



June 10, 2026

Agri-Waste Technology, Inc.
1225 Crescent Green, Suite 250, Cary NC 27518
agriwaste.com | 919.859.0669

ATTN: NV5 c/o Michael Allen
3300 Regency Parkway, Suite 100
Cary, NC 27518

SUBJECT: Engineered Option Permit
Released for Bid
Lake Myra WWTS – Aerobic Drip
0 S. Smithfield Rd, Wendell, NC 27591
Wake County PIN 1763519788



Dear Michael,

Enclosed please find the “**Released for Bid**” design package for the wastewater system to serve Lake Myra County Park’s facilities. The subject property is located at 0 S. Smithfield Rd, Wendell, NC 27591 (Wake County PIN 1763519788). The park’s subsurface dripfield is designed to support a daily flow of 680 GPD. This wastewater system is permitted through the *Engineered Option Permit*. Because you have selected the private permitting route, the system is completely dependent on the work completed by the soil scientist and engineer. The county bears no responsibility for the system. To ensure a smooth transition into the construction phase of this project, below are the next steps:

1. The “Released for Bid” design package can be sent to potential installers to get quotes for the system installation. With this being an Engineered Option Permit, the engineer may assist in the installer selection based on the specifications set forth in the design package. We are happy to aid in facilitating bids with potential installers on your behalf. A follow-up email will be sent out with a list of AWT Recommended installers in your area.

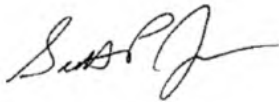
***Please note:** Alternative installers may be used, but ultimately must be approved by AWT. In the event a non-recommended installer is used to install the system, additional construction oversight fees will apply.

2. Once an installer is selected, a pre-construction meeting with the engineer, soil scientist, septic installer, builder (optional, but strongly recommended), and owner (optional) is required prior to any construction or clearing of the designated septic areas. **Please note, the soil in the primary and repair drainfield areas is very fragile and can be easily compacted.** To protect these sensitive areas from potential disturbance, the designated drainfield area should be clearly marked and/or fenced off so no disturbance from construction activities can occur.
 - AWT will establish with the installer the required times an AWT representative is to be present to oversee system installation.
 - Prior to clearing the drainfield and installation of the drip tubing, the soil scientist must approve the site conditions (dry period).

3. This system will require an operator to maintain the system. An Operator in Responsible Charge (ORC) must be contacted to visit twice a year to inspect the system and provide the necessary ongoing maintenance. AWT can be the contracted ORC of the system if desired – a separate contract will be sent for this service.
4. Upon completion of the system installation and successful system start up, an Authorization to Operate “ATO” Meeting will be scheduled. The engineer, soil scientist, septic installer, and owner are required to attend the meeting. The county representative is also invited to attend. The ATO meeting is a formality to familiarize the owner with system components, confirm system operation, ensure ongoing maintenance of the system is understood, and ultimately provide all documentation to the county to file. Once the final ATO package is sent to the county, this allows for the issuance of the Certificate of Occupancy.

If you have any questions or concerns, please feel free to contact me at 919-859-0669 or via email at sjones@agriwaste.com.

Regards;

A handwritten signature in black ink, appearing to read 'Scott P. Jones', with a stylized flourish at the end.

Scott P. Jones, P.E.
Sr. Project Engineer



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**Lake Myra WWTS – Aerobic Drip
0 S. Smithfield Road, Wendell, NC 27591
Wake County PIN 1763519788**

Plans and Specifications for Wastewater Treatment System

**FINAL DESIGN
RELEASED FOR BID
NOT RELEASED FOR CONSTRUCTION**



Date: June 10, 2026

Consultants: Scott P. Jones, P.E.
Sr. Project Engineer
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Plans and Specifications for Wastewater System

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1. Narrative Description of Wastewater System



Narrative Description of Subsurface Drip System with Pretreatment

Agri-Waste Technology, Inc.

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The designed Subsurface Drip System with Pretreatment (TS-II) considers the following components:

- Septic Tank with Effluent Filter
- Recirculation Tank
- AdvanTex Treatment Pods (2-AX20 Unit)
- UV Disinfection
- Pump (Field Dosing) Tank
- Headworks Box
- Control Panel
- Subsurface Dripfield

Due to the advanced technology in this system, a Certified Operator must be contracted to maintain this system.

Septic Tank

A new 2,100-gallon traffic-rated septic tank will serve the facilities at Lake Myra County Park. The septic tank will be outfitted with an 8-in. Orenco Biotube effluent filter on the outlet. Orenco Access Risers (24 in.) will be installed on both the inlet and outlet ends of the septic tank. To facilitate the riser installation, riser adapters will be cast into the septic tank during tank construction. All tank risers shall be equipped with a safety net. Rubber boots (4 in.) shall be cast into the inlet and outlet ends of the septic tank. Waste that exits the septic tank will flow via gravity to the recirculation tank.

Recirculation Tank

A new 1,800-gallon traffic rated recirculation tank will be installed. Liquid from the septic tank will flow by gravity to the inlet of the recirculation tank. A recirculation pump will be located on the outlet end of the recirculation tank to deliver effluent to the AdvanTex treatment pod. An Orenco Biotube Pump Vault will house the recirculation pump. As liquid exists the treatment component (AdvanTex Pod), it will flow to the recirculating splitter valve located in the inlet riser of the recirculation tank. Depending on the liquid level in the tank, liquid from the pod that flows to the recirculating splitter valve will either return to the recirculation tank or continue through the system. Orenco Access Risers (24 in.) will be installed on both the inlet and outlet ends of the recirculation tank. To facilitate the riser installation, riser adapters will be cast into the recirculation tank during tank construction. All tank risers shall be equipped with a safety net, shall contain an inner lid, or shall have an approved safety device. A rubber boot (4 in.) shall be cast into the inlet and outlet ends of the recirculation tank.

The recirculation pump is controlled by a system of three (3) floats that operate the recirculation pump in a Timed Dose arrangement. Float 1 (lowest elevation) is a Timer Enable float. Float 2 is a Peak Enable Float and Float 3 acts as a High Water Alarm. Under normal operation the Timer Enable float will be engaged thereby activating the timer in the control panel. At the pre-set interval the pump will engage and deliver effluent to the AdvanTex treatment pod (“On” cycle). Following this period, the pump will turn off for a designated time (“Off” cycle). During the periods of high water in the recirculation tank, the Peak Enable float will engage and reduce the pre-set “Off” time and thereby send increased flow to the treatment pod. If the water level in the recirculation tank does not decrease, the High water Alarm will activate.

AdvanTex AX20 Treatment Pods (Total of 2)

The treatment component of the system is comprised of two (2) AdvanTex AX20 treatment pods. Liquid from the recirculation tank will be periodically (approximately every 15 min.) pumped to the treatment pods and sprayed over the fabric-media filters for treatment. The wastewater will percolate down through the textile sheets. The treated water will be collected via bottom drains. Treated water from one treatment pod will flow to the inlet boot of the recirculation tank, and treated water from the second treatment unit will flow to the recirculating splitter valve in the outlet compartment of the recirculation tank.

The supply line to the AdvanTex pods will also direct flow back to the septic tank. To control flow, a ball valve will be installed on the terminal end of the line in the septic tank riser.

The pod will be installed on a bed of gravel.

Recirculating Splitter Valve

The recirculating splitter valve is located on the inlet access riser of the recirculation tank. Depending on the liquid level in the recirculation tank, the valve will either allow water back into the recirculation tank for further treatment or direct water to the UV disinfection component in the inlet access riser of the pump tank.

UV Disinfection

Disinfection for the system will be accomplished using a single bulb UV system integrated into the inlet riser of the pump (field dosing) tank. The UV light should operate for approximately one year prior to needing to be replaced. If the UV light burns out or loses sufficient intensity (below a set threshold), an alarm will activate and disable the system pump. An alarm light on the control panel will also illuminate. When the alarm is activated, the facility owner should reduce water use (faucets and toilet flushing) until the system is operating properly.

Pump (Field Dosing) Tank

A new traffic-rated 1,800-gallon pump tank will be installed for this system. As treated effluent leaves the AdvanTex unit and is treated by the UV unit in the inlet access riser of the pump tank, the effluent will be stored in the pump tank. Periodically, the effluent will be pumped from the tank to the dripfield. Orenco Access Risers (24 in.) will be installed on both the inlet and outlet ends of the tank. To facilitate the riser installation, riser adapters will be cast into the pump tank.

Flow to the dripfield is controlled by the floats in the pump tank and the specific timer settings programmed into the control panel. There is a 3-float system in the pump tank. Float 1 (lowest elevation) is a Redundant Off float. Float 2 is a Timer Enable float. Float 3 is a Peak Enable and High Water Alarm float. Under normal operation the Redundant Off and Timer Enable floats will be engaged thereby activating the timer in the control panel. At the pre-set interval, the pump will engage and send water to the dripfield (“On” cycle). Following this period, the pump will turn off for a designated time (“Off” cycle)”. During periods of high water in the pump tank, the Peak Enable float will engage and reduce the pre-set “Off” time and thereby send increased flow to the dripfield. If the water level in the pump tank does not decrease, the High Water Alarm will activate.

Headworks Box

The headworks box contains irrigation components including a spin filter, flowmeter, and solenoid valves. The headworks box will be placed on a gravel bed (on the pump tank if space allows) and outlet drain (if site topography conditions allow).

The spin filter collects small debris from the treated water before it is sent to the dripfield. At pre-set intervals the spin filter is flushed of the collected debris. This flushed water is sent back to the septic tank. Similarly, on a set basis, the “field return valve” (located in the headworks box) opens thereby allowing the field driplines to be flushed. This flushed water also returns to the septic tank.

Control Panel

One control panel will be installed with this wastewater system. The panel will control operation of the recirculation pump, UV system, field discharge pump, and solenoid valves within the headworks boxes. This panel will be connected to an internet connection that will notify the operator of system operation.

Dripfield

The treated effluent is pumped to a four-zone subsurface drip field. The field consists of supply and return lines as well as a minimum of 3,400 feet of dripline. The primary system uses a total of 3,560 feet (4.7% blanking). The dripline is installed at a 6-in. depth and placed along elevation contours. Emitters are spaced every 2 feet on the dripline. Each emitter has a 0.61 gph flowrate. Air/vacuum relief valves are located on the supply and return manifolds to allow the system to properly operate.

Construction Inspections

During the installation of the system, construction inspection(s) will be conducted by the certifying engineer or his designated representative. These inspections will help to ensure the system is installed to meet the intended design and to document the system components. At the completion of the installation a final inspection will be completed by the certifying engineer. At this time, the system installer will also provide the certifying engineer with documentation of the installation as well as an installer certification indicating the system was installed to meet the intent of the design.

Testing and Start-Up Procedures

At the final inspection (after system installation is complete), the different components will be tested to ensure they are operating as intended. The system will be placed into operation and using the flow meter and pressure check points, system operating parameters will be recorded. The measured values will be compared to the system design and the installation to document the baseline parameters of the installed system.

Operation and Maintenance

Per the regulatory requirements and based on the system classification, this system will require a certified operator. A copy of the contract with the certified operator will be submitted to the local health department prior to receiving the operations permit. A contract must be maintained throughout the life of the system. The operator will perform a minimum of two inspections per year. At each inspection, the operator will inspect the treatment unit and the dripfield. The system will be manually operated and tested to ensure the system is operating as intended. The operator will also perform the required maintenance activities (clean filters, check pumps, check drainfield). Additionally, the operator will collect wastewater samples per the regulatory requirements.

2. Wastewater System Calculations

Wastewater Treatment System Design Calculations

Summary Page

Project: NV5-Smithfield Rd
Location: S.Smithfield Road
Wendell, NC 27591
County: Wake



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Design Parameters

Daily Design Flow: 680 gal/day

L.T.A.R. (from L.S.S.)

Primary: 0.1 gal/day/ft²

Repair: 0.1 gal/day/ft²

Dripline Spacing: 2.0 ft

Number of Zones: 4

Project: NV5-Smithfield Rd
Location: S.Smithfield Road
Wendell, NC 27591
County: Wake

Daily Design Flow:	680 gal/day	
L.T.A.R. (from L.S.S.):	0.1 gal/day/ft ²	
Dripline Spacing:	2 ft	
Dripline Required:	3400 ft	
Total Layout Length:	3560 ft	
Effective Drainfield Area:	7120 ft ²	
Available for Blanking:	160 ft	4.7%

Line	Type	Flag Color	Layout Line Length (ft)	Zone	Lateral	Run Length (ft)	Lateral Length (ft)	Zone Length (ft)
	1 Layout Line	blue		4		58		
	2 Interpolated Line					62		
	3 Interpolated Line					68		
	4 Interpolated Line				4	72	260	
	5 Interpolated Line					65		
	6 Layout Line	pink				65		
	7 Interpolated Line					65		
	8 Interpolated Line				3	65	260	
	9 Interpolated Line					65		
	10 Interpolated Line					65		
	11 Layout Line	blue				65		
	12 Interpolated Line				2	65	260	
	13 Interpolated Line					65		
	14 Interpolated Line					65		
	15 Interpolated Line					65		
	16 Layout Line	pink			1	65	260	1,040
	17 Interpolated Line			3		140		
	18 Interpolated Line				3	140	280	
	19 Interpolated Line					140		
	20 Layout Line	blue			2	140	280	
	21 Interpolated Line					140		
	22 Interpolated Line				1	140	280	840
	23 Interpolated Line			2		140		
	24 Interpolated Line				3	140	280	
	25 Layout Line	pink				140		
	26 Interpolated Line				2	140	280	
	27 Interpolated Line					140		
	28 Interpolated Line				1	140	280	840
	29 Interpolated Line			1		140		
	30 Layout Line	blue			3	140	280	
	31 Interpolated Line					140		
	32 Interpolated Line				2	140	280	
	33 Interpolated Line					140		
	34 Interpolated Line				1	140	280	840
TOTAL:								
3,560								

Repair Dripfield Layout

Project: NV5-Smithfield Rd
Location: S.Smithfield Road
Wendell, NC 27591
County: Wake

Dripfield Sizing - Repair

Daily Design Flow:	680 gal/day	
L.T.A.R. (from L.S.S.):	0.1 gal/day/ft ²	
Dripline Spacing:	2 ft	
Dripline Required:	3400 ft	
Total Layout Length:	3684 ft	
Effective Drainfield Area:	7368 ft ²	
Available for Blanking:	284 ft	8.4%

Repair Dripfield Layout

Line	Type	Flag Color	Layout Line Length (ft)	Zone	Lateral	Run Length (ft)	Lateral Length (ft)	Zone Length (ft)
	35 Layout Line	pink		4		150		
	36 Interpolated Line				3	150	300	
	37 Interpolated Line					150		
	38 Interpolated Line				2	150	300	
	39 Interpolated Line					150		
	40 Layout Line	blue			1	150	300	900
	41 Interpolated Line			3		150		
	42 Interpolated Line				3	150	300	
	43 Interpolated Line					150		
	44 Interpolated Line				2	150	300	
	45 Layout Line	pink				150		
	46 Interpolated Line				1	150	300	900
	47 Interpolated Line			2		150		
	48 Interpolated Line				3	150	300	
	49 Interpolated Line					150		
	50 Layout Line	blue			2	150	300	
	51 Interpolated Line					150		
	52 Interpolated Line				1	150	300	900
	53 Interpolated Line			1		128		
	54 Interpolated Line				4	128	256	
	55 Layout Line	pink				130		
	56 Interpolated Line				3	122	252	
	57 Interpolated Line					114		
	58 Interpolated Line				2	106	220	
	59 Interpolated Line					64		
	60 Layout Line	blue				64		
	61 Interpolated Line					64		
	62 Interpolated Line				1	64	256	984
TOTAL:							3,684	

Wastewater Treatment System Design Calculations

Field Flow

Project: NV5-Smithfield Rd
Location: S.Smithfield Road
 Wendell, NC 27591
County: Wake

Total Field

Total quantity of effluent to be disposed per day 680 gallons / day
 Hydraulic Loading Rate 0.100 gallons / sq.ft. / day
 Minimum Dispersal Field Area 6800 sq.ft.

Flow Per Zone

Number of Zones 4 zone(s)

	Zone 1	Zone 2	Zone 3	Zone 4	
Dispersal area per zone	1,680	1,680	1,680	2,080	sq.ft.
Spacing between lines	2.0	2.0	2.0	2.0	ft.
Spacing between emitters	2.0	2.0	2.0	2.0	ft.
Total linear feet per zone	840	840	840	1,040	ft. per zone
Total number of emitters per zone	420	420	420	520	emitters per zone
Dripline Type	Netafim	Netafim	Netafim	Netafim	
Pressure at beginning of zone	38	38	38	35	psi
Feet of Head at the beginning of zone	87.8	87.8	87.8	80.9	ft.
Flow rate per emitter	0.61	0.61	0.61	0.61	gph
Dose flow per zone	4.27	4.27	4.27	5.29	gpm
Min. Flushing Velocity (Normal Operation)	2	2	2	2	ft/sec
Min. Flushing Velocity (Maintenance Operation)	2	2	2	2	ft/sec
Flush flow required at the end of each dripline	1.54	1.54	1.54	1.54	gpm
Length of longest dripline lateral	280	280	280	260	ft.
Flow required to Dose longest dripline lateral	1.42	1.42	1.42	1.32	gpm
Laterals per zone	3	3	3	4	laterals
Total flow for flushing velocity in all lines	4.61	4.61	4.61	6.14	gpm
Total flow per zone (flushing + dosing)	8.88	8.88	8.88	11.43	gpm

Dosing

Number of doses per day per zone	2.89	doses		
Timer ON. Pump run time per dose per zone	13:00	min:sec		
Timer OFF. Pump off time between doses per zone	1:50	hr:min		
Pump run time per day per zone	0:37	hr:min		
Number of doses per day for all zones	11.56	doses / day		
Time for field to pressurize	0:00:30	hr:min:sec		
Filter flush timer	0:00:20	hr:min:sec		
Field flush timer	0:01:00	hr:min:sec		
Field flush counter	10	cycles		
Time required to complete all functions per day	2:51	hr:min		
Dose volume per zone	56		56	69 gallons per dose
Length of Draining Supply Line	0	0	0	0
Volume	0.00	0.00	0.00	0.00
Length of Draining Supply Feeder Lines	30	30	28	80 ft
Volume	0.44	0.44	0.41	1.18 gallons
Length of Draining Return Line	0	0	0	0
Volume	0.00	0.00	0.00	0.00
Length of Draining Return Feeder Lines	44	44	44	102 ft
Volume	0.65	0.65	0.65	1.51 gallons
Volume in dripline per zone	10.37	10.37	10.37	12.84 gallons
Total Recharge Volume	53	53	53	67 gallons

Note: Zones are analyzed individually. The more extreme demands are used for pump selection.

Wastewater Treatment System Design Calculations

Pump Sizing Zone 1

Project: NV5-Smithfield Rd
 Location: S.Smithfield Road
 Wendell, NC 27591
 County: Wake

Field Flow Summary

Number of Zones 4 zones
 Zone to Calculate Zone 1
 Number of Laterals in Zone 3 laterals
 Flow Required to dose field 4.27 gpm
 Flow required to flush field 4.61 gpm
 Flow required to dose & flush field 8.88 gpm

	Flushing Condition		Dosing Condition	
	(ft.)	(psi)	(ft.)	(psi)
Losses through Return Line				
Common Return pipe Diameter	1"		1"	
Length of return line	624		0	
Equivalent length of fittings	62		0	
Elevation Change	0.0		0.0	
Pressure loss in 100 ft of Common Return pipe	1.45	0.63	0.0	0.0
Total Pressure Loss Common Return pipe	9.94		0.00	
Return Feeder Line Diameter	1/2"		1/2"	
Length of Longest Return Feeder Line along Zone	20		0.0	
Pressure Loss in 100 ft. of Zone Return Feeder pipe	2.57	1.11	0.00	
Total Pressure Loss Return Feeder Line	0.57		0.00	
Total pressure loss from end of zone back to tank	10.50	4.55	0.00	0.0
Minimum Pressure Specified Returning to Tank	4.62	2.0	0.0	0.0
Losses through Dripline				
Length of longest dripline lateral in zone	280		280	
Minimum dosing pressure required at end of dripline	16.17	7.00	16.17	7.00
Loss through dripline during dose/flush	65.08	28.17	8.47	3.67
Min. Pressure Required at Beginning of Dripfield				
Calculated Pressure	85.87	37.17	24.64	10.67
Specified Pressure (from Field Flow)	87.78	38.00		

Losses through Headworks

Recommended Filter (Jain Irrigation Spin Filter)	4EH-1			
Selected Filter	4EH-1			
Filter Pressure Loss	6.06	2.62	2.08	0.90
Recommended Zone Valve (Netafim Solenoid)	1.0" Solenoid			
Selected Zone Valve	1.0" Solenoid			
Zone Valve Pressure Loss	6.93	3.00	6.93	3.00
Recommended Flow Meter (Master Meter)	3/4" Meter			
Selected Flow Meter	3/4" Meter			
Flow Meter Pressure Loss	1.84	0.80	0.42	0.18
Other Pressure Losses	0	0	0	0
Total loss through Headworks components	14.83	6.42	9.43	4.08

Losses through Supply Line

Zone Supply pipe Diameter	1 1/2"		1 1/2"	
Length of Zone Supply pipe from PT to Manifold	785		785	
Equivalent length of fittings	78.5		78.5	
Pressure Loss in 100 ft. of Zone Supply pipe	0.59	0.25	0.15	0.07
Total Pressure Loss Zone Supply pipe	5.07		1.31	
Supply Feeder Line Diameter	1/2"		1/2"	
Length of Longest Supply Feeder Line Along Zone	16		16	
Pressure Loss in 100 ft. of Zone Supply Feeder Pipe	8.66	3.75	2.23	0.97
Total Pressure Loss Supply Feeder Line	1.52		0.39	
Elevation Change (Pump to tank outlet)	12		11.85	
Elevation Change (Tank outlet to Start of Zone)	8.0		8	
Total Supply Line Head Loss from Pump to Zone	26.44	11.45	21.55	9.33

Total Dynamic Head (TDH)	129.1 ft	55.6 ft
Pump Capacity - Flow Rate	8.9 gpm	4.3 gpm

Pressure Regulator (Dosing Condition)

Total Dynamic Head Loss (from PT to Start of Zone) 30.59 ft
 TDH of Selected Pump at Dose Flow 145 ft
 TDH at Start of Zone 114.41 ft
 = 49.53 psi
 Is Pressure Regulator Required? NO

Wastewater Treatment System Design Calculations

Pump Sizing Zone 2

Project: NV5-Smithfield Rd
 Location: S.Smithfield Road
 Wendell, NC 27591
 County: Wake

Field Flow Summary

Number of Zones 4 zones
 Zone to Calculate Zone 2
 Number of Laterals in Zone 3 laterals
 Flow Required to dose field 4.27 gpm
 Flow required to flush field 4.61 gpm
 Flow required to dose & flush field 8.88 gpm

	Flushing Condition		Dosing Condition	
	(ft.)	(psi)	(ft.)	(psi)
Losses through Return Line				
Common Return pipe Diameter	1"		1"	
Length of return line	606		0	
Equivalent length of fittings	61		0	
Elevation Change	0.0		0.0	
Pressure loss in 100 ft of Common Return pipe	1.45	0.63	0.0	0.0
Total Pressure Loss Common Return pipe	9.65		0.00	
Return Feeder Line Diameter	1/2"		1/2"	
Length of Longest Return Feeder Line along Zone	16		0.0	
Pressure Loss in 100 ft. of Zone Return Feeder pipe	2.57	1.11	0.00	
Total Pressure Loss Return Feeder Line	0.45		0.00	
Total pressure loss from end of zone back to tank	10.10	4.37	0.00	0.0
Minimum Pressure Specified Returning to Tank	4.62	2.0	0.0	0.0
Losses through Dripline				
Length of longest dripline lateral in zone	280		280	
Minimum dosing pressure required at end of dripline	16.17	7.00	16.17	7.00
Loss through dripline during dose/flush	65.08	28.17	8.47	3.67
Min. Pressure Required at Beginning of Dripfield				
Calculated Pressure	85.87	37.17	24.64	10.67
Specified Pressure (from Field Flow)	87.78	38.00		

Losses through Headworks

Recommended Filter (Jain Irrigation Spin Filter)	4EH-1			
Selected Filter	4EH-1			
Filter Pressure Loss	6.06	2.62	2.08	0.90
Recommended Zone Valve (Netafim Solenoid)	1.0" Solenoid			
Selected Zone Valve	1.0" Solenoid			
Zone Valve Pressure Loss	6.93	3.00	6.93	3.00
Recommended Flow Meter (Master Meter)	3/4" Meter			
Selected Flow Meter	3/4" Meter			
Flow Meter Pressure Loss	1.84	0.80	0.42	0.18
Other Pressure Losses	0	0	0	0
Total loss through Headworks components	14.83	6.42	9.43	4.08

Losses through Supply Line

Zone Supply pipe Diameter	1 1/2"		1 1/2"	
Length of Zone Supply pipe from PT to Manifold	768		768	
Equivalent length of fittings	76.8		76.8	
Pressure Loss in 100 ft. of Zone Supply pipe	0.59	0.25	0.15	0.07
Total Pressure Loss Zone Supply pipe	4.96		1.28	
Supply Feeder Line Diameter	1/2"		1/2"	
Length of Longest Supply Feeder Line Along Zone	16		16	
Pressure Loss in 100 ft. of Zone Supply Feeder Pipe	8.66	3.75	2.23	0.97
Total Pressure Loss Supply Feeder Line	1.52		0.39	
Elevation Change (Pump to tank outlet)	12		11.85	
Elevation Change (Tank outlet to Start of Zone)	7.6		7.6	
Total Supply Line Head Loss from Pump to Zone	25.93	11.23	21.12	9.14

Total Dynamic Head (TDH)	128.5 ft	55.2 ft
Pump Capacity - Flow Rate	8.9 gpm	4.3 gpm

Pressure Regulator (Dosing Condition)

Total Dynamic Head Loss (from PT to Start of Zone) 30.16 ft
 TDH of Selected Pump at Dose Flow 145 ft
 TDH at Start of Zone 114.84 ft
 = 49.71 psi
 Is Pressure Regulator Required? NO

Wastewater Treatment System Design Calculations

Pump Sizing Zone 3

Project: NV5-Smithfield Rd
 Location: S.Smithfield Road
 Wendell, NC 27591
 County: Wake

Field Flow Summary

Number of Zones 4 zones
 Zone to Calculate Zone 3
 Number of Laterals in Zone 3 laterals
 Flow Required to dose field 4.27 gpm
 Flow required to flush field 4.61 gpm
 Flow required to dose & flush field 8.88 gpm

	Flushing Condition		Dosing Condition	
	(ft.)	(psi)	(ft.)	(psi)
Losses through Return Line				
Common Return pipe Diameter	1"		1"	
Length of return line	590		0	
Equivalent length of fittings	59		0	
Elevation Change	0.0		0.0	
Pressure loss in 100 ft of Common Return pipe	1.45	0.63	0.0	0.0
Total Pressure Loss Common Return pipe	9.39		0.00	
Return Feeder Line Diameter	1/2"		1/2"	
Length of Longest Return Feeder Line along Zone	16		0.0	
Pressure Loss in 100 ft. of Zone Return Feeder pipe	2.57	1.11	0.00	
Total Pressure Loss Return Feeder Line	0.45		0.00	
Total pressure loss from end of zone back to tank	9.85	4.26	0.00	0.0
Minimum Pressure Specified Returning to Tank	4.62	2.0	0.0	0.0
Losses through Dripline				
Length of longest dripline lateral in zone	280		280	
Minimum dosing pressure required at end of dripline	16.17	7.00	16.17	7.00
Loss through dripline during dose/flush	65.08	28.17	8.47	3.67
Min. Pressure Required at Beginning of Dripfield				
Calculated Pressure	85.87	37.17	24.64	10.67
Specified Pressure (from Field Flow)	87.78	38.00		

Losses through Headworks

Recommended Filter (Jain Irrigation Spin Filter)	4EH-1			
Selected Filter	4EH-1			
Filter Pressure Loss	6.06	2.62	2.08	0.90
Recommended Zone Valve (Netafim Solenoid)	1.0" Solenoid			
Selected Zone Valve	1.0" Solenoid			
Zone Valve Pressure Loss	6.93	3.00	6.93	3.00
Recommended Flow Meter (Master Meter)	3/4" Meter			
Selected Flow Meter	3/4" Meter			
Flow Meter Pressure Loss	1.84	0.80	0.42	0.18
Other Pressure Losses	0	0	0	0
Total loss through Headworks components	14.83	6.42	9.43	4.08

Losses through Supply Line

Zone Supply pipe Diameter	1 1/2"		1 1/2"	
Length of Zone Supply pipe from PT to Manifold	750		750	
Equivalent length of fittings	75		75	
Pressure Loss in 100 ft. of Zone Supply pipe	0.59	0.25	0.15	0.07
Total Pressure Loss Zone Supply pipe	4.84		1.25	
Supply Feeder Line Diameter	1/2"		1/2"	
Length of Longest Supply Feeder Line Along Zone	20		20	
Pressure Loss in 100 ft. of Zone Supply Feeder Pipe	8.66	3.75	2.23	0.97
Total Pressure Loss Supply Feeder Line	1.90		0.49	
Elevation Change (Pump to tank outlet)	12		11.85	
Elevation Change (Tank outlet to Start of Zone)	7.2		7.2	
Total Supply Line Head Loss from Pump to Zone	25.80	11.17	20.79	9.00

Total Dynamic Head (TDH)	128.4 ft	54.9 ft
Pump Capacity - Flow Rate	8.9 gpm	4.3 gpm

Pressure Regulator (Dosing Condition)

Total Dynamic Head Loss (from PT to Start of Zone) 29.73 ft
 TDH of Selected Pump at Dose Flow 145 ft
 TDH at Start of Zone 115.27 ft
 = 49.90 psi
 Is Pressure Regulator Required? NO

Wastewater Treatment System Design Calculations

Pump Sizing Zone 4

Project: NV5-Smithfield Rd
Location: S.Smithfield Road
Wendell, NC 27591
County: Wake

Field Flow Summary

Number of Zones 4 zones
Zone to Calculate Zone 4
Number of Laterals in Zone 4 laterals
Flow Required to dose field 5.29 gpm
Flow required to flush field 6.14 gpm
Flow required to dose & flush field 11.43 gpm

	Flushing Condition		Dosing Condition	
	(ft.)	(psi)	(ft.)	(psi)
Losses through Return Line				
Common Return pipe Diameter	1"		1"	
Length of return line	572		0	
Equivalent length of fittings	57		0	
Elevation Change	0.0		0.0	
Pressure loss in 100 ft of Common Return pipe	2.47	1.07	0.0	0.0
Total Pressure Loss Common Return pipe	15.52		0.00	
Return Feeder Line Diameter	1/2"		1/2"	
Length of Longest Return Feeder Line along Zone	44		0.0	
Pressure Loss in 100 ft. of Zone Return Feeder pipe	2.57	1.11	0.00	
Total Pressure Loss Return Feeder Line	1.24		0.00	
Total pressure loss from end of zone back to tank	16.76	7.26	0.00	0.0
Minimum Pressure Specified Returning to Tank	4.62	2.0	0.0	0.0
Losses through Dripline				
Length of longest dripline lateral in zone	260		260	
Minimum dosing pressure required at end of dripline	16.17	7.00	16.17	7.00
Loss through dripline during dose/flush	57.60	24.94	6.82	2.95
Min. Pressure Required at Beginning of Dripfield				
Calculated Pressure	78.98	34.19	22.99	9.95
Specified Pressure (from Field Flow)	80.85	35.00		

Losses through Headworks

Recommended Filter (Jain Irrigation Spin Filter)	4EH-1			
Selected Filter	4EH-1			
Filter Pressure Loss	9.25	4.00	2.76	1.19
Recommended Zone Valve (Netafim Solenoid)	1.0" Solenoid			
Selected Zone Valve	1.0" Solenoid			
Zone Valve Pressure Loss	6.93	3.00	6.93	3.00
Recommended Flow Meter (Master Meter)	3/4" Meter			
Selected Flow Meter	3/4" Meter			
Flow Meter Pressure Loss	3.08	1.33	0.65	0.28
Other Pressure Losses	0	0	0	0
Total loss through Headworks components	19.26	8.34	10.34	4.47

Losses through Supply Line

Zone Supply pipe Diameter	1 1/2"		1 1/2"	
Length of Zone Supply pipe from PT to Manifold	728		728	
Equivalent length of fittings	72.8		72.8	
Pressure Loss in 100 ft. of Zone Supply pipe	0.94	0.41	0.22	0.10
Total Pressure Loss Zone Supply pipe	7.51		1.80	
Supply Feeder Line Diameter	1/2"		1/2"	
Length of Longest Supply Feeder Line Along Zone	40		40	
Pressure Loss in 100 ft. of Zone Supply Feeder Pipe	8.11	3.51	1.95	0.84
Total Pressure Loss Supply Feeder Line	3.57		0.86	
Elevation Change (Pump to tank outlet)	12		11.85	
Elevation Change (Tank outlet to Start of Zone)	6.4		6.4	
Total Supply Line Head Loss from Pump to Zone	29.33	12.70	20.91	9.05

Total Dynamic Head (TDH)	129.4 ft	54.2 ft
Pump Capacity - Flow Rate	11.4 gpm	5.3 gpm

Pressure Regulator (Dosing Condition)

Total Dynamic Head Loss (from PT to Start of Zone) 30.39 ft
TDH of Selected Pump at Dose Flow 145 ft
TDH at Start of Zone 114.61 ft
= 49.62 psi
Is Pressure Regulator Required? NO

Wastewater Treatment System Design Calculations

Pump Selection

Project: NV5-Smithfield Rd
Location: S.Smithfield Road
Wendell, NC 27591
County: Wake

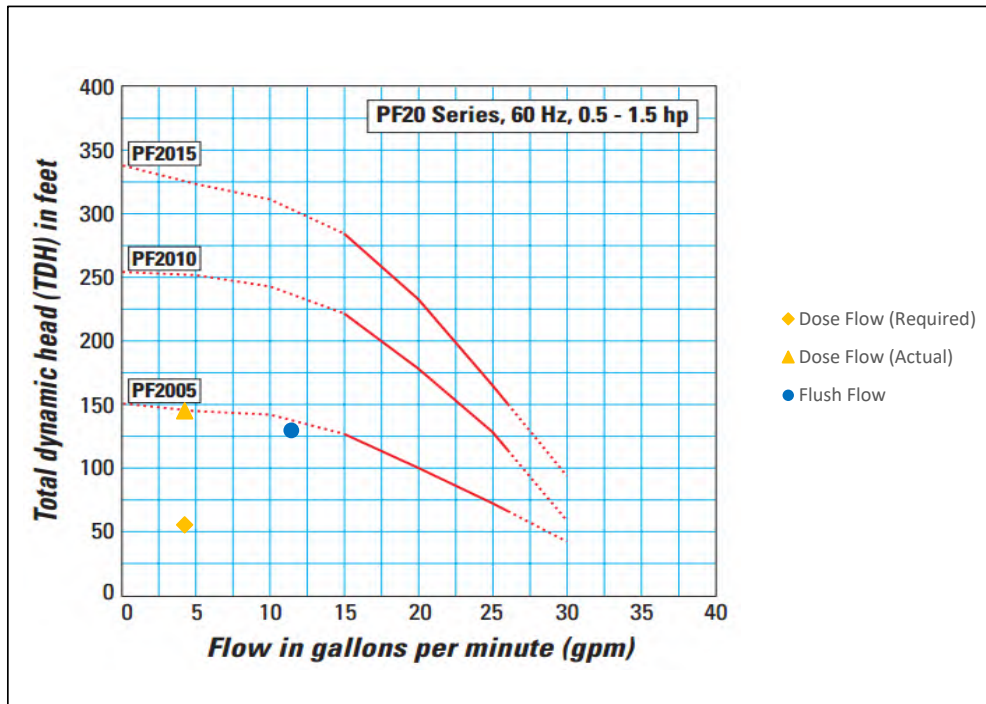
IRRIGATION PUMP SIZING

Pump Selection

Manufacturer: **Orengo**
Model: **PF200511**
Horsepower: **0.50**

Pump Operating Points (from drip spreadsheet)

Operating Conditions	TDH (ft.)	Flow (gpm)	Legend
Dose Flow (Required)	55.6	4.3	◆ (single zone, minimum dose flow)
Dose Flow (Actual)	145.0	4.3	▲ (minimum dose flow on pump curve)
Flush Flow	129.4	11.4	● (Flush Velocity, maximum conditions)



Wastewater Treatment System Design Calculations

Design, Tank, and Treatment Sizing

Project: NV5-Smithfield Rd
Location: S.Smithfield Road
 Wendell, NC 27591
County: Wake

SEPTIC TANK SIZING

Daily Flow Estimate

# of Units	Units	Flow/Unit (gpd/unit)	Flow/Day (gpd)
68	Parking Spaces	10	680
TOTAL DAILY FLOW (Q) =			680 gpd

Septic Tank Volume/Size (based on maximum daily flow estimate)

For Single Family Residences with 5 bedrooms or less,

# Bedrooms	Min. Volume (gal)
4 or less	1,000
5	1,250

*For Single Family Residences with more than 5 bedrooms,
 multiple dwelling units, places of business, or places of public assembly:*

DDF	Min. Volume (gal)
$Q \leq 600$	$V = 2Q$
$600 < Q < 1,500$	$V = 1.17Q + 500$
$1,500 \leq Q \leq 4,500$	$V = 0.75Q + 1,125$
$Q > 4,500$	$V = Q$

Required Minimum Tank Size **1,635 gal**
 per 15A NCAC 18E .0801 (a)

Septic Tank Volume/Size (based on AdvanTex Innovative Approval)

Flow (GPD)	Min. Volume (gal)
500	1,000
501 - 600	1,500
601 - 750	2,000
751 - 1000	2,500
1001 - 1500	3,750
1501 - 2000	5,000
2001 - 2500	6,250
2501 - 3000	7,500

Required Minimum Tank Size: **2,000 gal.**
 (per Advantex Approval)
Tank Size Provided: **2,100 gal.**

Tank Model: ShoafSepticMS Traffic-Rated 2100 H20 STB
 STB-548

RECIRCULATION TANK SIZING and ADVANTEX PODS

Recirculating Tank Volume/Size (based on maximum daily flow estimate)

Flow (GPD)	Min. Volume (gal)	AX Units	AX-RT Unit
500	1,000	1-AX-20	AX-20 RT
501 - 600	1,000	2-AX-20	AX-25 RT
601 - 750	1,000	2-AX-20	
751 - 1000	1,500	2-AX-20	
1001 - 1500	2,000	3-AX-20	
1501 - 2000	2,500	1-AX-100	
2001 - 2500	3,000	2-AX-100	
2501 - 3000	3,500	2-AX-100	

Required Minimum Tank Size: 1,000 gal.

Tank Size Provided: 1,800 gal.

Tank Model: ShoafSepticMS Traffic-Rated 1800 H20 PT
PT-2025

AX Unit Required: 2-AX-20

PUMP TANK SIZING

Required Minimum Tank Size *24 Hour Storage

Tank Size Provided: 1,800 gal

Tank Model: ShoafSepticMS Traffic-Rated 1800 H20 PT
PT-2025

Wastewater Treatment System Design Calculations

Recirculation Pump Sizing

Project: NV5-Smithfield Rd
Location: S.Smithfield Road
 Wendell, NC 27591
County: Wake

Timer Settings *2 AX20 Pods

Required Doses/Day	96
Recirculation Ratio	3 :1
Design Flow (Q)	680 gpd
Flow to Pods	2,040 gpd
Flow to ST	154 gpd
Flow to Pump	2,194 gpd
Dose Volume to Pods	21.3 gallons
# of Pumps	1
Pod Flowrate	50 gpm
Return Flowrate	2 gpm
Pump Flowrate	52.00 gpm
# of Cycles/day	96
Cycle Volume	41.6 gallons
Cycle Run time	0.80 min
Cycle Off Time	14.20 min

Friction Losses

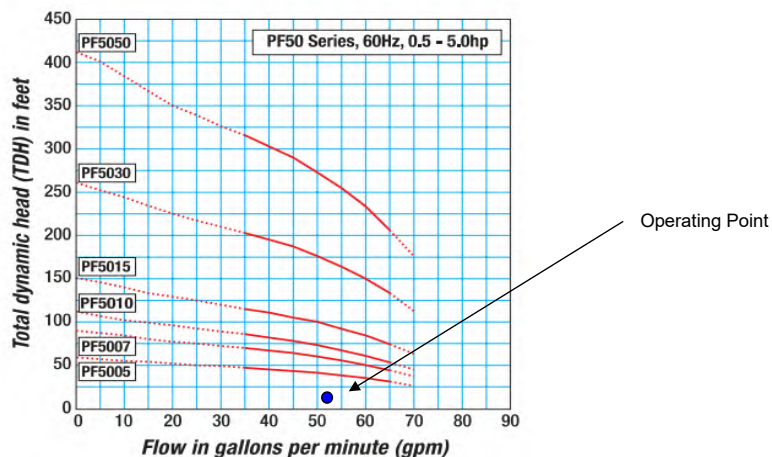
Suction Head =	0 ft.	(submersible = 0)
Elev. Difference (highest point from pump) =	10.12 ft.	
Design Pressure At Outlet =	6.93 ft.	
Line Length =	45 ft.	2.0" Schedule 40 PVC
Line Loss/100 ft =	1.53 ft/100 ft.	
Friction Loss - Line =	0.69 ft.	
SUB-TOTAL =	17.74 ft.	
Friction Loss - Fittings (5%) =	0.89 ft.	
TOTAL =	18.63 ft.	

Pump Efficiency = 0.7 (assumed, typical)
 Motor Efficiency = 0.9 (assumed for electric pumps)
Flow = 52.00

Required Horsepower = 0.4 hp
TDH = 18.63 ft.

Recirc. Pump Selection

Manufacturer: **Orengo**
 Model: **PF5005 1 1**
 Horsepower: **1/2**



Tank Float Settings	Float Set Points	Float Set Points
	from tank floor (in)	from top of filter (in)
Low Water/Redundatnt Off	32.0	32.0
Timer Enable	54.0	54.0
Peak Enable/High Water Alarm	56.0	56.0
Top of RSV Cage	42.0	42.0

Pump Vault Specification		
Interior Tank Height	67.0	inches
Tank Top Thickness	6.0	inches
Top Offset for PVU	0.0	inches
Total Height	73.0	inches
Filter height	24.0	inches
Required Height of PVU	72	inches
Bottom of PVU	1.0	inches from Tank Floor
Top of Filter	29.0	inches from Tank Floor

PVU Specification

PVU 72-24-19

Wastewater Treatment System Design Calculations

Working Volume and Emergency Storage

Project: NV5-Smithfield Rd
Location: S.Smithfield Road
 Wendell, NC 27591
County: Wake

Pump/Storage Tank

Working Volume Needed: 680 gal
 Dose Volume: 170 gal

Emergency Storage Volume

Tank Size (nominal)	1,800 gal	
Basis of Design	Shoaf	
Avg. Gal / Inch	26.79 gal/in.	(from tank manufacturer)
Interior Top of Tank	67.0 in.	(from interior Tank floor)
Low Water Alarm (LWA)	20.0 in.	(min. depth required 18")
Dose Drawdown	6.3 in.	
Timer Enable (TE)	34.0 in.	
High Water Alarm Level (HWA)	40.0 in.	

Working Volume & Storage Time

Pump Submergence & Dose Volume	706 gal
Storage Volume	723 gal

Estimated Storage Time in Tank	1.06 days
---------------------------------------	------------------

Note: Storage time must be greater than 1 day for single family residences

Wastewater Treatment System Design Calculations
Elevations

Project: NV5-Smithfield Rd
Location: 5.Smithfield Road
Wendell, NC 27591
County: Wake

*Elevations based on GIS data
*Confirm all elevations in field prior to installation

Septic Tank	MS TR 2100 H20 STB	Recirculation Tank	MS TR 1800 H20 PT	Specifications		2-AX-20	Pump Tank	MS TR 1800 H20 PT
				AdvanTex Pods (2)				
Length	167.00 in. 13.92 ft.	Length	127.00 in. 10.58 ft.	Height of AdvanTex Pods	30.00 in. 2.50 ft.	Length	127.00 in. 10.58 ft.	
Width	78.00 in. 6.50 ft.	Width	70.00 in. 5.83 ft.	Height of Pods above Ground	3.00 in. 0.25 ft.	Width	70.00 in. 5.83 ft.	
External Height	70.00 in. 5.83 ft.	External Height	79.00 in. 6.58 ft.	Distance to Outlet Invert from Top	30.00 in. 2.50 ft.	External Height	79.00 in. 6.58 ft.	
Bottom of 4" Inlet	13.00 in.	Bottom of 4" Inlet	16.00 in.			3" UV Inlet Invert	3.00 in.	
*from Top of Tank	1.08 ft.	*from Top of Tank	1.33 ft.			*Above Top of Tank in Riser	0.25 ft.	
Bottom of 4" Outlet	16.00 in.							
*from Top of Tank	1.33 ft.							
Elevations								
Stubout (Assumed)	256.22 ft.							
Septic Tank		Recirculation Tank		AdvanTex Pods (2)			Pump Tank	
DL Pipe Length to ST Inlet	40.0 ft.	DL Pipe Length to RT Inlet	5.00 ft.	Ground Surface at AdvanTex Pods	261.2 ft.	DL Pipe Length to PT Inlet from RSV	9.0 ft.	
Ground Surface at Low Side of ST	261.0 ft.	Ground Surface at Low Side of RT	261.0 ft.	Elevation at Top of AdvanTex Pods	261.5 ft.	Ground Surface at Low Side of PT	261.4 ft.	
Cover over Low Side of ST	54.0 in.	Cover over Low Side of RT	54.5 in.	Elevation at Outlet Invert	259.0 ft.	Cover over Low Side of ST	38.0 in.	
	4.50 ft.		4.54 ft.	Recirculating Splitter Valve			3.17 ft.	
Exterior Top of Tank	256.5 ft.	Exterior Top of Tank	256.5 ft.	Pipe Slope to RSV	1.98%	Exterior Top of Tank	258.2 ft.	
Inlet Invert	255.4 ft.	Inlet Invert	255.1 ft.	Pipe Length to RSV	8.0 ft.	Inlet Invert	258.5 ft.	
Slope of DL Pipe	2.01%	Slope of DL Pipe	1%	Elevation at RSV Inlet Invert	258.8 in.	Slope of DL Pipe	1.57%	
*minimum 2% slope		*minimum 1% slope		Drop Across RSV	0.17 ft.	*minimum 1% slope		
Outlet Invert	255.2 ft.	Elevation at Top of Tank	256.5 ft.	Elevation at RSV Outlet Invert	258.6 ft.	Bottom of Excavation	251.2 ft.	
		Distance to RSV invert from Top	28 in.			*beneath 6" gravel base		
Gravel Base Thickness	6 in.		2.33 ft.	Recirc Tank Float Settings		Tank Bottom Thickness	0.50 ft.	
Bottom of Excavation	250.2 ft.	RSV Inlet Invert	258.8 ft.	Height from		Elevation at Tank Floor	252.2 ft.	
Riser Heights		Elevation at Tank Bottom	249.9 ft.	Elev. (ft)		Pump Tank Float Settings		
Septic Tank	5.00 ft.	Tank Bottom Thickness	0.50 ft.	Tank Floor (in)		Elev. (ft)		
	60.0 in.	Elevation at Tank Floor	250.4 ft.	Pump Enable/Low water (12" below Pump Override)	253.0	32	Tank Floor (in)	
Recirc Tank	5.04 ft.			Pump Override (2" below High Water Alarm)	254.9	54		
	60.5 in.			High Water Alarm (1-2" below inlet invert)	255.0	56		
Pump Tank	3.67 ft.			Top of RSV Cage (~10" above PE/LW)	253.9	42		
	44.0 in.			*PVU 72- 24-19				

Wastewater Treatment System Design Calculations

Septic Tank Buoyancy

Project: NV5-Smithfield Rd
Location: S.Smithfield Road
Wendell, NC 27591
County: Wake

Tank Size (nominal) 2,100 gallons

Properties/Assumptions:

Min. liquid level to be maintained in tank at all times after initial installation.

Assume groundwater table is equal to or higher than top of chamber.

(Buoyancy is the same as long as water table is higher than top of tank.)

Effluent Density	62.4 lb/ft ³ (Specific Weight of Water)
Concrete Density	142.56 lb/ft ³
Soil Bulk Density	1.25 (typical value)
Soil Cover Over Tank	1.00 ft (min.)

Tank Dimensions (from supplier):

	<u>Exterior</u>	<u>Interior</u>
Length	13.92 ft	12.92 ft
Width	6.50 ft	5.50 ft
Total Tank Depth	5.83 ft	
Permanent Liquid Depth in Tank	0 in.	
Area of Riser Openings	6.28 ft ²	
Tank Weight (est.)	32,000 lb. (based on manufacturer)	

Buoyancy Force Calculation:

Buoyancy Force = Specific Weight of Water x Displaced Volume

Buoyancy Force 32,927 lb

Weight Calculation:

Tank Weight	32,000 lb
Water Weight in Tank	0 lb
Soil Weight Over Tank	6,555 lb
Soil Tension Force	6,709 lb
Total Weight	45,265 lb

Note: Total weight must be greater than buoyancy force so that tank will not float during high water table conditions.

Wastewater Treatment System Design Calculations

Recirc Tank Buoyancy

Project: NV5-Smithfield Rd
Location: S.Smithfield Road
Wendell, NC 27591
County: Wake

Tank Size (nominal) 1,800 gallons

Properties/Assumptions:

Min. liquid level to be maintained in tank at all times after initial installation.

Assume groundwater table is equal to or higher than top of chamber.

(Buoyancy is the same as long as water table is higher than top of tank.)

Effluent Density	62.4 lb/ft ³ (Specific Weight of Water)
Concrete Density	142.56 lb/ft ³
Soil Bulk Density	1.25 (typical value)
Soil Cover Over Tank	1.00 ft (min.)

Tank Dimensions (from supplier):

	<u>Exterior</u>	<u>Interior</u>
Length	10.58 ft	12.92 ft
Width	5.83 ft	4.83 ft
Total Tank Depth	6.58 ft	
Permanent Liquid Depth in Tank	0 in.	
Area of Riser Openings	6.28 ft ²	
Tank Weight (est.)	22,400 lb (based on manufacturer)	

Buoyancy Force Calculation:

Buoyancy Force = Specific Weight of Water x Displaced Volume	
Tank Displacement	406.4 ft ³
Buoyancy Force	25,361 lb.

Weight Calculation:

Tank Weight	22,400 lb
Water Weight in Tank	0 lb
Soil Weight Over Tank	4,319 lb
Soil Tension Force	6,871 lb
Total Weight	33,590 lb

Note: Total weight must be greater than buoyancy force
so that tank will not float during high water table conditions.

Wastewater Treatment System Design Calculations

Pump Tank Buoyancy

Project: NV5-Smithfield Rd
Location: S.Smithfield Road
Wendell, NC 27591
County: Wake

Tank Size (nominal) 1,800 gallons

Properties/Assumptions:

Min. liquid level to be maintained in tank at all times after initial installation.

Assume groundwater table is equal to or higher than top of chamber.

(Buoyancy is the same as long as water table is higher than top of tank.)

Effluent Density	62.4 lb/ft ³ (Specific Weight of Water)
Concrete Density	142.56 lb/ft ³
Soil Bulk Density	1.25 (typical value)
Soil Cover Over Tank	1.00 ft (min.)

Tank Dimensions (from supplier):

	<u>Exterior</u>	<u>Interior</u>
Length	10.58 ft	12.92 ft
Width	5.83 ft	4.83 ft
Total Tank Depth	6.58 ft	
Permanent Liquid Depth in Tank	0 in.	
Area of Riser Openings	6.28 ft ²	
Headworks	3.14 ft ³	
Tank Weight (est.)	22,400 lb (based on manufacturer)	

Buoyancy Force Calculation:

Buoyancy Force = Specific Weight of Water x Displaced Volume	
Tank Displacement	406.4 ft ³
Buoyancy Force	25,361 lb.

