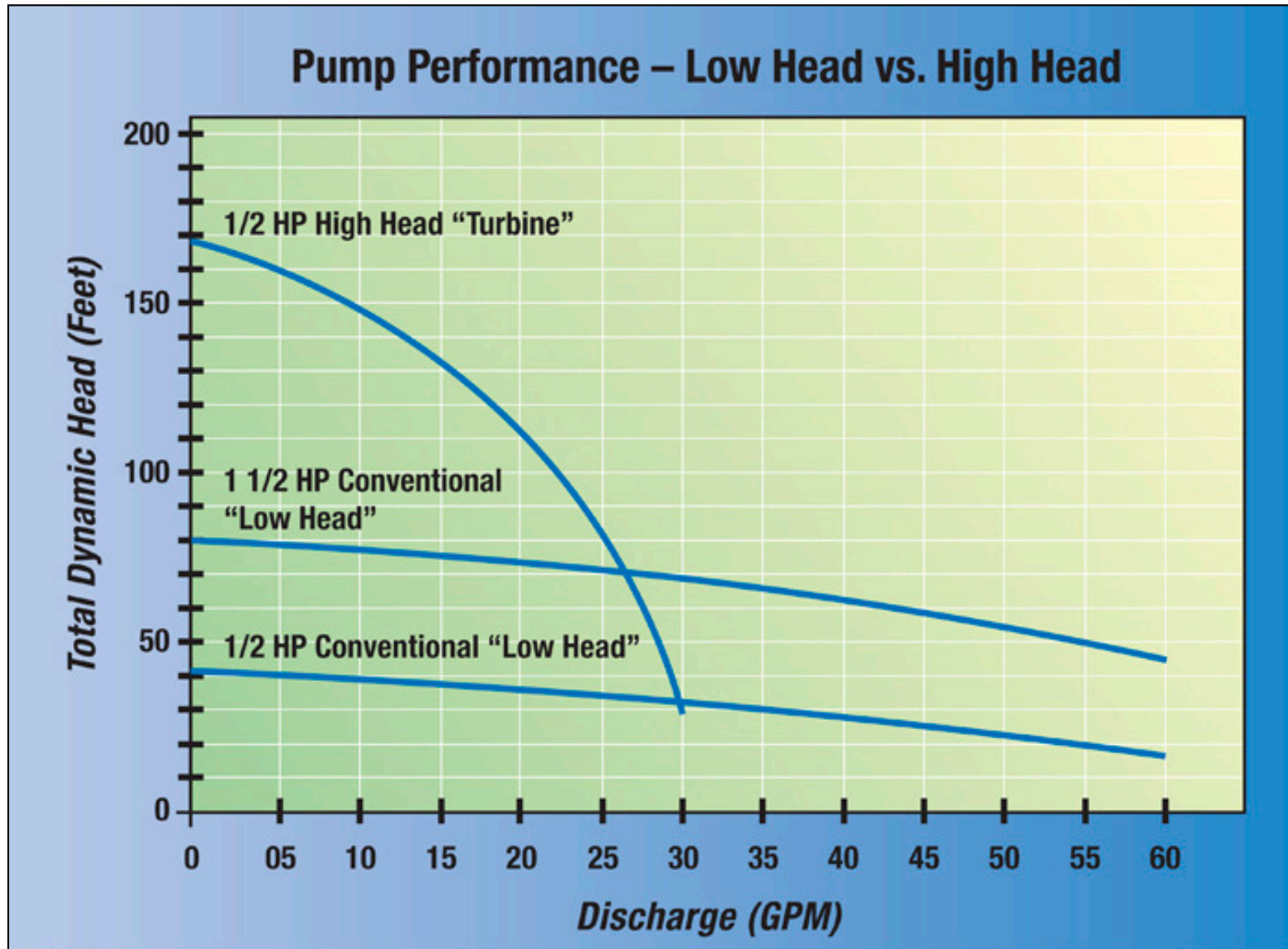


# Effluent Pump

- UL/CSA Listed
  - Corrosion resistant
  - Lightweight
  - Easy to service
- 
- PF Series
  - PVA Series
  - P Series



