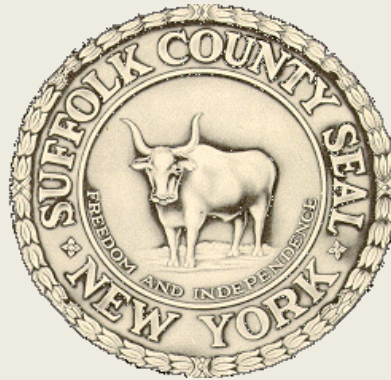


**SUFFOLK COUNTY'S  
RECLAIM OUR WATER INITIATIVE**

**SUFFOLK COUNTY DEPARTMENT OF HEALTH SERVICES**

**THE DESIGN OF INNOVATIVE AND ALTERNATIVE ONSITE WASTEWATER  
SYSTEMS AND LEACHING SYSTEMS**

**MAY 10, 2018**



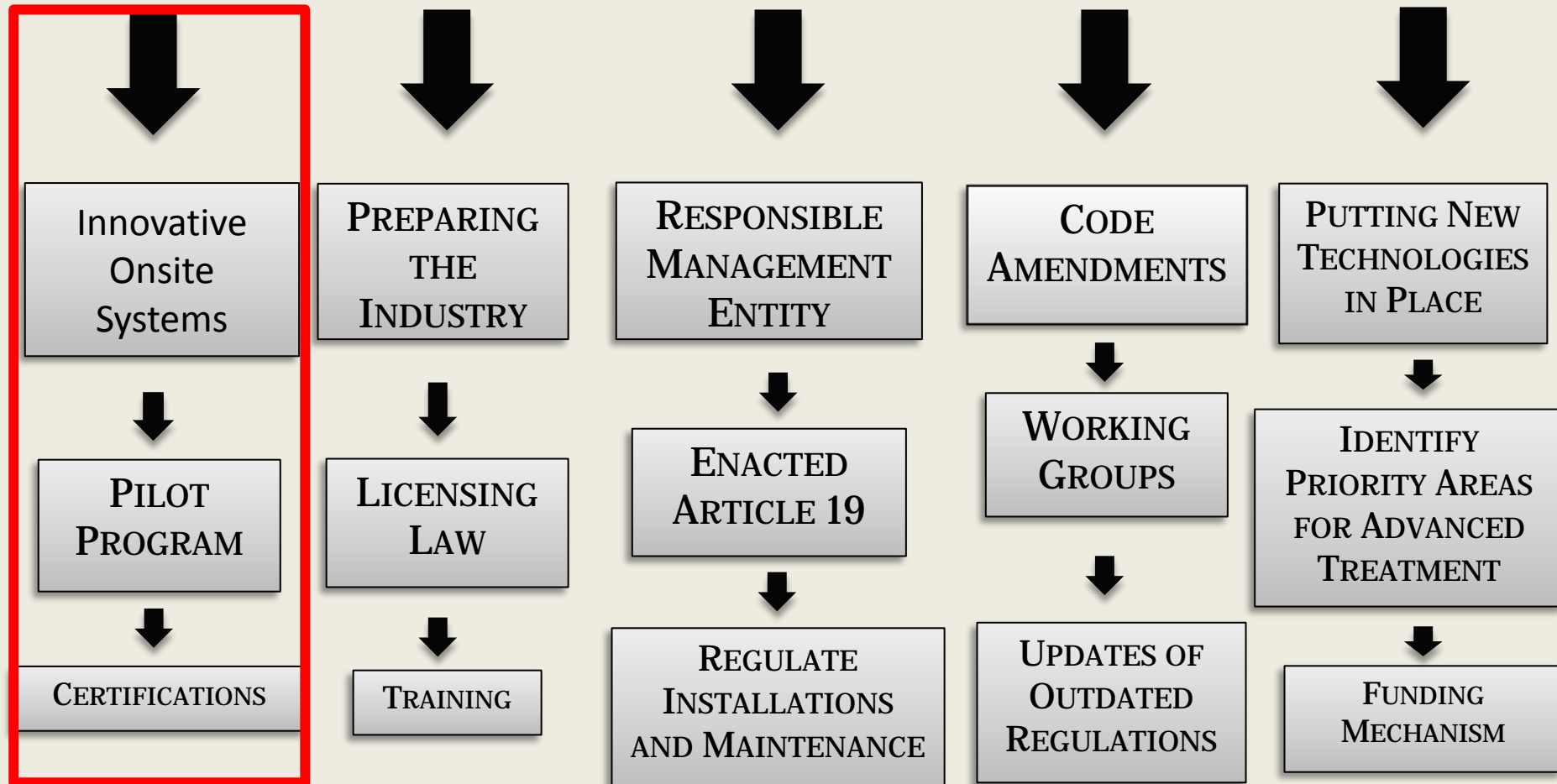
Reclaim  Our Water

# Topics to be covered over the next 2 hours

1. Understanding Specific I/A OWTS Technologies
2. I/A OWTS Design Basics
3. I/A OWTS Selection
4. Overview of Pumps and Controls
5. Alternate Leaching Options

# SETTING THE STAGE FOR THE SOLUTION TO NITROGEN POLLUTION:

## Evolution to the Use of Innovative Treatment Systems



# Septic Demonstration Program (I/A OWTS)

## ➤ *Phase 1 - Septic Demo Program*

- Manufacturer Selection
  - 4 manufacturers selected to install 6 types of systems for a total of 19 systems
- Homeowner Selection
  - 19 homes selected throughout the County via lottery by Legislative District







## ➤ *Phase 2 - Septic Demo Program*

- 6 manufacturers applied to install 8 types of systems
- Homeowner Selection - over 207 Applicants
- 23 homeowners selected on July 26, 2016







# Suffolk County I/A OWTs Approval Process

## Comparison of Septic Demo vs Piloting

Septic Demo	Piloting	Provisional	General Use
			
1-5 Systems Required	8-12 Systems Required	Minimum of 20 Systems Required	Greater than 20 Systems
Dataset of 75% of systems must average 19 mg/L or less	Dataset of 75% of systems must average 19 mg/L or less	Entire dataset must average 19 mg/L or less	Entire dataset must average 19 mg/L or less
Procedures for excluding outliers; Streamlined path to Provisional	Procedures in place for excluding outliers	Cannot exclude outliers	Cannot exclude outliers
NSF 245 or USEPA ETV only	NSF 245, USEPA ETV or approval for N reduction in 2 comparable jurisdictions	NSF 245, USEPA ETV or approval for N reduction in 2 comparable jurisdictions	NSF 245, USEPA ETV or approval for N reduction in 2 comparable jurisdictions
Only installed in households who met specific criteria & agreed to routine visits & monthly sampling by SCDHS	Must be year round residences that agree to routine visits & monthly sampling by SCDHS	20 year round residences sampled every 60 days for 2 years by manufacturer with SCDHS QA/QC	All residential systems sampled every 3 years by O&M Provider with SCDHS QA/QC
Proven technologies with >20,000 installed in similar jurisdictions. Great confidence systems will reduce TN by 50% as certified by NSF & ETV	Proven technologies with >20,000 installed in similar jurisdictions. Great confidence systems will reduce TN by 50% as certified by NSF & ETV	Proven technologies with >20,000 installed in similar jurisdictions. Great confidence systems will reduce TN by 50% as certified by NSF & ETV. Proven ≥ 70% TN reduction on limited dataset in Suffolk County (i.e. achieved 19 mg/L)	Great confidence systems will reduce TN by 70%. Large dataset showing reduction of TN to 19 mg/L in Suffolk County

*Note - SCDHS is the first jurisdiction to have a program designed with US EPA statistical analysis. Approval process also allows for an experimental phase which requires an additional 12 months of sampling prior to a technology being accepted into the piloting phase.*

# Residential Approval Process

Approval Phase	# of Systems	Sampling Frequency	Performance Requirement
 Experimental*	3 – 5 year-round	Monthly Sampling 12 months rolling average	The total dataset of 75% of the systems must have a combined average of 19 mg/L or less TN
 Piloting*	8 – 12 year-round	Monthly Sampling 12 months rolling average	The total dataset of 75% of the systems must have a combined average of 19 mg/L or less TN
 Septic Demo Piloting	1-5 Meeting Specific Criteria	Monthly Sampling 6 months rolling average	The total dataset of 75% of the systems must have a combined average of 19 mg/L or less TN
 Provisional 1	First 20 year-round	Bi-Monthly Sampling for 24 months rolling average	The dataset of all the 20 systems must have a combined average of 19 mg/L or less TN
Provisional 2	All Residential Systems installed during Provisional Use Approval	Every 12 Months	The annual dataset must maintain a combined average of 19 mg/L or less TN in order to remain in the Provisional phase
General Use	All Residential Systems	Every 36 Months	The dataset must maintain an average of 19 mg/L or less in order to remain in General Use phase

# List of Approved I/A OWTS

- *Updated periodically ( last update 1/19/18)*
- *Experimental Systems:*
  - *Nitrex System (with Orenco, Waterloo Biofilter, or SeptiTech)*
    - *Nitrex w/ Orenco installed at Scully Estates*
  - *Nitrogen Reducing Biofilter (lined, unlined, or Denite Tank)*
  - *Vegetated Gravel Recirculating Filter (AKA Constructed Wetlands)*
- *Pilot Systems*
  - *ECOPOD-N Series*
- *Provisional Systems*
  - *Hydro-Action AN Series*
  - *Norweco Singulair TNT*
  - *Norweco Hydro-Kinetic*
  - *Orenco AX-RT*
  - *Fuji Clean CEN Series*
- *Septic Demo Pilot Systems*
  - *System currently installed as part of septic demo are not on the list since they cannot be sold until approved for Provisional Use*





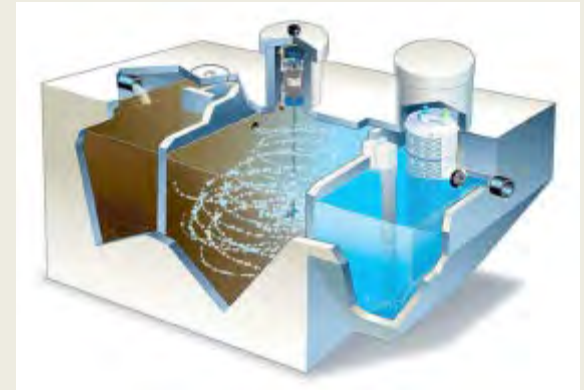
# PROVISIONALLY APPROVED I/A OWTS



**Hydro-Action**



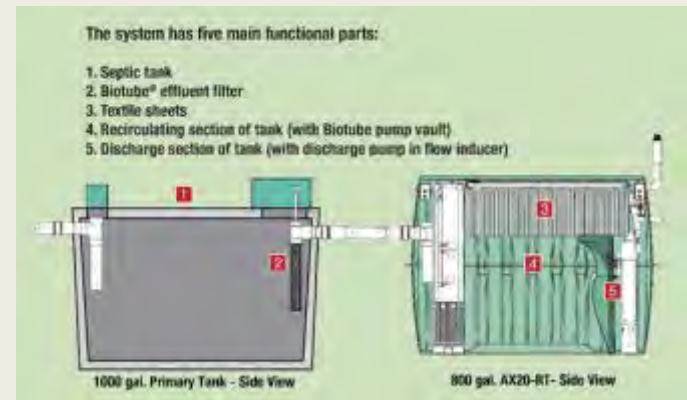
**Fuji Clean System**



**Norweco Singlair TNT**



**Norweco Hydro-Kinetic**



**Orencia Advantex AX-RT**



# Performance Summary of I/A OWTS Demonstrated in Suffolk County and Approved for Provisional Use

Technology	AVG (Mg/L)*	Provisional Approval
Hydro-Action AN Series	11.6 mg/L	Approved in September 2016
Norweco – Singulair TNT	18.3 mg/L	Approved in October 2016
Orenco Advantex – RT	18.8 mg/L	Approved in March 2017
Norweco – Hydro-Kinetic	17.4 mg/L	Approved in April 2017
Fuji Clean System	16.6 mg/L	Approved in January 2018

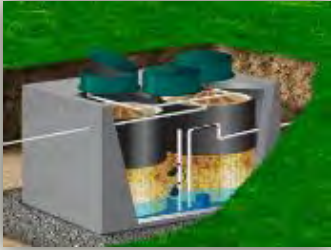
\*Standard is 19mg/L

# Provisional Sampling Results

Technology	AVG (Mg/L)*	# of samples	Provisional Approval
Hydro-Action AN Series	15.7 mg/L	27	Approved in September 2016
Norweco – Singulair TNT	42.9 mg/L	25	Approved in October 2016
Orenco Advantex – RT	33.1 mg/L	10	Approved in March 2017
Norweco – Hydro-Kinetic	29. mg/L	25	Approved in April 2017
Fuji Clean System	9.25 mg/L	4	Approved in January 2018

\*Standard is 19mg/L

# I/A OWTs BEING EVALUATED BY SUFFOLK COUNTY



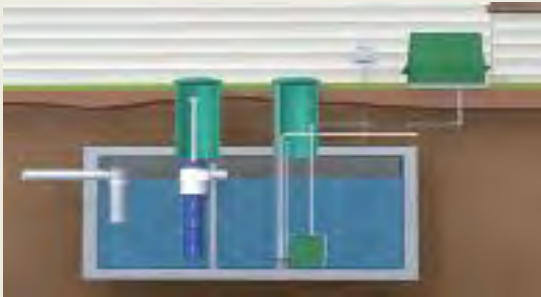
**Waterloo  
BioFilter**



**PUGO  
Systems**



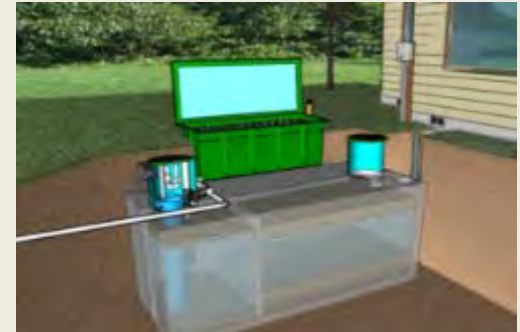
**BioMicrobics  
SeptiTech STAAR**



**BioMicrobics  
BioBarrier MBR**



**BUSSE MBR**



**Orenco Advantex  
AX-20**

# Suffolk County Department of Health Services

## Septic Demo Performance Data

Technology	Projected Approval Data	Treatment Performance *	# of Systems Being Sampled	% Completed
Orenco Advantex – AX20	Summer 2018	22.5 mg/l	3	83%
Amphidrome	Spring 2018	18.3 mg/L	2	(one system restarted) 50%
Ecoflow with Denite	Spring 2018	17.3 mg/L	2	90%
SepticTech	Summer 2018	11.5 mg/l	2	50%
Pugo	Cannot Project	35.5 mg/L	4	Manufacturer to make adjustments in 2018
Ecoflow	Cannot project	38.4 mg/L	2	Adjustments made in 2017
Waterloo	Cannot Project	49.4 mg/L	2	Manufacturer to make adjustments in 2018
BioBarrier	Cannot Project	52.9 mg/L	2	Manufacturer to make adjustments in 2018
BUSSE - MF	Cannot Project	83.1 mg/l	2	Systems offline. Manufacturer to make adjustments in 2018

\*Standard is 19mg/L

# **I/A OWTS DESIGN BASICS**

# The Wastewater Management Permit Process

- Design Professional completes a permit application and submits to OWM including vendor cost estimate. Homeowner enters into contract with Vendor. The Design Professional will also identify any required Town, Village, or State permits that may be required.
- SCDHS permit to construct is issued.
- Vendor and Design Professional Assignment of Payment Must be included with Application to OWM
- Town/Village/New York State Department of Environmental Conservation (NYSDEC) permits are secured if required.



# I/A OWTS Installation Process

- *I/A OWTS Installation Process:*
  - Construction can begin. SCDHS inspectors will visit the site and inspect that the installation is in accordance with County and Manufacturer Standards.
- *Final Approval Process:*
  - System start-up witnessed by SCDHS. As-built plans submitted to SCDHS by the Design Professional. The homeowner submits I/A OWTS Registration form.
- *Issuance of Final Approval:*
  - Final Approval letter will be issued by SCDHS Office of Wastewater Management. Design Professionals and Vendors must submit payment vouchers and invoices to SCDHS.