Weight Calculation:

Tank Weight	22,400 lb
Water Weight in Tank	0 lb
Soil Weight Over Tank	4,074 lb
Soil Tension Force	6,871 lb
Total Weight	33,345 lb

*Note: Total weight must be greater than buoyancy force
so that tank will not float during high water table conditions.*

3. Wastewater System Drawings

LAKE MYRA WWTS

Project Location	0 Smithfield Rd, Wendell, NC 27591 Wake County PIN 1763519788
Client	NV5 3300 Regency Parkway, Suite 100, Cary, NC 27518 michael.allen@nv5.com 919-201-5002
Project Consultants	Scott Jones, P.E (919) 367-6317 Trent Bostic, L.S.S (919) 367-6322 Agri-Waste Technology, Inc. 1225 Crescent Green, Suite 250 Cary, NC 27518 (919) 859-0669 (919) 233-1970 Fax
System Overview	Engineered Option Permit Recreational Park Aerobic Subsurface Drip with TS-II Pretreatment 680 gal./day 10 gal./day per parking space, 68 parking spaces total



Sheet Index

Sheet 1	Cover Sheet
Sheet 2	Property Layout
Sheet 3	Facility Overview
Sheet 4	Component Layout
Sheet 5	Primary Drainfield
Sheet 6	Primary Manifolds
Sheet 7	Repair Drainfield
Sheet 8	Detail Sheet 1
Sheet 9	Detail Sheet 2
Sheet 10	Detail Sheet 3
Sheet 11	Detail Sheet 4
Sheet 12	Excavation Safety



Agri-Waste Technology, Inc.
1225 Crescent Green, Suite 250, Cary, NC 27518
agriwaste.com | 919.859.0669

Lake Myra WWTS
NV5

Project Location
0 Smithfield Rd,
Wendell, NC 27591
Wake County
PIN: 1763519788

Client Information
NV5
3300 Regency Parkway, Suite 100,
Cary, NC 27518
Michael.allen@NV5.com
919-201-5002

PROFESSIONAL ENGINEER SEAL



FINAL DESIGN NOT RELEASED
FOR CONSTRUCTION

REV.	ISSUED DATE	DESCRIPTION

SHEET TITLE

COVER SHEET

Drawn By: C. Barbee	Drawn On: ----
Revised By: ----	Revised On: ----
Released By: ----	Released On: ----

Drawing Number:

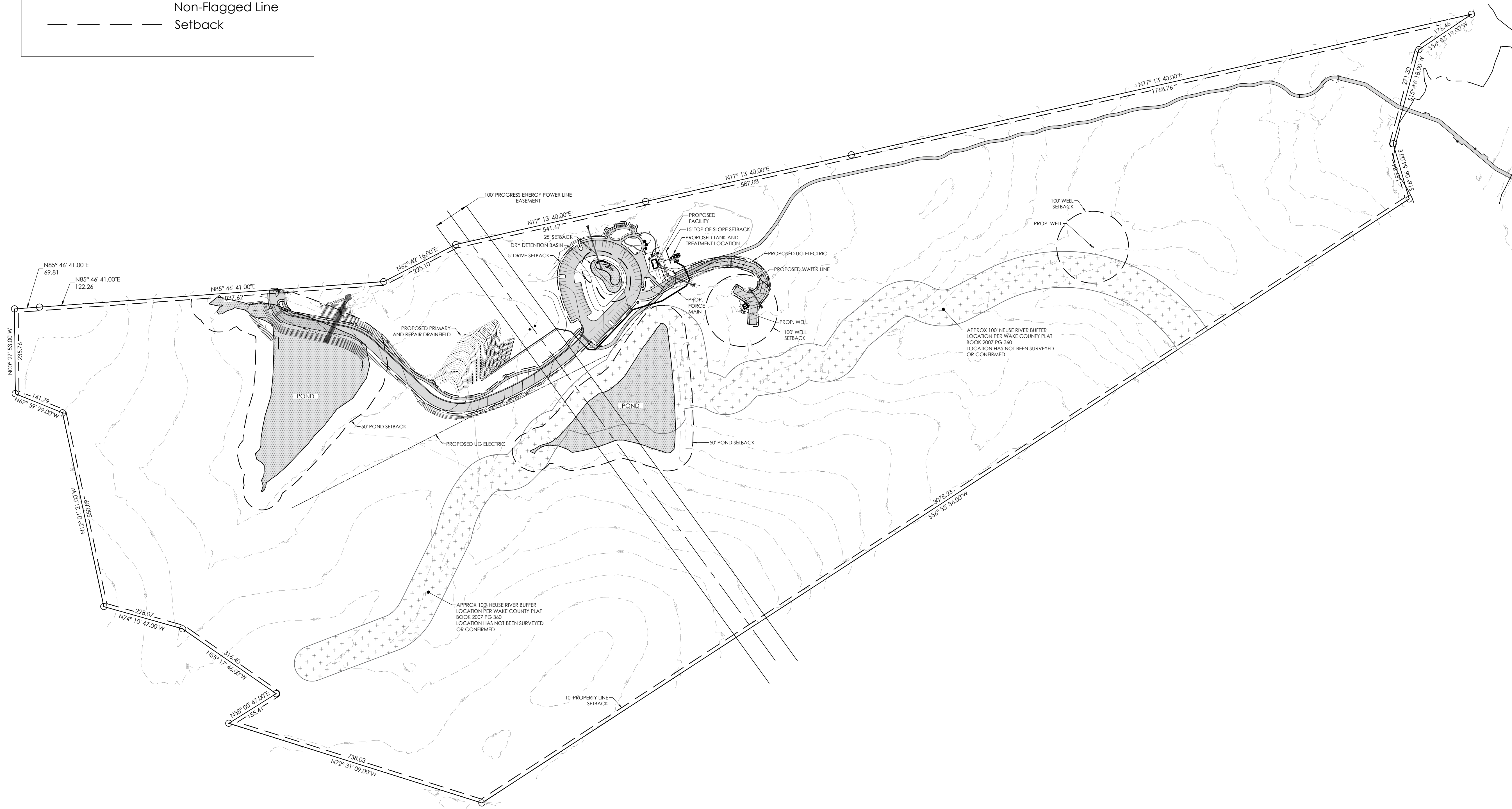
WW-1

Scaled for 24"x36" Output



LINE LEGEND

- Flagged Line, Primary
- Flagged Line, Repair
- Non-Flagged Line
- Setback



NOTE
Elevation contours via NV5 and may not accurately reflect the ground surface or recent grading operations.
Parcel boundary via Wake County PLAT book 2007 page 360.
Not a survey product.
Utilities to be located and marked on site prior to excavation.
A minimum 18-inches clear vertical separation shall be provided between the supply line and water line at all crossings, with the supply line passing beneath the water line. If 18" of separation is not able to be met, the supply line shall be sleeved in DIP and the water line be constructed of ferrous materials per 15A NCAC 18E .0601(l).
A minimum 12 inches clear vertical separation shall be maintained between the supply line and storm drains at all crossings per 15A NCAC 18E .0601(m).
As the supply line crosses under areas subject to vehicular traffic, the pipe shall be sleeved in ductile iron pipe, DOT traffic rated culvert pipe, or have 30" of compacted material provided over the crown of the pipe per 15A NCAC 18E .0601(g).



Lake Myra WWTS
NV5

Project Location
0 Smithfield Rd,
Wendell, NC 27591
Wake County
PIN: 1763519788

Client Information
NV5
3300 Regency Parkway, Suite 100,
Cary, NC 27518
Michael.allen@NV5.com
919-201-5002

PROFESSIONAL ENGINEER SEAL



NOT RELEASED FOR
CONSTRUCTION

REV.	ISSUED DATE	DESCRIPTION
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SHEET TITLE

PROPERTY LAYOUT

Drawn By:	Drawn On:
C. Barbee	----

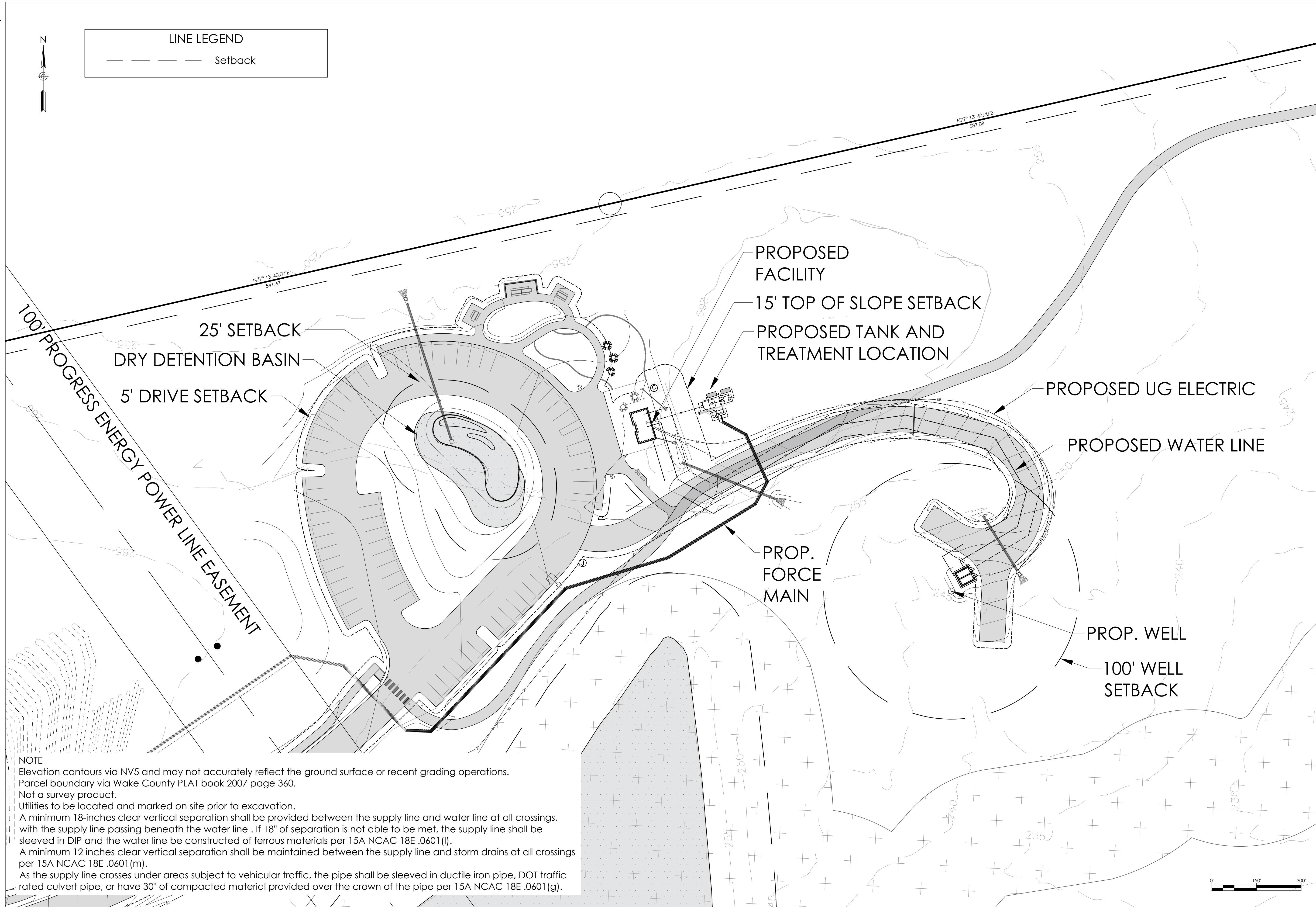
Revised By:	Revised On:
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Released By:	Released On:
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Drawing Number:

WW-2

Scaled for 24"x36" Output



NOTE
Elevation contours via NV5 and may not accurately reflect the ground surface or recent grading operations.
Parcel boundary via Wake County PLAT book 2007 page 360.
Not a survey product.
Utilities to be located and marked on site prior to excavation.
A minimum 18-inches clear vertical separation shall be provided between the supply line and water line at all crossings, with the supply line passing beneath the water line. If 18" of separation is not able to be met, the supply line shall be sleeved in DIP and the water line be constructed of ferrous materials per 15A NCAC 18E .0601(l).
A minimum 12 inches clear vertical separation shall be maintained between the supply line and storm drains at all crossings per 15A NCAC 18E .0601(m).
As the supply line crosses under areas subject to vehicular traffic, the pipe shall be sleeved in ductile iron pipe, DOT traffic rated culvert pipe, or have 30" of compacted material provided over the crown of the pipe per 15A NCAC 18E .0601(g).



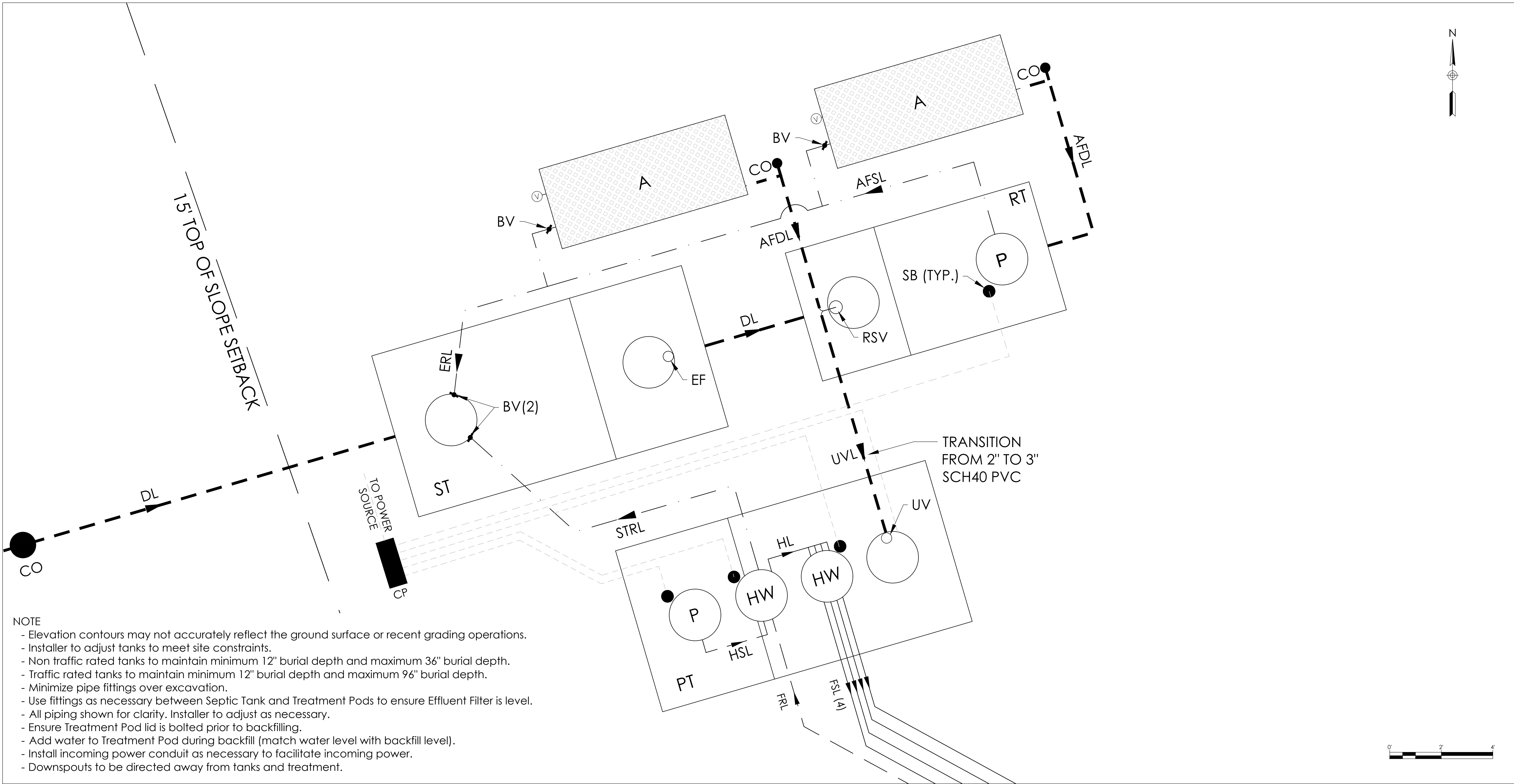
Scaled for 24"x36" Output

COMPONENT LEGEND			
NOTATION	NAME	NOTATION	NAME
ARV	Air/Vacuum Release Valve	P	Pump
A	AdvanTex Unit	PT	1800 gal. Traffic Rated Pump Tank
BV	Ball Valve	RT	1,800 gal. Traffic Rated Recirculation Tank
CO	Cleanout	RSV	Recirculating Splitter Valve
CP	Control Panel	SB	Splice Box
CV	Check Valve	ST	2,100 gal. Traffic Rated Septic Tank
EF	Effluent Filter	UV	UV Disinfection
HW	Head Works		

LINE LEGEND			
NOTATION	NAME	SIZE	TYPE
AFDL	AdvanTex Drainline	2.0"	SCH 40 PVC
AFSL	AdvanTex Supply Line	2.0"	SCH 40 PVC
DL	Drain Line	4.0"	SCH 40 PVC
ERL	Effluent Return Line	1.0"	SCH 40 PVC
FRL	Field Return Line	1.0"	SCH 40 PVC
FSL	Field Supply Line	1.5"	SCH 40 PVC
HSL	Headworks Supply Line	1.25"	SCH 40 PVC
HL	Headworks Line	1.0"	SCH 40 PVC
STRL	Septic Tank Return Line	1.0"	SCH 40 PVC
UVL	UV Drainline	3.0"	SCH 40 PVC

DOSING SETTINGS	
Doses Per Day/Zone	2.89 doses
Timer ON	13 min. 0 sec.
Timer OFF	1 hr. 50 min. (110 min.)

RECIRCULATION TIMER SETTINGS	
Number of Cycles Per Day	96
Cycle Volume	41.6 gallons
Cycle Run Time	0.8 minutes
Cycle Off Time	14.2 minutes



- NOTE
- Elevation contours may not accurately reflect the ground surface or recent grading operations.
 - Installer to adjust tanks to meet site constraints.
 - Non traffic rated tanks to maintain minimum 12" burial depth and maximum 36" burial depth.
 - Traffic rated tanks to maintain minimum 12" burial depth and maximum 96" burial depth.
 - Minimize pipe fittings over excavation.
 - Use fittings as necessary between Septic Tank and Treatment Pods to ensure Effluent Filter is level.
 - All piping shown for clarity. Installer to adjust as necessary.
 - Ensure Treatment Pod lid is bolted prior to backfilling.
 - Add water to Treatment Pod during backfill (match water level with backfill level).
 - Install incoming power conduit as necessary to facilitate incoming power.
 - Downspouts to be directed away from tanks and treatment.



Scaled for 24"x36" Output

LINE LEGEND

Supply Line

Return Line

Non Emitter Line

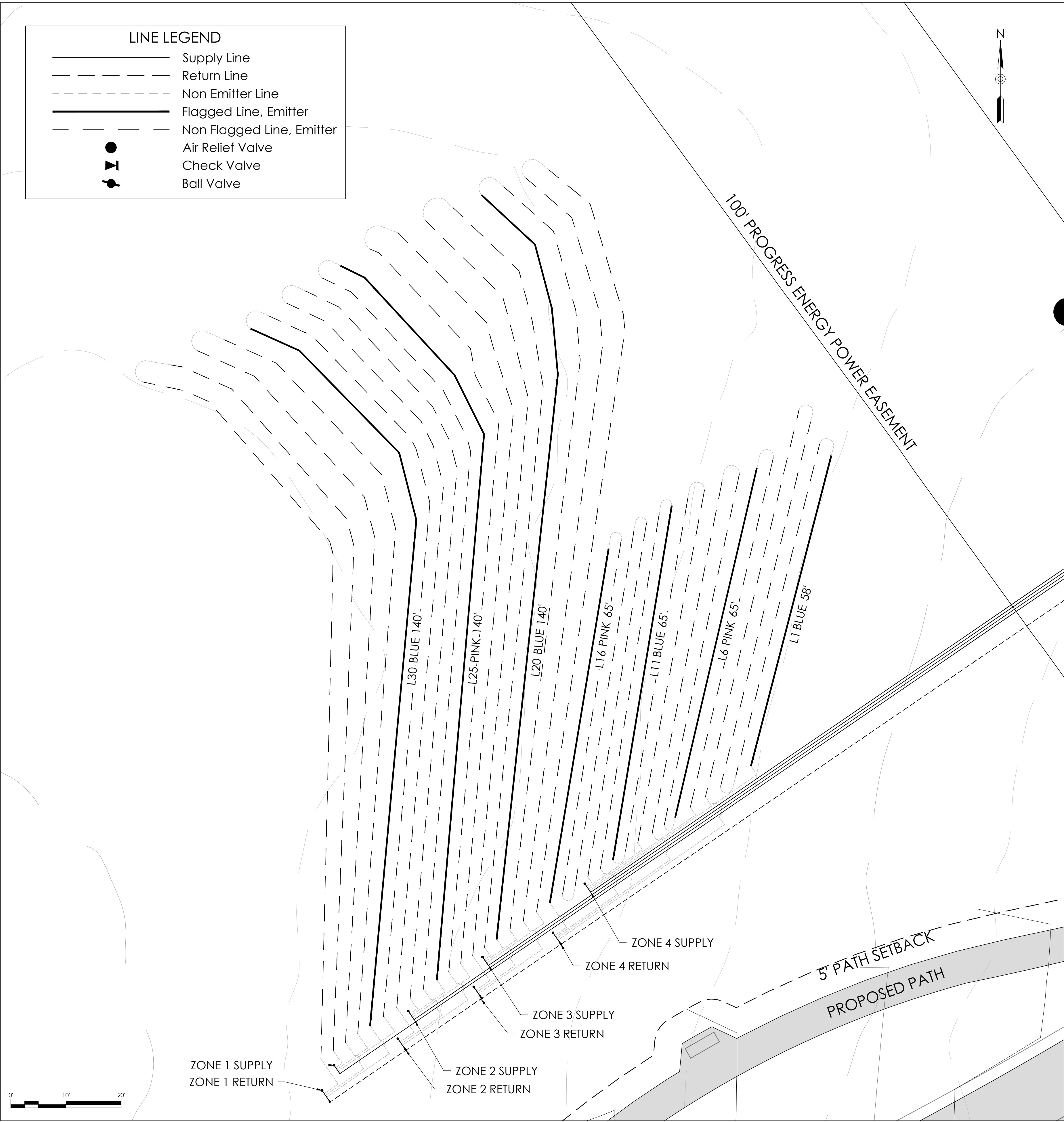
Flagged Line, Emitter

Non Flagged Line, Emitter

Air Relief Valve

Check Valve

Ball Valve



General Drainfield Notes:

- Clear all trees less than 4" in diameter (measured at a height 3' from soil surface) from the drainfield.
- Vegetation that will re-grow from a cut stump shall be stumped or pulled from the ground. Stumps shall not be pushed over.
- Drainfield area shall be cleared of all leaves, pine straw, debris, etc. The accumulated material shall be removed from the drainfield.
- Emitter lines shall be installed to a depth of 6". If trenched in, loose soil shall be cleared from the trench bottom.
- Manifold supply and return lines shall be installed with a minimum of 18" cover.
- Drip tubing shall be hand laid into the trench if a trencher is used.
- A minimum of 3,400' of emitter tubing is required. 3,560' is demonstrated, allowing for 4.7% blanking. The trenches shall be backfilled appropriately so no low areas are present.
- Apply lime over the drainfield area as needed. Seed fine fescue over the drainfield at the rate recommended by the seed manufacturer. Hand rake the seed into the soil surface. Straw the disturbed seeded area at the rate of 1.5-2 bales per 1000 sq. ft.

General Layout Notes:

- Supply/Return Lines and Manifolds:
- Manifold and Air relief valve at highest elevation of each zone.

Line	Type	Flag Color	Zone	Lateral	Run Length (ft)	Lateral Length (ft)	Zone Length (ft)
1 Layout Line		blue	4		58		
2 Interpolated Line					62		
3 Interpolated Line					68		
4 Interpolated Line				4	72	260	
5 Interpolated Line					65		
6 Layout Line		pink			65		
7 Interpolated Line					65		
8 Interpolated Line				3	65	260	
9 Interpolated Line					65		
10 Interpolated Line					65		
11 Layout Line		blue			65		
12 Interpolated Line				2	65	260	
13 Interpolated Line					65		
14 Interpolated Line					65		
15 Interpolated Line					65		
16 Layout Line		pink		1	65	260	1,040
17 Interpolated Line			3		140		
18 Interpolated Line				3	140	280	
19 Interpolated Line					140		
20 Layout Line		blue		2	140	280	
21 Interpolated Line					140		
22 Interpolated Line				1	140	280	840
23 Interpolated Line			2		140		
24 Interpolated Line				3	140	280	
25 Layout Line		pink			140		
26 Interpolated Line				2	140	280	
27 Interpolated Line					140		
28 Interpolated Line				1	140	280	840
29 Interpolated Line			1		140		
30 Layout Line		blue		3	140	280	
31 Interpolated Line					140		
32 Interpolated Line				2	140	280	
33 Interpolated Line					140		
34 Interpolated Line				1	140	280	840
TOTAL:							3,560



Engineers and Soil Scientists

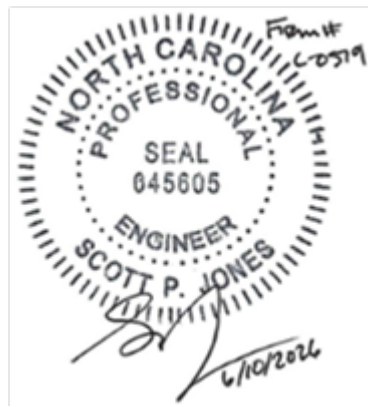
Agri-Waste Technology, Inc.
1225 Crescent Green, Suite 250, Cary, NC 27518
agriwaste.com | 919.859.0669

Lake Myra WWTS
NV5

Project Location
0 Smithfield Rd,
Wendell, NC 27591
Wake County
PIN: 1763519788

Client Information
NV5
3300 Regency Parkway, Suite 100,
Cary, NC 27518
Michael.allen@NV5.com
919-201-5002

PROFESSIONAL ENGINEER SEAL



FINAL DESIGN NOT RELEASED
FOR CONSTRUCTION

REV. ISSUED DATE DESCRIPTION

SHEET TITLE

PRIMARY
DRAINFIELD

Drawn By:

C. Barbee

Drawn On:

Revised By:

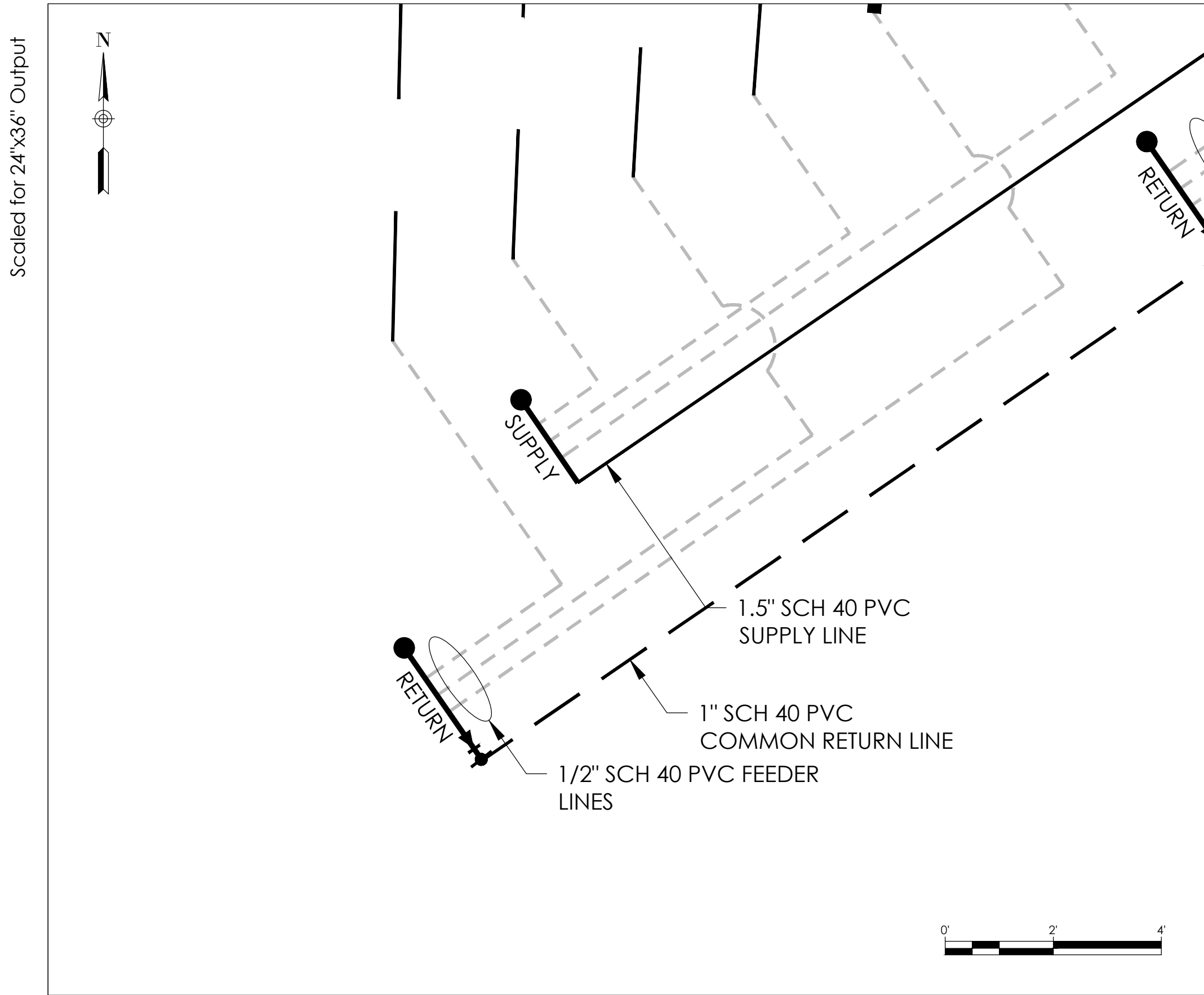
Revised On:

Released By:

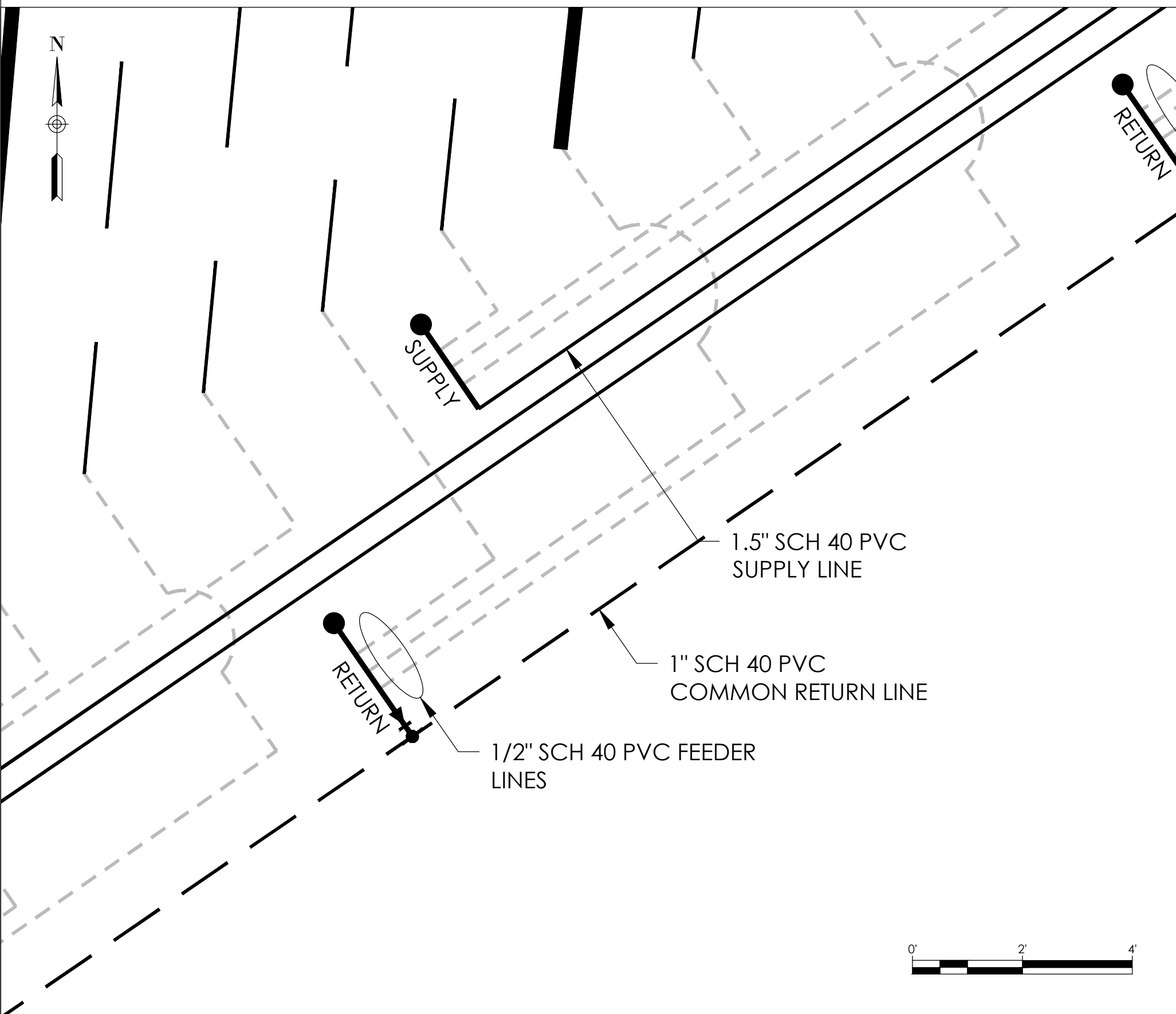
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Drawing Number:

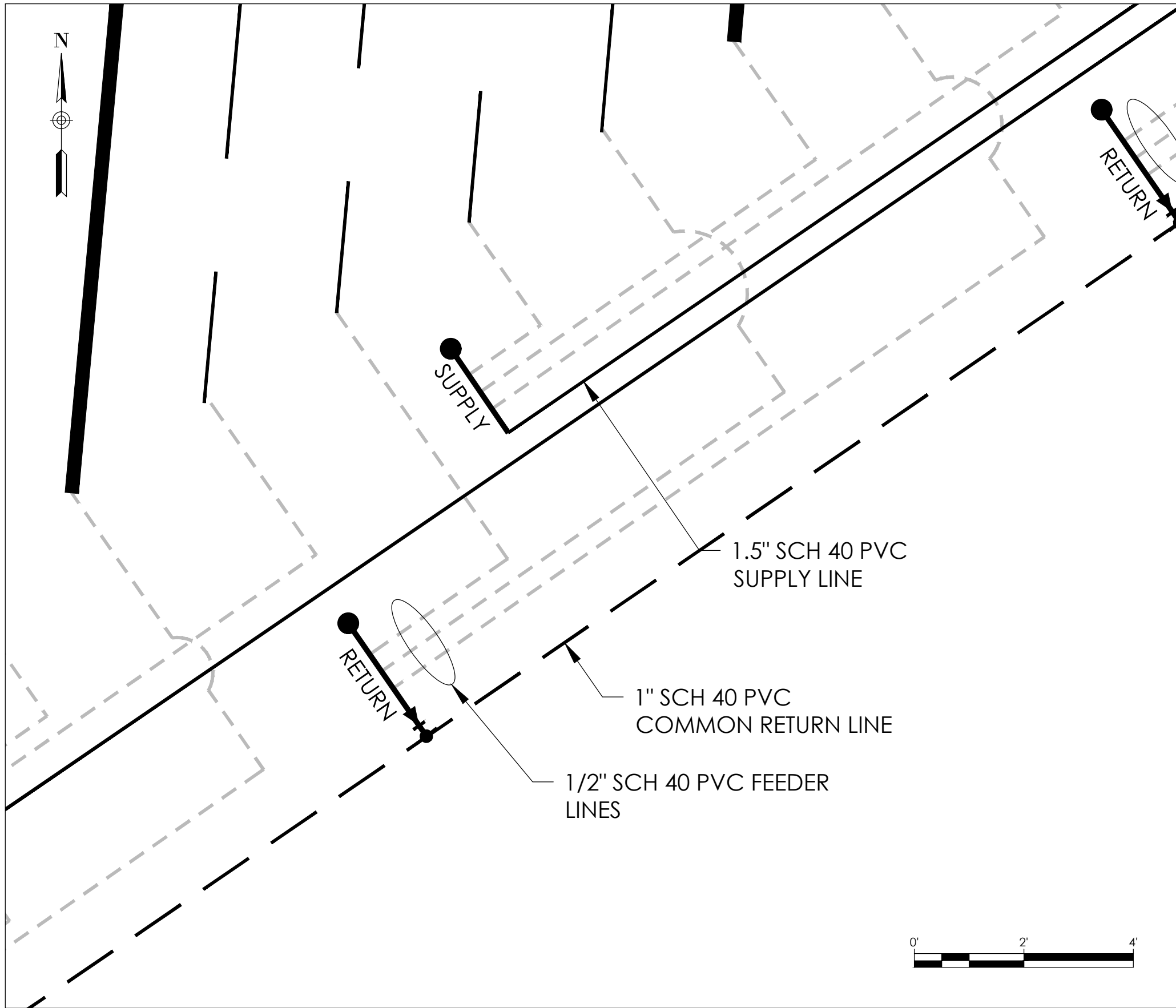
WW-5



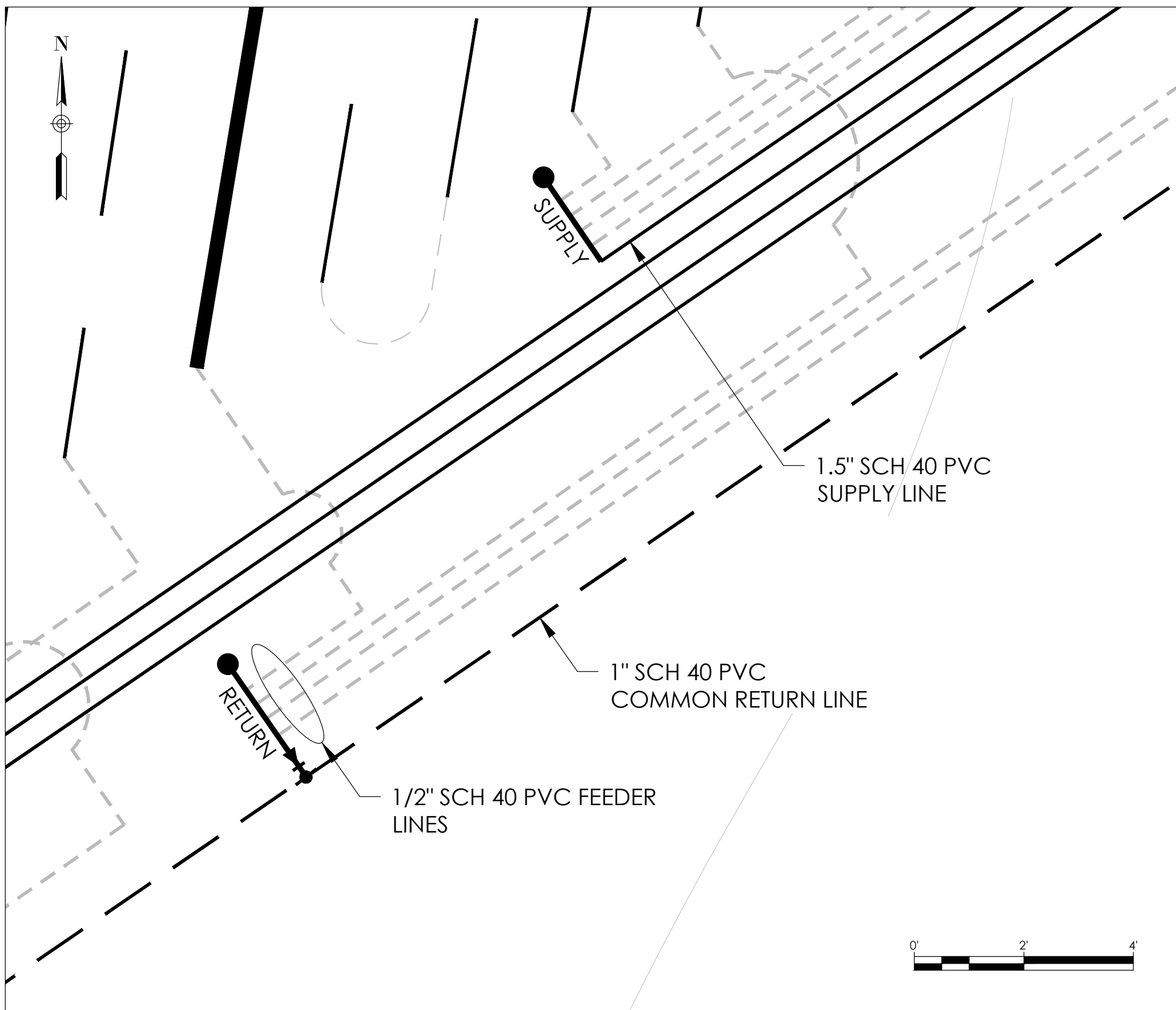
1 ZONE 1 MANIFOLD DETAIL



3 ZONE 3 MANIFOLD DETAIL



2 ZONE 2 MANIFOLD DETAIL



4 ZONE 4 MANIFOLD DETAIL

LINE LEGEND	
	Supply Line
	Return Line
	Non Emitter Line
	Flagged Line, Emitter
	Non Flagged Line, Emitter
	Air Relief Valve
	Check Valve
	Ball Valve

- NOTE
- Manifold and air relief valve shall be at highest elevation of each zone.
 - Ball valve to be installed after check valve on return manifold at top of each zone.
 - Ball valves shall be installed on each individual lateral.
 - All valves shall be installed in boxes.
 - Minimum 18" cover over supply/return lines.

Zone 1			
840	linear ft	drip tubing, not including loops	
420	emitters	expected	
0.61	gph	flow per emitter	
4.27	gpm	expected dosing flow	
3	laterals		
4.61	gpm	flow need for flushing	
8.88	gpm	Total Flow Per Zone	
		Calculated Flushing Velocity (fps)	

Zone 2			
840	linear ft	drip tubing, not including loops	
420	emitters	expected	
0.61	gph	flow per emitter	
4.27	gpm	expected dosing flow	
3	laterals		
4.61	gpm	flow need for flushing	
8.88	gpm	Total Flow Per Zone	
		Calculated Flushing Velocity (fps)	

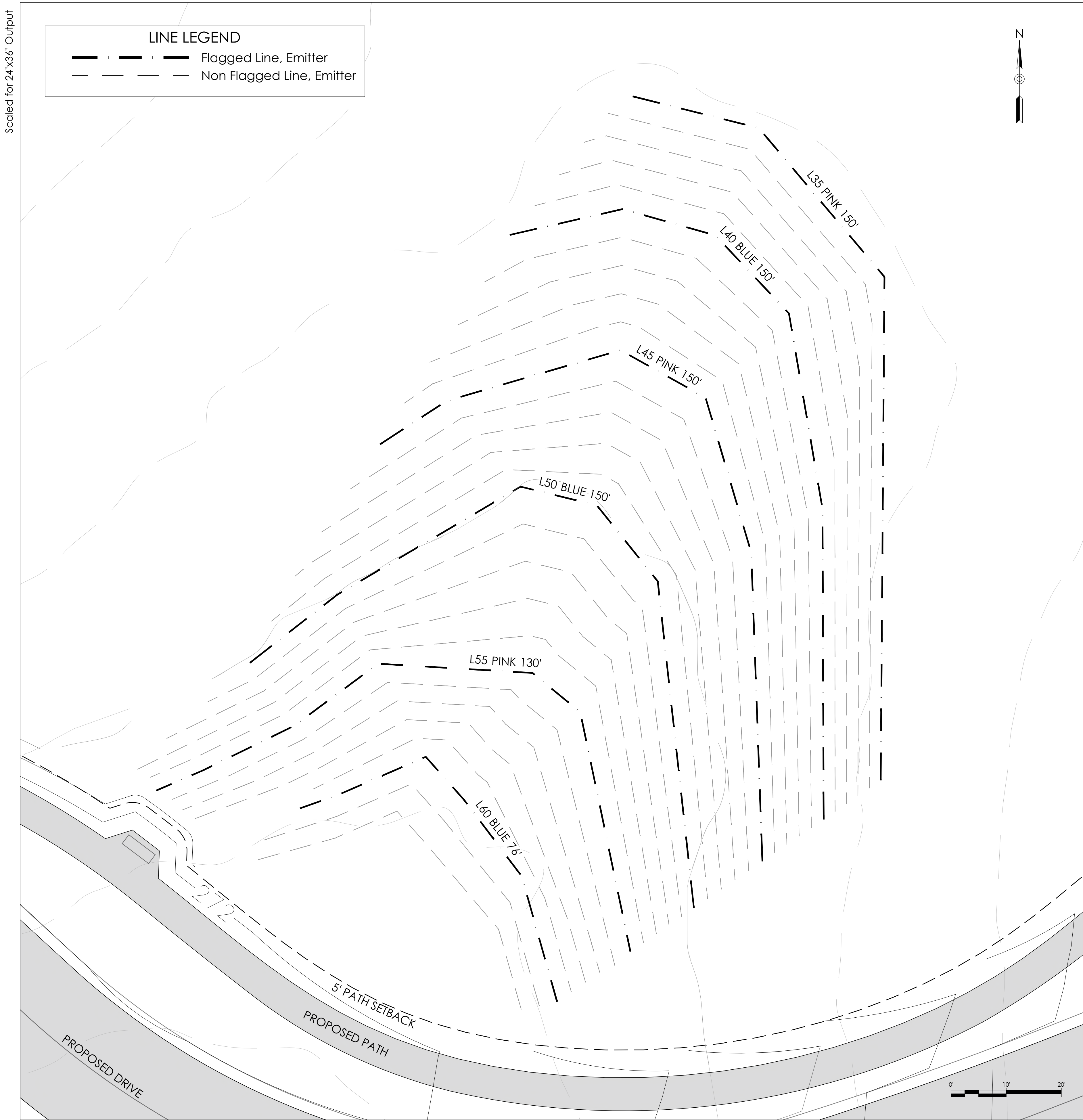
Zone 3			
840	linear ft	drip tubing, not including loops	
420	emitters	expected	
0.61	gph	flow per emitter	
4.27	gpm	expected dosing flow	
3	laterals		
4.61	gpm	flow need for flushing	
8.88	gpm	Total Flow Per Zone	
		Calculated Flushing Velocity (fps)	

Zone 4			
1040	linear ft	drip tubing, not including loops	
520	emitters	expected	
0.61	gph	flow per emitter	
5.29	gpm	expected dosing flow	
4	laterals		
6.14	gpm	flow need for flushing	
11.43	gpm	Total Flow Per Zone	
		Calculated Flushing Velocity (fps)	

5 EXPECTED FLOWS



Scaled for 24"x36" Output



General Drainfield Notes:

- Clear all trees less than 4" in diameter (measured at a height 3' from soil surface) from the drainfield.
- Vegetation that will re-grow from a cut stump shall be stumped or pulled from the ground. Stumps shall not be pushed over.
- Drainfield area shall be cleared of all leaves, pine straw, debris, etc. The accumulated material shall be removed from the drainfield.
- Emitter lines shall be installed to a depth of 6". If trenched in, loose soil shall be cleared from the trench bottom.
- Manifold supply and return lines shall be installed with a minimum of 18" cover.
- Drip tubing shall be hand laid into the trench if a trencher is used.
- A minimum of 3,400' of emitter tubing is required. 3,684' is demonstrated, allowing for 8.4% blanking. The trenches shall be backfilled appropriately so no low areas are present.
- Apply lime over the drainfield area as needed. Seed fine fescue over the drainfield at the rate recommended by the seed manufacturer. Hand rake the seed into the soil surface. Straw the disturbed seeded area at the rate of 1.5-2 bales per 1000 sq. ft.

General Layout Notes:

- Supply/Return Lines and Manifolds:
- Manifold and Air relief valve at highest elevation of each zone.

Line	Type	Flag Color	Zone	Lateral	Run Length(ft)	Lateral Length (ft)	Zone Length(ft)
35 Layout Line		pink	4		150		
36 Interpolated Line				3	150	300	
37 Interpolated Line					150		
38 Interpolated Line				2	150	300	
39 Interpolated Line					150		
40 Layout Line		blue		1	150	300	900
41 Interpolated Line			3		150		
42 Interpolated Line				3	150	300	
43 Interpolated Line					150		
44 Interpolated Line				2	150	300	
45 Layout Line		pink			150		
46 Interpolated Line				1	150	300	900
47 Interpolated Line			2		150		
48 Interpolated Line				3	150	300	
49 Interpolated Line					150		
50 Layout Line		blue		2	150	300	
51 Interpolated Line					150		
52 Interpolated Line				1	150	300	900
53 Interpolated Line			1		128		
54 Interpolated Line				4	128	256	
55 Layout Line		pink			130		
56 Interpolated Line				3	122	252	
57 Interpolated Line					114		
58 Interpolated Line				2	106	220	
59 Interpolated Line					64		
60 Layout Line		blue			64		
61 Interpolated Line					64		
62 Interpolated Line				1	64	256	984
TOTAL:						3,684	



Engineers and Soil Scientists

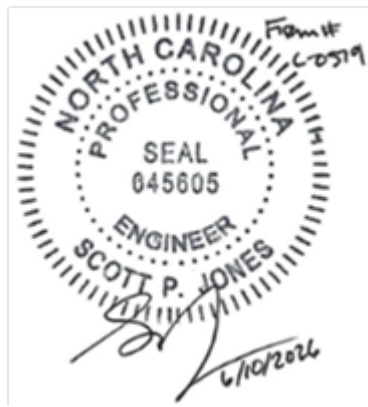
Agri-Waste Technology, Inc.
1225 Crescent Green, Suite 250, Cary, NC 27518
agriwaste.com | 919.859.0669

Lake Myra WWTS
NV5

Project Location
0 Smithfield Rd,
Wendell, NC 27591
Wake County
PIN: 1763519788

Client Information
NV5
3300 Regency Parkway, Suite 100,
Cary, NC 27518
Michael.allen@NV5.com
919-201-5002

PROFESSIONAL ENGINEER SEAL



FINAL DESIGN NOT RELEASED
FOR CONSTRUCTION

REV. ISSUED DATE DESCRIPTION

SHEET TITLE

REPAIR DRAINFIELD

Drawn By:
C. Barbee

Drawn On:

Revised By:

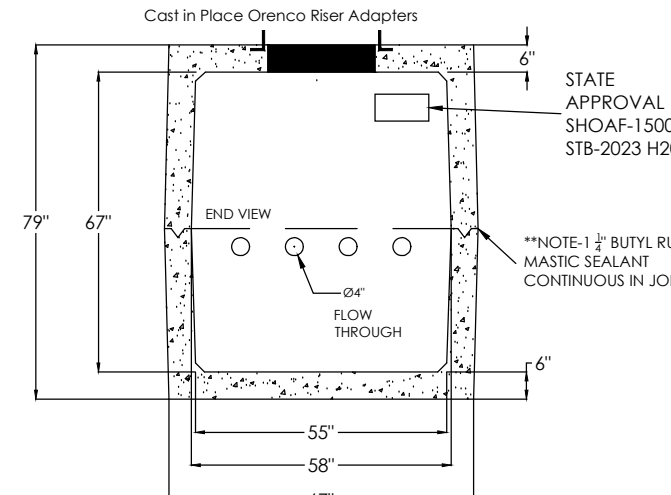
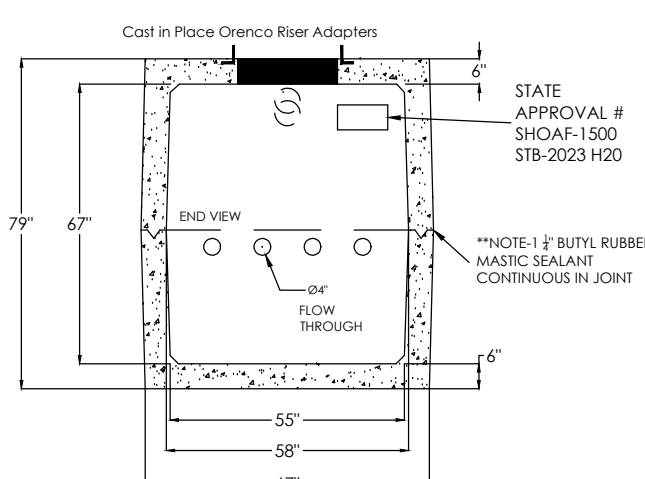
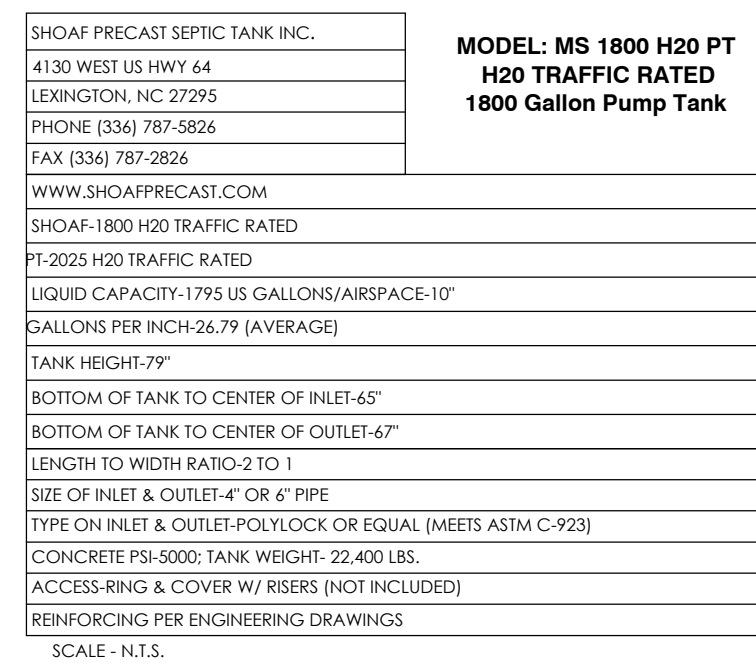
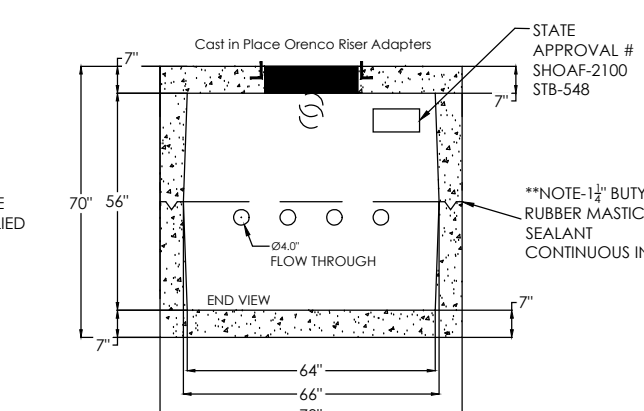
Revised On:

Released By:

Released On:

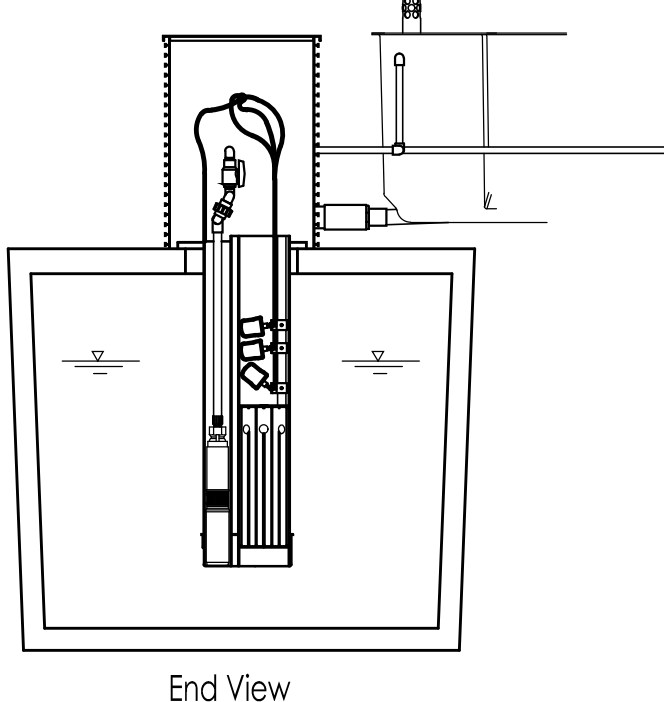
Drawing Number:

WW-7

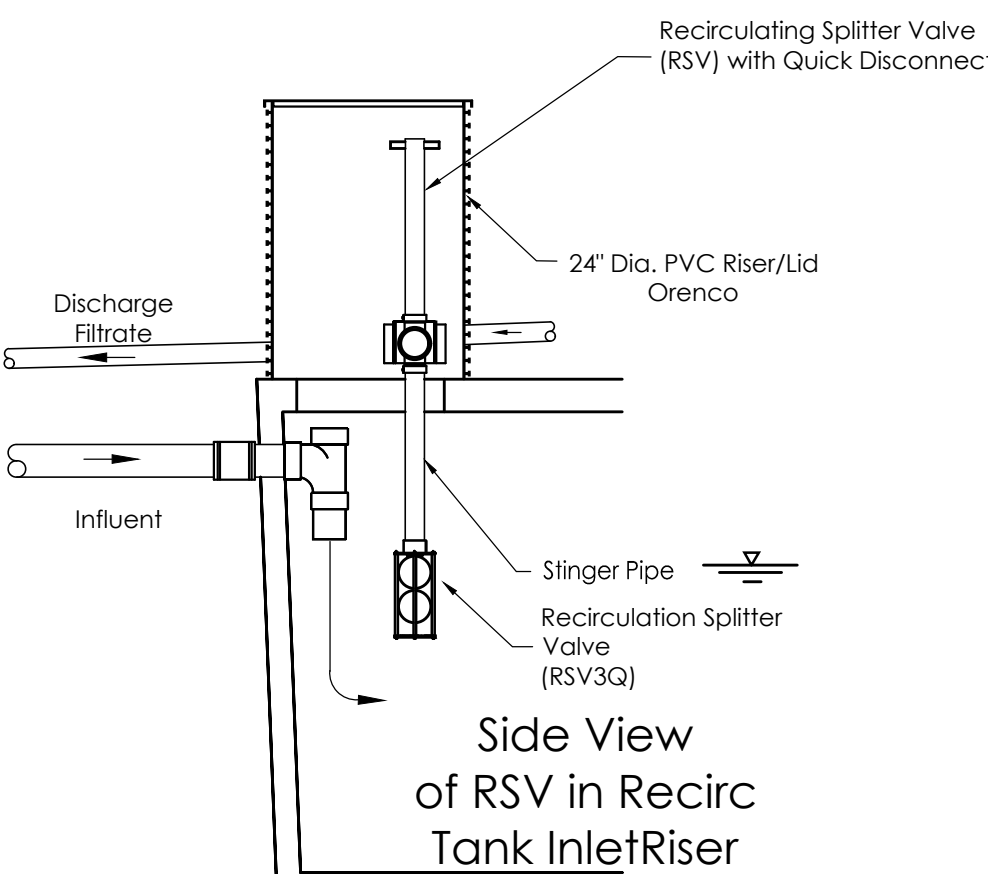

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2
WW-

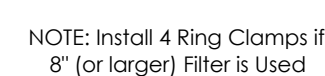
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WW



4
WW-8



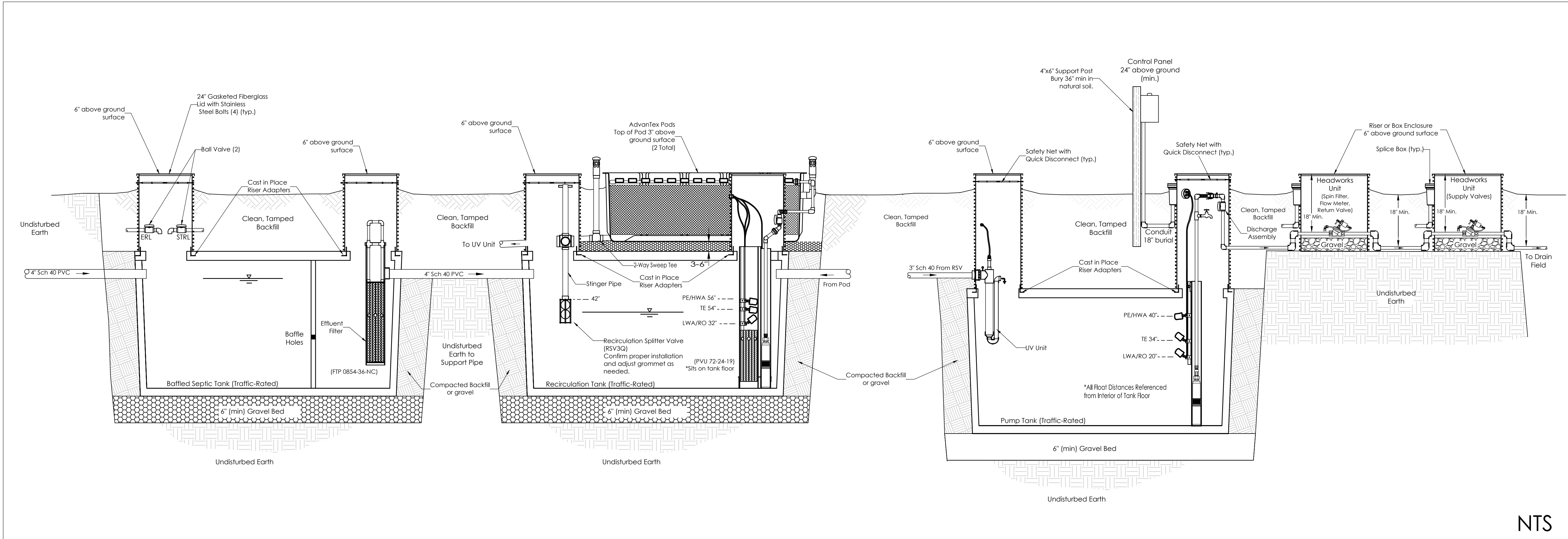
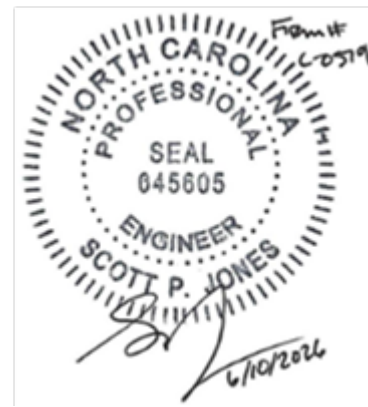
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WW-8



- ### RESIN INSTALLATION INSTRUCTIONS:
1. Prep Adaptor Channel & Resin
 - 1.1. Roughen the bonding surfaces of the adaptor and the inside of the adaptor.
 - 1.2. Use a clean cloth and acetone or alcohol to clean the bonding surfaces of the adaptor and resin. The bonding surfaces must be clean and dry for a good fit and watertight joint. Let the acetone or alcohol dry completely.
 2. Apply Adhesive
 - 2.1. Apply a bead of methacrylic adhesive to the inside of the adaptor. (A 100 gram packet of MA320 adhesive is typical for one 24" riser).
 3. Install Riser
 - 3.1. If the riser has penetrations, align the riser correctly.
 - 3.2. Firmly press the riser onto the adaptor until the bottom of the riser is resting on the concrete (cast-in-adaptors) or the adaptor flanges (bolted-down adaptors).
 - 3.3. Push the riser back and forth slightly to fully seat it in to create a good bond.
 - 3.4. Apply a bead of methacrylic adhesive to the inside of the access riser-adaptor joint.
 - 3.5. Use a torque dispenser, putty knife, or clean cloth to make an even layer of resin on the inside of the access riser-adaptor joint.
 - 3.6. Apply a hydraulic cement to bond outer riser wall and top inner lid.
 - 3.7. Ensure safety net and inner lid are in place and secure.