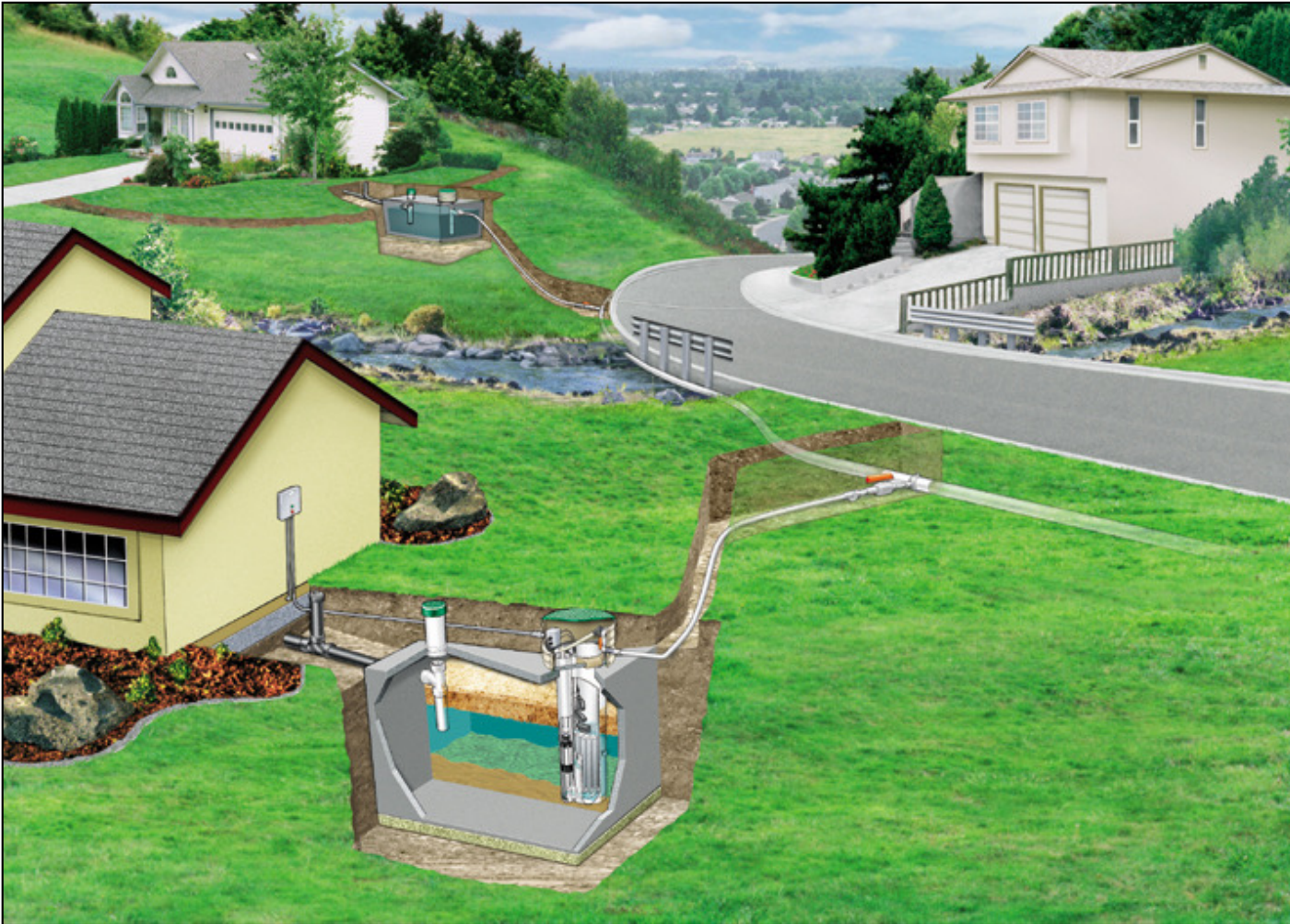
# Pump Selection



# Applications

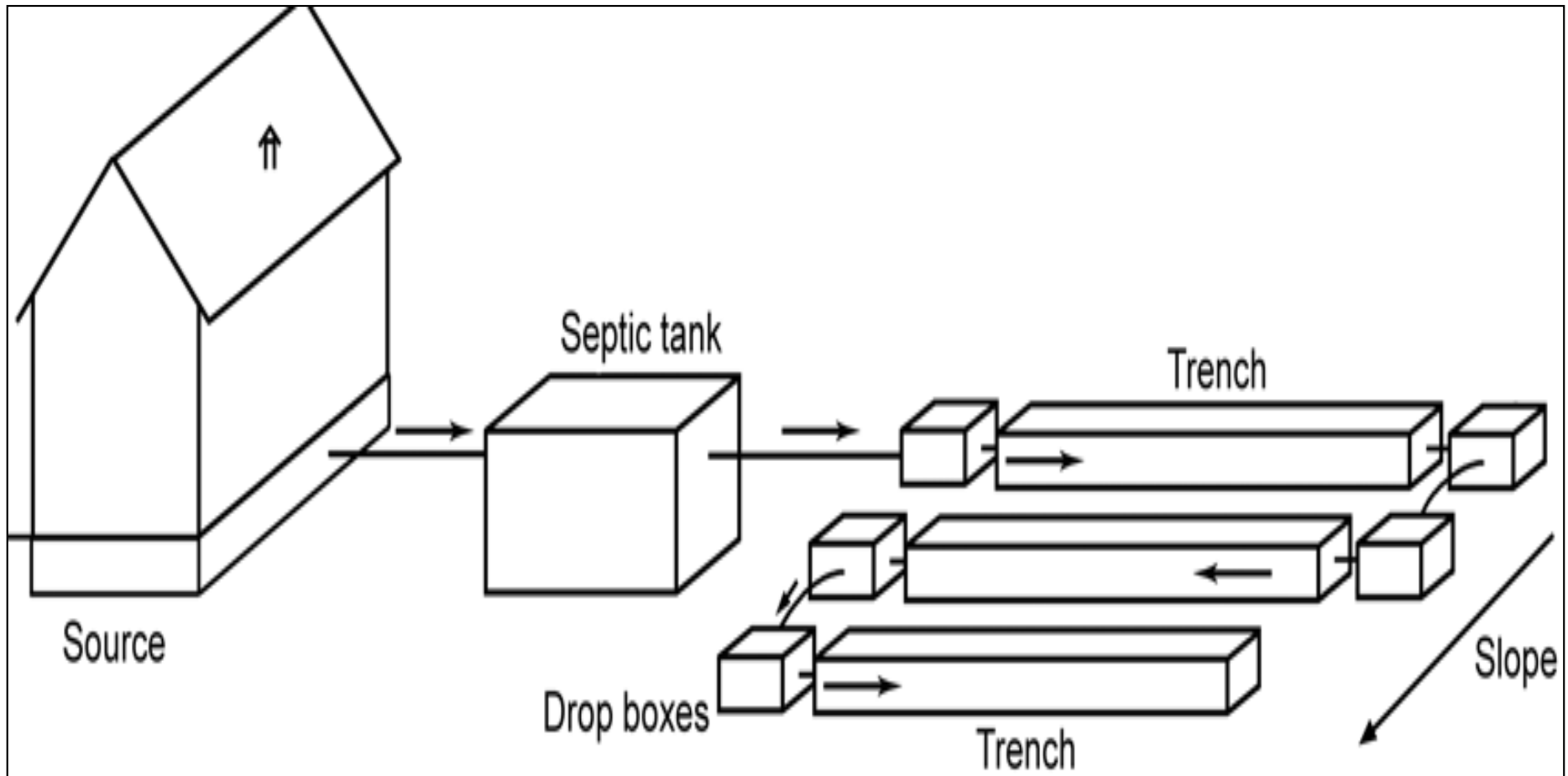
# Pumping Systems

- Effluent sewer pumping collection systems



