Residential Advantex Design

Our Presenter

David Shriver

David Shriver is a Technical Sales Representative with Orenco Systems, a company based in Sutherlin, Oregon, that engineers and manufactures innovative infrastructure solutions. In this role, he works with customers to familiarize them with Orenco's products and help them select the appropriate equipment for their projects. He also assists Orenco's technical sales representatives in providing purchase orders and sales quotes.

David has several years of previous customer service experience that includes troubleshooting system issues, preparing parts orders, and helping customers become familiar with products. When he's not on the job, he enjoys spending time with his son and coaching him in various sports, including baseball and basketball.

AdvanTex® Design Module Outline

- AX20 Pod and AXRT configurations
- Processing tank requirements
- Performance data
- System configurations
- Ventilation requirements
- UV Disinfection
- Power requirements
- Siting considerations
- Effluent reuse

Sustainability

"Advanced onsite wastewater treatment systems are a permanent part of the nations infrastructure and must be managed as such."

Albert Rubin – Professor Emeritus, NC State University

AX20 Pod

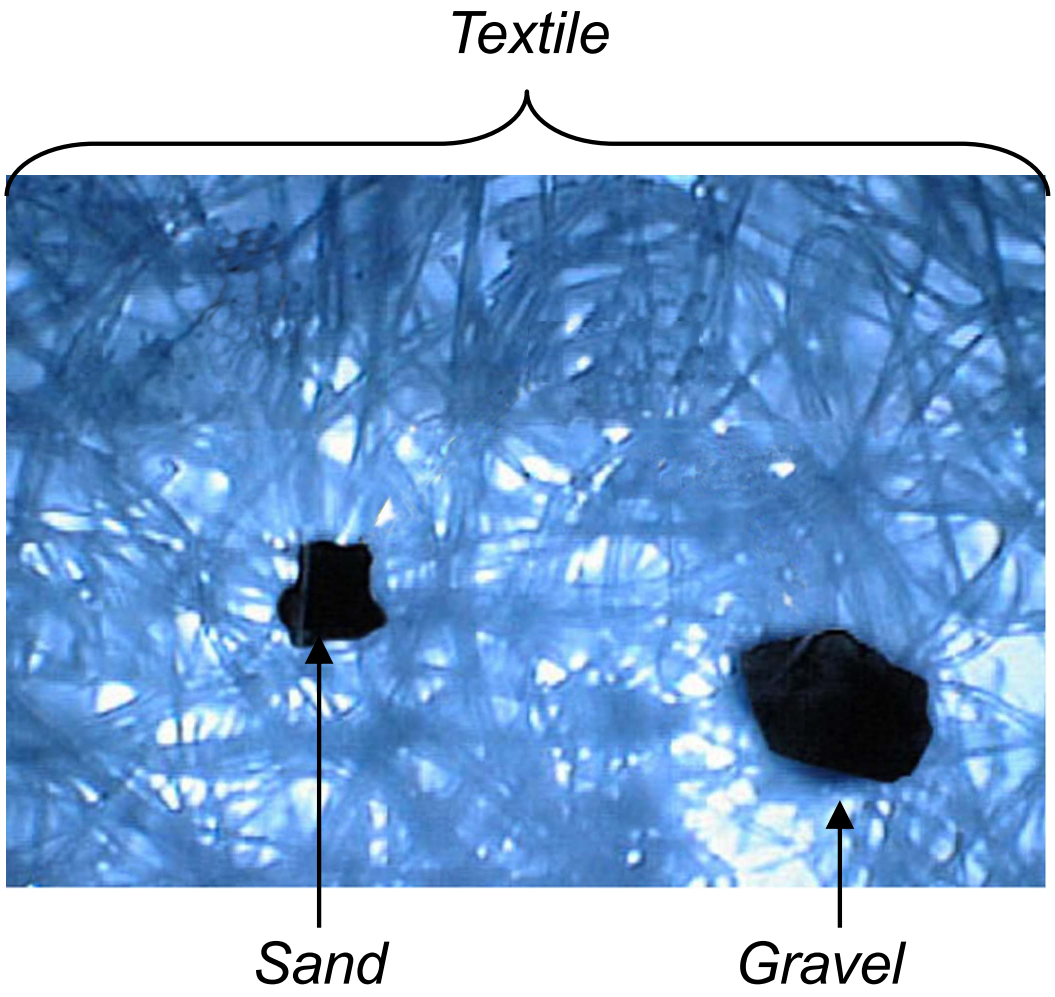
- Physical specifications
  - ~ 7.5' x 3' x 2.5'
  - ~ Footprint: ~23 sq. ft.
  - ~ Dry weight: ~300 lb.

AX20 Pod

- Uses hanging textile sheets
- Can withstand occasional abnormally high loading conditions
- Has outstanding serviceability

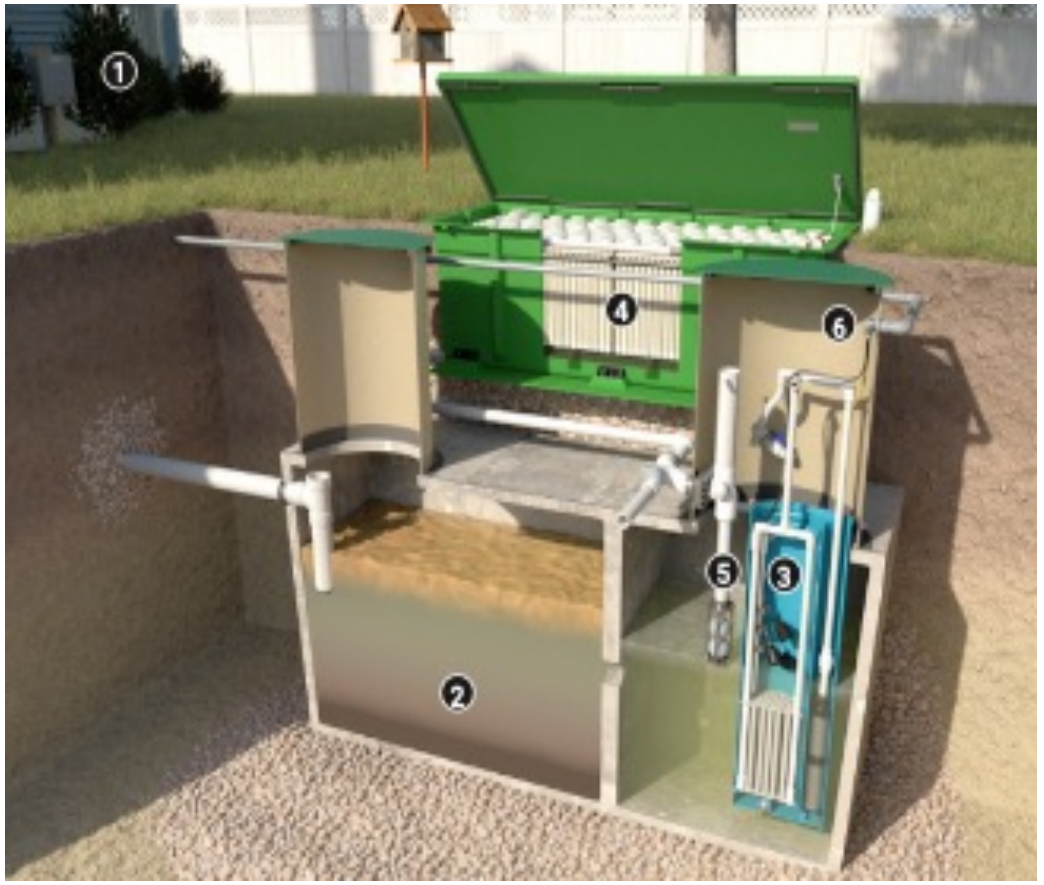
Textile Offers Greater Surface Area

- Specifically engineered textile fabric
- 5-20 times more surface area than sand (ft^2 per ft^3 of material)
- The more surface area, the more area for bacterial growth
- Allows for much higher loading rates than sand filters



AX20 Configuration

1. Control Panel
2. Processing Tank
3. Biotube® pump package
4. AX20 Pod
5. Recirculating Splitter Valve
6. Riser and lid
7. Antiflotation Flanges

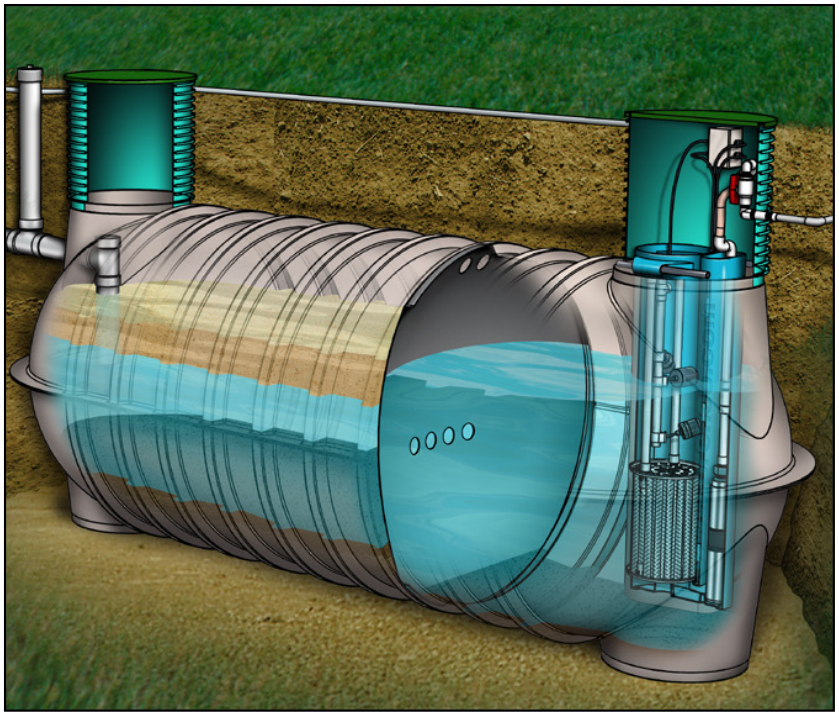


Antiflotation Flanges

- Set the unit on a raised surface with access to the underside
- Align flanges with the pre-drilled brackets at the bottom of the unit
- Use the bracket holes as pilots to drill 17/64-in (7-mm) holes in the flanges
- Attach flanges to brackets with included hardware

Processing Tank Requirements Residential

- Two-compartment tank with “center pass-through” design
- Must be structurally sound and watertight
- Must be from Orenco-approved tank manufacturer/design
- Minimum 12-square-inch pass-through port in baffle wall
- The center pass through must be located at 65 to 75% of minimum liquid level



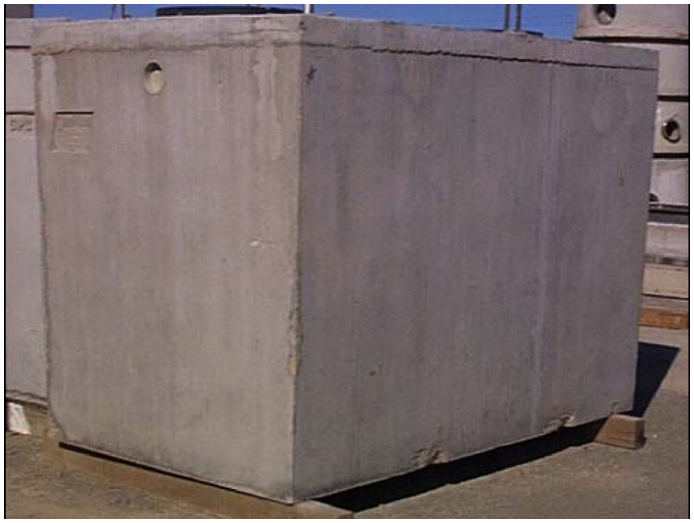
Materials of Tank Construction

Tanks must meet the below requirements

- Must be made of Concrete, DCPD or High- Quality Plastic
- Meet Orenco's General Specifications Guidelines
- Be approved for use with AdvanTex® Treatment Systems