FOR RISER WALL PENETRATIONS	
Grammet Size, Inches (Nominal IPS Pipe Size)	Hole Saw Size, Inches
1/2	1
3/4	1 1/4
1	1 9/16
1 1/4	1 3/4
1 1/2	2 1/8
2	2 3/4
3	3 7/8
4	5

6
WW-



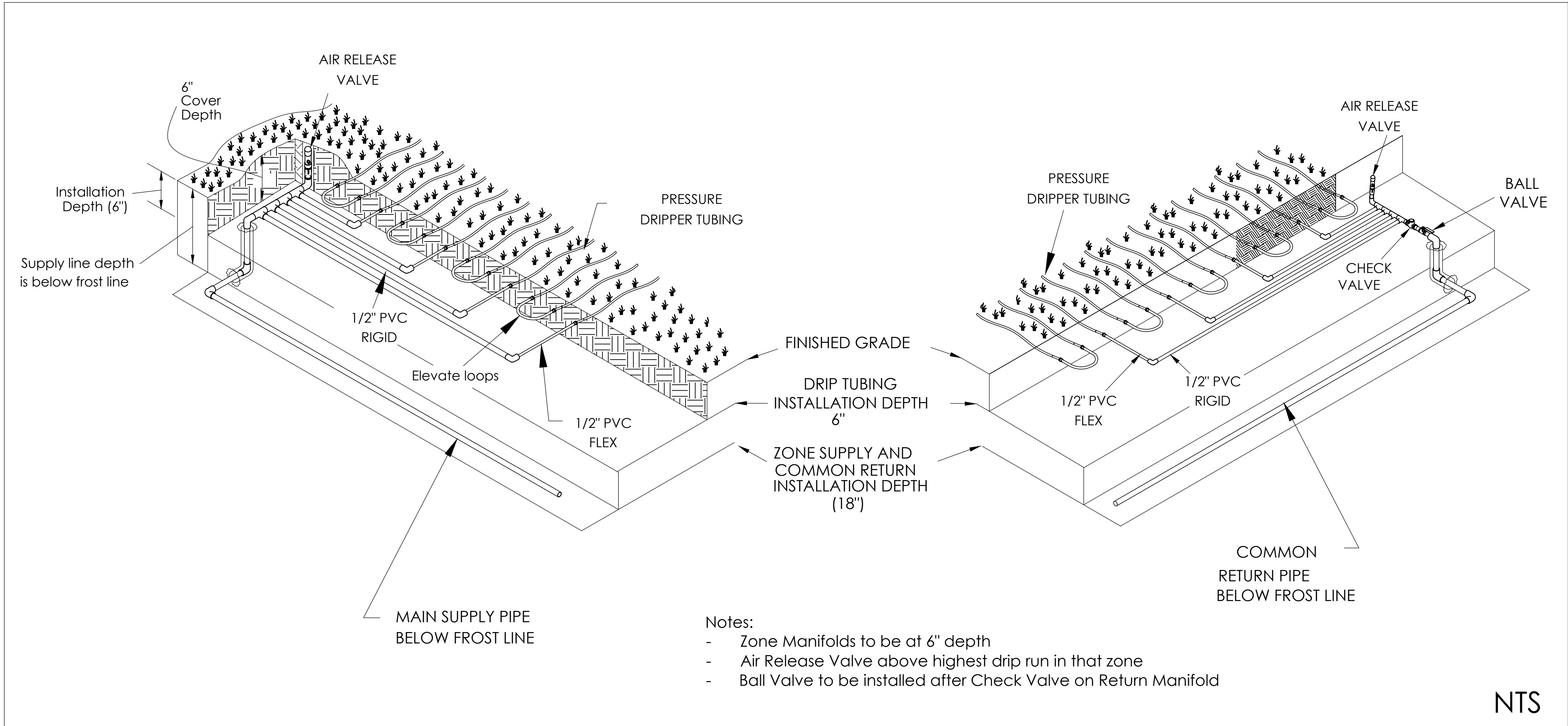
1 SYSTEM PROFILE VIEW

*Elevations based on GIS data

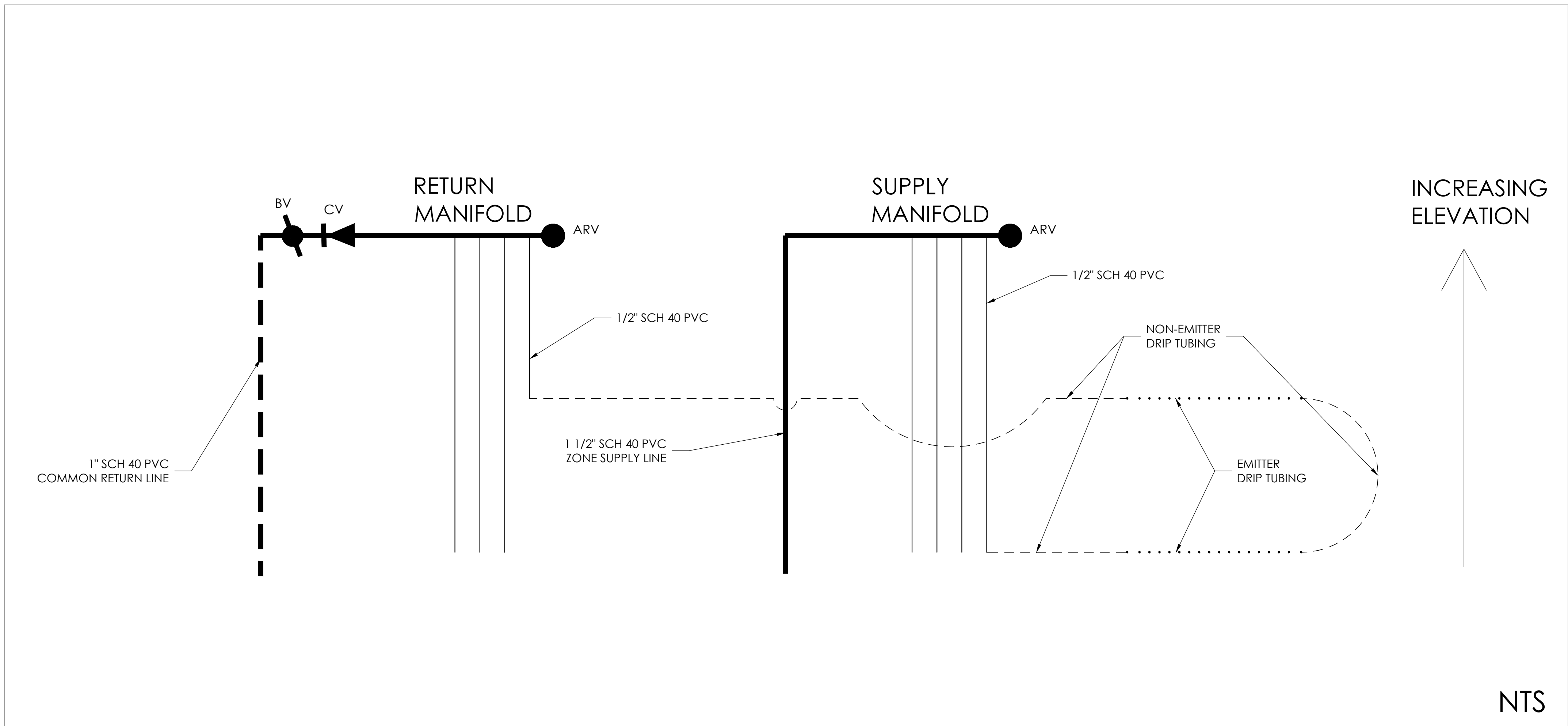
*Confirm all elevations in field prior to installation

Specifications									
Septic Tank		MS TR 2100 H20 STB		Recirculation Tank		MS TR 1800 H20 PT		Pump Tank	
Length		167.00 in.		Length		127.00 in.		Length	
		13.92 ft.				10.58 ft.			
Width		78.00 in.		Width		70.00 in.		Width	
		6.50 ft.				5.83 ft.			
External Height		70.00 in.		External Height		79.00 in.		External Height	
		5.83 ft.				6.58 ft.			
Bottom of 4" Inlet		13.00 in.		Bottom of 4" Inlet		16.00 in.		3" UV Inlet Invert	
*from Top of Tank		1.08 ft.		*from Top of Tank		1.33 ft.		*Above Top of Tank in Riser	
Bottom of 4" Outlet		16.00 in.						3.00 in.	
*from Top of Tank		1.33 ft.						0.25 ft.	
Elevations									
Stubout (Assumed)		256.22 ft.							

Septic Tank		Recirculation Tank		AdvanTex Pods (2)		Pump Tank	
DL Pipe Length to ST Inlet	40.0 ft.	DL Pipe Length to RT Inlet	5.00 ft.	Ground Surface at AdvanTex Pods	261.2 ft.	DL Pipe Length to PT Inlet from RSV	9.0 ft.
Ground Surface at Low Side of ST	261.0 ft.	Ground Surface at Low Side of RT	261.0 ft.	Elevation at Top of AdvanTex Pods	261.5 ft.	Ground Surface at Low Side of PT	261.4 ft.
Cover over Low Side of ST	54.0 in.	Cover over Low Side of RT	54.5 in.	Elevation at Outlet Invert	259.0 ft.	Cover over Low Side of ST	38.0 in.
	4.50 ft.		4.54 ft.	Recirculating Splitter Valve			3.17 ft.
Exterior Top of Tank	256.5 ft.	Exterior Top of Tank	256.5 ft.	Pipe Slope to RSV	1.98%	Exterior Top of Tank	258.2 ft.
Inlet Invert	255.4 ft.	Inlet Invert	255.1 ft.	Pipe Length to RSV	8.0 ft.	Inlet Invert	258.5 ft.
Slope of DL Pipe	2.01%	Slope of DL Pipe	1%	Elevation at RSV Inlet Invert	258.8 in.	Slope of DL Pipe	1.57%
*minimum 2% slope		*minimum 1% slope		Drop Across RSV	0.17 ft.	*minimum 1% slope	
Outlet Invert	255.2 ft.	Elevation at Top of Tank	256.5 ft.	Elevation at RSV Outlet Invert	258.6 ft.	Bottom of Excavation	251.2 ft.
		Distance to RSV Invert from Top	28 in.			*beneath 6" gravel base	
Gravel Base Thickness	6 in.		2.33 ft.	Recirc Tank Float Settings		Tank Bottom Thickness	0.50 ft.
Bottom of Excavation	250.2 ft.	RSV Inlet Invert	258.8 ft.	Height from		Elevation at Tank Floor	252.2 ft.
Riser Heights		Elevation at Tank Bottom	249.9 ft.	Elev. (ft)	Tank Floor (in)	Pump Tank Float Settings	
Septic Tank	5.00 ft.	Tank Bottom Thickness	0.50 ft.	Pump Enable/Low water (12" below Pump Override)	253.0	Elev. (ft)	Height from
	60.0 in.	Elevation at Tank Floor	250.4 ft.	Pump Override (2" below High Water Alarm)	254.9	272.2	20
Recirc Tank	5.04 ft.			High Water Alarm (1'-2" below inlet invert)	255.0	286.2	34
	60.5 in.					292.2	40
Pump Tank	3.67 ft.			Top of RSV Cage (~10" above PE/LW)	253.9		
	44.0 in.			*PVU 72-24-19	42		



1 TYPICAL SUPPLY AND RETURN MANIFOLD CONFIGURATION



2 TYPICAL TOP FEED MANIFOLD DISTRIBUTION

- NOTES
1. Site plan taken from plot plan by NV5.
 2. Parcel boundary via Wake County PLAT book 2007 page 360.
 3. Installation to follow all NC DHHS and Wake County applicable rules and regulations.
 4. If actual site conditions vary from those shown on plans, contact Engineer before moving forward.
 5. Pre-construction meeting to be held with Certified Installer and L.S.S. prior to any construction activities.
 6. Engineer inspection required during system installation and at final completion.
 7. Engineer inspection(s), installer certification, and engineer certification of installed system is required.
 8. Contractor to abide by all safety regulations during system installation.
 9. Upon system completion, Contractor to supply Engineer with documentation of installation and a signed letter indicating system was installed per approved design or noting any deviation from approved design.
 10. Treatment system and dripfield to be 100' from any well, 50' from any pond, 25' from any dry detention basin, 15' from any building foundation, 15' from any cut, 10' from any water line, 5' from any driveway, and 10' from property line. Verification of these setbacks to be performed by Contractor.
 11. Actual installation and placement of treatment system to be overseen by Contractor.
 12. Contractor to document system installation with photographs.
 13. Contractor shall backfill around all access areas such that storm water is shed away from potential entry points.
 14. Invert elevations of all components to be verified in field by Contractor to insure proper operation.
 15. Contractor to seed and/or mulch disturbed areas to coincide with existing landscape. Area shall not be left with uncovered soil.
 16. Contractor to install phone or Internet line to control panel.
 17. All system piping and fittings to be SCH40 PVC (except where noted). All gravity elbows to be long radius or long sweeping type elbows (DWV).
 18. New tanks and pod to be set on 6" minimum gravel base. Use #5 or #57 stone for base.
 19. Tank(s) shall be backfilled with gravel or tank hole shall be over-excavated a minimum of 2' in all directions to allow for mechanical tamping of backfill.
 20. All tank penetrations shall be sealed with a cast-in-place boot with a stainless steel strap.
 21. All metal in tanks shall be stainless steel.
 22. All tanks to have cast-in-place riser adapter on both ends.
 23. Septic Tank to have approved 8" effluent filter.
 24. On site vacuum or hydrostatic leak test required on all tanks. Vacuum test at 5 inches of Hg for 5 minutes. Water leak test for one hour duration with water level to the underside of the top of tank. Documentation to be provided to Engineer.
 25. All risers to have cast-in-place tank adapters and be single piece riser. Risers shall be secured to cast-in tank adapters per manufacturer's recommendations. Risers to extend 6" above soil surface and be designed and maintained to prevent surface water inflow. Risers to be gasketed and secured with four (4) 1/4" diameter screws. AdvanTex Pod(s) to be placed on gravel bed.
 26. Pump discharge piping fittings and valves shall be of compatible corrosion-resistant material.
 27. A threaded union (or equivalent type of disconnect) shall be provided in each pump discharge line.
 28. All valves shall be readily accessible from the ground surface.
 29. Mount Control Panel 24" (min.) above grade.
 30. Control panel shall be locked or secured against unauthorized access.
 31. All system wiring to be installed in electrical conduit buried to a minimum depth of 18". All wire to be UF or THWN rated.
 32. Electrical service from facility to be installed by licensed electrician under the facility building permit.
 33. Separate circuits for each pump and alarm/control panel are required (2-120V, 20 amp; 1-120V, 15 amp. All single phase.). Separate conduit required for phone or Internet line.
 34. Spigot to be located on outside of building within 50' of septic tank inlet or yard hydrant shall be installed.
 35. Sampling spigot to be installed with Pump Tank's discharge pump line. Samples to be collected from UV outlet or pump discharge.



The employer must comply with the trenching and excavation requirements of 29 CFR 1926.651 and 1926.652 or comparable OSHA-approved state plan requirements.

OSHA standards require that a competent person inspect trenches daily and as conditions change before worker entry to ensure elimination of excavation hazards. A competent person is an individual who is capable of identifying existing and predictable hazards or working conditions that are hazardous, unsanitary, or dangerous to workers, soil types and protective systems required, and who is authorized to take prompt corrective measures to eliminate these hazards and conditions.

OSHA standards require safe access and egress to all excavations, including ladders, steps, ramps, or other safe means of exit for employees working in trench excavations 4 feet (1.22 meters) or deeper. These devices must be located within 25 feet (7.6 meters) of all workers.

Heavy equipment and trucks should stay as far as possible from the edge of any trench. Always use pads under stabilizers to minimize ground pressures that could lead to failures.

"Cemented soil" means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

"Cohesive soil" means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical sideslopes, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

"Dry soil" means soil that does not exhibit visible signs of moisture content.

"Fissured" means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

"Granular soil" means gravel, sand, or silt (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

"Layered system" means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or bedded planes in rock or shale are considered layered.

"Moist soil" means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

"Plastic" means a property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.

"Saturated soil" means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or shear vane.

Type A* means cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot [tsf] [144 kPa] or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam, and in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if:

- (i) The soil is fissured; or
- (ii) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or
- (iii) The soil has been previously disturbed; or
- (iv) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or
- (v) The material is subject to other factors that would require it to be classified as a less stable material.

- (i) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or
- (ii) Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
- (iii) Previously disturbed soils except those which would otherwise be classed as Type C soil.
- (iv) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or
- (v) Dry rock that is not stable; or
- (vi) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

- (i) Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or
- (ii) Granular soils including gravel, sand, and loamy sand; or
- (iii) Submerged soil or soil from which water is freely seeping; or
- (iv) Submerged rock that is not stable; or
- (v) Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.

"Unconfined compressive strength" means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods.

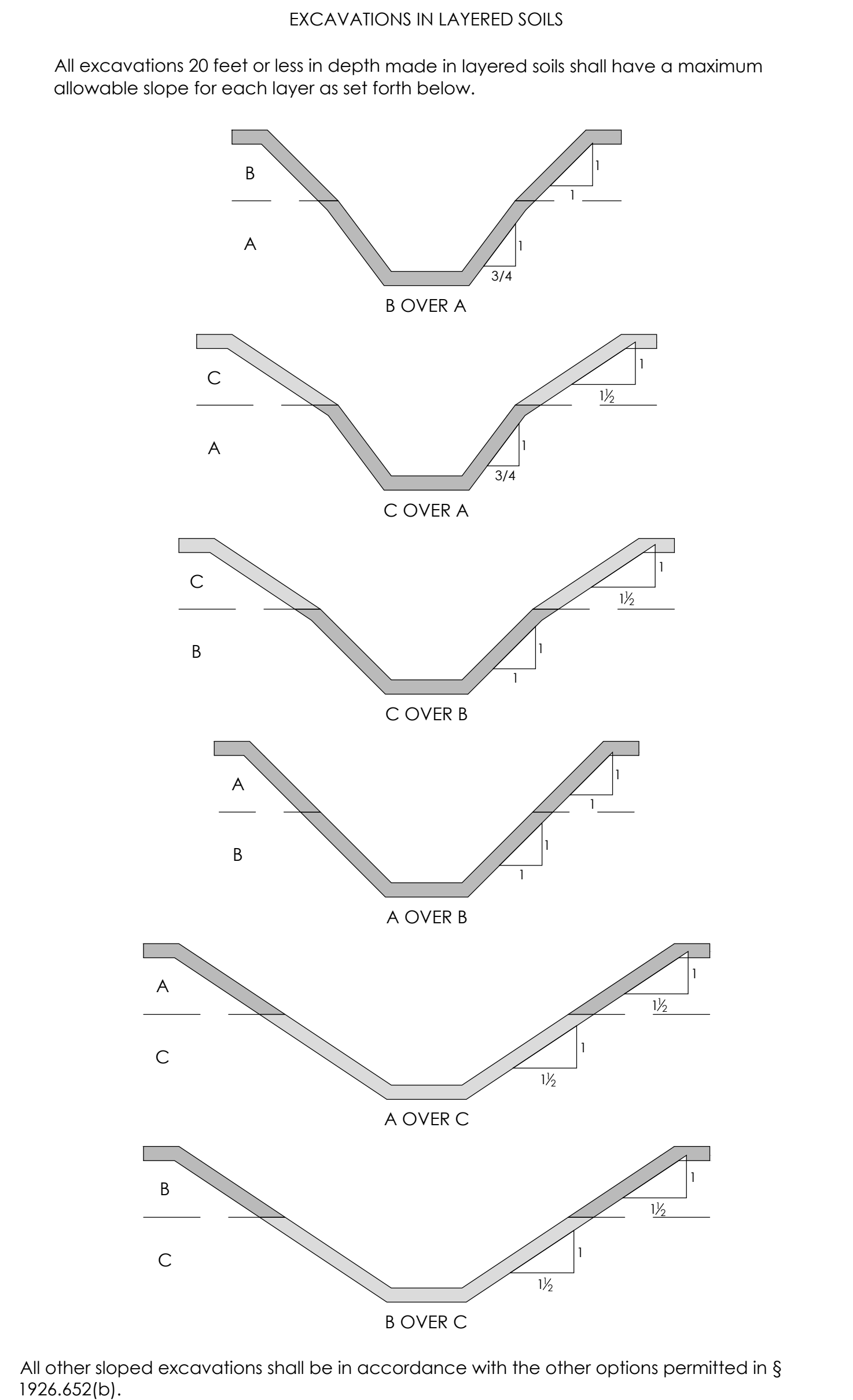
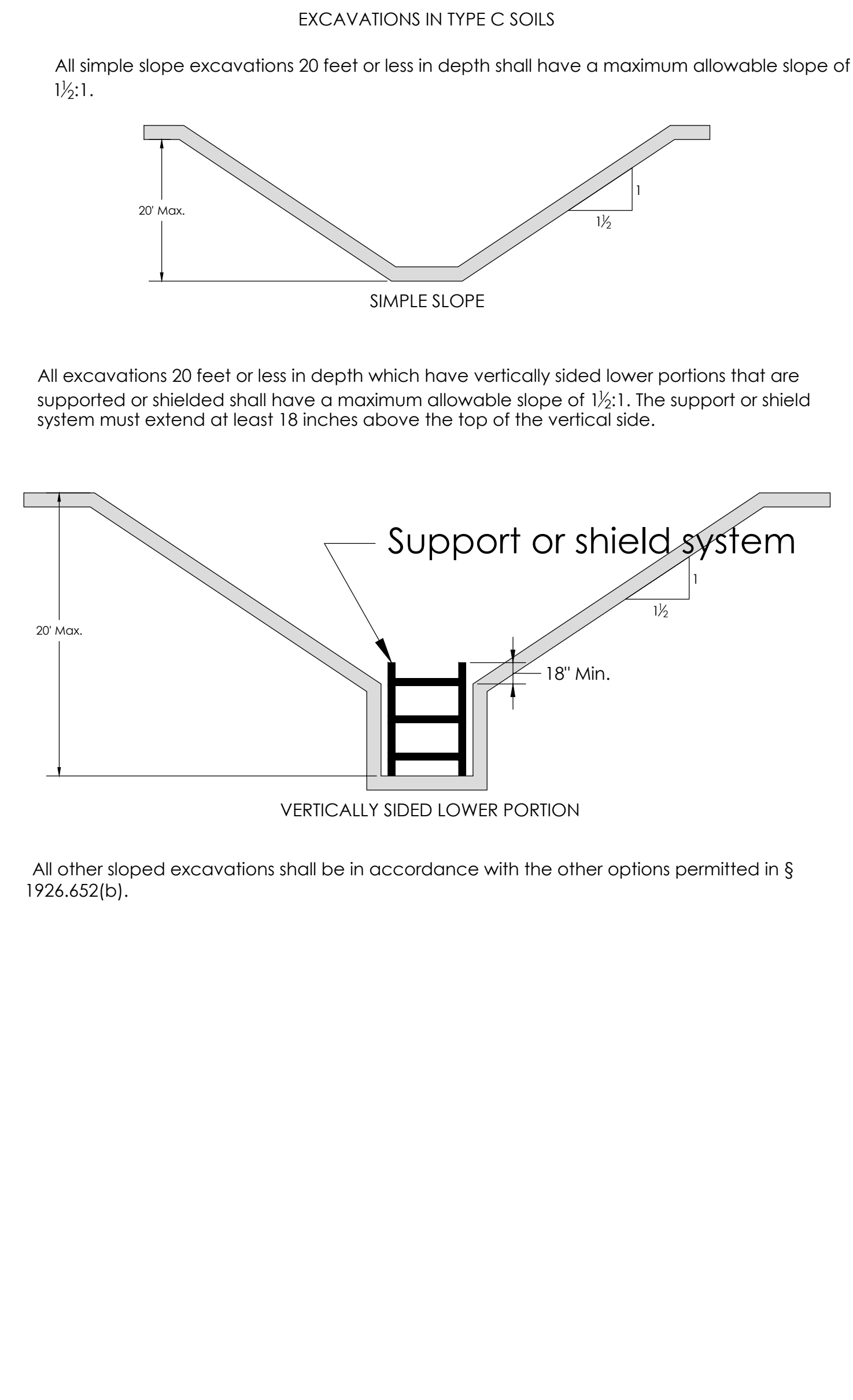
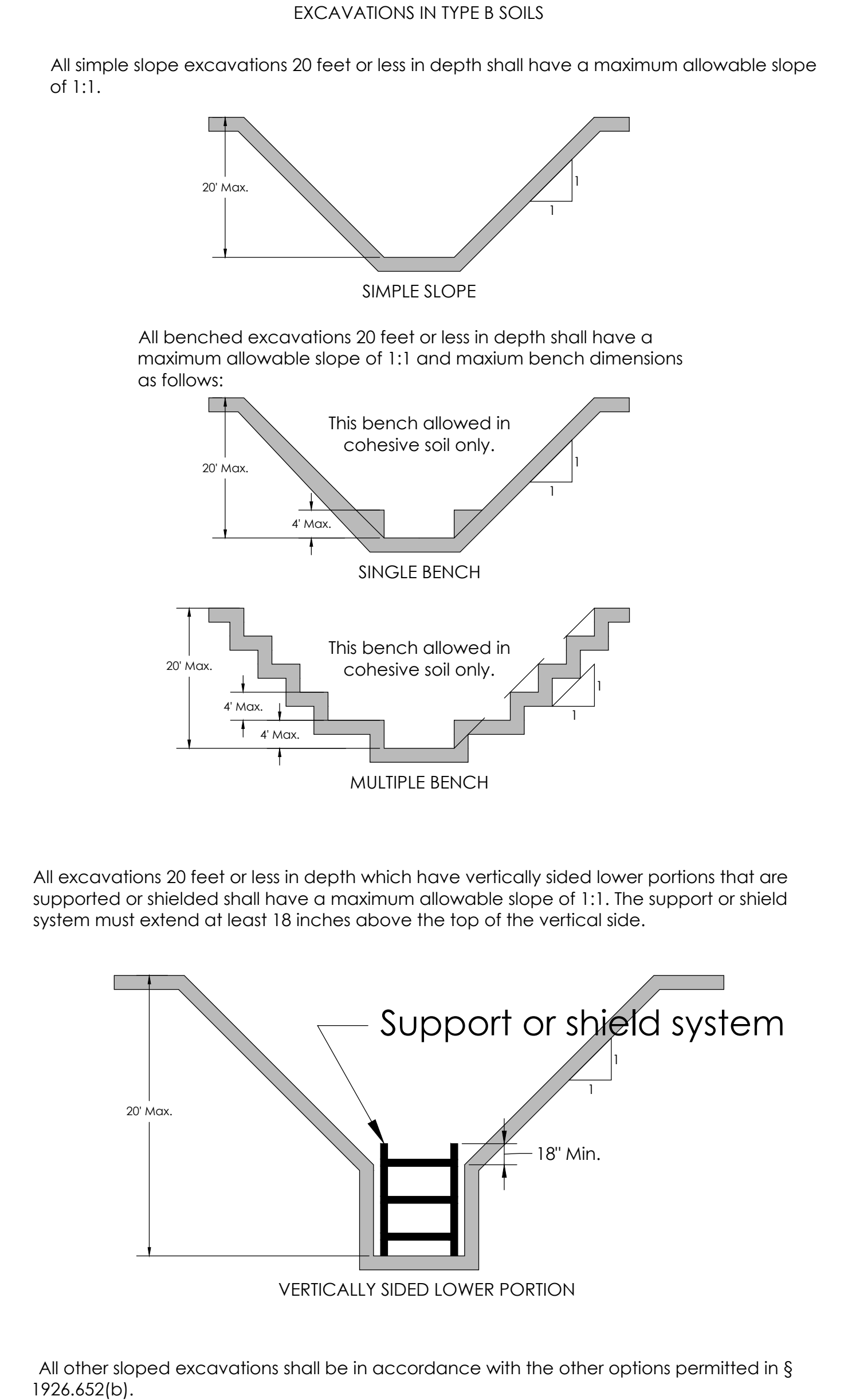
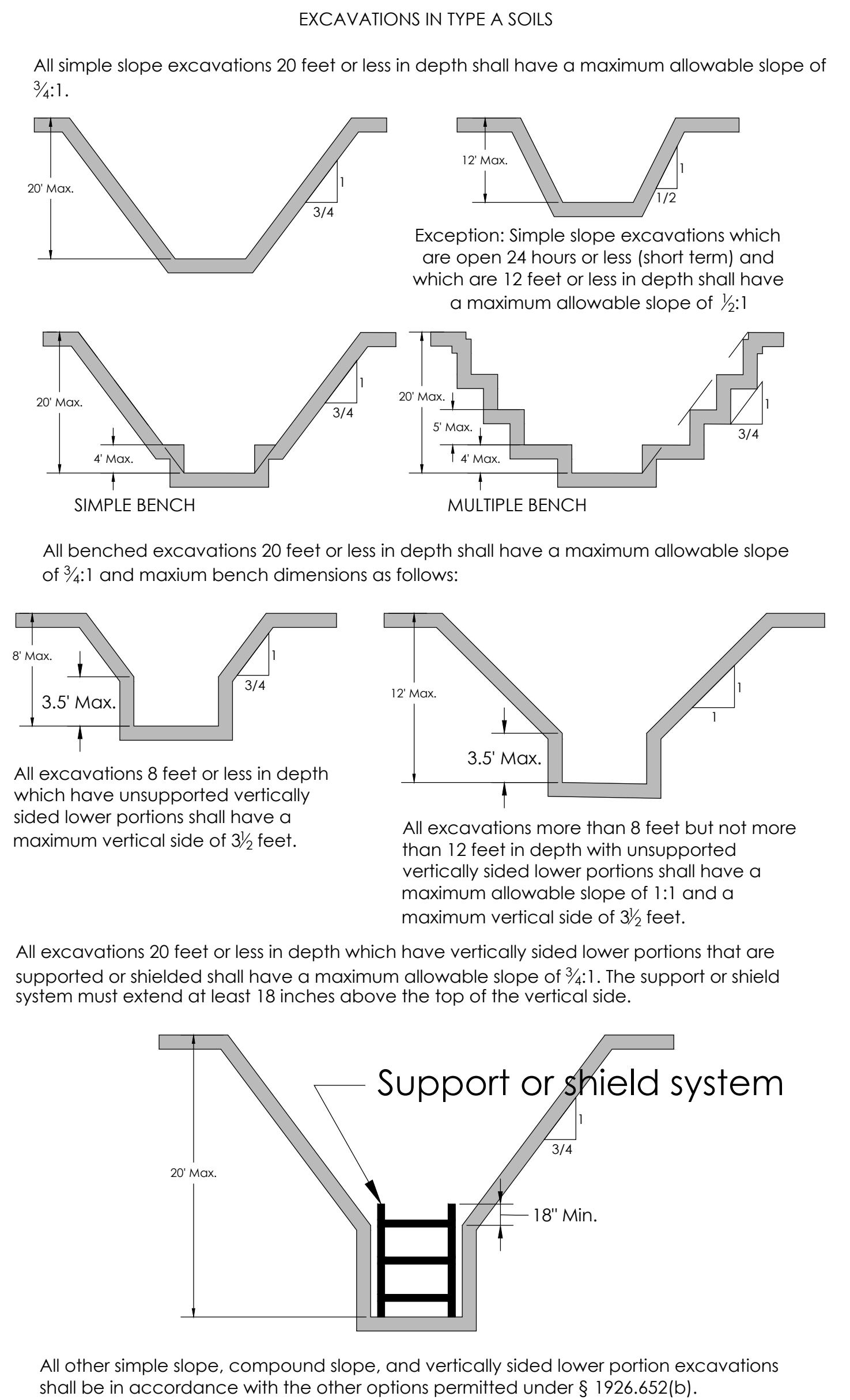
"Wet soil" means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.

- (1) Classification of soil and rock deposits. Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with the definitions set forth in paragraph (b) of this appendix.
- (2) Basis of classification. The classification of the deposits shall be made based on the results of at least one visual and at least one manual analysis. Such analyses shall be conducted by a competent person using tests described in paragraph (d) below, or in other recognized methods of soil classification and testing such as those adopted by the American Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.
- (3) Visual and manual analyses. The visual and manual analyses, such as those noted as being acceptable in paragraph (d) of this appendix, shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors, and conditions affecting the classification of the deposits.
- (4) Layered systems. In a layered system, the system shall be classified in accordance with its weakest layer. However, each layer may be classified individually where a more stable layer lies under a less stable layer.
- (5) Reclassification. If, after classifying a deposit, the properties, factors, or conditions affecting its classification change in any way, the changes shall be evaluated by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumstances.

- (I) Visual tests. Visual analysis is conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from excavated material.
 - (i) Observe samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the relative amounts of the particle sizes. Soil that is primarily composed of fine-grained material is cohesive material. Soil composed primarily of coarse-grained sand or gravel is granular material.
 - (ii) Observe soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does not stay in clumps is granular.
 - (iii) Observe the side of the opened excavation and the surface area adjacent to the excavation. Crack-like openings such as tension cracks could indicate fissured material. If chunks of soil spill off a vertical side, the soil could be fissured. Small spalls are evidence of moving ground and are indications of potentially hazardous situations.
 - (iv) Observe the area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground structures, and to identify previously disturbed soil.
 - (v) Observe the opened side of the excavation to identify layered systems. Examine layered systems to identify if the layers slope toward the excavation. Estimate the degree of slope of the layers.
 - (vi) Observe the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the level of the water table.
 - (vii) Observe the area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the stability of the excavation face.

(2) **Manual tests.** Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly.

- (i) **Plasticity.** Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as 1/8-inch in diameter. Cohesive material can be successfully rolled into threads without crumbling. For example, if at least a two inch (50 mm) length of 1/8-inch thread can be held on one end without tearing, the soil is cohesive.
- (ii) **Dry strength.** If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand, or silt. If the dry soil breaks into clumps which do not break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.
- (iii) **Thumb penetration.** The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. (This test is based on the thumb penetration test described in American Society for Testing and Materials (ASTM) Standard designation D2488 - "Standard Recommended Practice for Description of Soils (Visual - Manual Procedure).") Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.
- (iv) **Other strength tests.** Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetrometer or by using a hand-operated shearvane.
- (v) **Drying test.** The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesive material, and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.54 cm) and six inches (15.24 cm) in diameter until it is thoroughly dry.
 - (A) If the sample develops cracks as it dries, significant fissures are indicated.
 - (B) Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil has significant cohesive material content. The soil can be classified as an unfissured cohesive material and the unconfined compressive strength should be determined.
 - (C) If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.



Lake Myra WWTS
NV5

Project Location
0 Smithfield Rd,
Wendell, NC 27591
Wake County
PIN: 1763519788

Client Information
NV5

3300 Regency Parkway, Suite 100
Cary, NC 27518
Michael.allen@NV5.com
919-201-5002

PROFESSIONAL ENGINEER SEAL



FINAL DESIGN NOT RELEASED
FOR CONSTRUCTION

REV.	ISSUED DATE	DESCRIPTION
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SHEET TITLE

EXCAVATION
SAFETY

Drawn By: C. Barbee	Drawn On: ----
Revised By: ----	Revised On: ----
Released By: ----	Released On: ----

Drawing Number:

WW-12

4. Wastewater System Specifications



Engineers and Soil Scientists

Wastewater System Specifications Table of Contents

Agri-Waste Technology, Inc.

1225 Crescent Green, Suite 250, Cary NC 27518

agriwaste.com | 919.859.0669

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1.0. General Project Specifications

1.1 Project Description

The purpose of the project is to install a new wastewater treatment system to accommodate waste from the future proposed facilities at Lake Myra County Park. The treatment system will consist of a septic tank, recirculating tank, treatment units, UV disinfection, pump tank, discharge pump, headworks unit, control panel, and subsurface aerobic dripfield.

1.2 Site Description

The project site consists of property located at 0 S. Smithfield Rd, Wendell, NC 27591 (Wake County PIN 1763519788). The proposed dripfield is located west of the proposed facilities. The setbacks and proposed location of the treatment system and dripfield are shown on the system drawings.

1.3 Adjacent Property

The surrounding area is comprised mostly of single-family residences.

2.0. Material Management Practices

The following are the material management practices that will be used to reduce the risk of spills and other accidental exposure of materials and substances to storm water runoff.

2.1 Housekeeping

The following good housekeeping practices will be followed on site during the construction project.

- An effort will be made to store only enough product required to do the job.
- All materials stored on site will be stored in a neat orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
- Products will be kept in their original containers with the original manufacturer's label.
- Substances will not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of a product will be used before disposing of the container.
- Manufacturer's recommendations for proper use and disposal will be followed.
- The site superintendent will inspect daily to ensure proper use and disposal of materials on site.

2.2 Hazardous Products

These practices are used to reduce the risks associated with hazardous materials (if any are present):

- Products will be kept in original containers unless they are not re-sealable.
- Original labels and Material Safety Data Sheets (MSDS) will be retained as they provide important product information.
- If surplus product must be disposed of, the manufacturer's or local and state recommended methods for proper disposal will be followed.

2.3 Product Safety Practices

The following product safety practices will be followed on site:

2.3.1 Petroleum Products

All on-site vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled.

2.3.2 Fertilizers

Fertilizers used will be applied at recommended agronomic rates. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

2.4 Spill Control Practices

The following practices will be followed for spill prevention and cleanup:

- Manufacturer's recommended methods for spill cleanup will be clearly understood and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area on site. Equipment and materials will include but not be limited to brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
- All spills will be cleaned up immediately after discovery.
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- Spills of toxic or hazardous material will be reported to the appropriate state or local government agency, regardless of size.
- The spill prevention plan will be adjusted to include measures to prevent this type of spill from reoccurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included.
- The site superintendent responsible for the day-to-day site operations will be the spill prevention and cleanup coordinator. He should designate at least one other site personnel who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase of prevention and cleanup.

3.0. Site Work

The site shall be maintained in an orderly and clean fashion. Debris should be confined to a common area and removed weekly. The minimum area needed shall be disturbed. Due to the small footprint of the project, a formal erosion and control plan has not been developed. However, contractor shall follow standard practices to minimize any adverse effects from the installation of the system.

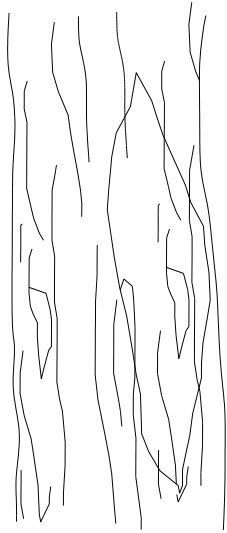
3.1 Construction Roads and Parking

Inspect construction roads and parking areas periodically for condition of surface. Topdress with new gravel as needed. Check areas for erosion and sedimentation after runoff-producing rains. Maintain all vegetation in a healthy, vigorous condition. Sediment-producing areas should be treated immediately.

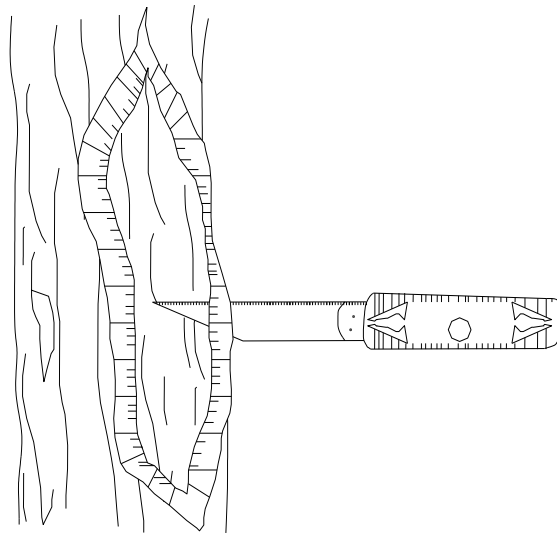
3.2 Tree Preservation and Protection

Some clearing of trees will be required for the installation of the drain line connecting the facility to the treatment unit. Care shall be taken to minimize the disturbed area during installation. In spite of precautions, some damage to protected trees may occur. In such cases, repair any damage to the crown, trunk, or root system immediately.

- Repair roots by cutting off the damaged areas and painting them with tree paint. Spread peat moss or moist topsoil over exposed roots.
- Repair damage to bark by trimming around the damaged area as shown in Figure 1 below, taper the cut to provide drainage, and paint with tree paint.
- Cut off all damaged tree limbs above the tree collar at the trunk or main branch. Use three separate cuts as shown in Figure 2 to avoid peeling bark from healthy areas of the tree.

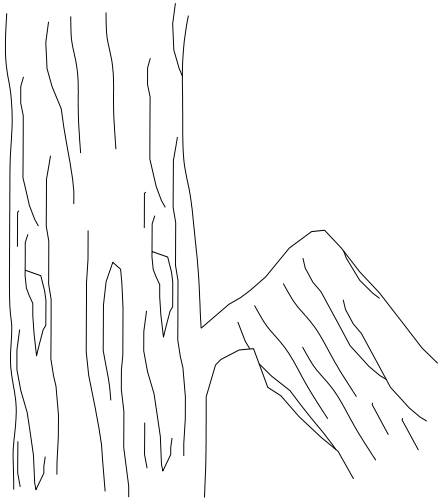


TREE WOUND

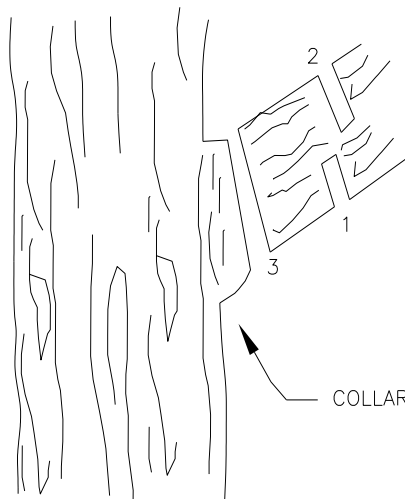


TRIM AND TAPER

Figure 1. Trim bark wounds with a tapered cut, then apply tree paint.



INCORRECT



CORRECT

Figure 2. Prune damaged branches with three cuts to avoid peeling bark from the tree when tree trunk falls from tree.

To the degree possible, the vegetation that is removed during the drain line installation shall be shredded on site and used to cover the drain line installation. Larger material shall be removed from the site and disposed of properly.

3.3 Removal of Topsoil

MATERIALS

Determine whether the quality and quantity of available topsoil justifies selective handling. Quality topsoil has the following characteristics:

- **Texture**—loam, sandy loam, and silt loam are best; sandy clay loam, silty clay loam, clay loam, and loamy sand are fair. Do not use heavy clay and organic soils such as peat or muck as topsoil
- **Organic matter content**—(sometimes referred to as “humic matter”) should be greater than 1.5% by weight.
- **Acidity**—pH should be greater than 3.6 before liming, and liming is required if it is less than 6.0.
- **Soluble salts**—should be less than 500 ppm.
- **Sodium**—sodium adsorption ratio should be less than 12. The depth of material meeting the above qualifications should be at least 2 inches. Soil factors such as rock fragments, slope, depth to water table, and layer thickness affect the ease of excavation and spreading of topsoil. Generally, the upper part of the soil, which is richest in organic matter, is most desirable; however, material excavated from deeper layers may be worth storing if it meets the other criteria listed above. Organic soils such as mucks and peats do not make good topsoil. They can be identified by their extremely light weight when dry.

STRIPPING

Strip topsoil only from those areas that will be disturbed by excavation, filling, roadbuilding, or compaction by equipment. A 4-6 inch stripping depth is common, but depth varies depending on the site. Determine depth of stripping by taking soil cores at several locations within each area to be stripped. Topsoil depth generally varies along a gradient from hilltop to toe of the slope. Put sediment basins, diversions, and other controls into place before stripping.

STOCKPILING

Select stockpile location to avoid slopes, natural drainageways, and traffic routes. Respreading is easier and more economical when topsoil is stockpiled in small piles located near areas where they will be used.

- **Sediment barriers**—Use sediment fences or other barriers where necessary to retain sediment.
- **Temporary seeding**—Protect topsoil stockpiles by temporarily seeding as soon as possible, no more than 21 calendar days after the formation of the stockpile
- **Permanent vegetation**—If stockpiles will not be used within 90 days they must be stabilized with permanent vegetation to control erosion and weed growth.

SITE PREPARATION

Before spreading topsoil, establish erosion and sedimentation control practices such as diversions, and berms as needed.

- **Grading**—Maintain grades on the areas to be topsoiled according to the approved plan and do not alter them by adding topsoil.
- **Limit of subsoil**—Where the pH of the existing subsoil is 6.0 or less, or the soil is composed of heavy clays, incorporate agricultural limestone in amounts recommended by soil tests or specified for the seeding mixture to be used. Incorporate lime to a depth of at least 2 inches by disking or raking.
- **Roughening**—Immediately prior to spreading the topsoil, loosen the subgrade by disking or scarifying to a depth of at least 4 inches, to ensure bonding of the topsoil and subsoil. If no amendments have been incorporated, loosen the soil to a depth of at least 6 inches before spreading topsoil.

SPREADING TOPSOIL

Uniformly distribute topsoil to a minimum compacted depth of 2 inches. Do not spread topsoil while it is frozen or muddy or when the subgrade is wet or frozen. Correct any irregularities in the surface that result from topsoiling or other operations to prevent the formation of depressions or water pockets. Compact the topsoil enough to ensure good contact with the underlying soil, but avoid excessive compaction, as it increases runoff and inhibits seed germination. Light packing with a roller is recommended where high-maintenance turf is to be established.

On slopes and areas that will not be mowed, the surface may be left rough after spreading topsoil. A disk may be used to promote bonding at the interface between the topsoil and subsoil. After topsoil application, follow procedures for seedbed preparation, taking care to avoid excessive mixing of topsoil into the subsoil.

3.4 Permanent Seeding

3.4.1 Seedbed Requirements

Establishment of vegetation should not be attempted on sites that are unsuitable due to inappropriate soil texture poor drainage, concentrated overland flow, or steepness of slope until measures have been taken to correct these problems.

To maintain a good stand of vegetation, the soil must meet certain minimum requirements as a growth medium. The existing soil should have these criteria:

- Enough fine-grained (silt and clay) material to maintain adequate moisture and nutrient supply (available water capacity of at least .05 inches of water to 1 inch of soil).
- Sufficient pore space to permit root penetration.
- Sufficient depth of soil to provide an adequate root zone. The depth to rock or impermeable layers such as hardpans should be 12 inches or more, except on slopes steeper than 2:1 where the addition of soil is not feasible.
- A favorable pH range for plant growth, usually 6.0-6.5.
- Freedom from large roots, branches, stones, large clods of earth, or trash of any kind. Clods and stones may be left on slopes steeper than 3:1 if they are to be hydroseeded.

If any of the above criteria are not met—i.e., if the existing soil is too coarse, dense, shallow, or acidic to foster vegetation—special amendments are required. The soil conditioners described below may be beneficial.

3.4.2 Soil Conditioners

In order to improve the structure or drainage characteristics of a soil, the following materials may be added. These amendments should only be necessary where soils have limitations that make them poor for plant growth or for fine turf establishment.

- | | | |
|---|----------------------|--|
| - | Peat | Appropriate types are sphagnum moss peat, hypnum moss peat, reed-sedge peat, or peat humus, all from fresh-water sources. Peat should be shredded and conditioned in storage piles for at least 6 months after excavation. |
| - | Sand | clean and free of toxic materials. |
| - | Vermiculite | horticultural grade and free of toxic substances. |
| - | Rotted manure | stable or cattle manure not containing undue amounts of straw or other bedding materials. |

3.4.3 Seedbed Preparation

Complete grading according to the approved plan before seeding. Below are steps to take in order to prepare the seedbed for planting.