# Pumping Systems

- Serial distribution utilizes drop boxes



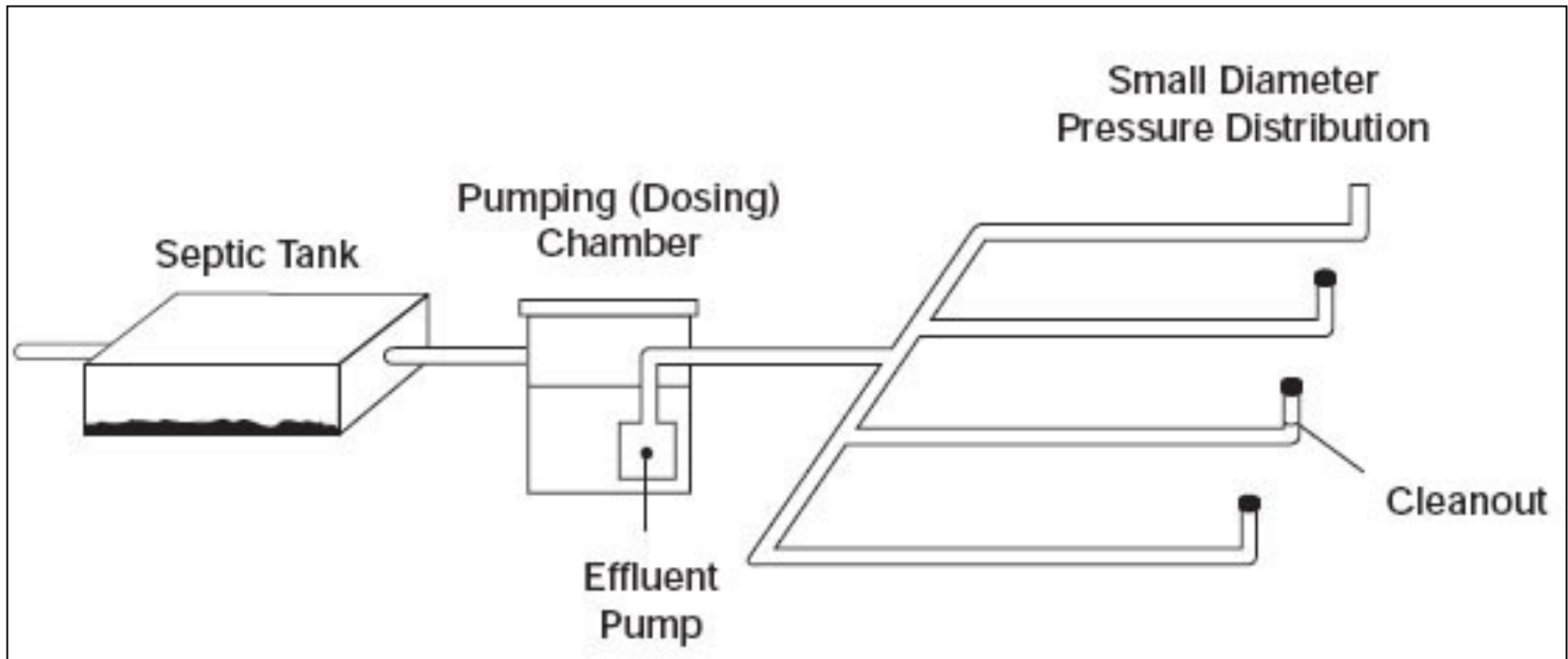
# Pumping Systems

- Equal distribution box



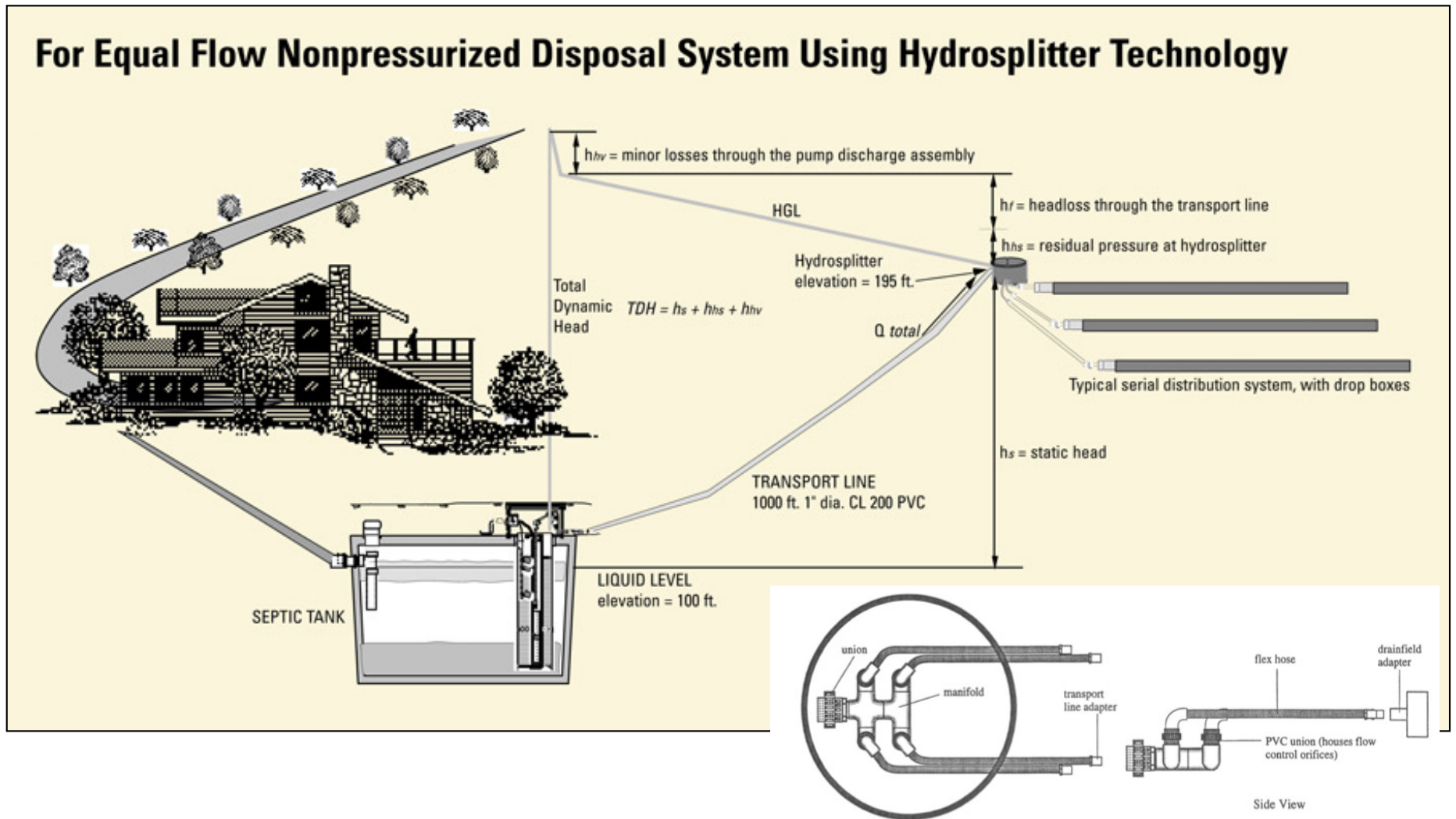
# Pumping Systems

- Equal distribution – pressurized laterals