Materials of Tank Construction

- Concrete
- DCPD Orenco Meandor
- High Quality Plastic Infiltrator



Residential Waste Strength Screened Effluent*

	Average *mg/L*	Weekly Peak *mg/L*	Rarely Exceed *mg/L*
$cBOD_5$	**150**	200	300
TSS	**40**	60	150
TKN	**65**	75	150
G&O	**20**	25	25

** From structurally sound and watertight tanks.*

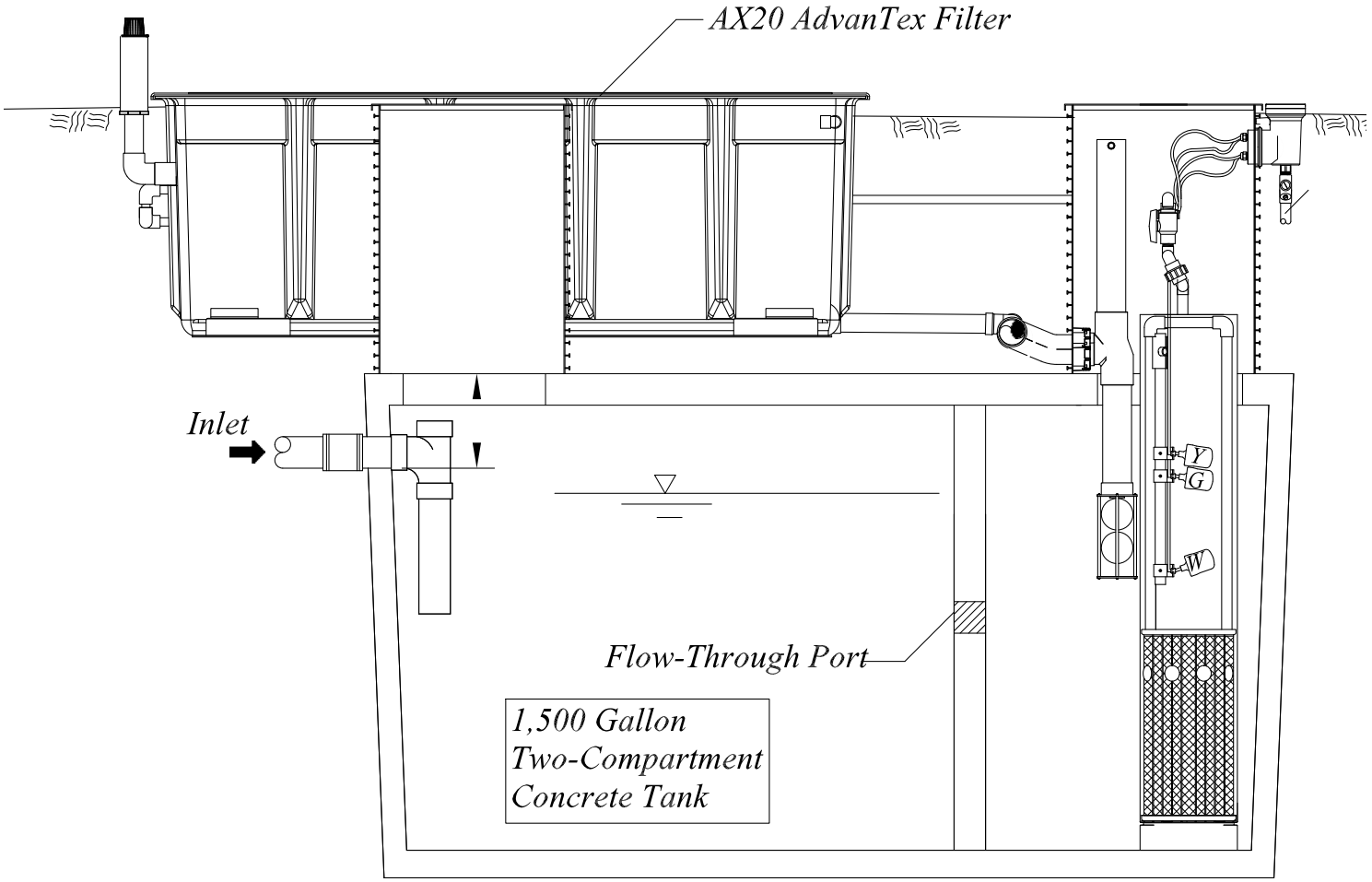
Modes of Operation

- AdvanTex® Treatment Systems available in two different modes
  - Mode 1: BOD_5 and TSS the primary concern
  - Mode 3: Nitrogen reduction maximized
- Mode determined by local and state regulations

Nitrogen Reduction

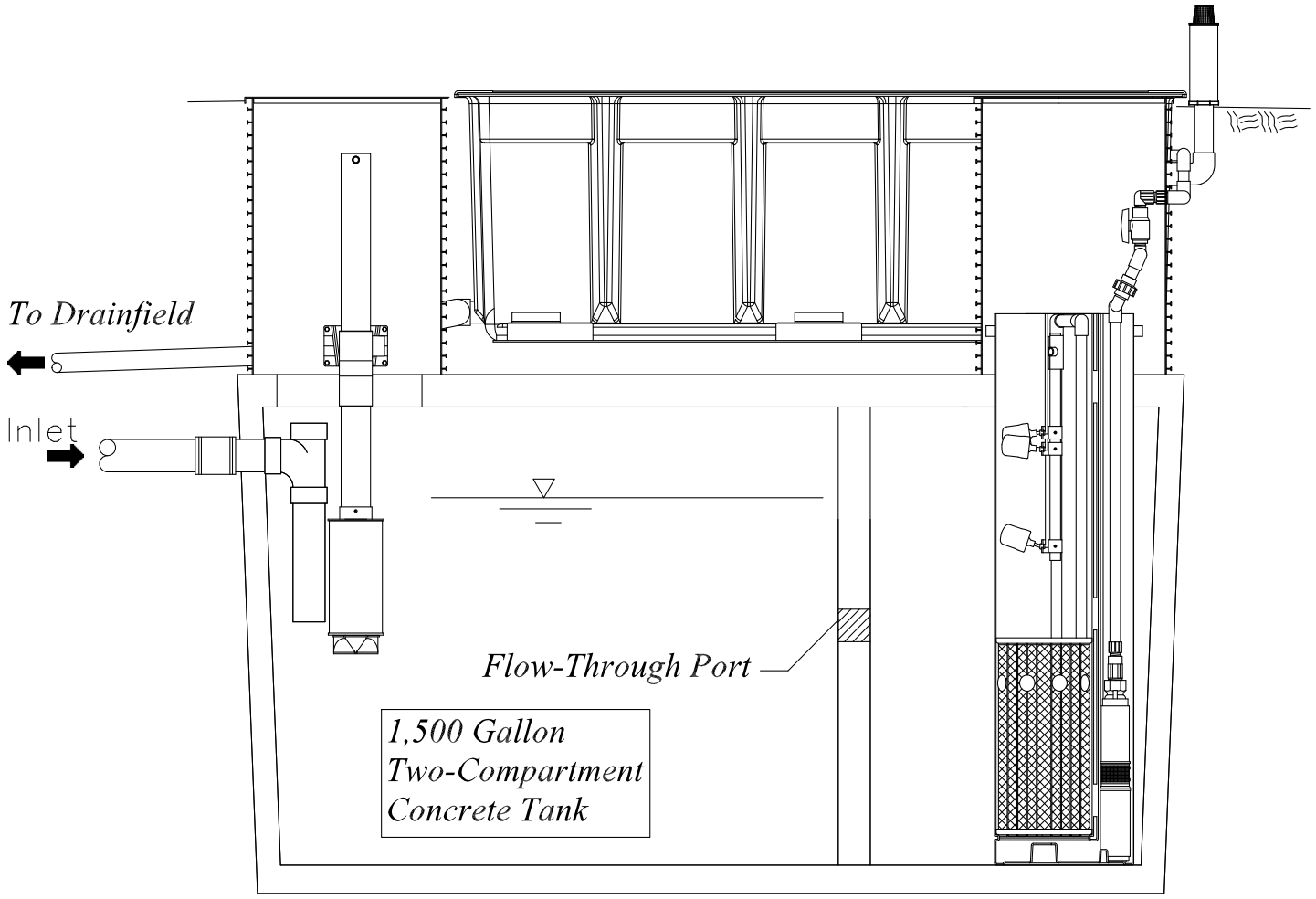
- Depends on wastewater alkalinity, strength, pH, FOG
- Mode 1: Typically get 60% reduction
- Mode 3: Typically get 70% reduction

Mode 1B: Standard Configuration – AX20



Recirculates through 2nd chamber: Filtrate discharge.

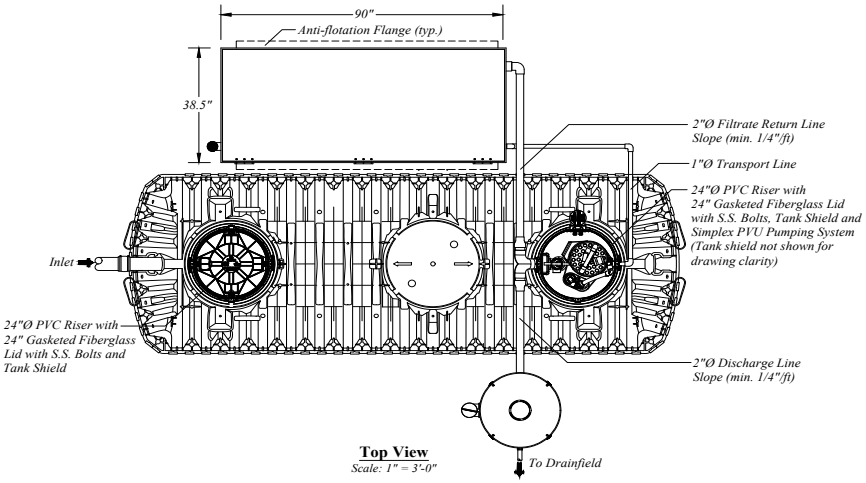
Mode 3B: Maximizing Nitrogen Reduction - AX20



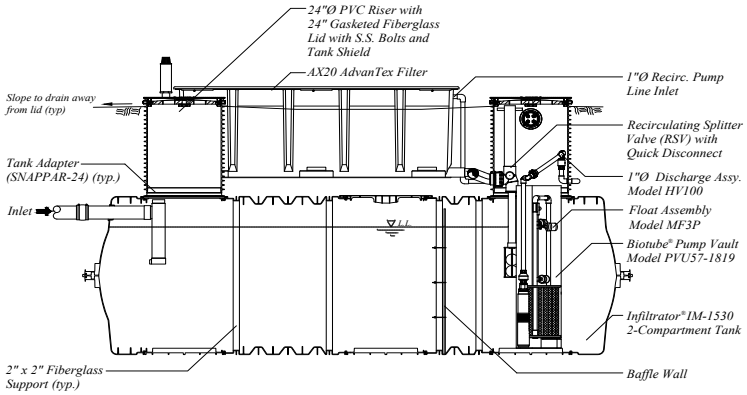
Recirculates through both chambers: Filtrate discharge

AX20 Mode 1B w/ Infiltrator IM-1530 Tank

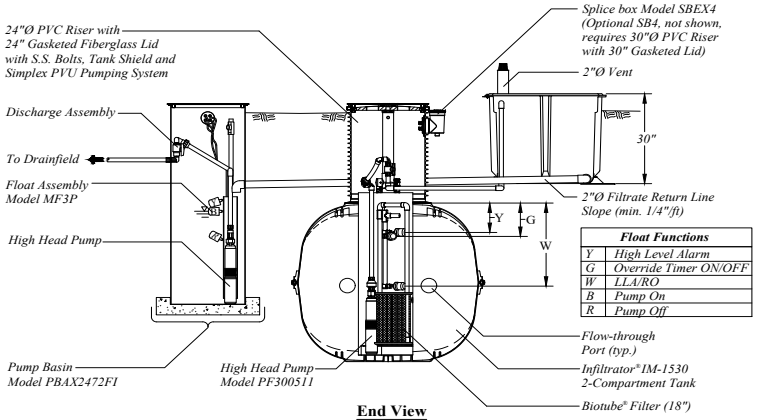
AdvanTex® AX20 Mode 1B w/ Infiltrator® IM-1530 Tank



Top View
Scale: 1" = 3'-0"



Side View
Scale: 1" = 3'-0"



End View
Scale: 1" = 3'-0"

Design Notes

For residential strength waste up to 4 bedrooms.