- Chisel compacted areas and spread topsoil 3 inches deep over adverse soil conditions, if available.
- Rip the entire area to 6 inches deep.
- Remove all loose rock, roots, and other obstructions leaving surface reasonably smooth and uniform.
- Apply agricultural lime, fertilizer, and superphosphate uniformly and mix with soil.
- Continue tillage until a well pulverized, firm reasonably uniform seedbed is prepared 4 to 6 inches deep.
- Seed on a freshly prepared seedbed.
- Mulch immediately after seeding and anchor mulch.

Apply lime and fertilizer evenly and incorporate into the top 4–6 inches of soil by disking or other suitable means. Operate machinery on the contour. When using a hydroseeder, apply lime and fertilizer to a rough, loose surface.

Roughen surfaces. Complete seedbed preparation by breaking up large clods and raking into a smooth, uniform surface. Fill in or level depressions that can collect water. Broadcast seed into a freshly loosened seedbed that has not been sealed by rainfall.

3.4.4 Seeding

Seeding dates given in the manufacturer's seeding mixture specifications are designated as "best" or "possible". Seedings properly carried out within the "best" dates have a high probability of success. It is also possible to have satisfactory establishment when seeding outside these dates. However, as you deviate from them, the probability of failure increases rapidly. Seeding on the last date shown under "possible" may reduce chances of success by 30-50%. Always take this into account in scheduling land-disturbing activities.

Labeling of non-certified seed is also required by law. Labels contain important information on seed purity, germination, and presence of weed seeds. Seed must meet State standards for content of noxious weeds. Do not accept seed containing "prohibited" noxious weed seed.

Apply seed uniformly with a cyclone seeder, drop-type spreader drill, cultipacker seeder, or hydroseeder on a firm, friable seedbed.

When using a drill or cultipacker seeder, plant small grains no more than 1-inch deep, grasses and legumes no more than ½ inch. Equipment should be calibrated in the field for the desired seeding rate.

When using broadcast-seeding methods, subdivide the area into workable sections and determine the amount of seed needed for each section. Apply one-half the seed while moving back and forth across the area, making a uniform pattern; then apply the second half in the same way, but moving at right angles to the first pass.

Cover broadcast seed by raking or chain dragging; then firm the surface with a roller or cultipacker to provide good seed contact.

3.4.5 Mulch

Mulch all plantings immediately after seeding. Select a material based on site and practice requirements, availability of material, labor, and equipment. Before mulching, complete the required grading, install sediment control practices, and prepare the seedbed. Apply seed before mulching except in the following cases:

- Seed is applied as part of a hydroseeder slurry containing wood fiber mulch.
- A hydroseeder slurry is applied over straw.

3.4.6 Irrigation

Moisture is essential for seed germination and seedling establishment. Supplemental irrigation can be very helpful in assuring adequate stands in dry seasons or to speed development of full cover. Assess the need for irrigation when the seeding is conducted.

Water application rates must be carefully controlled to prevent runoff. Inadequate or excessive amounts of water can be more harmful than no supplemental water.

3.4.7 Application of Organic Mulch

Organic mulches are effective where they can be tacked securely to the surface.

Spread mulch uniformly by hand, or with a mulch blower. When spreading straw mulch by hand, divide the area to be mulched into sections of approximately 1,000 ft², and place 70-90 lb of straw (1 ½ to 2 bales) in each section to facilitate uniform distribution. After spreading mulch, no more than 25% of the ground surface should be visible. In hydroseeding operations, a green dye, added to the slurry, assures a uniform application.

3.4.8 Anchoring Organic Mulch

Straw mulch must be anchored immediately after spreading using vegetation. Rye (grain) may be used to anchor mulch in fall plantings, and German millet in spring. Broadcast at 15 lb/acre before applying mulch.

3.4.9 Permanent Stabilization

Permanent stabilization is needed in graded or cleared areas subject to erosion and where a permanent, long-lived vegetative cover is needed. Typically, disturbed portions of a site where construction activities have permanently ceased will be stabilized with permanent seeding no later than 14 days after the last construction activity. This method will not provide erosion control cover or prevent soil slippage on soils that are not stable due to soil texture or structure, water movement or excessively steep slopes. In some areas it may be necessary to install erosion or sediment control practices such as dikes, contour ripping, erosion stops, channel liners, sediment basins, diversions, subsurface drainage, or other practices.

Prior to seeding, 1,000 lbs/ac of a 12-12-12 or equivalent fertilizer and lime according to soil test or in lieu of soil test, 4,000 lbs/ac of ground agricultural limestone shall be worked into the soil to a depth of 3 inches.

Seed should be applied uniformly at a depth of 1/4 to 1/2 inch with appropriate equipment. Except on very flat slopes and ideal seeding conditions, small grain straw should be applied at a rate of 3,000 to 4,000 lbs/ac using appropriate mulch anchoring techniques. Other mulch materials can be used except under adverse conditions or steep slopes, grain straw should be adequate.

4.0 Installer Specification

The system installer shall maintain Class IV Installer License with the North Carolina Onsite Wastewater Contractor Inspector Certification Board (NCOWCICB).

5.0 Material Specifications

5.1 Concrete Tanks

All concrete tanks are to be State-approved tanks.

5.2 Piping

All drainlines and piping to be SCH 40 PVC. Non-pressure drain lines can be DWV. Sweeping style elbows to be used in gravity situations. All pressure lines to be pressure rated SCH 40 PVC. All pressure lines (less than 2" in diameter) to be cut with a hand ratcheting style cutter or wheel style cutter. PVC saws shall not be used to cut pressure pipe.

5.3 Electrical Requirements

The installer shall install all electrical fittings from the control panel to the individual treatment components and pumps. All system wire installed in electrical conduit shall be buried to a minimum of 18". All buried line not installed in conduit shall be rated for direct burial and be buried to a depth of 24". Conduit shall be installed where the underground line breaks the soil surface. Installation shall be in accordance with the manufacturer's specifications. A qualified electrician or local power utility shall bring power to the panel and energize panel.

6.0 Component Specifications (information following)

6.1 Concrete Tanks

- All concrete tanks to be State Approved Tanks.
- All tank seams to be sealed with butyl rubber sealant.
- Backfill and compact soil around tank with “jumping jack” style compactor.
- Following installation, tanks to be vacuum and water tested. Passing criteria as follows:
 - Vacuum Test 5 in Hg for 5 min with <0.5 in Hg
 - Water Test 10 gallons/1000 gallons/24 hr period
- Tanks to be installed level on 6" gravel base (#5 or #57 stone)
- All penetrations to be cast in place rubber boots for inflow and outflow penetrations
- All tanks to have cast in place riser adapters for Orenco Risers

6.2 Access Risers

- Install risers per manufacturer’s specifications
- All Orenco risers to extend minimum 6" above grade.
- All electrical conduits to be sealed with duct seal.
- Penetrations thru risers to use grommets or bulk head fitting.

6.3 Drain Line

- All gravity drain line to be 4" SCH 40 PVC, DWV (except where noted in system drawings)
- Elbows to be sweeping style fitting

6.4 Recirculation and Field Dose Pump

- Install pumps per system drawing and manufacturers specifications (included)
- Piping to be SCH 40 Pressure Pipe.

6.5 Irrigation Headworks

- Install headworks per system drawing.
- Install headworks on 6" gravel base with daylighted drainline (if site topography allows).

6.6 Control Panel

- Install per system drawing and manufacturers specifications (included).
- Panel to be minimum 24" above grade.
- Seal all pipes with duct seal
- Panel to be mounted on 4" x 6" (minimum) pressure treated post.

POLYVINYL CHLORIDE (PVC) PRESSURE PIPE FOR WASTEWATER IRRIGATION SYSTEMS

PART 1 - INSTALLATION SPECIFICATIONS

1.1 Scope

A. This section is a minimum guideline for furnishing and the installation of Polyvinyl Chloride (PVC) pipe and fittings for lines with hydraulic pressure.

B. Pipe shall be furnished complete with all fittings, specials, and other accessories.

1.2 Quality Assurance

A. Standards (as applicable)

1. ANSI/AWWA C605, Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water, latest revision.

B. Manufacture

1. All PVC pipe for a project/development shall be supplied by one manufacturer.

1.3 Product delivery, storage, and handling

A. Handling

1. Do not drop pipe or fittings including dropping on cushions.
2. Do not use hooks.
3. Polyvinyl chloride pipe has reduced flexibility and impact resistance as temperatures approach and drop below freezing. Extra care should be used in handling and installing PVC pipe during cold weather.
4. Care must be taken to prevent damage to the pipe and fittings by impact, bending, compression, or abrasion.

B. Storage

1. Store and use solvents and glue in a manner which will avoid contamination.
2. Pipe shall be stored in accordance with the manufacturer's specifications.
3. Pipe shall be stored on a surface which provides even support for the pipe barrel.
4. Pipe which exhibits excessive ultraviolet deterioration and cracking which in the opinion of the Engineer and/or the N.C. Division of Water Quality degrades the pipe quality shall not be used.

PART 2 – PRODUCTS

2.1 Polyvinyl Chloride (PVC) Pipe – Slip Joint

A. General

1. All PVC pipe shall be manufactured in accordance with AWWA Standard C900.

B. Pipe joints shall be made using an integral bell with push-on type joint or using couplings of a sleeve type and smooth cut pipe ends to form a push-on type joint.

C. All sizes of pipe under these specifications shall be pressure class as shown on the plans.

D. Each length of pipe shall be a standard laying length of 20 feet (20') unless field conditions or connections dictate that a shorter length be used. If a vendor of choice does not readily carry 20-foot lengths then another vendor should be sought. Lengths less than 20 feet can be used only if primary local vendors note that this length is unavailable.

2.2 Fittings and Couplings

All fittings and couplings shall be of the same class and material as the pipe used for the project. Each fitting should be inspected for damage and cleaned (if necessary) prior to use. Fittings with excessive abrasions, damage or dirt where pipe connections will be made should be discarded.

PART 3 - EXECUTION

3.1 Inspection

A. PVC pipe which has any of the following visual defects will not be accepted:

1. Pipe which is sufficiently out-of-round to prohibit proper joining.
2. Fractured, cracked, chipped, dented, abrasions, or otherwise damaged pipe.
3. Pipe that has been damaged during shipment or handling. Acceptance of the pipe at point of delivery will not relieve the Contractor of full responsibility for any defects in material of the completed pipeline.

3.2 Preparation

A. Trenching, backfilling, and compaction.

1. Trenching shall be performed such that soil cover over the pipe is a minimum of 18 inches.
2. Pipe should be placed on native soil or soil that is well compacted using a tamping rod or a mechanical tamper.
3. Fill should be placed over the pipe ONLY AFTER required testing has been performed. Fill shall be well compacted over the pipe and approximately 2 to 4 inches of soil shall be mounded over the trench to allow for subsequent settling.

B. Cutting the pipe.

1. Cut pipe smooth, straight and at right angles to the pipe axis with saws or pipe cutters designed specifically for the material.
2. Remove burrs and wipe off all dust from the jointing surfaces.
3. Do not disturb previously installed joints during cutting operations.

C. Field Joints.

1. Use push-on joints for buried pipe except where indicated otherwise on the plans.
 - a. Dirt, oil, grit, and other foreign matter shall be removed from the inside of the bell, outside of the spigot, and where other pipe connections are to be made.
 - b. All joints shall be cleaned with a solvent PVC cleaner prior to joining.
 - c. Joints shall be glued using an acceptable PVC glue that will provide a water-tight joint at a pressure of 100 psi.

3.3 Installation

A. All joints shall be watertight and free from leaks.

B. Test all pipe under drives, sidewalks and similar crossings prior to covering pipe.

Pipe that is buried less than 3 feet of cover under such crossings shall be sleeved with PVC or ductile iron pipe that is two (2) times the diameter of the working pipe.

3.4 Field Quality Control

A. Pipe Leakage Tests

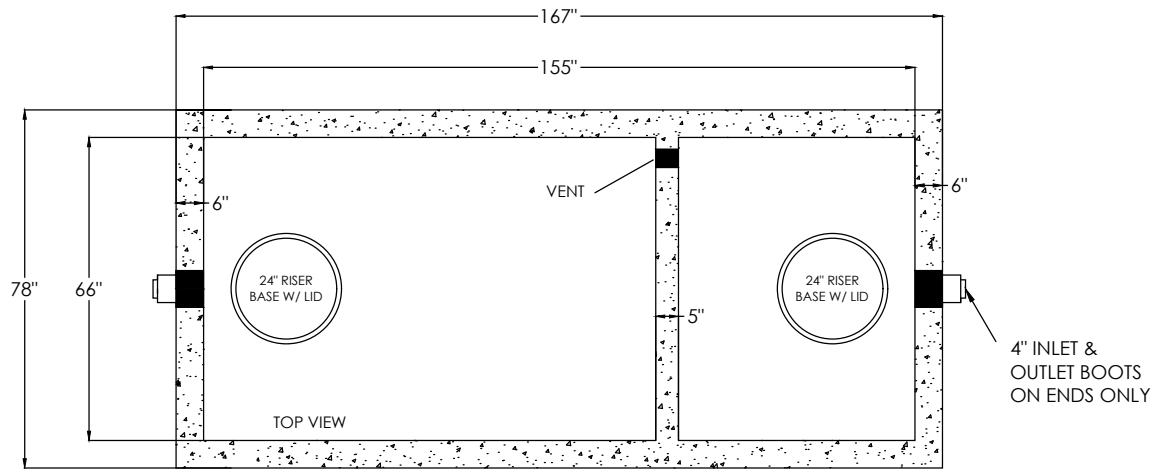
1. When the supply line length exceeds 500', prior to filling in trenches with soil, the pipe shall be tested by pressurizing the pipe through either a water or air test. When conducting a water test, pressurize the pipe to 100 psi or 1.5 times the operating pressure of the pump, whichever is greater AND BELOW the maximum line pressure rating for the pipe used.
2. This pressure shall be held on the pipe for 2 hours. For solvent weld pipe, there should not be any leakage observed during the test.

For purposes of this specification, allowable "make up water" at a rate of 100 gal/day/inch pipe diameter/mile is acceptable. For 1" diameter pipe, "make up water" shall not exceed 0.16 gal/100 feet of pipe length for the 2-hour test (100 gal/day/inch pipe/mile). For 1.25" diameter pipe, "make up water" shall not exceed 0.20 gal/100 feet of pipe length for the 2-hour test (100 gal/day/inch pipe/mile).

3. If the measured "make up water" exceeds the above rates, then the pipe shall be re-inspected and any leaking joints shall be replaced. Once this is complete the pipe shall be re-tested.
4. When conducting an air test, pressurize the pipe to 10 psi. This pressure shall be held on the pipe for 10 minutes. **Ensure that no objects come into contact with the pipe while under pressure. Pressure shall be released from the pipe prior to backfill.**

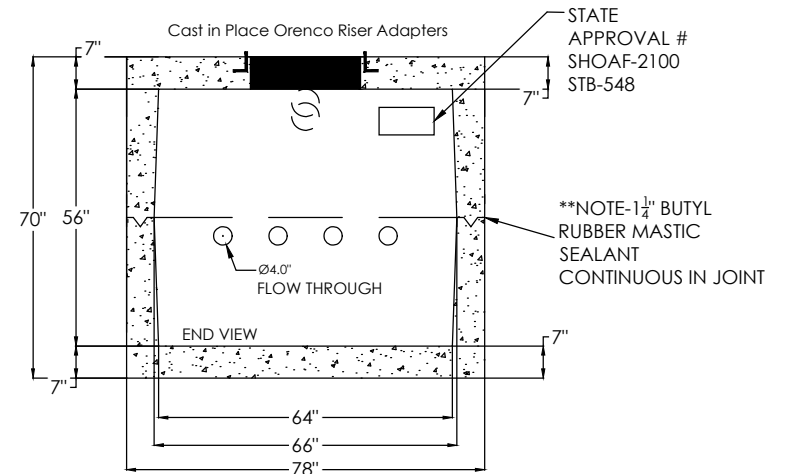
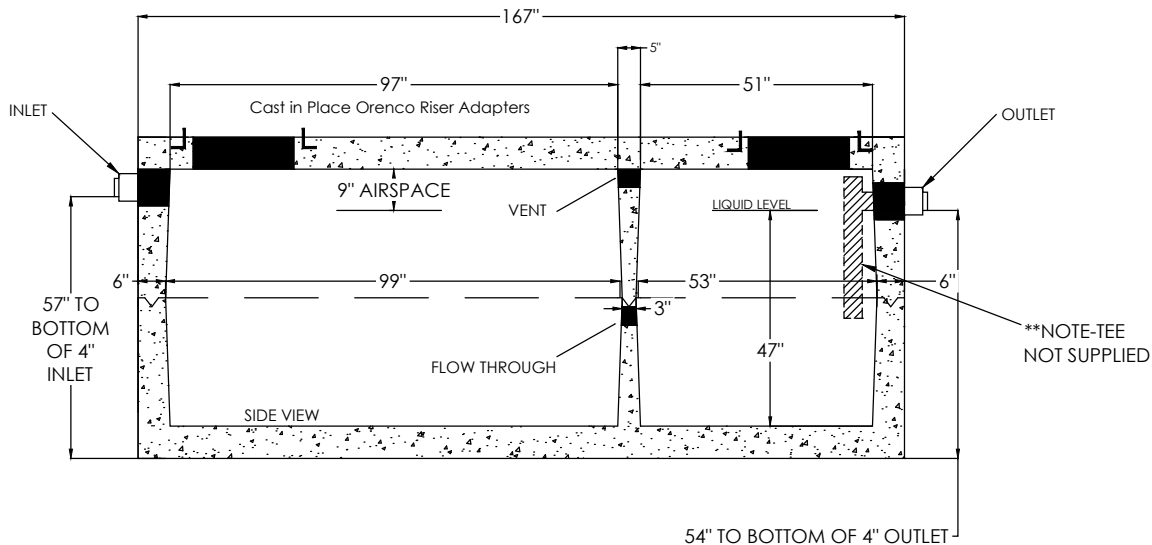
5. Design Basis - Component Selection

Tank Sheets
Access Riser Adapters, Tank Risers, Riser Lids
External Splice Box
Safety Nets
Effluent Filter
AX20 Treatment
Recirculating Splitter Valve
UV Disinfection
System Pumps
Pump Vault Unit
Flow Inducer Tower
Control Panel
Float Switch Assemblies
Dripline
Spin Filter
Solenoid Valve
Flow Meter



**NOTE-TOP VIEW MEASUREMENTS ARE TO WIDEST DIMENSIONS

Septic Tank

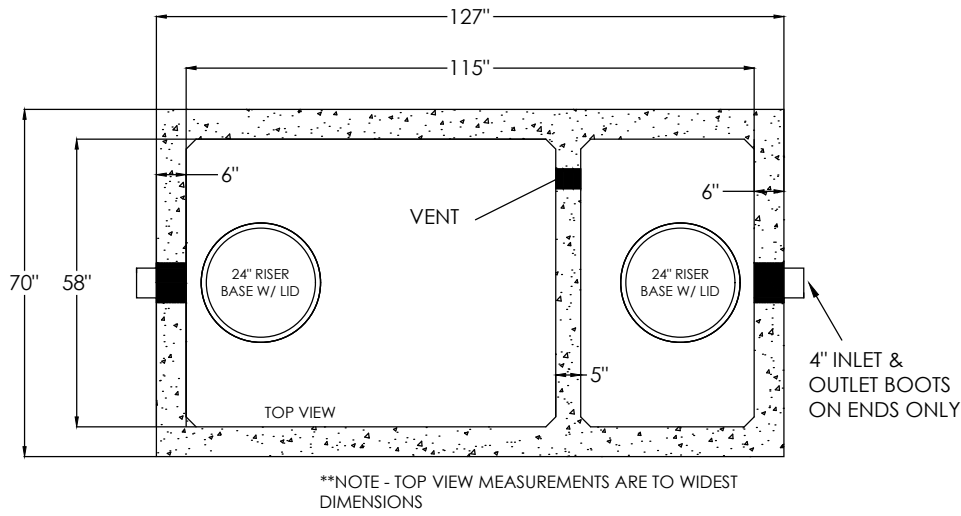


SHOAF PRECAST SEPTIC INC.
4130 WEST US HWY 64
LEXINGTON, NC 27295
PHONE (336) 787-5826
FAX (336) 787-2826

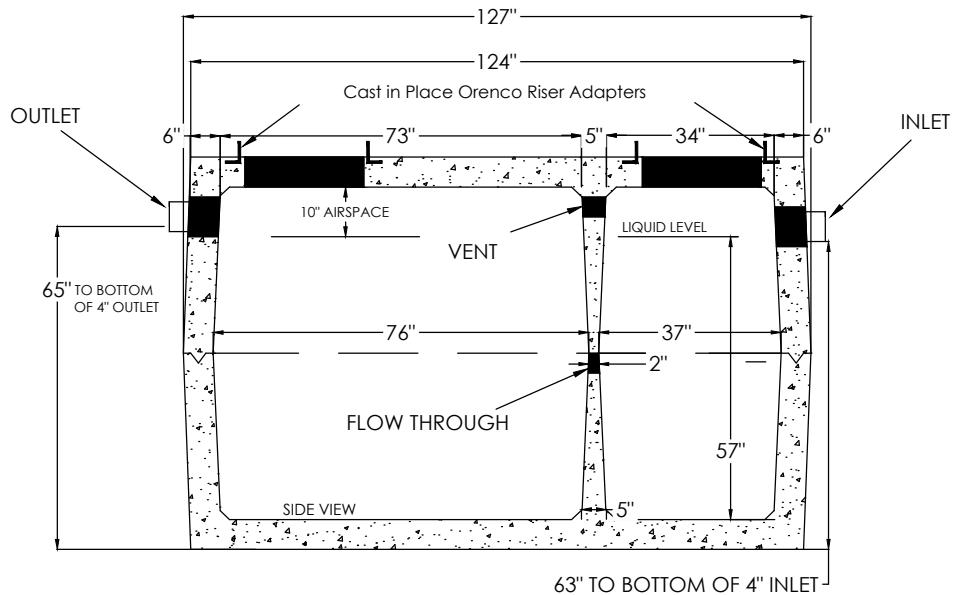
MODEL: MS 2100 H2O STB H2O TRAFFIC RATED 2100 Gallon Septic Tank

WWW.SHOAFPRECAST.COM
SHOAF-2100 H2O TRAFFIC RATED
STB-548 H2O TRAFFIC RATED
LIQUID CAPACITY-2100 US GALLONS/AIRSPACE-9"
TANK HEIGHT-70"
BOTTOM OF TANK TO CENTER OF INLET-59"
BOTTOM OF TANK TO CENTER OF OUTLET-56"
LENGTH TO WIDTH RATIO-2 TO 1
SIZE OF INLET & OUTLET-4" OR 6" PIPE
TYPE OF INLET & OUTLET-POLYLOCK OR EQUAL (MEETS ASTM C-923)
CONCRETE PSI-5000; TANK WEIGHT- 32,000 LBS.
ACCESS- RING AND COVER W/ RISERS (NOT INCLUDED)
REINFORCING PER ENGINEERING DRAWING

SCALE - N.T.S.



Recirculation Tank



SHOAF PRECAST SEPTIC TANK INC.

4130 WEST US HWY 64

LEXINGTON, NC 27295

PHONE (336) 787-5826

FAX (336) 787-2826

WWW.SHOAFPRECAST.COM

SHOAF-1800 H2O TRAFFIC RATED

PT-2025 H2O TRAFFIC RATED

LIQUID CAPACITY-1795 US GALLONS/AIRSPACE-10"

GALLONS PER INCH-26.79 (AVERAGE)

TANK HEIGHT-79"

BOTTOM OF TANK TO CENTER OF INLET-65"

BOTTOM OF TANK TO CENTER OF OUTLET-67"

LENGTH TO WIDTH RATIO-2 TO 1

SIZE OF INLET & OUTLET-4" OR 6" PIPE

TYPE ON INLET & OUTLET-POLYLOCK OR EQUAL (MEETS ASTM C-923)

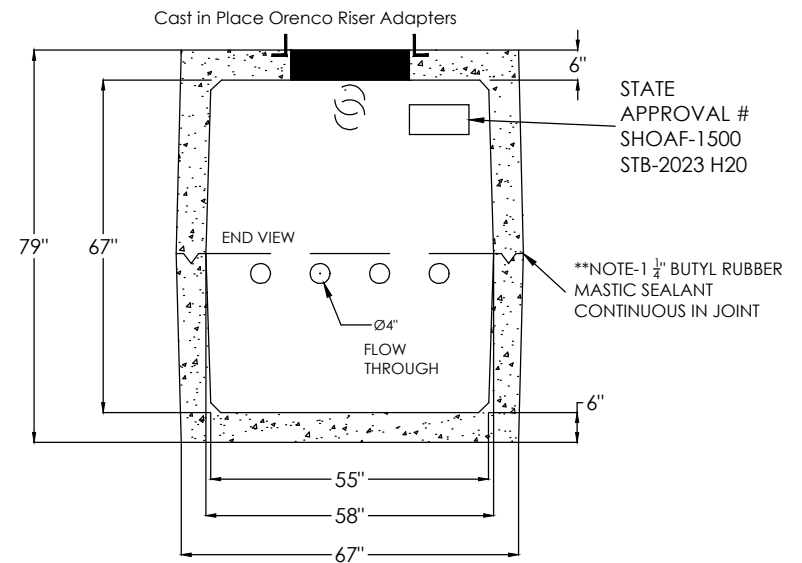
CONCRETE PSI-5000; TANK WEIGHT- 22,400 LBS.

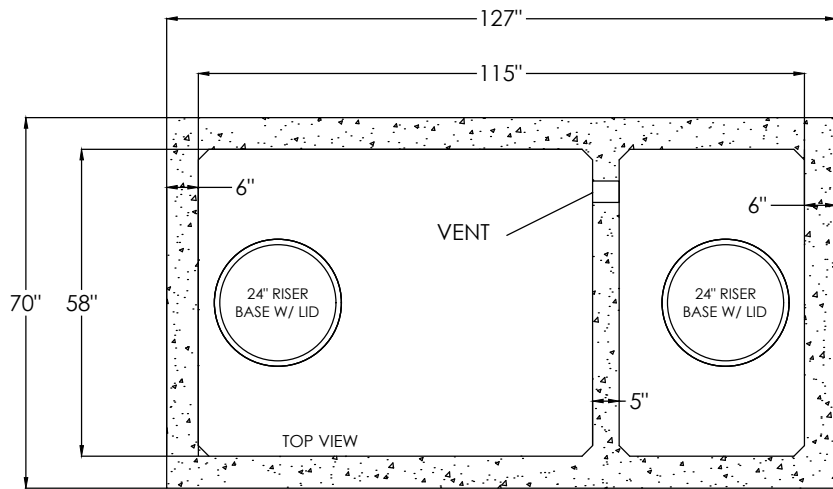
ACCESS-RING & COVER W/ RISERS (NOT INCLUDED)

REINFORCING PER ENGINEERING DRAWINGS

SCALE - N.T.S.

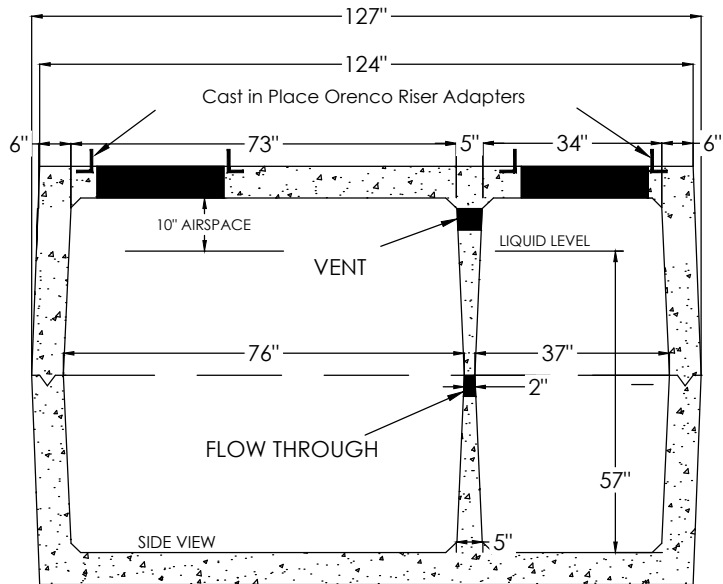
**MODEL: MS 1800 H2O PT
H2O TRAFFIC RATED
1800 Gallon Pump Tank**





**NOTE - TOP VIEW MEASUREMENTS ARE TO WIDEST DIMENSIONS

Pump (Field Dosing) Tank



SHOAF PRECAST SEPTIC TANK INC.

4130 WEST US HWY 64

LEXINGTON, NC 27295

PHONE (336) 787-5826

FAX (336) 787-2826

WWW.SHOAFPRECAST.COM

SHOAF-1800 H2O TRAFFIC RATED

PT-2025 H2O TRAFFIC RATED

LIQUID CAPACITY-1795 US GALLONS/AIRSPACE-10"

GALLONS PER INCH-26.79 (AVERAGE)

TANK HEIGHT-79"

BOTTOM OF TANK TO CENTER OF INLET-65"

BOTTOM OF TANK TO CENTER OF OUTLET-67"

LENGTH TO WIDTH RATIO-2 TO 1

SIZE OF INLET & OUTLET-4" OR 6" PIPE

TYPE ON INLET & OUTLET-POLYLOCK OR EQUAL (MEETS ASTM C-923)

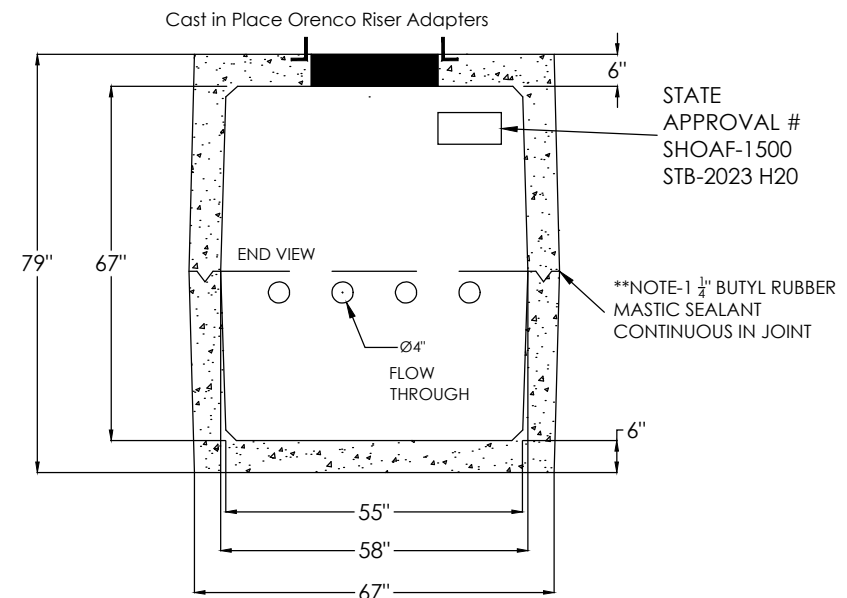
CONCRETE PSI-5000; TANK WEIGHT- 22,400 LBS.

ACCESS-RING & COVER W/ RISERS (NOT INCLUDED)

REINFORCING PER ENGINEERING DRAWINGS

SCALE - N.T.S.

MODEL: MS 1800 H2O PT H2O TRAFFIC RATED 1800 Gallon Pump Tank



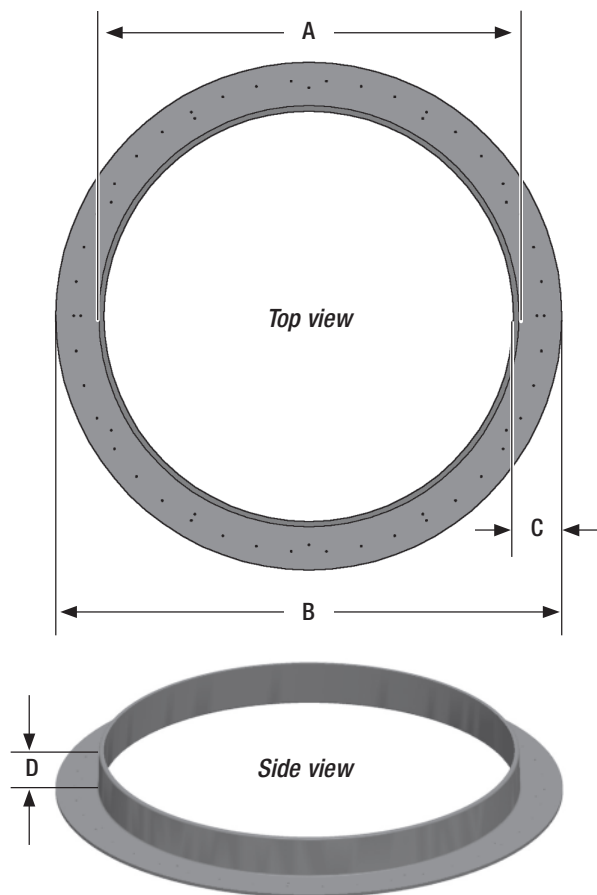
STATE
APPROVAL #
SHOAF-1500
STB-2023 H2O

**NOTE-1 1/4" BUTYL RUBBER
MASTIC SEALANT
CONTINUOUS IN JOINT

PRTA ABS Tank Adapters

Applications

PRTA tank adapters are used to provide a structural, watertight method of installing a 24- or 30-inch (600- or 750-mm) access riser over a tank opening.



General

Orenco's PRTA tank adapters are molded plastic products and therefore have excellent part-quality and consistency. PRTA tank adapters can be cast into a tank or fastened to the top of the tank with a bolt-down kit. The bolt-down kit consists of either six or twelve (depending on model) stainless steel concrete anchors and a roll of butyl tape.

The O.D. of the vertical flange matches the I.D. of Orenco's ribbed risers, which provides a suitable joint to seal with MA320, ADH100, SS115, or SS140 adhesive.

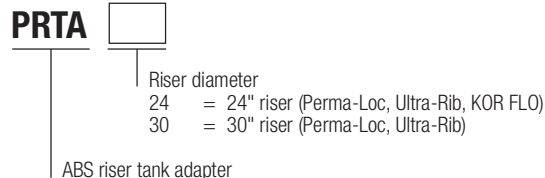
Standard Models

PRTA24, PRTA30

PRTA24BDKIT (6 anchors), PRTA30BDKIT (12 anchors)

Cast in Place Tank Adapters
One or each end of each tank.
6 x PRTA24

Product Code Diagram



Materials of Construction

Tank adapter	ABS
Concrete anchors	Stainless steel anchor bolts
Sealant	Butyl tape

Specifications

Dimensions*	PRTA24	PRTA30
A - Outside dia., in. (mm)	23.38 (594)	29.25 (743)
B - Flange dia., in. (mm)	26.75 (679)	34.25 (870)
C - Horizontal flange width, in. (mm)	2.00 (51)	2.50 (64)
D - Vertical flange height, in. (mm)	3.50 (89)	3.25 (83)

*The tank adapter has a nominal 0.25 inch (6 mm) thickness.

Access Risers – Ultra-Rib™

Applications

Orenco's Access Risers provide access to septic tank openings and can be cast into the tops of concrete tanks, bonded in place, or bolted down using a riser tank adaptor. They can also be used as valve enclosures.



General

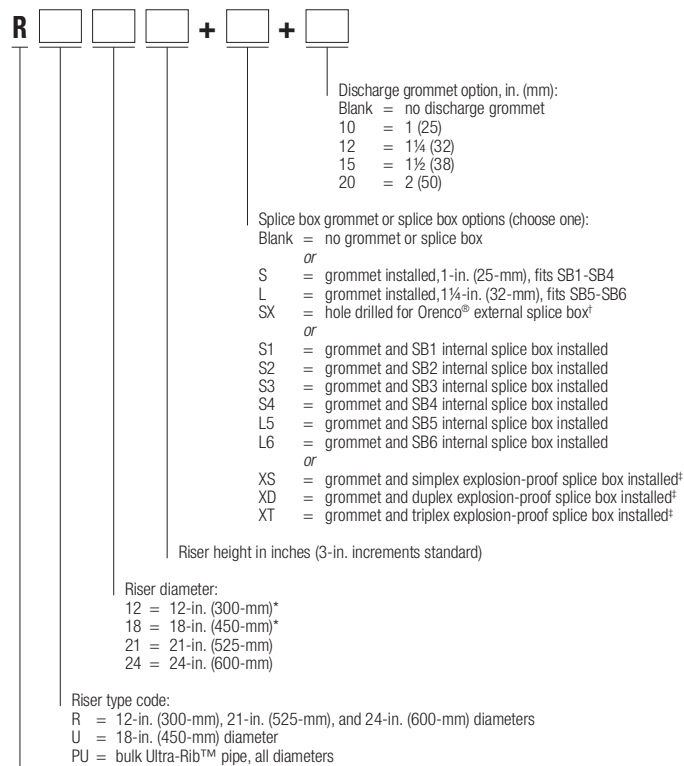
Orenco Ultra-Rib™ Access Risers are constructed of ribbed PVC pipe and are available in 12-, 18-, 21-, and 24-in. diameters. They can be ordered in 3-in. (76.2-mm) increments in lengths up to 13 ft (3.96 m) for 12- and 18-in. diameter risers, and up to 14 ft (4.27 m) for 21- and 24-in. diameter risers. Orenco Ultra-Rib riser pipe is also available in truckload quantities. A complete line of Orenco pipe-cutting tools makes it easy to fabricate risers in your shop or in the field

Risers: 8 x RR24 XX
Adjust riser height to allow for minimum 6" above ground.

Standard Models

RR12XX, RU18XX, RR21XX, RR24XX

Product Code Diagram



Materials of Construction

Ultra-Rib™ PVC Pipe: PVC

Specifications

Model	RR12XX	RU18XX	RR21XX	RR24XX
I.D., in. (mm)	11.74 (298)	17.65 (448)	20.50 (521)	23.50 (597)
Wall Thickness - excluding ribs, in. (mm)	0.10 (3)	0.19 (5)	0.25 (6)	0.25 (6)
O.D. - including ribs, in. (mm)	13.13 (334)	19.44 (494)	22.63 (575)	25.63 (651)
Weight, lbs per ft (kg per m)	5 (7.4)	11 (16.4)	15 (22.3)	19 (28.3)

PVC Riser Installation

Installing PVC Access Risers onto Cast-In Orenco® Riser-Tank Adapters

Access risers provide access to septic tank openings, simplifying inspection and maintenance procedures. Access riser-to-tank connections must be watertight for the proper functioning of an onsite septic system or effluent sewer system. Orenco strongly recommends watertightness testing of all access riser-to-tank connections after installation.

Following are instruction sets for prepping and installing access risers, installing grommets, and selecting adhesives for riser installations. Refer to the chart below to determine which instruction set to use.

Instruction Set	Page
1. Riser Preparation	1
2. Grommet Installation	2
3. Riser Installation — PRTA24-2 Adapters	3
4. Riser Installation — RRFTA24, RRFTA30, PRTA24, PRTA30, FRTA24-RVF, and FRTA30-FRP Adapters	4
5. Riser Installation — Orenco FRP Tanks with 24-inch-Diameter (600-mm) Risers	5
6. Riser Watertightness Testing	6
7. Adhesive Selection and Quantities	7

Instruction Set 1: Riser Preparation

Step 1: Determine Riser Height

Determine how high the riser needs to be.

- The top of the riser should be about 3 inches (75 mm) above finished grade after installation and backfilling — This allows 2 inches (50 mm) for tank settling and 1 inch (25 mm) for ensuring drainage away from the riser.

Step 2: Cut Riser to Size (if Necessary)

If the riser needs to be cut to size, cut it with a circular saw or table saw.

- Always cut excess length from the bottom of the riser.
- For square, even cuts, a good fit, and a watertight joint between the riser and the adapter, use an Orenco riser-cutting saw guide.
- To install risers less than 30 inches (760 mm) wide onto 500-gallon (2000-L) Orenco FRP tanks, cut the riser so it fits into the tank and the lowest rib rests on the tank's top, as shown.

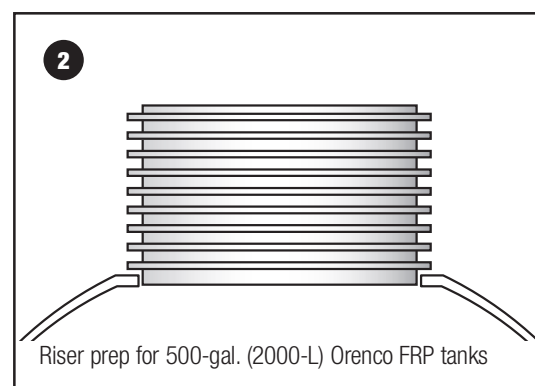
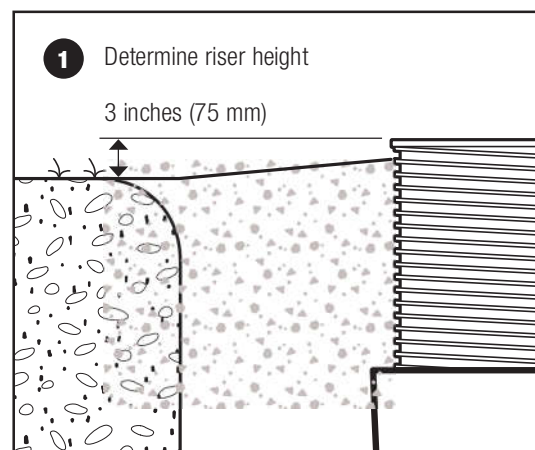
Step 3: Dry Fit Riser to Adapter

Step 3a: Dry fit the riser to the adapter.

- Make sure riser penetrations are the right sizes and in the correct locations.

Step 3b: If the riser is higher than 3 inches (75 mm) above the estimated final grade, cut it to size per the instructions in Step 2.

Step 3c: If the riser is too short, use an Orenco grade ring to extend it.



Instruction Set 2: Grommet Installation

Step 1: Mark Access Riser

Step 1a: Use the site plans or drawings to find out if riser penetrations are needed.

Step 1b: Use the plans or drawing to mark the locations of the penetrations.

- If plans or drawings aren't available, use Drawing 1b as a general guide for locating riser penetrations.

Step 2: Drill Holes and Clean Access Riser

Step 2a: Drill holes for riser penetrations.

- If you have questions about where to locate various riser penetrations, contact your Distributor for more information.

Using Orenco® RKHS Hole Saws ...

Cut the hole and grind the ribs down to make a flat, smooth surface for installing the grommet.

- Make sure your hole saw is the correct size and your drill is at least 18 volts.
- Don't grind too deeply — about 1/16 inch (1.6 mm) is deep enough.

Using Standard Hole Saws ...

- 1: Use the correctly sized hole saw to cut a hole, centered on the mark.
 - 2: Trim the riser ribs back 1 inch (25 mm) from around the hole.
- Use a grinder or cutting tool to notch the ribs through to the riser wall.
 - Use a hammer and chisel to break off the notched rib sections.
 - Use a grinder to make a flat, smooth surface around the hole.

Step 2b: Clean and deburr the hole and flat surface with a wire brush and deburring knife or tool.

- Be careful not to enlarge the penetration.

Step 3: Install Grommet

Step 3a: Apply a bead of adhesive to the groove in the grommet's outer diameter.

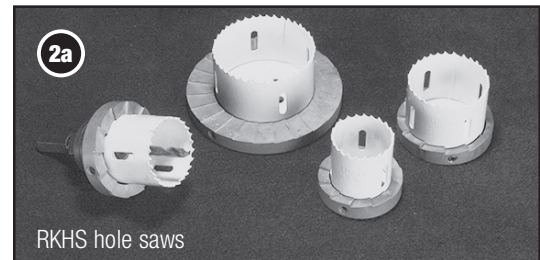
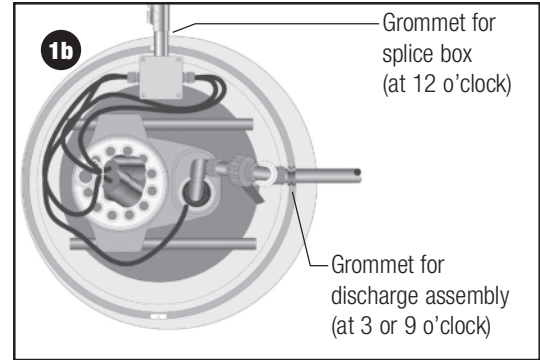
- For adhesive recommendations, see Instruction Set 7.

Step 3b: Firmly press the grommet into the penetration.

Grommet Hole Sizing Guide

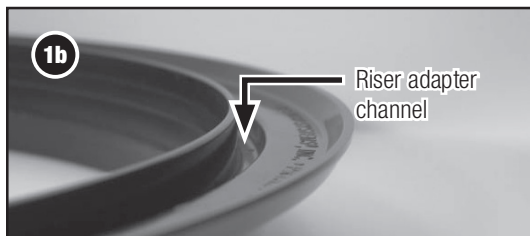
Grommet size, inches (nominal IPS pipe size)	Hole saw size
1/2	1
3/4	1-1/4
1	1-9/16
1-1/4	1-3/4
1-1/2	2-1/8
2	2-3/4
3	3-7/8
4	5

For more information on grommet dimensions and actual pipe O.D., see the Orenco Technical Data Sheet for grommets, NTD-RLA-PG-1





Cutaway view of Orenco® PRTA24-2, cast into concrete tank with 24-inch (600-mm) access riser attached



Instruction Set 3: Riser Installation — PRTA24-2 Adapters

Step 1: Prep Adapter Channel and Riser

Step 1a: Roughen the adapter channel and the bottom surfaces of the riser with sandpaper.

Step 1b: Use a clean cloth and acetone or alcohol to clean the channel and the bottom surfaces of the riser.

- The channel must be clean and dry for a good fit and watertight joint.
- Let the acetone or alcohol dry completely.

Step 2: Apply Adhesive

Fill the channel with methacrylate adhesive.

- For adhesive recommendations, see Instruction Set 7.

Note: If you're using a methacrylate adhesive that's non-self-leveling, use enough to fully fill the channel, with no voids in the adhesive.

Step 3: Install Riser

Step 3a: If the riser has penetrations, align the riser correctly.

Step 3b: Firmly press the bottom of the riser into the channel.

- Twist the riser back and forth slightly to fully seat it and to create a good bond.
- If the inside seam is not completely filled, add adhesive to form a complete fillet.

Step 3c: Use a tongue depressor, putty knife, or clean cloth to make a good fillet over the inside seam.

Note: If cold weather conditions or frost heave are a concern at the site, contact a qualified engineer or Orenco for additional recommendations on installing ribbed PVC risers.

IMPORTANT: Orenco strongly recommends that all tank risers 12-in. (300-mm) and larger in diameter be equipped with riser safety grates to help prevent accidental or unauthorized entry.

Step 4: Test Riser Watertightness

Follow Instruction Set 6 of this document for testing the riser's watertightness.

Note: Watertight connections are critical for the wastewater system to function effectively and efficiently.

Instruction Set 4: Riser Installation — RRFTA24, RRFTA30, PRTA24, PRTA30, FRTA24-RVF, and FRTA30-FRP Adapters

Step 1: Prep Adapter and Riser

Step 1a: Roughen the bonding surfaces of the adapter and riser with sandpaper.

Step 1b: Use a clean cloth and acetone or alcohol to clean the bonding surfaces of the adapter and the riser.

- The bonding surfaces must be clean and dry for a good fit and watertight joint.
- Let the acetone or alcohol dry completely.

Step 2: Apply Methacrylate Adhesive

Apply a bead of methacrylate adhesive to the outside of the adapter.

- For adhesive recommendations, see Instruction Set 7.

Step 3: Install Riser

Step 3a: If the riser has penetrations, align the riser correctly.

Step 3b: Firmly press the riser onto the adapter until the bottom of the riser is resting on the concrete (cast-in adapters) or the adapter flange (bolted-down adapters).

- Twist the riser back and forth slightly to fully seat it and to create a good bond.

Step 3c: Apply a bead of methacrylate adhesive to the inside of the access riser-adapter joint.

Step 3d: Use a putty knife, tongue depressor, or clean shop rag to make a continuous fillet on the inside of the access riser-adapter joint.

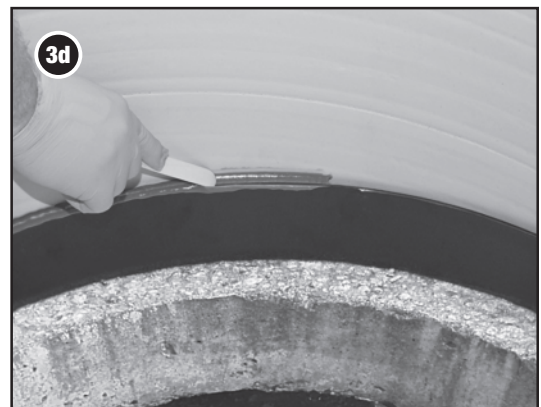
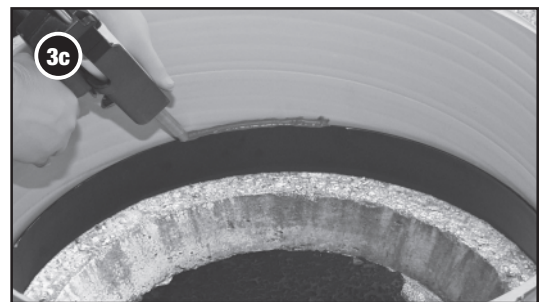
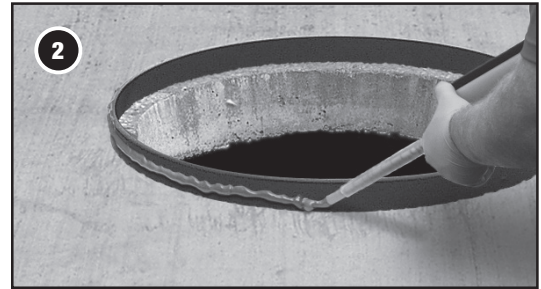
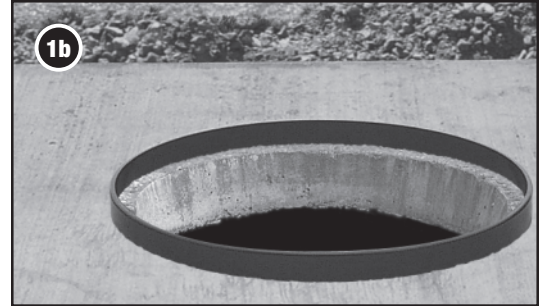
Note: If cold weather conditions or frost heave are a concern at the site, contact a qualified engineer or Orenco for additional recommendations on installing ribbed PVC risers.

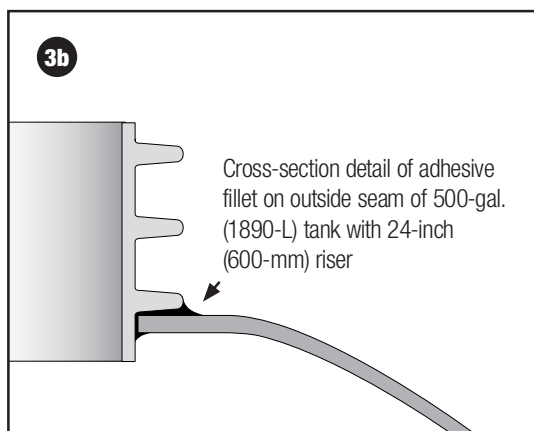
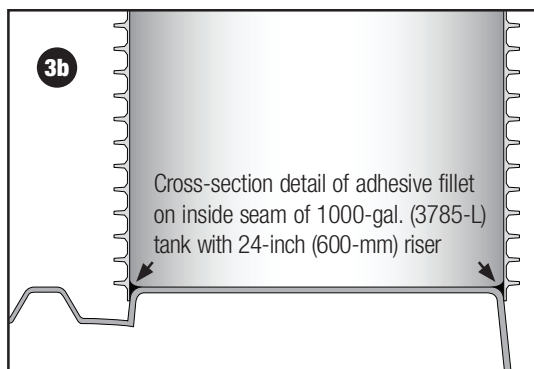
IMPORTANT: Orenco strongly recommends that all tank risers 12-in. (300-mm) and larger in diameter be equipped with riser safety grates to help prevent accidental or unauthorized entry.

Step 4: Test Riser Watertightness

Follow Instruction Set 6 of this document for testing the riser's watertightness.

Note: Watertight connections are critical for the wastewater system to function effectively and efficiently.





Instruction Set 5: Riser Installation — Orenco FRP Tanks with 24-inch- Diameter (600-mm) Risers

Step 1: Prep Tank and Riser

Step 1a: Roughen the bonding surfaces of the tank and the riser with sandpaper.

Step 1b: Use a clean cloth and acetone or alcohol to clean the roughened tank surface and the bottom surfaces of the riser.

- The surfaces must be clean and dry for a good fit and watertight joint.
- Let the acetone or alcohol dry completely.

Step 2: Apply Methacrylate Adhesive

Apply methacrylate adhesive to the bonding surfaces of the tank and the riser.

- For adhesive recommendations, see Instruction Set 7.

Step 3: Install Riser

Step 3a: If the riser has penetrations, align the riser correctly.

Step 3b: Press the riser into position

- For 1000-gal. through 2000-gal. tanks (3785-L through 7570-L), firmly press the riser onto the tank opening
- For 500-gal. (1890-L) tanks, firmly press the riser into the tank opening.
- Twist the riser back and forth slightly to fully seat it and create a good bond.
- If the seams aren't completely filled, add adhesive to form a complete fillet.

Step 3c: Use a tongue depressor, putty knife, or clean cloth to make a good fillet over the seams.

Note: If cold weather conditions or frost heave are a concern at the site, contact a qualified engineer or Orenco for additional recommendations on installing ribbed PVC risers.

IMPORTANT: Orenco strongly recommends that all tank risers 12-in. (300-mm) and larger in diameter be equipped with riser safety grates to help prevent accidental or unauthorized entry.

Step 4: Test Riser Watertightness

Follow Instruction Set 6 of this document for testing the riser's watertightness.

Note: Watertight connections are critical for the wastewater system to function effectively and efficiently.

Instruction Set 6: Riser Watertightness Testing

IMPORTANT: A watertight tank and watertight riser-to-tank connections are critical for the wastewater system to function effectively and efficiently.

