SUPERVISOR/ADMINISTRATIVE PROFESSIONAL CHECKLIST

☑ NEW SEPTIC ☐ REPAIR ☐ USE EXISTING ☐ MODIFIED PLOT PLAN ☐ ALTERATION

File Number: 120366

Assigned Inspector: Patrick Mitchell / Brian D.

☐ IP $250.00: _____ Initial/Date

☑ IP Commercial $450.00: MR 9-4-24 Initial/Date

☑ CA & OP $400.00: SM 7/1/25 Initial/Date

☐ Alteration Fees $300: _____ Initial/Date

☐ Modified Plot Plan Fees $100.00: _____ Initial/Date

☐ Use Existing Fees $100.00: _____ Initial/Date

☐ Use Existing Approved ☐ Use Existing Denied

☒ Send IP permit for signature: 10/4/24 ☑ Signature received: 10/7/24

☒ Floor plans reviewed

☒ Generate CA ☒ Approve as Noted in Winchester

☐ This site is served by septic and well. Verify each is complete before final hold is released

☐ This septic system requires a certified operation contract before final hold is released

☒ Certified operator contract is on file: _____

☒ Septic file complete: 1/28/26

☐ Release final hold in Winchester: _____

Comments:

120368/14902

14 AUG '24 AM 9:59

MECKLENBURG COUNTY
HEALTH DEPARTMENT

APPLICATION FOR A COMMERCIAL SITE IMPROVEMENT PERMIT/ CONSTRUCTION AUTHORIZATION FOR AN ON-SITE WASTEWATER SYSTEM, NEW WELL INSTALLATION, OR REPAIR OF EXISTING WELL

1. **SEPTIC / TYPE APPLICATION:** ○ N/A ● NEW SYSTEM ○ ALTERATION ○ REPAIR ○ MODIFIED PLOT PLAN

2. **WELL / TYPE APPLICATION:** ● N/A ○ NEW WELL ○ MAJOR REPAIR ○ ABANDONMENT

3. **JOB LOCATION INFORMATION:**

TAX PARCEL NUMBER: 21506111
STREET ADDRESS: 3116 Campus Ridge Raod
CITY: Matthews
STATE: NC **ZIP:** 28105
TOWNSHIP:

○ MECKLENBURG ○ CORNELIUS ○ HUNTERSVILLE
○ DAVIDSON ○ CHARLOTTE ○ PINEVILLE
● MATTHEWS ○ MINT HILL

4. **BUILDING INFORMATION:**

DESCRIBE TYPE OF BUSINESS: Charter School (HS/Upper Grades)

● COMMERCIAL ○ INDUSTRIAL
SQUARE FOOTAGE OF FACILITY: _____
NUMBER OF EMPLOYEES PER SHIFT: 99 Students & 10 Staff
NUMBER OF SHIFTS: 1 **NUMBER OF SEATS:** N/A
TYPE OF WASTEWATER GENERATED:
● DOMESTIC SEWAGE ○ INDUSTRIAL WASTEWATER
● OTHER Potential HSE offsite w/ advanced treatment

5. ***IF PLANNING TO EXPAND OR ALTER THE EXISTING SEPTIC SYSTEM, INFORMATION DOCUMENTING THE INCREASED WASTEWATER FLOW AND/OR A JUSTIFICATION FOR SYSTEM ALTERATION IS REQUIRED.*** ☐ N/A

6. **WATER SUPPLY:** ● MUNICIPAL ○ PRIVATE WELL ○ PUBLIC WELL ○ SHARED WELL ○ OTHER _____

7. **PROPOSED USE OF WELL:** ● N/A ○ IRRIGATION ○ POTABLE (DRINKING WATER) ○ OTHER _____

8. **PLEASE INDICATE AND RANK DESIRED SEPTIC SYSTEM TYPE(S) IN ORDER OF PREFERENCE** *(1-MOST DESIRED 5-LEAST DESIRED):*

☐ N/A ● ANY TYPE ☐ CONVENTIONAL ☐ ACCEPTED ☐ INNOVATIVE ☐ ALTERNATIVE ☐ OTHER _____

8A. **RANK:** _____ _____ _____ _____ _____

9. **DO ANY OF THE FOLLOWING APPLY TO THE PROPERTY IN QUESTION? IF "YES" PLEASE ATTACH SUPPORTING DOCUMENTATION.**

BURIED CABLES, LANDFILLS, STUMPHOLES	○ YES ● NO	GRADING/SOIL REMOVAL PERFORMED	○ YES ● NO
EXISTING WASTEWATER (SEPTIC) SYSTEMS	● YES ○ NO	JURISDICTIONAL WETLANDS	○ YES ● NO
WELLS, SPRINGS, OR WATER LINES	● YES ○ NO	APPROVAL REQUIRED BY ANY OTHER PUBLIC AGENCY	● YES ○ NO
EASEMENTS OR RIGHT-OF-WAYS	● YES ○ NO	WASTEWATER OTHER THAN DOMESTIC SEWAGE	○ YES ● NO
CHEMICAL/PETROLEUM STORAGE TANKS	○ YES ● NO	KNOWN UNDERGROUND CONTAMINATION	○ YES ● NO
WASTE STORAGE	○ YES ● NO	GROUNDWATER USE RESTRICTIONS/VARIANCES	○ YES ● NO

10. **WHAT DATE WAS THE PROPERTY ORIGINALLY DEEDED AND RECORDED?** June 1, 1992 ☐ UNKNOWN

11. **WHAT IS THE ANTICIPATED CLOSING DATE FOR THIS PROPERTY?** ASAP ☐ N/A

12. **PROPERTY OWNER:**

NAME: Dennis & Robin Harkey
ADDRESS: 417 Navajo Trail
CITY: Indian Trail
STATE: NC **ZIP:** 28079
WORK PHONE: _____
MOBILE PHONE: _____
FAX: _____
E-MAIL: _____

13. **OWNER'S LEGAL REPRESENTATIVE, IF APPLICABLE:**

**Owner's Authorization form is required if legal representative is submitting application*

NAME: David DeCaron (Piedmont Design Associates)
ADDRESS: 125 East Plaza Drive, Suite 101
CITY: Mooresville
STATE: NC **ZIP:** 28115
WORK PHONE: 704-664-7888
MOBILE PHONE: N/A
FAX: N/A
E-MAIL: ddecaron@pdapa.com
Wendell Overby, LSS (Consultant)

MECKLENBURG COUNTY – GROUNDWATER & WASTEWATER SERVICES
3205 Freedom Drive, Suite 8000, Charlotte, NC 28208
OFFICE: 980-314-1680, FAX: 704-336-6894

Revised on: 12/15/10

14. SEPTIC SYSTEM PERMIT APPLICATION:

If the information in this application is falsified, changed, or the site is altered, then the Improvement Permit and Authorization to Construct shall become invalid. I have read this application and certify that the information provided herein is true, complete and correct. Authorized county and state officials are granted right of entry to conduct necessary inspections to determine compliance with applicable laws and rules. I understand that I am solely responsible for the proper identification and labeling of all property lines and corners and making the site accessible so that a complete site evaluation can be performed. The permit is valid for either sixty (60) months or is non-expiring depending upon the documentation submitted: complete site plan = 60 months, complete plat = non-expiring.

DMD (Initial here for septic system applications)

15. WELL PERMIT APPLICATION:

If the information in this application is falsified, changed, or the site is altered, then the Well Permit shall become invalid. I have read this application and certify that the information provided herein is true, complete and correct. Authorized county and state officials are granted right of entry to conduct necessary inspections to determine compliance with applicable laws and rules. I understand that I am solely responsible for the proper identification and labeling of all property lines and corners and making the site accessible so that a complete site evaluation can be performed. The permit is valid for a period of twelve (12) months from the date of issuance.

N/A (Initial here for well applications)

16. APPLICATION SIGNATURE SECTION:

ONLY COMPLETE APPLICATIONS WILL BE PROCESSED. A proper signature is required in order to process your application. Please review the application carefully and sign in the space provided below. A PROPOSED PLOT PLAN is required to be submitted with each application.

Property Owner's or Owner's Legal Representative Signature

August 9, 2024
Date

OFFICE USE ONLY

○ SURVEY PLAT TO SCALE SUBMITTED ● SCALED SITE PLAN SUBMITTED ○ UN-SCALED SITE PLAN SUBMITTED

SEPTIC APPLICATION FEE RECEIVED: $ _____ DATE FEE RECEIVED: _____

WELL APPLICATION FEE RECEIVED: $ _____ DATE FEE RECEIVED: _____

APPLICATION PROCESSED BY: _____

GWS FILE NUMBER ASSIGNED: _____

APPLICATION ID NUMBER ASSIGNED: _____

COMMENTS:

Engineer - Piedmont Design Associates, PA 704-664-7888 ddecaron@pdapa.com

Soil Scientist - Soil & Forestry Services 980-439-5007 sfsconcordNC@gmail.com

MECKLENBURG COUNTY – GROUNDWATER & WASTEWATER SERVICES
3205 Freedom Drive, Suite 8000, Charlotte, NC 28208
OFFICE: 980-314-1680, FAX: 704-336-6894

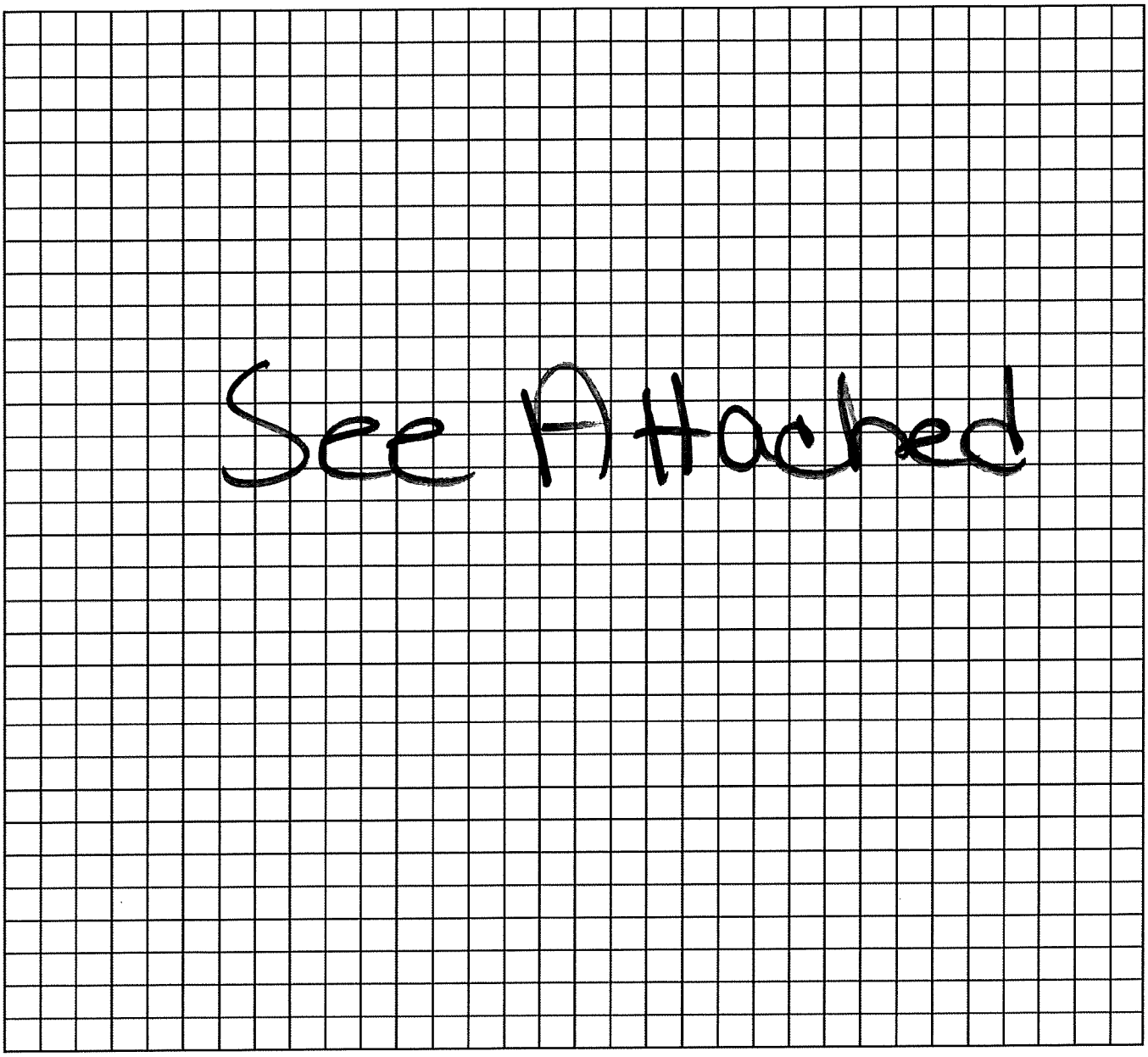
File #: _____

PROPOSED PLOT PLAN

A drawing showing the locations of the following items is required: existing and proposed property lines with dimensions, easements or right-of-ways, proposed building pad(s) or existing building footprint(s), all appurtenances (garage, driveway, deck, pool, etc.), location of existing or proposed well(s), location of existing or proposed sewer lines and sewage disposal systems, surface water bodies, and any aboveground or underground storage tanks. Provide names for all roads that adjoin the property.

Street Address: 3116 Campus Ridge Rd Tax Parcel #: 21506111

Subdivision Name: _____ Lot #: _____

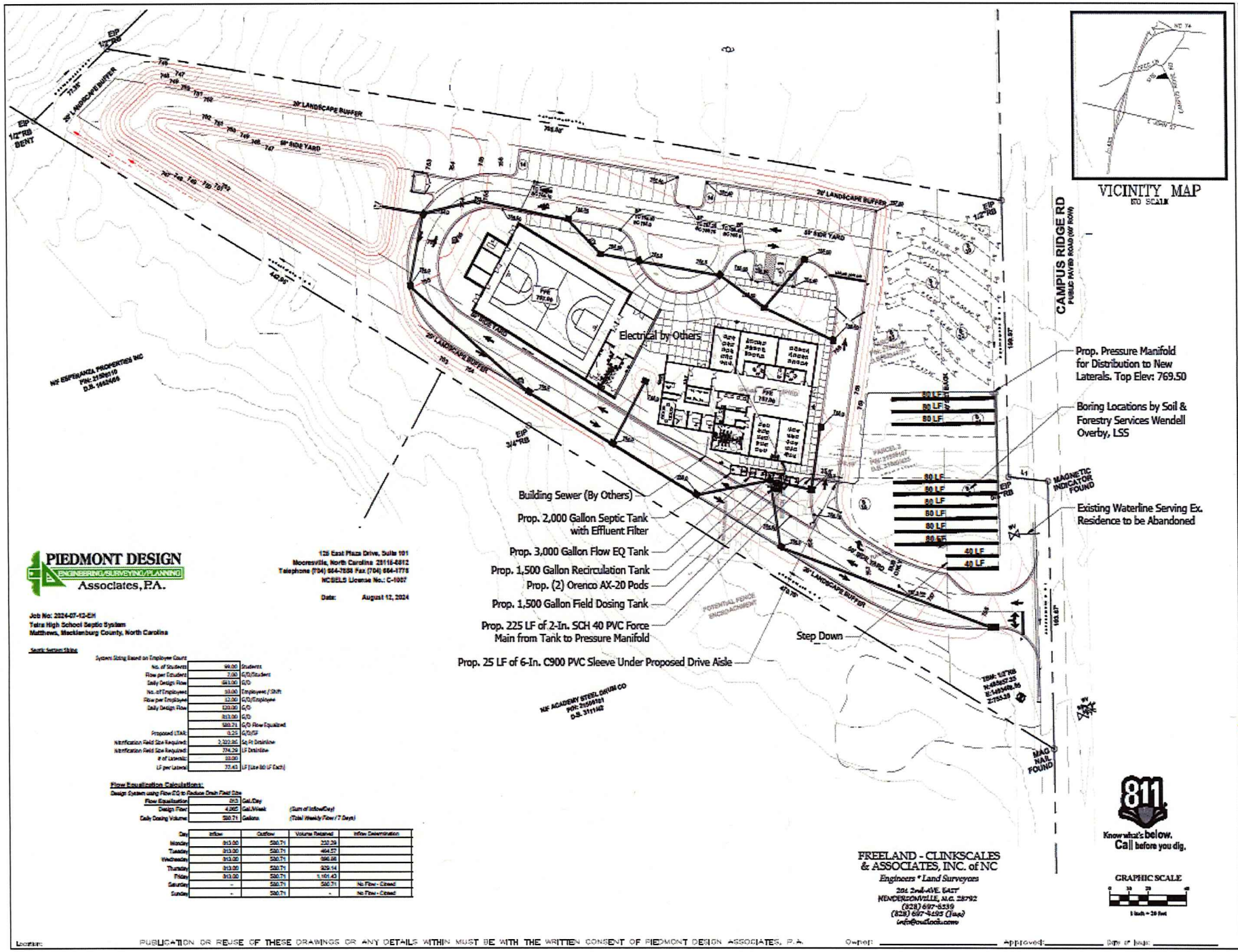


_____ _____

Property Owner's or Owner's Legal Representative Signature Date

MECKLENBURG COUNTY – GROUNDWATER & WASTEWATER SERVICES
3205 Freedom Drive, Suite 8000, Charlotte, NC 28208
OFFICE: 980-314-1680, FAX: 704-336-6894

Revised on: 12/15/10



VICINITY MAP
NO SCALE

PIEDMONT DESIGN
ENGINEERING/SURVEYING/PLANNING
Associates, P.A.

125 East Plaza Drive, Suite 101
Mooresville, North Carolina 28115-6812
Telephone (704) 664-7838 Fax (704) 664-1775
NCBELS License No.: C-1007

Date: August 12, 2024

Job No: 2024-07-12-EH
Telra High School Septic System
Matthews, Mecklenburg County, North Carolina

Septic System Sizing

System Sizing Based on Employee Count

No. of Students:	66.00	Students
Flow per Student:	7.00	G/D/Student
Daily Design Flow	462.00	G/D
No. of Employees:	33.00	Employees / Shift
Flow per Employee	12.00	G/D/Employee
Daily Design Flow	396.00	G/D
	858.00	G/D
	580.71	G/D Flow Equalized
Proposed LTAR:	0.25	G/D/SF
Nitrification Field Size Required:	2,322.84	Sq Ft Drainline
Nitrification Field Size Required:	774.29	LF Drainline
# of Laterals:	22.00	
LF per Lateral:	77.43	LF (Use 80 LF Each)

Flow Equalization Calculations:

Design System using Flow EQ to Reduce Drain Field Size

Flow Equalized:	580	Gal./Day
Design Flow:	4,065	Gal./Week (Sum of Inflow/Day)
Daily Dosing Volume:	580.71	Gallons (Total Weekly Flow / 7 Days)

Day	Inflow	Outflow	Volume Retained	Inflow Determination
Monday	913.00	580.71	332.29	
Tuesday	913.00	580.71	664.57	
Wednesday	913.00	580.71	996.86	
Thursday	913.00	580.71	329.14	
Friday	913.00	580.71	1,161.43	
Saturday	-	580.71	580.71	No Flow - Closed
Sunday	-	580.71	-	No Flow - Closed

FREELAND - CLINKSCALES & ASSOCIATES, INC. of NC
Engineers * Land Surveyors
204 2nd AVE. EAST
HENDERSONVILLE, NC. 28792
(828) 697-9339
(828) 697-9295 (Fax)
info@cscalesinc.com

Know what's below. Call before you dig.

GRAPHIC SCALE
0 10 20 40
1 Inch = 20 Feet

PIEDMONT DESIGN Associates, P.A.
525 N. Tryon St. Suite 1400, Charlotte, NC 28202
Phone (704) 333-1163 Fax (704) 333-1769
NCBELS C-1007

PREPARED FOR:
TELRA SUPPORTING ORGANIZATION, INC.
4150 MCKEE ROAD
CHARLOTTE, NC 28270
704-727-2530

SEPTIC SYSTEM OVERALL SITE PLAN
TELRA INSTITUTE HIGH SCHOOL
3116 CAMPUS RIDGE ROAD
MATTHEWS, MECKLENBURG COUNTY, NORTH CAROLINA

For Review
08/12/2024 7:26:05 AM

REVISIONS	BY

Date: 8/12/24
Scale: 1" = 20' FT
1" CONTOURS
Drawn: DMD
Checked: DLW
Project: 2024-08-01
Job: 2024-08-01
Sheet: U-1
of 4 Sheets

Location:

PUBLICATION OR REUSE OF THESE DRAWINGS OR ANY DETAILS WITHIN MUST BE WITH THE WRITTEN CONSENT OF PIEDMONT DESIGN ASSOCIATES, P.A.

Owner: _____ Approved: _____ Date of Issue: _____

Docusign Envelope ID: D422408F-A127-4B03-B880-D0C4363602CC

MECKLENBURG COUNTY
North Carolina
Public Health

Mecklenburg County Public Health

Raynard Washington, PhD, MPH
Health Director

Addendum to Application for
New Well or Septic System Installation
Abandonment or Repair of Existing Well or Septic System

Your signature below confirms the following:

1.The information on the application is true, complete and accurate.

2. Authorized county and state officials are granted right of entry to conduct necessary inspections to determine compliances with applicable laws and rules.

3.I acknowledge that David DeCaron (Piedmont Design Associates) is acting as my legal representative(agent) in the submittal of the application for a water supply well or septic permit located at

3116 Campus Ridge Road (PIN 21506111) Matthews, NC

Number Street Town
(Or Parcel Number)

Signed by:
75AADADBF1F7435...

Signed by:
6B564D236626498...