Installation to be performed by an AdvanTex Authorized Installer only.

Start-up and service to be performed by an AdvanTex Authorized Service Provider only.

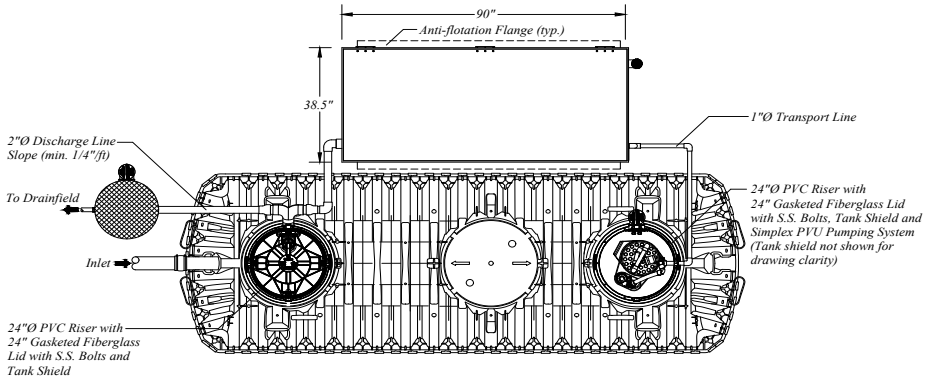
Orenco SYSTEMS

Disclaimer: This Proposed System Configuration Drawing is provided solely as a design aid and illustrates one possible configuration of a system that would comply with Orenco's design criteria for the requirements and/or specifications that have been communicated to Orenco (based on third-party standards testing protocols and performance reports, as applicable). Design decisions, including the actual layout and configuration of the system and its viability for the project, are at the sole discretion of the systems's designer.

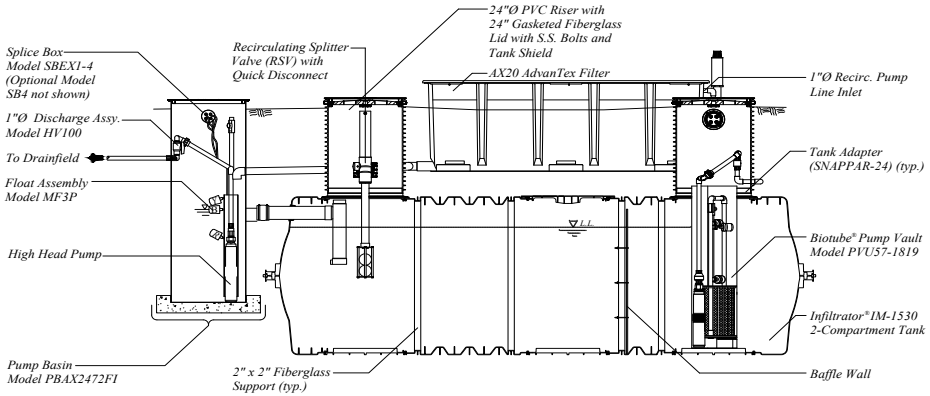
AX20 Mode 1B with Infiltrator® IM-1530 Tank	Drawn By: BAS	Scale: 1" = 3'-0"	
	Reviewed By: CL	Sheet: 1 OF 1	
Design Aid	File Name: NDW-TDD-AXR-15.DWG	Rev: 1.0	Date: 1/30/2025

AX20 Mode 3B w/ Infiltrator IM-1530 Tank

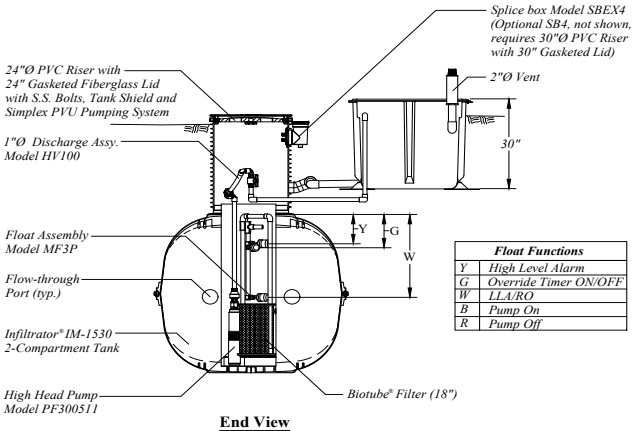
AdvanTex® AX20 Mode 3B w/ Infiltrator® IM-1530 Tank



Top View
Scale: 1" = 3'-0"



Side View
Scale: 1" = 3'-0"



Float Functions	
Y	High Level Alarm
G	Override Timer ON/OFF
W	LLA/RO
B	Pump On
R	Pump Off

End View
Scale: 1" = 3'-0"

Design Notes

For residential strength waste up to 4 bedrooms.

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Orenco SYSTEMS

AX20 Mode 3B with Infiltrator® IM-1530 Tank

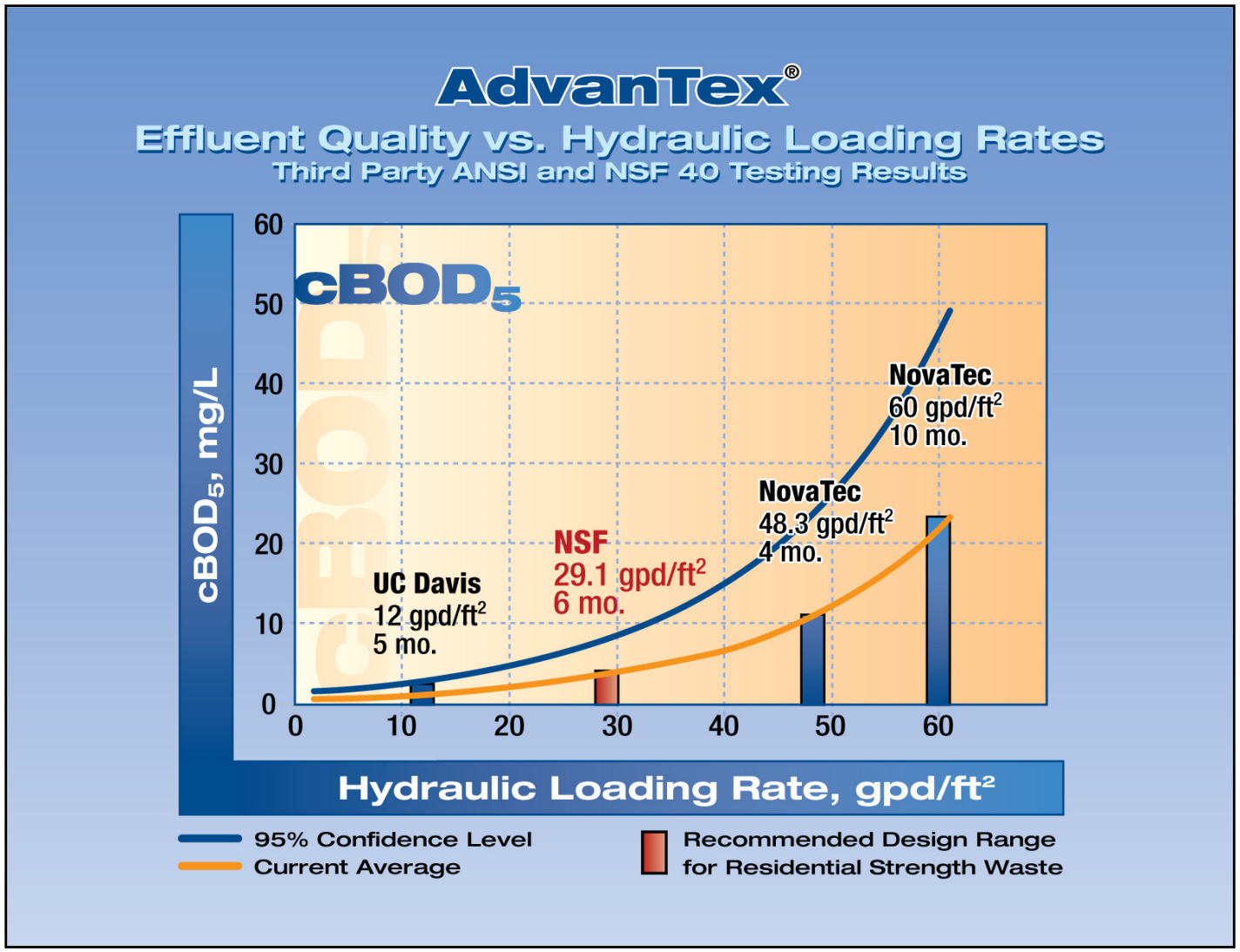
Design Aid

Drawn By:	BAS	Scale:	1" = 3'-0"
Reviewed By:	CL	Sheet:	1 OF 1
File Name:	NDW-TDD-AXR-17.DWG	Rev:	1.0
		Date:	1/30/2025