# I/A OWTS Basics

## ➤ Capacity Requirements:

- Designed Based on Bedrooms
  - 110 GPD/Bedroom
- Minimum Capacity for 4 bedrooms -- 440 gpd rated treatment capacity

## ➤ Setbacks :

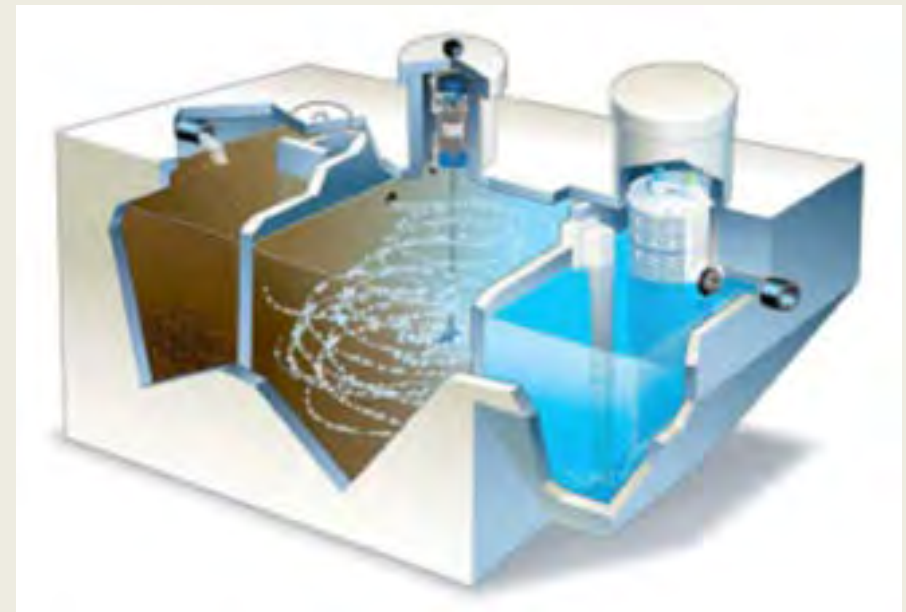
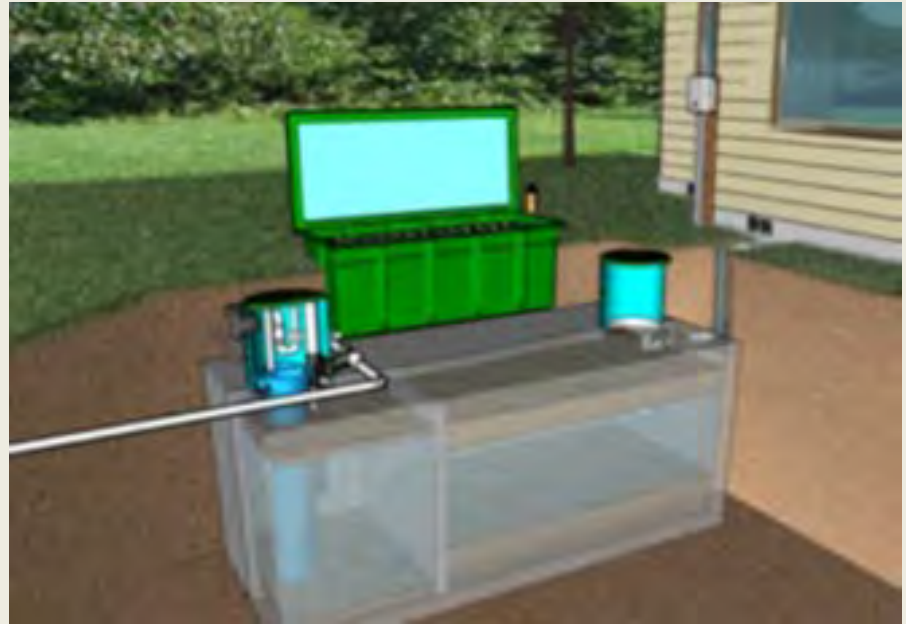
- I/A OWTS are equivalent to Septic Tanks (8ft to driveway if non-concrete)

## ➤ I/A Tank Materials permitted and requirements:

- Pre-cast Concrete, Fiberglass , & Polyethylene

## ➤ General Electrical Requirements :

- Control panels, pumps, blowers, floats, etc.



# DESIGN SPECIFICATION TABLE

Model:	CE Series BOD, TSS, TN*							CEN Series BOD, TSS, Enhanced TN			
	CE5	CE7	CE10	CE14	CE21	CE30	CE6KG	CEN5	CEN7	CEN10	CEN21
Load Hydraulic** (GPD)	450	630	900	1,000	1,900	2,700	6,000	450	630	900	1,900
<b>Effluent (assumes domestic strength influent):</b>											
BOD – Effluent (mg/L)	10-20	10-20	10-20	10-20	10-20	10-20	10-20	10	10	10	10
BOD (removal pounds/day)	.52	.73	1.04	1.46	2.08	3.12	6.93	.69	.97	1.38	2.9
TSS (mg/L)	10-20	10-20	10-20	10-20	10-20	10-20	10-20	10	10	10	10
TN (mg/L)	10-20	10-20	10-20	10-20	10-20	10-20	10-20	10	10	10	10
<b>Blower Detail:</b>											
Blower Model	MAC80R	MAC80R	MAC100R	MAC100R	MAC150R	MAC200R	MAC200R (3)	MAC80R	MAC100R	MAC100R	MAC200R
Normal Pressure (kPa)	15	15	18	18	20	20	20	15	18	18	20
CFM; L/Min	2.8 CFM 80 L/MIN	2.8 CFM 80 L/MIN	3.5 CFM 100 L/MIN	3.5 CFM 100 L/MIN	5.3 CFM 150 L/MIN	7.0 CFM 200 L/MIN	21.0 CFM 600 L/MIN	2.8 CFM 80 L/MIN	3.5 CFM 100 L/MIN	3.5 CFM 100 L/MIN	7.0 CFM 200 L/MIN
Power Use (kWh/day)	1.1	1.1	1.6	1.6	2.4	3.4	10.2	1.1	1.6	1.6	3.4
Weight (lbs.)	11	11	11	11	13	13	13 x 3	11	11	11	13
Outlet Diameter (OD, inches)	0.70	0.70	0.70	0.70	1.0	1.0	1.0 x 3	.070	0.70	0.70	1.0
<b>Tank Detail:</b>											
Material	Fibre-reinforced plastic							Fibre-reinforced plastic			
Height (inches)	61.8	65.7	73.6	77.4	81.3	87.2	87.2	65.7	73.6	77.4	87.2
Length (inches)	85	95.7	98.8	118.9	152.8	183.7	434.7	95.7	98.8	118.9	183.7
Width (inches)	43.7	49.2	56.7	68.9	72.4	78.3	115.3	49.2	56.7	68.9	78.3
Weight (lbs.)	397	463	705	926	1,168	1,543	2,900	463	705	926	1,543
Inlet Invert (inches)	49	53	61	62	65	71	67	53	61	62	71
Outlet Invert (inches)	47	51	59	59.5	63	69	64	51	59	59.5	69
Access Ports (number)	3	3	3	3	3	3	7	3	3	3	3
Access Port Diameter (inches)	3@20"	2@20" 1@24"	2@20" 1@24"	2@20" 1@24"	2@20" 1@24"	2@20" 1@24"	4@24"x24" 3@24"x48"	2@20" 1@24"	2@20" 1@24"	2@20" 1@24"	2@20" 1@24"
Volume Total (gallons)	545	749	1,069	1,498	2,252	3,199	7,267	749	1,069	1,498	3,199

\* TN data obtained during CE testing, but not to NSF 245 testing protocol. CEN testing to NSF 40/245 protocol.

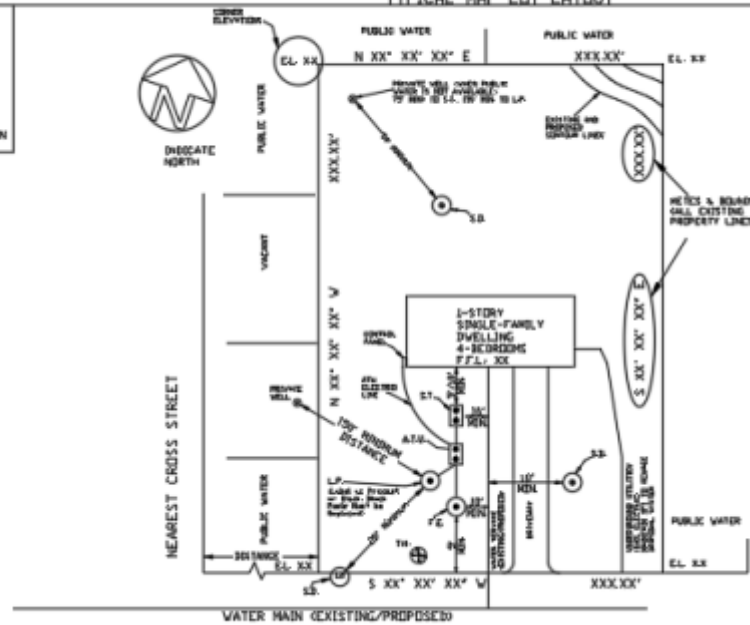
\*\* Please consult with distributor or Fuji Clean USA for bedroom equivalents associated with hydraulic flows (which vary by state) and commercial projects designed to treat hydraulic flows above those listed in this table.



# TYPICAL SEPTIC DEMO RESIDENTIAL PLAN WITH I/A DWTS SYSTEM

## ADVANCED TREATMENT UNIT DETAIL

KEY:  
S.T.-SEPTIC TANK  
A.T.U.-Advanced  
L.P.-LEACHING POOL  
F.C.-EXPANSION POOL  
C.D.-CLEAN-OUT  
S.B.-STORM DRAIN  
T.H.-TEST BORING  
E.L.-GRADE ELEVATION



## CONTROL PANEL DETAIL

## ELECTRIC SINGLE-LINE DIAGRAM (LINE DIAGRAM OF ATU CONNECTION TO ELECTRIC PANEL)

SANITARY SYSTEM DESIGN  
# OF BEDROOMS: 4  
SEPTIC TANK: 1000 GALLON  
ADVANCED TREATMENT UNIT: XXXX  
LEACHING POOL: 6' DIAM X 10' FT  
EXPANSION POOL: 6' DIAM X 10' FT

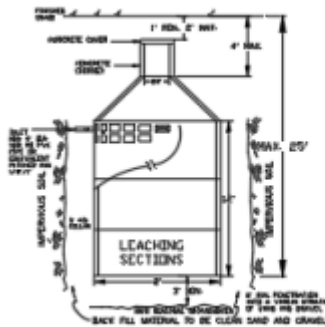


5' X 5' AREA FOR HEALTH DEPARTMENT APPROVAL STAMP

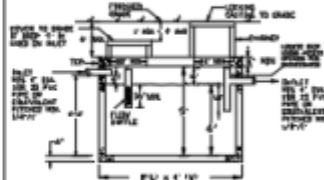
SITE DATA  
OWNER: MR. & MRS. ABC  
ADDRESS: J. RESIDENTIAL PLACE  
RESIDENCE, NY 00000  
S.C.T.M. #: 0000-000-000-0000  
LOT AREA: XX,XXX SF  
SCALE: (ENGINEERING SCALE)  
DATUM: MGSVD (ENGR. USC & GS (WHEN NO GROUNDWATER ASSURED DATUM MAY BE USED)

DESIGN  
PROFESSIONAL  
COMPANY TITLE BLOCK

## TYPICAL LEACHING POOL DETAIL (IF NEW POOL REQUIRED)

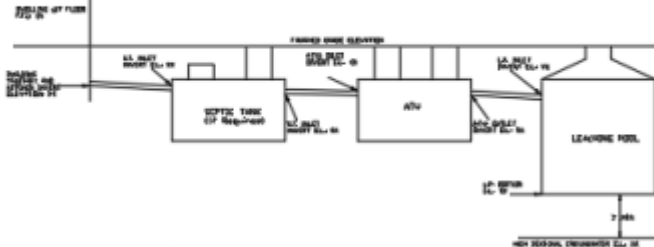


## TYPICAL RECTANGULAR 1000 GALLON SEPTIC TANK WITH SLAB DETAIL (IF NEW SEPTIC TANK REQUIRED)



## TYPICAL MAP DETAILS

### SANITARY SYSTEM PROFILE



TEST HOLE  
DATE: / /  
BY: / /  
REVISIONS: / /

# General Site Plan Requirements

- Lot Lines w/ Metes & Bounds
- TMP #
- Site Address
- Site Area
- Indicate # of bedrooms
- Engineering Scale
- Label street names (provide tie distance to cross street)
- Show and label existing locations of structures, driveway, drainage, water line/well, underground utilities, sanitary systems
- Corner elevations/contours
- Neighboring water info (w/in 150ft)
- Test hole/perc test info
- Properly label existing sanitary system components and indicate which ones are to be abandoned
- Leaching structure calcs/size
- Effluent filter detail (if required)
- Profile
- Leaching structure details

# Additional Site Plan

## Requirements for I/A OWTS

- Basic design calcs of I/A OWTS as follows:
  - Indicate number of bedrooms
  - Indicate required I/A OWTS treatment capacity == # bedrooms x 110 gpd/bedroom
  - Indicate I/A OWTS manufacturer, I/A OWTS model, and I/A OWTS rated treatment capacity
- I/A Unit Details (cross-sections & top views)
- Control panel location/Detail
- Vent piping location/details
- I/A unit electric line
- Air piping locations
- Control Panel wiring
- Junction box locations
- Electric single-line diagram



**TABLE 1 - MINIMUM SEPARATION DISTANCE TO SEWAGE DISPOSAL SYSTEMS (IN FEET)**

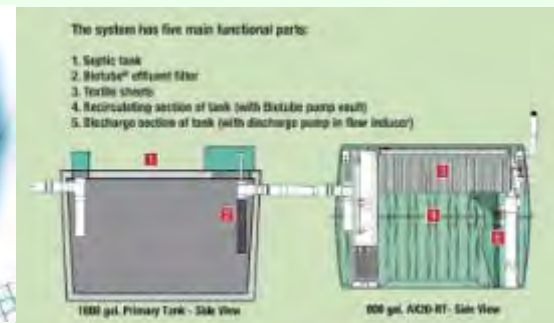
<b>Table of Minimum Horizontal Separation Distances From:</b>	<b>Septic Tank, I/A OWTS Pump Station, or Manhole</b>	<b>Leaching Structure/System (including expansion)</b>	<b>Sewer Line, Force Main</b>
Building with Cellar/Basement	10 ft.	10 ft.	5 ft.
Building on Slab	5 ft.	10 ft.	5 ft.
Porches, decks, house overhangs, cantilevers, etc.	5 ft.	5 ft.	5 ft.
Water Service Line/Laterals/Mains <sup>1</sup>	10 ft.	10 ft.	10 ft.
Underground Utilities	5 ft.	5 ft.	5 ft.
Surface Waters <sup>2</sup>	75 ft.	100 ft.	50 ft.
Public Water Well	200 ft.	200 ft.	50 ft.
Private Well <sup>3</sup>	75 ft.	100/150 ft.	50 ft.
Non-Potable Water Well	50 ft.	50 ft.	50 ft.
Road Storm Drains/Stormwater Recharge Basin <sup>4</sup>	20 ft.	20 ft.	10 ft.
On-site Drywells/Drainage Structures <sup>4</sup>	10ft	10ft	10ft
Catch Basins (non-leaching)/Drainage Pipe <sup>5</sup>	5 ft.	10 ft.	5 ft.
Leaching Pool	8 ft.	8 ft.	5 ft.
Septic Tank, Pump Station, or Manhole <sup>6,8</sup>	5 ft.	8 ft.	5 ft.
Property Lines	5 ft.	5 ft.	5 ft.
Swimming Pool	20 ft.	20 ft.	5 ft.
Retaining Wall (water proof) <sup>7</sup>	10 ft.	10 ft.	5 ft.
Fuel Storage Tanks (below ground)	10 ft.	10 ft.	10 ft.
Bluffs	65 ft.	65 ft.	65 ft.

**NOTES:**

1. If proven to be absolutely necessary, water lines may be approved within 10 feet of a sewage disposal system, provided the water line is protected from contamination or disturbance (e.g. installation of line inside a larger diameter line for protection).
2. Distances between leaching structure and wetlands are subject to approval by the New York State Department of Environmental Conservation & the local municipality prior to issuance of Suffolk County approval.
3. Distances between leaching structure and wells are based upon the depth of the well (s) involved or realty subdivision requirements. Refer to "Standards and Procedures for Private Water Systems". For separation to Geothermal Wells see General Guidance Memorandum #25
4. A minimum of 10-foot separation is required between water service line/laterals/mains and the edge of all stormwater drainage leaching structures.
5. A minimum of 5-foot separation is required between water service line/laterals/mains and the edge of all stormwater drainage non-leaching structures and associated piping.
6. Multiple unit septic tanks shall be considered one structure and therefore individual components may be installed at lesser separation distances.
7. Retaining walls not intended to contain sewage are permitted to be 5 ft. minimum from sanitary structures
8. Non-precast distribution boxes may be 5ft from septic tank or I/A unit and 2ft from leaching structures.