Dennis & Robin Harkey
Property Owner (Print Name) Property Owner (Signature)

8/9/2024 | 13:19 EDT

8/9/2024 | 13:18 EDT

Date

Department of Health and Human Services
Environmental Health Section
On-site Water Protection Branch

Property ID: 21506111
Lot #: ---
File #: 12036B
AppID: 14902

SOIL/SITE EVALUATION
for ON-SITE WASTEWATER SYSTEM

Owner: Dennis & Robin Harkey
Applicant: Same
Address: 3116 Campus Ridge Rd.
Date Evaluated: 9/9/2024
Proposed Facility: School (99 students, 10 staff)
Design Flow (.0400): 581 GPD (flow equalization)
Property Size: 4.15 ac.
Location of Site: See file
Property Recorded: After Jan. 1, 1983
Water Supply: [X] Public [ ] Single Family Well [ ] Spring [ ] Other:
Evaluation Method [X] Auger Boring [ ] Pit [ ] Cut
Type of Wastewater: [X] Domestic [ ] Industrial Process [X] High Strength

PROFILE #	.0502 Landscape Position/ Slope%	Horizon Depth (IN.)	SOIL MORPHOLOGY .0503 Structure/ Texture	SOIL MORPHOLOGY .0503 Consistence/ Mineralogy	PROFILE FACTORS Matrix Soil Color	PROFILE FACTORS .0504 Soil Wetness/ Color	PROFILE FACTORS .0505 Soil Depth (IN.)	PROFILE FACTORS .0506 Sapro Class	PROFILE FACTORS .0507 Restr Horiz	General Comments / Other	0.0509 Profile Class & LTAR	0.0502 Slope Correction Max Trench Depth *(Low Side of trench)*
1	L 2 - 4%	0 - 6	Wk, Sbk, SiCL	Fr, SS, SP	RB	F: YB Mottles @ 10-27"	≥50% Sap. @ ~48"	N/A	N/A	F-C: Sap. inclus. @ 16-27" M: Sap. inclus. @ 27-40"	S 0.275	36"
		6 - 27	Mo, Abk, SiC	Fr, SS, SP, SEXP	R							
		27 - 40	Wk, Abk, SiCL	Fr, SS, SP	R							
		40 - 48	Wk, Abk, SiCL & SiL	Sap. Mix Fr, SS, SP	R							
2	L 2 - 4%	0 - 5	Wk, Sbk, SiL	Fr, SS, SP	RB	N/A	≥50% Sap. @ ~42"	SiL-Sap.	N/A	F: Sap. inclus. @ 10-24" C-M: Sap. inclus. @ 24-38"	S 0.30	30" Unless Pit Eval.
		5 - 24	Mo, Abk, SiC	Fr, SS, SP, SEXP	R							
		24 - 38	Mo, Abk, SiCL	Fr, SS, SP	R							
		38 - 42	Wk, Abk, SiCL & SiL	Sap. Mix Fr, SS, SP	R / M							
		42 - 48	M, SiL-Sap.	Fr, SS, SP	M							
3	L 2 - 4%	0 - 4	Wk, Gr, SL	Fr, SS, NP	B	C: YB mottles @ 8-27" F: Chroma 2 mottles @ 34-42" (lithochromic?) *Need pit to determine*	≥50% Sap. @ ~42"	SiL-Sap.	N/A	F-C: Sap. inclus. @ 15-27" M: Sap. inclus. @ 27-42"	S 0.25	22" Unless Pit Eval.
		4 - 27	Mo, Abk, SiC	Fr, SS, SP, SEXP	YB							
		27 - 42	Wk, Abk, SiCL	Fr, SS, SP	RB							
		42 - 48	Wk, Abk, SiCL & SiL	Sap. Mix Fr, SS, SP	R / M							
4	L 2 - 4%	0 - 5	Wk, Gr, SiL	Fr, SS, SP	RB	N/A	≥50% Sap. @ ~45"	SiL-Sap.	N/A	C-M: Sap. inclus. @ 26-42"	S 0.275	33" Unless Pit Eval.
		5 - 26	Mo, Abk, SiC	Fr, SS, SP, SEXP	R							
		26 - 42	Wk, Abk, SiCL	Fr, SS, SP	R							
		42 - 48	Wk, Abk, SiCL & SiL	Sap. Mix Fr, SS, SP	R / M							

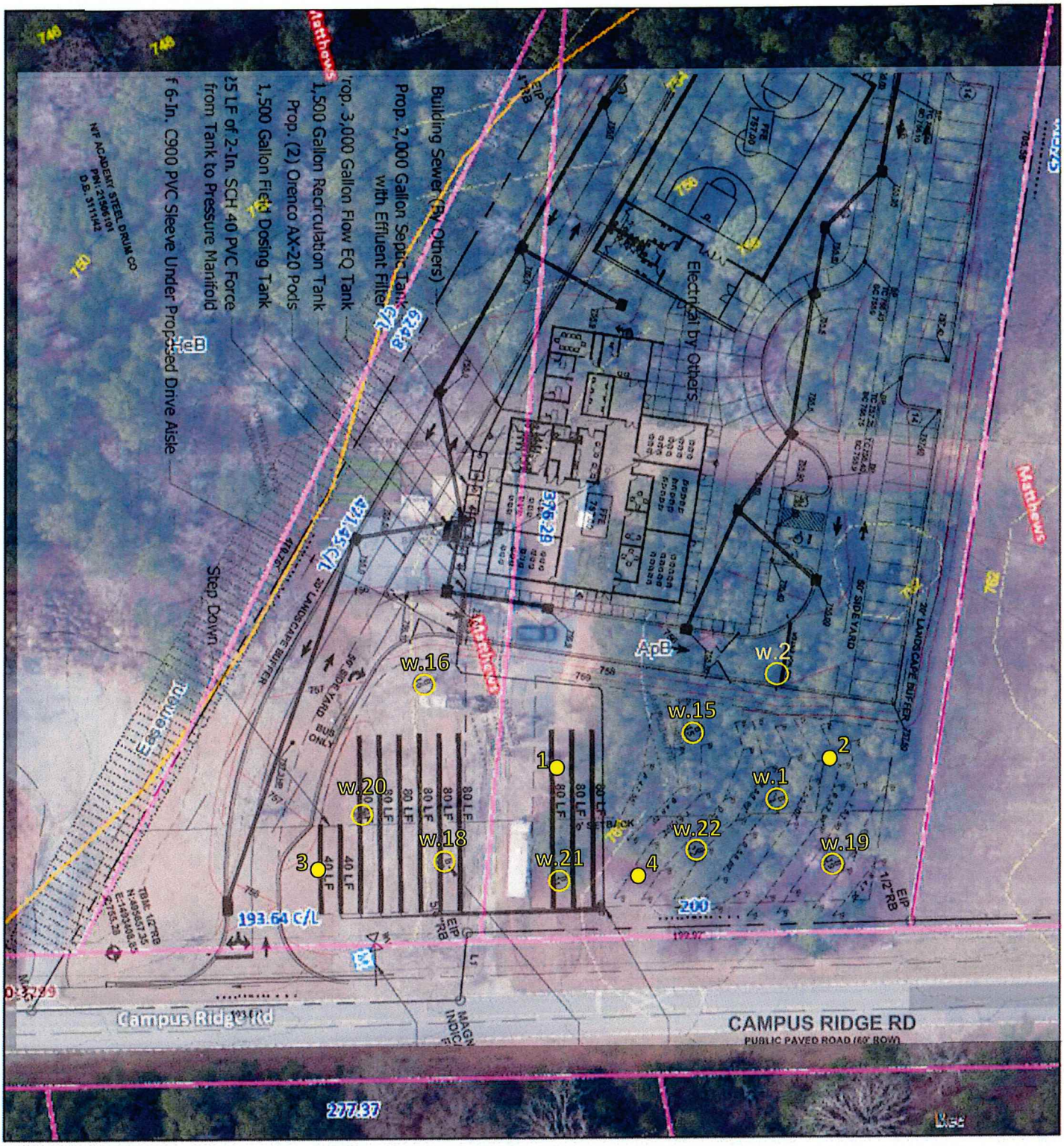
Description	Initial System	Repair System
Available Space (.0508)	---	---
System Type(s)	---	---
Site LTAR	0.25	0.25
Maximum Trench Depth	30"	22"

Soil Evaluation By: P. Mitchell, REHS, LSS
Soil Classification (.0502 - .0507): S
Other(s) Present:
Site Classification (.0509): ---

COMMENTS: Maximum trench depths listed above could potentially be deeper if soil pit evaluations are conducted to evaluate saprolite & mottles to determine if redox vs lithochromic.
The initial system should be installed in the areas of soil borings #2 & #4, and the repair area in the areas of soil borings #1 & #3.

Soil & Site Evaluation Map

Overlaid System Design Layout by Piedmont Design Associates
& Soil Borings by Wendell Overby



Map Created by: P. Mitchell
Date: 9/09/2024

PROPERTY INFO
Address: 3116 Campus Ridge Rd.
PID No.: 21506111

1 in = 60 ft

Mecklenburg County
Groundwater & Wastewater Services

Mecklenburg County Groundwater & Wastewater Services
3205 Freedom Dr., Suite 8000 Charlotte, NC 28208
Phone: (980) 314-1680 Fax: (704) 336-6894

NC DHHS
Division of Environmental Health
On-Site Wastewater Section

IMPROVEMENT PERMIT for a COMMERCIAL
ON-SITE WASTEWATER TREATMENT & DISPOSAL SYSTEM

Permit #: **30014902** GWS File #: **12036B** Tax Parcel #: **215-061-11**

- This IMPROVEMENT PERMIT is subject to revocation if site plans or the intended use change. There is to be **NO** grading, filling, or disturbance of the soil in the area of the septic tank system or repair area.
- CONSTRUCTION AUTHORIZATION must be obtained prior to receiving a Building Permit. Do not clear, grade, fill or disturb soil prior to obtaining a Construction Authorization.
- Domestic-type wastewater only. No industrial process wastewater may be discharged into the system.

I. This Improvement Permit Shall: Expire in Five (5) Years **Expiration Date (If Applicable):** 10/3/2029

Intallation Type: Commercail/Industrial - New System Business Type: Commercial

Facility Size (ft^2): 0 # Employees/Shift: 10 # Shifts: 1

Wastewater Type: Sewage Water Supply: Municipal

II. Initial System Type: Pump to Accepted **System Classification:** Va

Initial System Specifications:

Design Flow (gpd):	581	LTAR (gpd/ft^2):	0.25	Septic Tank Size (gal):	2000	Pump Tank Size (gal):	3000
Trench Width (ft):	3	Trench Spacing (ft):	9	Absorption Area (ft^2):	2324	Total Trench Length (ft):	775
Maximum Trench Depth (in):	30	Depth of Media (in):	12	Distribution Device:	Pressure Manifold		

III. Repair System Type: Pump to Accepted **System Classification:** Va

Repair System Specifications:

Design Flow (gpd):	581	LTAR (gpd/ft^2):	0.25	Septic Tank Size (gal):	2000	Pump Tank Size (gal):	3000
Trench Width (ft):	3	Trench Spacing (ft):	9	Absorption Area (ft^2):	2324	Total Trench Length (ft):	775
Maximum Trench Depth (in):	22	Depth of Media (in):	12	Distribution Device:	Pressure Manifold		

IV. Permit Conditions/Comments:

(Please See the Following Page for Permit Conditions.)

The undersigned, an authorized agent of the STATE OF NORTH CAROLINA, certifies that the Department is issuing an IMPROVEMENT PERMIT for the above referenced property. This permit is being issued in accordance with the *Laws and Rules For Sewage Treatment, and Disposal Systems* and is subject to the following provisions:

- No work shall be conducted on the septic system until a Pre-Construction meeting has been completed by the Department.
- The septic system installer shall be a licensed septic contractor with the North Carolina Wastewater Contractor Inspector Certification Board.
- The permitted system shall be installed in accordance with the included PLOT PLAN.
- This IMPROVEMENT PERMIT is transferable.

Authorized Agent: Bryan Davenport Owner/Legal Agent:_____
Print Name

Signature: Bryan Davenport Signature:_____

Date Issued: 10/3/2024

Mecklenburg County Groundwater & Wastewater Services
3205 Freedom Dr., Suite 8000 Charlotte, NC 28208
Phone: (980) 314-1680 Fax: (704) 336-6894

NC DHHS
Division of Environmental Health
On-Site Wastewater Section

IMPROVEMENT PERMIT for a COMMERCIAL
ON-SITE WASTEWATER TREATMENT & DISPOSAL SYSTEM

Permit #: **30014902** GWS File #: **12036B**

IV. Permit Conditions/Comments:

- This type of septic system requires an inspection once every 6 months by our office. The system owner is responsible for any fees, as determined by the Mecklenburg County Board of Commissioners, associated with this inspection.
- This type of septic system requires an inspection once every year by our office. The system owner is responsible for any fees, as determined by the Mecklenburg County Board of Commissioners, associated with this inspection.
- This type of septic system requires a Certified Operator to maintain the system. A system maintenance contract with a Certified Operator must be on file prior to issuance of an Operation Permit.
- The septic system shall be installed in accordance with the plans submitted by the wastewater system design consultant.
- This septic system design requires pretreatment equipment to be installed. This equipment shall be installed as specified by the wastewater system design consultant.
- All components of the septic system must be installed in accordance with the required setbacks listed on the corresponding plot plan.
- All components of the septic system must be located at least 100 ft. (50 ft. minimum) from all private wells.
- All waterlines must be located a minimum of 10 ft. from any part of the septic system.
- Upon completion of the project the system designer shall provide Groundwater & Wastewater Services with a letter certifying that the system was installed in accordance with the approved design.
- The permitted system design requires a pressure manifold with varying tap diameters and/or pipe schedules. The contractor should review the specification detail provided by the system designer prior to bidding the project.
- An effluent filter is required on the pump discharge pipe exiting the pump tank.
- Flow from all gutters and downspouts shall be directed not to discharge water onto or across any part of the septic system.
- Septic Contractors are REQUIRED to notify design professional of preconstruction meeting, install date, and final inspection times.

The undersigned, an authorized agent of the STATE OF NORTH CAROLINA, certifies that the Department is issuing an IMPROVEMENT PERMIT for the above referenced property. This permit is being issued in accordance with the *Laws and Rules For Sewage Treatment and Disposal Systems* and is subject to the following provisions:

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- The septic system installer shall be a licensed septic contractor with the North Carolina Wastewater Contractor Inspector Certification Board.
- The permitted system shall be installed in accordance with the included PLOT PLAN.
- This IMPROVEMENT PERMIT is transferable.

Authorized Agent: Bryan Davenport

Signature: Bryan Davenport

Date Issued: 10/3/2024

Owner/Legal Agent: _____
Print Name

Signature: _____

Mecklenburg County Groundwater & Wastewater Services
3205 Freedom Dr., Suite 8000 Charlotte, NC 28208
Phone: (980) 314-1680 Fax: (704) 336-6894

NC DHHS
Division of Environmental Health
On-Site Wastewater Section

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- Domestic-type wastewater only. No industrial process wastewater may be discharged into the system.

I. This Improvement Permit Shall: Expire in Five (5) Years **Expiration Date (If Applicable):** 10/3/2029

Intallation Type: Commercail/Industrial - New System Business Type: Commercial

Facility Size (ft^2): 0 # Employees/Shift: 10 # Shifts: 1

Wastewater Type: Sewage Water Supply: Municipal

II. Initial System Type: Pump to Accepted **System Classification:** Va

Initial System Specifications:

Design Flow (gpd):	581	LTAR (gpd/ft^2):	0.25	Septic Tank Size (gal):	2000	Pump Tank Size (gal):	3000
Trench Width (ft):	3	Trench Spacing (ft):	9	Absorption Area (ft^2):	2324	Total Trench Length (ft):	775
Maximum Trench Depth (in):	30	Depth of Media (in):	12	Distribution Device:	Pressure Manifold		

III. Repair System Type: Pump to Accepted **System Classification:** Va

Repair System Specifications:

Design Flow (gpd):	581	LTAR (gpd/ft^2):	0.25	Septic Tank Size (gal):	2000	Pump Tank Size (gal):	3000
Trench Width (ft):	3	Trench Spacing (ft):	9	Absorption Area (ft^2):	2324	Total Trench Length (ft):	775
Maximum Trench Depth (in):	22	Depth of Media (in):	12	Distribution Device:	Pressure Manifold		

IV. Permit Conditions/Comments:

(Please See the Following Page for Permit Conditions.)

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- The permitted system shall be installed in accordance with the included PLOT PLAN.
- This IMPROVEMENT PERMIT is transferable.

Authorized Agent: Bryan Davenport Owner/Legal Agent: David DeCarlo, Piedmont Design

Signature: Bryan Davenport Signature:

Date Issued: 10/3/2024

Mecklenburg County Groundwater & Wastewater Services
3205 Freedom Dr., Suite 8000 Charlotte, NC 28208
Phone: (980) 314-1680 Fax: (704) 336-6894

NC DHHS
Division of Environmental Health
On-Site Wastewater Section

IMPROVEMENT PERMIT for a COMMERCIAL
ON-SITE WASTEWATER TREATMENT & DISPOSAL SYSTEM

Permit #: **30014902** GWS File #: **12036B**

IV. Permit Conditions/Comments:

- This type of septic system requires an inspection once every 6 months by our office. The system owner is responsible for any fees, as determined by the Mecklenburg County Board of Commissioners, associated with this inspection.
- This type of septic system requires an inspection once every year by our office. The system owner is responsible for any fees, as determined by the Mecklenburg County Board of Commissioners, associated with this inspection.
- This type of septic system requires a Certified Operator to maintain the system. A system maintenance contract with a Certified Operator must be on file prior to issuance of an Operation Permit.
- The septic system shall be installed in accordance with the plans submitted by the wastewater system design consultant.
- This septic system design requires pretreatment equipment to be installed. This equipment shall be installed as specified by the wastewater system design consultant.
- All components of the septic system must be installed in accordance with the required setbacks listed on the corresponding plot plan.
- All components of the septic system must be located at least 100 ft. (50 ft. minimum) from all private wells.
- All waterlines must be located a minimum of 10 ft. from any part of the septic system.
- Upon completion of the project the system designer shall provide Groundwater & Wastewater Services with a letter certifying that the system was installed in accordance with the approved design.
- The permitted system design requires a pressure manifold with varying tap diameters and/or pipe schedules. The contractor should review the specification detail provided by the system designer prior to bidding the project.
- An effluent filter is required on the pump discharge pipe exiting the pump tank.
- Flow from all gutters and downspouts shall be directed not to discharge water onto or across any part of the septic system.
- Septic Contractors are REQUIRED to notify design professional of preconstruction meeting, install date, and final inspection times.

The undersigned, an authorized agent of the STATE OF NORTH CAROLINA, certifies that the Department is issuing an IMPROVEMENT PERMIT for the above referenced property. This permit is being issued in accordance with the *Laws and Rules For Sewage Treatment and Disposal Systems* and is subject to the following provisions:

- No work shall be conducted on the septic system until a Pre-Construction meeting has been completed by the Department.
- The septic system installer shall be a licensed septic contractor with the North Carolina Wastewater Contractor Inspector Certification Board.
- The permitted system shall be installed in accordance with the included PLOT PLAN.
- This IMPROVEMENT PERMIT is transferable.

Authorized Agent: Bryan Davenport

Signature: Bryan Davenport

Date Issued: 10/3/2024

Owner/Legal Agent: David DeCaron, Piedmont Design
Print Name

Signature: _____

PIEDMONT DESIGN ASSOCIATES, P.A.
125 East Plaza Drive | Suite #101
Mooresville, NC 28115
Phone: 704-664-7888 | Fax: 704-664-1778
Email: dmunday@pdapa.com

Engineering
Surveying
Planning

December 17, 2025

Mecklenburg County Groundwater & Wastewater Services
3205 Freedom Drive, Suite 8000
Charlotte, NC 28208
Attn: April Bumgardner, REHS

RE: Flow Equalized Subsurface Effluent Disposal System
3116 Campus Ridge Road, Matthews, Mecklenburg County, North Carolina

Dear Ms. Bumgardner:

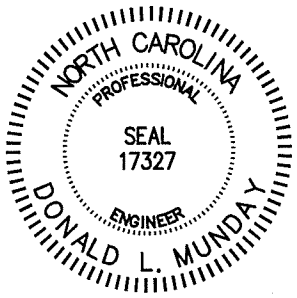
ENGINEERS CERTIFICATION

I, **Donald L. Munday**, as a duly registered Professional Engineer in the State of North Carolina, having been authorized to observe periodically the construction of the referenced project, Flow Equalized Subsurface Effluent Disposal System; 3116 Campus Ridge Road, Matthews, Mecklenburg County, NC, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the approved plans and specifications.

Sincerely,

PIEDMONT DESIGN ASSOCIATES, P.A.

Donald L. Munday, P.E.
N.C. Registration No. 17327



12/17/2025

Cc: Mr. Ben Taylor, Myers and Chapman
Mr. Scott Simmons, Windriver Environmental
Ms. Tammy Riggan, AQWA

INSPECTION AND MAINTENANCE AGREEMENT

STATE OF NORTH CAROLINA, COUNTY OF MECKLENBURG

This agreement is made and entered into this 17 day of December, 2025 by and between Telra Institute (hereinafter referred to as the "Owner"), and AQWA, Inc. (hereinafter referred to as the "Contractor").