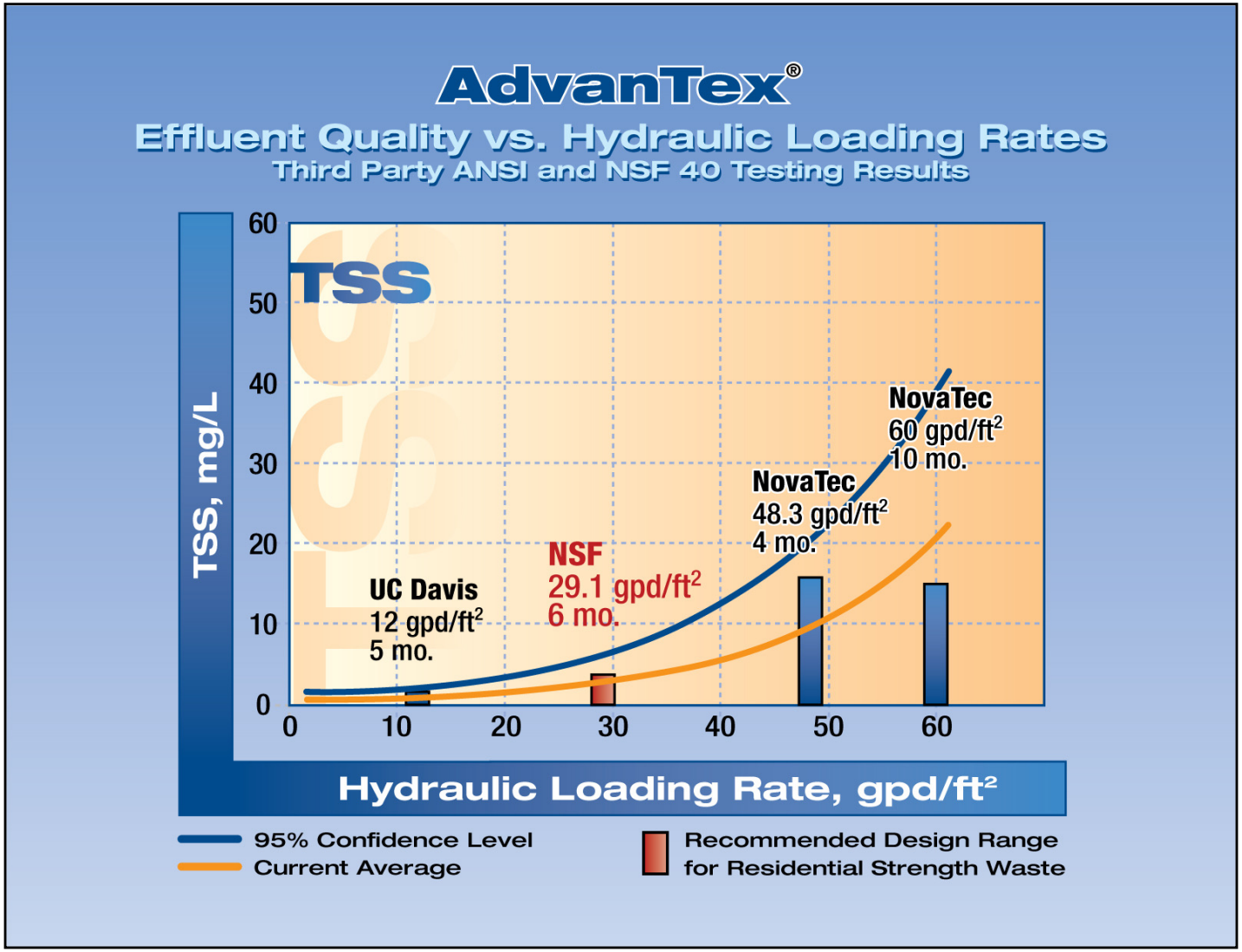
Performance Data Sources

- NSF 40 testing and evaluation to ANSI standards
- NovaTec testing and evaluation to ANSI standards
- EPA national demonstration projects
- State demonstration projects
- University research projects
  - ~ UC Davis, University of MN
- Private installations
  - ~ Throughout U.S., Canada, New Zealand

Performance vs. Loading Rates, $cBOD_5$



Performance vs. Loading Rates, TSS



Design Flow and Loading Rates

DEFINITION OF DESIGN FLOW

- The maximum daily flow a residence is expected to produce
  - Allows for a safety margin and reserve capacity during periods of heavy use

DESIGN LOADING RATES

- AX20 Nominal loading rate is 25 gpd/square foot or 500 gpd
- AX20 Peak loading rate is 29.9 gpd/square foot or 600 gpd

Required Number of Filter Units and Tankage*

Table 2. Required Tankage and Number of Filter Units: Systems Using Single Processing Tank

Number of Bedrooms[1]	Occupants[2] *maximum*	Processing Tank *minimum size, gal. (L)*	AX Units[4] *model*
4 (or fewer)	8	1,500 (5,700)	1 – AX20[5]
5	10	2,500 (9,500)	2 – AX20[5]
6	12	3,000 (11,400)	2 – AX20[5]

Table 3. Recommended Tankage and Number of Filter Units: Systems Using Separate Septic/Recirc Tanks*

Number of Bedrooms[1]	Occupants[2] *maximum*	Septic Tank *minimum size, gal. (L)*	Recirc Tank[3] *minimum size, gal. (L)*	AX Units[4] *model*
4 (or fewer)	8	1,000 (3,800)	1,000 (3,800 L)	1 – AX20[5]
5	10	1,500 (5,700)	1,000 (3,800 L)	2 – AX20[5]
6	12	2,000 (7,600)	1,000 (3,800 L)	2 – AX20[5]

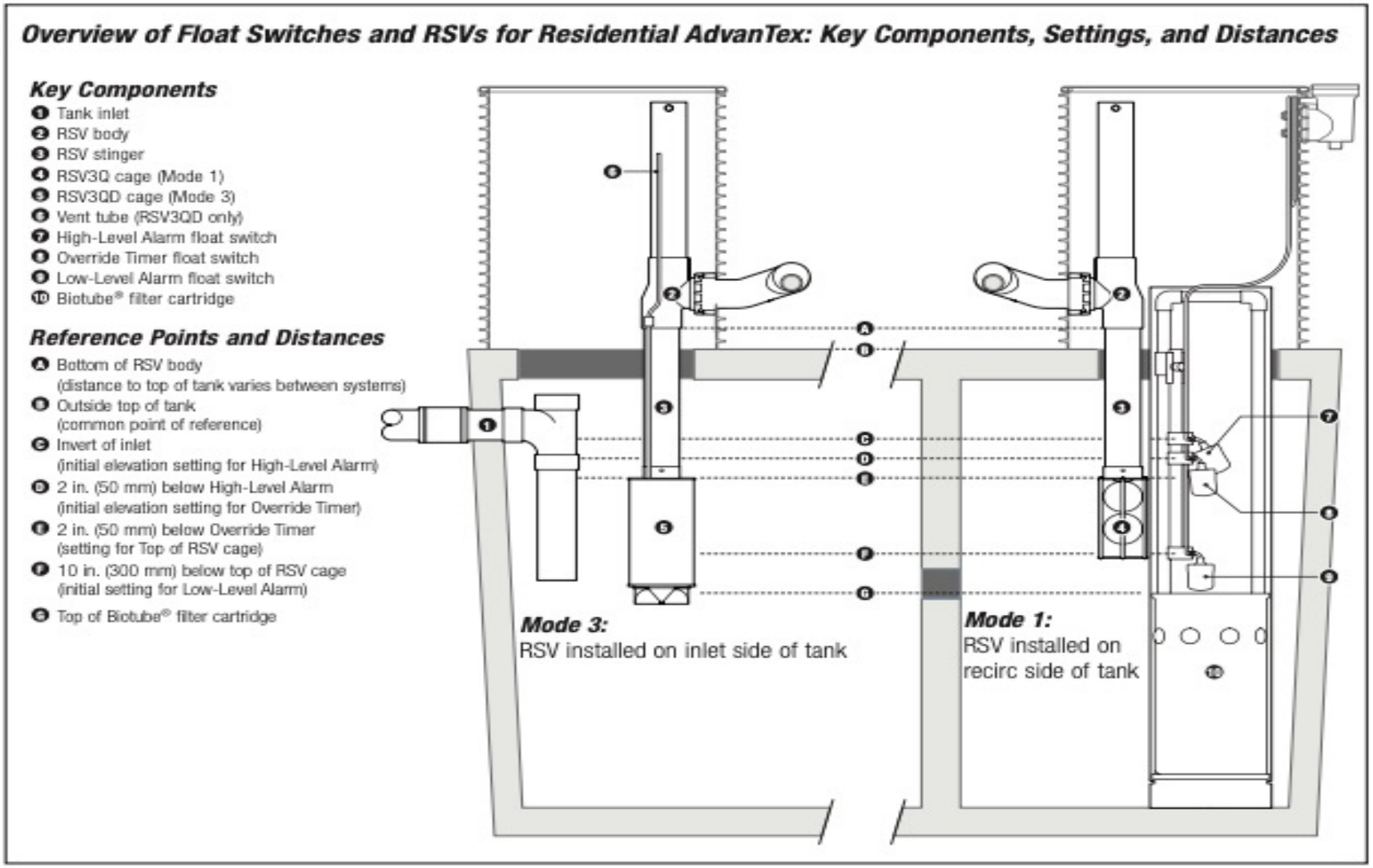
** In jurisdictions which require separate septic and recirc tankage, contact Orenco for options.*

System applications > 6 bedrooms will require a design review by Orenco

System Configurations

- Processing tank liquid levels
- Programmable timer settings

Processing Tank RSV and Float Settings



AX20 Recirculation Ratio

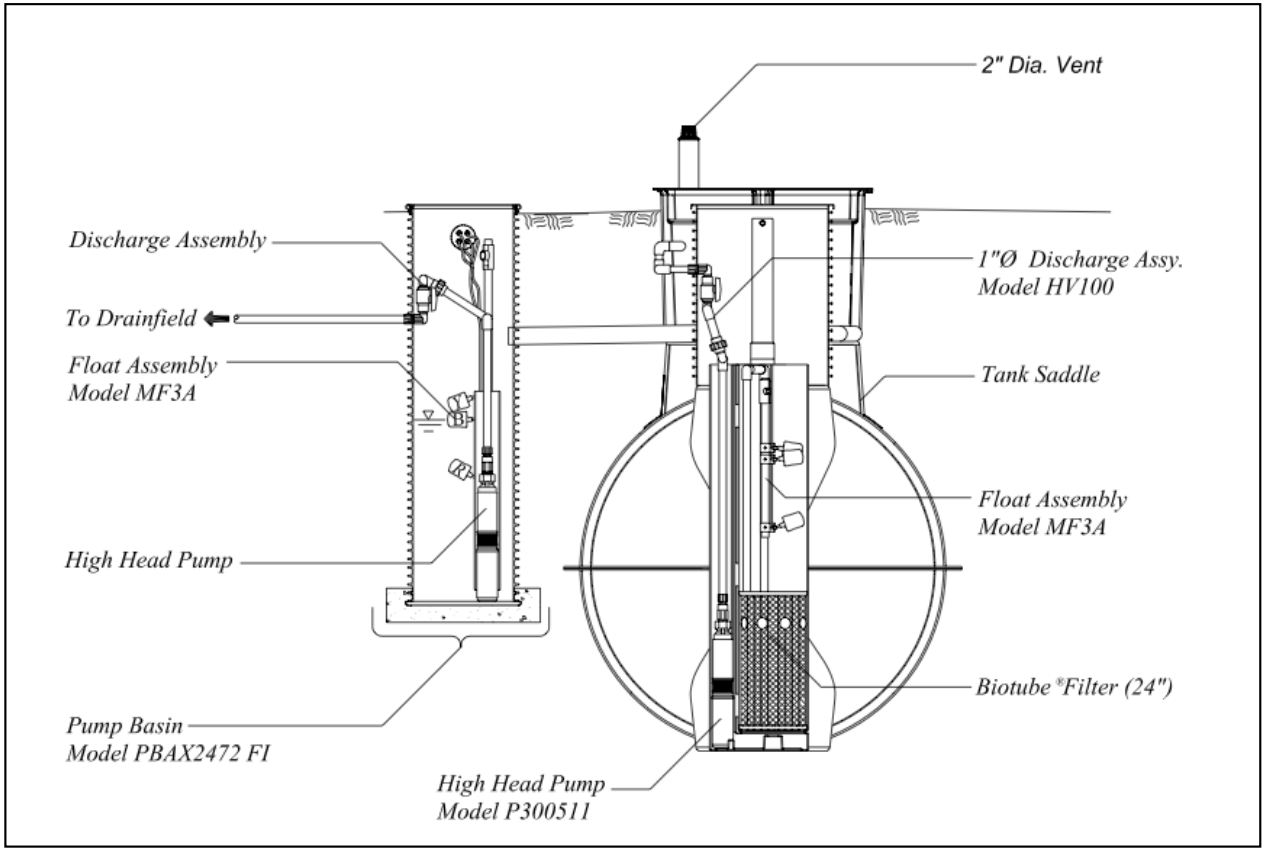
- Initial timer settings based upon expected average daily flows
- 72 to 300 cycles per day (typically a 20-minute cycle time)
- Typically 72 cycles per day
- Initial recirculation ratio 4:1
- Recommended timer settings for 4 people
  - The “On” time is set for 20 seconds
  - The “Off” time is set for 20 minutes
  - Refer to AX20 Design Criteria or O & M manual for recommended timer settings