# Types of secondary treatment technologies Approved in Suffolk County

- Aerobic treatment units
- Media filters
- Nitrogen Reducing Biofilters
  - These will be covered by Glynis





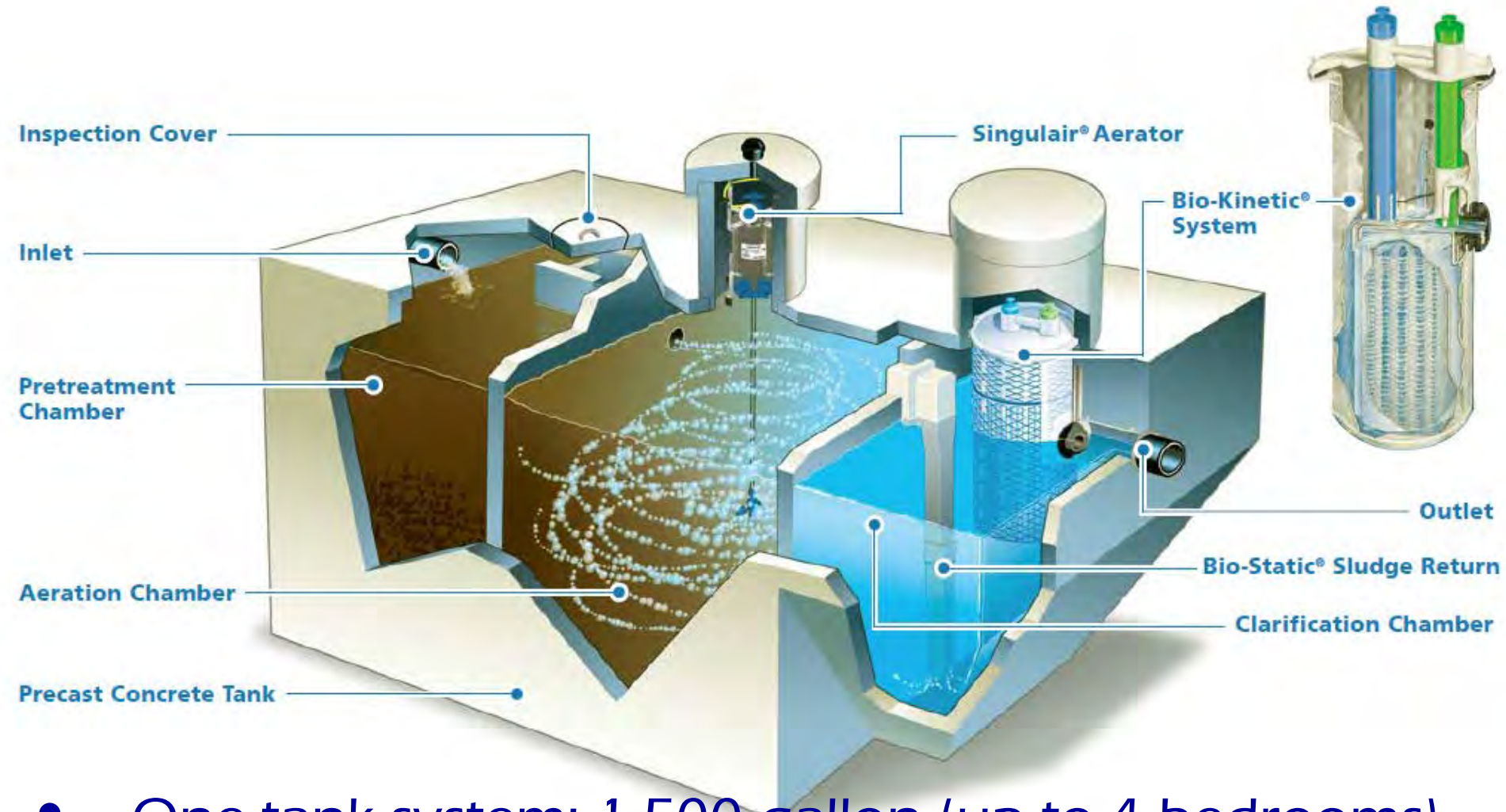
## Overview of I/A OWTS Installations and Pending Applications in Suffolk County, NY

Technology	# of Septic Demo Installs	# of SIP Install s	Approval Status	Other Installation s or Pending Applications
Hydroaction AN Series	5	9	Provisional	55
Norweco Singulair TNT	5	8	Provisional	68
Orenco Advantex RT	2	0	Provisional	14
Norweco Hydro-Kinetic	5	0	Provisional	1
Fuji Clean CEN Series	4	0	Provisional	32
Orenco AX-20	3	0	Demonstration	0
Orenco AX-MAX	1	0	Demonstration	0
BUSSE	2	0	Demonstration	0
Pugo	4	0	Demonstration	0
Ecoflo Cocofilter	2	0	Demonstration	0
Waterloo BioFilter	2	0	Demonstration	0
Amphidrome	2	0	Demonstration	0
BioMicrobics BioBarrier	2	0	Demonstration	0
BioMicrobics SepticTech	2	0	Demonstration	0
BioMicrobics microFAST	0	0	Demonstration	2
Nitrogen Reducing BioFilters (NRB's)	3	0	Experimental	2
<b>Totals</b>	<b>46</b>	<b>17</b>		<b>174</b>

Note: Total amount of Applications (Installed, Under Review, or Permitted) is **237**

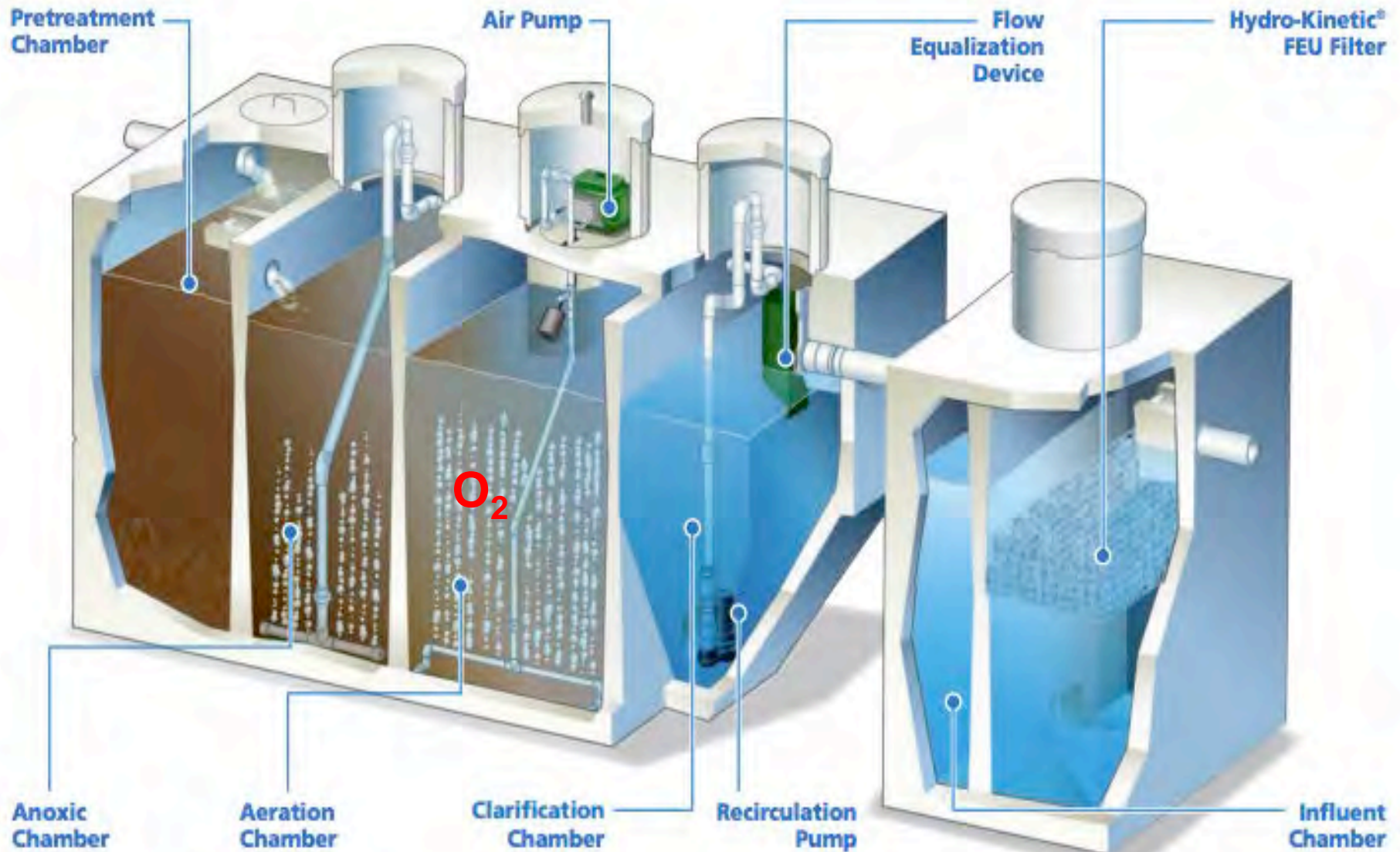


# Norweco Singulair TNT

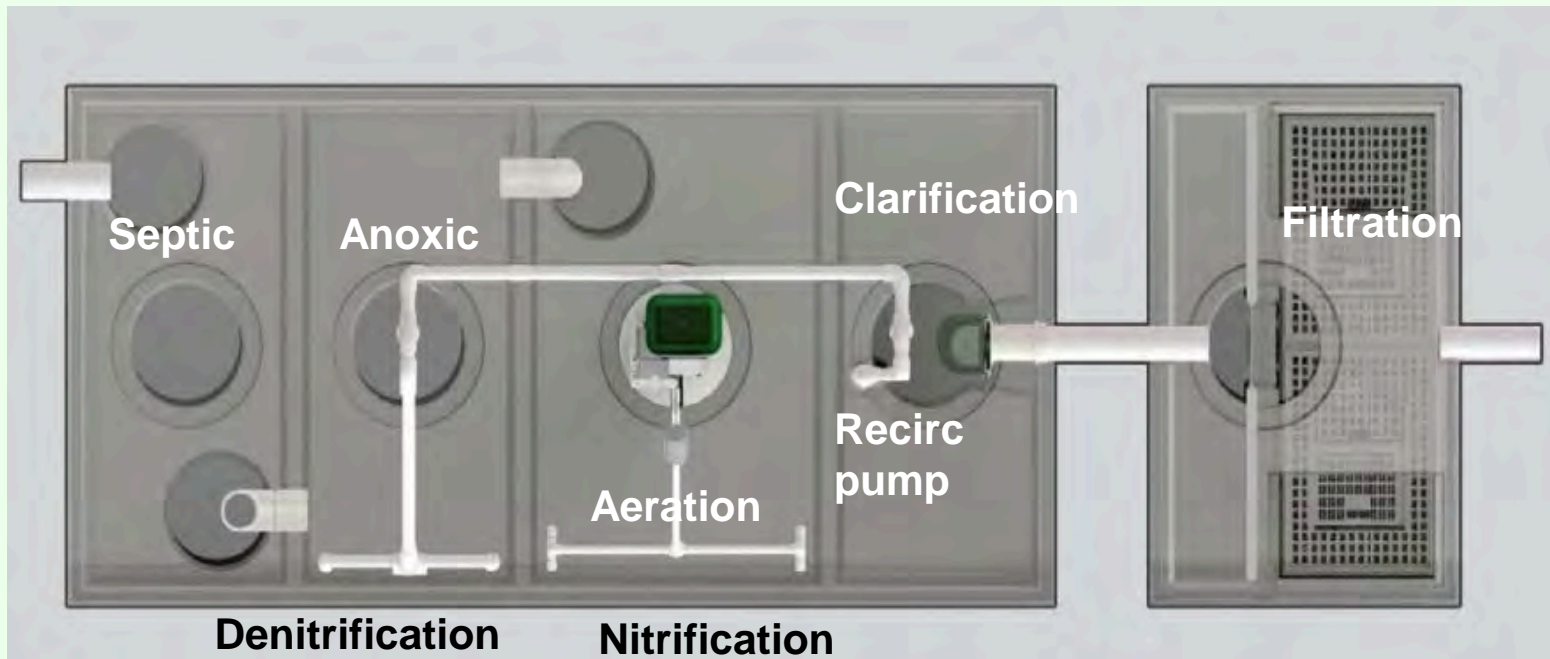


- One tank system: 1,500 gallon (up to 4 bedrooms)
- \$11/month to run

# Norweco Hydro-Kinetic FEU



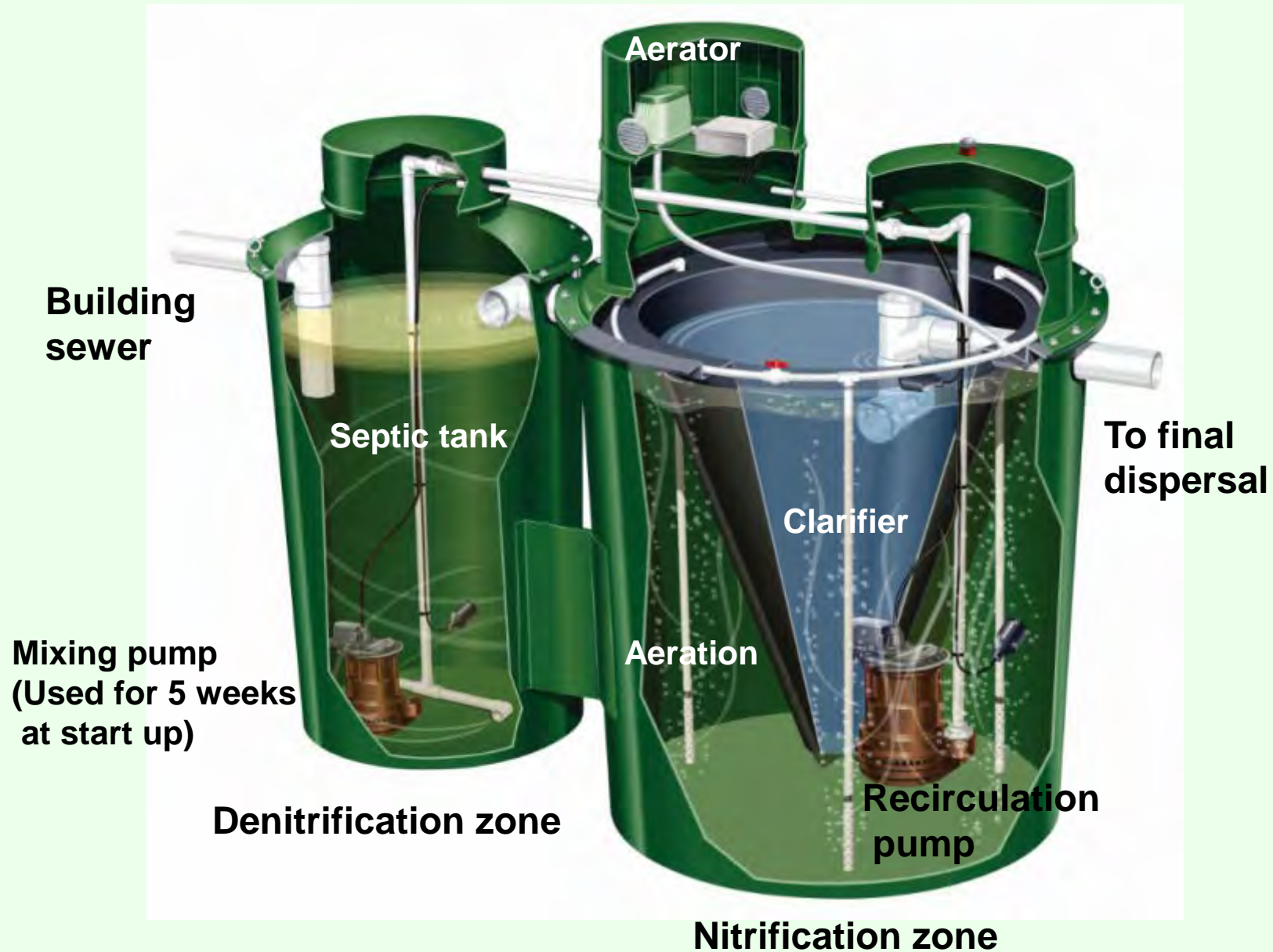
# Norweco Hydro-Kinetic FEU



- **NSF International Standards 40 and 245**
- **600 Model = 600 gpd**
- **1 recirc pump and 1 air pump**