# Pumping Systems

- Hydrosplitter





# Flow Control Disks



# Hydrosplitter Example

# 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
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## Frictional Head Losses

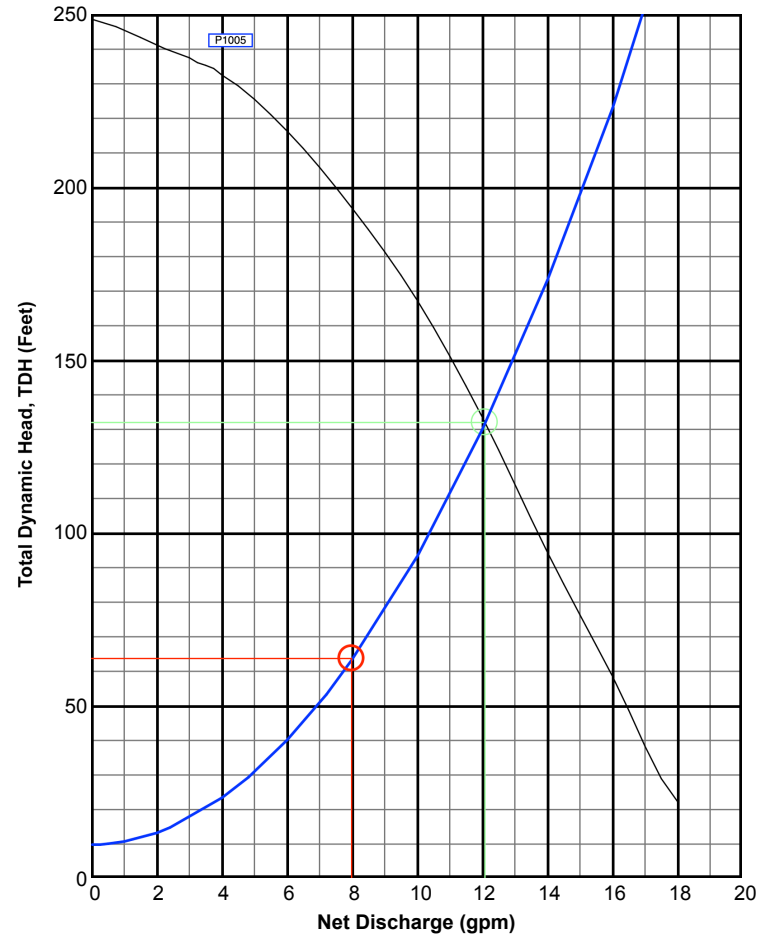
Loss through Discharge	48.0	feet
Loss in Transport	3.7	feet
Loss through Valve	0.0	feet
Loss through Flowmeter	0.0	feet
'Add-on' Friction Losses	2.0	feet