Ventilation Requirements

- Passive air vent
  - 2" vent line
  - 20’ or less including any vertical distance
  - No moving parts
  - No power usage
  - Carbon-impregnated cartridge
  - Very Serviceable

AX20 Discharge Equipment

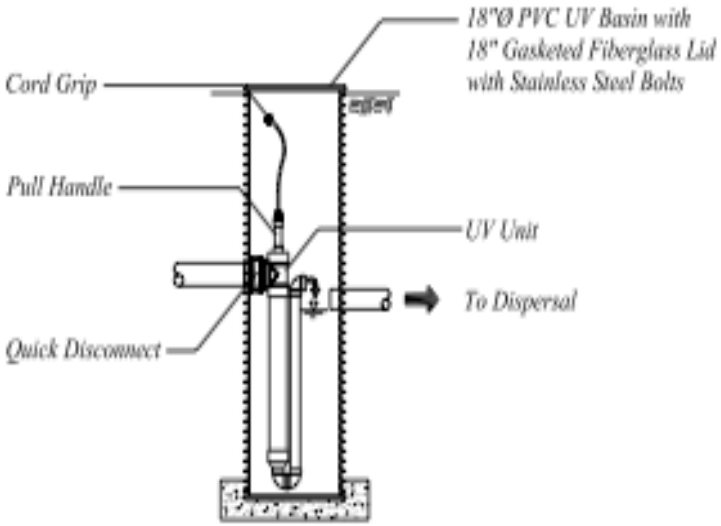
- Pump Discharge to Final Dispersal
  - ~ 10, 20, 30 and 50 gpm options
  - ~ Pump Basin
  - ~ Pump Tank



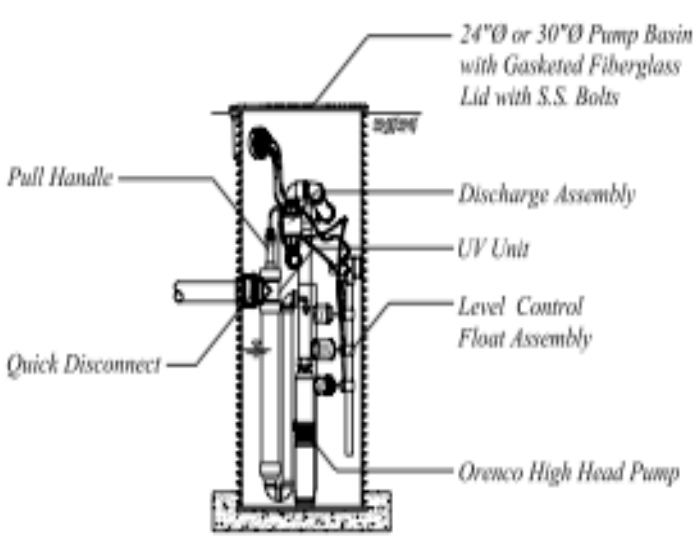
UV Disinfection

- Orenco UV Disinfection
  - UL Recognized
  - 360º contact zone
  - Ballast in control panel
  - NSF comparative testing meets or exceeds other residential UV units

AX20 UV Discharge Equipment



UV Basin: Gravity Discharge Option
Side View



UV Basin: Pump Discharge Option
Side View

AXRT

Filter Type AX20

- *Physical specifications*
  - ~ *7.5' x 3' x 2.5'*
  - ~ *Textile: ~ 20ft²*
  - ~ *Dry weight: ~ 300 lb.*

Filter Type AXRT

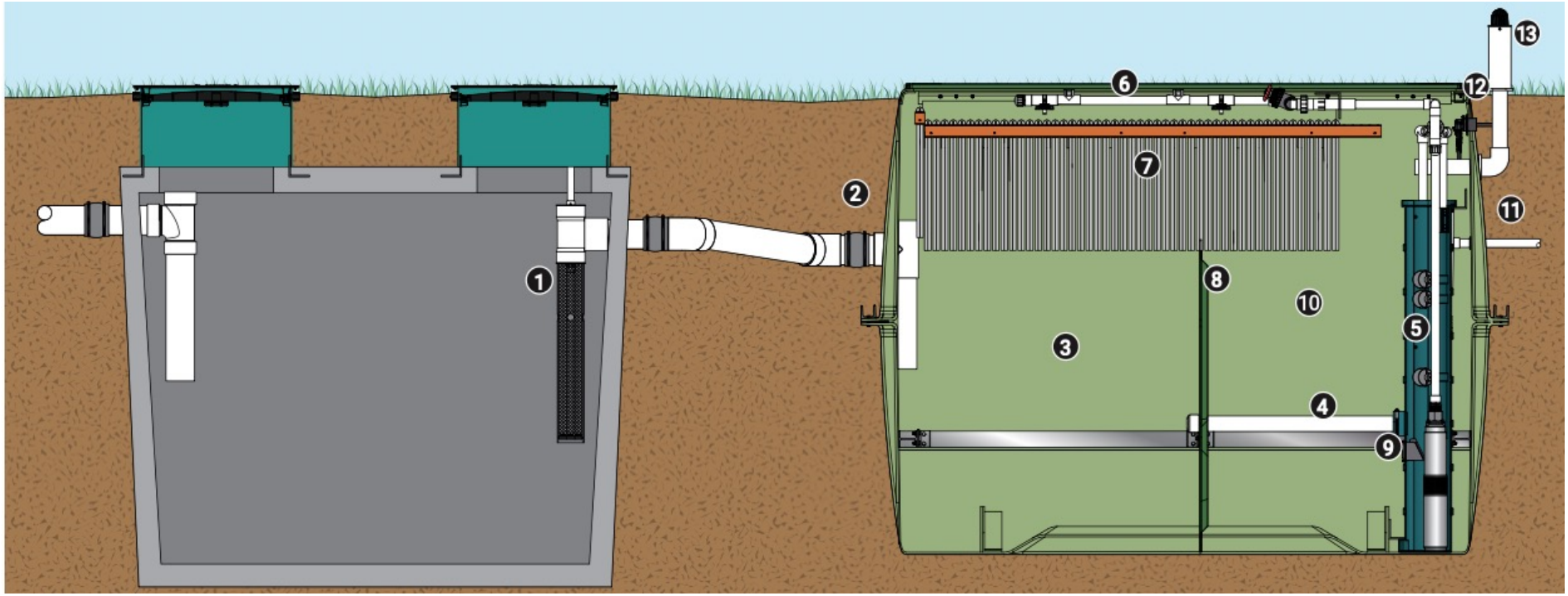
- *Physical specifications*
  - *8.5’x 5’x 6’*
  - *Textile: 20ft² or 25ft²*
  - *Dry weight*
    - *Gravity Discharge - 900 lbs*
    - *Pump Discharge - 940 lbs*

AX Series

- Uses hanging textile sheets
- Can withstand occasional abnormally high loading conditions
- Has outstanding serviceability

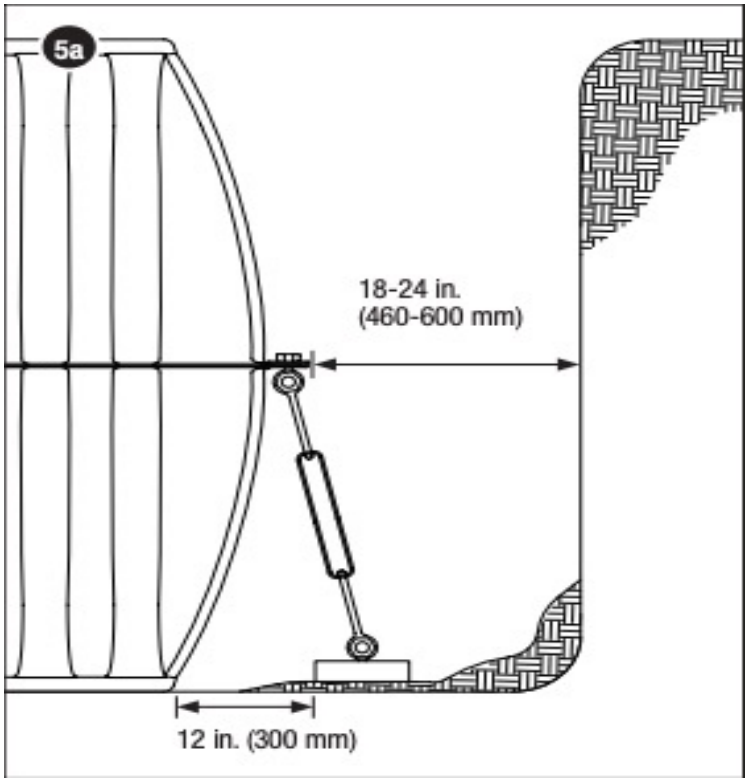
AXRT Configuration

- Control Panel
- Primary Tank
- Vented Effluent Filter
- AdvanTex RT Filter
- Pump System
- Recirc-return valve
- Passive Vent
- Antibuoyancy Deadmen



Antibuoyancy Deadmen

- Deadmen are *recommended* for all installations
- Deadmen are **required** if there is a potential for groundwater to be present in the excavation at any time*
- If you are unsure whether to install antibuoyancy deadmen, consult the system designer or engineer