# Hydro-Action Industries AN 500 Series

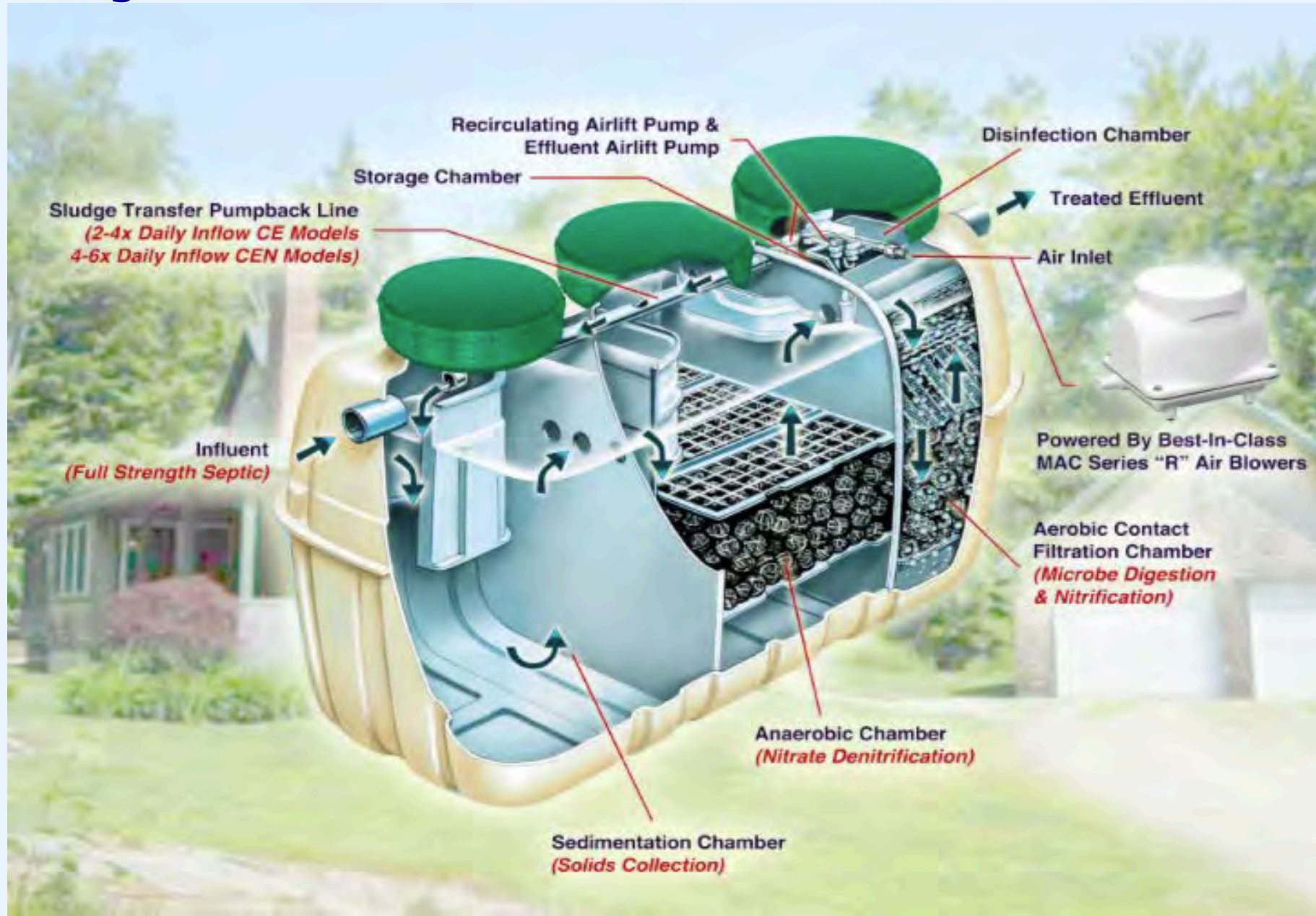








# Fuji Clean

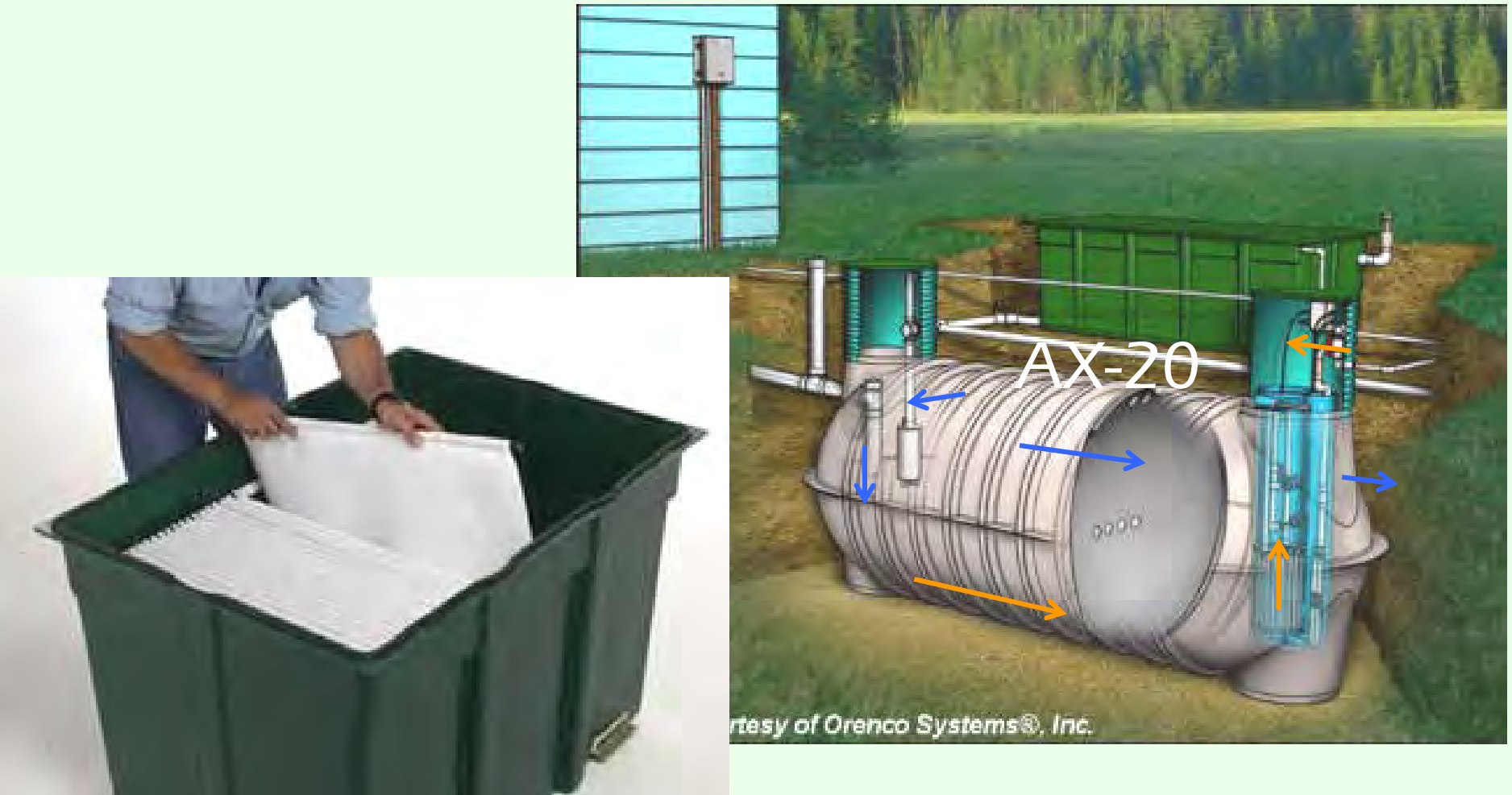


# Fiji Clean system – Phase 2





# Orenco Advantex AX-20

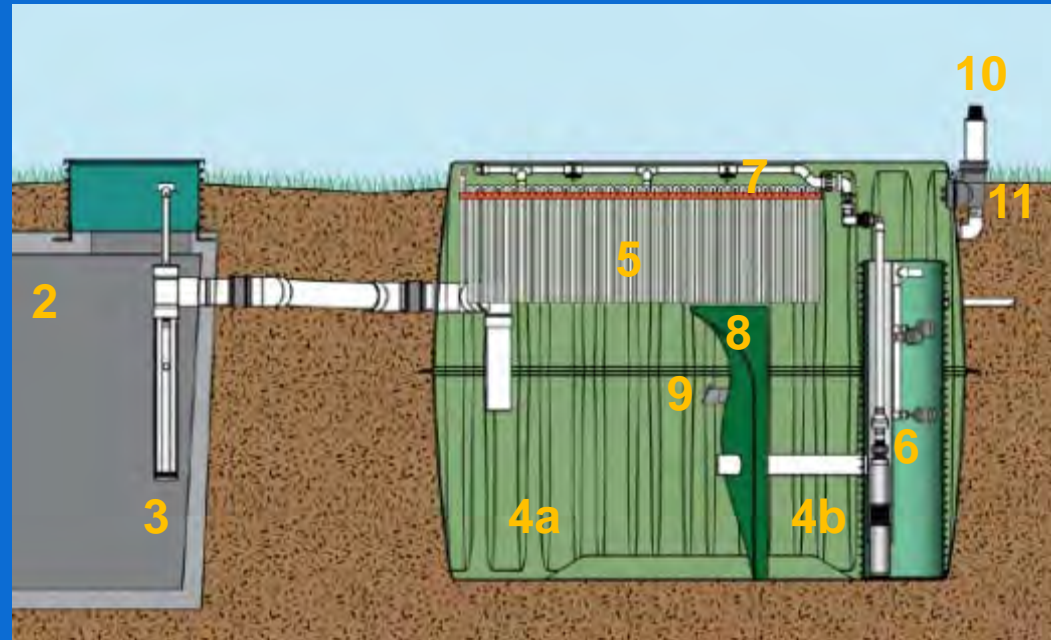


# AdvanTex® Overview - AXRT

## Main Components

1. Control panel (not shown)
2. Primary tank
3. Biotube effluent filter
4. Treatment tank
  - a. recirc / blend chamber
  - b. recirc / filtrate chamber
5. AdvanTex textile filter
6. Recirc pumping system
7. Manifold & spin nozzles
8. Tank baffle
9. Recirc-return valve
10. Passive vent
11. External splice box
12. Primary return line (not shown)