## Pipe Volumes

Vol of Transport Line	4.5	gals
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## 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"

# Floats

# 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



# 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

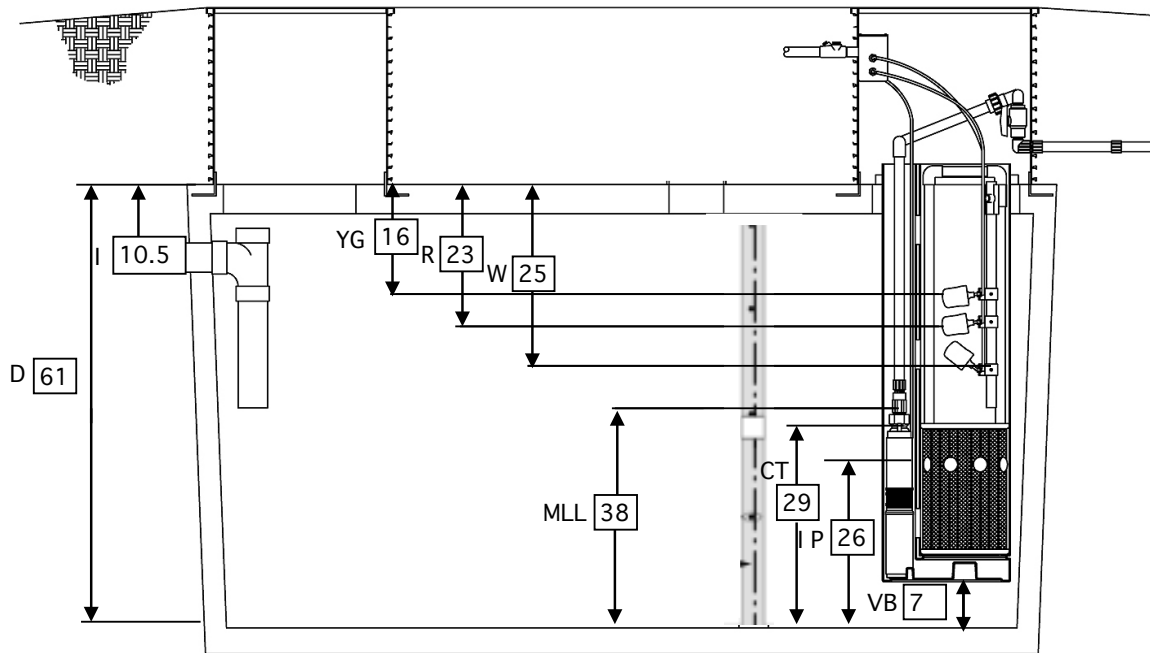
Application: Sand Filter  
 Design Flow = 450 gpd  
 32 Gallons/Inch  
 PVU57-1819  
 MVP-S1DM Control Panel  
 MF3A-YG,R,W  
 Enlet Hole Location = 68%  
 PF300511 MLL 20"



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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