* the bathtub effect

Antibuoyancy Deadmen

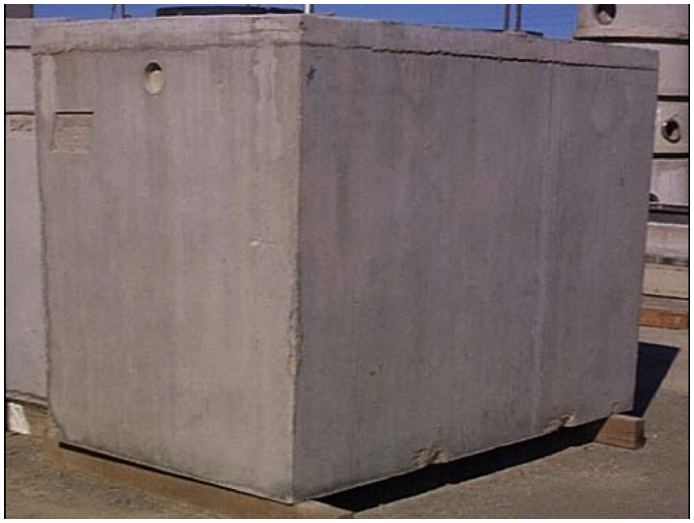
AXRT Processing Tank Requirements

Residential

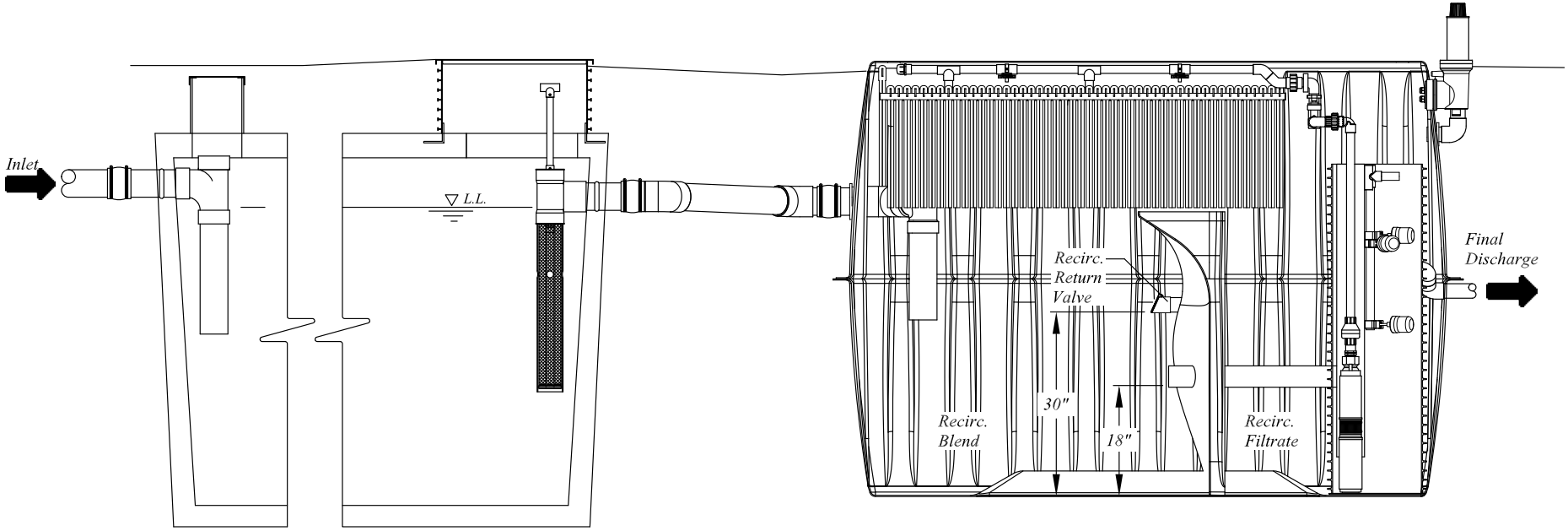
- Tank must…
  - Meets Orenco Minimum Tank Requirements
  - Structurally sound and watertight
  - Be approved for use with AdvanTex®
  - Must have an Orenco effluent filter
    - FTS0444-36
    - PSC0621-18

Materials of Tank Construction

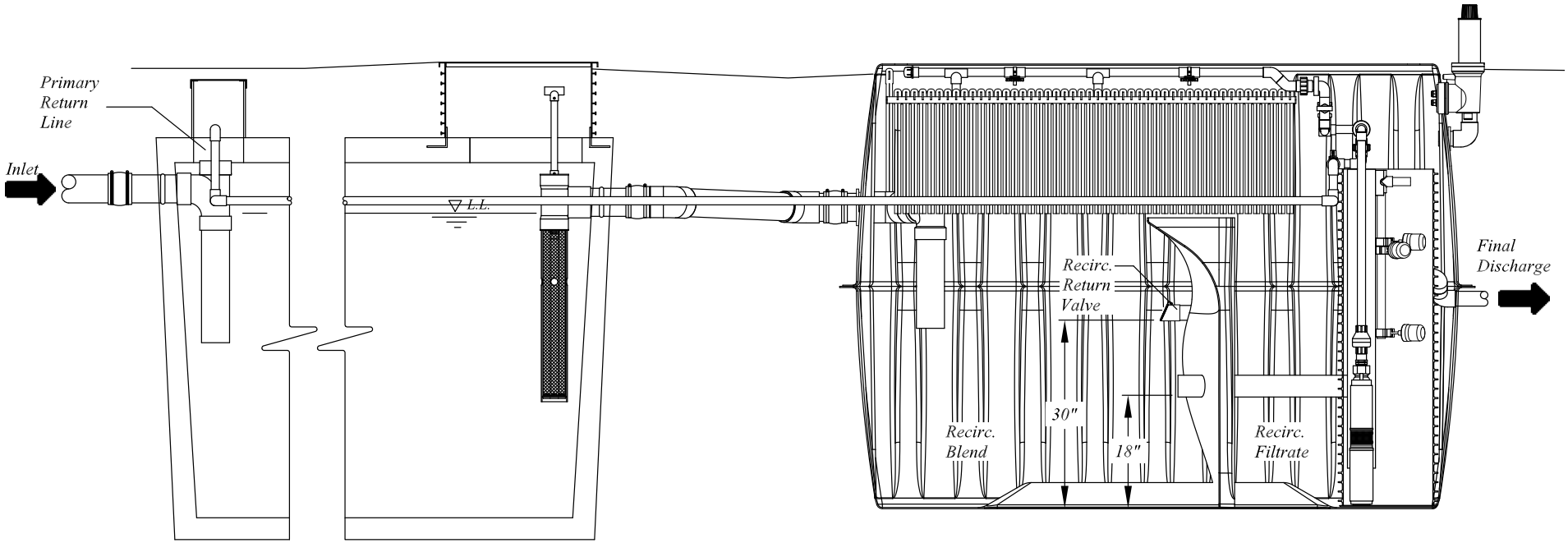
- Concrete
- DCPD
- Approved high quality plastics



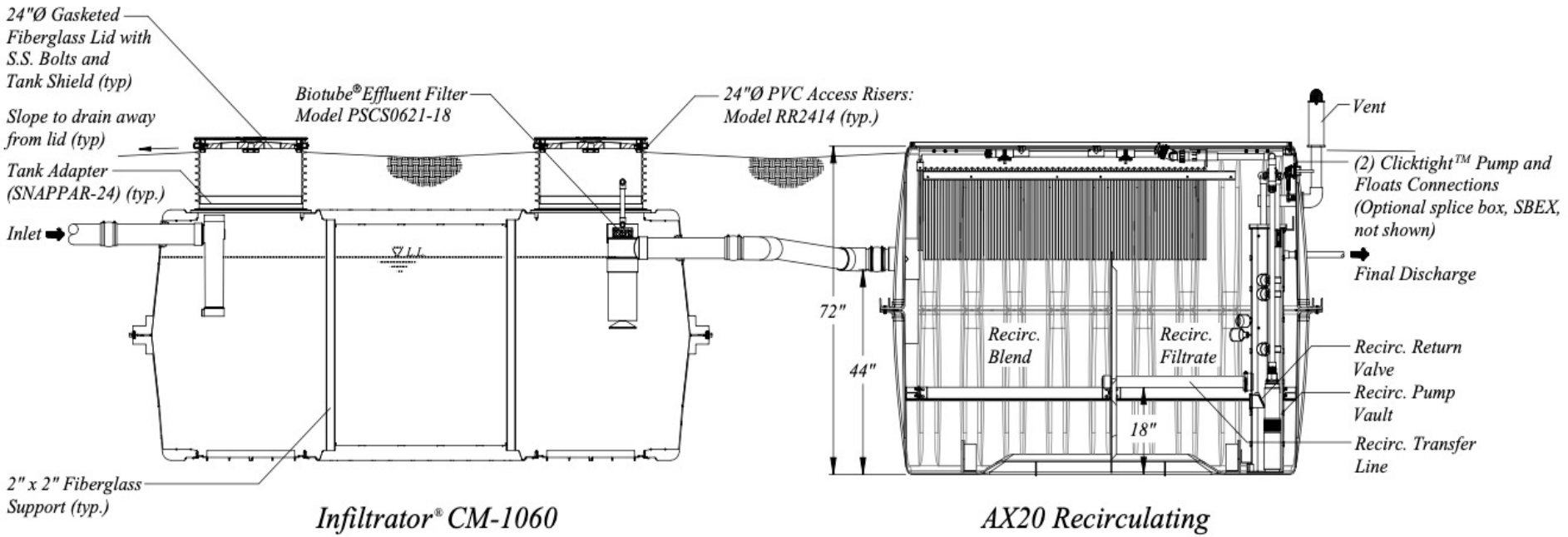
Mode 1: Standard Configuration - AXRT



Mode 3: Maximizing Nitrogen Reduction - AXRT



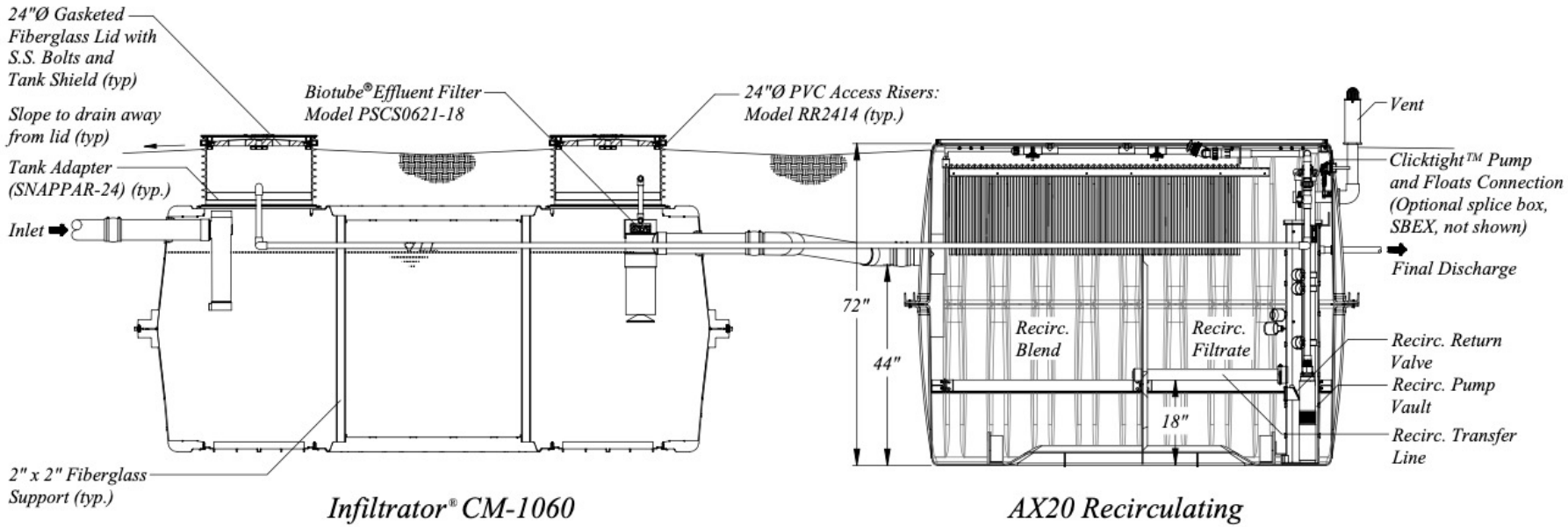
Mode 1 Standard Configuration
AXRT with Infiltrator CM1060