## Pressure and Timed-dosed media filter





# Advantex AX-20RT and AX-25RT

20 sq. ft.  
media

25 sq. ft.  
media

6 ft

8.5 ft

5.2 ft



# Waterloo biofilter

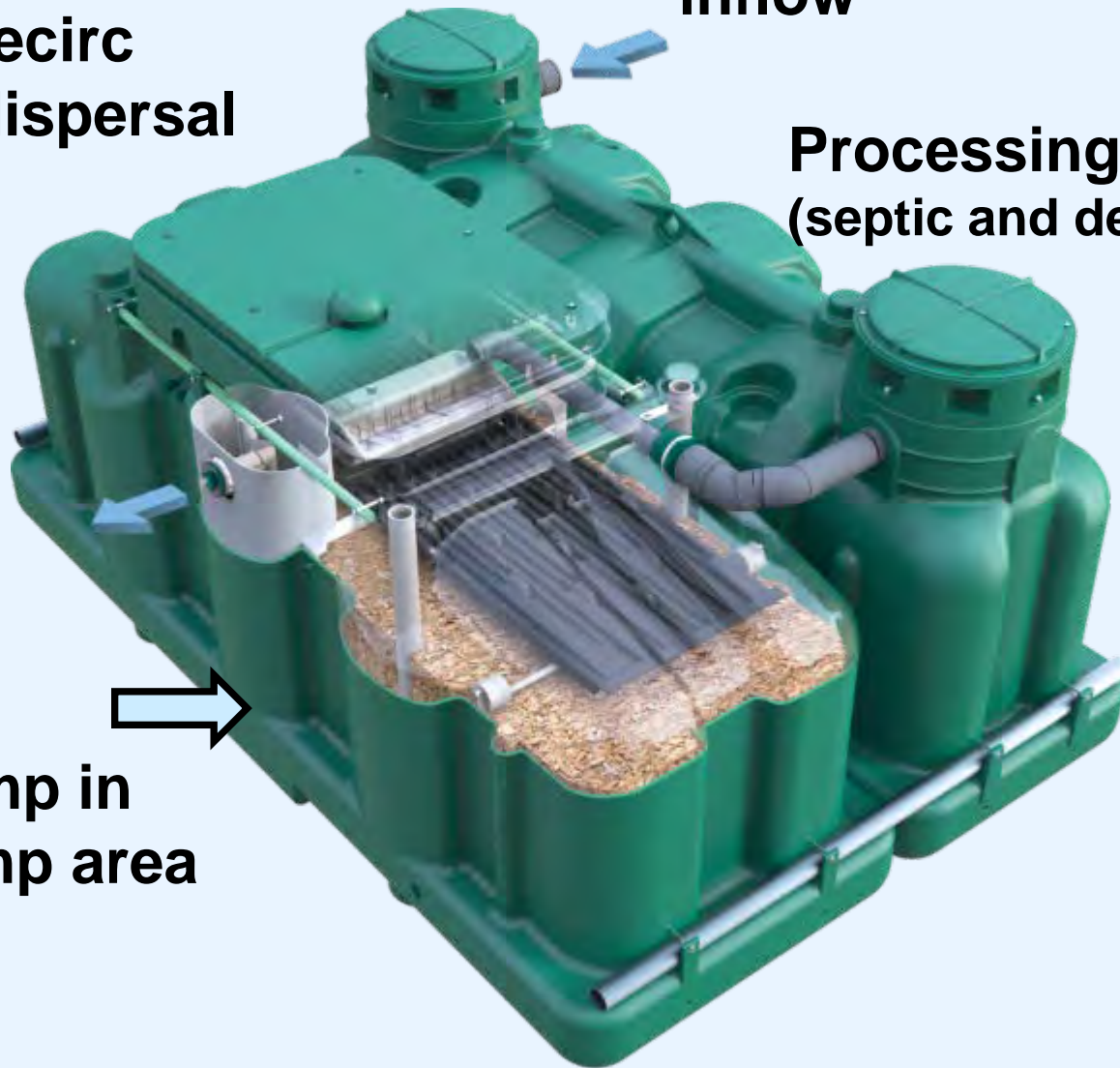


**1/3 recirc  
2/3 dispersal**

**inflow**

**Processing tank  
(septic and denite reactor)**

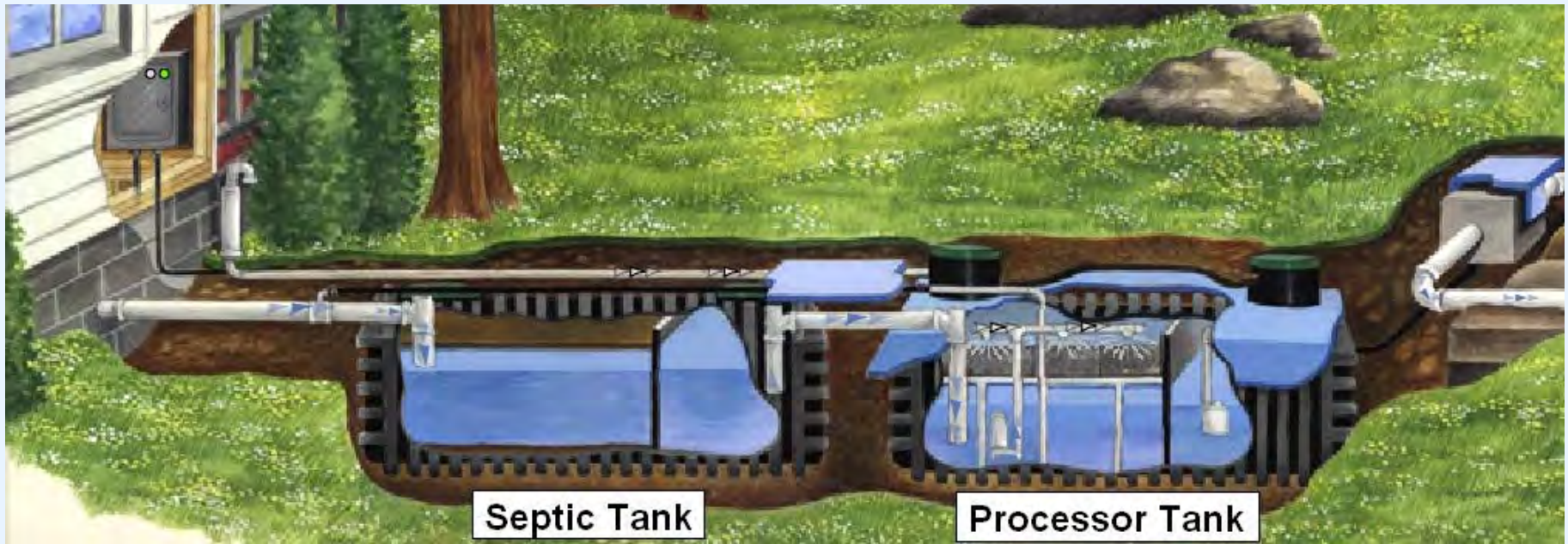
**Pump in  
sump area**



**EcoFlo Coco Filter**

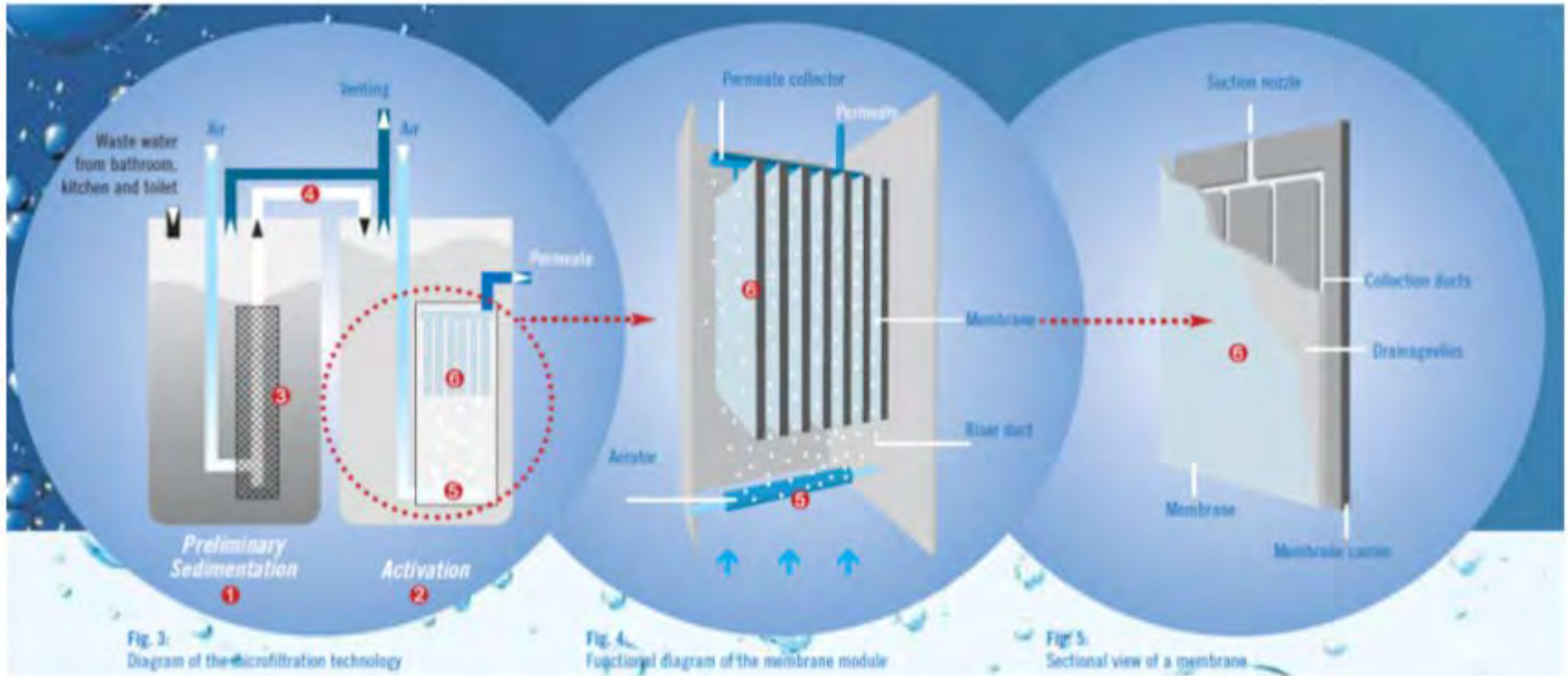


# BioMicrobics Septitech STAAR





# Membrane Bio Reactor



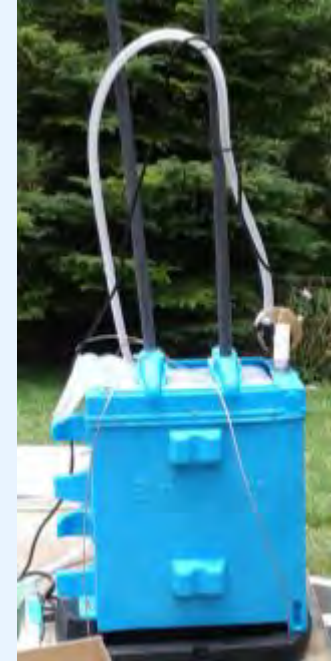
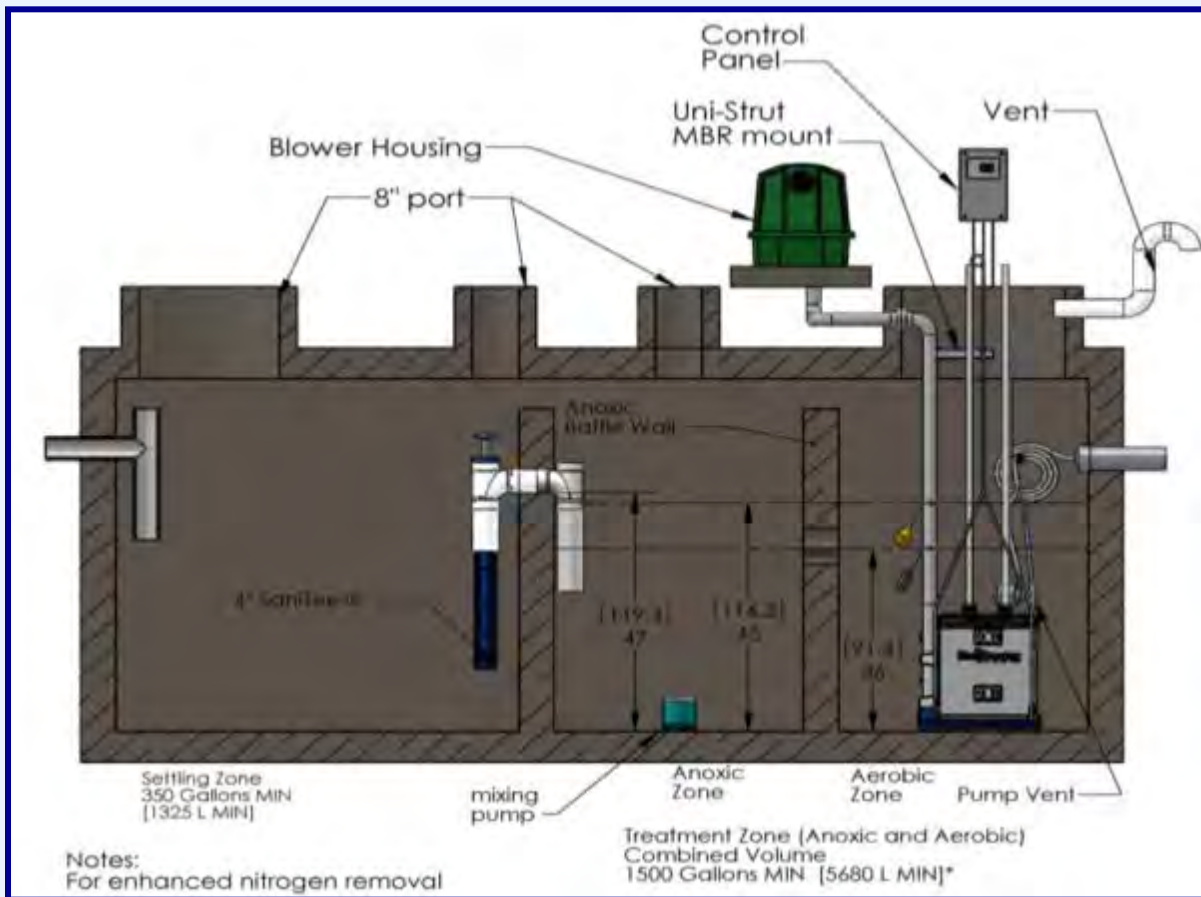
# BUSSE MBR





# Biomicrobics Biobarrier MBR

(membrane bioreactor )



- Aerator on during filtration mode
- 30 min. ON / 90 min. OFF cycles (when membrane is at rest)

You may have a different tank configuration – perhaps a septic tank and reactor tank in series

# **I/A OWTS SELECTION**

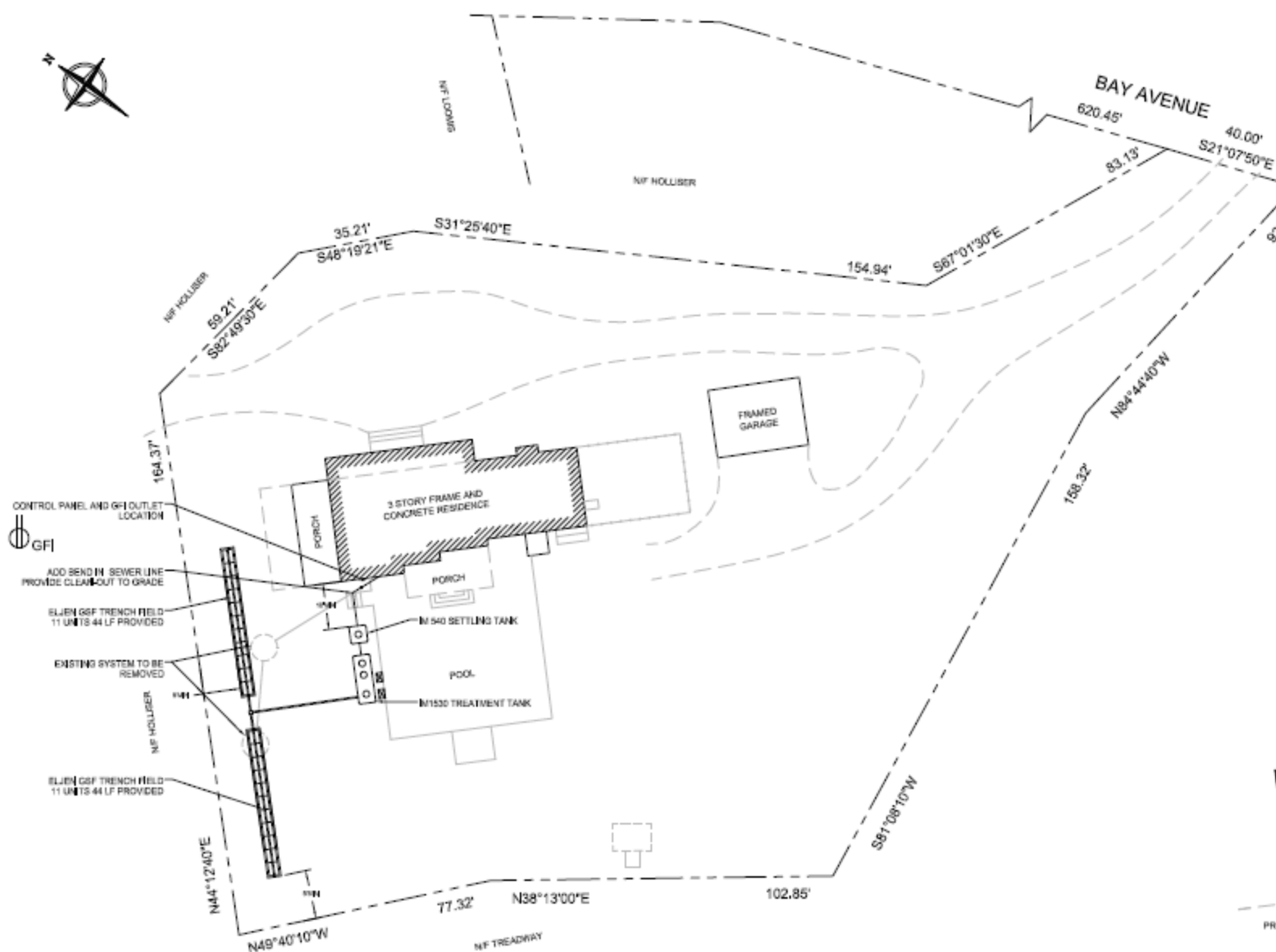
# Decision process

- Watershed & resource health
- Treatment goals
- Site accessibility
- Existing obstacles
- Size of lot and usable space
- Soil type
- Receiving soil permeability
- Depth to limiting layer(s)
- Wetlands
- Homeowner aesthetic concerns







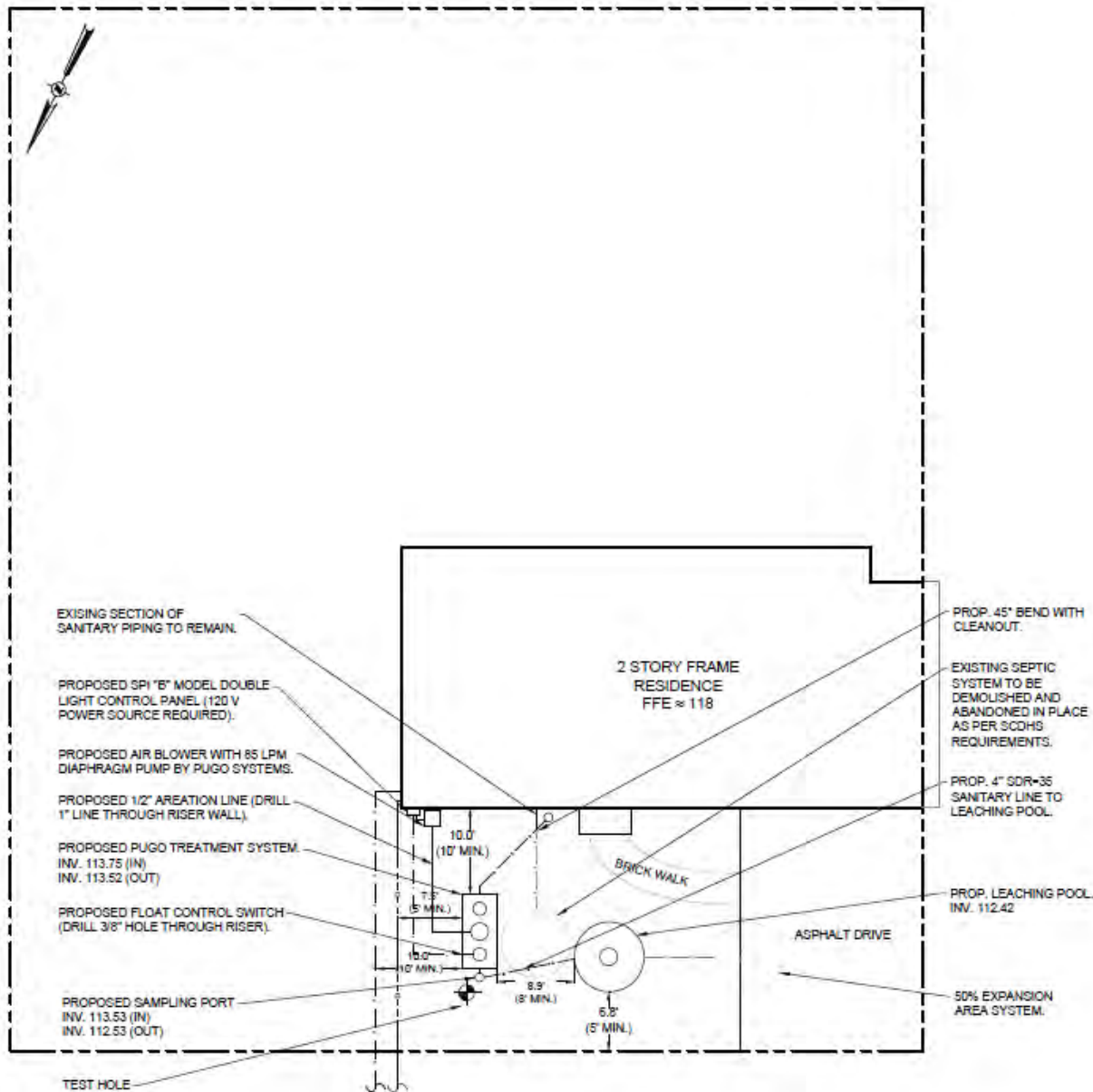


### PROPOSED SITE PLAN

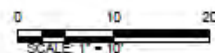
SCALE: 1/32







**OVERALL SITE PLAN**  
SCALE 1" = 10'

















# MORNINGSIDE AVE.

S 22° 00' E 100.00'

N 68° 00' E 150.00'

S 68° 00' W 150.00'

N 22° 00' W 100.00'

APPROXIMATE LIMITS OF

WATER LINE  
CONTRACTOR TO CONFIRM  
LOCATION BEFORE EXCAVATION

EXST. DWELLING

2" PVC PIPE WITH 3" ORENCO CARBON FILTER

CONTROL PANEL AND ALARM

4" SCH 40 PVC PIPE AT 1/4" PER FT SLOPE

LOCATE AND ABANDON EXST. SEPTIC TANK,  
CESSPOOL, AND PIPING

LOCATE FUJI CLEAN COMPRESSOR  
IN CONVENIENT LOCATION  
BENEATH DECK

FUJI CLEAN CEN5

SAMPLING TRAP

NOTE: BACKYARD AND FLOWER BEDS ARE  
EXTENSIVELY IRRIGATED. CONTRACTOR  
MUST AVOID DAMAGING IRRIGATION SYSTEM  
AND BE PREPARED TO REPAIR AND TEST  
SYSTEM PRIOR TO COMPLETION OF  
INSTALLATION.