# Timer Settings

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

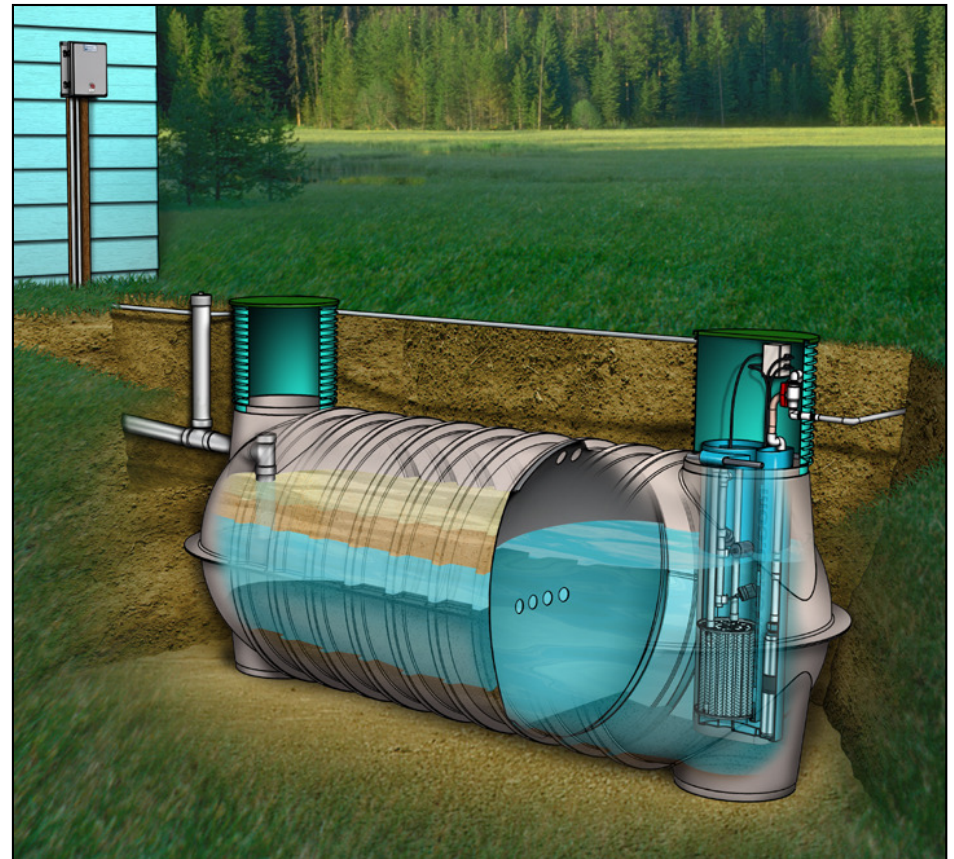
# Timer Settings

- Program Panel
  - Electromechanical
  - PLC



# 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.





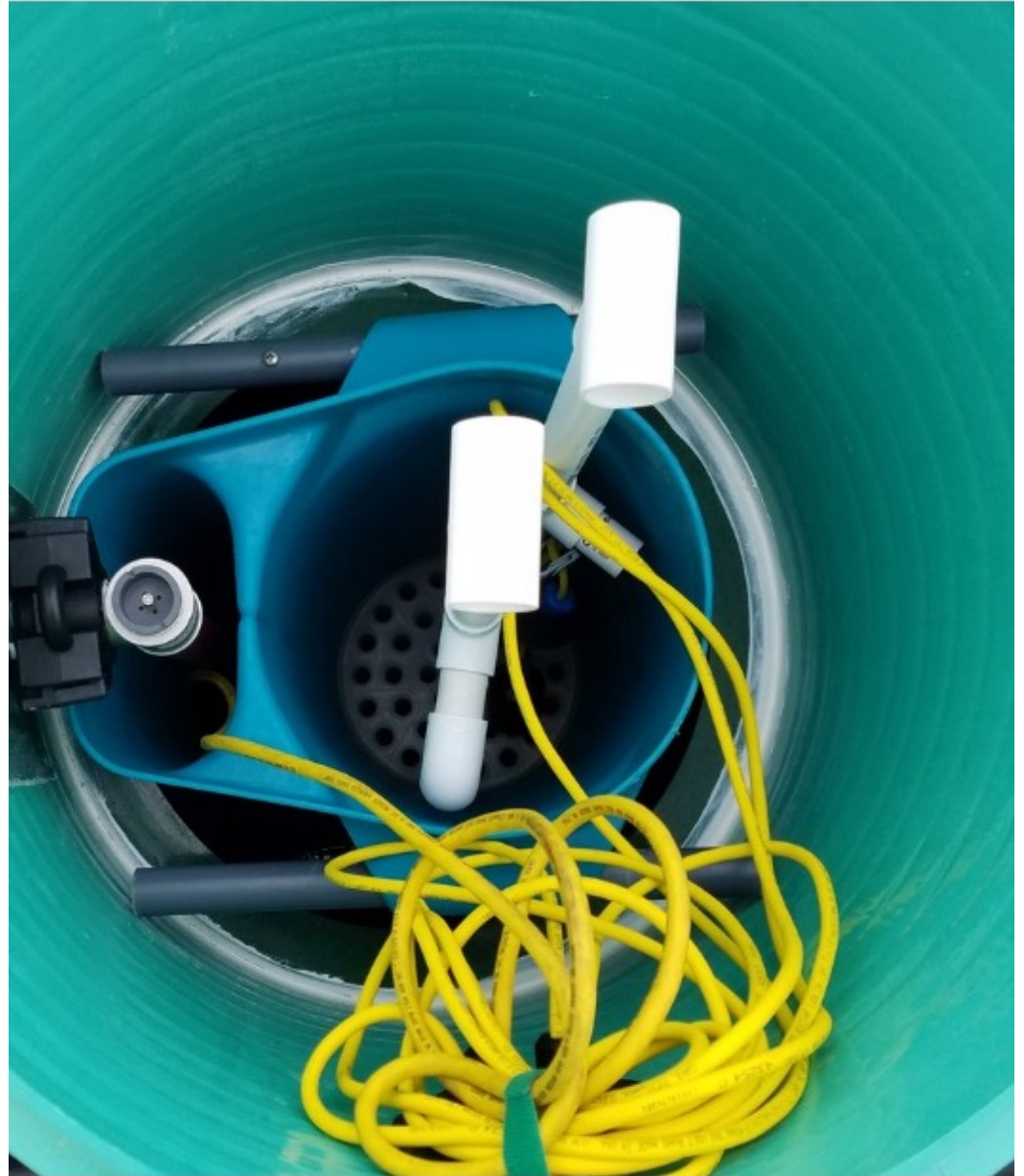
# Pump Vault/Pump/H&V

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

# Floats

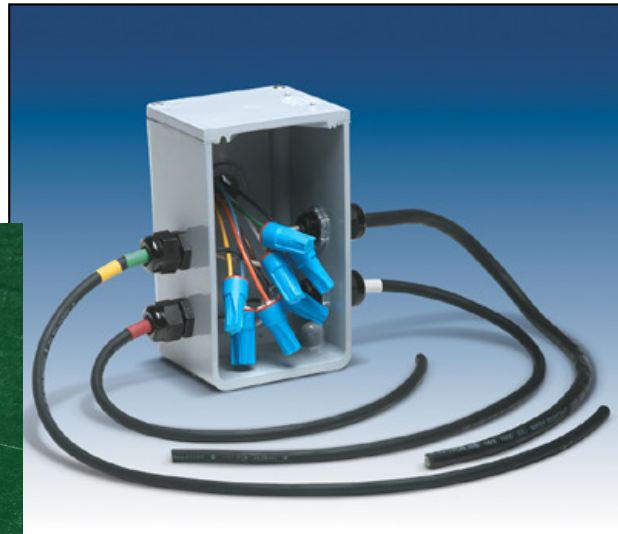
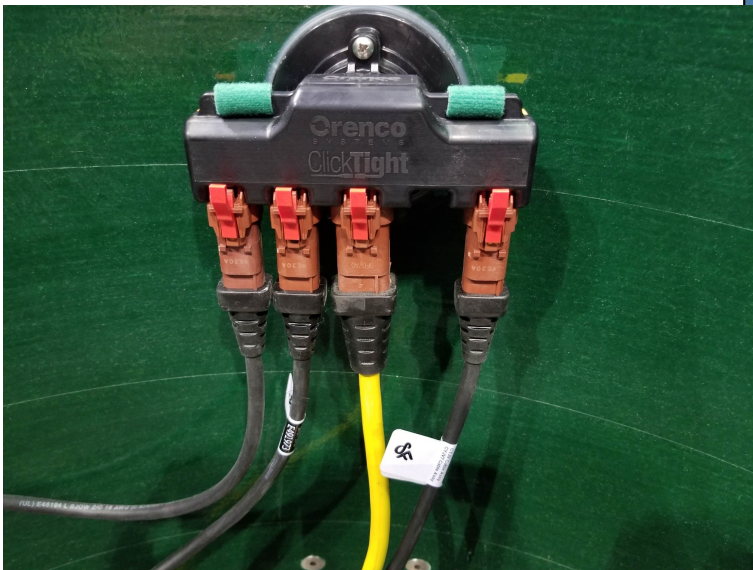
- Double check your float settings and document
- Make sure the floats have a clear path to move up/down
- Get the cords out of the way





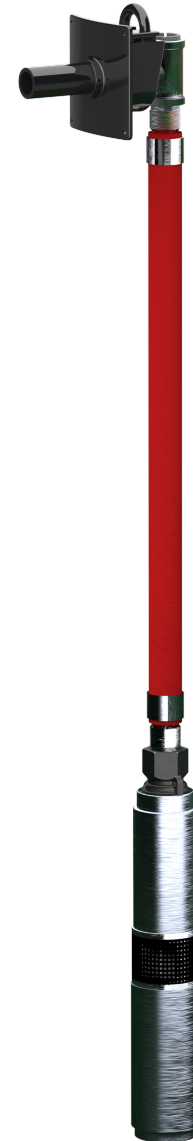
# Splice Box

- 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



# 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



# 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

# Summary

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

# *Solutions for Decentralized Wastewater Treatment*

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