WITNESSETH

WHEREAS, the Owner owns or controls the property upon which a ground absorption sewage treatment system (hereinafter "system") is installed, such system being designated a Type Va system under the Rules for Sanitary Sewage Collection, Treatment and Disposal found at 15A N.C. Administrative Code 18E.1300 et seq.; and,

WHEREAS, 15A N.C. Administrative Code 18E.1300 requires a contract to be executed between the system Owner and a management entity prior to the issuance of an Operation Permit for said system; and,

WHEREAS, 15A N.C. Administrative Code 18E.1300 requires that a condition of the Operation Permit for said system be that a properly executed contract between the system Owner and a management entity shall be in effect for as long as the system is in use; and,

WHEREAS, the Contractor is'a management entity, of a type authorized by 15A N.C. Administrative Code 18E.1300 to manage a Type Va system.

NOW THEREFORE, in consideration of the premises and of the mutual covenants and promises contained in this Agreement, it is hereby agreed by and between the Owner and the Contractor as stipulated below.

1. The Contractor's Obligations. The Contractor shall perform the following services on the Owner's system located at 3116 Campus Ridge Rd, Matthews, Mecklenburg Co. NC 28105. TMS # 21506111

a) The Contractor shall inspect the system at least at the frequency, required in Table XXXII of 15A N.C. Admin. Code 18E.1300 for a Type Va System and as specified in the State approval document for the equipment.

b) The Contractor shall monitor the routine operation of the system using the telemetry equipped control panel at least monthly and make such performance data available to the Owner if requested.

c) The Contractor shall take laboratory samples of effluent from the system as prescribed by the Health Department to monitor system performance at no additional expense to the Owner.

d) The Contractor shall perform the maintenance procedures in accordance with the conditions of the Operation Permit, 15A N.C. Administrative Code 18E.1300, specifications of the applicable N. C. Department of Natural Resources system approval document, and the manufacturers Operations and Maintenance Manual. Routine semi-annual maintenance procedures include: inspect the structural integrity and maintain all of the physical and mechanical components of the system, inspect the performance and condition of the low pressure drainfield, check and set pressures in the system, check and adjust pump delivery rate of the system, clean septic tank filter if applicable and accessible, and perform any other requirements of the operations permit.

e) The Contractor shall have an operator on call 24 hours daily. All emergency services will be billed to the owner.

f) The Contractor shall report the results of its inspections to the local Health Department at the frequency specified in Table XXXII of 15A N.C. Administrative Code 18E.1300 for a Type Va System.

g) If an inspection indicates the need for system repairs, the Contractor shall notify the local health department within 48 hours of the inspection.

h) The Contractor shall notify the Owner of needed repairs, which are outside of the scope of routine maintenance described in subparagraph (d) above. The Contractors shall perform necessary repairs to the system at the request of the Owner and shall be entitled to payment therefore at the Contractor's customary rate for services and materials.

i) The Contractor shall employ or shall contract with a State certified operator(s) if required by Table XXXII of 15A N.C. Administrative Code 18E.1300 for a Type Va System.

j) The Contractor shall respond to a request for service or maintenance call within forty eight (48) hours upon receipt of request.

2. The Owner's Obligations.

a) The Owner shall pay to the Contractor the sum of $2240.00 for periodic inspections (first year) and $2000.00 thereafter, for routine maintenance procedures, required sampling and periodic reports. The annual fee will be renewed at the end of each 12 month period. The annual fee may be amended upon sixty (60) days advance notice to the Owner but may not be increased more than six (6) percent per year. Upon notice by the Contractor, the Owner shall pay to the Contractor his normal and customary fees for any work performed on the system as a result of unscheduled service or maintenance calls. Unscheduled service or maintenance calls will be at the Contractor's customary rate with a two hour minimum, plus materials, and drive time. All fees are due and payable within thirty (30) days of billing. Payments due to the Contractor and unpaid by the Owner after thirty (30) days shall incur a late fee of $25 per month for each month payment is not received by the Contractor.

b) Within thirty (30) days of receipt of notice of needed repairs pursuant to paragraph 1.h. above, the Owner shall request the Contractor to complete needed repairs.

c) The Owner shall provide the Contractor with such access to the system as is reasonably necessary for the Contractor to comply with the terms of this Agreement and requirements of the local health department.

d) The owner shall provide the contractor with gate code, spare key location for any external lock or work with the contractor to have the gate unlocked when service is needed. It is the owners responsibility to make sure the contractor has access to the system and the contractor will not be responsible for keeping copies of keys.

e) The Owner shall keep the area of the septic system equipment and drain field properly mowed and protected from traffic.

f) The Owner shall maintain all lids such that they are above grade and shall not be covered except light (<1" of mulch or straw). Lids shall be able to be accessible for opening by the Contractor personnel without requiring the removal of lawn equipment, furniture, decks, fences, etc.

g) The Owner shall provide a hose bib with water service within 75 feet of the system.

h) The Owner shall apply and enforce the "Do's and Don'ts" as prescribed by the manufacturer in the provided publication.

3. Term. This Agreement shall remain in effect until terminated.

a) Automatic Termination. This agreement shall automatically terminate if the Operation Permit for the system is revoked and all appeals of the revocation are exhausted or the time for taking an appeal has passed.

b) Termination by Mutual Consent. The Parties may mutually agree to terminate this Agreement by giving written notice of termination by mutual consent to the local health department thirty (30) days in advance of the date of termination.

c) Termination by the Owner. The Owner may terminate this Agreement by giving notice to the Contractor and to the local health department thirty (30) days in advance of the date of termination.

d) Termination by the Contractor.

1) The Contractor may terminate this Agreement for cause by giving written notice of intent to terminate this Agreement to the Owner and to the local health department thirty (30) days in advance of the date of termination. Cause shall be defined as:

a. failure of the Owner to remit payment for any bill for services performed under and in accordance with this Agreement if said bill is not paid within thirty (30) days of receipt by the Owner of the bill. If said bill is paid after notice of termination of this Agreement, the Agreement shall continue in effect; or,

b. failure of the Owner to provide to the Contractor authorization to complete needed repairs within thirty (30) days of receipt of notice of needed repairs pursuant to paragraph 1.h. above. If said authorization to complete needed repairs or evidence of completion of said repairs is provided after notice of termination is given but prior to the date of termination of this Agreement, this Agreement shall continue in effect; or,

c. failure of the Owner to allow the Contractor such access to the system as is reasonably necessary in order for the Contractor to comply with the terms of this Agreement.

2) The Contractor may not terminate this Agreement without cause, but may assign its rights and duties under this Agreement as provided in paragraph 4, below.

4. Assignment.

a) Assignment by the Owner. The Owner shall notify the Contractor of the name and address of any purchaser of the property on which the system is located. The Owner shall also notify any purchaser of the property on which the system is located of the existence of this Agreement and shall assign all rights and duties under this Agreement to said purchaser. Prepaid annual service fees are non-refundable and any prorations are to be handled between seller/purchaser at closing.

b) Assignment by the Contractor. The Contractor may assign its rights and duties under this Agreement to another management entity, which is qualified pursuant to 15A N.C. Administrative Code 18E.1300 to manage a Type Va system upon thirty (30) days written notice to the Owner and to the local health department.

5. Use of Subcontractors. The Contractor may subcontract with such manufacturers, suppliers and contractors as it deems desirable to perform any of the Contractor's duties under this Agreement. The Contractor shall at all times remain responsible for the performance of and payment for all work performed by all subcontractors.

6. Representations. The Parties represent to each other that each has the power, authority and legal right to enter into and perform its obligations as set forth in this Agreement.

7. Regulatory Amendments. References in this Agreement to sections of the Administrative Code shall include such rules as they may be amended in the future.

8. No Implied Waiver. The waiver by either Party, of the default or a breach by the other Party of any provision of this Agreement shall not operate or be construed to operate as a waiver of any subsequent default or breach. The failure at any time of either Party to enforce any provision of this Agreement (a) shall not be construed to be a waiver of such provisions, or of any other provision; and (b) shall not in any way affect the validity of this Agreement, or any part of this Agreement, or the right of either Party thereafter to enforce each provision of this Agreement.

9. Notice. Every notice required under this Agreement shall be in writing and shall be deemed sufficiently given if delivered in person or sent by certified or registered mail, return receipt requested, postage prepaid to the Party to be notified and addressed as follows:

   To the Owner: Telra Institute, 4150 McKee Rd, Charlotte, NC 28270
   To the Contractor: AQWA, Inc., 1908 Baldree Rd S, Wilson, NC 27893
   To the Mecklenburg Co. Health Dept: 700 N Tryon St, Suite 208, Charlotte, NC 28202

   The date of any Notice shall be the date of personal delivery or the date shown on the return receipt as the date of delivery or attempted delivery, as the case may be. Changes in the respective addresses to which notice may be directed may be made from time to time by either Party by notice to the other party.

10. Place of Agreement. This Agreement and any questions concerning its validity, the system construction or performance shall be governed by the laws of the State of North Carolina, notwithstanding the place of execution, or the order in which the signatures of the Parties are affixed.

11. Entire Agreement and Amendment. This Agreement supersedes all prior negotiations, agreements and understandings between the Parties with respect to Inspection and Maintenance of the system and constitutes the entire Inspection and Maintenance Agreement between the Parties. To be effective, any amendment or modification to this Agreement must be in writing and must be signed by the Parties.

12. Severability. In the event that any provision of this Agreement shall, for any reason, be determined to be invalid, illegal or unenforceable in any respect, the Parties shall negotiate in good faith and agree to such amendments, modifications or supplements to this Agreement or such other appropriate actions as shall, to the maximum practicable in light of such determination, implement and give effect to the intentions of the Parties as reflected in this Agreement, and the other provisions of this Agreement shall, as so amended, modified, supplemented or otherwise affected by such actions, remain in full force and effect.

IN TESTIMONY WHEREOF, the Parties hereto have executed this Agreement in duplicate originals, one of which is retained by each of the Parties, the day and year first above written.

Authorized Representative:

Signature

Ronak Bhatt

Printed Name

Contractor

Tammy Riggan
Operations Manager, AQWA, Inc.

SPECIFICATIONS, CALCULATIONS & SUPPORTING MATERIAL

FOR A FLOW EQUALIZED GROUND ABSORPTION SEWAGE

DISPOSAL SYSTEM SERVING

TELRA HIGH SCHOOL

3116 CAMPUS RIDGE ROAD

Matthews, Mecklenburg County, North Carolina

August 19, 2024
Revised September 17, 2024

Prepared for:
Telra Supporting Organization, Inc.
4150 McKee Road
Charlotte, NC 28270
Phone: 704-727-2530

Prepared by:
PIEDMONT DESIGN ASSOCIATES, P.A.
125 East Plaza Drive, Suite 101
Mooresville, NC 28115
Phone: 704-664-7888
Fax: 704-664-1778
NCBELS No.: C-1007



SPECIFICATIONS, CALCULATIONS & SUPPORTING MATERIAL

FOR A FLOW EQUALIZED GROUND ABSORPTION SEWAGE

DISPOSAL SYSTEM SERVING

TELRA HIGH SCHOOL

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NCBELS No.: C-1007



Ground Absorption Sewage Disposal System
Telra High School
Matthews, Mecklenburg County, NC

Wastewater Treatment & Disposal System

I. NARRATIVE:

Telra Supporting Organization, Inc. is currently seeking a permit to construct a new High School located at 3116 Campus Ridge Road in Matthews, Mecklenburg County, North Carolina. The septic system is being designed for 99 students and 10 staff members. Since the facility will only operate 5 days, a flow equalization system is recommended by the Engineer. Due to schools having the potential for HSE, advanced treatment is being utilized prior to effluent being introduced to the drainfield. The drain field (both primary and repair) has been identified and evaluated by Mr. Wendell Overby, LSS with Soil and Forestry Services. The recommended loading rate for the primary and repair areas has been determined to be 0.25 G/D/SF by taking the mean loading rate of Group IV soils.

The system is designed to accept, treat, and dispose of waste from this facility only. No other discharge is allowed into this system, including condensate water from HVAC systems, stormwater, etc.

The Engineer has designed a textile-media filter and pressure dosed subsurface disposal system that dispenses treated effluent using design criteria intended to comply with NC DEM Administrative Code 15A NCAC 2H.0200 and 15A NCAC 18A .1969, and NC DHHS Onsite Section Innovative Wastewater System & Orenco Advantex Recirculating Textile-Media Filter (IWWS-2004-3-R4).

Until plan acceptance and construction, the primary and repair fields shall be maintained undisturbed. This shall include placement of signs, ribbons, and barricades to avoid traffic, storage, or parking in the area. Encroachment by any utility or others is not permitted. The primary and repair septic fields shall be used for such purposes only and shall not be used for any other activities including athletic fields, main or overflow parking use.

The Contractor shall be prohibited from working while the site is wet. The Contractor shall contact the Engineer, Local Health Department, or the Soil Scientist prior to commencement of work after rainfall. Any of these parties have the right to suspend work until soil moisture conditions are favorable to optimal installation.

The installer shall be knowledgeable of the type of system to be installed and shall have prior instruction on the installation of the various components of the system and shall have the prior approval of the component manufacturer (Orenco), and the approval of the Design Engineer.

The Engineer and Field Representative of treatment shall provide written acceptance of the system installation prior to issuance of operation permit.

Scope of the Project: The scope of this project is to construct a system to treat & dispose of the waste from the current facility. The system will consist of a new 2,000-gallon septic tank with effluent filter that will separate most all the solids in the waste from the liquid waste. Effluent from this tank flows via gravity to a 3,000-gallon flow equalization that will handle wastewater surges and spread the flow out evenly over a week to a new recirculation tank. The 1,500-gallon recirculation tank doses the treatment units at a programmed rate determined by the manufacturer. After treatment, effluent passes to a 1,500-gallon field dosing pump tank that passes effluent on to the new pressure manifold which will dose the new drain field.

The field dosing system will have a single pump, separate float switches, pressure manifold and other appurtenances and controls to allow the automatic dosing of the system.

The pump controls will have a 24-hour clock, programmable as determined by the operator. Controls shall also have an elapsed run time clock and cycle counter for each pump. Unless alternately

provided with the advanced Pretreatment System, the system control panel shall enable the daily, 7-day and 30-day monitoring requirements of Rule .1970 to be met, such as by data logging the field dosing times or field flow meter readings. The controls shall also have manual operating capabilities and alarms. The controls are to be located at a readily accessible location at the residence.

DIRECTIONS TO THE PROPERTY:
From Interstate 485, take Exit 52 E John Street (becomes Old Monroe Road). Turn right at the end of the ramp. Turn left on McKee Road (becomes Campus Ridge Road). Cross railroad tracks and property will be located on the left side of road.

SECTION II - REGULATIONS
In addition to compliance with laws, rules and regulations as required under the General Conditions of these Documents, the Contractor shall comply with the following specific regulations applicable to the nature of work included under this Contract.

Reference Material:

(1) EPA 625/R-00/008 Design Manual - On-site Wastewater Treatment and Disposal System; February 2002; Chapter 7.
(2) NC DHHS Administrative Code : 15A NCAC 18E
(3) OSI ADVANTEX Treatment System, Manual including performance information, Orenco, Inc.
(4) EPA: Technology Assessment of Intermittent Sand Filter, April 1985.
(5) NC DHHS-OSWPS – Innovative Approval IWWS-2004-3-R4 for Orenco Systems, Inc.
(6) NC DHHS-OSWPS – Innovative Approval IWWS-2004-01 for Flow Equalization.

Sheet 1 of 1

PROPERTY ID #: 21506111

COUNTY: Mecklenburg

SOIL/SITE EVALUATION
for ON-SITE WASTEWATER SYSTEM
(complete all fields in full)

OWNER: Dennis & Robin Harkey

ADDRESS: 417 Navajo Trail

PROPOSED FACILITY: Telra High School

LOCATION OF SITE: Campus Ridge Road

APPLICATION DATE:

DATE EVALUATED: 6/27/2024

PROPERTY SIZE: 3 ACRES

PROPERTY RECORDED:

WATER SUPPLY: ☐ Private ☐ Well ☐ Spring ☑ Other Municipal Supply

EVALUATION METHOD: ☑ Auger Boring ☐ Pit ☐ Cut

TYPE OF WASTEWATER: ☑ Sewage ☐ Industrial Process ☐ Mixed

PROFILE #	.1940 LANDSCAPE POSITION/ SLOPE %	HORIZON DEPTH (IN.)	SOIL MORPHOLOGY (.1941)		OTHER PROFILE FACTORS				PROFILE CLASS & LTAR
			.1941 STRUCTURE/ TEXTURE	.1941 CONSISTENCE/ MINERALOGY	.1942 SOIL WETNESS/ COLOR	.1943 SOIL DEPTH	.1956 SAPR CLASS	.1944 RESTR HORIZ	
1	L / 3%	0 - 9	YB L WFG	FR SS SP	N/A	48	N/A	N/A	0.25
		9 - 20	YB CL WMA	FR SS SP					
		20 - 30	BR C/CL WMA	FR SS SP C YB MOT					
		30 - 48	YR L WMA	FR SS SP F SAP					
2	L / 3%	0 - 8	YR L WFG	FR SS SP	N/A	48	N/A	N/A	0.275
		8 - 24	BR C MMA	FI SS SP F YB					
		24 - 48	YR L WMS	FR SS SP F/C SAP					
15	L / 2%	0 - 8	Y L WFG	FR SS SP	N/A	48	N/A	N/A	0.3
		8 - 24	BR C MMA	FI SS SP					
		24 - 36	R CL WMA	FR SS SP					
		36 - 48	YB L WMS	FR SS SP C SAP					
16	L / 2%	0 - 36	CL MMA	FR SS SP	N/A	48	N/A	N/A	0.3
		36 - 48	YR L WFS	FR SS SP C SAP					
18	L / 2%	0 - 7	B SIL WFG	FR SS SP	N/A	48	N/A	N/A	0.25
		7 - 14	YB SICL WMA	FI SS SP					
		14 - 32	YB C MMA	FI SS SP					
		32 - 48	YR L WMS	FR SS SP C SAP					
19	L / 2%	0 - 4	DB L WFG	FR SS SP	N/A	48	N/A	N/A	0.3
		4 - 7	YB SCL WMS	FR SS SP					
		7 - 30	R C WMS	FR SS SP					
		30 - 48	R CL WMS	FR SS SP					
20	L / 2%	0 - 3	B L WFG	FR SS SP	N/A	48	N/A	N/A	0.25
		3 - 8	YR CL WMA	FR SS SP					
		8 - 32	YR C WMS	FR SS SP C YW MOT					
		32 - 48	YR CL WMA	FR SS SP C YW MOT					
21	L / 2%	0 - 13	YB L WFG	FR SS SP	2CH@34	48	N/A	N/A	0.25
		13 - 30	YR CL WMA	FR SS SP					
		30 - 48	YR L WMS	FR SS SP C YB MOT					
22	L / 2%	0 - 6	DB L WFG	FR SS SP	N/A	48	N/A	N/A	0.25
		6 - 13	YB CL WMA	FR SS SP					
		13 - 30	YR C WFS	FR SS SP F R MOT					
		30 - 48	YR L WMA	FR SS SP F/C SAP					

DESCRIPTION	INITIAL SYSTEM	REPAIR SYSTEM
Available Space (.1945)	775	775
System Types(s)	ACCEPTED	ACCEPTED
Site LTAR	0.25	0.25

OTHER FACTORS (.1946):