Infiltrator® CM-1060 Primary Tank - Side View

AX20 Recirculating Tank - Side View

Mode 3 Standard Configuration
AXRT with Infiltrator CM1060

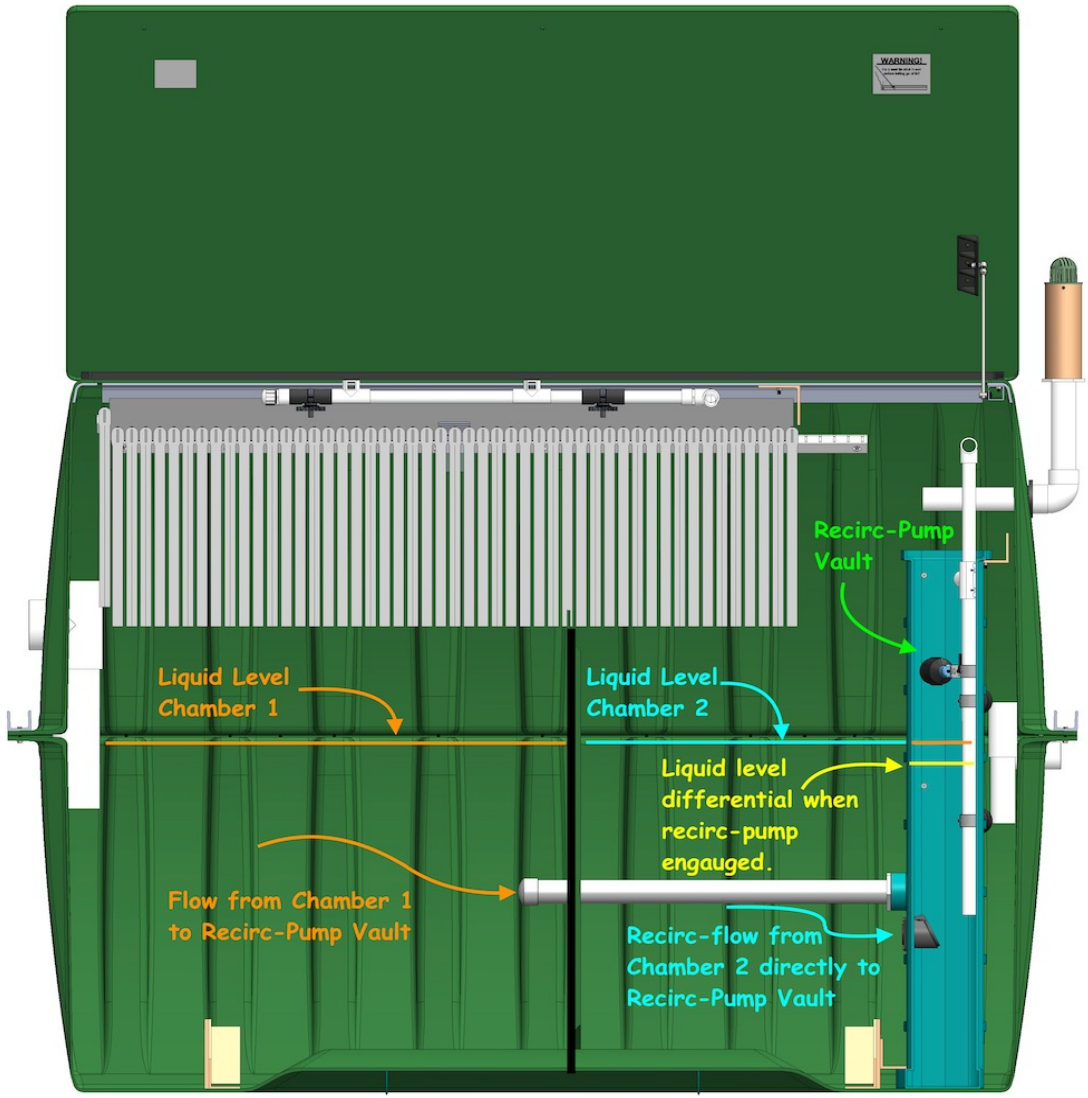


Infiltrator® CM-1060 Primary Tank - Side View

AX20 Recirculating Tank - Side View

AXRT Liquid Level Settings

- Pre-set at Factory
- Surge volume 210 gallons total
  - 135 to override float
  - 75 gallons above override
- Total emergency storage 500 gallons



Design Flow

Definition of Design Flow

- The maximum daily flow a residence is expected to produce
  - ~ Allows for a safety margin and reserve capacity during periods of heavy use

AX20RT and AX25RT Loading Rates

- AX20RT Nominal loading rate is 25 gpd/square foot or 500 gpd
- AX20RT Peak loading rate is 29.9 gpd/square foot or 600 gpd
- AX25RT Nominal loading rate is 25 gpd/square foot or 625 gpd
- AX25RT Peak loading rate is 29.9 gpd/square foot or 750 gpd

AX20RT and AX25RT Units Required

Table 2. Treatment Unit Recommendations

Number of Bedrooms	Number of Occupants	Septic Tank Size, gal. (L)	AX-RT Model
1-4	8	1000 (3800)	AX20-RT
5	10	1250 (4732)	AX25-RT
6	12	1500 (5678)	AX25-RT

AXRT Recirculation Ratio

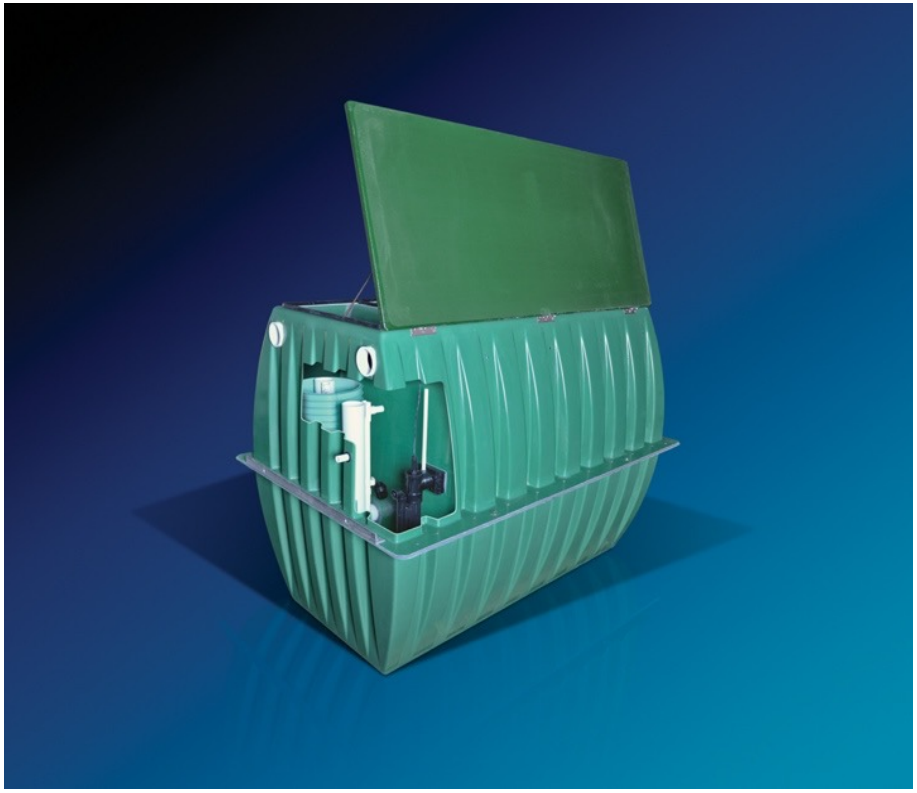
- Initial timer settings based upon expected average daily flows
- Initial recirculation ratio 7:1
- Recommended timer settings for 4 people
  - The “On” time is set for 1 minute
  - The “Off” time is set for 12 minutes
  - Refer to AXRT Design Criteria or the supplemental AXRT O & M manual for recommended timer settings

Discharge Options AXRT

- Gravity Discharge
- Pump Discharge
  - Pump Basin
  - Dosing Tank
  - Filtrate Blend Chamber (AXRT)

AXRT Discharge Equipment

- Pump Discharge to Final Dispersal
  - 10, 20, 30 and 50 gpm options
  - “Off” float is the only float that is adjustable
  - Approximately 8 gal/in