PERCOLATION TEST HOLE  
AND AUGER BORING

GARDEN PLANTINGS

GEOFLOW DRIPLINE (SEE DETAIL)

ACCESS GATE  
REMOVE AND REPLACE FENCE  
FOR SITE ACCESS AT MFGR. EXPENSE  
IF NECESSARY FOR ACCESS

INSTALL CLEANOUTS AT 45° BENDS (TYP)

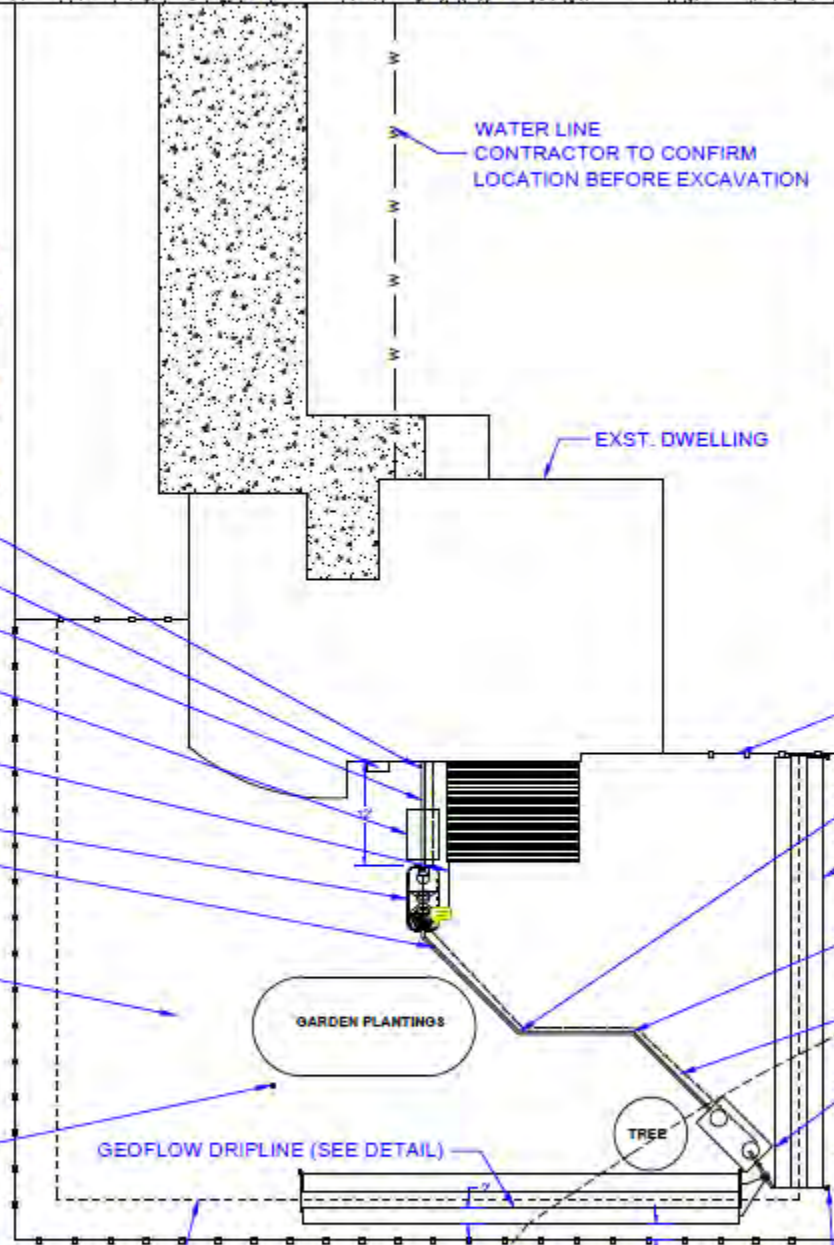
GEOFLOW DRIPLINE (SEE DETAIL)

4" SCH 40 PVC SEWER  
1/4" PER FOOT SLOPE MIN.  
PLACE 45° BEND AS REQ'D

LOCATE PUMP TANK TO AVOID TREE

1,000-GAL PUMP TANK (SEE DETAIL)

GROUNDLINE





# FUJI CEN SERIES DURING INSTALLATION





# FUJI CEN SERIES AFTER INSTALLATION







ORENCO AX-RT



This site has an advanced treatment system and pressurized drainfield – ***But you don't see it***



# **COMMERCIAL SYSTEMS**

**TABLE 2 - MINIMUM HORIZONTAL SEPARATION DISTANCES**

<b>Table of Minimum Horizontal Separation Distances From:</b>	<b>Septic Tank, I/A OWTS, Pump Station, Grease Trap, or Manhole</b>	<b>Leaching Structure<sup>3</sup></b>	<b>Sewer Line, Force Main</b>
Building with Cellar	10 ft.	10 ft.	5 ft.
Building on Slab	5 ft.	10 ft.	5 ft.
Water Service Line/Laterals/Mains <sup>1</sup>	10 ft.	10 ft.	10 ft. <sup>4</sup>
Underground Utilities	5 ft.	5 ft.	5 ft.
Surface Water/Regulated Wetlands	75 ft.	100 ft.	50 ft.
Public Water Well <sup>2</sup>	200 ft.	200 ft.	50 ft.
Private Well <sup>1</sup>	100 ft.	150 ft.	50 ft.
Storm Drain/Stormwater Recharge Basin <sup>5</sup>	20 ft.	20 ft.	10 ft.
Catch Basins (non-leaching)/Drainage Pipe <sup>6</sup>	5 ft.	10 ft.	5 ft.
Leaching Structure <sup>8</sup>	8 ft.	8 ft.	10 ft. <sup>7</sup>
Septic Tank, Pump Station, Grease Trap, or Manhole <sup>9</sup>	5 ft.	8 ft.	5 ft.
Property Lines	5 ft.	10 ft.	5 ft.
Swimming Pool	20 ft.	20 ft.	5 ft.
Retaining Wall (water proof)	10 ft.	10 ft.	5 ft.
Fuel Storage Tanks (below ground)	20 ft.	20 ft.	10 ft.
Top of Embankment or Steep Slope (15 % slope or greater)	25 ft.	25 ft.	25 ft.
Bluffs	65 ft.	65 ft.	65 ft.



# Meschutt County Park I/A OWTS Commercial Demo System

- Upgrade an existing failing onsite sewage disposal system consisting of cesspools
- Orenco AXMAX-225 I/A OWTS Packed Bed
- Recirculating Textile Filter
- Construction completed May 2016
- System serves Concession and bathroom building plus a life guard building
- Design Flow = 3,225 gpd
- Summer 2016 Average TN 17.4 mg/l





# Commercial Demonstration Projects

## Completed

- *Meschutt County Park*
  - \$ 300,000 County Funding
  - Orenco AXMAX-225 Unit (Packed Bed Textile Recirculating Filter)
  - Construction completed May 2016
  - Average Total Effluent Nitrogen 17.2 mg/l (7-months composite sampling)
- *Sylvester Manor Educational Farm*
  - \$209,000 County Funding
  - Vegetated gravel recirculating filter
  - Construction Complete Spring 2017
  - Average Total Effluent Nitrogen 14.5 mg/l (3-months composite sampling)
- *Lake Ronkonkoma Park*
  - \$408,000 County Funding (Enhanced Water Quality funding)
  - Norweco Hydro-Kinetic I/A OWTS with Eljen geotextile gravelless sand filter leaching
  - Construction Complete (to Be Sampled 2018)
- *SBU CCWT NRB (County Parks)*
  - Installed 3 Nitrogen Reducing Biofilters (NRB) at County Parks
  - Lined, Unlined, and Box
  - Systems installed in Spring 2018
  - Sampling to begin Spring/Summer 2018

## Pending

- *County Parks Pending Appropriation of funding (Enhanced Water Quality Funding)*
  - *Cupsogue Beach County Park*
  - *West Sayville County Park*
- *Vanderbilt Museum/Planetarium*
  - \$167,000 County Funding (Enhanced Water Quality funding)
  - Currently in Design/Permitting Phase
- *TNC Upland Farms*
  - \$220,000 County Funding (Enhanced Water Quality funding)
  - Constructed Wetland & NRB's
  - Currently in Design/Permitting Phase



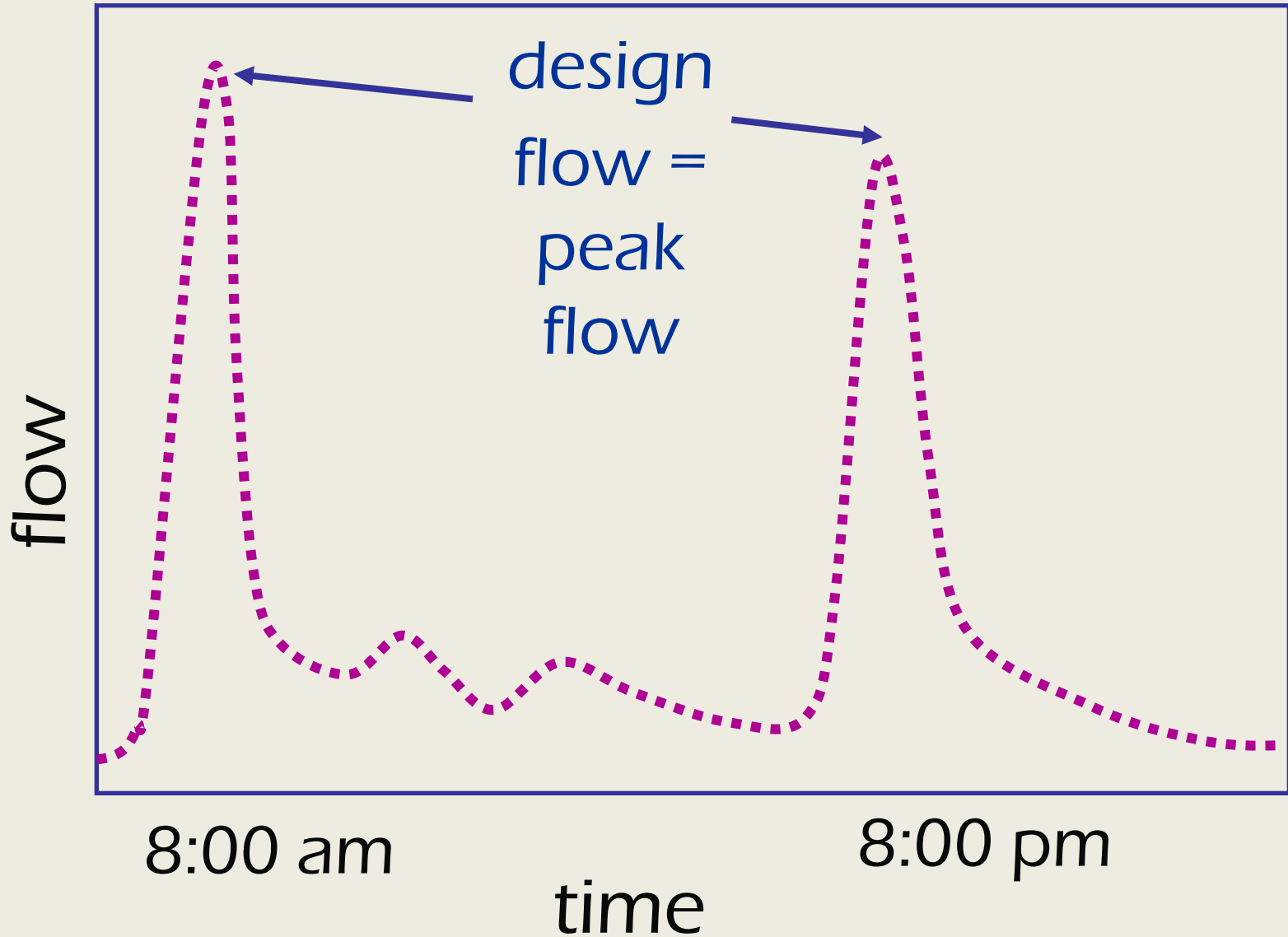
# **PUMPS & CONTROLS**

# Flow in a conventional OWTs

- Gravity displacement of wastewater
- Flow based upon social clock (socially dosed)
- Plug flow movement through the system
- Drainfield sized to handle peak flow
- No active feedback to system maintenance provider



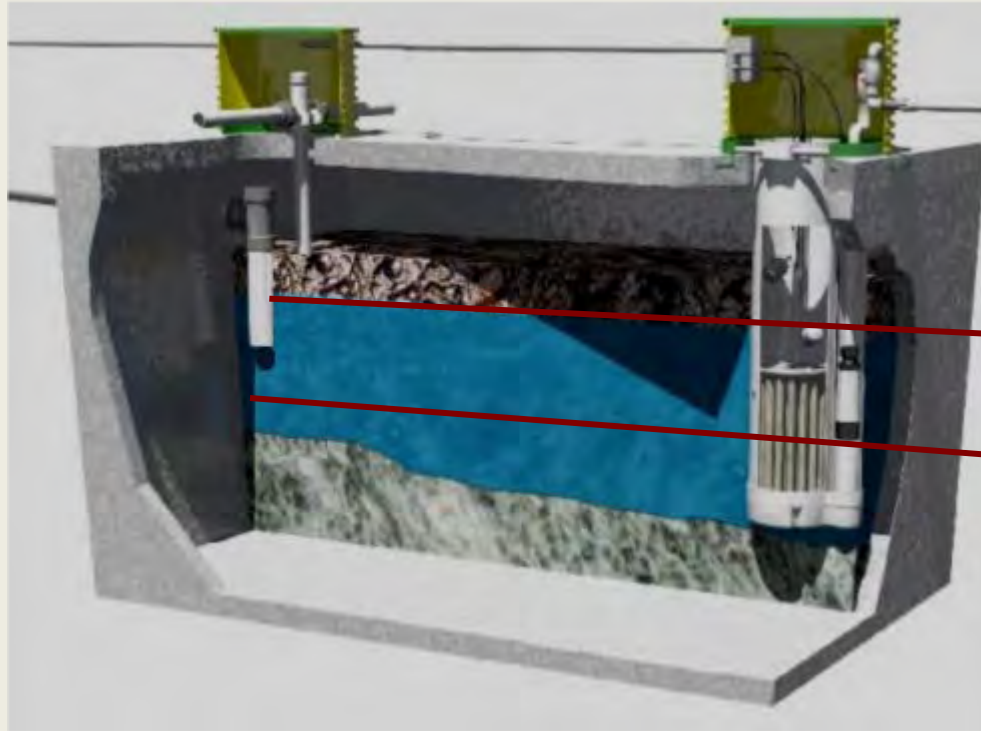
# Conventional septic system



# Timed-dosing system

- Captures and stores peak flows in tank
- 2 to 3 day emergency flow storage in tank head space
- Wastewater delivery to next treatment step is in uniform and controlled manner
- Flow through systems is based upon a 24-hour clock and not subject to what is happening in home
- Programmable logic controls are very proactive