SITE CLASSIFICATION (.1948): S

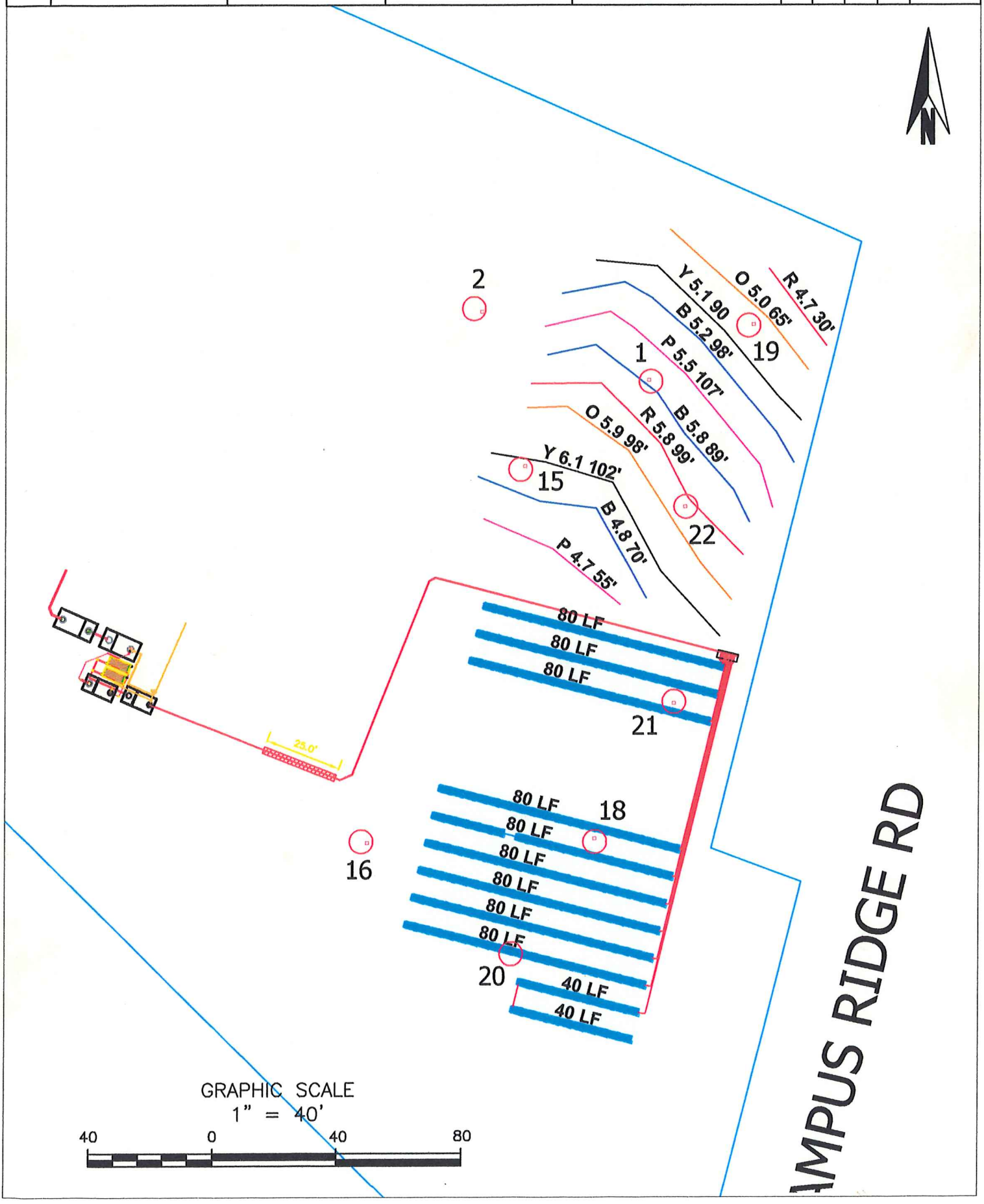
EVALUATED BY: Wendell Overby

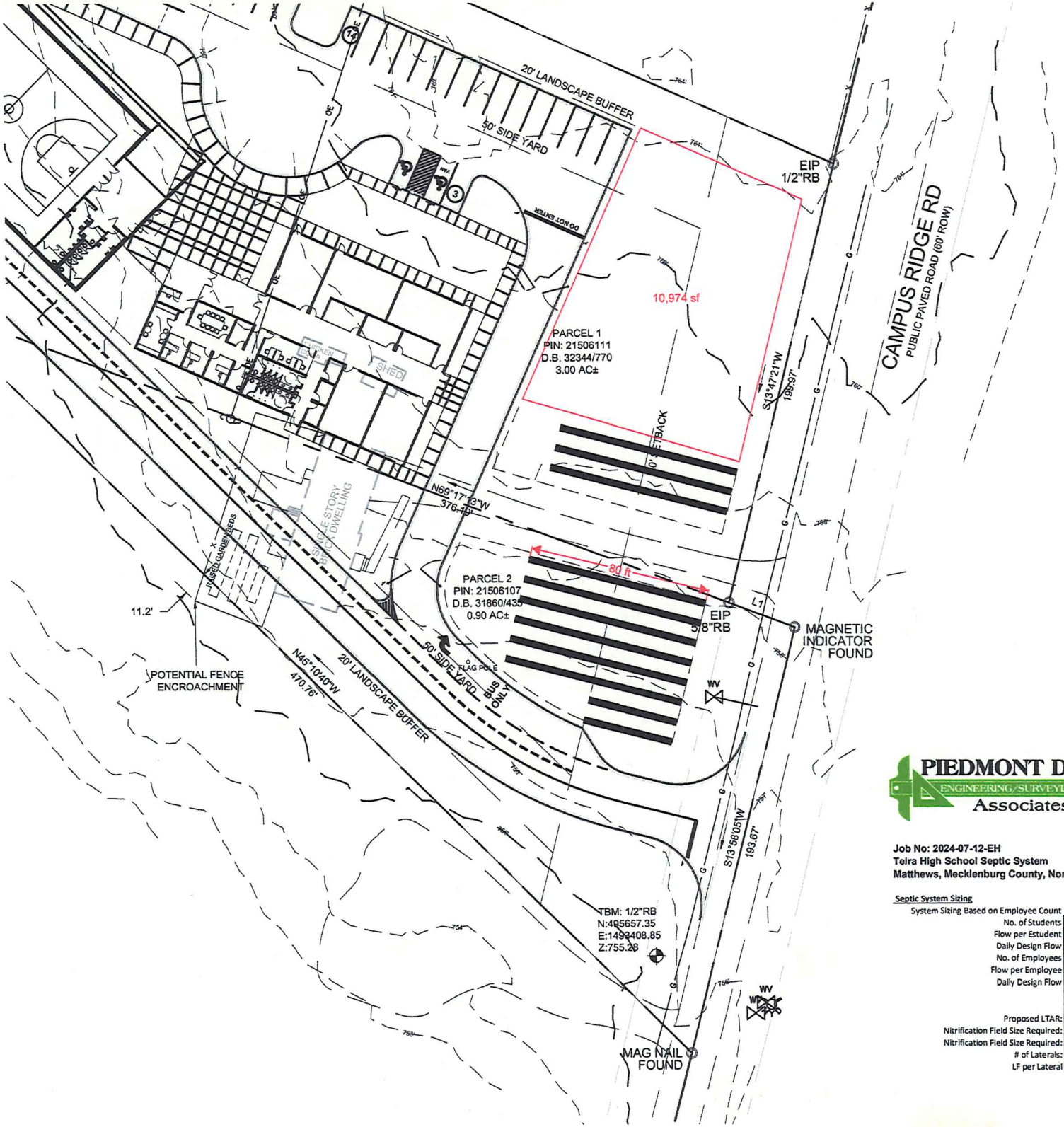
OTHER(S) PRESENT:

LICENSED SOIL SCIENTIST WENDELL OVERBY 1215 N.C. NORTH CAROLINA

COMMENTS:

SHEET 1 OF 1	SHEET TITLE: SEPTIC SYSTEM LAYOUT SKETCH MAP	PROJECT NAME: BHATT CAMPUS RIDGE RD MECKLENBURG COUNTY SEPTEMBER 2024	SOIL & FORESTRY SERVICES OF THE CAROLINAS, PA	Soil & Forestry Services of the Carolinas, PA 813 Davidson Dr NW Concord NC 28025 usablesoil@gmail.com 980-439-5007 soilandforestryservices.com	SCALE 1" = 40'	FIELD WORK WO	DRAWN BY WO	PROJECT MGR. WO	PROJECT NO. 24-1097





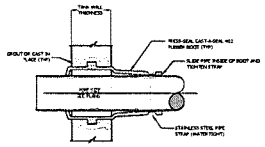
PIEDMONT DESIGN
ENGINEERING/SURVEYING/PLANNING
Associates, P.A.

Job No: 2024-07-12-EH
Telra High School Septic System
Matthews, Mecklenburg County, North Carolina

Septic System Sizing

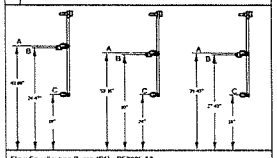
System Sizing Based on Employee Count

No. of Students	99.00	Students
Flow per Estudent	7.00	G/D/Student
Daily Design Flow	693.00	G/D
No. of Employees	10.00	Employees / Shift
Flow per Employee	12.00	G/D/Employee
Daily Design Flow	120.00	G/D
	813.00	G/D
	580.71	G/D Flow Equalized
Proposed LTAR:	0.25	G/D/SF
Nitrification Field Size Required:	2,322.86	Sq Ft Drainline
Nitrification Field Size Required:	774.29	LF Drainline
# of Laterals:	10.00	
LF per Lateral	77.43	LF (Use 80 LF Each)



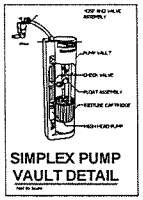
STANDARD PIPE PENETRATIONS

A	High Level Alarm / Leg Enable
B	Pump Enable
C	Redundant Off / Low Level Alarm



Flow Equalization Pump (S1)	PF7005-12
Recirculation Pump (S2)	(2) PF500512
Drainfield Dosing Pump (S3)	Goulds 3885 Series Model WE1012H

FLOAT SETTINGS



SIMPLEX PUMP VAULT DETAIL

RISER & LID NOTE:
RISERS TO BE CAST IN PLACE AT TIME OF TANK CONSTRUCTION AND MEET THE REQUIRED APPROVAL FOR THE SPECIFIED RISER. ALL TANK ACCESS LIDS MUST HAVE BOLT DOWN OR LOCKING CAPABILITY.

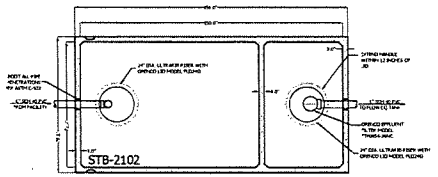
TANK ELEVATIONS
NOTE: TANK DIMENSIONS & ELEVATIONS BASED ON SHOAF PRECAST COMPANY, INC. OTHER STATE APPROVED TANKS MAY BE SUBSTITUTED BUT NOT WITHOUT PRIOR APPROVAL FROM THE ENGINEER. CONTRACTOR SHALL VERIFY DIMENSIONS AND ADJUST GRADES AND FLOAT SETTINGS AS REQUIRED TO CAUSE FLOW AND DOSING AS CALLED FOR.
TANKS SHALL NOT BE PUMPED DURING EXTREMELY WET CONDITIONS.

GENERAL NOTES:
1. NOTIFY UNDERGROUND UTILITIES LOCATOR PRIOR TO ANY EXCAVATION. CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF ALL TRADES AND SUBCONTRACTORS. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING ALL DIMENSIONS, ELEVATIONS, AND LOCATION OF ALL EXISTING CONDITIONS AND UTILITIES.
2. ALL PIPING SHALL BE SCH 40 PVC UNLESS OTHERWISE NOTED ON PLANS. ALL PVC PIPES SHALL BE BURIED A MINIMUM OF 3 FEET UNLESS SHOWN OTHERWISE.
3. CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE SOIL EROSION AND SEDIMENTATION CONTROL REQUIREMENTS.
4. CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE OSHA, NCDOT, AND OTHER RELATED SAFETY REQUIREMENTS.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ALL CONSTRUCTION DAMAGE EXPEDITIOUSLY AND AT NO ADDITIONAL COST TO THE OWNER.
6. SEPTIC TANKS SHALL BE CONSTRUCTED WITH A BAFFLE WALL DIVIDING THE TANK INTERIOR 2/3rd TO 1/3rd. THE BAFFLE WALL SHALL BE CONSTRUCTED TO PERMIT PASSAGE OF EFFLUENT THROUGH A SLOT OR HOLES LOCATED BETWEEN 45 & 55 PERCENT OF THE INTERIOR DEPTH.
7. ALL TANKS SHALL HAVE A MINIMUM 28-DAY CONCRETE STRENGTH OF 4,000 PSI.
8. TANKS SHALL MEET REINFORCING REQUIREMENTS TO ACCOMMODATE 2,000 POUNDS PER SQ. FT. EITHER STEEL REINFORCING WIRE, REBAR OR APPROVED FIBER, MAY BE USED.
9. ALL SERVICE ACCESS OPENINGS WILL BE A MINIMUM OF 24 INCHES.
10. ALL TANKS AND EFFLUENT FILTERS SHALL BE APPROVED BY ENGINEER AND ON-SITE WATER PROTECTION SECTION. EFFLUENT FILTERS SHALL BE SIZED FOR DESIGN FLOW AND EXTEND DOWN TO 80-PERCENT OF LIQUID LEVEL.
11. ALL JOINTS (MID-RISER, TOP-RISER) SHALL BE SEALED USING CONCRETE SEALANTS BUTYL SEALANT # CS-102 MEETING ASTM C-990.
12. TANKS SHALL BE LEAK-TESTED PRIOR TO SYSTEM START UP BY APPLYING A VACUUM OF 5-INCHES OF MERCURY WITH RISER ASSEMBLIES IN PLACE OR A 24-HOUR STATIC WATER TEST IN ACCORDANCE WITH ASTM STANDARDS.
13. ALL PIPE PENETRATIONS THROUGH PRECAST CONCRETE TANKS SHALL BE PRESS-SEAL CAST A-SEAL 401 RUBBER BOOTS AND GROUTED.
14. ALL TANK RISERS AND LIDS SHALL EXTEND A MINIMUM OF 6" ABOVE THE FINISHED GRADE.
15. ALL METAL INSTALLED IN TANKS SHALL BE STAINLESS STEEL.
16. ALL MANHOLES NOT INSTALLED NOT IN TRAFFIC AREAS SHALL HAVE BOLT DOWN LIDS. LIDS SHALL BE 6" MINIMUM ABOVE FINISHED GRADE.
17. CONTROL PANELS SHALL BE INSTALLED A MINIMUM OF 36 INCHES FROM FINISHED GRADE TO BOTTOM OF PANEL BOX. SEAL OFF ALL CONDUITS BETWEEN TANKS AND PANEL.

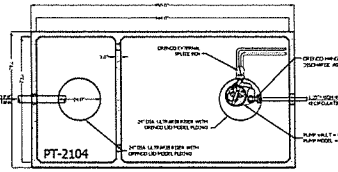
REFER TO SHEET U-1 FOR SYSTEM LAYOUT

REFER TO SPECIFICATION PACKAGE FOR MATERIALS SELECTION AND INSTALLATION REQUIREMENTS

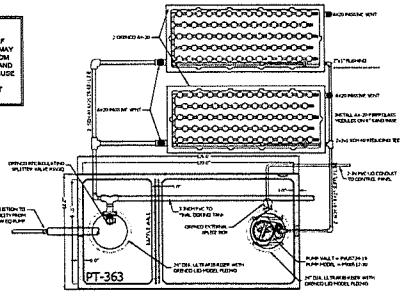
ORENCO SYSTEMS, INC. CONTROL PANEL SHALL BE PROVIDED BY THE MANUFACTURER AND MEET THE DAILY, 7-DAY AND 30-DAY MONITORING REQUIREMENTS OF RULE 1970, UNLESS THE DRAINFIELD PANEL IS PROVIDED BY A DISTRIBUTION SYSTEM MANUFACTURER OTHER THAN ORENCO SYSTEMS, INC. IF SO, THE OTHER MANUFACTURER'S PANEL SHALL MEET THESE SAME MONITORING REQUIREMENTS.



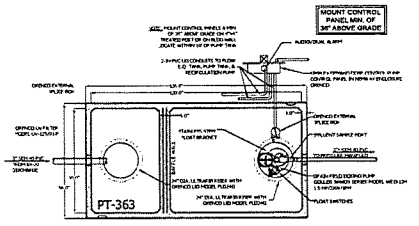
PLAN VIEW - 2,000 GAL SEPTIC TANK



PLAN VIEW - 3,000 GALLON FLOW EQ TANK

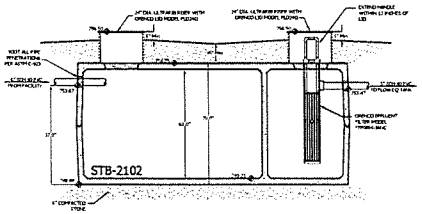


PLAN VIEW - 1,500 GAL RECIRC. TANK

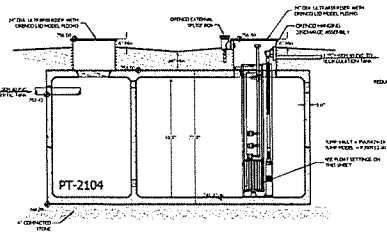


PLAN VIEW - 1,500 GAL PUMP TANK

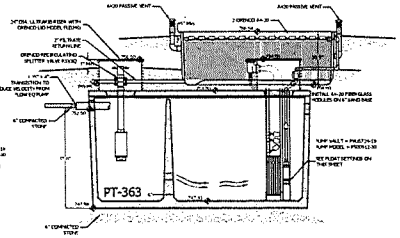
NOTE:
ALL GRAVITY PIPE BETWEEN TANKS SHALL BE SCH 40 PVC. MINIMUM SLOPE SHALL BE 2%.



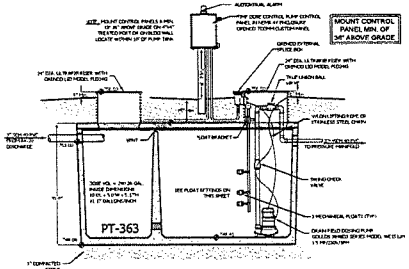
SECTION VIEW - 2,000 GALLON SEPTIC TANK



SECTION VIEW - 3,000 GALLON FLOW EQ TANK



SECTION VIEW - 1,500 GAL RECIRC. TANK



SECTION VIEW - 1,500 GAL PUMP TANK

PIEDMONT DESIGN ASSOCIATES
ENGINEERING • PLANNING • SURVEYING
Piedmont Design Associates, P.A.
Suite 260 Westfield Center, 135 East Main Street
Mooresville, North Carolina 28115
Phone (704) 662-4240 Fax (704) 662-4241 www.pdpa.com
NC PE & LS Licensed # C-1509

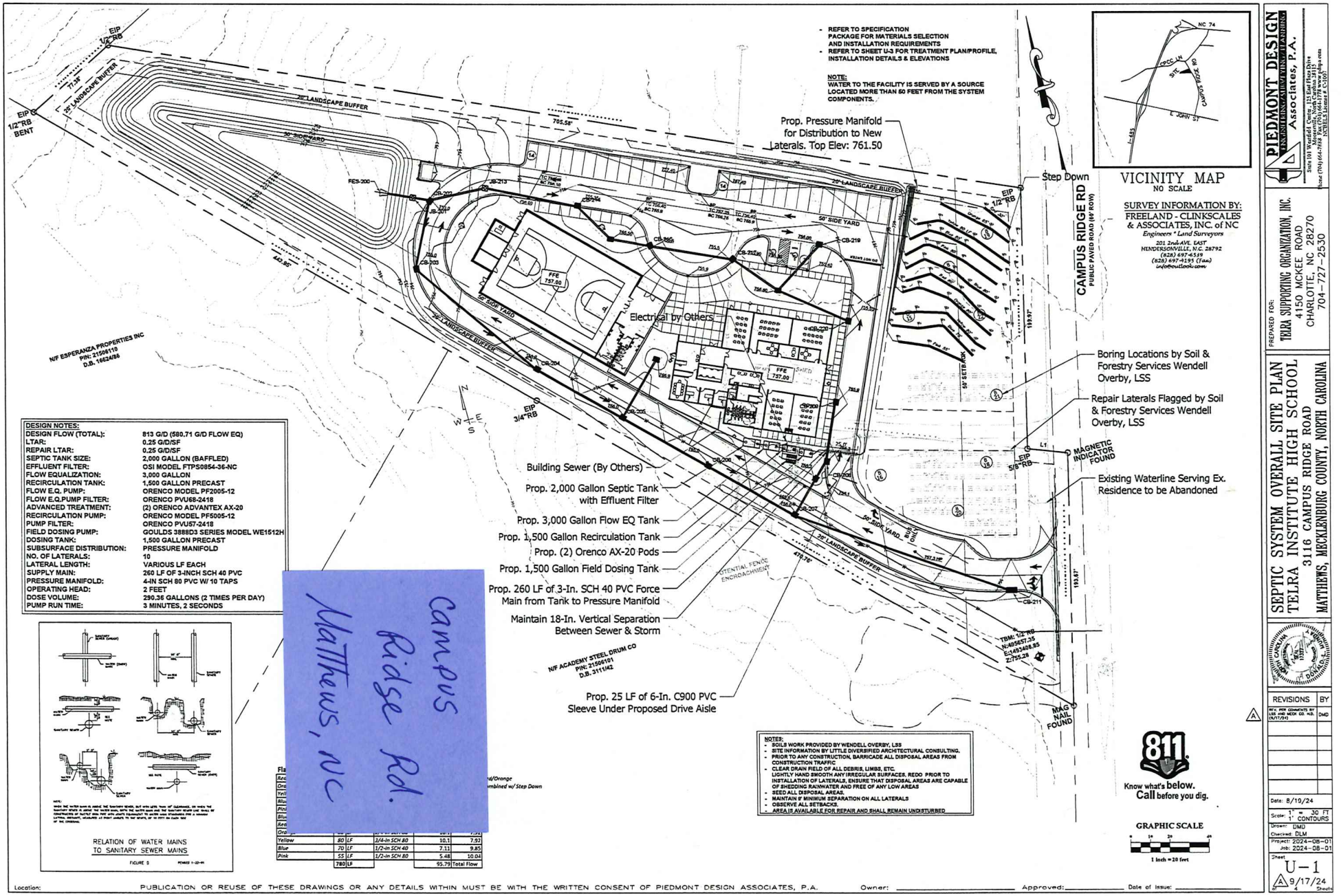
PREPARED FOR:
TELRA SUPPORTING ORGANIZATION, INC.
4150 MCKEE ROAD
CHARLOTTE, NC 28270
704-727-2530

SEPTIC SYSTEM TREATMENT PLAN/PROFILE
TELRA INSTITUTE HIGH SCHOOL
3116 CAMPUS RIDGE ROAD
MATTHEWS, MECKLENBURG COUNTY, NORTH CAROLINA

REVISIONS	BY
RE-L PER COMMENTS BY ESE AND MECK CO H.D. (W/STCH)	DMD

Date: 8/19/24
Scale: N.T.S.
Drawn: DMD
Checked: DLM
Project: 2024-08-01
Job: 2024-08-01
Sheet: U-3
A 9/17/24
of 4 Sheets

Location: PUBLICATION OR REUSE OF THESE DRAWINGS OR ANY DETAILS WITHIN MUST BE WITH THE WRITTEN CONSENT OF PIEDMONT DESIGN ASSOCIATES, P.A. Owner: _____ Approved: _____ Date of Issue: _____