Step 1: Prep for Test

Step 1a: Make sure the adhesive seams have set and the tank has been backfilled according to the manufacturer's instructions – typically to the tank's midpoint.

Step 1b: Plug the inlet (and outlet, if present) of the tank with watertight plugs.

Step 1c: Fill the tank with water to a level 2 inches (51 mm) into the riser.

Step 2: Test Watertightness

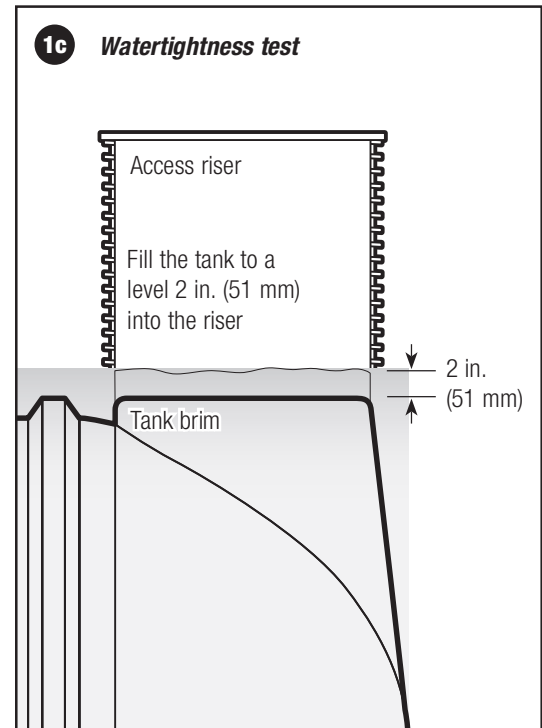
Step 2a: Wait for the required time before inspecting the riser-to-tank connections for leakage.

- Follow the tank manufacturer's recommendations (or applicable local regulations) for wait times before inspecting the tank for leaks.
- Orenco recommends at least 30 minutes for its fiberglass tanks.

Step 2b: Check for any drop in the liquid level inside of the riser and any visible leakage from the riser-to-tank connections.

- At the end of the test, there should be no drop in liquid level and no visible leakage from seams, pinholes, or other imperfections.
- If leaks are found during the test, seal the leaks and repeat the test.

Step 2c: Once the riser-to-tank connections are proven watertight, remove the plug(s) and drop the water level in the tank to just below the invert of the inlet or outlet, whichever is lower.



Instruction Set 7: Adhesive Selection and Quantities

Use the table below to select the correct adhesive and quantity for your grommet or riser installation(s). Be sure to check the expiration date on the adhesive package. If the adhesive is expired, do not use it to install Orenco components.

Note: Before installing a riser on an Orenco riser-tank adapter with an adhesive not recommended in the table below, contact your Distributor or Orenco.

Component		Adhesive Type and Approximate Usage				
		MA8120 300/300-mL cartridge (600-mL total)	SA510 300/300-mL cartridge (600-mL total)	MA320 7-oz (200-mL) packet	IPS 810 1-pint (473-mL) 1-quart (946-mL)	ADH100 10.2-oz (300-mL) tube
Grommets		n/a	n/a	n/a	n/a	various quantities
Riser Tank Adapters	FRTA36	1 cartridge*	1 cartridge*	n/a	n/a	n/a
	PRTA24	½ cartridge*	½ cartridge*	1 packet	n/a	1 tube
	PRTA24-2	≥ ½ cartridge*	≥ ½ cartridge*	n/a	< 1 pint	n/a
	PRTA30	< 1 cartridge*	< 1 cartridge*	2 packets	n/a	2 tubes
	RRFTA24	½ cartridge*	½ cartridge*	1 packet	n/a	1 tube
	RRFTA30	1 cartridge*	1 cartridge*	2 packets	n/a	n/a

* Indicates preferred adhesive for this application

DuraFiber™ Access Lids

Applications

Orenco® DuraFiber™ Access Lids provide a secure, damage-resistant covering for ribbed PVC and HDPE risers, pump basins, and access ports. They are not recommended for vehicular traffic. 24-inch (600-mm) DuraFiber lids require an RLA24 adapter to mate to 24-inch (600-mm) Perma-Loc™ pipe. 30-inch (750-mm) DuraFiber lids are not compatible with 30-inch (750-mm) RLA Riser-Lid-Adapters or 30-inch (750-mm) Perma-Loc pipe. For these products, use Orenco's FLF-Series lids.

General

DuraFiber Access Lids are constructed of resin-infused fiberglass fabrics for extreme durability and damage resistance, with breaking strengths in excess of 20,000 pounds (9,000 kg).

They feature flat-style flanges for easier access, allowing clean, flush-to-grade installations. They have cored centering rings for aligning lids with risers. They also have urethane gaskets to help provide watertight seals.

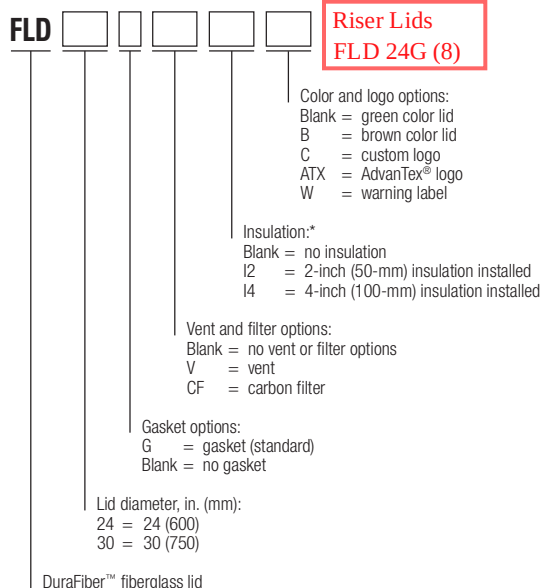
DuraFiber Lids feature a non-skid surface for better grip and aesthetics, a molded-in caution statement, and room for a customer logo. They come with four 5/16-inch stainless steel flathead socket cap screws and a hex key wrench.

DuraFiber Lids are available with optional insulation, installed at the factory or in kits that can be installed in the field.

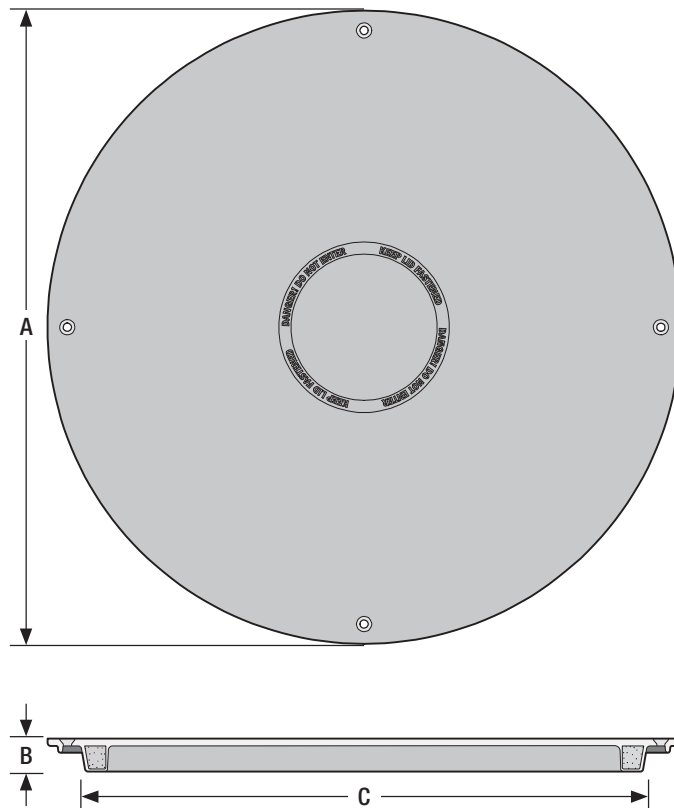
Standard Models

FLD24G, FLD24GATX, FLD24GW, FLD30G, FLD30GATX, FLD30GW

Product Code Diagram



* Insulation has an R-value of 10 per 2-inch (50-mm) increment.



Materials of Construction:

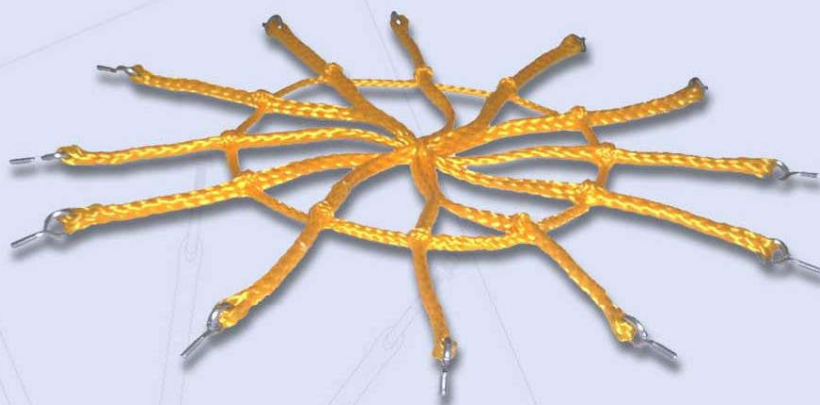
Lid	Fiberglass reinforced polyester
Gasket	Urethane
Centering ring core	Structural foam
Mounting hardware	Stainless steel
Insulation (optional)	Closed-cell foam
Insulation mounting hardware	Stainless steel

Specifications

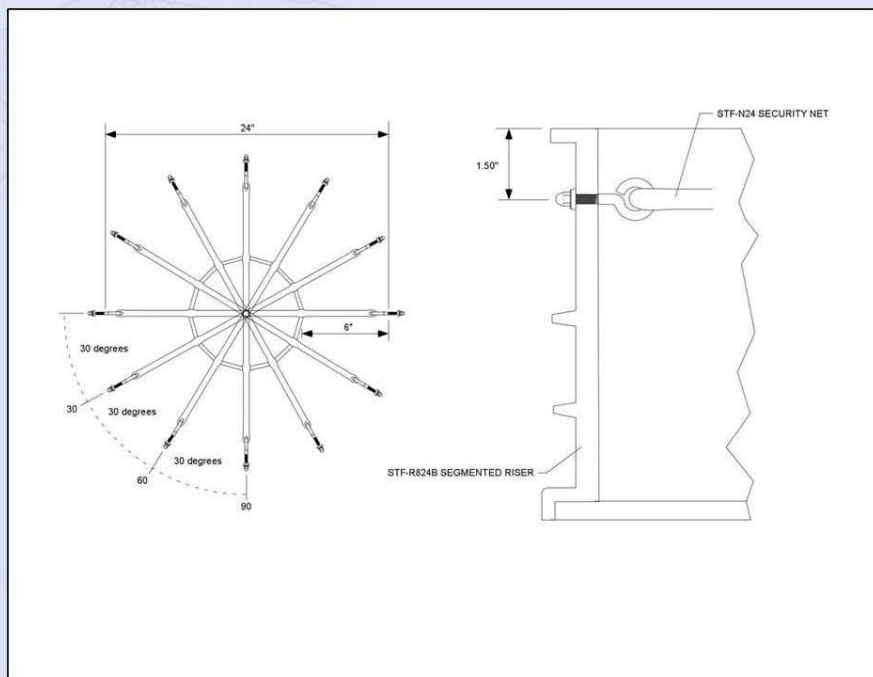
Model	FLD24XX	FLD30XX
A in. (mm)	26 (660)	33 (838)
B, in. (mm)	1½ (38)	1½ (38)
C, in. (mm)	23¼ (590)	29¼ (743)
Gasket width, in. (mm)	¾ (19)	¾ (19)
Bolt hole diameter, in. (mm)	5/16 (8)	5/16 (8)
Weight, lbs (kg)	11 (5)	20 (9)
Bolt holes, per lid	4	4

FEATURES

- ❖ Use as a security measure to keep persons, especially children, from accidental entry while systems are being serviced or any other instance where a cover is removed
- ❖ Available to fit 18", 24", and 30" diameter risers
- ❖ Open areas in web are large enough to allow tanks to be pumped without having to remove the security net
- ❖ Installs easily in our segmented riser and others



Install safety net in all risers not containing an inner lid.



Order part No. STF-N18
STF-N24
STF-N30

CAD detail drawing available in DXF format

RELATED PRODUCTS

STF-CI24 page 5
STF-APC24G page 6
STF-APC24B page 6
STF-R824B page 9
STF-AR24 page 9
STF-APC24GI-075 page 14
STF-APC24BI-075 page 14
STF-APC24GI-100 page 14
STF-APC24BI-100 page 14
STF-APL24G page 14
STF-APL24B page 14

U.S. Patent Pending

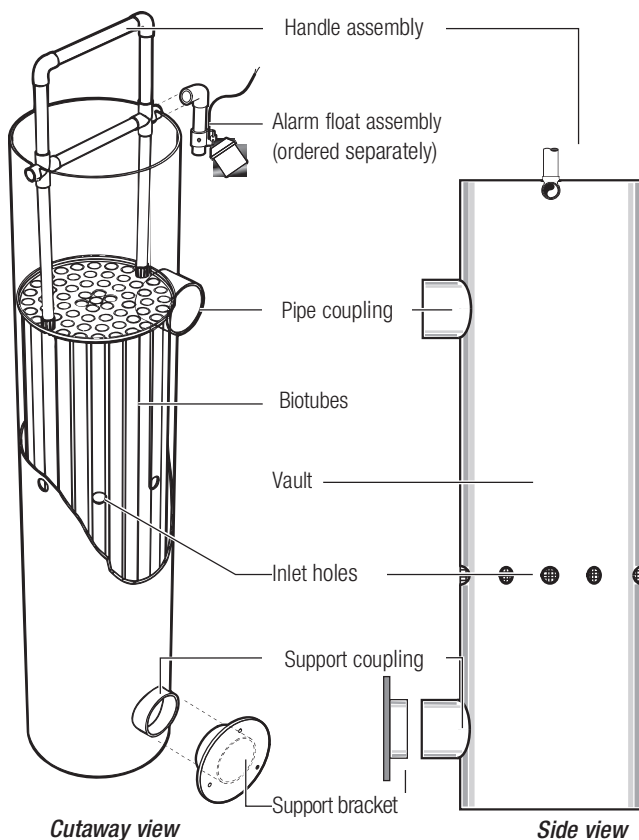
8-in. to 15-in. Dia. Biotube Effluent Filters

Applications

Orenco® 8-inch to 15-inch Biotube® Effluent Filters are designed to remove solids from effluent leaving commercial septic tanks. They can be used in new and existing tanks.

General

Orenco® 8-inch to 15-inch Biotube® Effluent Filters* are used to improve the quality of effluent exiting a commercial septic tank. The Biotube cartridge fits snugly in the vault and is removable for maintenance, the handle assembly snaps into the notches in the top of the vault, and the tee handle can be extended for easy removal of the cartridge. A “base inlet” model (see p. 2) is available for low-profile tanks. An optional slide rail system, available on larger models, simplifies installation and provides tank access for servicing.

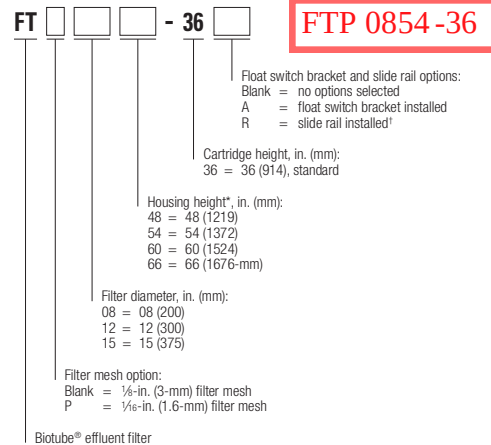


* Orenco® Biotube® Effluent Filters are covered under multiple U.S. and international patents.

Standard Models

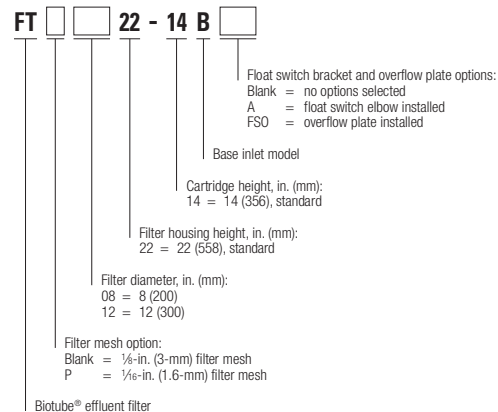
FT0854-36, FT1254-36, FT1554-36, FT0822-14B, FT1254-36AR

Product Code Diagrams



* Minimum liquid level (MLL) information:
48-in. (1219-mm) housing for MLL of 37-46 in. (940-1168 mm)
54-in. (1372-mm) housing for MLL of 47-63 in. (1194-1600 mm)
60-in. (1524-mm) housing for MLL of 64-84 in. (1626-2134 mm)
66-in. (1676-mm) housing for MLL of 85-112 in. (2159-2845 mm)

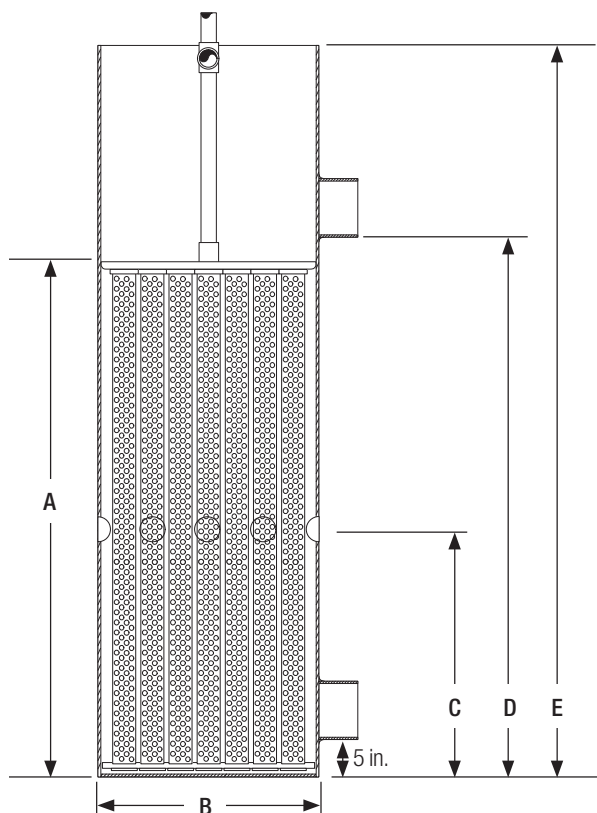
† For 12- and 15-in. (300- and 375-mm) only; use slide rail option when only one access is available for the filter chamber



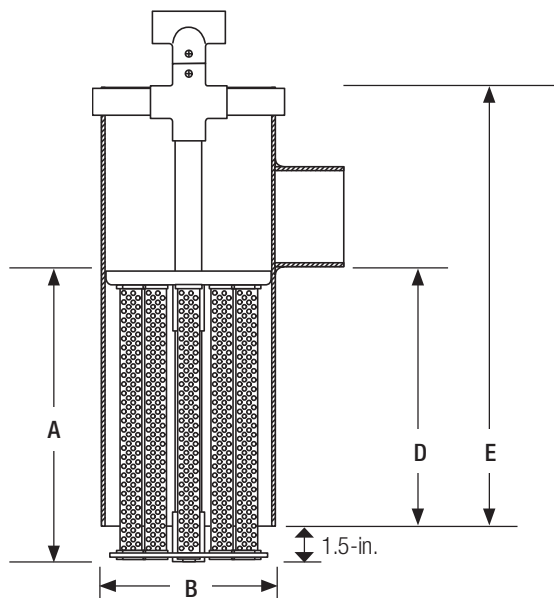
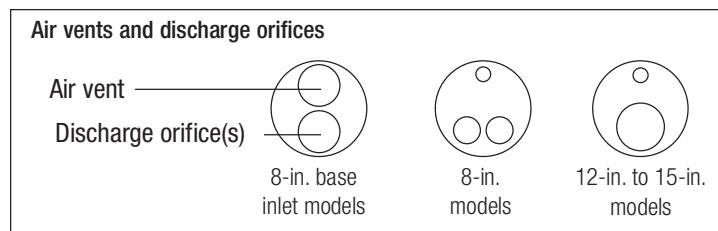
Materials of Construction

Vault	PVC
Pipe coupling	PVC
Handle components	PVC
Support coupling and bracket	PVC
Biotube® cartridge	Polypropylene and polyethylene

Note: Support coupling and support bracket are available on 12-inch and 15-inch filters only.



Standard model



Base inlet model

Specifications

Model	FT0854-36	FT0822-14B	FT1254-36	FT1254-36AR	FT1554-36
A - Cartridge height, in.	36	14	36	36	36
B - Nominal diameter, in.	8	8	12	12	15
C - Inlet hole height*, in.	22	n/a†	22	22	22
D - Vault base to invert height, in.	38	13	38	38	38
E - Vault height	54	22	54	54	54
Number of inlet holes	8	n/a	8	8	8
Inlet hole diameter, in.	1.375	n/a	1.375	1.375	1.375
Number of discharge orifices	2	1	1	1	1
Discharge orifice diameter, in.	1.125	1.750	2	2	2
Pipe coupling diameter, in.	4	4	4	4	4
Number of air vents	1	1	1	1	1
Air vent diameter, in.	0.75	1.750	0.75	0.75	0.75
Filter surface area‡, ft²	14.6	6.0	30.0	30.0	50.5
Flow area**, ft²	4.4	1.8	9.0	9.0	15.2

* Inlet hole height can vary depending on the configuration of the tank. Optimum hole height is 65-75% of the minimum liquid level.

† No inlet holes required, because influent enters between the vault base and the bottom of the filter cartridge.

‡ Filter area is defined as the total surface area of all individual Biotubes® within the filter cartridge.

** Flow area is defined as the total open area (area of the mesh openings) of all the individual Biotubes within the filter cartridge.

Biotube® Effluent Filters

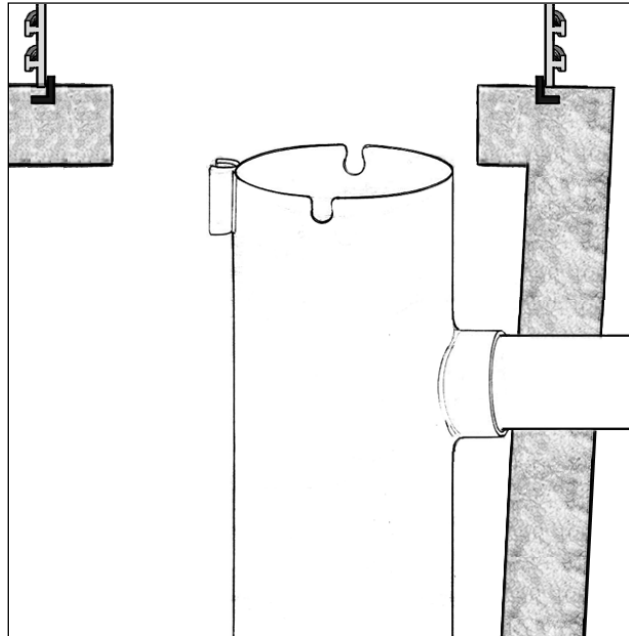
Installation, Operation and Maintenance Instructions FT08 Models and All Base Inlet Models U.S. Patent Nos. 5294635 / 4439323

Installation Instructions:

The Biotube Effluent Filter is suspended in the septic tank by the 4" outlet pipe. The filter is composed of a vault body that will be fixed to the discharge pipe and a removable cartridge that consists of the Biotube filter cartridge and the extendible handle.

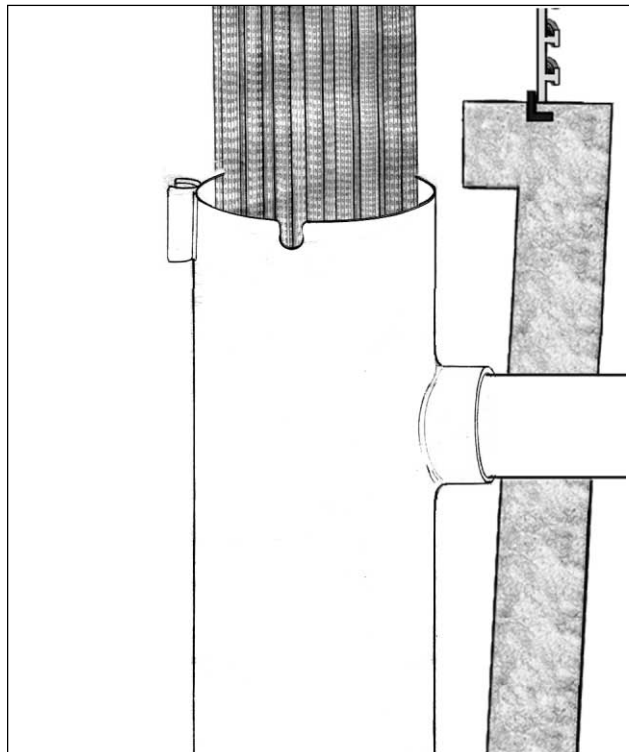
1. Test-fit the effluent filter on the 4" outlet pipe without gluing. Make sure that it fits plumb.

Any existing outlet tee will have to be removed.



2. Ensure sufficient clearance for trouble-free servicing of filter cartridge. Install assembly near the tank wall to reduce any stresses that may be caused by maintenance.

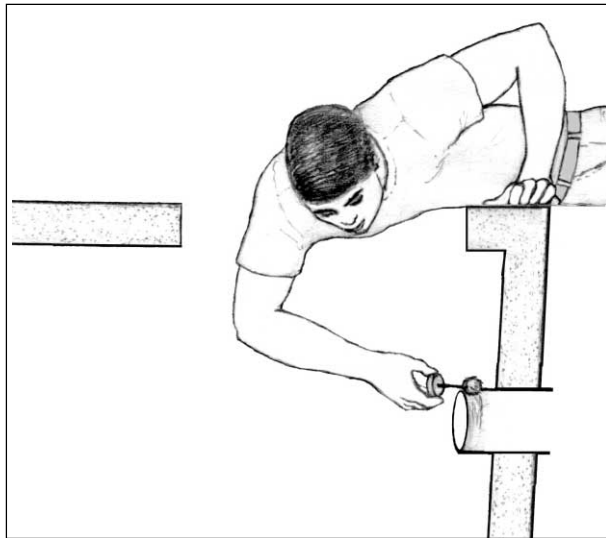
Sufficient room between the access port and filter should be provided for easy removal of solids from the tank. The cartridge will need to be removed and cleaned while the tank's solids content is being pumped-out.



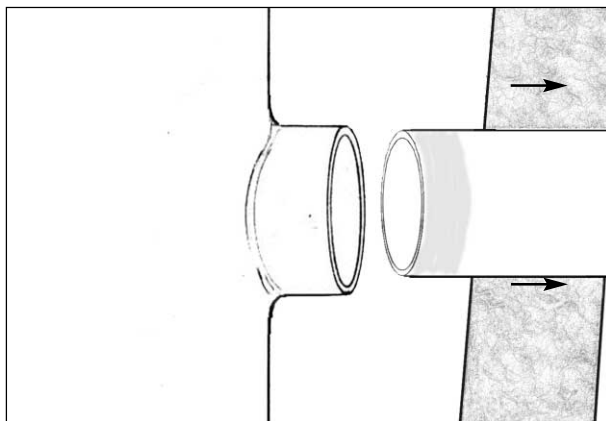
Installation Instructions (continued)

- Once the filter has been fitted properly, apply primer and PVC cement to the outside of the outlet pipe and the filter's 4" outlet. Use a multipurpose cement if the outlet pipe is ABS. Do not use primer on ABS.

Optional: Stainless steel set screws may be used instead of glue.

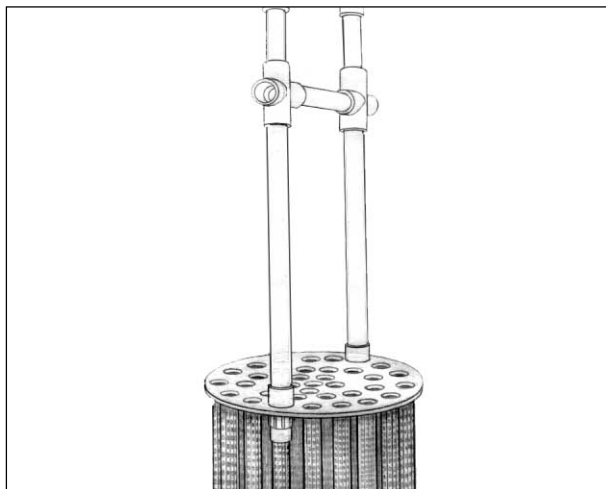


- Slide the effluent filter onto the 4" pipe and plumb vertically.
- Hold the filter in position until the adhesive has time to set (approximately 20 seconds).



- Extend the handle of the cartridge to an elevation above the top of the tank for easy access. Use 3/4" schedule 40 PVC for extension.

Either use the stainless steel set screws or glue the extensions in place.

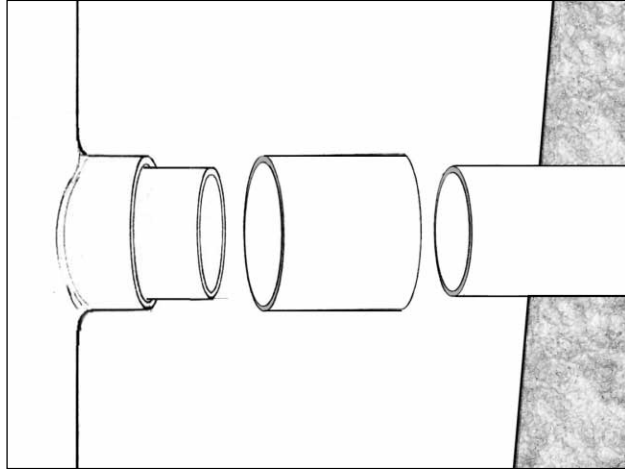


Installation Instructions (continued)

Optional

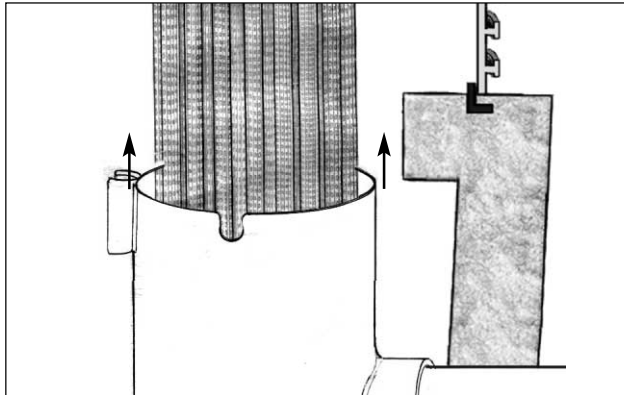
In existing tanks or in tanks with poorly located access ports, it may be necessary to extend the tank outlet fitting by using a coupling.

A coupling may also be needed to bush from 3034 PVC to the schedule 40 outlet of the filter.



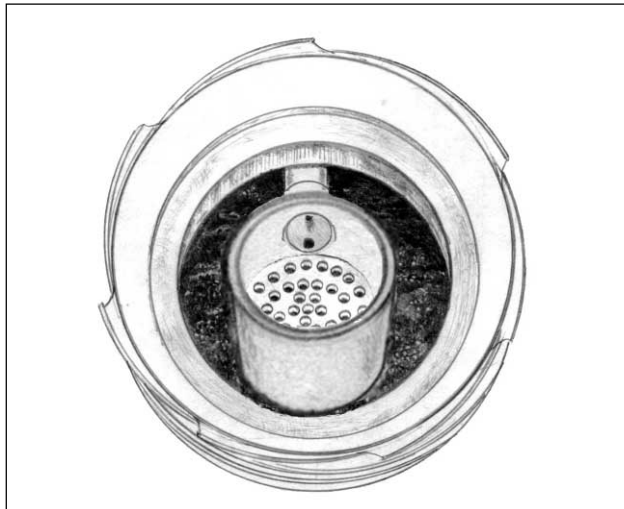
Maintenance Instructions:

1. Remove the filter cartridge by lifting it out of the vault.
2. Spray the cartridge tubes with a hose to remove material sticking to them. Make sure the rinse water runs back into the tank.



3. Inspect the vent hole and modulating orifices. Spray them clear of any debris.

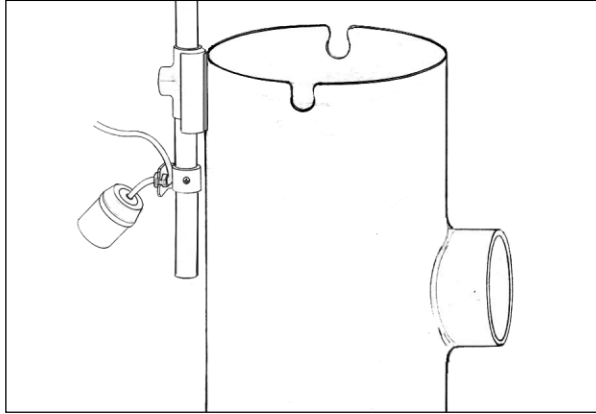
Replace the cartridge. Be sure to snap the cartridge back into the saddle holes at the top of the cartridge vault.



Maintenance Instructions (continued)

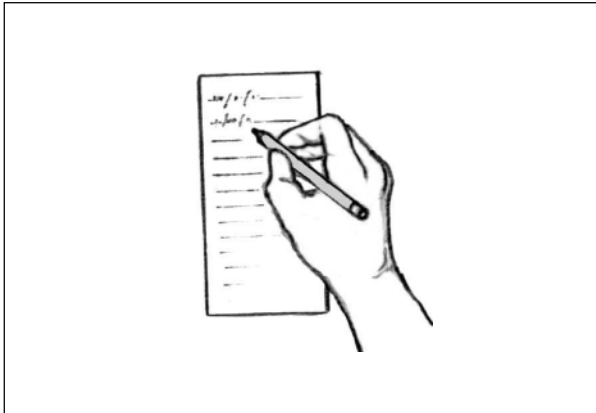
4. An alarm is optional and will give notice that the filter needs attention before the building sewer backs up.

If you have an alarm, check to make sure it is working by lifting the float switch and sounding the alarm.



- Record that you have cleaned the filter and, if applicable, checked the alarm. Also comment any other observations about the tank or system.

Make sure to clean up thoroughly when finished.



Inspection / Maintenance

Date installed:_____ Model Tank:_____ Size:_____

Model: _____ Single/Double Compartment: _____

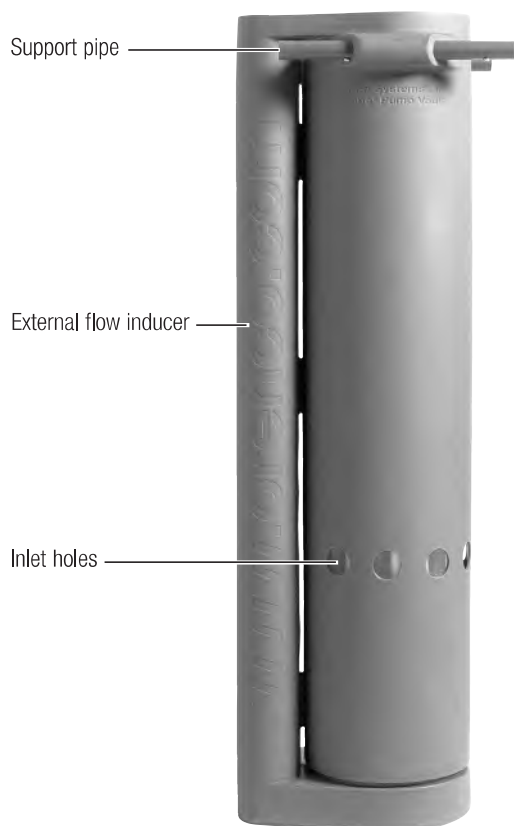
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Universal Biotube® Pump Vaults

For use with Orenco® 4-inch (100-mm) Submersible Effluent Pumps

Applications

Orenco Biotube® Pump Vaults are used to filter effluent that is pumped from septic tanks or separate dosing tanks in STEP systems and onsite wastewater treatment systems. They remove two-thirds of suspended solids, on average. Pump vaults house a Biotube effluent filter and one or two Orenco high-head effluent pumps and can be used in single-compartment septic tanks with flows up to 40 gpm (2.5 L/sec). When flows are greater than 40 gpm (2.5 L/sec), a double-compartment septic tank or separate dosing tank is recommended.



Side view

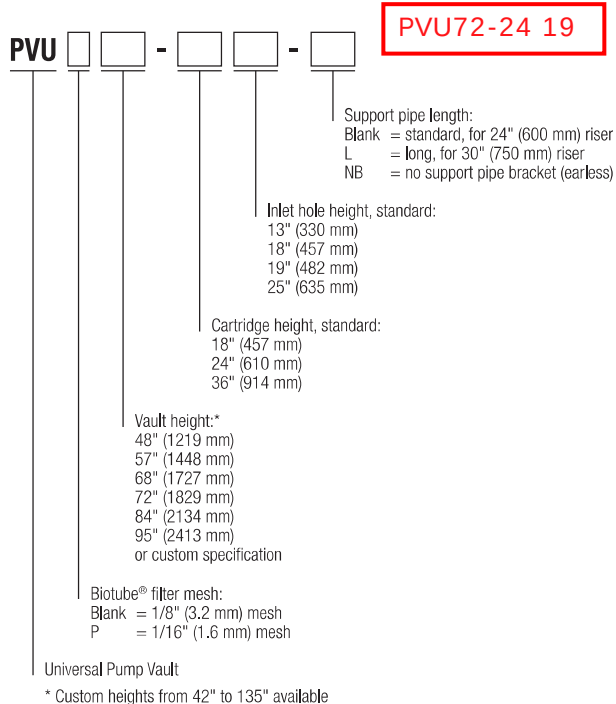
General

The Orenco Biotube Pump Vault includes a molded polyethylene housing with an internal Biotube filter cartridge constructed of polypropylene and PVC. Schedule 80 PVC support pipes are included to suspend the vault in a tank opening. "Earless" 68-inch (1727-mm) vaults, which rest on the bottom of the tank instead of on support pipes, are also available. The filter cartridge can be removed without pulling the pump or the vault. Effluent enters through inlet holes around the perimeter of the Biotube vault and flows through the Biotubes to the external flow inducer. The external flow inducer accommodates one or two pumps. Orenco Biotube Pump Vaults are covered by U.S. patents #4,439,323 and 5,492,635.

Standard Models

PVU48-1818, PVU57-1819, PVU68-2419, PVU84-2419, PVU95-3625

Product Code Diagram

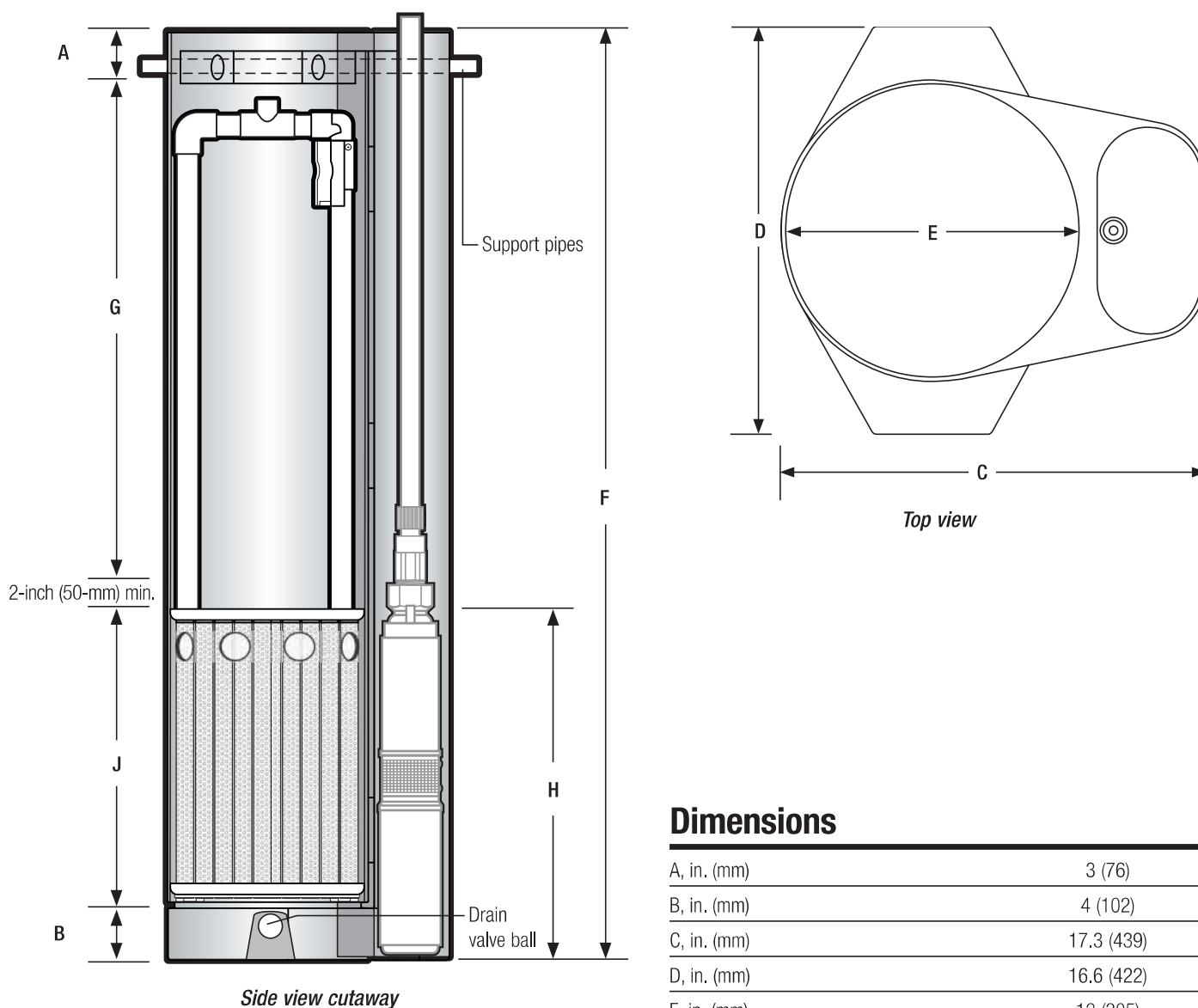


Tank Access and Riser Diameters

Diameter, in. (mm)	PVU with simplex pump	PVU with duplex pumps
Tank access, minimum	19 (483)	19 (483)
Tank access, recommended	20 (508)	20 (508)
Riser, minimum	24 (600)	30 (750)

Materials of Construction

Support pipe	Schedule 80 PVC
Biotube® vault	Polyethylene
Biotube filter cartridge	Polypropylene/PVC
Float stem	Schedule 40 PVC
Drain valve ball	Polypropylene



Dimensions

A, in. (mm)	3 (76)
B, in. (mm)	4 (102)
C, in. (mm)	17.3 (439)
D, in. (mm)	16.6 (422)
E, in. (mm)	12 (305)

Specifications

Model	PVU48-1818	PVU57-1819	PVU68-2419	PVU84-2419	PVU95-3625
F, vault height, in. (mm)	48 (1219)	57 (1448)	68 (1727)	84 (1727)	95 (2413)
G, lowest float setting point, in. (mm)	21 (533)	29 (737)	35 (889)	51 (1295)	50 (1270)
H, inlet hole height, in. (mm)*	18 (457)	19 (483)	19 in. (483)	19 (482)	25 (635)
J, Biotube® cartridge height, in. (mm)	18 (457)	18 (457)	24 (610)	24 (610)	36 (914)
Biotube mesh opening, in. (mm)	0.125 (3)	0.125 (3)	0.125 (3)	0.125 (3)	0.125 (3)
Filter flow area, ft² (m²)	4.4 (0.4)	4.4 (0.4)	5.9 (0.5)	5.9 (0.5)	9.0 (0.84)
Filter surface area, ft² (m²)	14.5 (1.35)	14.5 (1.35)	19.7 (1.83)	19.7 (1.83)	30 (2.79)
Maximum flow rate, gpm (L/sec)	140 (8.8)	140 (8.8)	140 (8.8)	140 (8.8)	140 (8.8)

* May vary depending on the configuration of the tank.

Biotube® Pump Vault Installation

Biotube® PV and PVU Pump Vaults

There are two styles of Biotube® pump vaults, the PV-Style and the PVU-style. PV-style pump vaults come with support pipes. PVU-style pump vaults can be configured in two ways:

Standard — Placed in the tank opening, resting on PVC support pipes.

Earless — Placed in the tank opening, resting on the bottom of the tank.

Step 1: Prep Vault for Installation

Step 1a: Detach and remove the float switch assembly from the float bracket.

Step 1b: Remove any loose items from the vault.

Step 1c: Measure the tank opening diameter.

- PV-style: minimum diameter is 16 in. (406 mm).
- PVU-style: minimum diameter is 19 in. (483 mm).

Step 1d: For a standard PVU-style vault, check the diameter of the access riser.

- If the access riser's diameter is 30 in. (762 mm), measure the support pipes.
- If the support pipes aren't 24 in. long (600-mm), replace them with 1-in. diameter (25-mm) Schedule 80 PVC pipes that are 24-in. long (600-mm) .

Step 1e: Fully seat the Biotube® filter into the pump vault.

Step 2: Lower Vault into Position

Step 2a: Lower the vault into position.

- If the tank is full of liquid, fill the vault with water from a hose to help sink the vault and prevent material from entering it through the inlet holes.

Step 2b: Make sure the vault is fully seated.

- "Standard" vaults sit in the tank opening; support pipes rest on the tank opening.
- "Earless" vaults sit in the tank opening; vault bottom rests on the tank bottom.

Step 2c: Reattach the float assembly after the vault is installed.

- Use NIN-MF-1, *Float Switch Assembly Installation Instructions*.

Step 2d: Position the vault in the riser to avoid interfering with plumbing or wiring.

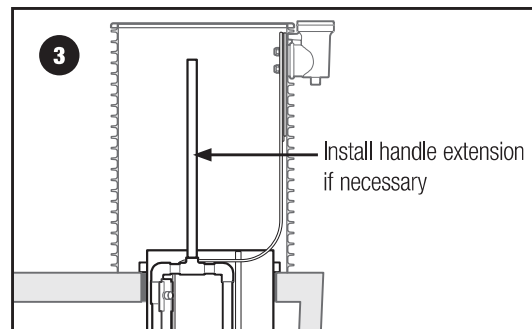
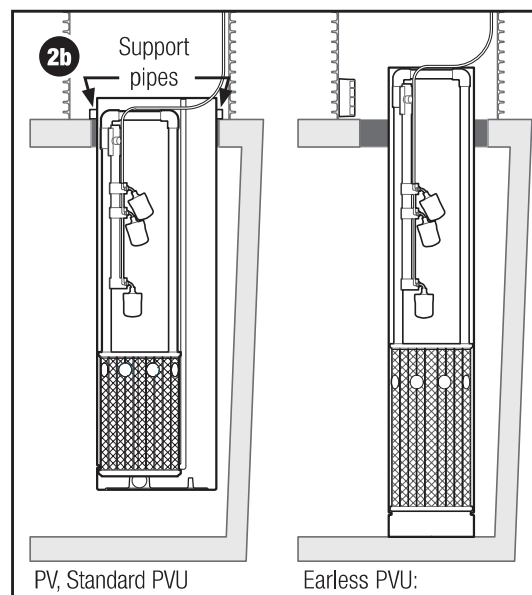
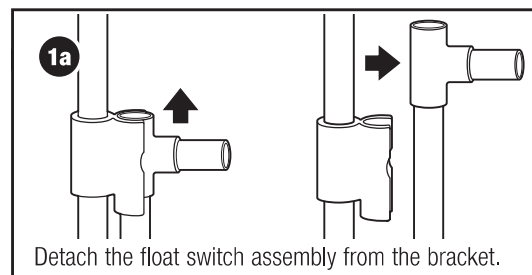
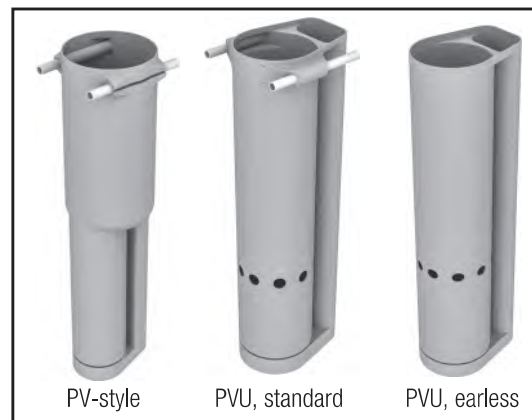
- The penetration for the pump discharge in the access riser wall will determine the overall position of the vault.

Step 3: Install Handle Extension, if Necessary

If necessary, install an extension on the filter cartridge handle to bring it to within 6 inches (150 mm) below the top of the riser.

Step 3a: Measure and cut an appropriate length of 1-inch (25-mm) PVC pipe.

Step 3b: Use PVC cement to glue the extension into the cartridge handle's tee.



AdvanTex® AX20 Textile Filter

Applications

Orenco's AdvanTex AX20 Treatment System is an innovative technology for onsite treatment. The heart of the system is the modular AdvanTex AX20 filter, a sturdy, watertight basin filled with an engineered textile material. This lightweight, highly absorbent textile material treats a tremendous amount of wastewater in a small space.



AdvanTex AX20 Textile Filter

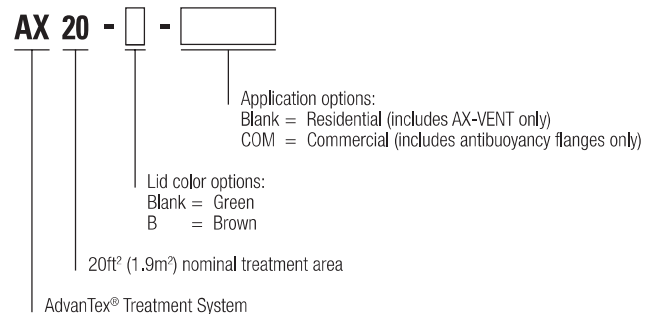
Features/Specifications

To specify this product, require the following:

- Non-skid lid surface
- Easily removable and serviceable fixed-film textile media (a polyester plastic), operated in an unsaturated condition
- Consistent media quality
- Completely serviceable manifold
- Watertight construction and corrosion-proof materials
- Multiple inlet and vent locations available for flexible orientation of the unit
- Foam-core lid with insulation value of R-6 (RSI-1.1)

Product Code Diagram

Two (2) AX-20 Units



Related Information

See [AdvanTex Air Vents Technical Data Sheet](#), NTD-ATX-VENT-1 for information on air vents.

Physical Specifications*

Filter basin length, in (mm)	91 (2311)
Width, in (mm)	40 (1016)
Height, in (mm)	31 (787)
Area (footprint), ft ² (m ²)	20 (1.85)
Filter dry weight, lb (kg)	383 (174)

* Nominal values provided. See AdvanTex Treatment System drawings for exact dimensions.



AdvanTex Treatment Systems are listed to NSF/ANSI Standards 40 and 245 for Class I Systems.

All product and performance assertions are based on proper design, installation, operation, and maintenance according to Orenco's current published documentation.

Installation Manual

AdvanTex® **AX20 Treatment Systems** *Residential Applications*



1-800-348-9843
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www.orenco.com

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How To Use This Manual

This manual contains an Installation Overview and a set of Installation Steps.

- **Installation Overview** — This is a simple overview of the installation steps. It is a reference only; complete instructions are found in the installation steps that follow.
- **Installation Steps** — This provides general instructions for each installation step, along with references to installation documents for specific components. There are also steps in this manual covering operations performed before and after the AX20 unit is installed that are necessary to successfully complete the installation. Many Orenco products come with installation instructions. All of these instructions are also provided in hardcopy form in our Orenco Installer Binder. Contact your Distributor or Orenco for a copy of the binder, or find individual instructions online in the Orenco Document Library at www.orenco.com.

You will find *IMPORTANT* information, *Key Points*, and *Notes* in this manual, marked with easy-to-see visuals:



IMPORTANT — These point out potential hazards to equipment or people during and after the installation.



Key Points — These are critical for a quality installation and must be completed in order for your installation to be successful.



Notes — These cover useful information and tips that can help make your installation simpler or easier. They may also provide information on variations in components or methods.

Before You Begin

Before you begin the installation, read this manual and any documents referenced in it. Also, be sure that the instructions for these products are the most current ones available. Please note that **you must perform the installation according to the current manual or the AdvanTex® Treatment Systems Limited Warranty will be void.** You can make sure your instructions are current by checking our online Document Library at www.orenco.com. You'll save time and money on installation day, and you'll get fewer call-backs.

This manual provides basic information for installing AdvanTex™ AX20 treatment systems. It does not replace training or engineering plans. If there are differences between your engineering plans and the instructions in this manual, contact your Designer or your local Dealer of Orenco Residential Wastewater Treatment Systems.

If you are not an Authorized AdvanTex Installer, contact your local Dealer for training and authorization before installing this system. The Dealer can provide technical support, training, and replacement components. To find the nearest Dealer, check the Distributor Locator page at www.orenco.com. If there is no local Dealer, call Orenco Systems, Inc. at (800) 348-9843 or +1 (541) 459-4449.



IMPORTANT:

- The backwash discharge from a salt-type water softener **MUST NOT** be plumbed into an AX20 unit or the preceding septic tank.
- Failing to follow these instructions will void the system's warranty.
- Contact your Dealer if you have questions about any household plumbing arrangements that may interfere with the functioning of the system.



Key Points:

- Inspect your order for completeness and inspect each component for shipping damage. If any of the order is incomplete or damaged, contact your Dealer or Orenco.
- Check to be sure instructions and items supplied comply with your state and local regulations.
- Carefully read and follow all instructions.
- If you are not an authorized AdvanTex Installer, contact your local Dealer for training and authorization before installing this system.



Note: All pipe diameters provided are U.S. nominal IPS pipe sizes. If you are using metric pipe, you may need adapters to connect to the U.S. fittings supplied with AdvanTex Treatment Systems.