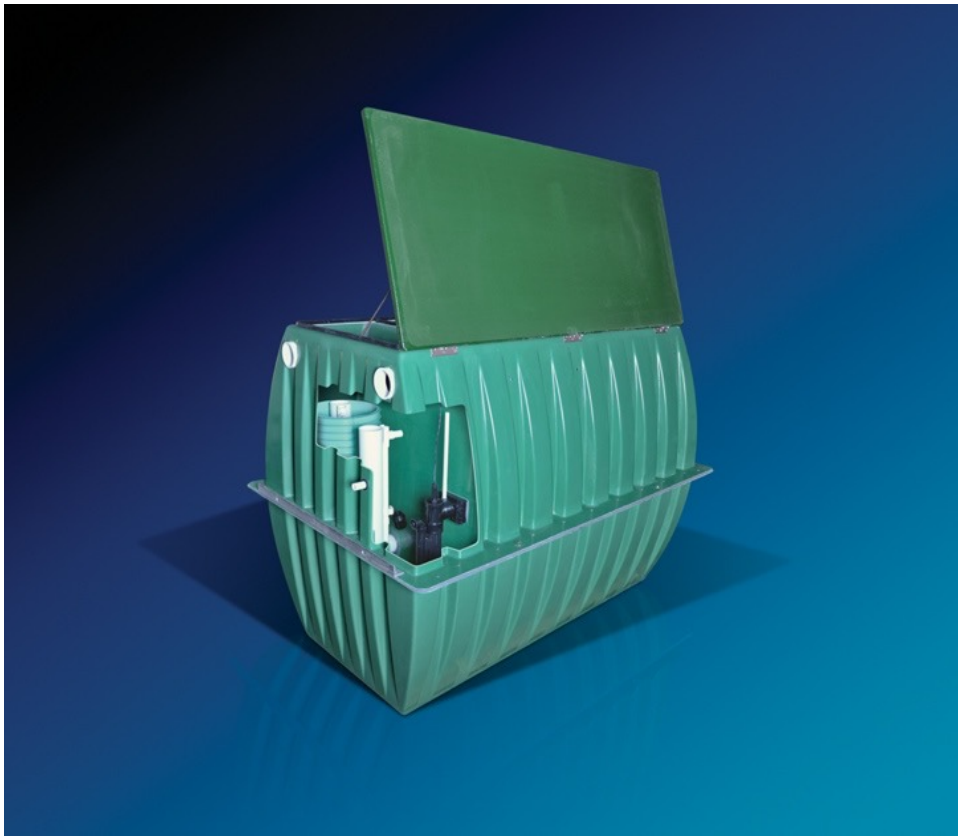


UV Disinfection

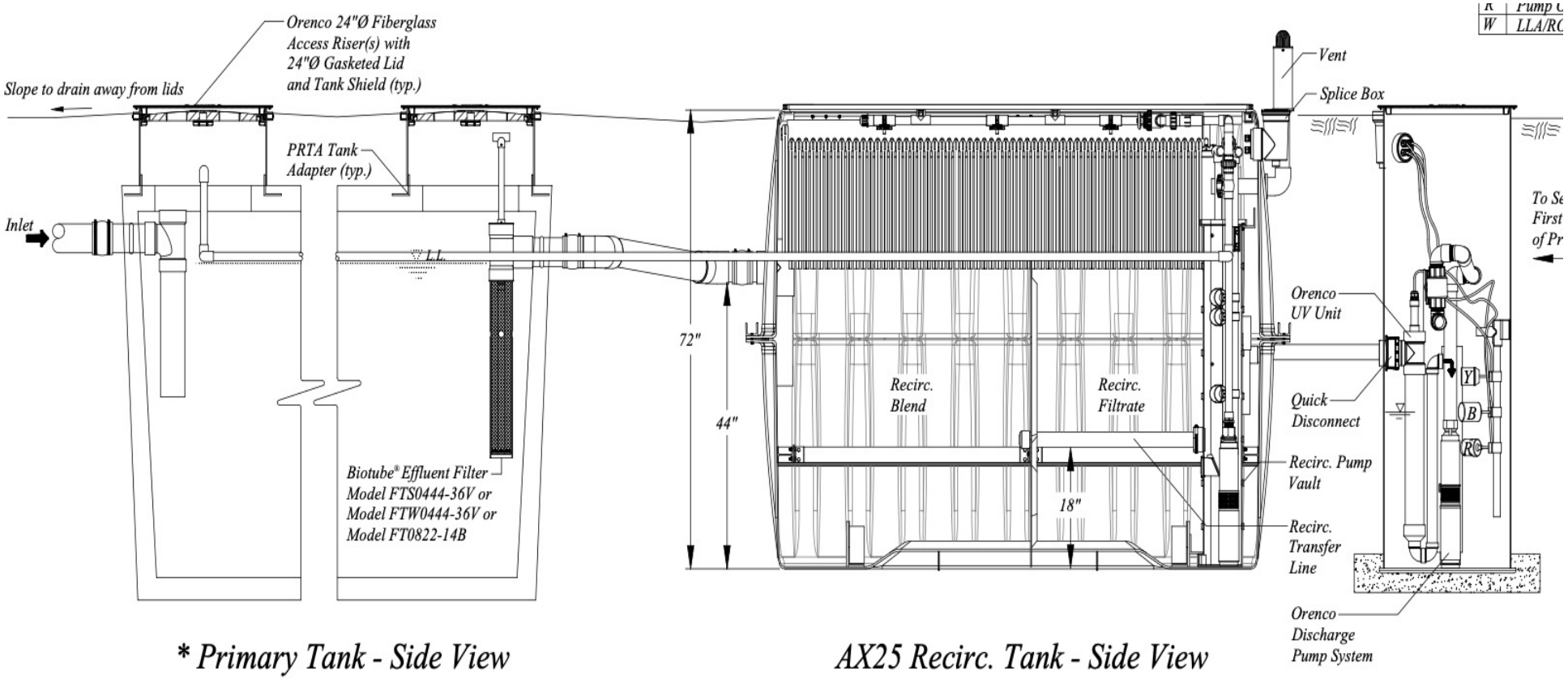
- Orenco UV Disinfection
  - UL Recognized
  - 360º contact zone
  - Ballast in control panel
  - NSF comparative testing meets or exceeds other residential UV units

AX20RTUV Discharge Equipment

- Orenco UV Disinfection
  - Standard RT body
  - Additional baffle
  - Orenco UV unit
  - Approximately 4 gal/in



AX25RTUV Discharge Equipment



AX20 and AXRT Power Requirements

- Recirculation pump
  - ~ Runs approximately 30 to 60 min./day
  - ~ 9 Amps, 115 volts
  - ~ $2.00 to $4.00/month at national average electrical rate of $0.23/kWh

AX20 and AXRT Plumbing Considerations

- Water softener backwash prohibited
- Gravity pipes sloped properly
- No dips or “bellies in any gravity

AX20 and AXRT Compact Install

- Ideal for small sites
- At-grade components
  - Filter pod
  - Access risers
  - Pump basin

Lids Nearly Flush with Lawn

- Lids available in two colors
  - ~ Green (standard)
  - ~ Brown

Landscaped Systems

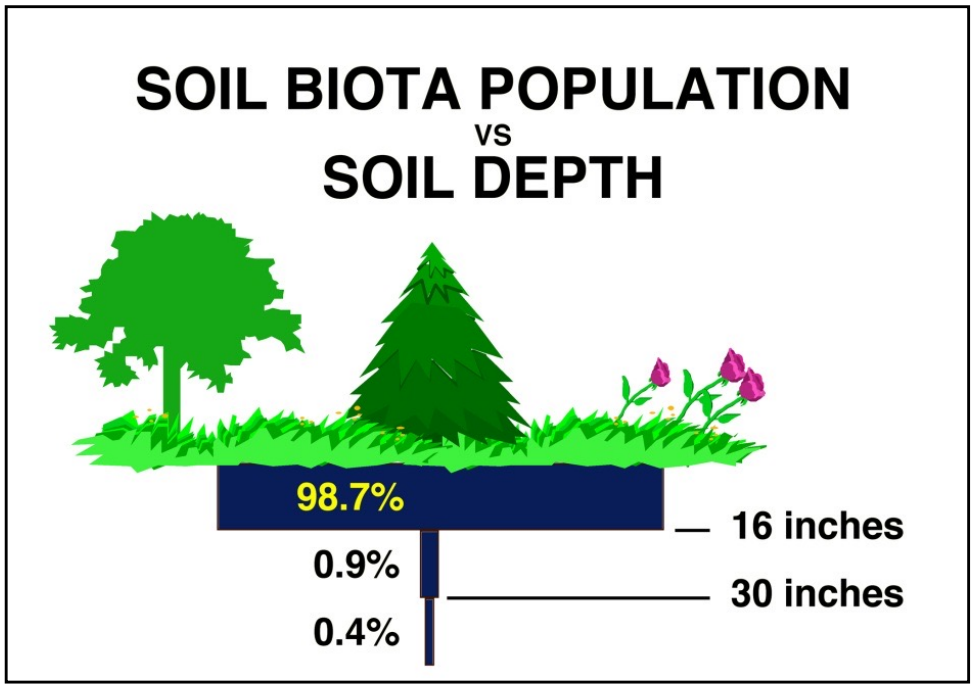
Effluent Reuse

Water Reuse Technologies Using Shallow Soil Distribution

- Shallow effluent dispersal
- Shallow gravelless
- Landscape irrigation
- Conventional drip irrigation

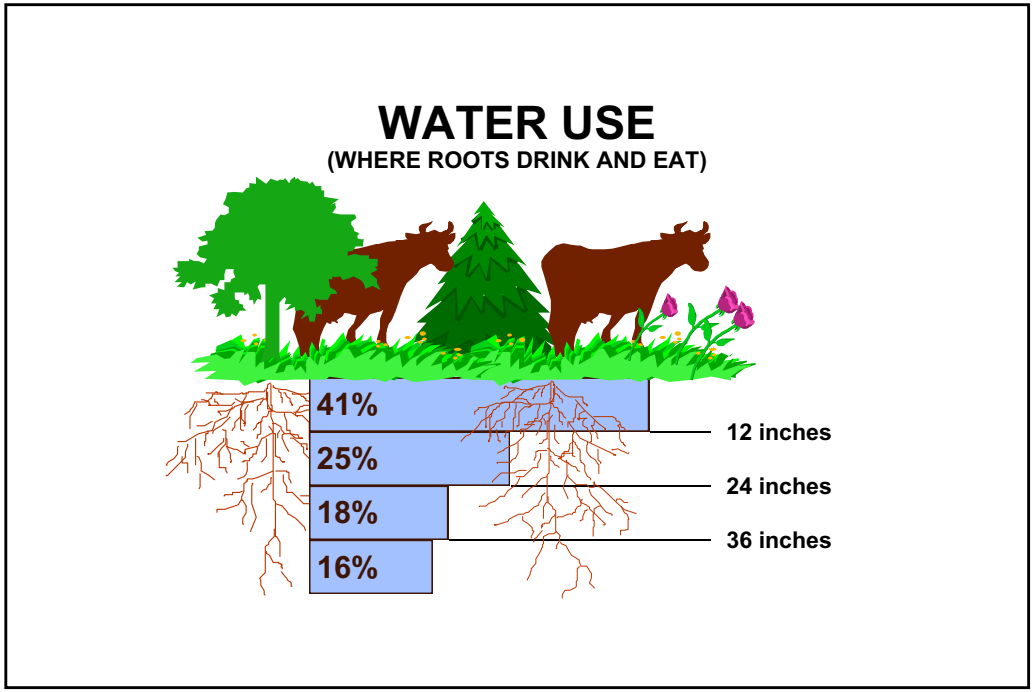
Shallow Effluent Dispersal is Better

Final treatment of effluent takes place in the top 16" of soil, where soil biota and roots are concentrated



Shallow Effluent Dispersal is Better

41% of plant roots are concentrated in the top 12" of soil



Shallow Pressurized Dispersal System

- Improved soil infiltration
- Optimized treatment
- Easy installation
- No rock required
- Less impact to site

Shallow Gravelless Drainfield

Inspection Port

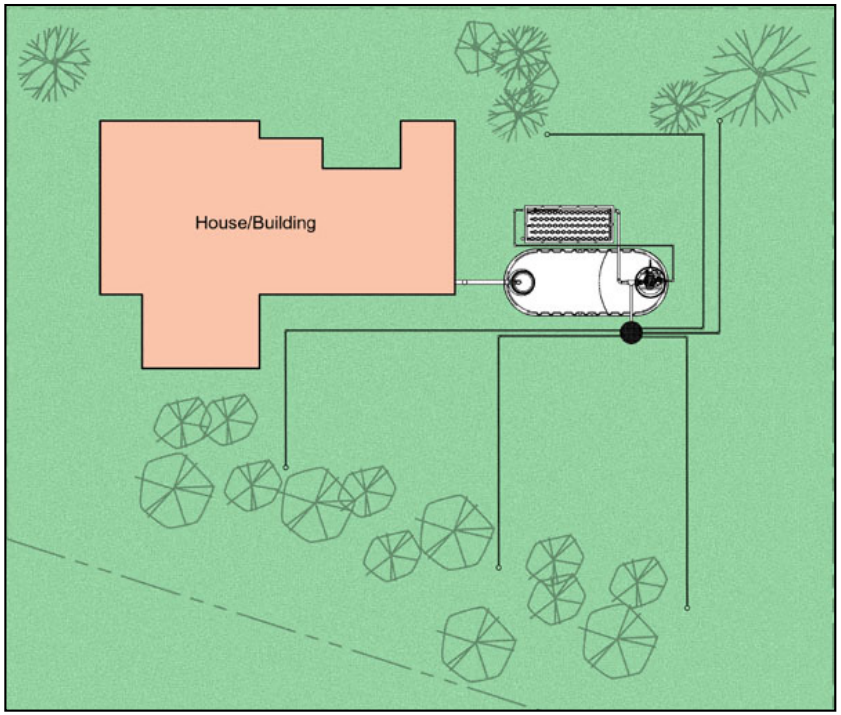
- Note shallowness
- No ponding

Shallow Gravelless Drainfield

- No biomat formation
- Enhanced soil structure

Landscape Irrigation

- Targeted use
- Common components
- Low maintenance



Landscape Irrigation

- Main PVC “transport”
- Spot irrigation “drainfield laterals”

Summary

- Filter type
- Performance data
- Processing tank requirements
- System configurations
- Ventilation requirements
- Disinfection
- Power requirements
- Siting considerations
- Effluent reuse

Solutions for Decentralized Wastewater Treatment

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