DESIGN NOTES:	
DESIGN FLOW (TOTAL):	813 G/D (580.71 G/D FLOW EQ)
LTAR:	0.25 G/D/SF
REPAIR LTAR:	0.25 G/D/SF
SEPTIC TANK SIZE:	2,000 GALLON (BAFFLED)
EFFLUENT FILTER:	OSI MODEL FTPS0854-36-NC
FLOW EQUALIZATION:	3,000 GALLON
RECIRCULATION TANK:	1,500 GALLON PRECAST
FLOW E.Q. PUMP:	ORENCO MODEL PF2005-12
FLOW E.Q.PUMP FILTER:	ORENCO PVU68-2418
ADVANCED TREATMENT:	(2) ORENCO ADVANTEX AX-20
RECIRCULATION PUMP:	ORENCO MODEL PF5005-12
PUMP FILTER:	ORENCO PVU57-2418
FIELD DOSING PUMP:	GOULDS 3888D3 SERIES MODEL WE1512H
DOSING TANK:	1,500 GALLON PRECAST
SUBSURFACE DISTRIBUTION:	PRESSURE MANIFOLD
NO. OF LATERALS:	10
LATERAL LENGTH:	VARIOUS LF EACH
SUPPLY MAIN:	260 LF OF 3-INCH SCH 40 PVC
PRESSURE MANIFOLD:	4-IN SCH 80 PVC W/ 10 TAPS
OPERATING HEAD:	2 FEET
DOSE VOLUME:	290.36 GALLONS (2 TIMES PER DAY)
PUMP RUN TIME:	3 MINUTES, 2 SECONDS

Campus Ridge Rd. Matthews, NC

Yellow	80 LF	3/4-In SCH 80	10.1	7.92
Blue	70 LF	1/2-In SCH 40	7.11	9.85
Pink	55 LF	1/2-In SCH 80	5.48	10.04
	780 LF		95.79	Total Flow

RELATION OF WATER MAINS TO SANITARY SEWER MAINS
FIGURE 5

NOTES:
- SOILS WORK PROVIDED BY WENDELL OVERBY, LSS
- SITE INFORMATION BY LITTLE DIVERSIFIED ARCHITECTURAL CONSULTING.
- PRIOR TO ANY CONSTRUCTION, BARRICADE ALL DISPOSAL AREAS FROM CONSTRUCTION TRAFFIC
- CLEAR DRAIN FIELD OF ALL DEBRIS, LIMBS, ETC. LIGHTLY HAND SMOOTH ANY IRREGULAR SURFACES. REDO PRIOR TO INSTALLATION OF LATERALS, ENSURE THAT DISPOSAL AREAS ARE CAPABLE OF SHEDDING RAINWATER AND FREE OF ANY LOW AREAS
- SEED ALL DISPOSAL AREAS.
- MAINTAIN 5' MINIMUM SEPARATION ON ALL LATERALS
- OBSERVE ALL SETBACKS.
- AREA IS AVAILABLE FOR REPAIR AND SHALL REMAIN UNDISTURBED

PIEDMONT DESIGN ASSOCIATES, P.A.
ENGINEERING * SURVEYING * PLANNING
Suite 101 Woodfield Center, 125 East Plaza Drive, Hendersonville, NC 28792
Phone (704) 664-7868 Fax (704) 664-1778 www.pdanc.com
NCBELS Licensed C-0907

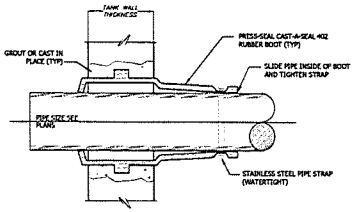
PREPARED FOR:
TELRA SUPPORTING ORGANIZATION, INC.
4150 MCKEE ROAD
CHARLOTTE, NC 28270
704-727-2530

SEPTIC SYSTEM OVERALL SITE PLAN
TELRA INSTITUTE HIGH SCHOOL
3116 CAMPUS RIDGE ROAD
MATTHEWS, MECKLENBURG COUNTY, NORTH CAROLINA

REVISIONS	BY
A. PER COMMENTS BY LSS AND MECK CO. H.D. (9/17/24)	DMD

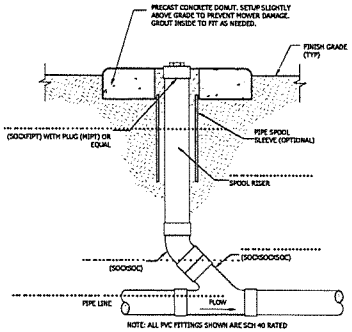
Date: 8/19/24
Scale: 1" = 30 FT, 1" CONTOURS
Drawn: DMD
Checked: DLM
Project: 2024-08-01
Job: 2024-08-01
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PIPE PENETRATION DETAIL

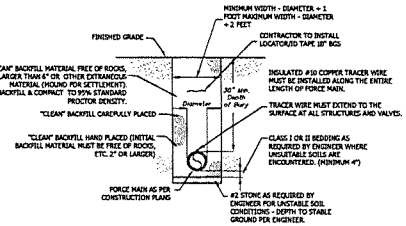
Not to Scale



NOTE: ALL PVC FITTINGS SHOWN ARE SCH 40 RATED

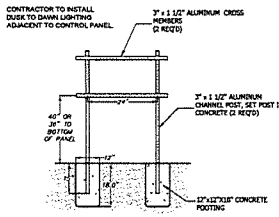
CLEANOUT DETAIL

Not to Scale



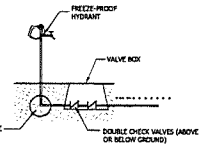
PVC SEWER PIPE TRENCH DETAIL

Not to Scale



PANEL MOUNTING RISER

Not to Scale

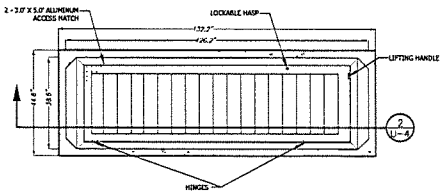


YARD HYDRANT DETAIL

Not to Scale

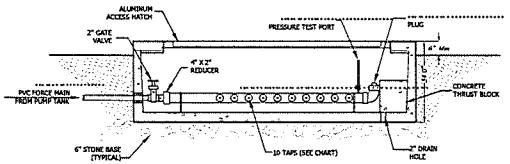
Locate Greater Than 10 Feet From System Components

Flagged Lateral			Tap Size	Flow per Tap	Gal./LF	
Red	30	LF	3/4-in SCH 40	12.5	7.60	Red/Orange Combined w/ Step Down
Orange	65	LF				
Yellow	80	LF	3/4-in SCH 80	10.1	7.92	
Blue	80	LF	3/4-in SCH 80	10.1	7.92	
Pink	80	LF	3/4-in SCH 80	10.1	7.92	
Blue	80	LF	3/4-in SCH 80	10.1	7.92	
Red	80	LF	3/4-in SCH 80	10.1	7.92	
Orange	80	LF	3/4-in SCH 80	10.1	7.92	
Yellow	80	LF	3/4-in SCH 80	10.1	7.92	
Blue	70	LF	1/2-in SCH 40	7.11	9.85	
Pink	55	LF	1/2-in SCH 80	5.48	10.04	
	780	LF		95.79	Total Flow	



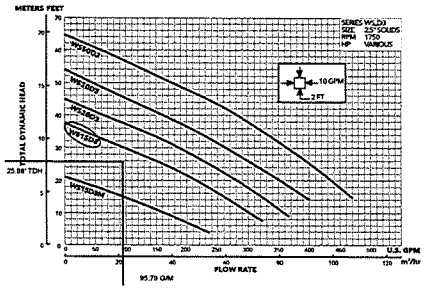
1 U-4 PLAN VIEW - MANIFOLD VAULT LID

Not to Scale



2 U-4 SECTION VIEW - MANIFOLD VAULT

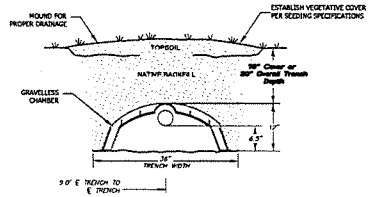
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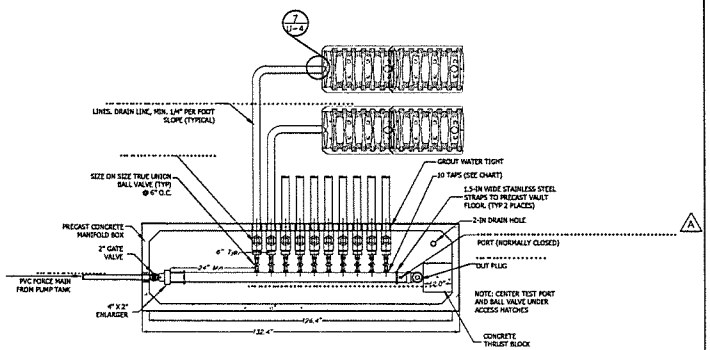
NOTE: SIGN SHALL BE INSTALLED AT TOP OF EVERY OTHER T-POST (OR EVERY 25 FEET WHICHEVER IS GREATER) SUPPORTING 4' HIGH ORANGE SAFETY FENCE SURROUNDING PRIMARY & REPAIR SEPTIC AREAS. CONTRACTOR TO INSTALL PRIOR TO ANY SITE DISTURBANCE.

DRAINFIELD PROTECTION & SIGNAGE



3 U-4 GRAVELLESS CHAMBER NITRIFICATION TRENCH TYPICAL SECTION VIEW

Not to Scale



PLAN VIEW - MANIFOLD VAULT

Not to Scale

PIEDMONT DESIGN
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NCBELS Licensed # C-1701

PREPARED FOR:
TELRA SUPPORTING ORGANIZATION, INC.
4150 MCKEE ROAD
CHARLOTTE, NC 28270
704-727-2530

SEPTIC SYSTEM DETAILS
TELRA INSTITUTE HIGH SCHOOL
3116 CAMPUS RIDGE ROAD
MATTHEWS, MECKLENBURG COUNTY, NORTH CAROLINA

REVISIONS	BY
A REV. PER COMMENTS BY LEE AND MCK CO. HD. (9/17/24)	DMD

Date: 8/19/24
Scale: N.T.S.
Drawn: DMD
Checked: DLM
Project: 2024-08-01
Job: 2024-08-01
Sheet: U-4
A 9/17/24
Of 4 Sheets

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Location: Owner: Approved: Date of Issue:

Sim/Tech Filter
1455 Lexamar Drive
Boyne City, MI 49712
Office: 231-582-1020

Website: www.gag-simtech.com
Email: sales@gag-simtech.com
Fax: 231-582-7324
Toll Free: 888-999-3290

Safety Nets

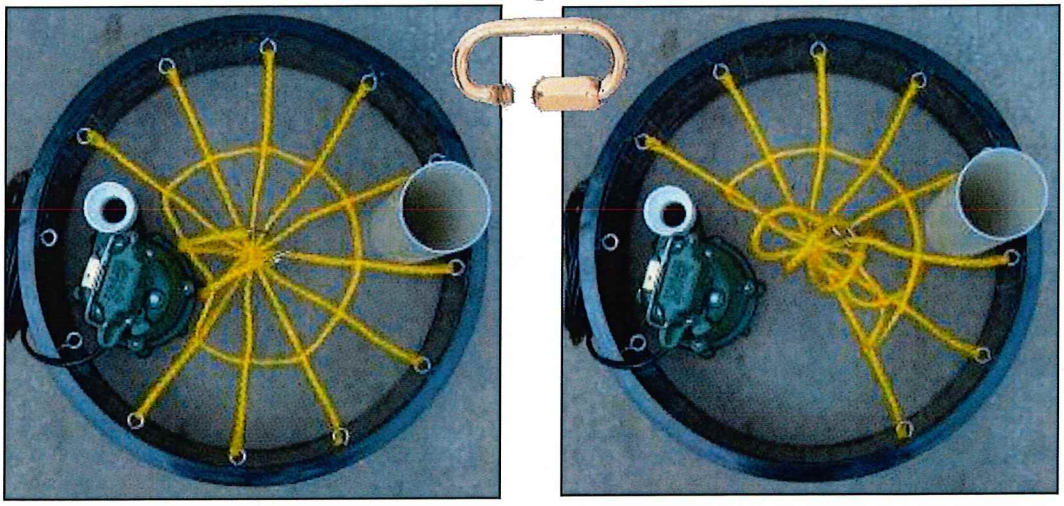
24/7 protection from accidental and unauthorized entry

Sim/Tech Filter offers security nets for risers up to 36". The STF-N24 is designed to fit 18" to 24" risers, STF-N30 is designed to fit 24" to 30" risers while the STF-N36 is designed to fit 30" to 36". They attach with eye bolts so they will work for most risers. These nets provide protection from accidental or unauthorized entry into tanks. They stay in place at all times. This is a key feature as even the most secure cover is removed for system maintenance. If a service technician is distracted or needs to leave the access area for some reason the access is vulnerable to accidental entry. The net protects the access during these times as well. There is no impact on the service, pump hoses can be inserted through the web. Each net comes standard with 2 quick links (STF-QLINK) to allow for pump removals etc. More quick links are also available for instances where a larger opening is desired.

A safety device that works and won't cause a hassle!

Below is a 24" net installed in a Sim/Tech Riser. Shown in these pictures is a 4" diameter pipe inserted into an opening. These openings allow about a 5" diameter access. The standard net also comes with 2 quick links that can be temporarily disconnected to allow for pumps or other large items to pass through the net. Shown in the picture on the left is a standard residential size effluent pump sitting in the opening created by the quick link disconnection. If you require a larger opening more quick links can be added as depicted in the picture on the right.

STF-QLINK





Solutions
For the protection and performance of wastewater systems by
SIM/TECH FILTER
www.gag-simtech.com
888-999-3290

ALWAYS USE PROPER SAFETY EQUIPEMNT
WHEN INSTALLING

Installation Instructions

STF-CI24 Cast Iron Cover
STF-APC24G Polycarbonate Cover
STF-N24 Security Net with Hardware
STF-AR24 Adapter Ring

STF-CI24 Cast Iron Cover & STF-APC24G polycarbonate cover

1. Center cover onto riser.
2. Utilizing pre-drilled holes, secure cover to riser with screws provided.
3. **Do not over-tighten screws.** Over-tightening of screws can bow the cover and compromise the seal.

STF-N24 Security Net with Hardware

STF-N24 Security Net is designed for easy installation with the STF-R824B Riser, but can be installed in most 24" risers. Nets also available for other sizes of risers

Note: The STF-R824 Segmented Riser has drillable dimples to facilitate installation of the STF-N24.

1. Locate 12 topmost drill-dimples on **inside** of riser (1-1/2" down from top cover flange).
2. Using dimples as guides, drill all 12 dimples with 1/4" holes for 12 security net eye-bolts.
3. Place net inside of riser.
4. Inserting eye-bolts through 1/4" holes, first place 1/4" soft rubber washer over eye-bolt, followed by 1/4" stainless steel washer and 1/4"-20 stainless steel lock -nut (refer to Figure 1.1). A 7/16" deep well socket on a clutch equipped battery powered drill will speed up the assembly process.
5. Secure eye-bolts, be careful not to over-tighten.

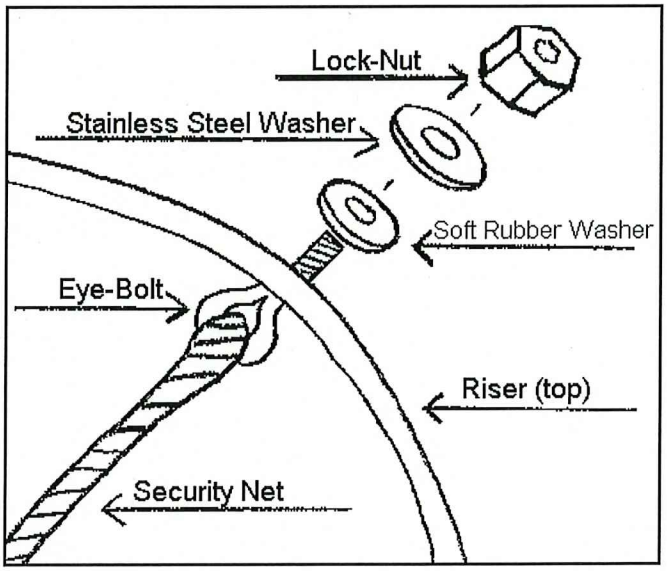


Figure 1.1

STF-AR24 Adapter Ring

1. If using the STF-AR24 Adapter Ring, clean and dry mounting surfaces on both tank and adapter ring (refer to Figure 1.2).
2. Apply plastic roof cement or soft butyl ribbon between adapter ring and tank to provide seal.
3. Center over septic tank hole firmly pressing ring into plastic roof cement or equivalent. **Note**: Additional fastening is recommended (cement nails or screws) to keep adapter ring from sliding while back filling.

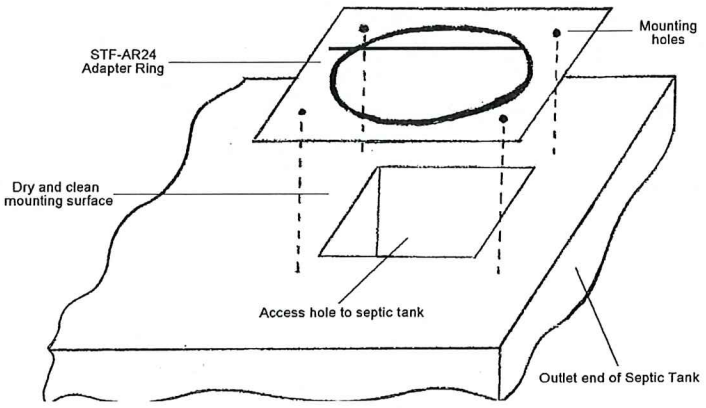


Figure 1.2

Orenco SYSTEMS **Technical Data Sheet**

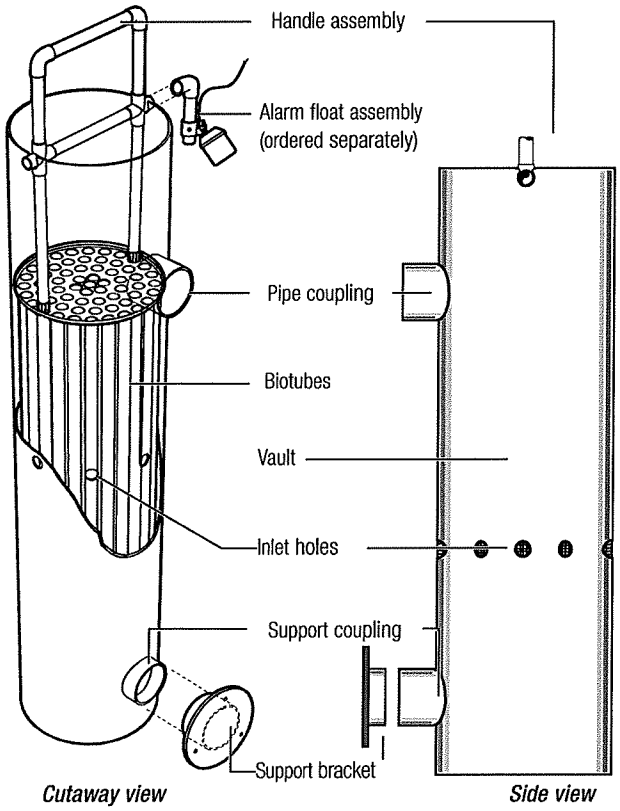
8-in. to 15-in. Dia. Biotube Effluent Filters

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.