# Timed-dosing system



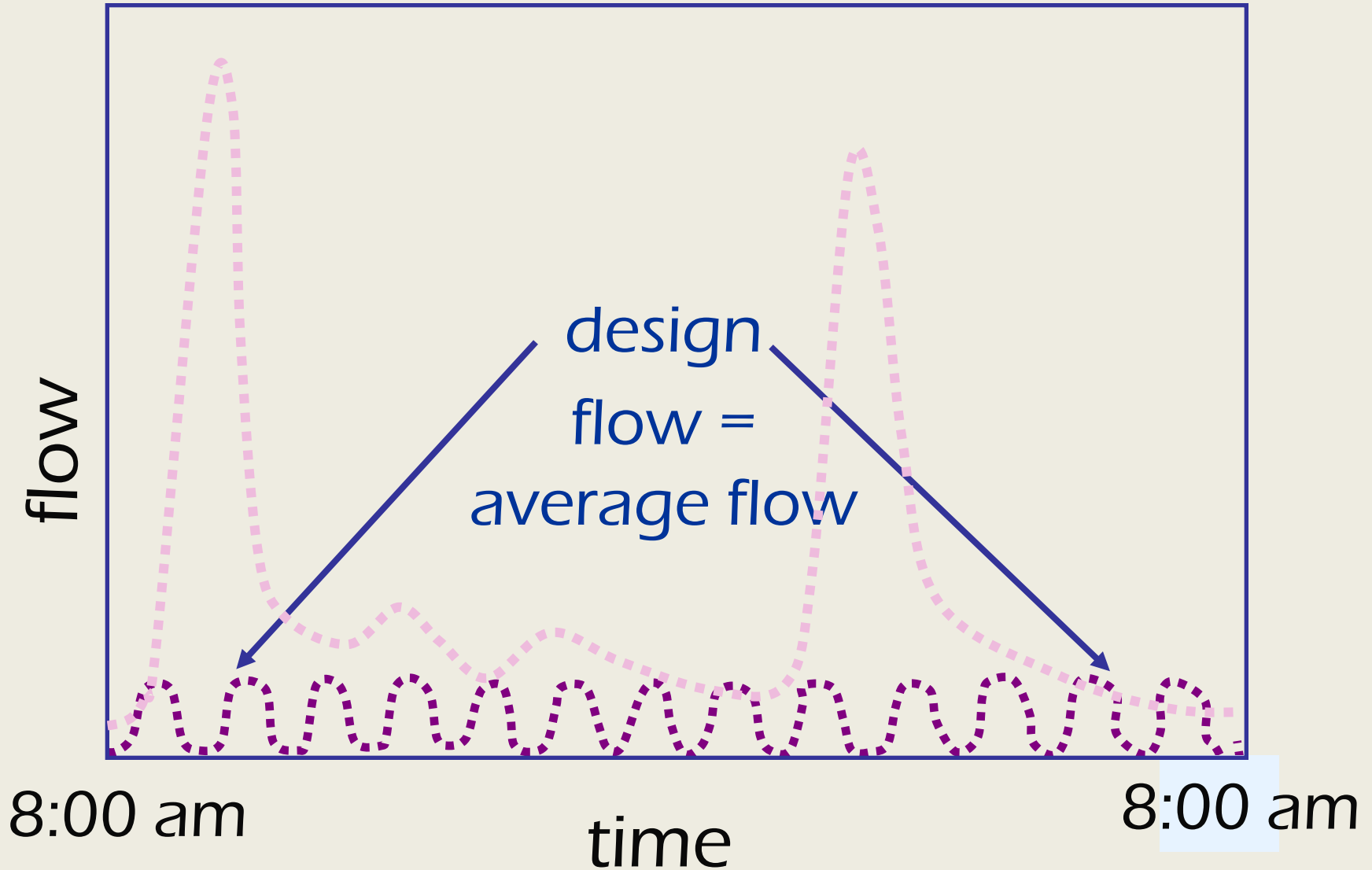
Surge Storage  
for Timed -  
dosing

There is no gravity outlet in tank, so liquid level can vary.

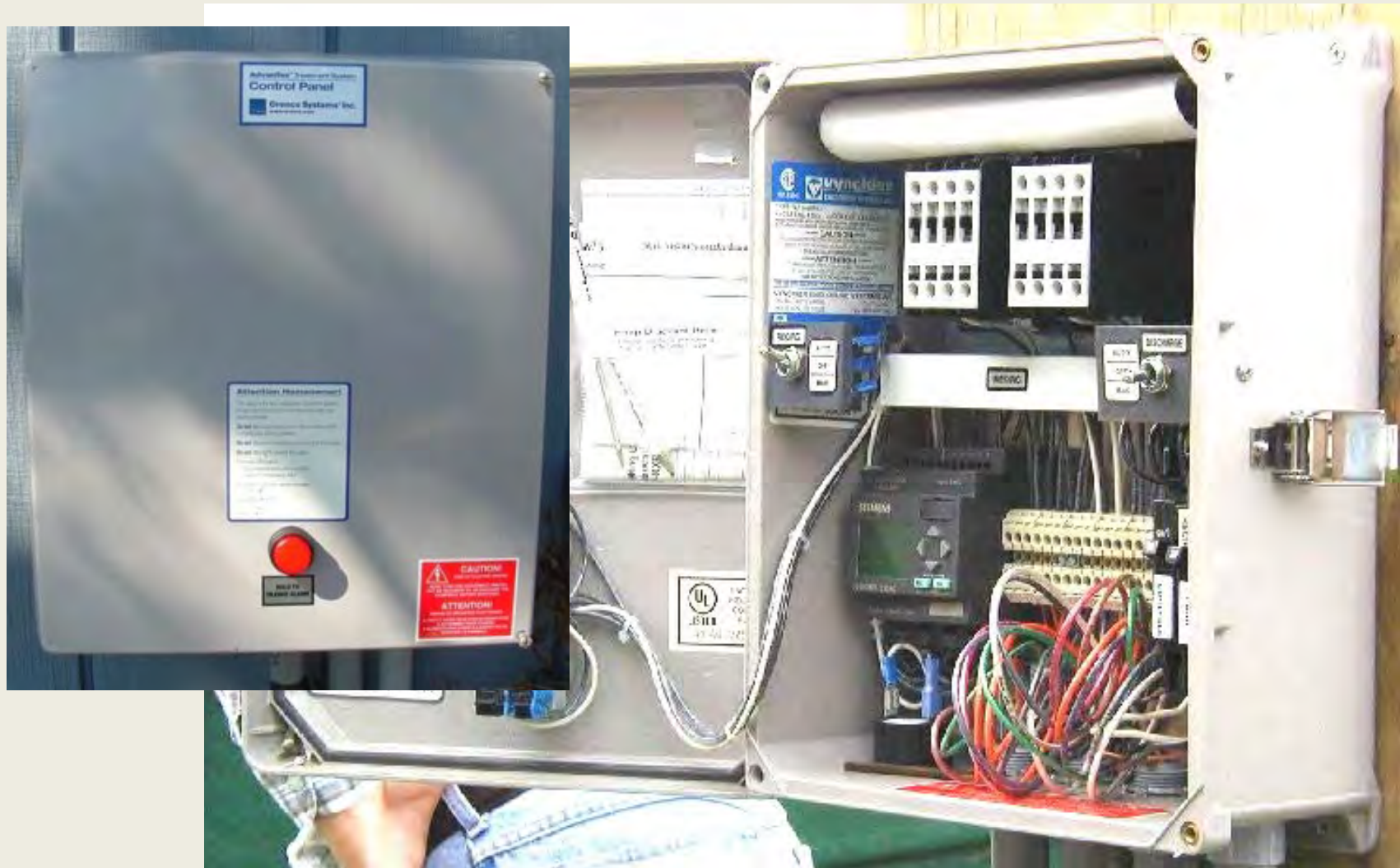
A good surge storage volume is 75 gals/bedroom



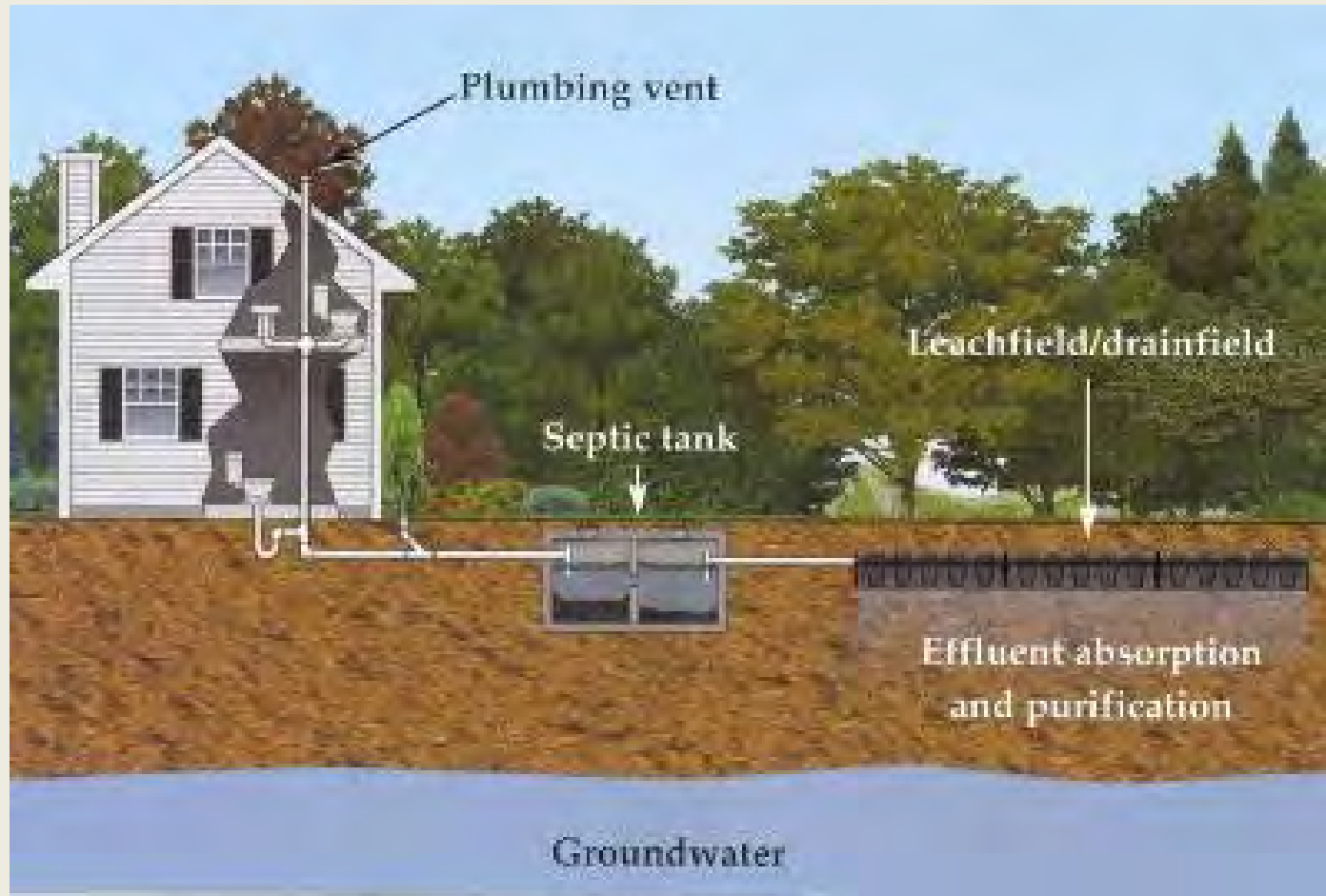
# Timed-dosing systems



# Control panel box

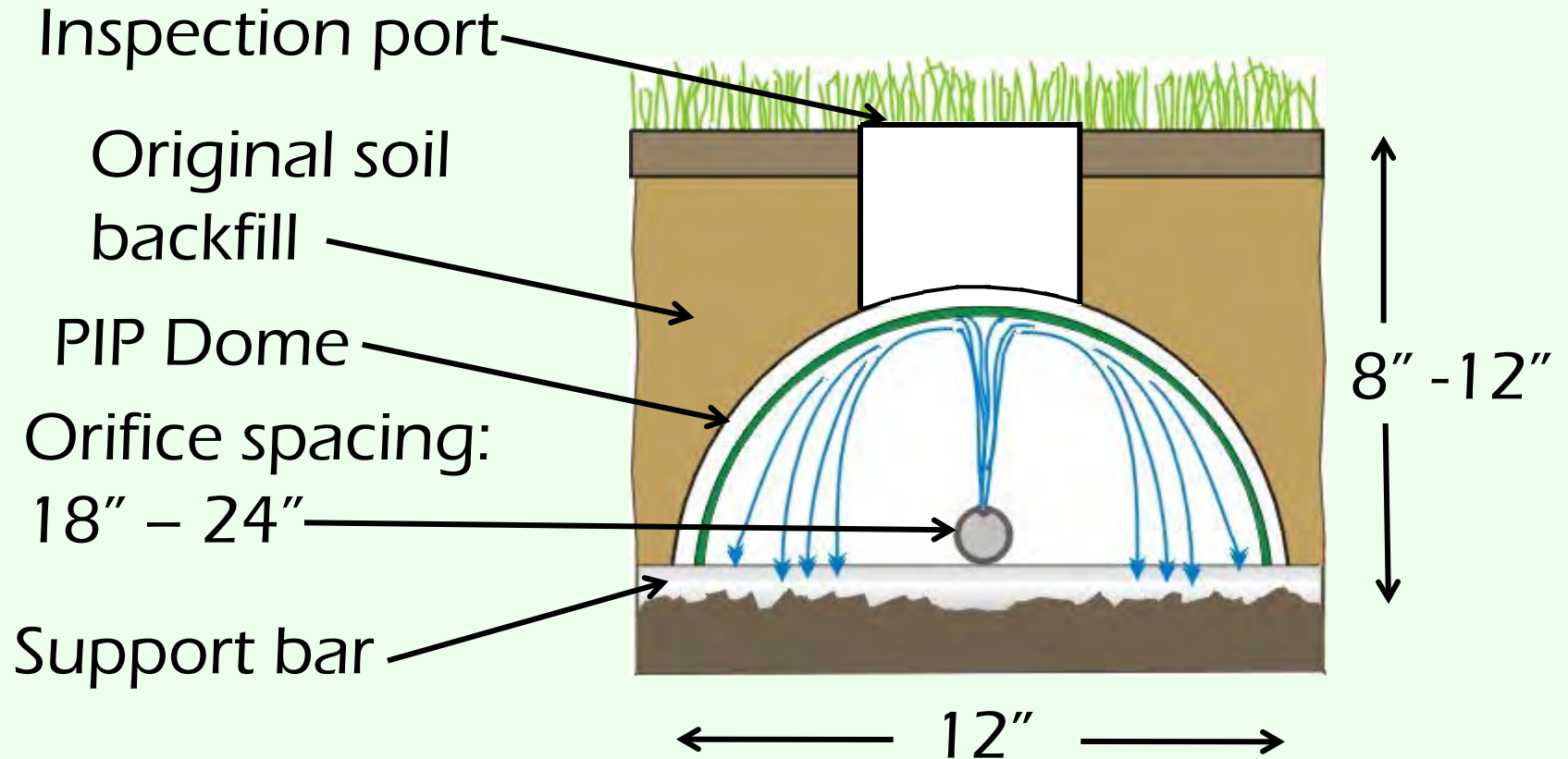


# ALTERNATE LEACHING OPTIONS





# Pressurized shallow drainfield



*Used only with advanced treated wastewater*

# Why keep it shallow?

- More oxygen present
- More biochemical reactivity
- More reactive coatings on soil surfaces
- Plant uptake potential (roots)
- Avoids restrictive layers
- Enhances vertical separation distances
- More treatment potential



# Shallow pressurized drainfield



- Near surface placement
- Used only with advanced treatment systems
- No biomat development
- Easy, cost effective
- 30" OC separation between trenches
- Site friendly
- Aesthetically pleasing