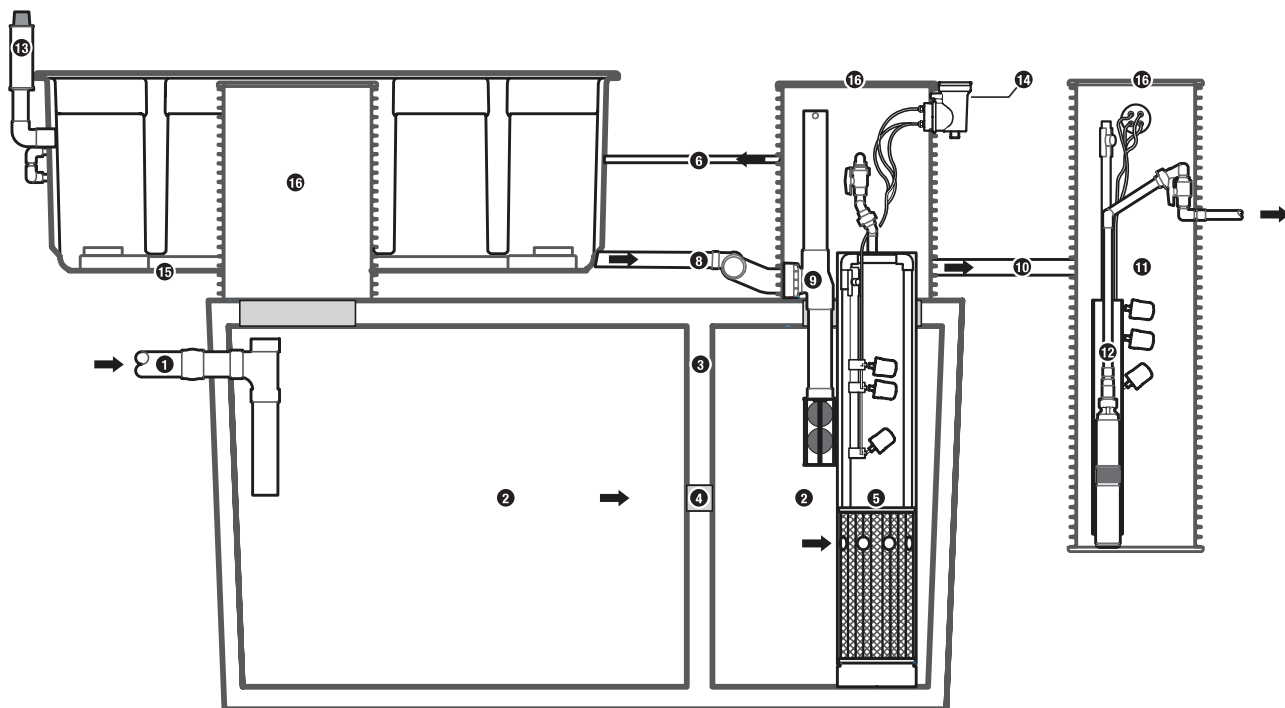
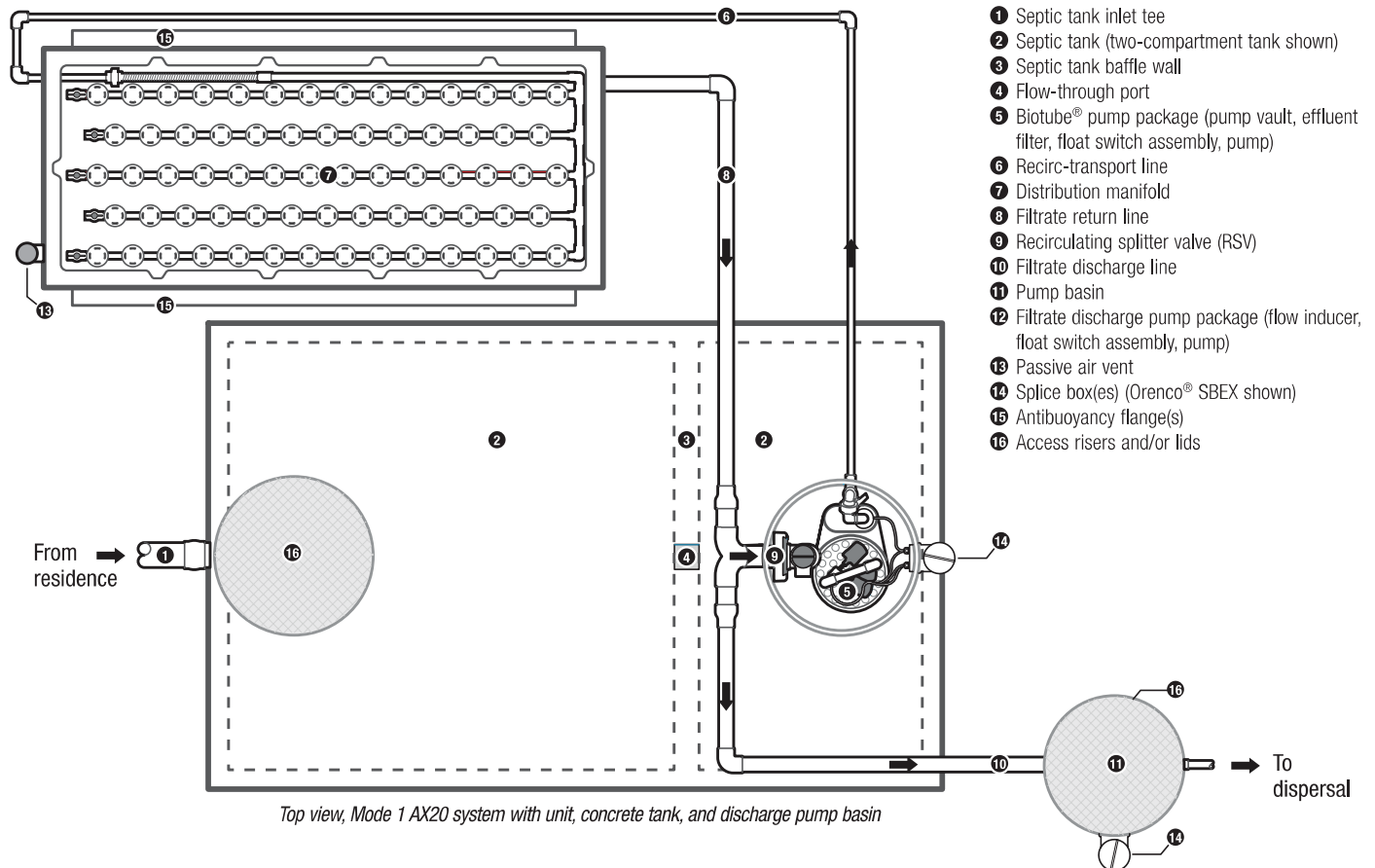
Septic Tanks Used in AX20 Treatment Systems

Be sure that any septic tank used in an AX20 Treatment System meets the following conditions:

- The tank must be watertight and free of leaks.
- The tank must conform to the specifications of an authorized tank design for AdvanTex Systems. Call your local Dealer for specifics.
- The tank must meet all applicable regulatory requirements.

All product and performance assertions are based on proper design, installation, operation, and maintenance according to Orenco's current published documentation.

Standard System Components



Installation Overview

Step 1: Review the site plan. If there is no site plan, draw up a plan including locations, elevations, and distances.

Step 2: Make the excavations for the septic tank, pump basin, and AX20 unit.



Note: You can make all of the excavations at the same time, or you can excavate separately for the unit, the basin, or both before installing them.

Step 3: Prep and set the septic tank and pump basin (if used) according to the manufacturer's instructions.



Note: If you are installing the pump basin in a separate installation, you can choose to prep and set it after testing the tank and adapters for watertightness.

Step 4: Install the tank adapters (if necessary) according to the manufacturer's instructions and install the access risers.

Step 5: Test the tank and the adapter seams for watertightness.



Key Point: The tank and tank-to-riser connections must pass this test before you connect the AX20.

Step 6: Prep and set the AX20 unit.

Step 7: Install the Biotube® Pump Package in the septic tank's second compartment (or the second tank, in two-tank systems).

Step 8: Install the discharge pumping equipment into the pump basin (if used).

Step 9: Install the recirculating splitter valve (RSV) in the septic tank and install the split flow tee between the septic tank, the AX20 unit, and the pump basin or final discharge.

Step 10: Connect the filtrate return line from the unit to the RSV.

Step 11: Connect the recirc transport line from the Biotube pump package to the distribution manifold in the AX20.

Step 12: Connect the filtrate discharge line.

Step 13: Install the passive air vent on the AX20 unit.

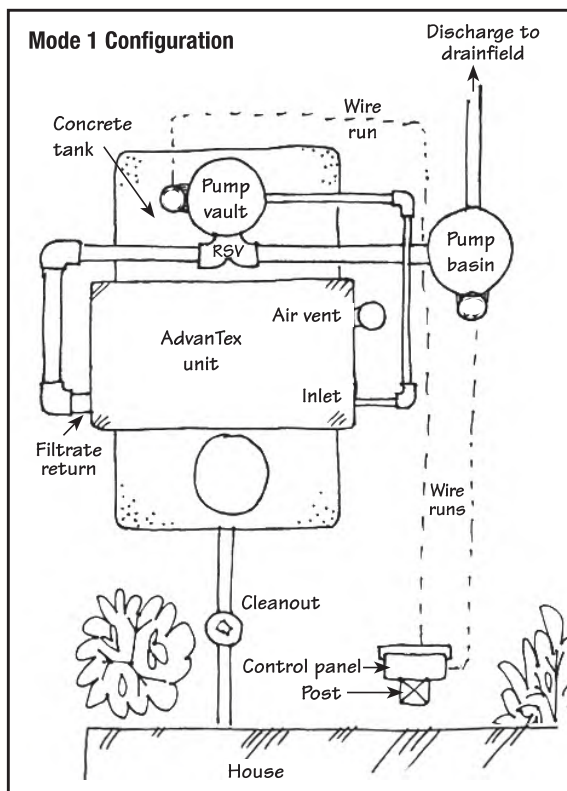
Step 14: Mount, wire, and test the control panel.

Step 15: Perform an operational test of the AdvanTex System.

Step 16: Backfill the installation and secure the AX20 lid and all access riser lids.

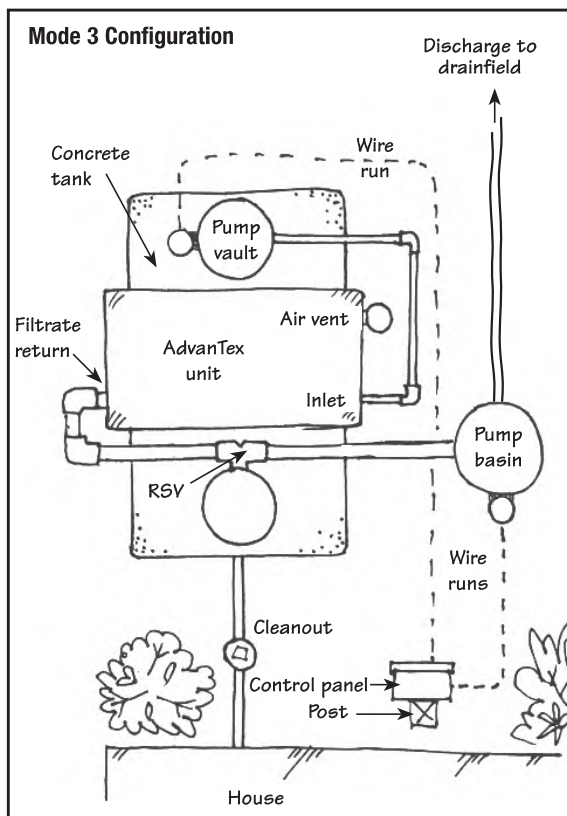
Installation Steps

Mode 1 Configuration



Sample sketch of a Mode 1 configuration system layout

Mode 3 Configuration



Sample sketch of a Mode 3 configuration system layout

Step 1: Review or Sketch Site Plan

Check the site plan for the specifics of your installation.



Key Points:

- If you're installing the AX20 unit more than 20 ft (6 m) from the septic tank, contact your Dealer for assistance.
- Confirm the treatment mode (Mode 1 or Mode 3) of the AdvanTex system you are installing before beginning the installation. The treatment mode is based on the system's nitrogen reduction requirements. For more information, contact your Dealer.

Step 1a: Detailed Site Plan Provided

Make sure that the site plan matches the site. If it doesn't, contact the designer or engineer before you schedule the installation.

Step 1b: Plan Of Limited Detail Or No Site Plan Provided

If you only have a plan of limited detail or no site plan, contact your Dealer for assistance.



Key Points:

- A minimum fall of 1/4 inch per foot (20 mm per m or 2%) is required ...
 - ~ From the invert of the AX20 filtrate outlet to the invert of the RSV's inlet.
 - ~ From the invert of the RSV's outlet to the invert of the pump basin's inlet (on systems with pump basins).
- If you are using a concrete tank or you are using an Orenco fiberglass tank without a tank saddle, calculate how high the unit needs to sit above the inlet on the RSV split flow tee. Variables include:
 - ~ Length of the filtrate return line
 - ~ Type of tank being used
 - ~ Tank adapter style
 - ~ Elevation of the RSV penetration in the access riser
 - ~ Final grade of the site
- The bottom of the AX20 lid must sit at least 2 inches (50 mm) above final grade.
- An AX20 unit can be placed in several different positions in relation to the septic tank. If you have questions about unit placement, contact your Dealer before continuing.
- The filtrate outlet and the recirc inlet are typically installed on opposite sides of the AX20 unit.
- Sketch the exact positions of the system components, pipes, electrical conduits, etc. Account for current and likely future landscape features in the sketch. (For control panel installation, see EIN-CP-GEN-1, *Panel Installation*.)



Note: If you have any questions about the key points of planning this installation, please contact your Dealer.

Installation Steps

Step 2: Make Excavation(s)

Consider the necessary elevations, offsets, and grade requirements for the septic tank, AX20 unit, and discharge pump basin.

Step 2a: Excavate the septic tank hole. Follow the manufacturer's instructions.

- For Orenco fiberglass tanks, see NIN-TNK-1, *Fiberglass Tank Burial*.

Step 2b: Excavate the pump basin hole or discharge tank hole, if necessary. Follow the manufacturer's instructions.

- The pump basin can be placed in the same excavation as the septic tank, if there is enough room.
- If needed, you can make the pump basin excavation after you have prepped and set the tank.
- For Orenco PVC pump basins, see NIN-PB-1, *PVC Basin Installation*.



Key Point: A minimum fall of ¼ inch per foot (20 mm per m or 2%) is required from the invert of the AX20 filtrate outlet to the invert of the RSV's inlet and from the invert of the RSV's outlet to the invert of the pump basin's inlet or discharge tank's inlet.

Step 2c: Excavate the AX20 hole, if it's being installed in a separate excavation.

- If needed, you can make the AX20 excavation after you prep and set the tank and (if your system includes one) the pump basin.
- Excavate a hole 8.5 ft × 4.5 ft (without antifoatation flanges) or 6 ft (with antifoatation flanges) × up to 28 in. deep [2.6 m × 1.4 (or 1.8 m) × 0.7 m], depending on the fall necessary to meet requirements.
- For information on installation configurations or methods not included in this manual, contact your Dealer.

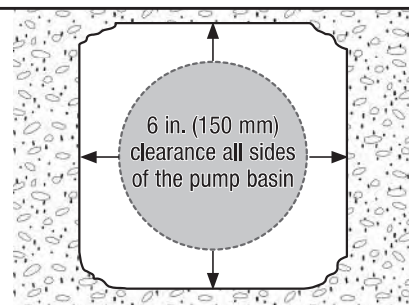


Key Points:

- A minimum fall of ¼ inch per foot (20 mm per m or 2%) is required from the invert of the AX20 filtrate outlet to the invert of the RSV's inlet.
- Allow at least 44 inches (1.1 m) between units in systems with multiple units.
- Antifoatation flanges are ...
 - ~ Recommended if the AX20 unit isn't attached directly to the tank.
 - ~ Required if groundwater could be present in the AX20 excavation at any time, or if surface runoff could fill the excavation at any time, resulting in a "bathtub" effect.
- If you have questions about the need for antifoatation flanges, contact your Designer or a qualified engineer.

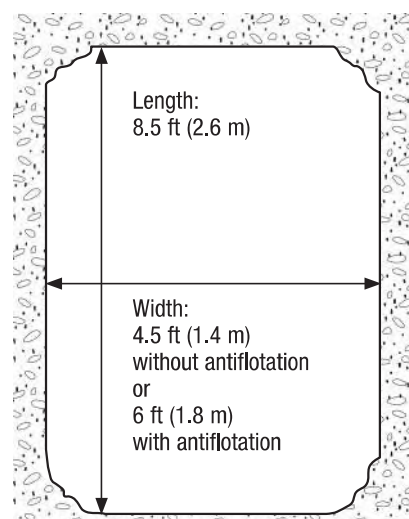


2b

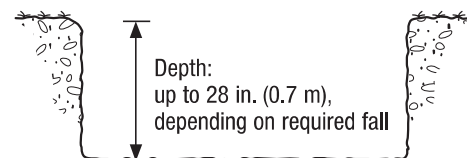


Example discharge basin hole (separate excavation)

2c

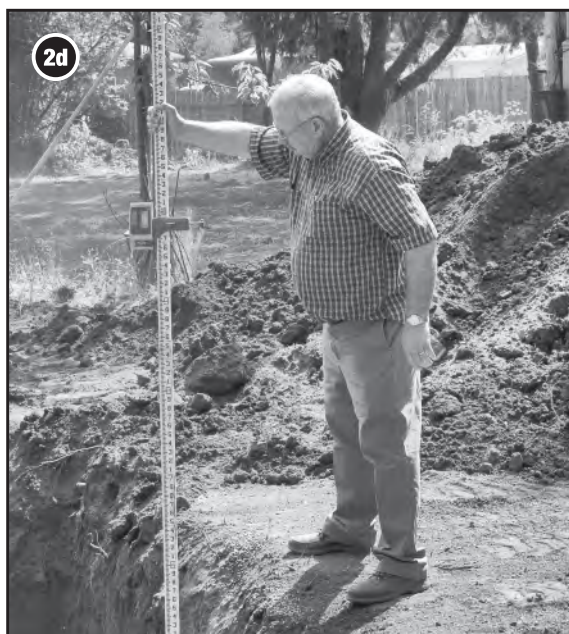


Excavation length and width for AdvanTex units (separate excavation)



Excavation depth for AdvanTex units (separate excavation)

Installation Steps



Step 2: Make Excavation(s), cont.

Step 2d: Make sure the bottom of each excavation is stable, smooth, level, and free of debris, rocks, and sharp objects.

Step 2e: Bed the tank and pump basin. Follow the manufacturers' instructions.

- For Orenco fiberglass tanks, see NIN-TNK-1, *Fiberglass Tank Burial*.
- For Orenco PVC pump basins, see NIN-PB-1, *PVC Basin Installation*.



Key Points:

- If the bottom is uneven or rocky, over-excavate the hole and lay a 4-inch (100-mm) bed of sand or pea gravel and compact it to make an even, smooth surface.
- For unstable soil (peat, quicksand, muck, soft or highly expansive clay, etc.), over-excavate the hole by 6 in. (150-mm) and set a firm, 6-in. (150-mm) compacted base of $\leq \frac{1}{2}$ - to $\leq \frac{3}{4}$ -in. (13- to 19-mm) aggregate or pea gravel.
- If you have doubts about the soil's stability, contact a qualified engineer or professional. For extremely unstable soil, contact a qualified engineer for recommendations on stabilizing the excavation before you continue.

Step 3: Prep and Set Septic Tank and Pump Basin

Step 3a: Prep and set the septic tank. Follow the manufacturer's instructions.

- For Orenco fiberglass tanks, see NIN-TNK-1, *Fiberglass Tank Burial*.



IMPORTANT: Take care to keep everyone clear of the excavation when placing the tank and pump basin!



Key Point: Set the tank at the correct depth to connect to the sewage inlet.

Step 3b: Prep and set the pump basin. Follow the manufacturer's instructions.

- If necessary, you can set and prep the pump basin at any time before prepping and setting the AX20 unit.
- For Orenco PVC pump basins, see NIN-PB-1, *PVC Basin Installation*.



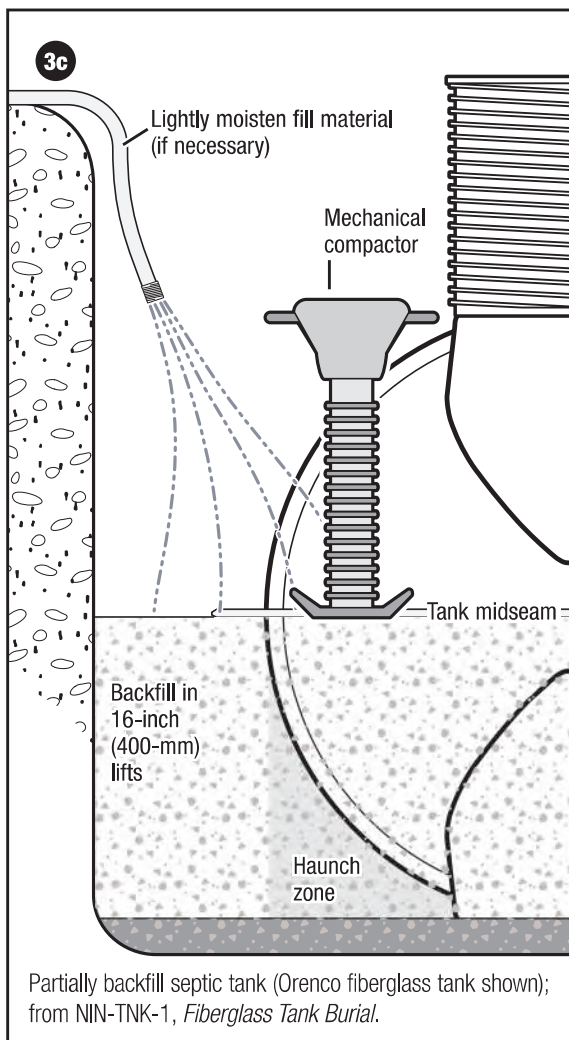
IMPORTANT: It is critical for system operation that you set the basin with the RSV penetration correctly aligned and at the correct height!

Step 3c: Partially backfill the septic tank (and pump basin, if it is in the same excavation). Follow the manufacturers' instructions.

- For Orenco fiberglass tanks, see NIN-TNK-1, *Fiberglass Tank Burial*.
- For Orenco PVC pump basins, see NIN-PB-1, *PVC Basin Installation*.



Key Point: If the tank and basin are in the same excavation, only backfill around the pump basin to just below the bottom of the basin inlet hole until you've plumbed the basin.



Installation Steps

Step 4: Install Tank Adapters and Risers (If Needed)

Step 4a: Install the tank adapters if they haven't been installed. Follow the manufacturer's instructions.

- For Orenco PRTA24 or PRTA30 Tank Adapters, see NIN-TA-PRTA-2, *PRTA24 and PRTA30 Tank Adapter*.
- For Orenco RRFTA or RRFTA30 Tank Adapters, see NIN-TA-RRFTA-1, *RRFTA and RRFTA30 Tank Adapter*.
- For Orenco FRTA30-FRP Tank Adapters, see NIN-TA-FRTA-1, *FRTA30-FRP Tank Adapter*.

Step 4b: Install the access risers, if they haven't been installed, as well as any necessary grommets and splice boxes.

- For installing grommets in access risers and installing risers onto Orenco tank adapters, see NIN-RLA-RR-1, *PVC Riser Installation*.
- For Orenco external splice boxes, see NIN-SB-SBEX-1, *External Splice Box*.
- For Orenco internal splice boxes, see NIN-SB-SB-1, *Internal Splice Box*.



Key Points:

- Watertight seams and penetrations are critical for proper performance.
- Before installing the risers, make sure that ...
 - ~ All risers are the correct height — the recommended riser height is 2 inches (50 mm) above final grade.
 - ~ All riser penetrations are at the correct height for the connections.
 - ~ The RS3 flanged coupling is installed in the correct riser and the riser with the RS3 flanged coupling is being installed over the correct tank access hole. (See NIN-RSV-3, *Recirculating Splitter Valve*.)
 - ~ All riser penetrations are aligned correctly.
- After installing the risers, make sure that ...
 - ~ All adhesive seams are free of voids, with smooth, continuous fillets.
 - ~ The adhesive is set before continuing.

Step 5: Test Tank and Adapter Seams for Watertightness

Step 5a: Test the tank's watertightness. Follow the manufacturer's instructions.

- Some manufacturers require you to partially or fully backfill around the tank before testing for watertightness.

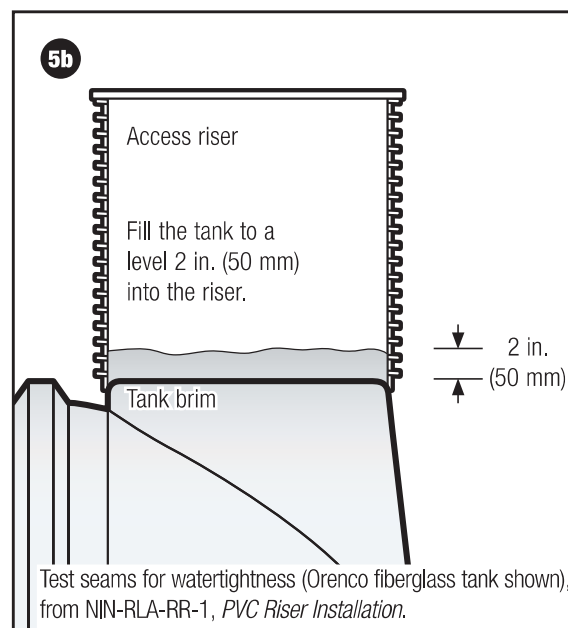
Step 5b: Test the tank-to-riser adapter seams for watertightness.

- Use NIN-RLA-RR-1, *PVC Riser Installation* instructions to test the seams between the access riser, tank adapter, and tank for watertightness.

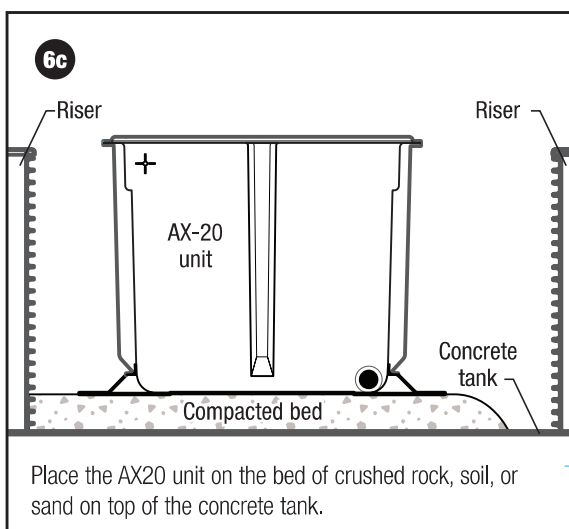


Key Points:

- The seams between the access riser, tank adapter, and tank must all pass the watertightness test before you continue.
- Follow all applicable regulations for watertightness testing.



Installation Steps



Step 6: Prep and Set AX20 Unit

To prep and set the AX20 unit, find the correct sub-step below. If you don't see your application listed, stop and contact your Dealer before continuing.

- Attaching antiflotation flanges to the unit ... see Step 6a.
- Setting the unit in its own excavation ... see Step 6b.
- Setting the unit over the tank, unattached ... see Step 6c.
- Attaching the unit to the top of an Orenco fiberglass tank ... see Step 6d.



Key Points:

- For all AX20 installations, a minimum fall of ¼ in. per ft (20 mm per m or 2%) is required from the invert of the AX20's filtrate outlet to the invert of the RSV's inlet.
- The AX20 lid's bottom must be at least 2 in. (50 mm) above finished grade.
- An AX20 weighs about 350 lb (160 kg) dry.



IMPORTANT:

- Always make sure the lid is bolted down before lifting the AX20 unit.
- Orenco strongly recommends using an excavator and lifting straps to lift and move the AX20 unit.
- Never wrap lifting straps around the antiflotation flanges. See Photo 6b, "Lift the AX20 unit," for the correct way to lift the unit.
- Keep everyone clear of the excavation when placing the unit.

Step 6a: Attaching Antiflotation Flanges To The Unit

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

Step 6b: Setting The Unit In Its Own Excavation

- 1: Make sure the AX20 unit's lid is bolted down.
- 2: Lift and lower the unit into position.
- 3: Make sure the unit is aligned correctly and that it is level.

Step 6c: Setting The Unit Over The Tank, Unattached

- 1: Follow the tank manufacturer's instructions for backfilling the tank.
 - For Orenco fiberglass tanks, see NIN-TNK-1, *Fiberglass Tank Burial*.
- 2: Place and compact a bed of crushed rock, soil, or sand on top of the tank.
 - The bed has to be thick enough to provide the correct fall from the invert of the AX20 filtrate outlet to the invert of the RSV's inlet.
- 3: Make sure the AX20 unit's lid is bolted down.
4. Lift and lower the AX20 unit into position.
- 5: Make sure the unit is aligned correctly and that it is level.

Installation Steps

Step 6: Prep and Set AX20 Unit, cont.

Step 6d: Attaching The Unit To An Orenco Fiberglass Tank

1: Install the tank saddles if they aren't already installed on the tank.

- For Orenco tank saddles, see NIN-SAD-2, *Two-Piece Fiberglass Tank Saddle Installation*.

2: Set the unit on a raised surface with access to the unit's bottom.

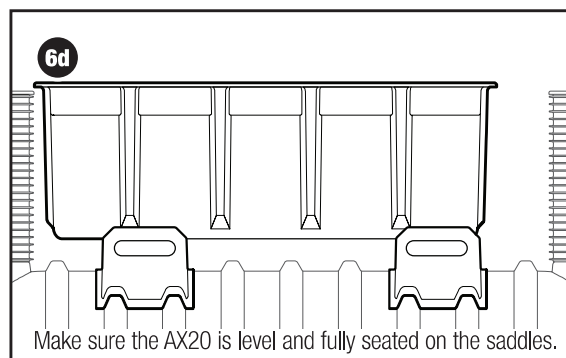
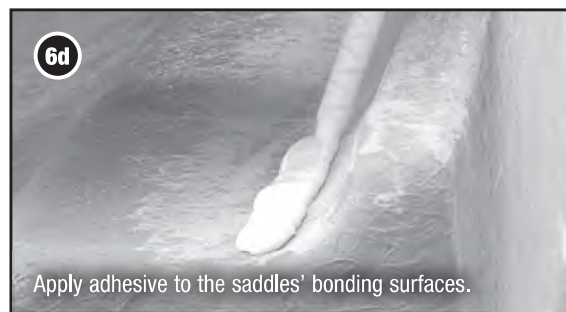
3: Sand the unit's bottom surface where it will rest on the saddles.

4: Wipe the unit's and saddles' bonding surfaces with acetone and a clean cloth.

5: Apply a bead of methacrylate adhesive to the saddles' bonding surfaces.

6: Lift and lower the AX20 unit into position.

7: Make sure the unit is level and fully seated on the saddles.



Step 7: Install Pump Package in Septic Tank

Install the Biotube® pump package components in the septic tank.

Step 7a: Install the pump vault.

- For PVU and PV series pump vaults, see NIN-PVU-1, *Biotube Pump Vault Installation*.

Step 7b: Install the pump and discharge plumbing assembly.

- For HV-style discharge plumbing, see NIN-HV-1, *Pump and Discharge Plumbing*.

Step 7c: Install the float switch assembly.

- For installing float switch assemblies, see NIN-MF-1, *Float Switch Assembly*.

Step 8: Install Pump Package in Pump Basin

If your system includes a pump basin, install the pump package now.



Key Point: A minimum fall of ¼ inch per foot (20 mm per m or 2%) is required from the invert of the RSV's outlet to the invert of the pump basin's inlet.

Step 8a: Install the pump and discharge plumbing assembly.

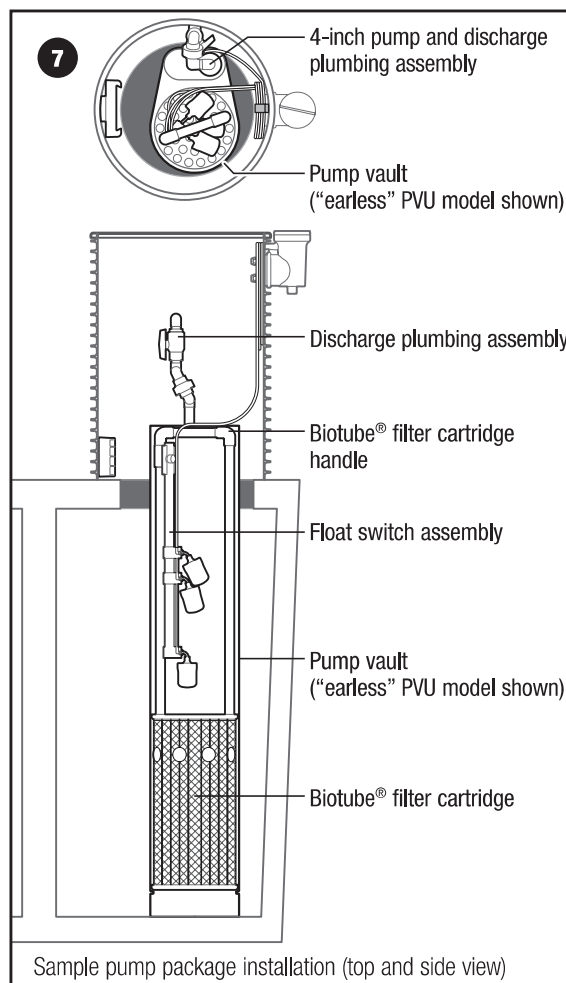
- For HV-style discharge plumbing, see NIN-HV-1, *Pump and Discharge Plumbing*.

Step 8b: Install the float switch assembly.

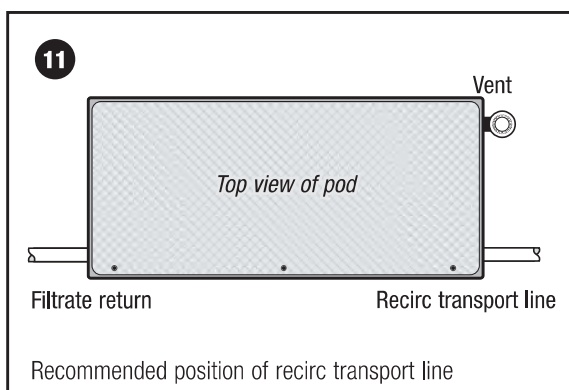
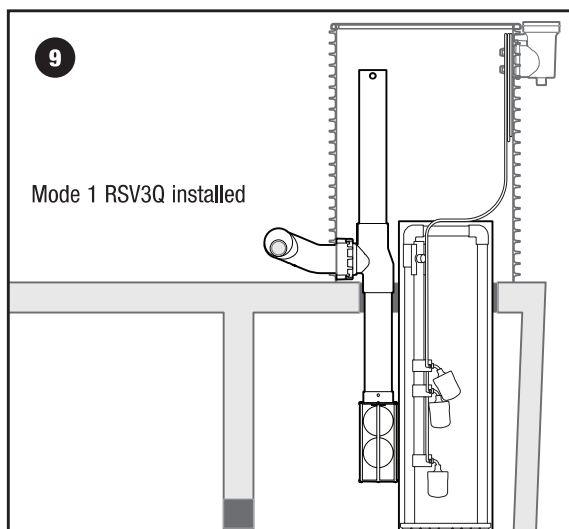
- For float switch assemblies, see NIN-MF-1, *Float Switch Assembly*.

Step 8c: After you've installed the pump package components, test the pump basin for watertightness.

- For Orenco PVC pump basins, see NIN-PB-1, *PVC Basin Installation*.



Installation Steps



Step 9: Install Recirculating Splitter Valve (RSV)

Install the RSV in the first septic tank's second compartment or in the second septic tank's inlet riser (Mode 1), or in the first septic tank's inlet riser (Mode 3).

- If you are unfamiliar with the terms "Mode 1" and "Mode 3," or if the design doesn't state the mode for the system, stop and contact the Designer or the Dealer.
- For RSVs in residential AX20 applications, see NIN-RSV-3, *Recirculating Splitter Valve Installation*.
- To determine the correct stinger length, see NIN-ATX-DA-1, *Float Switch and RSV Settings*.
- For RSVs in commercial AX20 applications, contact your Dealer.



IMPORTANT:

- It is critical for system operation that ...
 - ~ The split flow tee is correctly aligned and at the correct height!
 - ~ The eccentric couplings are installed with their offset openings at the invert of the split flow tee.
 - ~ The stinger length is correct.
- Use an all-purpose ABS/PVC transition cement to join ABS and PVC parts.

Step 10: Connect Filtrate Return Line

Step 10a: Dry fit the filtrate return plumbing between the filtrate return on the AX20 unit and the split-flow tee on the RSV.

- Use 2-inch nominal (50-mm DN) PVC pipe and fittings as needed.



Key Point: Maintain a minimum fall of ¼ inch per foot (20 mm per m or 2%) from the invert of the AX20 filtrate outlet to the invert of the RSV's inlet.

Step 10b: Mark the correct lengths and fall angles on the pipe and fittings.

Step 10c: Disassemble the plumbing and adjust as needed for good fit and fall.

Step 10d: Glue and refit the filtrate return line's pipe sections and fittings.



IMPORTANT: Use an all-purpose ABS/PVC transition cement to join ABS and PVC parts.

Step 11: Connect Recirc Transport Line

Step 11a: Dry fit the recirc transport line plumbing between the septic tank's outlet and the inlet of the AX20's distribution manifold.

- Use 2-inch nominal (50-mm DN) PVC pipe and fittings as needed.

Step 11b: Mark the correct lengths on the pipe and fittings.

Step 11c: Disassemble the plumbing and adjust as needed for good fit.

Step 11d: Glue and refit the recirc transport line's pipe sections and fittings.

Installation Steps

Step 12: Connect Filtrate Discharge Line

Step 12a: Dry fit the filtrate discharge plumbing between the RSV's split-flow tee and the transport line to dispersal or the pump basin's inlet (if equipped).



Key Point: Maintain a minimum fall of ¼ inch per foot (20 mm per m or 2%) from the invert of the RSV's outlet to final dispersal or the invert of the pump basin's inlet (if equipped).

Step 12b: Mark the correct lengths and fall angles on the pipe and fittings.

Step 12c: Disassemble the plumbing and adjust as needed for good fit and fall.

Step 12d: Glue and refit the filtrate discharge line's pipe sections and fittings.



IMPORTANT: Use an all-purpose ABS/PVC transition cement to join ABS and PVC parts.



Step 13: Install Passive Air Vent

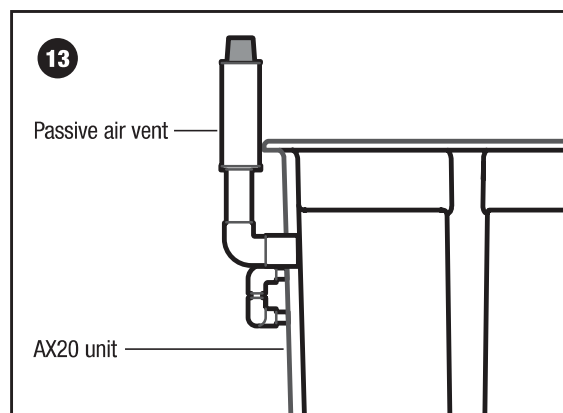
Use 2-inch (50 mm) PVC pipe to connect the unit's passive air vent to the 2-inch (50 mm) vent fitting that protrudes from the side of the AX20 unit.

- The air vent can be installed up to 20 ft (6 m) away from the AX20 unit, preferably near a wall or other location that will protect it from damage.
- The air vent can be hidden by shrubbery or landscaping, and it can be painted to better blend in with landscaping.



Key Point: Make sure that ...

- ~ The vent line slopes back toward the unit a minimum of ¼ inch per foot (20 mm per m) for proper drainage.
- ~ There are no "bellies" in the line that can collect water.
- ~ The vent's top is a minimum of 3 inches (75 mm) above final grade.



Step 14: Mount and Wire Control Panel



Note: Installation instructions, schematics, and wiring diagrams for the specific treatment system are included with each panel. If any of these are missing, contact your Dealer for a replacement.

Step 14a: Mount the panel using the instructions that came with it.



IMPORTANT:

- DO NOT mount the control panel on an exterior wall other than a garage or shop wall! The motor contactor makes a sound while engaging and disengaging that can be disruptive to residents.
- This step should be performed by a licensed and qualified electrician.



Key Points:

- Follow all applicable regulations for placement of the control panel.
- Mount the panel in a service-friendly location within sight of the tank.

Installation Steps

Step 14: Mount and Wire Control Panel, cont.

Step 14b: Route and install any necessary electrical conduit.

Step 14c: Route wires and connect the panel, pump, float switches, and other equipment shown in the instructions and schematics into the control panel.



IMPORTANT: Follow all applicable regulations and electrical codes.



Key Points:

- Use watertight wire connectors to avoid electrical shorts and other issues.
- Be sure to seal the conduit at the control panel and at the splice box with UL-listed sealing foam, putty, or silicone sealant.

Step 15: Perform Operational Test



IMPORTANT:

- Before using a generator to operate one or more pumps, contact your Dealer to make sure it can supply sufficient starting amperage to the pump(s).
- Always make sure there is enough water in the septic tank to safely run the pump — at least 4 inches (100 mm) above the bottom float switch.
- For Mode 1B and Mode 3B systems, fill the pump basin with water until the water level is just under the lowest float.

Step 15a: Disconnect the manifold union.

Step 15b: Toggle the recirc pump “AUTO/OFF/MAN” switch to “MAN” for 5-10 seconds to flush any debris out of the transport line.

Step 15c: Reconnect the manifold union and hand-tighten it.

Step 15d: Open all of the ball valves on the distribution manifold laterals.

Step 15e: Toggle the recirc pump “AUTO/OFF/MAN” switch to “MAN” for 5-10 seconds to flush any debris out of the manifolds.

Step 15f: Close the ball valves.

Step 15g: Remove orifice shields from several nozzles and use a tape measure to find out the squirt height from each.

- The squirt height should measure approximately 3-5 ft (0.9-1.5 m).
- If the squirt height isn't at least 3 feet (0.9 m),
 - ~ Check for debris, breaks, or closed valves.
 - ~ Check the required voltage on the pump to be sure the pump has enough power.
- If the system doesn't pressurize correctly, contact your Dealer.

Step 15h: Return the recirc pump “AUTO/OFF/MAN” switch to “AUTO.”

Step 15i: If necessary, refill the tank past the inlet holes on the pump vault.



Installation Steps

Step 16: Backfill Installation



Key Points:

- Do not alter the slope of pipes during backfilling. Brace them or place them on compacted beds and then carefully fill around them.
- Before backfilling, make sure all lids are bolted down.

Step 16a: Finish backfilling the tank excavation if it isn't done yet. Follow the manufacturer's instructions.

- For Orenco fiberglass tanks, see NIN-TNK-1, *Fiberglass Tank Burial*.



IMPORTANT: Attaching the AX20 unit to an Orenco fiberglass tank adds to the tank's buoyancy. In noncohesive soils,* this means a concrete antifloatation collar has to be installed around the tank's mid-seam. Contact your Dealer or a qualified engineer if you are unsure whether a concrete collar is needed.

Step 16b: Backfill the pump basin if it hasn't been done yet.

- For Orenco PVC pump basins, see NIN-PB-1, *PVC Basin Installation*.

Step 16c: Backfill and compact around the AX20 unit in 12-in. (300-mm) lifts.



Key Points:

- Do not use native material to backfill if it is primarily sand; very soft or highly expansive clay; or if it contains debris, large ($> \frac{3}{4}$ -in. or 19-mm) rocks, sharp rocks, peat, or muck. In these cases, use $\leq \frac{3}{4}$ -in. ($\leq$ 19-mm) rounded gravel, crushed stone, or pea gravel as fill material. This material should be washed, free-flowing, and free of debris.
- In noncohesive soils* with high seasonal water tables, use $\frac{3}{4}$ -inch crushed rock as the backfill material.
- Do not backfill with sand.

Step 16d: Compact the fill thoroughly with a mechanical compactor.



Key Points:

- The bottom of the AX20 lid should sit 2 inches (50 mm) above final grade.

Step 16e: Close and secure the AX20 unit's lid.

Step 16f: Secure the access lids on the tank and pump basin (if used).

Step 16g: Before the system goes into use, contact the system's Service Provider and complete the system start-up together per AIM-OM-ATX-1, *AdvanTex O&M Manual: Start-Up and Routine Maintenance*.

* As described in OSHA Standards (29 CFR, Part 1926, Subpart P, Appendix A), noncohesive soils or granular soils include gravel, sand, or silt with little or no clay content. Granular soil cannot be molded when moist and crumbles easily when dry. Cohesive soils include clayey silt, sandy clay, silty clay, clay, and organic clay. Cohesive soil does not crumble, can be excavated with vertical sideslopes, is hard to break up when dry, and when moist, can be rolled into threads without crumbling. For example, if at least a 2-inch (51-mm) length of 1/8-inch (3-mm) thread can be held on one end without tearing, the soil is cohesive.



Installation Manual

AdvanTex[®] **AX20 Treatment Systems** *Residential Applications*



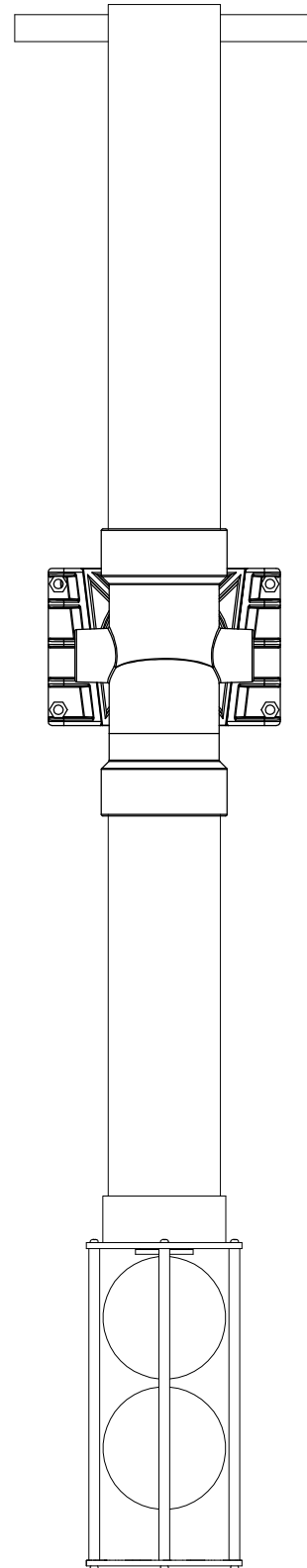
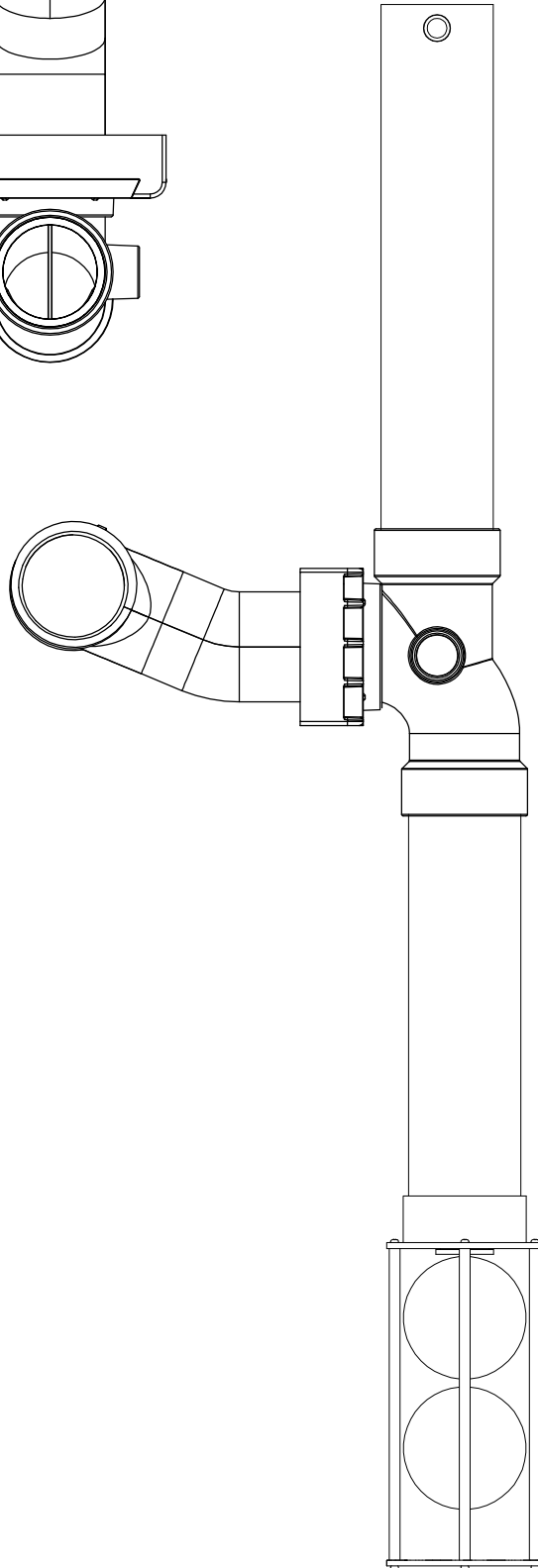
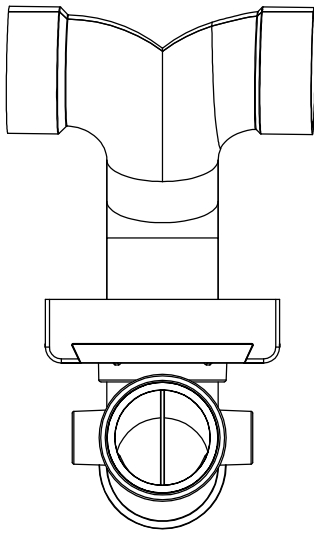
AdvanTex Treatment Systems are listed
to NSF/ANSI Standards 40 and 245 for
Class I Systems.



1-800-348-9843
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NIM-ATX-AX-1
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Orenco Systems[®], Inc.

Re-circulating Splitter Valve
RSV3Q



VeriComm® AXB_ Control Panels

VeriComm AXB1 UV IB
(IP Upgrade Kit is required if Internet Line is used)

Technical Data Sheet

For AdvanTex® Treatment Systems

Applications

VeriComm® AXB1 and AXB2 remote telemetry control panels are used with two-pump operations — recirculation and discharge (on-demand or timed) — for AdvanTex® Treatment Systems. Interlocked controls prevent the recirculation pump from running if there is a high level alarm on the discharge side. Coupled with the VeriComm Web-based Monitoring System, these affordable control panels give water/wastewater system operators and maintenance organizations the ability to monitor and control each individual system's operation remotely, with real-time efficiency, while remaining invisible to the homeowner. VeriComm AXB panels allow remote operators to change system parameters, including timer settings, from the Web interface.



Typical AXB_ VeriComm® Control Panel
Standard Models: VCOM AXB1, VCOM AXB2

To Specify...

To specify this panel for your installation, require the following:

Basic Control Logic: Three Operating Modes

- A "Start-up Mode" for the initial 30 days, during which the system collects trend data to establish operating standards for future reference.
- A "Normal Mode" that manages day-to-day functions.
- A "Test Mode" that suspends data collection and alarm reporting during installation and service.

Data Collection and Utilization

- Data logs of system conditions and events, such as pump run times, pump cycles, and alarm conditions.

Troubleshooting and Diagnostic Logic

- Troubleshooting capabilities that can report suspected failed components, which then trigger Alarms.

Advanced Control Logic

- Advanced control logic that activates during float malfunctions to diagnose the situation and keep the system operating normally until servicing.

Communication and Alarm Management

- Remote telemetry capabilities coupled with a Web-based monitoring application (see *VeriComm Monitoring System, ATD-WEB-VCOM-1*) for communication and alarm management. Updating of point values (including timer settings) and receipt of queued changes during each communication session with host. Communication sessions that occur monthly, at a minimum, and more frequently during alarm conditions.
- Multiple methods of communication, as follows:

Call-In to VeriComm® Host

- Automatic notification to host of "Alarms," which signal fault conditions that need to be addressed immediately (e.g., pump failure).
- Automatic notification to host of "Alerts," which signal less critical fault conditions and which trigger the panel's troubleshooting logic and alternative operating mode (e.g., stuck float switch).
- Automatic notification to host of "Updates," which include alarm updates or all-clear notifications following Alarms/Alerts, as well as normally scheduled monthly panel reports.
- Manual, forced communication from panel to host to effect an updating of point values and receipt of queued changes.

Real-Time Direct Connection to Panel

- Manual, direct connection at the site via RS-232 serial port, to allow a local operator real-time access to detailed logged data and the ability to change point values from a laptop.
- Manual, forced communication by local operator/homeowner at the site to initiate an auto-answer mode, allowing a remote operator real-time access to detailed logged data and the ability to change point values.

During real-time, manual connections, software with open architecture (and password security) is used; no proprietary software is required. VT100 protocol allows access and control from any computer modem (Mac or PC) with a simple communication program (e.g., Windows® HyperTerminal); multilevel password protection in panel ensures that only qualified personnel can access the panel's data.

Additional Features

- Status light indicators on the board, including . . .
 - Flashing green LED for normal operation
 - Yellow LEDs for status of digital inputs
 - Red LEDs for status of digital outputs and modem activity
- UL-recognized and FCC-approved

For more information, try our online demo at www.vericomm.net (no password required).