Standard Models

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

Product Code Diagrams

FT ☐ ☐ ☐ ☐ - 36 ☐

- Biotube® effluent filter
- Filter mesh option: Blank = ⅛-in. (3-mm) filter mesh; P = ⅙-in. (1.6-mm) filter mesh
- Filter diameter, in. (mm): 08 = 08 (200); 12 = 12 (300); 15 = 15 (375)
- Housing height*, in. (mm): 48 = 48 (1219); 54 = 54 (1372); 60 = 60 (1524); 66 = 66 (1676)
- Cartridge height, in. (mm): 36 = 36 (914), standard
- Float switch bracket and slide rail options: Blank = no options selected; A = float switch bracket installed; R = slide rail installed†

* 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

FT ☐ 08 22 - 14 B ☐

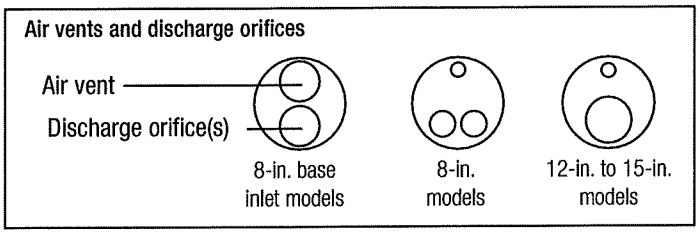
- Biotube® effluent filter
- Filter mesh option: Blank = ⅛-in. (3-mm) filter mesh; P = 1/16-in. (1.6-mm) filter mesh
- 8-in. (200 mm) filter diameter
- Filter housing height, in. (mm): 22 = 22 (558), standard
- Cartridge height, in. (mm): 14 = 14 (356), standard
- Base inlet model
- Float switch bracket and overflow plate options: Blank = no options selected; A = float switch elbow installed; FSO = overflow plate installed

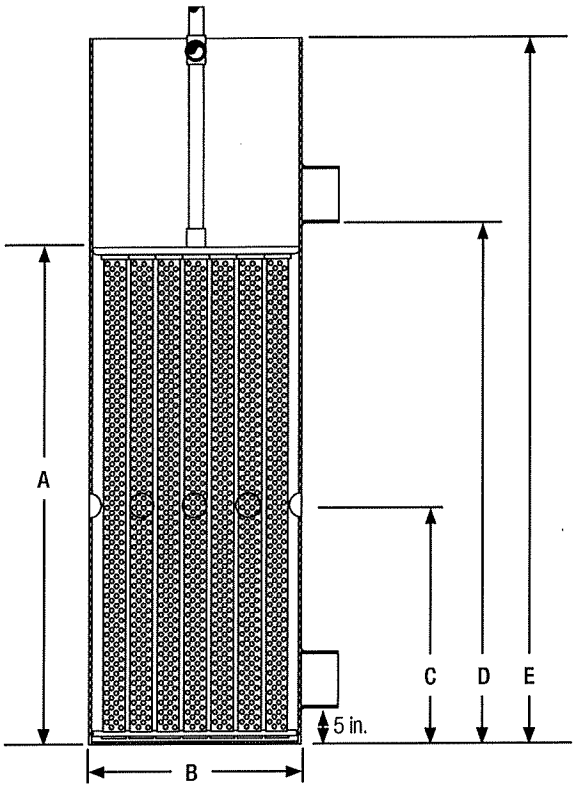
Materials of Construction

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

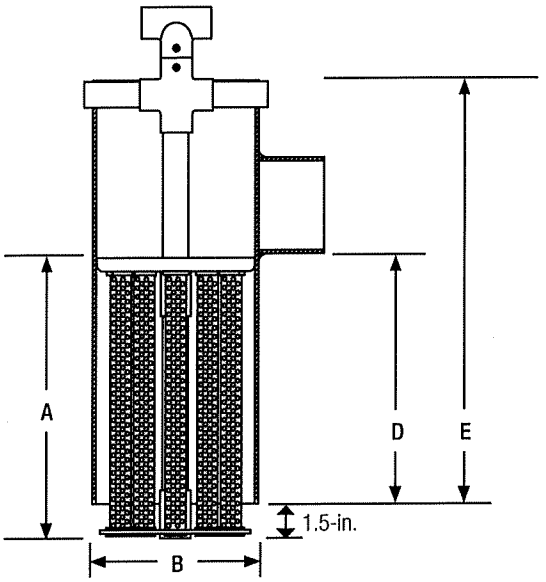
** Orenco® Biotube® Effluent Filters are covered under multiple U.S. and international patents.*

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.*

Orenco Systems® Inc., 814 Airway Ave., Sutherlin, OR 97479 USA • 800-348-9843 • 541-459-4449 • www.orenco.com

SECTION III - BASIS OF DESIGN

DEVELOPMENT DESCRIPTION

Location	3116 Campus Ridge Road Matthews, Mecklenburg County, NC
Water Supply	Municipal Water Supply Source
Sewage Disposal	On-Site Septic System

PROJECTED WASTEWATER FLOWS

Proposed Use	High School (No Cafeteria or Showers)
Base Design Flow	813 GPD Day 5 Days per Week 580.71 GPD Flow Equalized Over 7 Days

DESIGN BASIS - TREATMENT SYSTEM

Septic Tank	(1) 2,000 Gallon Precast Tank
Effluent Filter	(1) Orenco Model 0854-36-NC
Flow E.Q. Tank	(1) 3,000 Gallon Precast Tank
Flow E.Q. Pump	(2) Orenco Model PF2005-12 in PVU 68-2418
Recirculation Tank	(1) 1,500 Gallon Precast Tank
Recirculation Pump	(2) Orenco PF5005-12 in PVU 57-2418
Advanced Treatment	(2) Orenco AX-20 Recirculating Textile Filters

DESIGN BASIS - DOSING SYSTEM

Pump Tank	(1) 3,000 Gallon Precast Tank
Design Flow	580.71 Gallons per Day (Flow EQ Volume)
Recommended Application Rate	0.25 G/D/SF (Primary & Repair)
Force Main	260 LF of 3-Inch Dia. SCH 40 PVC
Drain Field Pump	Goulds 3888D3 Series Model WE1512H 1.5 HP/230 V/1 Ph 95.79 G/M @ 28.88 Ft TDH
Drain Field Dosing Pump Controller	T-COMM Custom panel w/ programmable controller. •Pump run timer •Pump run contacts •Elapsed pump run clock •Pump cycle counter •Zone valve contacts •Filter flush valve contacts •Alarm Features •Float input functions
Dosing Volume:	290.36 Gallons
Doses per Day:	2 per Day to Each Manifold
Pump Run Time:	3 Minutes 2 Seconds

Drawdown:	9.43 Inches
Drain Field:	10 Laterals at Various LF Each
Pressure Manifold:	4-In. Dia. SCH 80 with 10 Taps
Operating Head:	2 Feet

SECTION IV - COMPONENTS OF SYSTEM

- Collection system (design and installation by others)
- 2,000-gallon precast septic tank
- Orenco FTPS0854-36 Effluent Filter
- 3,000 Gallon Precast Flow Equalization Tank with pump, floats, controls, etc.
- 1,500-gallon recirculation tank with RSV, pump, and floats
- (2) Recirculating Textile Filters (Orenco AX-20)
- 1,500-gallon pump tank with pump, floats, and controls
- 260 LF of 3-Inch Diameter SCH 40 PVC Force main
- 4-In. SCH 80 PVC Pressure Manifold w/ 10 – ½-In. SCH 80 Taps
- 10 Laterals at Various LF Each

A. TREATMENT SYSTEM

1. General Requirements - The Contractor shall furnish, install, test, and place into service and warrant the complete system. The major system components include the precast tanks, slotted filters, textile filters, pumps, floats, drain field and controls. Accessories shall be supplied by a single operating entity and shall be equal to that as specified.
2. Three sets of submittal documents and shop drawings for all mechanical equipment and major materials including piping, tanks, and all other accessories shall be furnished to the Engineer for approval. No equipment shall be installed prior to approval by the Engineer.
3. Precast Structures - General: This section shall apply to the septic tank as shown on the Contract Drawings.
4. Approvals: The tank designs shall be approved by NC DHHS and shall have the approval number imprinted on the delivered tank. The tank shall be State Approved and equal to that manufactured by Shoaf Precast Tank Company, Inc. Openings or inserts shall be cast in during manufacture. Concrete shall have a minimum compressive strength of 4,000 PSI @ 28 days. Shop drawings shall be submitted to the Engineer for approval. If tanks are in vehicular traffic area or over a recommended bury depth, then tanks shall be constructed to meet H-20 highway loadings.

   Precast Tank Installation: Installer shall excavate for and install all precast concrete tanks as per plans. Installer shall ensure that the tank remains level and true to grade after placement and filling with water. All precast tanks shall be tested for water tightness by vacuum test. The contractor shall employee the tank manufacturer to perform a vacuum test. The test will take place once the tank has been placed in the tank hole and prior to backfill. The test will require that a vacuum of 5 in/hg be placed on the tank for a minimum of 2 minutes. The test shall take place prior to risers and pipes being placed in the tank. Each tank shall be installed in the location and to the elevations shown on the plans. A 6-inch undercut shall be made to allow for the washed stone leveling course for the tank to rest on.

   Once testing of the tank has been completed, the tanks shall be backfilled in lifts with well compacted, debris free earth to a level which directs surface water away from the tanks. Tank access holes in the yard shall be installed and grouted watertight and the earth raked smooth for grassing. All tank lids shall be lockable or constructed to prevent easy removal with fall protection netting.

5. Septic Tank: The new 2,000-gallon septic tank shall have a baffle wall installed. In the outlet end of the 2nd tank, the contractor shall install a new effluent filter. Provide access for entry into the tank directly over the outlet using Orenco lids, risers, and tank adapters, and extending 6" above final grade. Provide access for entry into the tank directly over the inlet and outlet pipes. Use an Orenco riser system manufactured by Orenco including lid, risers and tank adapter or approved alternate. Risers shall be made watertight at the tank. Locate the tank at such height as to provide a minimum of 18" of cover soil over top of the tank or as necessary to receive gravity flow from the facilities collection system. All pipe penetrations through precast concrete tanks shall be PRESS-SEAL CAST-A-SEAL 402 rubber boots or approved equal.

6. Slotted Effluent Filter: An Orenco Filter model FTP 0854-36 micro-filter with 1/16" infiltration shall be at the outlet end of the septic tank. The filter shall be manufactured by Orenco, Inc. 814 Airway Avenue, Sutherlin, Oregon 97479.

7. Flow Equalization Tank: shall be a 3,000-gallon capacity, reinforced, precast concrete tank. Provide access for entry into the tank directly over the outlet using Orenco lids, risers, and tank adapters, and extending 6" above final grade. Provide access for entry into the tank directly over the inlet and outlet pipes. Use an Orenco riser system manufactured by Orenco including lid, risers and tank adapter or approved alternate. Risers shall be made watertight at the tank. Locate the tank at such height as to provide a minimum of 18" of cover soil over top of the tank or as necessary to receive gravity flow from the septic. All pipe penetrations through precast concrete tanks shall be PRESS-SEAL CAST-A-SEAL 402 rubber boots or approved equal.

8. Recirculation Tank shall be a 1,500-gallon capacity, reinforced, precast concrete tank. Provide access for entry into the tank directly over the outlet using Orenco lids, risers, and tank adapters, and extending 6" above final grade. Provide access for entry into the tank directly over the inlet and outlet pipes. Use an Orenco riser system manufactured by Orenco including lid, risers and tank adapter or approved alternate. Risers shall be made watertight at the tank. Locate the tank at such height as to provide a minimum of 18" of cover soil over top of the tank or as necessary to receive flow from the flow equalization tank. All pipe penetrations through precast concrete tanks shall be PRESS-SEAL CAST-A-SEAL 402 rubber boots or approved equal.

9. Recirculating Textile Filters: Two treatment units shall be manufactured by Orenco and shall be model AX-20. See construction details on plan sheets. The filters shall be pressure dosed with flow equalized effluent filtered from the septic tank. The filters shall be constructed and operated to bring the effluent to a domestic strength standard. ORC reserves the right to request the Owner to adjust methods of operation as necessary to meet such standard(s). Filters and all components are available through AQWA (888) 552-AQWA.

10. Pump Tank shall be a 1,500-gallon capacity, reinforced, precast concrete tank without baffle. Provide access for entry into the tank directly over the outlet using Orenco lids, risers, and tank adapters, and extending 6" above final grade. Provide access for entry into the tank directly over the inlet and outlet pipes. Use an Orenco riser system manufactured by Orenco including lid, risers and tank adapter or approved alternate. Risers shall be made watertight at the tank. Locate the tank at such height as to provide a minimum of 18" of cover soil over top of the tank or as necessary to receive flow from the treatment unit discharge. All pipe penetrations through precast concrete tanks shall be PRESS-SEAL CAST-A-SEAL 402 rubber boots or approved equal.

11. Piping: All piping and fittings shall be Schedule 40 PVC conforming to ASTM D1785 as shown on plans. All couplings and fittings shall be of polyvinyl chloride compounds (ASTM D1784, Type I, Grade I). Any above grade piping that will be exposed to sunlight shall have a UV inhibitor added to the exterior surface to prevent degradation.

12. Pressure Force Main: From the field dosing tank to pressure manifold shall be 3-inch diameter SCH 40 PVC as called for on the plans. Pipe shall be buried with 36-inch minimum cover. Force main to be installed with tracer wire and reflective warning tape in trench. If installed under any paved areas, the Contractor shall install a minimum 6-inch diameter sleeve to allow for the pipe to be removed. The ends of casing pipe shall be sealed watertight. Maintain proper separation between storm drain and water lines.

13. Ball Valves: All thermoplastic ball valves shall be constructed from PVC Type I Cell Classification 12454 or CPVC Type IV Cell Classification 23447. All O-rings shall be Viton. All valves shall have

Safe-T-Shear stem and double stop polypropylene or CPVC handle. All valve union nuts shall have Buttress threads for structural integrity. All seal carriers shall be Safe-T-Blocked. All valve components shall be replaceable for valve serviceability using rebuild kits. All valves shall be warranted against defects in material and workmanship for a period of one year. All valves shall be listed for potable water use by the National Sanitation Foundation (NSF). All 1/2" through 2" valves shall be pressure tested at 235 PSI and all 2-1/2" through 6" valves shall be pressure rated at 150 PSI for water at 73 degrees Fahrenheit, as manufactured by Spears Manufacturing Company or approved equal.

14. Swing Check Valves: Swing check valves shall be flow control PVC swing check valves with rubber flapper and PVC cap as manufactured by Spears Mfg. as supplied by AQWA at (888) 552-2792.

DISPOSAL SYSTEM

1. Drain Field Dosing Pump: For the dosing of the pressure manifold, a Goulds 3888D3 Series Effluent Pumps model WE1512H 1.5 HP/230V/1 Ph, capable of pumping 95.79 GPM @ 28.88' TDH. Details of pump installation are shown on the plan.

2. System Controller: Control Panel shall be mounted 36" or more above grade and readily accessible. The unit shall be manufactured by Orenco, Inc. The panel model number shall be TCOM Custom Panel. The Orenco Treatment System Control Panel is designed to control the flow equalization pumps and floats, recirculation pumps and floats, irrigation pump and floats, and headworks solenoid valves. The control panel shall be provided factory pre-wired and tested in a NEMA 4X lockable fiberglass enclosure which shall contain the following: Components shall include motor contactors and circuit breakers for use with 230V AC 1 Ph current using a max 1½ HP motor. Programmable logic unit shall include time functions, motor function, valve controls and float input function. Unit shall include fused transformer for valves. An audiovisual alarm condition light and siren shall be mounted on the top of the panel and include a separately fused transformer. The unit shall have a hand-off-auto (H-O-A) switch. Product shall be as supplied by AQWA at (888) 552-2792.

   The controller shall be able to perform the following functions:

   - Receive input for floats, provide operator set timer-controlled pump operation, timer-controlled contacts for flow equalization and recirculation pump. The controller shall have an independent event counter, which shall count the number of pump overrides for each pump. The controller shall have an elapsed pump run clock and pump cycle counter for each pump.
   - Unless alternately provided with the Advanced Pretreatment System, the system control panel shall enable the daily, 7-day and 30-day monitoring requirements of Rule .1970 to be met, such as by data logging the field dosing times or field flow meter readings.
   - Floats, pump and control circuits, and the control panel shall meet the requirements of Rule .1952(c). Panel and control equipment shall include lightning protection, be protected from unauthorized access, and always remain accessible to the system operator.
   - The activation of any alarm shall result in the activation of a dry and a 120 V powered alarm contacts. These contacts may be used to activate externally mounted alarm devices and telemetry systems. The alarm contacts will automatically reset when the R/O-N Switch for the activated alarm is placed in the reset / off position.

   Panel Operation:

   - High Level Alarm Float: When lifted this float will activate the audible alarm and the illuminated pushbutton. Note: This function can be combined with the Override Timer On & Off Function.
   - Override Timer & Off Float: When lifted this float will activate the normal timer function. This timer is capable of cycling at a faster rate to accommodate high flow conditions. This float being enabled will force the pump to dose at twice the operating cycle until the effluent is at normal levels in the pump tank again.
   - Timer On & Off Float: When lifted this float will activate the normal timer function. This timer will begin with its 'off' cycle.
   - Redundant Off & Low-Level Alarm Float: When lowered this float will activate the audible

alarm and illuminated pushbutton. This float will also deactivate the pump in both auto and manual.

- Pump & Valve Operation: The timer will control the pump dosing cycles. During high flow conditions, the override timer will control the pump dosing cycles. Zone valves (if provided) will open as programmed and the pump comes on.
- Components Include:
  - Motor contractor & circuit breaker rated for use with 230VAC, 1Ph and 1 Ph max.
  - Programmable logic unit
  - Timer Functions
  - Valve control
  - Transformer for the valves
  - Fuse for the transformer
  - Top mounted audiovisual alarm (360 degree flashing red light and 90dB minimum)

3. Float Switches: Water level float control switches shall be equal to Orenco's mechanically activated switches, with cable of adequate length to terminate in the pump control panel. No splicing of wire allowed between switches and control box. Use properly rated mechanical switches on control circuits and power circuits. The conduct between the pump tank and the control panel shall be sealed to prevent sewer gas from entering the control panel. Each tank with a pump shall have 4 float switches, a low-level "pump off" switch, a "pump enabling" float "timer override" and at "high water alarm" float. Floats shall be hung from a stainless-steel float bracket attached to the riser and be within 12 inches of lid of riser. The float bracket shall be attached to the riser so that no damage is made to riser and any bolt penetrations into riser shall be sealed watertight with a silicon caulk or manufacturer approved equal. Float clamps or brackets shall be supplied by the manufacturer. The lower-level control or "pump-off" must be positioned above the pump, so that the pump always remains submerged. The upper-level control "pump-enabling" is positioned to pump a specified volume of effluent or assures that a full dose is available for timer-controlled dosing. The "high water alarm" control float is mounted at same level the "timer override" float control. (Note: Care must be taken to ensure that floats do not become fouled by other components in the tank such as the electric power cord or the lifting rope.).

4. New Pressure Manifold: shall be 4-inch diameter Schedule 80 PVC, ASTM D-1785, constructed as detailed on the plans. The new manifold shall be located above the nitrification field and placed in a precast manifold protective box. The manifold shall have a clean-out, a 1/2" pressure head monitoring port with valve and be securely anchored to the pressure manifold box. Pressure manifold taps shall be securely anchored to the pressure manifold box. Pressure manifold taps and the manifold shall be constructed as detailed on the plan.

5. Pressure Manifold Vault: Shall be precast concrete as constructed by Shoaf Precast Company, or approved equal, lockable aluminum lid sized to allow removal. The box shall be sized and constructed to accommodate the pressure manifold cleanout, lateral supply lines, the flow adjustment valves and inspection ports in each lateral. The precast box shall have a drain hole in the bottom over a bed of washed stone to allow the box to drain. The lockable lid shall have a checked aluminum plate with or be reinforced concrete with removable access hatch over the test port as called for on the plan.

6. Gravity Distribution Line: The gravity flow distribution pipe from the distribution manifold to the chambers shall be solid-core 3" SCH 40 PVC pipe. These lines shall be secured by the pressure manifold box, have a slope of not less than 1/4" per ft. to each of the laterals.

7. Nitrification Field: Lay out the nitrification field network area with stakes and flagging. As soon as the absorption area and repair areas are designated, they should be identified, barricaded, and isolated from construction traffic. This barrier should be maintained until the system is accepted by the Owner. Refer to site plan for the size of absorption area. 10 feet from any property lines and 15 feet from the top of cut slopes. Each nitrification lateral may be gravel-less chambers without reduction. Other trench systems must be approved by the Engineer and the LSS prior to installation.

8. Nitrification Trench: Shall be constructed as level as possible, but in no case shall the fall in a single trench bottom exceed ¼"/LF in entire lateral as determined by an Engineer's level. The nitrification trench shall not exceed a width of 36" & shall have a trench bottom depth of 30-in. An earthen dam shall separate the nitrification trench from the gravity supply pipe. Remove loose soil from bottom of trench. No rock shall be used in nitrification trenches with chambers. The finished grade over the nitrification fields shall be landscaped to prevent the ponding of surface water; and runoff of surface water shall be diverted away from the nitrification fields. The minimum separation between laterals shall be 9 feet.

SECTION V - SYSTEM INSTALLATION

- Prior to beginning construction of the system, a NC Licensed Surveyor shall stake entire system.
- Contractor shall contact the Design Engineer, Manufacturer's representative, Local Health Department and Soil Scientist for a preconstruction meeting.
- The contractor shall verify all elevations of all system components.
- Observe all side yard, building, and other setback restrictions. Installation of the system shall be performed under the supervision of the Design Engineer.
- Installation of the system shall be coordinated with the Owner and scheduled as necessary to comply with overall facility operation.
- Installation of the system shall be performed to the satisfaction of the Owner, Design Engineer, and Local Health Department.
- The Contractor shall install all components of the system in strict accordance with the plans and specifications. Upon completion of the system construction, the Contractor shall charge the system with water and go through a complete cycle. Any failure or discrepancy shall be corrected.
- The manufacturers of the components and the contractor shall warrant the components and system for one year from the date of acceptance by the Owner.

Utility Crossings & Locations

The Contractor is responsible for locating all services before beginning work on the site. The plans are approximate and may not show all utilities.

- Water Line Vertical Separation: Clear separation distance when a water line crosses over a sewer must be at least 18-inches at the closest point. When conditions prevent an 18-inch clear separation from being maintained, or whenever it is necessary for the water line to cross under the sewer, both the water line and sewer shall be constructed of ferrous materials with mechanical joints equivalent to water main standards for a distance of at least 10 feet on each side of the point of crossing, with full sections of pipe centered at the point of crossing.

- Storm Drain Separation: Horizontal separation between sewer lines and storm drains shall be at least five feet. Vertical separation between sewer lines and storm drains at crossings shall be at least one foot at the closest point unless the sewer is of cast iron pipe or encased in concrete for at least five feet on either side of the crossing.

Tank Installation

- Have Surveyor locate tank corners from site engineering plans.
- Excavate to 8" below tank base. De-water excavation if required.
- Add 6 to 8 inches of clean #57 washed stone.
- Check to ensure the stone base is level and elevation is correct.
- Carefully lower bottom section of tank into position with proper rigging and lifting techniques.
- Add butyl seal around tank seams.
- If the tank is installed in groundwater, contact the Design Engineer.
- If tanks are not installed in groundwater backfill excavation with clean material and to within 12" of the inlet pipes.
- Check the level of tanks.

  NOTE: Use care while backfilling to prevent tank movement and/or damage to tanks.

- Seal inside tank to ensure tank is watertight.
- Seal all pipe penetrations and fill with water to 12 inches over riser attachment on tank and perform watertight test or perform a vacuum test at the direction on the Engineer.
- Once the Design Engineer has approved testing (See Section on Tank Testing), install all piping, pumps, etc. within tanks as called for on the plans.
- Install wiring with watertight conduit from control location to tanks.
- Back fill around tanks with clean material to final grade.
- All components shall be checked, and proper flow verified.

Orenco Media Filter Installation

This section establishes the installation procedures for the Orenco secondary wastewater treatment system. It is recommended that these procedures be reviewed and approved by the engineer of record to ensure compatibility with specific site characteristics.