# **APPROVED ALTERNATIVES TO PIP PIPE FOR PSD APPLICATIONS**

# Infiltrator Quick 4 Equalizer 24 Low Profile chamber

- 9" H x 16" W x 53' L
- Direct substitution for PIP half-pipe dome



# Infiltrator

8 inch X 4'L x 3'W chamber





# **Infiltrator Quick 4 Plus std low profile chamber 8" H X 34" W X 48" L**

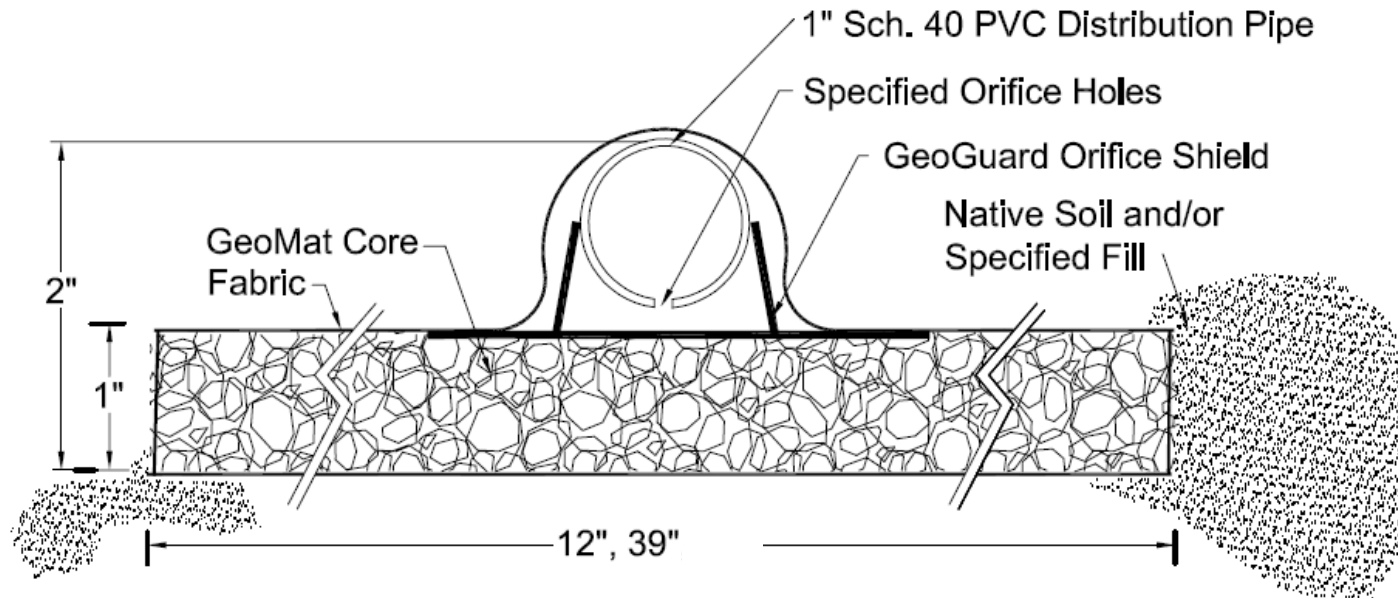


# GeoMat Leaching System

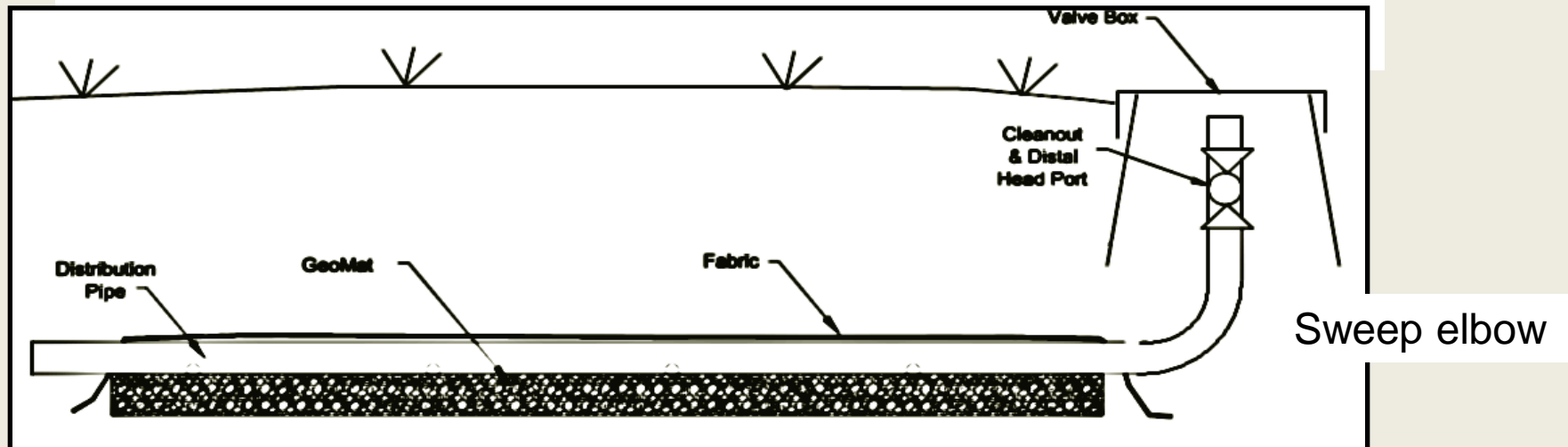


**Mat with greater contact to soil, LPP distribution system that can be jetted or brushed if necessary & provides gas displacement**

# GeoMat



**GEOMAT LEACHING SYSTEM**  
Cross Section  
- Not to Scale -





# Designing & Sizing PSD's

**TABLE 13 - LOADING RATES FOR PRESSURIZED SHALLOW DRAINFIELDS (PSD's)**  
**SIZED BASED ON BOTTOM AREA OF TRENCH**

Soil Type	Percolation Rate (min/in)	Application Rate (gal/day/sf)	
		CATEGORY 1 I/A OWTS	CATEGORY 2 I/A OWTS
Sand and loamy sand	1 – 5	3.0	1.9
Sandy loam	6 – 15	2.0	1.3
Fine sand, very fine sand, loam	16 – 30	1.5	.9
Silt and silt loam	30 – 45	1.2	.8
Clay loam, sandy clay, silty clay loam	45 – 60	1	.75
Clay	60 - 120	NOT ALLOWED	

# Design Example

- 4 Bedroom Home
- Perc Rate of 2 min/in
- Category 1 Technology = 3 g/sf/day

440 gpd / 3 g/sf/day = 147 sf

39 inch wide technology

(147 sf / 3.25 sf/lf) = 45.2 liner feet

(2) 22.6' trenches with 2' separation between trenches





# Open Bottom Gravelless Absorption Trenches

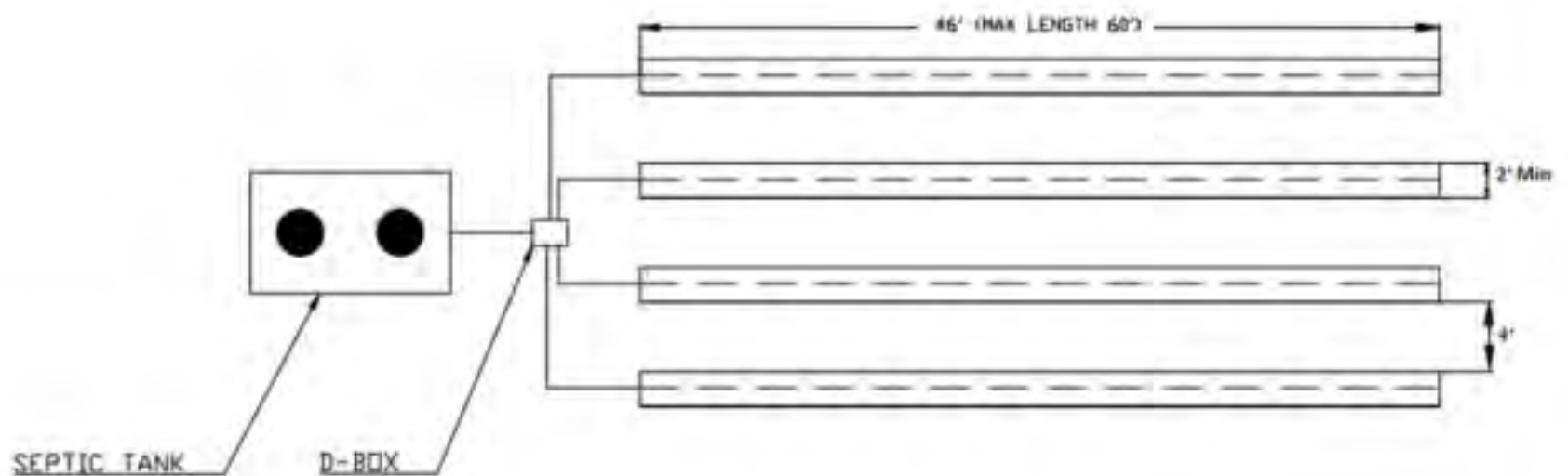
- Designed based on Perc Rate
- Designed based on 2ft wide trenches
- Products designed based on following are permitted 25% reduction compared to standard 2ft wide trench
  - Bottom area of 1.6 sf/lf
  - Min. Volume of 7.5 gal/lf
  - Open sidewall
- Placed in row w/ 4ft between rows
- Example: Infiltrator or Cultec Chambers







TYPICAL GRAVELLESS ABSORPTION TRENCH LAYOUT FOR  
4-BEDROOMS WITH AN APPLICATION RATE OF 1.2 g/sf/day





**TABLE 9 – REQUIRED LENGTH OF A GRAVELLESS ABSORPTION TRENCH FOR STANDARD DESIGN FLOWS (FEET)**  
**(BASED UPON TWO (2) FOOT WIDE TRENCH WITH 25% REDUCTION)**

Percolation Rate (minutes/inch)	Application Rate (gal/day/ft <sup>2</sup> )	Daily Flow Rate (gallons per day)							
		3-Bedrooms	4-Bedrooms	5-Bedrooms	6-Bedrooms	7-Bedrooms	8-Bedrooms	9-Bedrooms	10-Bedrooms
		330	440	550	660	770	880	990	1100
1-5	1.20	103	138	172	206	321	367	413	458
6-7	1.00	124	165	206	248	385	440	495	550
8-10	0.90	138	183	229	275	428	489	550	611
11-15	0.80	155	206	258	309	481	550	619	688
16-20	0.70	177	236	295	354	550	629	707	786
21-30	0.60	206	275	344	413	642	733	825	917
31-45	0.50	248	330	413	495	770	880	990	1100
46-60	0.45	275	367	458	550	856	978	1100	1222

**TABLE 10 – REQUIRED LENGTH OF A GRAVELLESS ABSORPTION TRENCH FOR STANDARD DESIGN FLOWS (FEET)**  
**(BASED UPON TWO (2) FOOT WIDE TRENCH WITH 33% REDUCTION FOLLOWING AN I/A OWTS)**

Percolation Rate (minutes/inch)	Application Rate (gal/day/ft <sup>2</sup> )	Daily Flow Rate (gallons per day)							
		3-Bedrooms	4-Bedrooms	5-Bedrooms	6-Bedrooms	7-Bedrooms	8-Bedrooms	9-Bedrooms	10-Bedrooms
		330	440	550	660	770	880	990	1100
1-5	1.20	92	123	154	184	321	367	413	458
6-7	1.00	111	147	184	221	385	440	495	550
8-10	0.90	123	164	205	246	428	489	550	611
11-15	0.80	138	184	230	276	481	550	619	688
16-20	0.70	158	211	263	316	550	629	707	786
21-30	0.60	184	246	307	369	642	733	825	917
31-45	0.50	221	295	369	445	770	880	990	1100
46-60	0.45	246	328	409	491	856	978	1100	1222

# Gravelless Geotextile Sand Filter

- Designed based on Perc Rate
- Designed based on 2ft wide trenches
- Products designed based on following are permitted to be designed based on 6 sq/lf compared to standard 2ft wide trench (See NYSDOH “Residential Onsite Wastewater Treatment System Design Handbook”, Appendix C List)
  - Width 3ft
  - Min. Storage of 12 gal/lf
  - Min 6sf/lf geotextile surface/lf
- Placed in row w/ 4ft between rows
- Example: Eljen, Geomat, Infiltrator ATL



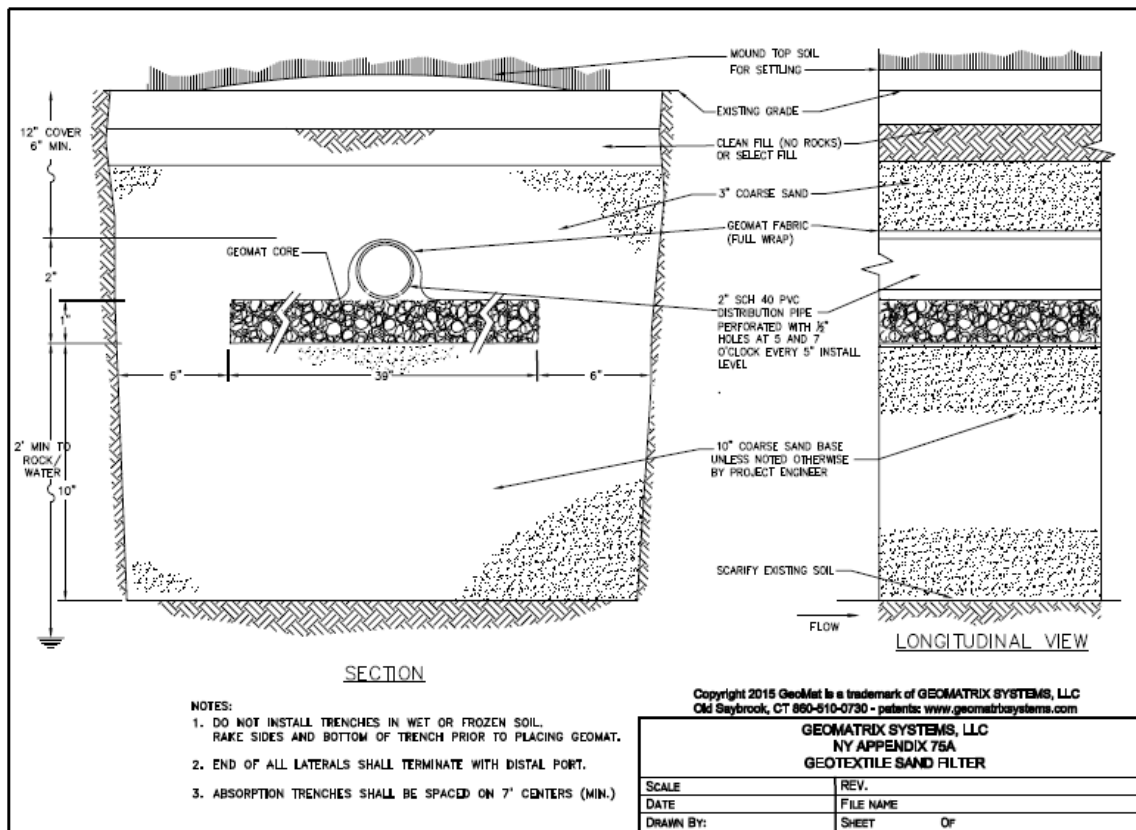






# GeoMat Leaching System

- Products designed based on following are permitted to be designed based on 6 sq/lf compared to standard 2ft wide trench Width 3ft
  - Min. Storage of 12 gal/lf
  - Min 6sf/lf geotextile surface/lf
- Placed in row w/ 4ft between rows



Patents: [www.geomatrixsystems.com](http://www.geomatrixsystems.com)

# Geotextile Sandfilters

**TABLE 11 – ADJUSTED REQUIRED LENGTH OF A GRAVELLESS ABSORPTION TRENCH FOR STANDARD DESIGN FLOWS (FEET)**  
**GRAVELLESS GEOTEXTILE SAND FILTERS**  
**(BASED UPON 6 FT<sup>2</sup>/FOOT OF TRENCH)**

Percolation Rate (minutes/inch)	Application Rate (gal/day/ft <sup>2</sup> )	Daily Flow Rate (gallons per day)							
		3-Bedrooms	4-Bedrooms	5-Bedrooms	6-Bedrooms	7-Bedrooms	8-Bedrooms	9-Bedrooms	10-Bedrooms
		330	440	550	660	770	880	990	1100
1-5	1.20	46	61	76	92	107	122	138	153
6-7	1.00	55	73	92	110	128	147	165	183
8-10	0.90	61	81	102	122	143	163	183	204
11-15	0.80	69	92	115	138	160	183	206	229
16-20	0.70	79	105	131	157	183	210	236	262
21-30	0.60	92	122	153	183	214	244	275	306
31-45	0.50	110	147	183	220	257	293	330	367
46-60	0.45	122	163	204	244	285	326	367	407

**TABLE 12 – REQUIRED AREA OF A GRAVELLESS ABSORPTION BED FOR STANDARD DESIGN FLOWS (FEET)**  
**(FT<sup>2</sup>)**

Percolation Rate (minutes/inch)	Application Rate (gal/day/ft <sup>2</sup> )	Daily Flow Rate (gallons per day)							
		3-Bedrooms	4-Bedrooms	5-Bedrooms	6-Bedrooms	7-Bedrooms	8-Bedrooms	9-Bedrooms	10-Bedrooms
		330	440	550	660	770	880	990	1100
1-5	0.95	347	463	579	695	811	926	1042	1158
6-7	0.80	413	550	688	825	963	1100	1238	1375
8-10	0.70	471	629	786	943	1100	1257	1414	1571
11-15	0.60	550	733	917	1100	1283	1467	1650	1833
16-20	0.50	600	800	1000	1200	1540	1760	1980	2200
21-30	0.45	733	978	1222	1467	1711	1956	2200	2444

# Distribution Boxes and Levelers

- Concrete or Non-Concrete (fiberglass or HDPE)
- All Outlets should be @ same level
- Must have locking cover to grade (cast iron or HDPE)
- Use of leveling devices required





*Any questions about  
drainfield options?*