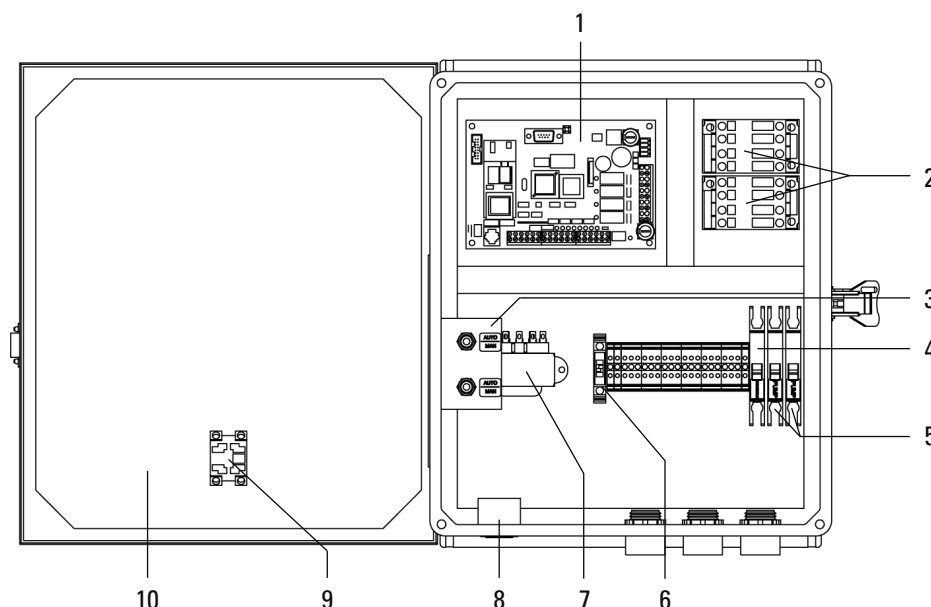
Orenco Systems®
Incorporated

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ATD-CP-VCOM-7
Rev. 2.5 © 6/06
Page 1 of 2

1. VeriComm® Remote Telemetry Board
2. Motor-Start Contactors
3. Toggle Switches
4. Control Circuit Breaker
5. Pump Circuit Breakers
6. Fuse
7. Transformer
8. Audio Alarm
9. Visual Alarm
10. Panel Enclosure



Standard Components

Feature	Specifications
1. VeriComm® Remote Telemetry Unit*	ATRTU-100: 36/18 VAC (center tap transformer), 8 digital inputs, 4 analog inputs, 4 digital outputs, 0 analog outputs, on-board modem (2400 baud), LED input and output indicators, 1-year battery backup of data and program settings.
2. Motor-Start Contactors	120 VAC: 16 FLA, 1 hp, 60 Hz; 2.5 million cycles at FLA (10 million at 50% of FLA). 240 VAC: 16 FLA, 3 hp, 60 Hz; 2.5 million cycles at FLA (10 million at 50% of FLA).
3. Toggle Switches	Single-pole switch, automatic On, with spring-loaded, momentary, manual On. 20 A, 1 hp.
4. Control Circuit Breaker	10 A, OFF/ON switch. Single-pole 120 VAC, double-pole 240 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
5. Pump Circuit Breakers	20 A, OFF/ON switch. Single-pole 120 VAC, double-pole 240 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
6. Fuse	120 VAC Primary, 36 VCT @ 0.85 A Secondary.
7. Transformer	250 VAC, 1 A.
8. Audio Alarm	95 dB at 24 in. (610 mm), warble-tone sound.
9. Visual Alarm	7/8 in. (22 mm) diameter red lens, "Push-to-silence." NEMA 4, 1 W bulb, 120 VAC.
10. Panel Enclosure	Measures 15.5 in. high x 13.3 in. wide x 6.7 in. deep (384 mm x 338 mm x 170 mm). NEMA 4X rated. Constructed of UV-resistant fiberglass; hinges and latch are stainless steel. Conduit couplings provided.
VCOM-AXB1	120 VAC, 3/4 hp, 14 A, single-phase, 60 Hz.
VCOM-AXB2	240 VAC, 2 hp, 14 A, single-phase, 60 Hz.

Optional Components

Feature	Specifications	Product Code Adder
Pump Run Light	7/8 in. (22 mm) diameter green lens. NEMA 4, 1 W bulb, 120 VAC.	PRL
Anticondensation Heater	Self-adjusting: radiates additional wattage as temperature drops.	HT
Programmable Timer	Discharge side timed dosing.	PT
UV Disinfection Compatibility	UV grounded power circuit and alarm contacts. Pump disable upon UV failure.	UV

* See VeriComm® Remote Telemetry Unit (ATD-CP-VCOM-1) and VeriComm® Monitoring System (ATD-WEB-VCOM-1) for more detail.

Float Switch Assemblies

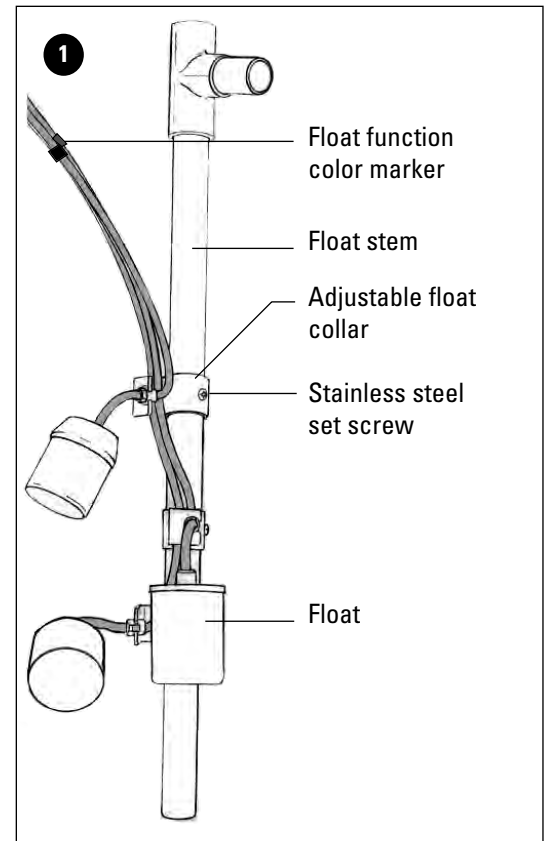
Installation, Operation and Maintenance Instructions **Model MF**_____

Installation Instructions

The float switch assembly is typically mounted in the screened pump vault or effluent screen inside of a septic or dosing tank. The assembly is detachable without removal of the screened pump vault or effluent screen. A typical float switch assembly is shown below.

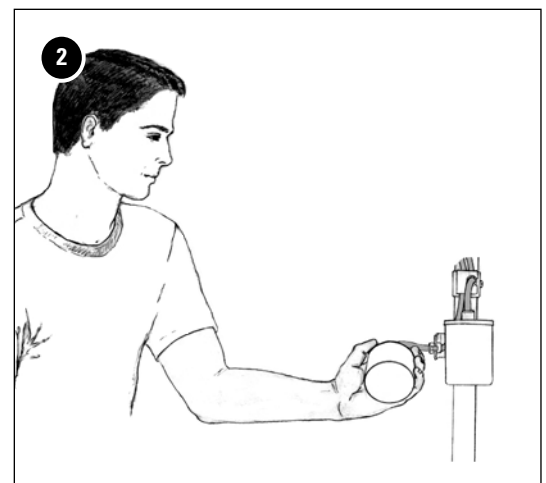
Step 1:

Each float cable is provided with a color marker. This marker indicates the function of the float. Make sure that your float cable color markers correspond with the wiring diagram provided. If the wiring diagram does not match your float cable marker colors, contact Oreco Systems® Inc. or your local dealer for assistance.

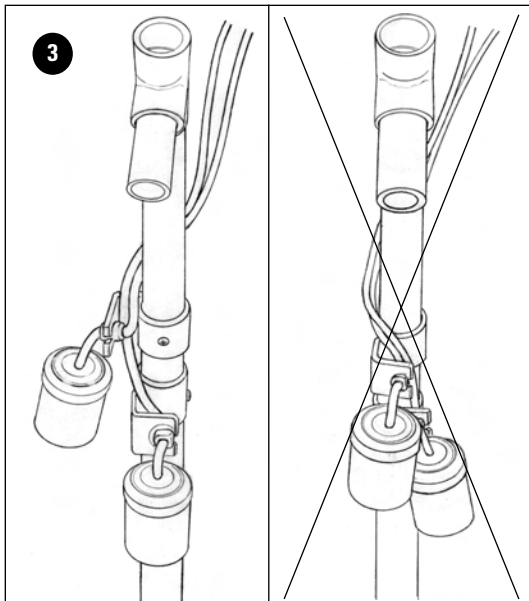


Step 2:

To check for proper float switch operation, move each switch up and down and check for interference. Remove the assembly from its holding bracket by snapping it out of the holding bracket.



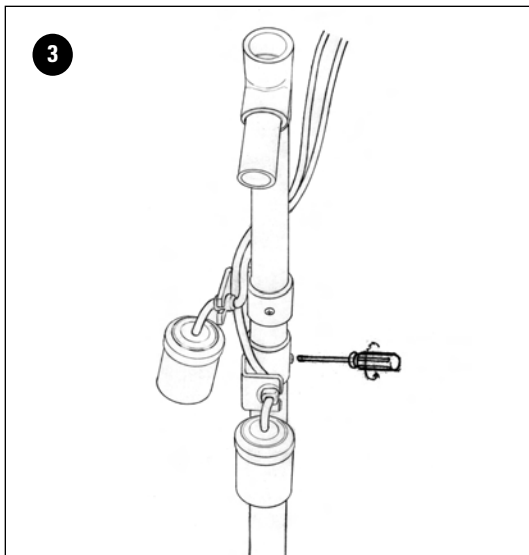
Installation Instructions (continued)



Step 3:

If any float interferes with another, the float may be adjusted by loosening the stainless steel set screw provided in the float collar. Using a phillips screwdriver, slowly back the screw out of the collar to a point at which the collar may be adjusted. Be careful not to back the screw completely out of the collar. Carefully rotate the collar on the stem until the float switches can move freely past one another. Tighten the stainless steel set screw and recheck.

Warning: *Be careful not to alter the the tether lengths of any of the floats. Alteration of the tether length may affect proper operation of the float switch assembly.*

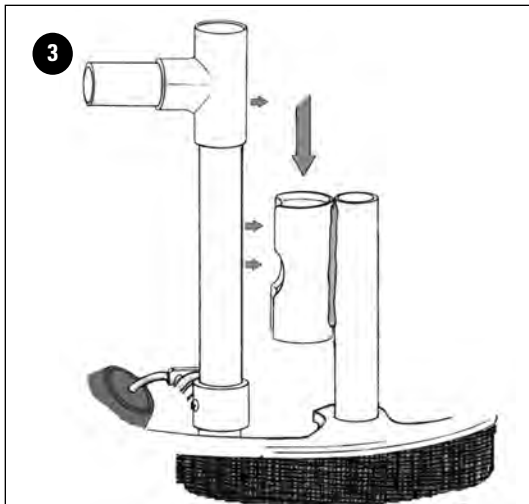


Step 4:

Check the float settings with the project plans and specifications. If the settings need to be adjusted, loosen the set screw as described in step 3.

Adjust the float switches to the desired level and tighten the set screw. Make sure float level settings do not violate any state or local regulations.

Note: The float stem provided is the maximum length possible without interfering with the pump minimum liquid level or screened pump vault intake ports. Never lengthen the float stem without prior approval from Orenco. Lengthening of the float stem will void the warranty.



Step 5:

Replace the float switch assembly in the holding bracket. Make sure the assembly snaps fully into the bracket.

Step 6:

To allow for easy removal of a float switch assembly, a 1" diameter handle may be added to the top of the float switch assembly. Measure the distance from the top of the float switch assembly up to about one foot from grade level. Cut a 1" diameter PVC pipe to the measured length and glue it into the handle.

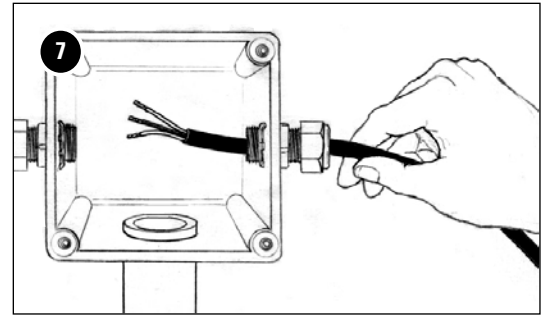
Installation Instructions (continued)

Step 7:

When used with an Orenco electrical splice box:

Push the level control wires through the watertight cord grips into the electrical splice box. Leave an adequate length of electrical cable coiled inside the riser to allow for easy removal of the pump and float switch assembly. **Do not remove the colored markers or the paper tags from the float cables, and do not try to thread the markers and tag through the cord grip.** Tighten the cord grips by hand, not by tool, then test the tightness of the cord grips by tugging on each cable. A cable is secure when the cord grip is tight enough to prevent slippage. Adequate lengths of cable should be left within the splice box to allow easy removal for future disconnecting and resplicing.

Note: See the splice box instructions (EIN-SB-SB-1) and corresponding splice box diagram for connection instructions.



Maintenance Instructions

During the annual inspection, follow the testing procedures provided to ensure that the system is operating properly. If a float is found to be faulty, either during the annual inspection or during troubleshooting after an alarm condition, see the section below titled Removing and Replacing Inoperative Floats.

Removing and Replacing Inoperative Floats

Important: Before doing any work either on the wiring to the level control floats and pump in the vault or in the pump control panel, switch the circuit breakers in the panel to their "OFF" positions; then switch off the power to the system at the service entrance panel.

1. Remove the float assembly from the vault.
2. Using a Phillips screwdriver, remove the stainless steel screws from the splice box lid, being careful not to drop the screws into the tank. If the splice box was submerged, or if there is a crack in the conduit, there may be water in the splice box. If this is the case, remove water from the splice box with a syringe, sponge, or other appropriate method. Loosen the cord grip at the splice box and verify the appropriate splice for the float. Unscrew the wire nuts and remove the float.
3. Remove the inoperative float and replace it with a new one. Push the float cable through the watertight cord grip into the electrical splice box. Leave an adequate length of electrical cord coiled inside the riser to allow for easy removal of the float assembly. Do not remove the colored markers or the paper tags from the float cords, and do not try to thread the markers and tag through the cord grip. Tighten the cord grip *by hand, not by tool*, then test the tightness of the cord grip by tugging on the cord. A cord is secure when the cord grip is tight enough to prevent slippage. An adequate length of cord should be left within the splice box to allow for easy removal for future disconnecting and resplicing.
4. Refer to document EIN-SB-SB-1 for instructions to splice the float wire to the wire from the control panel. Attach the float wires using the waterproof wire nuts. It is necessary to replace this wire nut with a new watertight wire nut. Always use watertight wire nuts or heat shrink splice kits for all connections!
5. Replace the float and collar and return the assembly to the pump vault.
6. Reconnect power and test the unit.

External Splice Box

Applications

The Orenco® External Splice Box attaches outside the access riser of an underground tank. It is engineered specifically for water and wastewater treatment systems and is especially suited for use in locations prone to high groundwater and other wet conditions. Its separate conduit hubs, large volume, and optional dividers make it useful for maintaining isolation of high and low voltage wires where needed. It has four cord grips which accommodate power cords for floats and pumps of 0.170 - 0.470 inches (4.3 - 11.9 mm) in diameter. Unused cord grips can be plugged watertight with the supplied cord grip plugs. Each External Splice Box is provided with a hole-cutting template to simplify installation on the riser and a 4-inch (100-mm) diameter grommet for the riser penetration.

**SBEX1-4, Use as Needed .
DO NOT CUT WIRES IN
SPLICE BOX IF POSSIBLE**

General

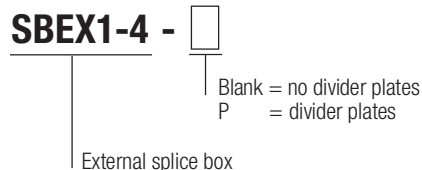
To specify the Orenco External Splice Box for your installation, require the following:

- Watertight for prolonged submergence per UL listing (Type 6P)
- Attachment external to access riser to allow inspection with no need to open the riser lid
- Volume of 100 in.³ (1639 cm³) for easy wiring access and to accommodate multiple wiring configurations
- Bottom entry, so conduit or direct-bury cable always remains below minimum burial depth
- Molded of UL (f1) rated plastic, resistant to cold and UV exposure, suitable for external applications
- Optional divider plates available for isolating high and low voltage wires from separate conduits or direct-bury cable

Standard Models

SBEX1-4, SBEX1-4-P

Product Code Diagram



The External Splice Box is molded of a UL (f1) rated PVC alloy. It has a UL Type 6P listing for prolonged submergence.

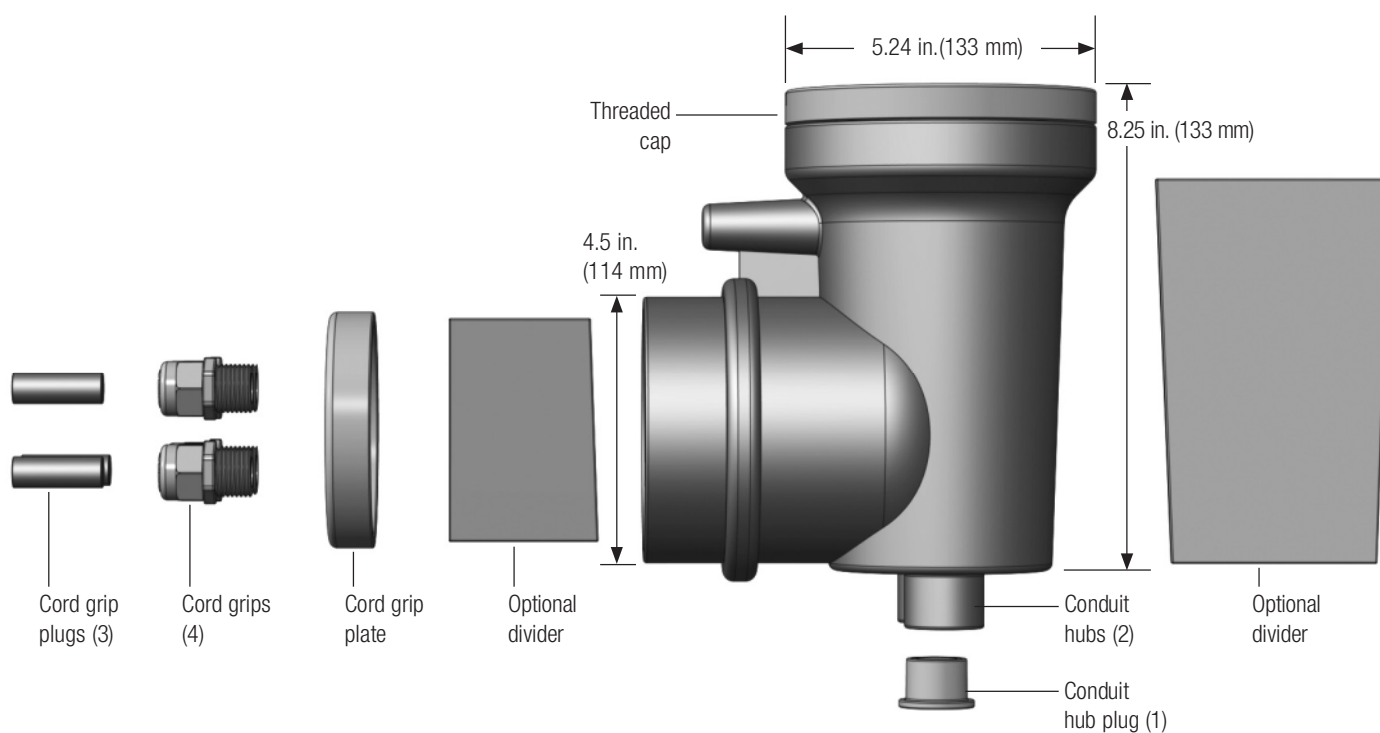
Physical Specifications

Volume	100 in.3 (1639 cm ³)
Cord grips	4 per SBEX
Cord grip plugs	3 per SBEX
Cord diameters accommodated	0.170- 0.470 in. (4.3 - 11.9 mm)
Conduit hubs	2
Conduit hub plug	1
Conduit sizes accommodated	¾ in., 1 in. (with coupling), ½ in. (with fitting or bell end)
Dia. of hole into riser	5 in. (127 mm), hole-cutting template included

Materials of Construction

Splice box	PVC alloy
Cord grips	Nylon
Cord grip plugs	EPDM rubber
O-rings	Buna rubber
Conduit hub plug	PVC per ASTM D-1784
4-in. (100-mm) grommet*	EPDM rubber

* Grommet not shown in illustration below



PF Series 60-Hz, 4-inch (100-mm) Submersible Effluent Pumps

Applications

Our 4-inch (100-mm) Submersible Effluent Pumps are designed to transport screened effluent (with low TSS counts) from septic tanks or separate dosing tanks. All our pumps are constructed of lightweight, corrosion-resistant stainless steel and engineered plastics; all are field-serviceable and repairable with common tools; 60-Hz PF Series models are CSA certified to the U.S. and Canadian safety standards for effluent pumps, meeting UL requirements.

Orenco's Effluent Pumps are used in a variety of applications, including pressurized drainfields, packed bed filters, mounds, aerobic units, effluent irrigation, effluent sewers, wetlands, lagoons, and more. These pumps are designed to be used with a Biotube® pump vault or after a secondary treatment system.



Powered by
Franklin Electric

Features/Specifications

To specify this pump for your installation, require the following:

- Minimum 24-hour run-dry capability with no deterioration in pump life or performance*
 - Patented 1/8-inch (3-mm) bypass orifice to ensure flow recirculation for motor cooling and to prevent air bind
 - Liquid end repair kits available for better long-term cost of ownership
 - TRI-SEAL™ floating impeller design on 10, 15, 20, and 30 gpm (0.6, 1.0, 1.3, and 1.9 L/sec) models; floating stack design on 50 and 75 gpm (3.2 and 4.7 L/sec) models
 - Franklin Electric Super Stainless motor, rated for continuous use and frequent cycling
 - Type SOOW 600-V motor cable
- Recirculation Pump: PF5005 11**

* Not applicable for 5-hp (3.73 kW) models

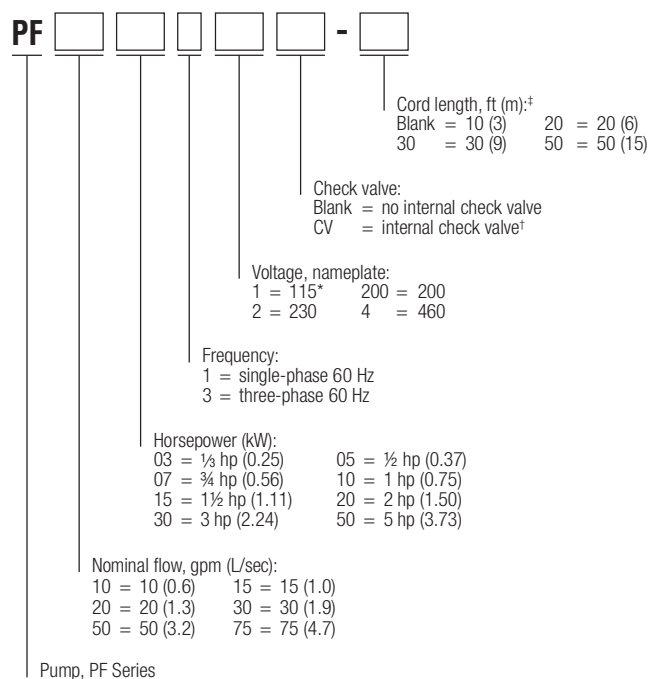
Recirculation Pump: PF5005 11

Dose Pump: PF2005 11

Standard Models

See specifications chart, pages 2-3, for a list of standard pumps. For a complete list of available pumps, call Orendo.

Product Code Diagram



* 1/2-hp (0.37kW) only

[†] Available for 10 gpm (0.6 L/sec). 1/2 hp (0.37 kW) only

* Note: 20-ft cords are available only for single-phase pumps through 1½ hp

Specifications

Pump Model	Design gpm (L/sec)	Horsepower (kW)	Phase	Nameplate voltage	Actual voltage	Design flow amps	Max amps	Impellers	Discharge size and material ¹	Length, in. (mm)	Min. liquid level, ² in. (mm)	Weight, ³ lb (kg)	Rated cycles/day
PF100511	10 (0.6)	0.50 (0.37)	1	115	120	12.7	12.7	6	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF100511CV	10 (0.6)	0.50 (0.37)	1	115	120	12.7	12.7	6	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF100512	10 (0.6)	0.50 (0.37)	1	230	240	6.3	6.3	6	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF10053200	10 (0.6)	0.50 (0.37)	3	200	208	3.8	3.8	6	1 ¼ in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF100712 ^{4, 5}	10 (0.6)	0.75 (0.56)	1	230	240	8.3	8.3	8	1 ¼ in. GFP	25.9 (658)	17 (432)	30 (14)	300
PF10073200 ^{4, 5}	10 (0.6)	0.75 (0.56)	3	200	208	5.1	5.2	8	1 ¼ in. GFP	25.4 (645)	17 (432)	31 (14)	300
PF101012 ^{5, 6}	10 (0.6)	1.00 (0.75)	1	230	240	9.6	9.6	9	1 ¼ in. GFP	27.9 (709)	18 (457)	33 (15)	100
PF10103200 ^{5, 6}	10 (0.6)	1.00 (0.75)	3	200	208	5.5	5.5	9	1 ¼ in. GFP	27.3 (693)	18 (457)	37 (17)	300
PF102012 ^{5, 6, 7, 8}	10 (0.6)	2.00 (1.49)	1	230	240	12.1	12.1	18	1 ¼ in. SS	39.5 (1003)	22 (559)	48 (22)	100
PF102032 ^{5, 6, 8}	10 (0.6)	2.00 (1.49)	3	230	240	7.5	7.6	18	1 ¼ in. SS	37.9 (963)	20 (508)	44 (20)	300
PF10203200 ^{5, 6, 8}	10 (0.6)	2.00 (1.49)	3	200	208	8.7	8.7	18	1 ¼ in. SS	37.9 (963)	20 (508)	44 (20)	300
PF150311	15 (1.0)	0.33 (0.25)	1	115	120	8.7	8.8	3	1 ¼ in. GFP	19.5 (495)	15 (380)	23 (10)	300
PF150312	15 (1.0)	0.33 (0.25)	1	230	240	4.4	4.5	3	1 ¼ in. GFP	19.5 (495)	15 (380)	23 (10)	300
PF200511	20 (1.3)	0.50 (0.37)	1	115	120	12.3	12.5	4	1 ¼ in. GFP	22.3 (566)	18 (457)	25 (11)	300
PF200512	20 (1.3)	0.50 (0.37)	1	230	240	6.4	6.5	4	1 ¼ in. GFP	22.5 (572)	18 (457)	26 (12)	300
PF20053200	20 (1.3)	0.50 (0.37)	3	200	208	3.7	3.8	4	1 ¼ in. GFP	22.3 (566)	18 (457)	26 (12)	300
PF201012 ^{4, 5}	20 (1.3)	1.00 (0.75)	1	230	240	10.5	10.5	7	1 ¼ in. GFP	28.4 (721)	20 (508)	33 (15)	100
PF20103200 ^{4, 5}	20 (1.3)	1.00 (0.75)	3	200	208	5.8	5.9	7	1 ¼ in. GFP	27.8 (706)	20 (508)	33 (15)	300
PF201512 ^{4, 5}	20 (1.3)	1.50 (1.11)	1	230	240	12.4	12.6	9	1 ¼ in. GFP	34.0 (864)	24 (610)	41 (19)	100
PF20153200 ^{4, 5}	20 (1.3)	1.50 (1.11)	3	200	208	7.1	7.2	9	1 ¼ in. GFP	30.7 (780)	20 (508)	35 (16)	300
PF300511	30 (1.9)	0.50 (0.37)	1	115	120	11.8	11.8	3	1 ¼ in. GFP	21.3 (541)	20 (508)	28 (13)	300
PF300512	30 (1.9)	0.50 (0.37)	1	230	240	6.2	6.2	3	1 ¼ in. GFP	21.3 (541)	20 (508)	25 (11)	300
PF30053200	30 (1.9)	0.50 (0.37)	3	200	208	3.6	3.6	3	1 ¼ in. GFP	21.3 (541)	20 (508)	25 (11)	300
PF300712	30 (1.9)	0.75 (0.56)	1	230	240	8.5	8.5	5	1 ¼ in. GFP	24.8 (630)	21 (533)	29 (13)	300
PF30073200	30 (1.9)	0.75 (0.56)	3	200	208	4.9	4.9	5	1 ¼ in. GFP	24.6 (625)	21 (533)	30 (14)	300
PF301012 ⁴	30 (1.9)	1.00 (0.75)	1	230	240	10.4	10.4	6	1 ¼ in. GFP	27.0 (686)	22 (559)	32 (15)	100
PF30103200 ⁴	30 (1.9)	1.00 (0.75)	3	200	208	5.8	5.8	6	1 ¼ in. GFP	26.4 (671)	22 (559)	33 (15)	300
PF301512 ^{4, 5}	30 (1.9)	1.50 (1.11)	1	230	240	12.6	12.6	8	1 ¼ in. GFP	32.8 (833)	24 (610)	40 (18)	100
PF30153200 ^{4, 5}	30 (1.9)	1.50 (1.11)	3	200	208	6.9	6.9	8	1 ¼ in. GFP	29.8 (757)	22 (559)	34 (15)	300
PF301534 ^{4, 5}	30 (1.9)	1.50 (1.11)	3	460	480	2.8	2.8	8	1 ¼ in. GFP	29.5 (685)	22 (559)	34 (15)	300
PF302012 ^{5, 6, 7}	30 (1.9)	2.00 (1.49)	1	230	240	11.0	11.0	10	1 ¼ in. SS	35.5 (902)	26 (660)	44 (20)	100
PF30203200 ^{5, 6}	30 (1.9)	2.00 (1.49)	3	200	208	9.3	9.3	10	1 ¼ in. SS	34.0 (864)	24 (610)	41 (19)	300
PF303012 ^{5, 6, 7, 8}	30 (1.9)	3.00 (2.23)	1	230	240	16.8	16.8	14	1 ¼ in. SS	44.5 (1130)	33 (838)	54 (24)	100
PF303032 ^{5, 6, 8}	30 (1.9)	3.00 (2.23)	3	230	240	10.0	10.1	14	1 ¼ in. SS	44.3 (1125)	27 (686)	52 (24)	300
PF305012 ^{5, 6, 7, 8}	30 (1.9)	5.00 (3.73)	1	230	240	25.6	25.8	23	1 ¼ in. SS	66.5 (1689)	53 (1346)	82 (37)	100
PF305032 ^{5, 6, 8}	30 (1.9)	5.00 (3.73)	3	230	240	16.6	16.6	23	1 ¼ in. SS	60.8 (1544)	48 (1219)	66 (30)	300
PF30503200 ^{5, 6, 8}	30 (1.9)	5.00 (3.73)	3	200	208	18.7	18.7	23	1 ¼ in. SS	60.8 (1544)	48 (1219)	66 (30)	300
PF500511	50 (3.2)	0.50 (0.37)	1	115	120	12.1	12.1	2	2 in. SS	20.3 (516)	24 (610)	27 (12)	300
PF500512	50 (3.2)	0.50 (0.37)	1	230	240	6.2	6.2	2	2 in. SS	20.3 (516)	24 (610)	27 (12)	300
PF500532	50 (3.2)	0.50 (0.37)	3	230	240	3.0	3.0	2	2 in. SS	20.3 (516)	24 (610)	28 (13)	300
PF50053200	50 (3.2)	0.50 (0.37)	3	200	208	3.7	3.7	2	2 in. SS	20.3 (516)	24 (610)	28 (13)	300
PF500534	50 (3.2)	0.50 (0.37)	3	460	480	1.5	1.5	2	2 in. SS	20.3 (516)	24 (610)	28 (13)	300
PF500712	50 (3.2)	0.75 (0.56)	1	230	240	8.5	8.5	3	2 in. SS	23.7 (602)	25 (635)	31 (14)	300
PF500732	50 (3.2)	0.75 (0.56)	3	230	240	3.9	3.9	3	2 in. SS	23.7 (602)	25 (635)	32 (15)	300

Specifications, cont.

Pump Model	Design gpm (L/sec)	Horsepower (kW)	Phase	Nameplate voltage	Actual voltage	Design flow amps	Max amps	Impellers	Discharge size and material ¹	Length, in. (mm)	Min. liquid level, ² in. (mm)	Weight, ³ lb (kg)	Rated cycles/day
PF50073200	50 (3.2)	0.75 (0.56)	3	200	208	4.9	4.9	3	2 in. SS	23.1 (587)	26 (660)	32 (15)	300
PF500734	50 (3.2)	0.75 (0.56)	3	460	480	1.8	1.8	3	2 in. SS	34.8 (884)	25 (635)	31 (14)	300
PF501012	50 (3.2)	1.00 (0.75)	1	230	240	10.1	10.1	4	2 in. SS	27.0 (686)	26 (660)	35 (16)	100
PF50103200	50 (3.2)	1.00 (0.75)	3	200	208	5.7	5.7	4	2 in. SS	26.4 (671)	26 (660)	39 (18)	300
PF501034	50 (3.2)	1.00 (0.75)	3	460	480	2.2	2.2	4	2 in. SS	26.4 (671)	26 (660)	39 (18)	300
PF501512 ⁴	50 (3.2)	1.50 (1.11)	1	230	240	12.5	12.6	5	2 in. SS	32.5 (826)	30 (762)	41 (19)	100
PF50153200 ⁴	50 (3.2)	1.50 (1.11)	3	200	208	7.0	7.0	5	2 in. SS	29.3 (744)	26 (660)	35 (16)	300
PF503012 ^{4, 5, 7, 8}	50 (3.2)	3.00 (2.23)	1	230	240	17.7	17.7	8	2 in. SS	43.0 (1092)	37 (940)	55 (25)	100
PF50303200 ^{4, 5, 8}	50 (3.2)	3.00 (2.23)	3	200	208	13.1	13.1	8	2 in. SS	43.4 (1102)	30 (762)	55 (25)	300
PF503034 ^{4, 5, 8}	50 (3.2)	3.00 (2.23)	3	460	480	5.3	5.3	8	2 in. SS	40.0 (1016)	31 (787)	55 (25)	300
PF505012 ^{5, 6, 7, 8}	50 (3.2)	5.00 (3.73)	1	230	240	26.2	26.4	13	2 in. SS	65.4 (1661)	55 (1397)	64 (29)	300
PF505032 ^{5, 6, 7, 8}	50 (3.2)	5.00 (3.73)	3	230	240	16.5	16.5	13	2 in. SS	59.3 (1506)	49 (1245)	64 (29)	300
PF751012	75 (4.7)	1.00 (0.75)	1	230	240	9.9	10.0	3	2 in. SS	27.0 (686)	27 (686)	34 (15)	100
PF751512	75 (4.7)	1.50 (1.11)	1	230	240	12.1	12.3	4	2 in. SS	33.4 (848)	30 (762)	44 (20)	100

¹ GFP = glass-filled polypropylene; SS = stainless steel. The 1 ¼-in. NPT GFP discharge is 2 7/8 in. octagonal across flats; the 1 ¼-in. NPT SS discharge is 2 1/8 in. octagonal across flats; and the 2-in. NPT SS discharge is 2 7/8 in. hexagonal across flats. Discharge is female NPT threaded, U.S. nominal size, to accommodate Orenco® discharge hose and valve assemblies. Consult your Orenco Distributor about fittings to connect hose and valve assemblies to metric-sized piping.

² Minimum liquid level is for single pumps when installed in an Orenco Biotube® Pump Vault or Universal Flow Inducer. In other applications, minimum liquid level should be top of pump. Consult Orenco for more information.

³ Weight includes carton and 10-ft (3-m) cord.

⁴ High-pressure discharge assembly required.

⁵ Do not use cam-lock option (Q) on discharge assembly.

⁶ Custom discharge assembly required for these pumps. Contact Orenco.

⁷ Capacitor pack (sold separately or installed in a custom control panel) required for this pump. Contact Orenco.

⁸ Torque locks are available for all pumps, and are supplied with 3-hp and 5-hp pumps.

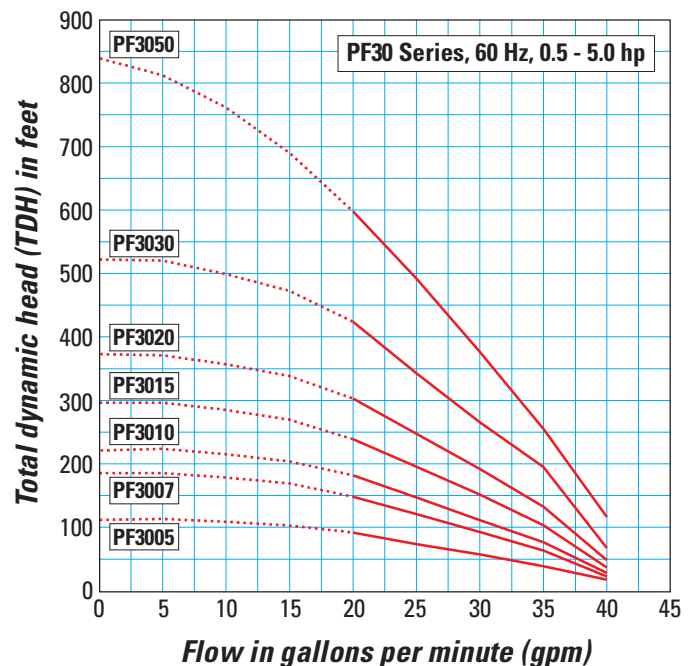
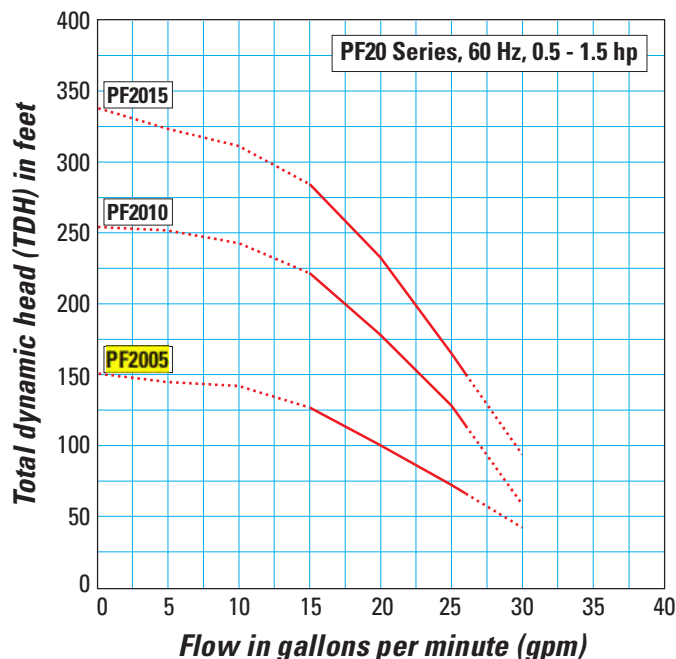
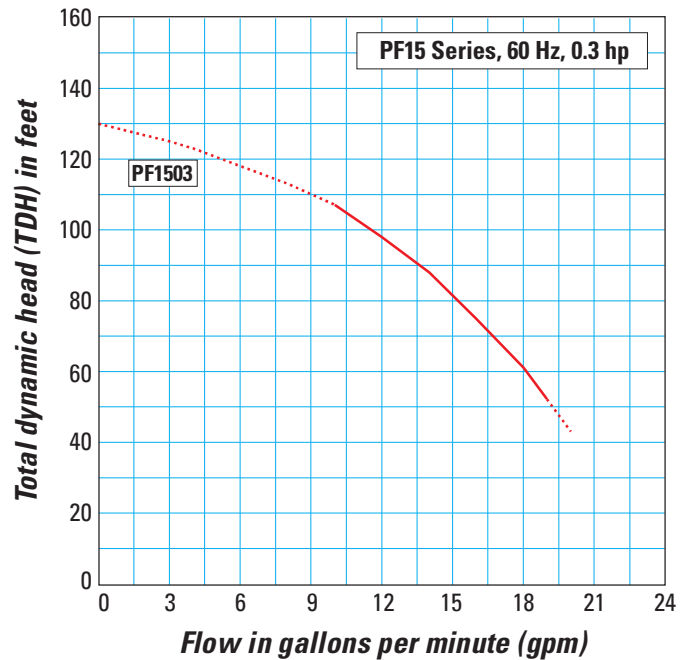
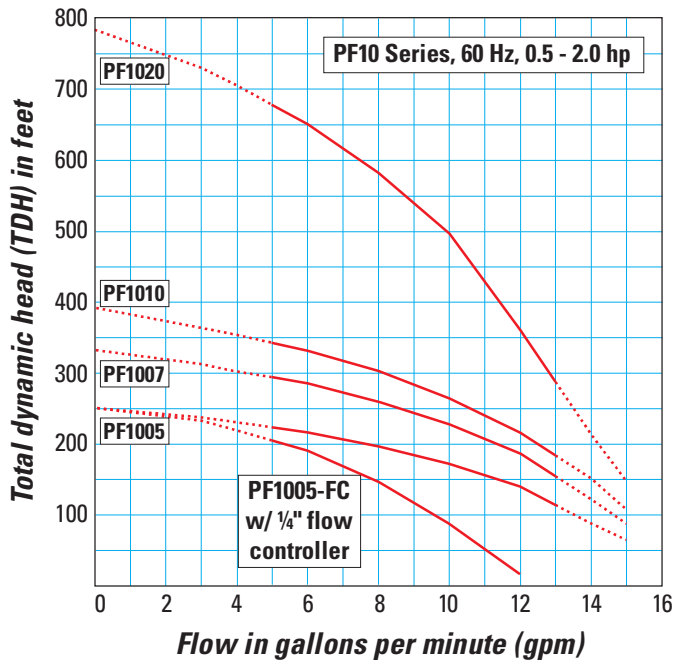
Materials of Construction

Discharge	Glass-filled polypropylene or stainless steel
Discharge bearing	Engineered thermoplastic (PEEK)
Diffusers	Glass-filled PPO (Noryl GFN3)
Impellers	Celcon® acetal copolymer on 10-, 20, and 30-gpm models; 50-gpm impellers are Noryl GFN3
Intake screen	Polypropylene
Suction connection	Stainless steel
Drive shaft	7/16 inch hexagonal stainless steel, 300 series
Coupling	Sintered stainless steel, 300 series
Shell	Stainless steel, 300 series
Motor	Franklin motor exterior constructed of stainless steel. Motor filled with deionized water and propylene glycol for constant lubrication. Hermetically sealed motor housing ensures moisture-free windings. All thrust absorbed by Kingsbury-type thrust bearing. Rated for continuous duty. Single-phase motors and 200 and 230 V 3-phase motors equipped with surge arrestors for added security. Single-phase motors through 1.5 hp (1.11 kW) have built-in thermal overload protection, which trips at 203-221° F (95-105° C).

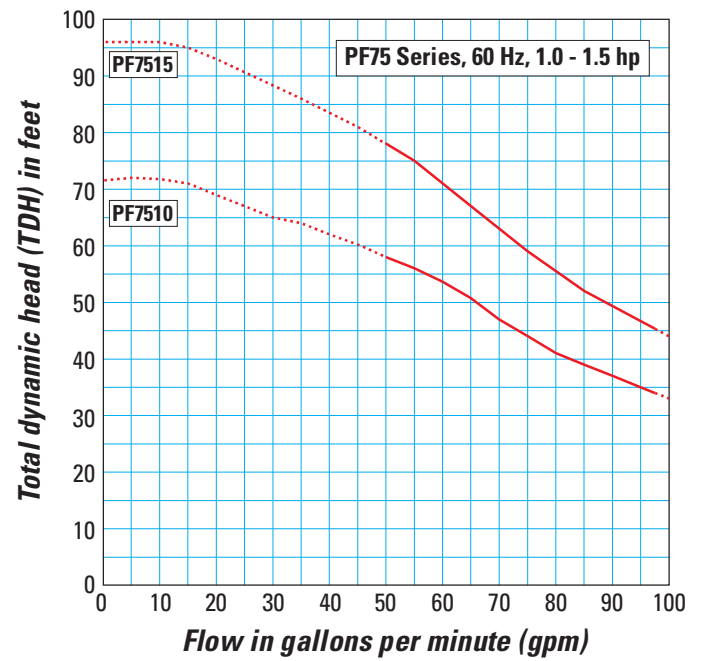
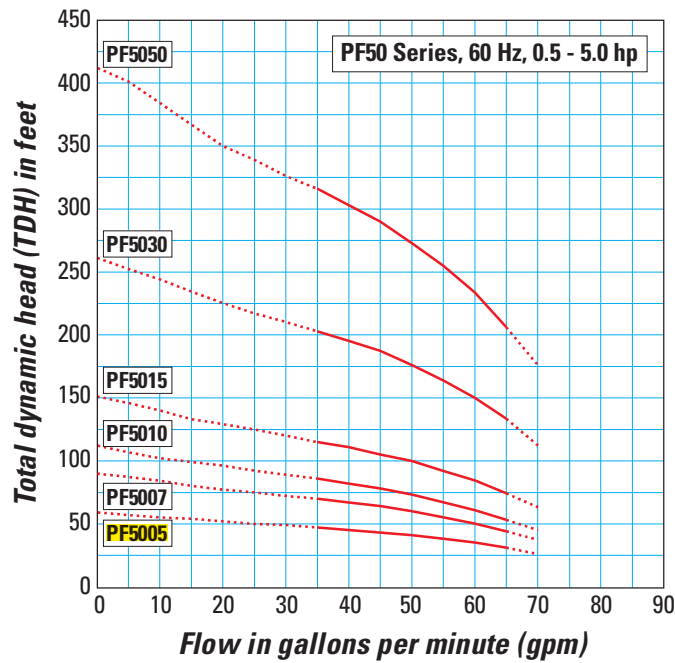
Using a Pump Curve

A *pump curve* helps you determine the best pump for your system. Pump curves show the relationship between flow and pressure (total dynamic head, or TDH), providing a graphical representation of a pump's optimal performance range. Pumps perform best at their nominal flow rate. These graphs show optimal pump operation ranges with a solid line and show flow rates outside of these ranges with a dashed line. For the most accurate pump specification, use Orenco's PumpSelect™ software.

Pump Curves



Pump Curves, cont.

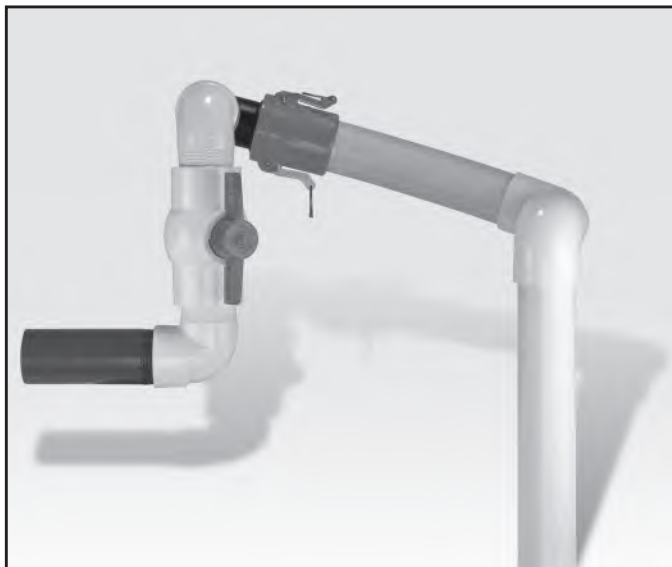


Discharge Assemblies

Applications

Orenco Discharge Assemblies are used to convey effluent from a pump to the exterior of a riser or pump basin. They come in the following configurations:

- High head, for use with submersible turbine pumps
- Low head, for use with common effluent pumps
- Drainback, for use with shallowly buried tanks and transport lines in cold climates
- Two additional applications are available:
- The cold weather kit coupled with a high-head discharge assembly is intended for use with deeply buried tanks and transport lines in cold weather
- The external flex extension is recommended for installations where tank settling may occur to avoid line breakage during settling.



High head style shown with optional quick-disconnect

General

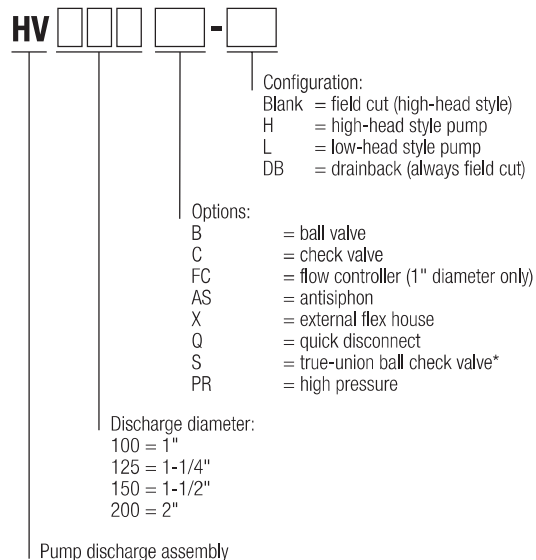
Orenco Discharge Assemblies are corrosion-resistant and adjustable for a proper fit. Discharge assemblies are composed of PVC valves and flexible hose that simplify installation and maintenance. The flexible hose damps vibrations from the pump and allows for easy installation. Cam-style quick-disconnect fittings are available on all configurations. All parts are either solvent welded or threaded and sealed with Teflon® paste.

Teflon® is a registered trademark of DuPont.

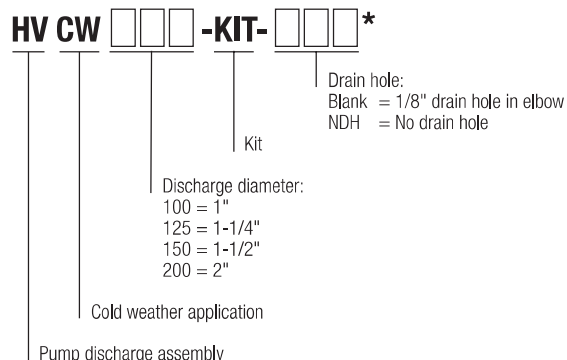
Standard Models

HV100, HV125, HV150, HV200

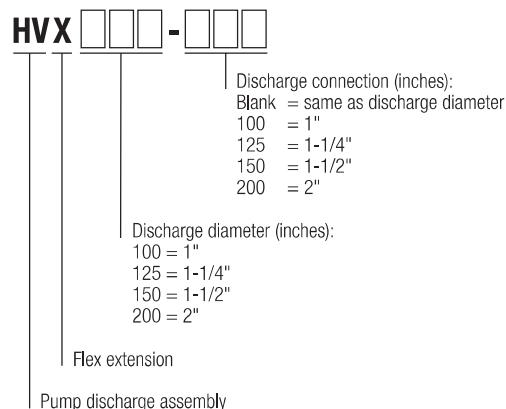
Product Code Diagram



* Available for 1-1/2" discharge only



* Always ordered with high head discharge assembly





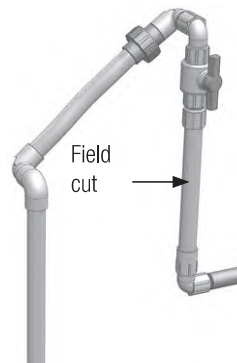
High head style



Drainback style



Low head style



High head style with cold weather kit installed



Cold weather kit



External flex extension

Component Working Pressure Ratings

True union ball check valve	200 psi (14 bar) at 73° F (23° C)
All other valves	150 psi (10 bar) at 73° F (23° C)
Unions	150 psi (10 bar) at 73° F (23° C)

Materials of Construction

Component	Material
Anti-siphon valve	Schedule 40 PVC
Ball valve	Schedule 40 PVC
Check valve	Schedule 40 PVC
Pipe and fittings	Schedule 40 PVC
Flexible hose	PVC
External flex hose	PVC
Flow control disc	Schedule 80 PVC
Gate valve	Schedule 80 PVC
Unions	Schedule 80 PVC
High-pressure flex hose	Special elastomer compound

Hose Specifications

Thickness and working pressures at 73° F (23° C)

Flexible hoses	Size (U.S. Nominal)	Wall thickness	Working pressure	Bursting pressure
(standard and external)	1 in.	0.11 in. (2.8 mm)	100 psi (7 bar)	355 psi (24 bar)
	1.25 in.	0.13 in. (3.3 mm)	80 psi (6 bar)	250 psi (17 bar)
	1.5 in.	0.13 in. (3.3 mm)	65 psi (4 bar)	200 psi (14 bar)
	2 in.	0.16 in. (4.1 mm)	60 psi (4 bar)	175 psi (12 bar)
Flexible hoses	Size (U.S. Nominal)	Wall thickness	Working pressure	Bursting pressure
(high-pressure)	1 in.	0.235 in. (6.0 mm)	250 psi (17 bar)	N/A
	1.25 in.	0.24 in. (6.1 mm)	250 psi (17 bar)	N/A
	1.5 in.	0.24 in. (6.1 mm)	250 psi (17 bar)	N/A
	2 in.	0.22 in. (5.6 mm)	200 psi (14 bar)	N/A

Pump and Discharge Plumbing

Installation Instructions for 4-in. (100-mm) Pumps and HV-Style Discharge Assemblies

These instructions explain how to install an Orenco 4-in. (100-mm) submersible effluent pump and an HV-style discharge assembly into an Orenco pump vault or flow inducer. For other installation options, contact your Distributor or Orenco. For wiring instructions, see the schematics and wiring diagrams included with the pump's control panel.

Step 1: Prep Pump and Discharge Stem

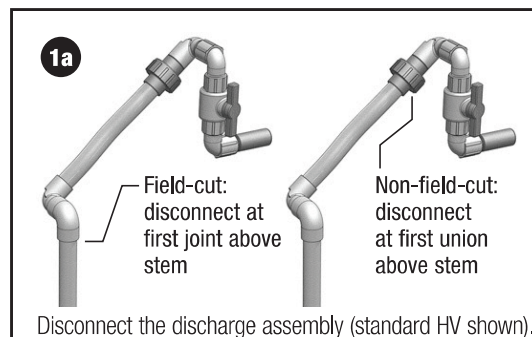
Step 1a: Disconnect the discharge assembly above the discharge stem.

- Field-cut assembly: disconnect at the first pipe joint above the stem.
- Non-field-cut assembly: disconnect at the first union above the stem.

Step 1b: Apply Teflon® paste or tape to the threads on the stem's bottom fitting.

Step 1c: Screw the stem's bottom fitting into the top of the pump.

- Do not tighten the fitting to more than hand-tight.



Step 2: Install Pump and Discharge Stem

Step 2a: Make sure that the pump vault or flow inducer has been installed.

Step 2b: Lower the pump and stem into the pump vault's flow inducer compartment or into the flow inducer.

IMPORTANT: DO NOT lower the pump by the cord! This can damage the pump!

- The base of the pump rests on the bottom of the vault or flow inducer.



Step 3: Install Upper Discharge Assembly

Install the upper portion of the discharge assembly. Position it to allow the best possible access to the quick disconnect union or ball valve (where used), and to allow easy removal of the float switch assembly and Biotube® filter cartridge.

Step 3a: Lubricate the inside of the discharge pipe grommet and the outside of the discharge assembly nipple with petroleum jelly or a similar product.

Step 3b: Push the nipple of the discharge assembly through the grommet.

- Make sure there is enough nipple outside the riser to attach a coupling.