Orenco, Inc. provides onsite supervision of the installation, the freshwater commissioning of the treatment system and certification that the system is operational.
Effective execution of these procedures requires coordination with the site contractor. We request that the site contractor contact AQWA to coordinate delivery, installation schedule and freshwater commissioning of the system.

- Have NC Licensed Surveyor locate units from site engineering plans.
- Excavate to 6" below units. De-water excavation if required.
- Add 6" sand base.
- Check to ensure mounting pad is level and elevation is correct.
- Carefully lower modules into position with proper rigging and lifting techniques.
- Orient and align modules to inlet and outlet directions. Check if modules are level.
- Install inlet, outlet, and vent/test port piping.
- If modules are not installed in groundwater, backfill excavation with clean fill material to allow for 6 inches of freeboard minimum. Check the level of modules.
  NOTE: Use care while backfilling to prevent module movement and/or damage to module.

Electrical Installation

Install the control system and wire per NC Building Code and NEC by a licensed electrical contractor. The contractor shall verify available electrical power before ordering components. Provide and connect to properly sized and number breakers in the main control panels as called for.

Final Landscaping: After the system is installed, the following should be checked to ensure that the system will not be overloaded with excess rainwater and run-off.

(a) The drain field is shaped to shed rainwater and is free of low area.

(b) Curtain drains, grassy swales, or ditches for diverting ground and surface water are installed properly.

(c) Gutter and downspout drains are diverted away from the system.

Any problems shall be corrected before approving the system.

Finally, all disturbed areas shall be planted with grass according to specifications.

Seeding: After completion of the land disturbing activity, the site shall be stabilized with tall fescue grass. This should be seeded at the rate of 25 lbs. per acre each for a total of 50 lbs. per acre. Before seeding, lime should be added at the rate of 1.5 tons per acre. Fertilizer shall be added at the rate of 100 units of Nitrogen, 120 lbs. of P_2O_5 and 120 lbs. of K_2O. Both the lime and fertilizer should be lightly incorporated into the soil before adding seed. After seeding, the area should be mulched until the stand is established. Due to the erosion potential of this soil, this is an important part of the system.

CONSTRUCTION & INSTALLATION TESTING

The Contractor shall be required to provide as many tests and/or certifications as the Engineer may deem necessary.

Requirements for Leakage Testing-Pressure Force Mains

Required testing of pipelines and valves shall be done under the direct supervision of the Project Engineer. Field-testing shall not negate the requirements for material certifications as contained in the material specification section of this contract. Unless otherwise directed by the Engineer, all testing and disinfection will be completed prior to connection to any existing line.

Hydrostatic & Leakage Tests

On completion of the line or sections of the lines, connections and appearances, the line shall be filled and hydrostatically tested. The water for testing purposes can be taken from the nearest available water main under the supervision of the Engineer's Inspector or the contractor may install a well on site and ensure that all setbacks are observed in doing so and leakage will be measured by the Inspector. All leaks and any defective material shall be repaired or replaced to the satisfaction of the Engineer and the tests repeated until the requirements of this specification are met. Any special equipment, pumps, etc., required to make the test shall be furnished and operated by the Contractor as directed by the Inspector.

The Contractor shall take great care to be sure that all air is expelled from each section under test. If service connection or other openings are not available for the purposes of expelling air, the Contractor shall provide air release of enough size (as determined by the Engineer).

Specific procedures for testing main are as follows:

- The test pressure will be 100 PSI at the low point of the section under test.
- Allowable leakage will be determined by Table 6, AWWA C-600 (see below) or by the formula:

  1 = 0.000106(S)(D) where.
  S = length of pipe under test
  D = pipe diameter.
- Pressure and leakage tests will be run concurrently and for duration of two hours except as modified below.
- The Contractor will pressurize the line and verify that it is within allowable leakage before the official test is started.
- The Inspector will begin the test and remain at the job for the first hour, making sure that the test pressure is maintained within 5 PSI. The Contractor is to maintain the pressure within 5 PSI for the duration of the test period. At the end of the first hour, with the line pumped to full test pressure, he will read the meter and record the first hour leakage. If the first hour leakage is within allowable, he will return at the end of the second hour and again read the meter. If the total leakage for the two-hour period does not exceed four times the first hour leakage, the test will be terminated. If the total leakage exceeds four times the first hour leakage, but is still within allowable, the test will be held an additional hour. If the second hour leakage does not exceed the average hourly leakage for the first hour, the test will be terminated at the end of the second hour. Otherwise, the test will be held until the leakage is non-increasing and within allowable for two consecutive hours.
- If leakage exceeds the allowable for the two-hour test, the test will be terminated and re-scheduled after the Contractor has verified that actual leakage is within the allowable leakage, but no earlier than the next working day.
- If the first hour leakage does not exceed 15% of the allowable, or if the allowable leakage rate does not exceed 0.4/gallons/hour, the test may be terminated at the end of two hours provided the second hour leakage does not exceed the first hour leakage. If the second hour leakage exceeds the first hour leakage, the test will be held for an additional period as described in Paragraph (e) above.
- The maximum length of pipe testing in one test shall be 500 feet or as close to 500 feet as possible depending on valve spacing.
- During the last stages of the test and without any reduction in pressure progressing from the end opposite the test pump, each mainline valve will be closed, and pressure released to determine if the valve is holding pressure (minimum 10 minutes per valve closing).

The Contractor shall be required to provide as many tests and/or certifications as the Engineer may deem necessary for materials, such as concrete, piping, valves, steel reinforcement, all fasteners and anchorage systems, etc. Testing for materials shall be done by a separate independent test laboratory employed by the Contractor and approved by the Engineer.

The Contractor shall coordinate and schedule site visits, installation, and startup assistance from the equipment manufacturers.

SECTION VI - OPERATING CHECKS AND ADJUSTMENTS (START-UP)

The system shall consist of the collection system (design and installation by others), new 2,000-gallon septic tank with effluent filter, new 3,000-gallon precast flow equalization tank with associated appurtenances, new 1,500-gallon precast recirculation tank with associated appurtenances, (2) new Orenco AX-20 textile filter units, 1,500-gallon field dosing tank with pump, floats, controls, force main, pressure manifold, drain field and other appurtenances.

1. After permanent power has been connected and all components of the system have been installed, the contractor shall schedule a time for the checking of the system for proper operation. The check shall be performed in the presence of the Design Engineer, ORC, Local Health Department and Owner. Any discrepancies shall be corrected until the system operates as designed.

It is the Clients responsibility to ensure that the Contractor checks the entire system and takes the system through a complete test cycle prior to Engineer making certification startup visit. This includes:

- Ensuring that all risers and lids are at grade and readily accessible.
- Floats are set at the proper elevations as required.
- Pumps are operable and deliver the required flow and head.
- Controls are in operation and operate as called for herein.
- The area around treatment and disposal area are at finished grade, raked fine with seed and straw as called for herein.
- Tanks are filled with water and ready for testing. The contractor is to dummy test the entire system prior to the final startup meeting with Engineer, Owner, Local Health Department and ORC.

Once all the items have been completed the Contractor shall run the system through an entire test in the presence of the Owner, Owner's Engineer, and ORC and to their satisfaction. If the test fails, adjustments shall be made, and the test repeated until the system is determined to operate properly.

Septic Tank: Ensure the tanks are free of all trash and debris. Check water level, pipes, and effluent filter. Verify that the effluent filter can be removed for service. Verify that the lids are 6" above finished grade and that riser nets are installed.

Flow EQ Tank: Ensure the tank is free of all trash and debris. Check water level, pipes, floats, pumps, and wiring. Verify that the pumps and floats can be removed for service. Verify that the lids are 6" above finished grade. Verify that all electrical conduits are sealed with duct seal or approved equal to prevent sewer gases from reaching control panels and other electrical devices and that riser nets are installed.

Recirculation Tank: Ensure the tank is free of all trash and debris. Check water level, pipes, floats, pumps, and wiring. Verify that the pumps and floats can be removed for service. Verify that the lids are 6" above finished grade. Verify that all electrical conduits are sealed with duct seal or approved equal to prevent sewer gases from reaching control panels and other electrical devices and that riser nets are installed.

Orenco Units

Start-Up (Treatment System Controls)

1. During tank installation care should be taken to prevent foreign matter/debris from entering the tank.
2. System needs to be commissioned prior to start-up.
   A. Check that the electrical connections have been made inside the control panel and that there is power to the panel.

B. See Appendix B for PLC (programmable logic controller) Operating Instructions prior to turning on the system.
C. Turn control panel power disconnect switch to "ON."
D. At the control panel use the control screen to set the PLC timers to a "**test cycle**" as follows:

TEST CYCLE SETTINGS	**ON**	**OFF**
Pump(s) 1	*1 min*	*1 min.*

3. Pump off Float: In the extended position this float switch shall create an open circuit and prevent operation of the pumps. When the circuit is closed the float switch shall allow activation of the timer and the pumps shall alternate between cycles, transferring wastewater to the downstream treatment reactor(s).
4. Dose Enable Float: Upon closure the mid-level float switch shall activate the pump, and the pump shall draw down the liquid in the dosing tank until the mid-level float is open. Upon this occurrence, a counter shall be triggered to alert the operator of a high-level condition has occurred and the timer "on" setting for the pumps may need adjusting.
5. Peak Enable Float: The high-level float switch shall activate the audio/visual alarm when the circuit is closed.
   - Test each float for proper function. Make sure each float is producing the correct given response.
   - Check to make sure that the float switch hanger is within 18" of finished grade.
   - Check that the slide rails have been installed properly. Pull up each pump to ensure the rails have been installed properly and that the pumps seal seats back on the slide rail assembly piping.
   - Check that the effluent piping was piped correctly.
   - At the panel turn the alarm to **TEST**. The alarm should sound. Press the alarm silence, audio alarm should silence, the red alarm light should remain illuminated. Turn alarm to OFF, red alarm light should turn off. Set the alarm to **AUTO** and un-silence the alarm.
   - Close and secure the lid.
   - Return to the control panel to set the pump(s) and timers to the settings specified in "PUMP TIMER SETTINGS."
   - Close/secure control panel.

Note: *Using manufacturer's instruction, become familiar with filter components and operation.*

Pump Tank: Ensure the tank is free of all trash and debris. Check water level, pipes, floats, pumps, and wiring. Verify that the pumps and floats can be removed for service. Verify that the lids are 6" above finished grade. Verify that all electrical conduits are sealed with duct seal or approved equal to prevent sewer gases from reaching control panels and other electrical devices and that riser nets are installed.

System Dosing Tank Pump Chamber - Sequence of Operation: Effluent fills pump tank to level that will activate the "Pump Enabling" float. Pump can now operate.

The pump shall operate delivering a demand controlled predetermined dose to the drain field. The pump shall also shut off when the low water level "pump off" switch is activated.

If the "high water alarm" float switch is activated, the controller shall activate audible and flashing alarm systems. Once energized, the flashing and audible alarm unit must be shut-off manually. After installation, each field shall be independently pressurized, and the function and operating pressure checked to verify compliance with the specifications.

SECTION VII - AS BUILTS

3 copies of an "As-Built" plan shall be prepared by a Professional Surveyor licensed to practice in the State of North Carolina.

- The Contractor shall hire the Surveyor to perform the work.
- The contractor shall provide the "As-Built" plans to the Engineer.
- The Engineer shall provide the signed and sealed "As-Built" plans to the Local Health Department, Owner & ORC which will show actual vertical and horizontal location and design of all system components, indicate any crossings of force mains and any deviations in installation of the force mains and plans. Exact locations of valves and cleanouts are required as well and contain a complete list of all mechanical equipment installed whenever any deviations were made from the approved plans and specifications.

- The Contractor shall forward to the Engineer two bound sets of all manufacturer's component data along with the "As Built" data.

SECTION VIII - OPERATING PERMIT

- The system shall not be operated until the Project Engineer certifies in writing that the system has been installed in accordance with the approved plans and specifications, and the installation is approved by the Engineer of Record.

- The operation permit shall include description of facilities served and sewage system components, as-built plans and specifications, legal documents, Operation and Maintenance manual, monitoring and performance requirements, and other operating conditions deemed appropriate.

SECTION IX - WARRANTY

The wastewater system installation contractor shall agree to provide a minimum of one-year regular service to the Owner for maintenance and upkeep of this system at no additional cost to the Owner, and such one-year period shall begin from the date of final inspection and acceptance of the system construction by the Owner, the Engineer, and representatives of the NC DHHS. Any concerns of the Owner shall be addressed promptly.

After the above one-year period has expired, the installation contractor shall offer a continuation of maintenance and upkeep service at a reasonable charge as may be negotiated between the installation Contractor and the Owner. Such service shall include checking the entire system at least monthly, offering quick response servicing in case of a malfunction of the system (maximum of 24 hours after warning is given by the "Owner's Warning Panel") and performing such servicing of components and replacing of worn or defective equipment as may be necessary to keep the system operating in good condition.

If the installation contractor will not be willing to agree to the above described one-year maintenance period, then any other period must be acceptable to the Owner, the Engineer, and the Local Health Department.

SECTION X - OPERATION & MAINTENANCE

This work shall be performed only by operators knowledgeable of the system. Operation, Maintenance, and Inspection Procedures shall include but not be limited to the following:

- Enter a contract with an ORC.
- Inspect and clean effluent filter in septic tank.
- The septic system shall be pumped every 5 years or when solids accumulate to one-third the volume of the tank.
- An inspection report should be completed and filed each time the system is checked.
- The pump control timer shall be checked to verify that the pump run time is correct to ensure the correct dosing volume. Adjustment shall be made as required.
- All piping, fittings and valve boxes shall be checked annually for damage and/or proper operation and corrections made immediately.
- The property should be inspected to ensure all surface water is deflected away from the fields and tank. Any ponding of surface water should be corrected.
- Grasses shall be mowed and maintained, and any erosion shall be corrected promptly.
- The discharge point shall be checked for leakages, blowouts or malfunction, indications of damp or mushy areas compared to surrounding area or evidence of noticeable odor of sewage. Repairs shall be made immediately.
- The pump electrical panel and wiring should be checked to ensure tight, clean connections with no corrosion and proper operation.
- Pump switches shall be checked for free operation and proper level set.
- Check all tanks, valve boxes, etc. for evidence of damage or leakage. Check the quality of effluent including grease and sludge accumulation.

The current system owners (**Telra Supporting Organization, Inc., and subsequent owners**) shall establish an operation and maintenance program, and procedure based on experience obtained from similar installations.

The current system owners (**Telra Supporting Organization, Inc. and subsequent owners**) shall be responsible to comply with all above operating and maintenance procedures in addition to any so specified on the operation permit issued by the Local Health Department or may be necessary in the future for the operation of the system to meet all public health laws, rules, and regulation regarding the wastewater system.

Failure to comply with these operating and maintenance procedures will necessitate immediate legal action by NC DHHS and/or Local Health Department to suspend or revoke the operation permit.

SECTION XI - OWNERSHIP RESPONSIBILITY FOR THE SYSTEM:

It must be kept in mind that this system is designed to accept a moderate amount of wastewater at domestic waste strength (which is called the EFFLUENT).

Conservation measures must be undertaken by all members of the operation to minimize the volume and strength of wastewater leaving system, including, but not limited to, the following:

(a) Enter a contract with a septic tank operator prior to operation.
(b) Provide water conserving plumbing fixtures within the facility. Installing water closets that require no more than 1.6 gallons per flush or less.
(c) Develop conservative water use habits.
(d) Monitor and maintain the system as necessary for proper operation. Establish a procedure to read and record water meter readings daily. Retain records.
(e) Check and pump the septic tank sludge on a regular basis as will be specified in the operating permit or as may be required.
(f) Make rapid repairs to leaking plumbing fixtures and faucets.
(g) Tanks shall not be pumped during extremely wet conditions.

PIEDMONT DESIGN
ENGINEERING/SURVEYING/PLANNING
Associates, P.A.

125 East Plaza Drive, Suite 101
Mooresville, North Carolina 28115-8812
Telephone (704) 664-7888 Fax (704) 664-1778
NCBELS License No.: C-1007

Date: August 19, 2024
Revised Date: September 17, 2024

Job No: 2024-07-12-EH
Telra High School Septic System
Matthews, Mecklenburg County, North Carolina

Septic System Sizing

System Sizing Based on Employee Count

No. of Students	99.00	Students
Flow per Estudent	7.00	G/D/Student
Daily Design Flow	693.00	G/D
No. of Employees	10.00	Employees / Shift
Flow per Employee	12.00	G/D/Employee
Daily Design Flow	120.00	G/D
	813.00	G/D
	580.71	G/D Flow Equalized
Proposed LTAR:	0.25	G/D/SF
Nitrification Field Size Required:	2,322.86	Sq Ft Drainline
Nitrification Field Size Required:	774.29	LF Drainline
# of Laterals:	10.00	
LF per Lateral	77.43	LF (Use 80 LF Each)

Flow Equalization Calculations:

Design System using Flow EQ to Reduce Drain Field Size

Flow Equalization	813	Gal./Day	
Design Flow:	4,065	Gal./Week	*(Sum of Inflow/Day)*
Daily Dosing Volume:	580.71	Gallons	*(Total Weekly Flow / 7 Days)*

Day	Inflow	Outflow	Volume Retained	Inflow Determination
Monday	813.00	580.71	232.29	
Tuesday	813.00	580.71	464.57	
Wednesday	813.00	580.71	696.86	
Thursday	813.00	580.71	929.14	
Friday	813.00	580.71	1,161.43	
Saturday	-	580.71	580.71	No Flow - Closed
Sunday	-	580.71	-	No Flow - Closed

Septic Tank Sizing:

	813.00	Gal./Day
	1,451.21	Gallons
Use	2,000.00	Gallons

Septic Tank Sizing Calculations
600 G/D to 1,500 G/D
V = 1.17Q + 500 V = Tank Volume
1,500 G/D to 4,500 G/D Q = Design Flow
V = 0.75Q + 1,125
4,500 G/D and up
V = Q

Flow EQ Tank Sizing:

Pump Tank Volume

Pump submergence Volume:	807.81	Gallons	18.00	Inches
Dose Volume to AX-20 Units:	290.36	Gallons	6.47	Inches
Equalization Volume	1,161.43	Gallons	25.88	Inches
Emer. Storage Volume (Peak Daily Flow):	813.00	Gallons	18.12	Inches
	3,073	**Gallons**	**68.47**	**Inches**
Gal./Inch in Pump Tank:	44.88	Gallons	**(3,000 Gallons - PT-129)**	

Interior FEQ Tank Dimensions

Length	12.00	Ft
Width	6.00	Ft

Drain Field Size

Drainfield Based on 25% Reduction System

LF Drainfield Installed:	774.29	LF
Gallons/100 LF of 4" Corregated Pipe	65.30	Gallons
100% Volume of Drainfield	505.61	Gallons
80% Volume of Laterals	404.49	Gallons
40% Volume of Laterals	202.24	Gallons
Therefore, Dose	290.36	Gallons per Dose
	57.43%	Volume of Laterals per Dose

Force Main:	2	Inch Dia. SCH 40 PVC
Pressure Manifold:	4	Inch Dia. SCH 80 w/8-1/2" SCH 80 orifice

Pressure Manifold 1: 4" Dia. Sch 80 w/ 10 Taps

Determine Flow:	95.79	G/M	*# of Taps at Orifice Flow*
Force Main Size:	3.00	Inch	*SCH 40 PVC*
Length of FM:	260.00	Ft.	*Site Plan*
Elev:	21.09	Ft.	*HI from pump to Manifold*
Oper:	2.00	Ft.	*Set by OSWW*
Friction:	5.79	Ft.	*Friction Loss times length of FM*
TDH:	28.88	Ft.	*Elev. HD + Oper. Head + Friction Head*
Pump Req'd:	95.79	G/M @	28.88 TDH

Use Goulds 3888D3 Series Model WE1512H Effluent Pump
1.5 HP - 230V - 1PH

Dosing Volume:	290.36	Gallons
Pump Run Time:	3.03	Min.
Gallons/Inch (In 1,500 Gal. Tank):	30.78	Inches (Field Verify)
Effluent Draw Down:	9.43	Inches (Field Verify)
Check Valve:	Yes	
Anti-Siphon Hole:	Yes	

Telra High School Septic System
Matthews, Mecklenburg County, North Carolina

Original Date: August 16, 2024
Revised Date:

ADVANTEX Dosing Regime (Normal & Override)

Recirculation Tank Inside Dimensions

Length	12.00	Ft
Width	6.00	Ft
Height	5.50	Ft
Invert	4.92	Ft from Tank Bottom
Tank Volume =	538.56	Gallons per Foot
Volume to Invert =	2647.92	Gallons

Inlet Holes on Filtered Effluent

40% Tank Volume (See RSV Application Sheet)

1.967 Feet from Bottom of Tank

Redundant Off Float Elevation

<50% Tank Volume (See RSV Application Sheet)

2.75 Feet from Bottom of Tank

RSV Setting

60% Tank Volume to Stinger Seat (See RSV Application Sheet)

3.30 Feet from Bottom of Tank

High Water Pump Float Setting

3" or more above normal operating level or Stinger seat level
(This depth should allow sufficient surge capacity to accommodate peak inflows between recirc doses)

RSV Stinger Seat level	3.30	Feet
Add 3" for Float Setting	3.55	Feet from Tank Bottom

High Water Alarm Elevation

10% Tank Depth or Below Inlet Invert Elevation (See RSV Application Sheet)