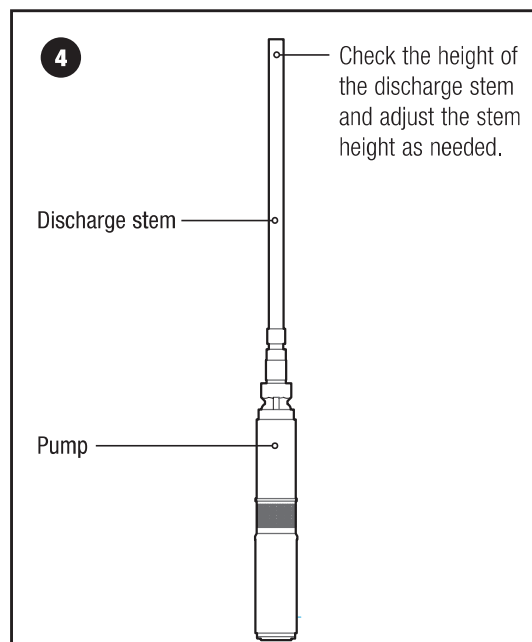
Step 3c: Route the discharge assembly to the top of the discharge stem.

- The section of the discharge assembly above the stem should be routed along the riser wall, as close to it as possible.

Step 4: Adjust Discharge Stem Height (If Necessary)

Before reconnecting the discharge stem to the rest of the discharge assembly, check the height of the stem and adjust it, if necessary.

- Field-cut stems must be measured for height and adjusted as needed.
- Non-field-cut stems may also require adjustment.
- If no adjustment is necessary, go to Step 5.



Step 4: Adjust Discharge Stem Height (If Necessary), cont.

Step 4a: Dry fit the stem to the rest of the discharge assembly.

- If the stem is too long, mark the stem at the location where it needs to be cut in order to provide the best access to key components.
- If the stem is too short, measure the additional distance necessary in order to provide the best access to key components.

Step 4b: If necessary, make adjustments to the stem length.

- To cut the stem ...
 - ~ Remove the pump and stem from the vault or flow inducer.
 - ~ Cut the stem off at the mark.
 - ~ Deburr the cut on the stem.
- To add length to the stem ...
 - ~ Cut a section of pipe equal to the additional necessary distance for an easy-to-service installation.
 - ~ Deburr the cuts on the pipe section.
 - ~ Glue the section to the stem with an appropriately sized pipe coupling.

Step 4c: Dry fit the stem to the rest of the discharge assembly.

Step 4d: If the pump and stem have been removed, lower the pump and stem back into the pump vault's flow inducer compartment or into the flow inducer.

IMPORTANT: DO NOT lower the pump by the cord! This can damage the pump!

Step 5: Reassemble Discharge Assembly

Step 5a: Reconnect the discharge assembly.

- Field-cut type assemblies: glue the stem to the rest of the discharge assembly at the first pipe joint above the top of the stem.
- Non-field-cut type assemblies: reconnect the stem and discharge assembly at the first union above the stem.

Step 5b: Check and tighten all of the fittings on the discharge assembly.

- Hand-tighten all threaded connections to snug — do not overtighten.
- Make sure all slip-fit connections are glued and secure.

Step 5c: Install the external flex extension, if necessary.

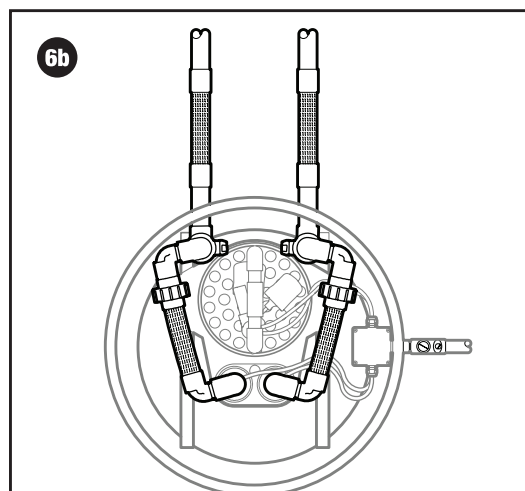
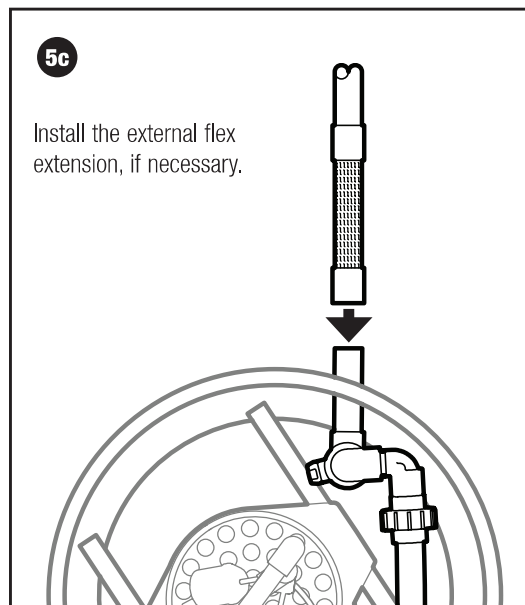
- Clean the lubricant off of the discharge nipple.
- Glue the external flex extension to the end of the discharge nipple.

Step 6: Final Installation Checks

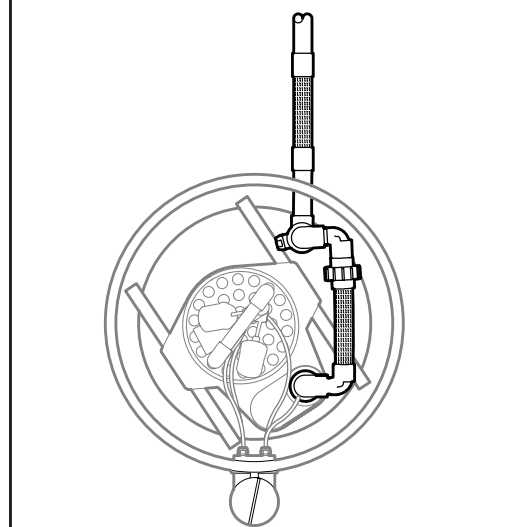
Step 6a: Neatly coil the pump cord and secure it inside of the riser.

Step 6b: Make sure the pump vault or flow inducer and discharge assembly are positioned for easy access to key components.

- Check for easy access to the ...
 - ~ Float switch assembly
 - ~ Biotube® filter cartridge
 - ~ Pump vault or flow inducer



Example installation — duplex pump system, top view



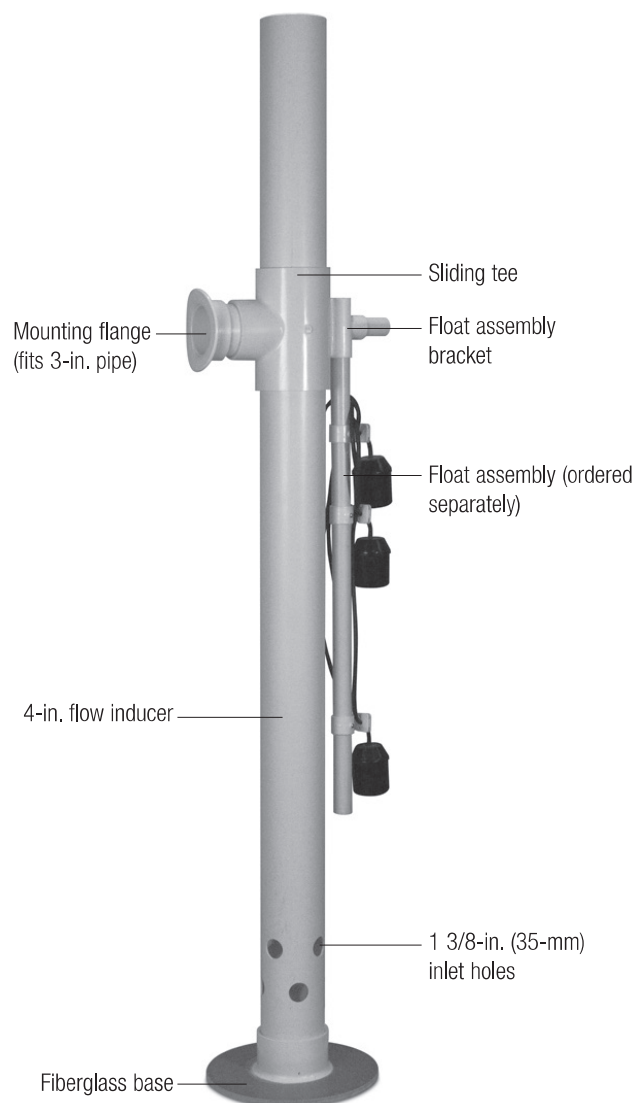
Example installation — simplex pump system, top view

Universal Flow Inducer

Applications

Orenco's Universal Flow Inducer houses any Orenco high-head effluent pump in applications where filtration is not necessary. The base rests on the bottom of the tank, and the mounting flange is epoxied to a PVC riser. The flow inducer can be lengthened or shortened to fit any tank. The tee, which holds the mounting flange and float assembly bracket, slides to any position along the flow inducer. A float assembly (ordered separately) snaps into the bracket. Applications include:

- Pump tanks
- Disinfection systems
- Effluent reuse systems
- Cisterns



General

To specify this product, require the following:

- Class 125 4-in. (nominal) PVC pipe body
- Injection-molded ABS mounting flange
- Injection-molded holster for float tree
- Ability to accommodate flows as great as 65 gpm (4.1 L/sec)

Standard Model

UFI-4

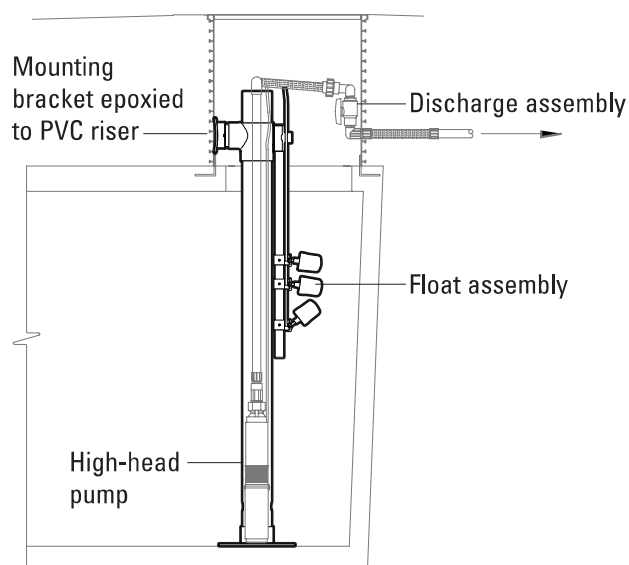
Field Dosing Tank

Materials of Construction

Flow inducer	Class 125 PVC
Mounting flange	Injection-molded ABS
Base	Fiberglass-reinforced polyester

Specifications

Dimensions	
Flow inducer diameter	4" nominal
Height	72" (1828 mm) (can be lengthened or shortened)
Shipping weight	13 lb (5.9 kg)



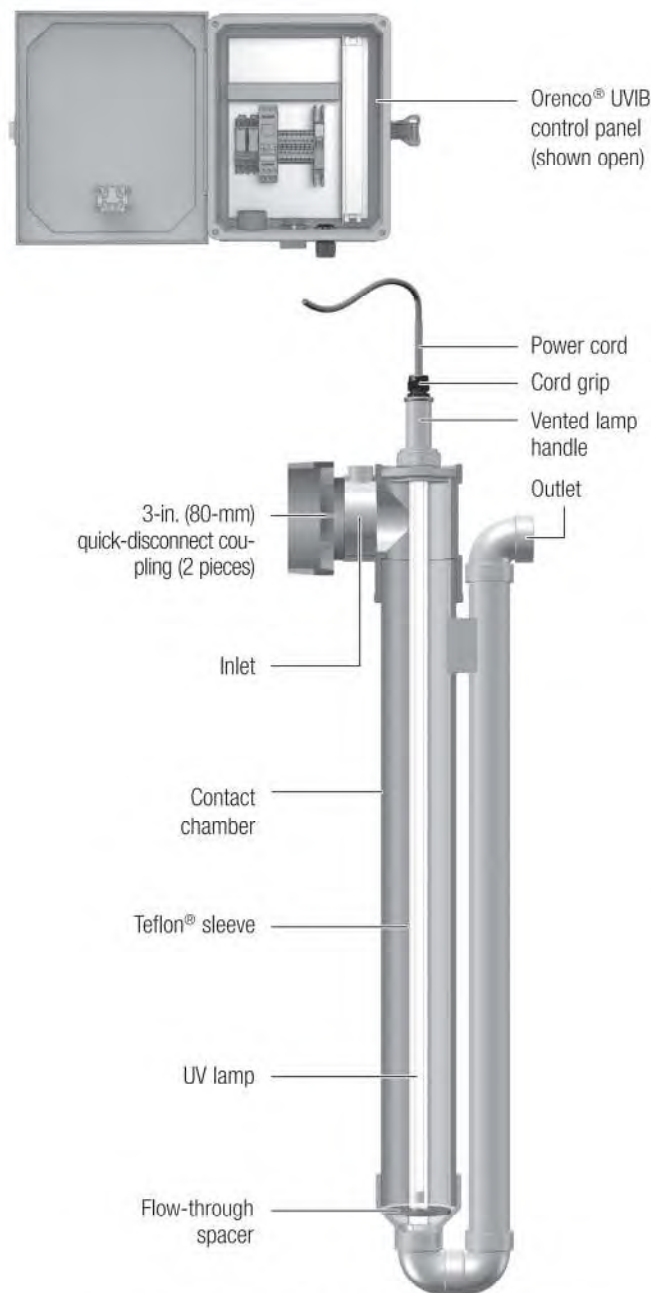
*Typical installation in concrete pump tank. Use screws to secure mounting bracket to riser while epoxy cures.

Orenco® UV Disinfection Unit

Applications

The Orenco® UV Disinfection Unit is designed for use in residential applications after advanced secondary treatment (10 mg/L cBOD5 and TSS) when disinfection is required before dispersal.

It requires installation inside a pump or gravity discharge basin or in a separate tank following an advanced secondary treatment system.



Orenco® UV Disinfection Unit, Cutaway View

General

Treated effluent flows by gravity through the contact chamber and around the UV lamp where it is disinfected in a 360-degree contact zone. The unit uses no chemicals and has no moving parts. It requires annual cleaning and lamp replacement.

In side-by-side NSF® testing, the Orenco UV Disinfection Unit reduced bacteria by 99.999% (5 logs), meeting or exceeding the performance of other residential UV disinfection units.

The Orenco UV Disinfection Unit comes with a power ballast and a lamp current sensor, housed in an Orenco control panel to protect the UV unit's electronic components. The control panel is installed externally, outside of the wet well.

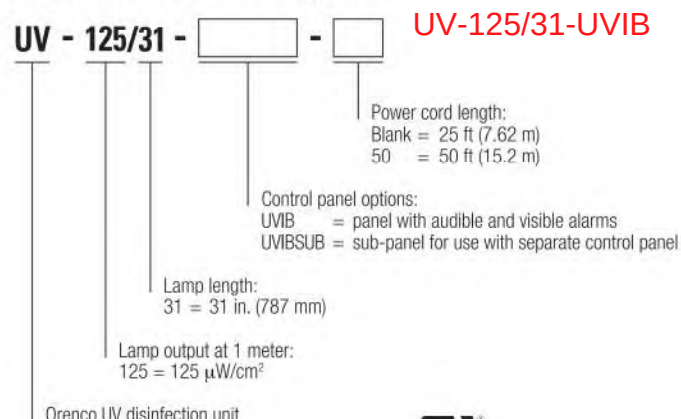
Features/Specifications

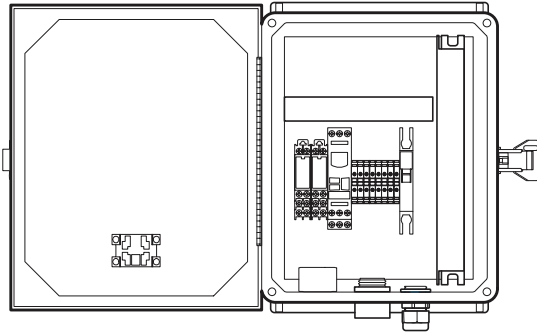
- UL-recognized for US and Canada
- Bacteria reduced by 99.999% (5 logs)
- Flow path designed for maximum contact time between effluent and lamp
- Components designed to work together — no piecemeal disinfection assemblies and wiring
- Teflon sleeve to protect lamp and minimize buildup and service intervals
- Quick-disconnect fitting for easy inspection and unit cleaning
- Power ballast and lamp current sensor housed in a control panel (not in a wet well) to minimize corrosion and failure due to environmental exposure

Standard Models

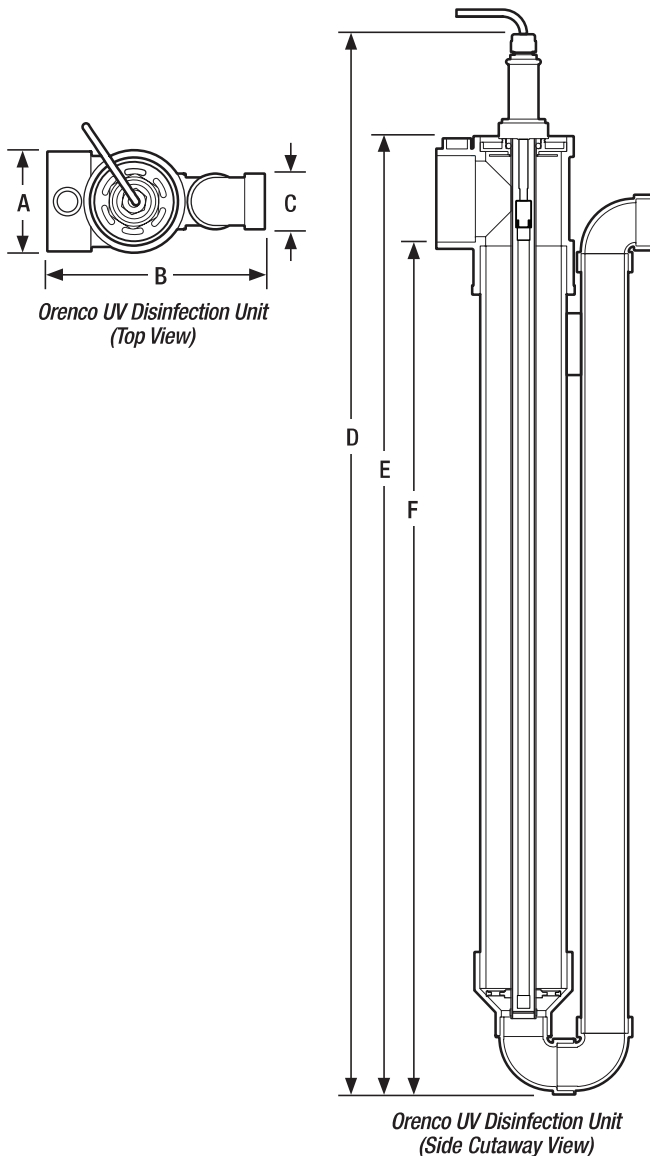
UV-125/31-UVIB, UV-125/31-UVIBSUB

Product Code Diagram





*Orenco UVIB Control Panel
(Shown Opened)*



*Orenco UV Disinfection Unit
(Side Cutaway View)*

Materials of Construction

Panel enclosure	UV-resistant fiberglass, UL Type 4X rated
Hinges and latches	Stainless steel
Cord grip	Nylon
Contact chamber	3-in. (80-mm) diameter Sch 40 black ABS
Inlet tee	3-in. (80-mm) Sch 40 black ABS
Other fittings	Black ABS
Quick-disconnect coupling	Black ABS
1½-in. IPS outlet	Black ABS
Lamp assembly seal	EPDM rubber
Lamp sleeve	Teflon®

Specifications

Panel Dimensions, in. (mm)

Height	11.5 (290)
Width	9.5 (240)
Depth	5.4 (135)

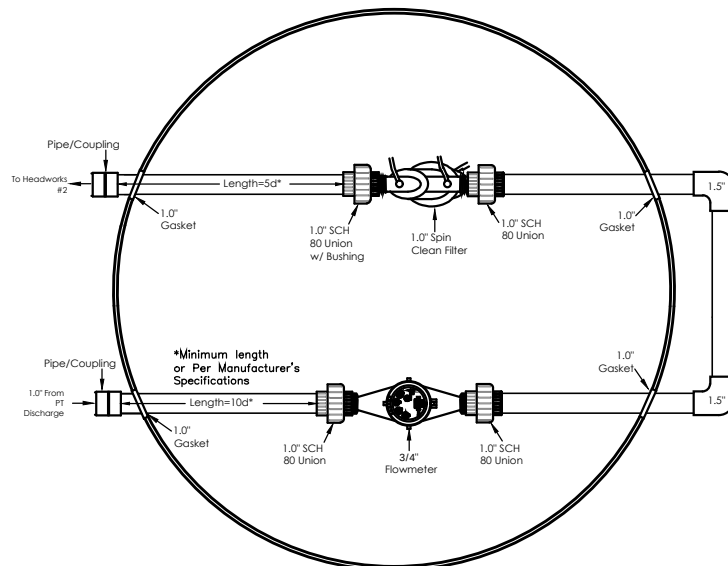
UV Unit Dimensions, in. (mm)

A	5.63 (143)
B	10.06 (256)
C	1.50 IPS (40 DN)
D	42.25 (1073)
E	38.56 (979)
F	34.50 (876)
Inlet-to-outlet fall	0.50 (13)

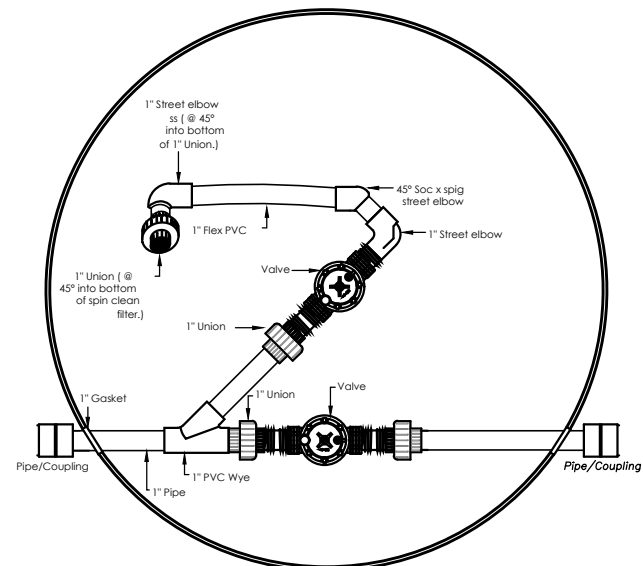
UV Unit Performance

Typical contact chamber UV dose (65% transmittance, 20% lamp degradation)	276,000 $\mu\text{W}\cdot\text{s}/\text{cm}^2$ at 1 gpm (0.06 L/sec) 55,000 $\mu\text{W}\cdot\text{s}/\text{cm}^2$ at 5 gpm (0.32 L/sec) 28,000 $\mu\text{W}\cdot\text{s}/\text{cm}^2$ at 10 gpm (0.63 L/sec)
Minimum target dose	30,000-38,000 $\mu\text{W}\cdot\text{s}/\text{cm}^2$
Lamp	31 inches (787 mm), 92 VAC, 50 or 60 Hz, 425 mA, 38 W; 254 nm UVC intensity at 1m is 125 $\mu\text{W}/\text{cm}^2$
Power cord	600V, 18/2 UL Type TC
Cord plug	UL listed four-pin connector, lampholder, electric discharge, 1000 V or less
Ballast	120V, AC, 50 or 60 Hz, located in UL listed Orenco® control panel
Audible alarm*	95 dB at 24 in. (610 mm), warble-tone sound
Visual alarm*	⅞-in. (22-mm) diameter red lens, "Push-to-silence." UL Type 4X rated, 1 W LED light, 120 V
Circuit breaker	10 A, OFF/ON switch. Single-pole 120 V*. DIN rail mounting with thermal magnetic tripping characteristics

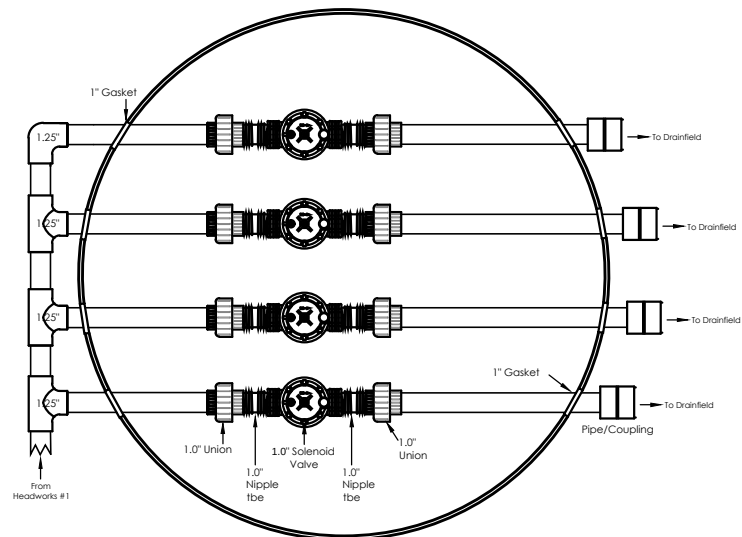
* UVIB control panels only



TOP LAYER



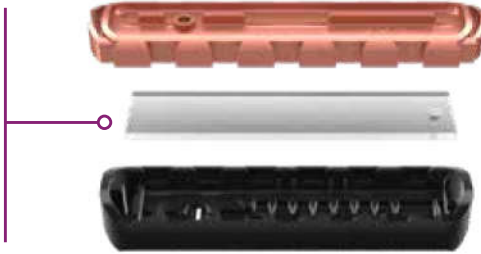
BOTTOM LAYER



BIOLINE® DRIPLINE

THE WORLD'S MOST ADVANCED CONTINUOUS
SELF-CLEANING, PRESSURE COMPENSATING DRIPLINE
SPECIFICALLY DESIGNED FOR WASTEWATER

Copper oxide is impregnated into the emitter serving as a natural antimicrobial agent to help prevent microbial activity.



PRODUCT ADVANTAGES

- Pressure compensation - all drippers deliver equal flow, even on sloped or rolling terrain.
- Unique flow path - Turbonet technology provides more control of water and a high resistance to clogging.
- Continuous self-flushing dripper design - flushes debris, as it is detected - throughout operation, not just at the beginning or end of a cycle. Ensures uninterrupted dripper operation.
- Single hole dripper outlet from tubing:
 - Better protection against root intrusion
 - Allows the dripline to be used in subsurface applications without need for chemical protection
- Drippers capture water flow from the center of the tubing - ensures that only the cleanest flow enters the dripper.
- Built-in physical root barrier - drippers are protected from root intrusion without the need for chemical protection.
- Three dripper flow rates - provides the broadest range of flow rates available. Allows the designer to match the dripline to any soil or slope condition.
- Bioline tubing is completely wrapped in purple - easily identifying it for non-potable use, regardless of how the tubing is installed.
- Cupron copper oxide is impregnated at specific concentrations, our patent-pending process, ensuring it remains effective throughout the life of the product.
- Bioline can be installed on-surface, under cover or subsurface.
- No special storage requirements - does not degrade if stored outdoors.

APPLICATIONS

- Typically installed following a treatment process
- Can be used with domestic septic tank effluent with proper design, filtration and operation
- Reuse applications including municipally treated effluent designated for irrigation and other disinfected and non-disinfected water sources.

SPECIFICATIONS

- Dripper flow rates: 0.4, 0.6 or 0.9 GPH
- Dripper spacings: 12", 18" or 24" dripper spacings and blank tubing
- Pressure compensation range: 7 to 58 psi
- Maximum recommended system pressure: 58 psi
- Tubing diameter: 0.66" OD, 0.56" ID
- Tubing color: Purple color indicates non-potable
- Coil lengths: 500' or 1,000' (Blank tubing in 250')
- Recommended filtration: 120 mesh
- Bending radius: 7"
- UV resistant
- Tubing material: Linear low-density polyethylene

Additional spacing and pipe sizes available by special order. Please contact Netafim USA Customer Service for details.

BIOLINE DRIPLINE

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 3.0 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 2.3 GPM REQUIRED PER LATERAL TO ACHIEVE 3 fps

DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	102	94	84	136	127	113	161	151	137
	25	151	136	118	203	184	161	245	223	197
	35	193	171	146	260	232	200	315	283	245
	40	211	186	158	286	254	218	347	311	267
	45	228	200	169	310	274	233	377	335	287
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 3 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 2.5 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 2.0 GPM REQUIRED PER LATERAL TO ACHIEVE 2.5 fps

DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	128	115	100	172	155	136	205	187	165
	25	183	161	137	248	220	188	301	268	231
	35	228	198	166	310	272	229	379	333	283
	40	248	214	178	338	295	247	413	362	305
	45	266	229	190	364	316	263	447	389	327
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 2.5 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 2.0 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 1.6 GPM REQUIRED PER LATERAL TO ACHIEVE 2.0 fps

DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	161	141	119	217	191	164	263	233	201
	25	221	190	157	302	261	218	369	321	270
	35	269	229	187	370	316	260	455	391	324
	40	290	246	200	399	340	278	493	421	347
	45	310	261	212	427	362	296	527	449	369
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 2 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 1.5 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 1.2 GPM REQUIRED PER LATERAL TO ACHIEVE 1.5 fps

DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	201	171	140	275	235	194	337	289	241
	25	266	222	179	366	308	251	453	383	313
	35	316	262	210	437	365	295	543	455	369
	40	337	280	223	469	391	313	583	487	393
	45	358	296	235	497	413	331	619	517	415
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 1.5 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 1.0 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 0.8 GPM REQUIRED PER LATERAL TO ACHIEVE 1.0 fps

DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	248	205	163	344	285	228	427	355	285
	25	315	258	203	440	361	286	549	453	359
	35	367	299	234	513	419	331	643	527	417
	40	389	316	248	545	445	350	683	559	441
	45	409	332	260	574	468	367	721	589	463
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 1 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 0.5 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 0.4 GPM REQUIRED PER LATERAL TO ACHIEVE 0.5 fps

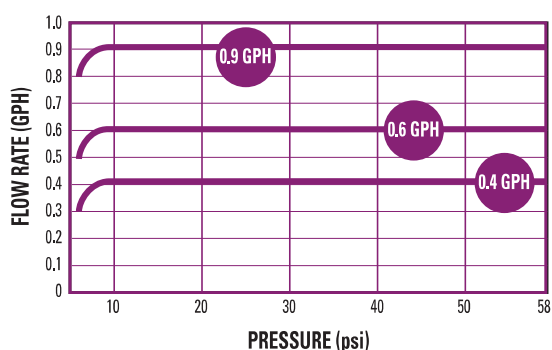
DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	301	242	188	422	341	265	531	429	335
	25	369	296	228	520	418	323	655	527	409
	35	421	337	260	595	476	368	749	603	467
	40	443	354	273	626	501	387	790	635	491
	45	464	371	285	656	524	404	829	665	513
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 0.5 fps flushing/scouring velocity

Netafim recommends flushing velocities capable of breaking free any accumulated bioslimes and debris in the piping network.

- Notes:
1. Refer to local regulations for information on flushing velocities that may be written into codes.
 2. Netafim does not endorse a specific flushing velocity.
 3. Flushing velocities should be determined based on regulations, quality of effluent, and type of flushing control.
 4. Using a flushing velocity less than 1 fps does not provide turbulent flow as defined by Reynolds Number.
 5. Higher flushing velocities provide more aggressive flushing.

DRIPPER FLOW RATE VS. PRESSURE



Between 0 and 7 psi, the dripper functions as a turbulent flow emitter, ensuring that the nominal design flow is not exceeded at system start-up.

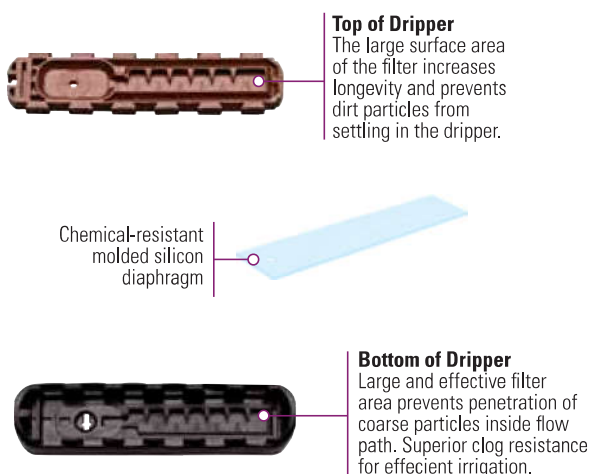
LOW PER 100 FEET

DRIPPER SPACING	0.4 GPH DRIPPER		0.6 GPH DRIPPER		0.9 GPH DRIPPER	
	GPH	GPM	GPH	GPM	GPH	GPM
12"	40.0	0.67	61.0	1.02	92.0	1.53
18"	26.7	0.44	41.0	0.68	61.0	1.02
24"	20.0	0.34	31.0	0.51	46.0	0.77

Netafim sets the bar for innovation in drip irrigation with copper. Cupron® copper oxide-based technology allows for maximum performance. The integration of copper oxide in the internal emitter, and the unique patented emitter design with physical root barrier provides two levels of protection, giving your system the protection it needs to fight against root intrusion.

- Cupron copper oxide provides one of two layers of defense against root intrusion, a physical root barrier inside the dripper provides the other.
- Cupron copper oxide technology will not wash out, wear off or leach out; remaining effective throughout the life of the product.
- Cupron copper oxide is approved for use by the EPA ensuring peace of mind.

EXPLODED VIEW OF BIOLINE DRIPPER



BIOLINE DRIPPER OPERATION

Bioline drippers are pressure compensating - delivering the water uniformly into the soil for further treatment or for reuse by the landscape. These unique drippers allow the tubing to be installed on flat topography or steep slopes.

Bioline drippers are protected against microbial activity. Copper oxide impregnated XR drippers – Copper, a natural antimicrobial material, is used to help prevent microbial activity.

Netafim drippers are continuously self-cleaning during operation, not just at the beginning and end of a cycle. The result is dependable, clog-free operation, year after year.

SPECIFYING INFORMATION

A Bioline Dripline = **08WRAM**

SAMPLE MODEL NUMBER

08WRAM.6-24 V

1 **DRIPPER FLOW RATE**
0.4 GPH = .4
0.6 GPH = .6
0.9 GPH = 1

2 **DRIPPER SPACING**
12" = 12
18" = 18
24" = 24

3 **COIL LENGTH**
500' = V500
1,000' = V

BLANK Tubing Model Number: 250' = 08WRAM-250

ORDERING INFORMATION

FLOW RATE	DRIPPER SPACING	COIL LENGTH	MODEL NUMBER
0.4 GPH	12"	1,000' 500'	08WRAM.4-12V 08WRAM.4-12V500
0.4 GPH	18"	1,000' 500'	08WRAM.4-18V 08WRAM.4-18V500
0.4 GPH	24"	1,000' 500'	08WRAM.4-24V 08WRAM.4-24V500
0.6 GPH	12"	1,000' 500'	08WRAM.6-12V 08WRAM.6-12V500
0.6 GPH	18"	1,000' 500'	08WRAM.6-18V 08WRAM.6-18V500
0.6 GPH	24"	1,000' 500'	08WRAM.6-24V 08WRAM.6-24V500
0.9 GPH	12"	1,000' 500'	08WRAM1-12V 08WRAM1-12V500
0.9 GPH	18"	1,000' 500'	08WRAM1-18V 08WRAM1-18V500
0.9 GPH	24"	1,000' 500'	08WRAM1-24V 08WRAM1-24V500
Blank Tubing 17mm		250'	08WRAM-250



Master Meter's Multi-Jet meter exceeds the AWWA C708 standard. With sensitivity to measure water flowing as low as 1/8 gallon per minute and accuracy unaffected by common particulates and build-up that would freeze other types, you can count on our Multi-Jet technology.

Technical Specifications:

AWWA Standard - Meets or exceeds all sections of AWWA Standard C-708, most recent revision. Compliant with SDWA, NSF ANSI 372 and NSF ANSI 61 standards.

Register - Standard Direct Read, DIALOG® 3G AMR System registers, AccuLinx Encoder, and IP 68 Electrical Output registers available. Together, an integrated and migratable technology environment is attained; direct, proximity (touch), mobile AMR, and Fixed Network AMI.

Register Sealing - Direct Read and DIALOG registers are permanently sealed with a scratch resistant glass lens, stainless steel base and wrap-around gasket to prevent intrusion of dirt or moisture.

Features & Benefits:

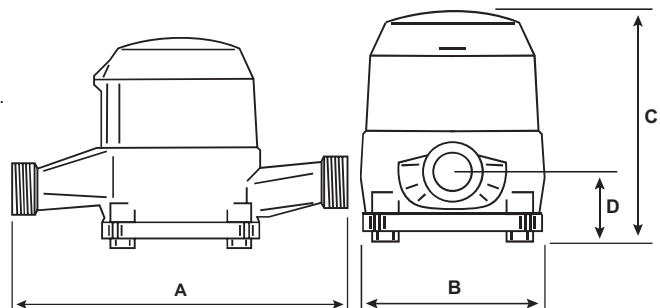
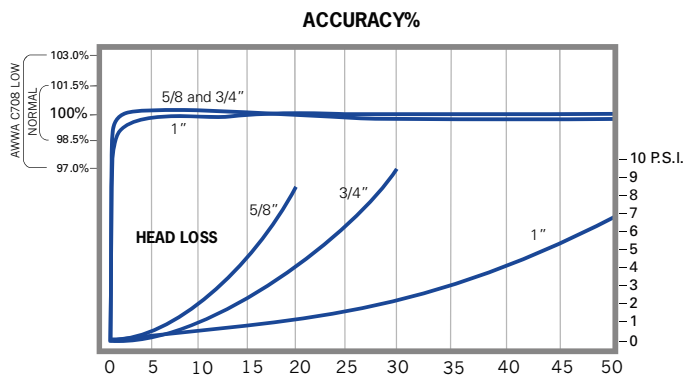
- Rugged basket strainer built from advanced polymer materials for superior wear mitigation.
- Proprietary design produces smooth, laminar flow profile for improved accuracy
- Award-winning DIALOG 3G register design houses all vital components - encoder, RF transmitter, battery and antennae - safely within the register's stainless steel and tempered glass enclosure. Free of external wires, components and connections - the #1 cause of field related issues on competitive designs.
- Assures compliance with the Safe Drinking Water Act (SDWA).
- Measures with only one moving part that is hydro-dynamically balanced on a sapphire bearing to preserve accuracy and promote a positive bottom line.
- Exceptional performance in passing entrained solids and operating in environments with high mineral content.
- Clean, elegant measurement design is highly sensitive to leaks and low flow while limiting wear for excellent revenue protection.

Technical Specs (Cont'd):

- **Register Unit** - Registration available in U.S. gallons, cubic feet or cubic meters.
- **Test Circle** - Large center sweep hand with one hundred (100) clearly marked gradations on the periphery of the dial face (available on Direct Read and DIALOG 3G registers).
- **Design/Operation** - Velocity-type flow measurement. Water that is evenly distributed by multiple converging inlet ports flows past an impeller in the measuring chamber, creating an impeller velocity directly proportional to water flow rate. The meter's register integrates that velocity into totalized flow. An inherent advantage for this design is unparalleled wear mitigation leading to sustained revenues. The register assembly is removable under line pressure permitting seamless, simplified upgrades in reading technology.
- **Strainer** - A rugged, 360-degree advance polymer basket strainer protects the critical measuring element from damage. The unique strainer design smoothes the flow of water entering into the meter creating a laminar flow that is gentle on the meter's internal components. Tough materials operating in a smooth, balanced environment enable the meters to perform more accurately over time. Utilities' investments last longer while capturing more revenue.
- **Measuring Chamber** - The measuring chamber housing and measurement element are built with an advanced synthetic polymer. Measurement surfaces are not wear surfaces, providing sustained accuracy despite the presence of entrained solids in the water. A long life, synthetic sapphire bearing serves as a wear surface with radially balanced water flows. The chamber housing is constructed in two parts to allow access to the impeller. Bottom plates available in Bronze, Cast Iron (CI) or Engineered Plastic.

METER OPERATING CHARACTERISTIC/DIMENSION	5/8"	3/4" x 7-1/2"	3/4" x 9"	3/4" x 9" x 1"	1"
Flow Rating (gpm)	20	30	30	30	50
Continuous Flow (gpm)	15	20	20	20	30
Normal Flow Range (gpm)	1-20	2-30	2-30	2-30	3-50
Extended Low Flow (gpm)	1/4	1/2	1/2	1/2	3/4
Maximum Working Pressure (psi)	150	150	150	150	150
Maximum Working Temperature (F)	120	120	120	120	120
Length (A below)	7-1/2"	7-1/2"	9"	9"	10-3/4"
Width (B below)	3-5/8"	3-5/8"	3-5/8"	3-5/8"	4"
Height, standard register with lid (C below)	5"	5"	5"	5"	5-1/4"
Height, bottom to center line (D below)	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-3/4"
Weight (lbs)	3.95	4.0	4.1	4.6	5.25
Packed To Carton	6	6	6	4	4
Carton Weight (lbs)	25.1	25.4	26	19.8	22.4

Accuracy and Head Loss Chart



VALVES



ELECTRIC PBI THROTTLING VALVES

**PROVEN PERFORMANCE
WITH A SIMPLE LOW
MAINTENANCE DESIGN**



**1" ELECTRIC PBI
THROTTLING NYLON VALVE**



**323 ELECTRIC PBI
THROTTLING NYLON VALVE**

PRODUCT ADVANTAGES

- Durable, glass reinforced nylon construction provides superb hydraulic performance.
- Large internal water passage with no moving parts in the flow path prevents clogging.
- Built-in 2-Way Solenoid with low power requirement for ease of operation and reliability.
- Simple installation either vertically or horizontally.
- High resistance to corrosive water containing fertilizer and chemicals.
- Standard with a flow control (throttling) handle.

APPLICATIONS

- Small agricultural irrigation zones
- Greenhouse and nursery irrigation
- Cooling systems
- Ultra high flow or low flow capacity irrigation systems

SPECIFICATIONS

- Available Sizes: 1", 1 1/2", 2" and 323
- Maximum Working Pressure:
1" - 115 psi and 2" to 323 - 150 psi
- Maximum Water Temperature: 140° F
- Connections: Female Threaded NPT
- Electrical Specifications:
Voltage - Standard 24 VAC, 60 Hz
Inrush Current - 29mA
Holding Current - 14mA
Allowable Voltage Variation: 10%

MATERIALS

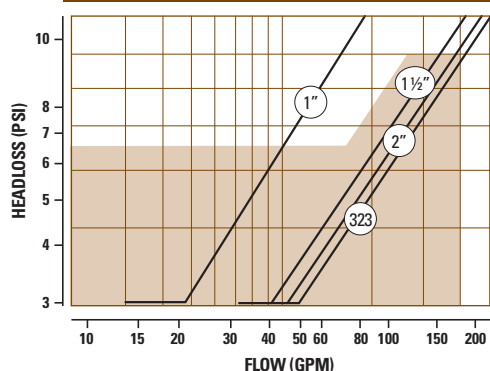
- Body and Bonnet: Glass Reinforced Nylon
- Spring: Stainless Steel (AISI 302)
- Nuts, Bolts, Washers: Stainless Steel (304)
- Diaphragm: Natural Rubber

ORDERING INFORMATION

SIZE	ITEM NUMBER	MODEL NUMBER
1"	71610-014015	61ET1PBI-BC
1 1/2"	71610-014040	61ET1.5PBI2-BC
2"	71610-014507	61ET2PBI2-BC
323	71610-015202	61ET323PBI2-BC

SOLD IN CASE QUANTITIES AND 24VAC ONLY
1" CASE QUANTITY = 20
1 1/2" AND 2" CASE QUANTITY = 8
323 CASE QUANTITY = 4

FLOW RATE VS. PRESSURE LOSS



FLOW RANGE

SIZE	GPM
1"	1 - 50
1 1/2"	1 - 125
2"	1 - 176
323	1 - 264

DIMENSIONS & WEIGHT

SIZE	LENGTH	HEIGHT	WEIGHT
1"	4 7/8"	4 7/8"	.5 LBS.
1 1/2"	7 3/8"	6"	2.0 LBS.
2"	7 7/8"	6"	2.2 LBS.
323	9 1/4"	6 5/8"	3.1 LBS.



NETAFIM USA
5470 E. Home Ave.
Fresno, CA 93727
CS 888 638 2346
www.netafimusa.com



Jain is a fully integrated global food / plant production company recognized by Harvard Business to be one of five global sustainability champions, the G-20 for lifting people out of poverty, and Fortune magazine for being a "Change the World Company." Our irrigation manufacturing capabilities include everything from behind the pump to the flush valve at the end of the lateral and everything in between. We lead the industry in manufacturing technology, owning both our extrusion and mold manufacturing equipment providers.

Jain leads plant science research globally across a variety of food crops and is staffed with some of the world's leading research scientists. With the Gandhi Library, Jain now houses the leading collection of the world's best plant science knowledge in a single facility. Our agronomic knowledge is integrated from our world class plant tissue culture operations through our food processing businesses. We research, educate, advance, manufacture, finance, propagate plants, and purchase produce for processing all in an effort to fulfill the Jain mission:

"Leave This World Better Than You Found It"

Jain Irrigation, Inc.

www.jainsusa.com

Jain Customer Service

Phone: (559) 485-7171

Fax: (800) 777-6162

Jain Corporate Office

5965 S 900 E

Murray, UT 84121

Western Manufacturing Facility

2851 E. Florence Ave.

Fresno, CA 93721

Northeastern Manufacturing Facility

740 Water St.

Watertown, NY 13601



Please recycle after use.
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Plastic Spin Clean 4E Filters

Product Features

- No moving parts
- Unique Spin Clean action keeps the screen clean during operation
- Engineered plastic construction is light in weight and resistant to corrosion and injected chemicals
- Two piece threaded housing with O-ring seal for easy screen access and maintenance
- Pressure ratings of 80 psi available in ¾" and 1" models, 150 psi rating for ¾" to 2"
- Strong stainless steel screen elements available in 30, 50, 100, 150 (standard) and 200 mesh
- Vinyl screen collars prevent debris from by-passing filter area
- Suitable for both above and below grade in box installation
- Available with ball valve for flushing debris basin
- Only 5-8 psi pressure loss required across filter to ensure best self cleaning action

Your Natural Choice for Vineyards and Orchards

Plastic Spin Clean Filters are unique screen filters that stay clean during operation. They effectively keep debris moving across the screen element towards the basin, where it is collected and can be drained.

The 4E Plastic Spin Clean Filter is best suited for applications where the contaminants are heavy particles like sand.



Models and Specifications

Type	Inlet/Outlet Size	Inlet/Outlet Type	Basin Cap or Valve	Basin Outlet Threads	Maximum Flow Rate (gpm)	Maximum Working Pressure (psi)
4E-3/4 A	3/4"	MPT	Cap	3/4 MPT	11	80
4E-3/4 B	3/4"	MPT	Valve	3/4 MPT	11	80
4EH-3/4 A	3/4"	MPT	Cap	3/4 MPT	11	150
4EH-3/4 B	3/4"	MPT	Valve	3/4 MPT	11	150
4E-1 A	1"	MPT	Cap	3/4 MPT	20	80
4E-1 B	1"	MPT	Valve	3/4 MPT	20	80
4EH-1 A	1"	MPT	Cap	3/4 MPT	20	150
4EH-1 B	1"	MPT	Valve	3/4 MPT	20	150
4EH-1 1/2	1 1/2"	MPT	Valve	3/4 MPT	55	150
4EH-2 P	2"	MPT	Valve	3/4 MPT	120	150

Ordering Information:

Examples: Type -Screen Mesh

4E-3/4B-200 3/4" MPT w/MHT flush & Ball Valve (80psi) w/200 mesh screen
 4EH-1A-30 1" MPT w/MPT flush & Ball Valve (150 psi) w/30 mesh screen
 4EH-1½-150 1½" MPT w/MPT flush & Ball Valve (150 psi) w/150 mesh screen

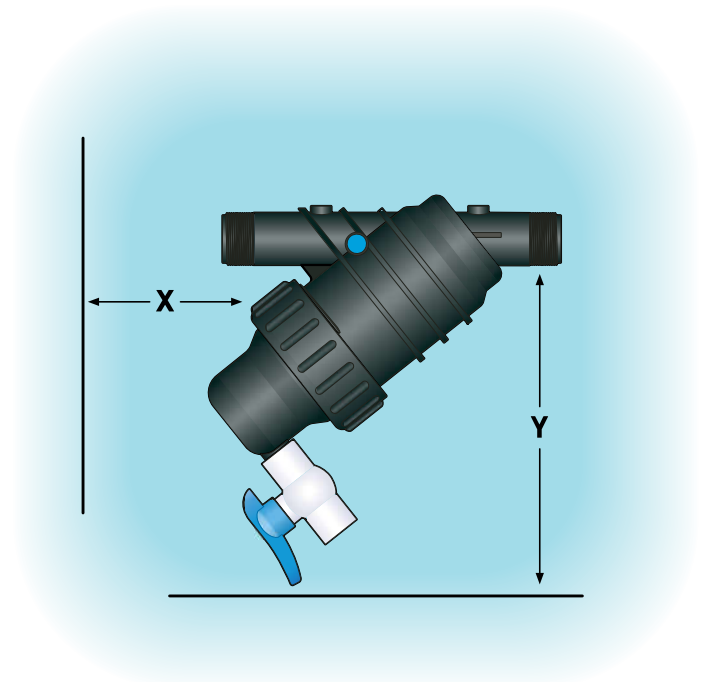
Options:

All models – Drilled and tapped 1/8" hole for pressure gauge, Shrader Valve or 1/8" mpt fitting at inlet and outlet boss 1" and larger models – BSP Threads

- Please call customer service for availability

Minimum Clearance

Size	X	Y
4E-3/4 & 1 w/cap	5"	8"
4E-3/4 & 1 w/valve	6"	12"
4EH-1-1/2	4"	15.5"
4E-02	4"	15.5"



6. Inspection Documentation



Agri-Waste Technology, Inc.
1225 Crescent Green, Suite 250, Cary NC 27518
agriwaste.com | 919.859.0669

Lake Myra WWTS Aerobic Drip Initial Inspection Form

Please consider the following information when installing this Subsurface Drip with Pretreatment System and preparing the information required for the final Engineer Certification and Authorization to Construct Meeting. Inspections (by the certifying Professional Engineer or designated representative) will be required during the system installation. Please note that representatives from Wake County Department of Public Health, NCDEQ, Division of Environmental Health, and On-site Water Protection may attend or inspect the system installation. The installation inspections shall be coordinated with Agri-Waste Technology, Inc. (AWT) at 919-859-0669 at least 48 hours notice when scheduling an inspection.

Initial Inspection

The initial inspection shall be scheduled during system installation.
The approximate state of construction for this inspection is as follows:

- Tanks shall be installed and partially backfilled.
The top of the tanks shall be left uncovered for inspection.
- Tank risers shall be installed and sealed to tank.
- All piping between tanks shall be installed.
- Control Panel location shall be marked.
- Headworks Boxes placed.
- Cleanouts installed (at house).

The following items shall be verified and approved by the inspector at the initial inspection:

___ Septic Tank Size	___ Tank Risers	___ Pipe Size/Type
___ Recirculation Tank Size	___ Tank Testing*	___ Pipe Routing
___ Pump Tank Size	___ Control Panel Location	

*System installer shall provide Engineer with documentation of tank leakage testing.
Photographs of the installation shall be taken by the inspector.

Comments:

Inspector Name and Signature

Date of Inspection



Agri-Waste Technology, Inc.
1225 Crescent Green, Suite 250, Cary NC 27518
agriwaste.com | 919.859.0669

Lake Myra WWTS Aerobic Drip Final Inspection Form

Final Inspection

The Final inspection shall be scheduled at the completion of the system installation.
The following activities shall be accomplished prior to final inspection:

- Complete system installation.
- Headworks shall be installed and plumbed to components.
- Final grading and stabilization.
- Electrical connections made.
- Water in tank to operate system.
- All meter boxes installed.
- Dripfield installed.

The following items shall be verified and approved by the inspector at the final inspection:

☐ Safety Nets Installed	☐ Float Switch Elevations	☐ Meter Boxes
☐ Tank Lids Installed	☐ Pump Operational	☐ Dripfield Pressures
☐ Control Panel Installed/Wired	☐ Pump Flowrate	☐ Final Site Grading
☐ Effluent Filter Installed	☐ System Operational	☐ Treatment Units

- Installer to provide pictures taken during construction.
- Photographs of the construction progress shall be taken by the inspector.

Comments:

Inspector Name and Signature

Date of Inspection



Agri-Waste Technology, Inc.
1225 Crescent Green, Suite 250, Cary NC 27518
agriwaste.com | 919.859.0669

Lake Myra WWTS Aerobic Drip Installer Certification Form

Installer Certification:

I (*Installer Company and Name*) _____
certify that the installation of the **Lake Myra WWTS - Aerobic Drip** was under my direct supervision. Further, to the best of my abilities, due care and diligence was used in the construction such that the system was built within substantial compliance and intent of the approved plans and specifications. Any deviation (to the extent there were deviations) from the approved plans is noted below.

Comments:

Installer Name and Signature

Date

Project: NV5-Smithfield Rd
Location: S.Smithfield Road
Wendell, NC 27591
County: Wake

Startup Date:

Number of zones 4

Zone 1	840	linear ft	drip tubing, not including loops
	420	emitters	expected
	0.61	gph	flow per emitter
	4.27	gpm	expected dosing flow
	3	laterals	
	4.61	gpm	flow need for flushing
	8.88	gpm	Total Flow Per Zone
Calculated Flushing Velocity (fps)			

PRESSURES		
MEASURED	Supply	Return
0.00		

Zone 2	840	linear ft	drip tubing, not including loops
	420	emitters	expected
	0.61	gph	flow per emitter
	4.27	gpm	expected dosing flow
	3	laterals	
	4.61	gpm	flow need for flushing
	8.88	gpm	Total Flow Per Zone
Calculated Flushing Velocity (fps)			

PRESSURES		
MEASURED	Supply	Return
0.00		

Zone 3	840	linear ft	drip tubing, not including loops
	420	emitters	expected
	0.61	gph	flow per emitter
	4.27	gpm	expected dosing flow
	3	laterals	
	4.61	gpm	flow need for flushing
	8.88	gpm	Total Flow Per Zone
Calculated Flushing Velocity (fps)			

PRESSURES		
MEASURED	Supply	Return
0.00		

Zone 4	1040	linear ft	drip tubing, not including loops
	520	emitters	expected
	0.61	gph	flow per emitter
	5.29	gpm	expected dosing flow
	4	laterals	
	6.14	gpm	flow need for flushing
	11.43	gpm	Total Flow Per Zone
Calculated Flushing Velocity (fps)			

PRESSURES		
MEASURED	Supply	Return
0.00		