4.43 Feet from Bottom of Tank

Enter Yellow Fields Only

Recirculation Ratio	4		580.71	Total Dosed over AdvanTex/day	2,322.86
Single Pump Delivery Rate (GPM)	25	Gal/Dose	30	Doses Per Day Required	77.43
Rest Time (Minutes)	18.1			Override Doses Per Calculated	150.80
Run Time (Minutes)	0.5	*Prefer 30 Secs. No more than 1 min*			
Override Rest (Minutes)	9.0				
Override Run (Minutes)	0.5	*Prefer 30 Secs. No more than 1 min*			

Single Pump Delivery Rates:
Single AX20 = 30
Double AX20 = 25
Triple AX20 = 25
Any AX100 System = 45

AQWA

www.aqwa.net
Info@aqwa.net

Project: Telra Institute
Prepared By: Michael Clyaton
Prepared For: David DeCaron
Date: 8/1/2024

Design Scenario: Schools/Churches
Collection System: Gravity

Flow:
Average Daily Flow: 585 gpd
Maximum Daily Flow: 813 gpd

Influent Parameters	BODi (mg/L)	TSSi (mg/L)	TKNi (mg/L)	Alk (mg/L)
	250	150	110	350

Effluent Parameters After Primary	BODi (mg/L)	TSSi (mg/L)	TKNi (mg/L)	Alk (mg/L)
	125	75	110	350

Raw Influent Parameters*				
	Typical Values*		Used for Calculations	
	Average	Max**	Average	Max**
BOD_i (mg/L)	250	400	250	400
TSS_i (mg/L)			150	300
TKN_i (mg/L)	110	225	110	225
NH_3-N (mg/L)			88	180
Alkalinity (mg/L)			350	

*AQWA Charter School Sample Data, no food prep
**Max values are assumed intermittent in duration and are utilized as a design factor of safety but Max values do not drive textile/permit design

Textile Required: 38 ft^2****
Textile Designed: 40 ft^2
**** Designed for Total Nitrogen Loading (Ave)

Alkalinity Addition *** TRUE
1 lb/d
***Assuming no Denite Alkalinity Release, if utilizing denitrification and filtrate return, alklalinity need may be reduced by up to 50%

First Stage Influent Parameters	BODi (mg/L)	TSSi (mg/L)	TKNi (mg/L)	TN (mg/L)
	125	75	110	110

First Stage Effluent Parameters	BOD_{1e} (mg/L)	TSS_{1e} (mg/L)	TKN_{1e} (mg/L)	NH_{31e} (mg/L)	NO_{31e} (mg/L)	TN_{1e} (mg/L)
	12.5	3.75	5.5	4.40	31.35	36.85

Anticipated Effluent	
Parameter	Monthly
	mg/L
BOD_e (mg/L)	12.5
TSS_e (mg/L)	3.75
NH_{3e} (mg/L)*	4.40
TN (mg/L)*	36.85
NO_3 (mg/L)*	31.35
Fecal Coli	TBD

Effluent Permit/Treatment Requirements			
	Permit Limits		
	Weekly	Monthly	%Removal
	mg/L		
BOD_e (mg/L)	350	350	
TSS_e (mg/L)	100	100	
NH_{3e} (mg/L)	60	60	
TN (mg/L)	100	100	9%
NO_3 (mg/L)	40	40	
Fecal Coli			cfu or mpn

*Treatment performance will likley be limited by available alkalinity in source water. At given influent average TKN value and influent alkalinity, Effluent NH3, TN, and NO3 will likely be higher than listed in the anticipated effluent section unless supplemental alkalinity is provided. With influent alkalinity of 350mg/l and an average influent TKN of 110mg/l, effluent values will likely be NH3 = 50mg/l, NO3 = 36mg/l, TN = 86mg/l

Tank Anti-Floatation Calculations

Tank Dimensions & Antifloatation: 2,000 Gallon Septic Tank Dimensions

Outer Length	12.50	Ft.	STB-2102	
Inner Length	12.00	Ft.		
Outer Width	6.50	Ft.		
Inner Width	6.00	Ft.		
Outer Height	5.50	Ft.		
Inner Height	4.83	Ft.		
Wt. of Water Displaced	27,885.00	Lbs.		*Outer Length x Outer Width x Outer Length x 62.4 Lb/CF (Wt of Water)*
Wt of Tank	6,093.75	Lbs.	*Top & Bottom*	*Outer Length x Outer Width x 150 Lb/CF x 2 (Top & Bottom) x Slab Thickness*
	2,900.00	Lbs.	*Ends*	*Inner Width x Inner Height x 150 Lb/CF x 2 (Ends) x Wall Thickness*
	6,875.00	Lbs.	*Sides*	*Outer Height x Outer Length x 150 Lb/CF x 2 (Sides) x Wall Thickness*
	1,300.00	Lb	*Baffle*	*Inner Width x (Inner Height-3 Inches) x 150 Lb/CF x x Wall Thickness*
	17,168.75	Lbs.	*Total Tank Wt.*	*Sum Above four*
Wt. of Overburden	12,187.50	Lbs.	@ 15" of Cover	*Outer Length x Outer Width x 120 Lb/CF (Saturated Soil Wt) x Soil Thickness*
Total	**29,356.25**	Lbs.		*Sum of Total Tank Wt. & Soil Overburden*

Water	**27,885.00**	<	**29,356.25**	Tank

Tank Dimensions & Antifloatation: 3,000 Gallon Pump Tank Dimensions

Outer Length	12.50	Ft.	PT-2104	
Inner Length	12.00	Ft.		
Outer Width	6.50	Ft.		
Inner Width	6.00	Ft.		
Outer Height	6.42	Ft.		
Inner Height	5.75	Ft.		
Wt. of Water Displaced	32,532.50	Lbs.		*Outer Length x Outer Width x Outer Length x 62.4 Lb/CF (Wt of Water)*
Wt of Tank	6,093.75	Lbs.	*Top & Bottom*	*Outer Length x Outer Width x 150 Lb/CF x 2 (Top & Bottom) x Slab Thickness*
	3,450.00	Lbs.	*Ends*	*Inner Width x Inner Height x 150 Lb/CF x 2 (Ends) x Wall Thickness*
	8,020.83	Lbs.	*Sides*	*Outer Height x Outer Length x 150 Lb/CF x 2 (Sides) x Wall Thickness*
	1,575.00	Lb	*Baffle*	*Inner Width x (Inner Height-3 Inches) x 150 Lb/CF x x Wall Thickness*
	19,139.58	Lbs.	*Total Tank Wt.*	*Sum Above three*
Wt. of Overburden	14,625.00	Lbs.	@ 18" of Cover	*Outer Length x Outer Width x 120 Lb/CF (Saturated Soil Wt) x Soil Thickness*
Total	**33,764.58**	Lbs.		*Sum of Total Tank Wt. & Soil Overburden*

Water	**32,532.50**	<	**33,764.58**	Tank

Tank Dimensions & Antifloatation: 1,500 Gallon Recirc Tank Dimensions

Outer Length	10.46	Ft.	PT-353	
Inner Length	9.96	Ft.		
Outer Width	5.46	Ft.		
Inner Width	4.96	Ft.		
Outer Height	5.13	Ft.		
Inner Height	4.54	Ft.		
Wt. of Water Displaced	18,255.81	Lbs.		*Outer Length x Outer Width x Outer Length x 62.4 Lb/CF (Wt of Water)*
Wt of Tank	4,281.38	Lbs.	*Top & Bottom*	*Outer Length x Outer Width x 150 Lb/CF x 2 (Top & Bottom) x Slab Thickness*
	2,251.91	Lbs.	*Ends*	*Inner Width x Inner Height x 150 Lb/CF x 2 (Ends) x Wall Thickness*
	5,359.90	Lbs.	*Sides*	*Outer Height x Outer Length x 150 Lb/CF x 2 (Sides) x Wall Thickness*
	1,002.00	Lb	*Baffle*	*Inner Width x (Inner Height-3 Inches) x 150 Lb/CF x x Wall Thickness*
	12,895.18	Lbs.	*Total Tank Wt.*	*Sum Above three*
Wt. of Overburden	8,562.76	Lbs.	@ 15" of Cover	*Outer Length x Outer Width x 120 Lb/CF (Saturated Soil Wt) x Soil Thickness*
Total	**21,457.94**	Lbs.		*Sum of Total Tank Wt. & Soil Overburden*

Water	**18,255.81**	<	**21,457.94**	Tank

Tank Dimensions & Antifloatation: 1,500 Gallon Pump Tank Dimensions

Outer Length	10.46	Ft.	PT-353	
Inner Length	9.96	Ft.		
Outer Width	5.46	Ft.		
Inner Width	4.96	Ft.		
Outer Height	5.13	Ft.		
Inner Height	4.54	Ft.		
Wt. of Water Displaced	18,255.81	Lbs.		*Outer Length x Outer Width x Outer Length x 62.4 Lb/CF (Wt of Water)*
Wt of Tank	4,281.38	Lbs.	*Top & Bottom*	*Outer Length x Outer Width x 150 Lb/CF x 2 (Top & Bottom) x Slab Thickness*
	2,251.91	Lbs.	*Ends*	*Inner Width x Inner Height x 150 Lb/CF x 2 (Ends) x Wall Thickness*
	5,359.90	Lbs.	*Sides*	*Outer Height x Outer Length x 150 Lb/CF x 2 (Sides) x Wall Thickness*
	1,002.00	Lb	*Baffle*	*Inner Width x (Inner Height-3 Inches) x 150 Lb/CF x x Wall Thickness*
	12,895.18	Lbs.	*Total Tank Wt.*	*Sum Above three*
Wt. of Overburden	8,562.76	Lbs.	@ 15" of Cover	*Outer Length x Outer Width x 120 Lb/CF (Saturated Soil Wt) x Soil Thickness*
Total	**21,457.94**	Lbs.		*Sum of Total Tank Wt. & Soil Overburden*

Water	**18,255.81**	<	**21,457.94**	Tank

Sheet 1 of 1
PROPERTY ID #: 21506111
COUNTY: Mecklenburg

SOIL/SITE EVALUATION
for ON-SITE WASTEWATER SYSTEM
(complete all fields in full)

OWNER: Dennis & Robin Harkey
ADDRESS: 417 Navajo Trail
PROPOSED FACILITY: Telra High School
LOCATION OF SITE: Campus Ridge Road

APPLICATION DATE:
DATE EVALUATED: 6/27/2024
PROPERTY SIZE: 3 ACRES
PROPERTY RECORDED:

WATER SUPPLY: ☐ Private ☐ Well ☐ Spring ☑ Other Municipal Supply

EVALUATION METHOD: ☑ Auger Boring ☐ Pit ☐ Cut TYPE OF WASTEWATER: ☑ Sewage ☐ Industrial Process ☐ Mixed

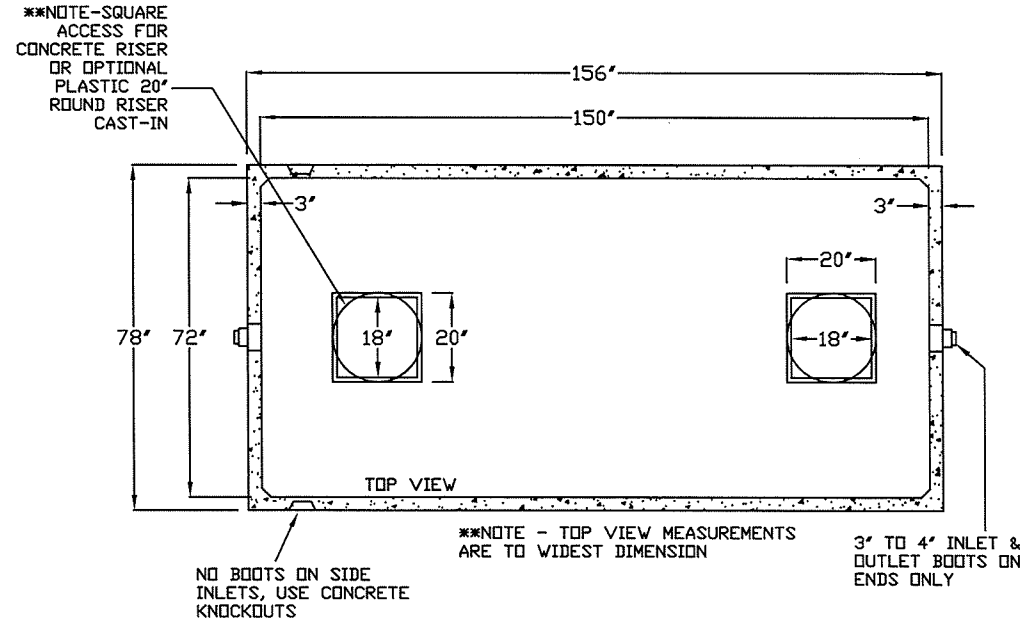
PROFILE #	.1940 LANDSCAPE POSITION/ SLOPE %	HORIZON DEPTH (IN.)	SOIL MORPHOLOGY (.1941)		OTHER PROFILE FACTORS				PROFILE CLASS & LTAR
			.1941 STRUCTURE/ TEXTURE	.1941 CONSISTENCE/ MINERALOGY	.1942 SOIL WETNESS/ COLOR	.1943 SOIL DEPTH	.1956 SAPR CLASS	.1944 RESTR HORIZ	
1	L / 3%	0 - 9	YB L WFG	FR SS SP	N/A	48	N/A	N/A	0.25
		9 - 20	YB CL WMA	FR SS SP					
		20 - 30	BR C/CL WMA	FR SS SP C YB MOT					
		30 - 48	YR L WMA	FR SS SP F SAP					
2	L / 3%	0 - 8	YR L WFG	FR SS SP	N/A	48	N/A	N/A	0.275
		8 - 24	BR C MMA	FI SS SP F YB					
		24 - 48	YR L WMS	FR SS SP F/C SAP					
15	L / 2%	0 - 8	Y L WFG	FR SS SP	N/A	48	N/A	N/A	0.3
		8 - 24	BR C MMA	FI SS SP					
		24 - 36	R CL WMA	FR SS SP					
		36 - 48	YB L WMS	FR SS SP C SAP					
16	L / 2%	0 - 36	CL MMA	FR SS SP	N/A	48	N/A	N/A	0.3
		36 - 48	YR L WFS	FR SS SP C SAP					
18	L / 2%	0 - 7	B SIL WFG	FR SS SP	N/A	48	N/A	N/A	0.25
		7 - 14	YB SICL WMA	FI SS SP					
		14 - 32	YB C MMA	FI SS SP					
		32 - 48	YR L WMS	FR SS SP C SAP					
19	L / 2%	0 - 4	DB L WFG	FR SS SP	N/A	48	N/A	N/A	0.3
		4 - 7	YB SCL WMS	FR SS SP					
		7 - 30	R C WMS	FR SS SP					
		30 - 48	R CL WMS	FR SS SP					
20	L / 2%	0 - 3	B L WFG	FR SS SP	N/A	48	N/A	N/A	0.25
		3 - 8	YR CL WMA	FR SS SP					
		8 - 32	YR C WMS	FR SS SP C YW MOT					
		32 - 48	YR CL WMA	FR SS SP C YW MOT					
21	L / 2%	0 - 13	YB L WFG	FR SS SP	2CH@34	48	N/A	N/A	0.25
		13 - 30	YR CL WMA	FR SS SP					
		30 - 48	YR L WMS	FR SS SP C YB MOT					
22	L / 2%	0 - 6	DB L WFG	FR SS SP	N/A	48	N/A	N/A	0.25
		6 - 13	YB CL WMA	FR SS SP					
		13 - 30	YR C WFS	FR SS SP F R MOT					
		30 - 48	YR L WMA	FR SS SP F/C SAP					

DESCRIPTION	INITIAL SYSTEM	REPAIR SYSTEM
Available Space (.1945)	775	775
System Types(s)	ACCEPTED	ACCEPTED
Site LTAR	0.25	0.25

OTHER FACTORS (.1946):
SITE CLASSIFICATION (.1948): S
EVALUATED BY: Wendell Overby
OTHER(S) PRESENT:

LICENSED SOIL SCIENTIST WENDELL OVERBY 1218 STATE OF NORTH CAROLINA

COMMENTS:

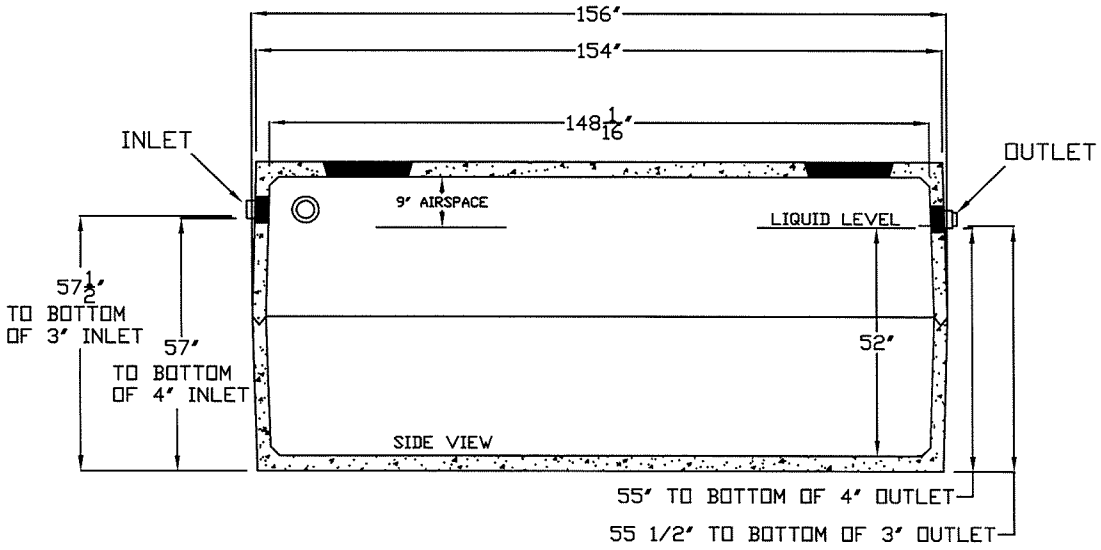


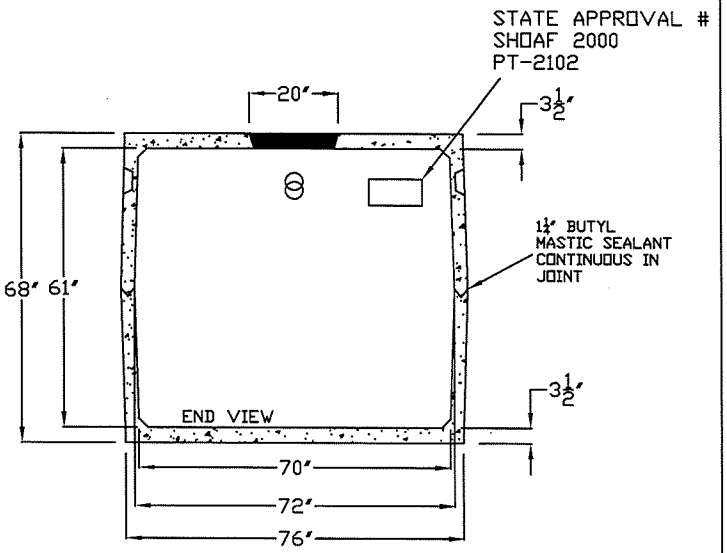
SHOAF PRECAST SEPTIC INC.
4130 WEST US HWY 64
LEXINGTON, NC 27295
PHONE (336) 787-5826
FAX (336) 787-2826
WWW.SHOAFPRECAST.COM

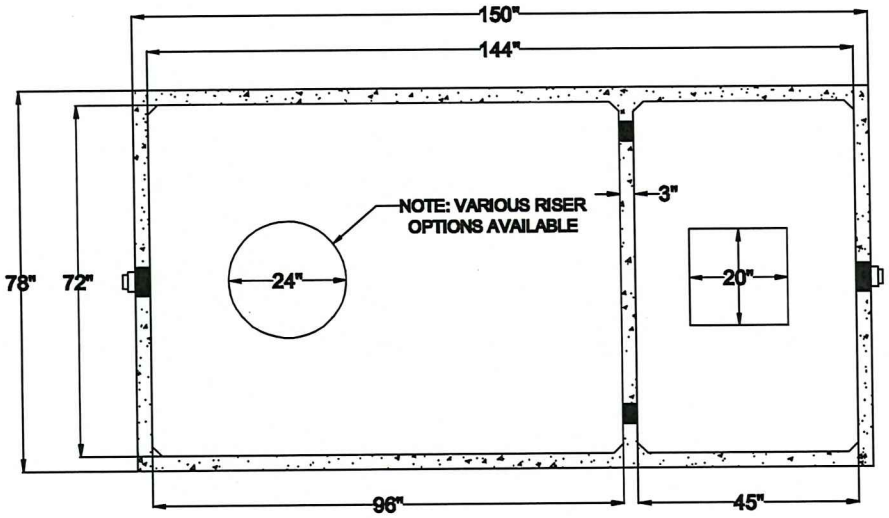
MODEL: MS 2000 PT NON TRAFFIC 2000 Gallon Pump Tank

SHOAF-2000 NONTRAFFIC
PT-2102 NONTRAFFIC
LIQUID CAPACITY-2000 US GALLONS/9" AIRSPACE
TANK HEIGHT-68"
BOTTOM OF TANK TO CENTER OF INLET-59"
BOTTOM OF TANK TO CENTER OF OUTLET-57"
LENGTH TO WIDTH RATIO-2 TO 1
SIZE OF INLET & OUTLET-3" OR 4"
TYPE OF INLET & OUTLET-POLYLOCK OR EQUAL (MEETS ASTM C-923)
CONCRETE PSI-4000; TANK WEIGHT-16,000 LBS.
REINFORCEMENT PER STATE CODE

SCALE-N.T.S.



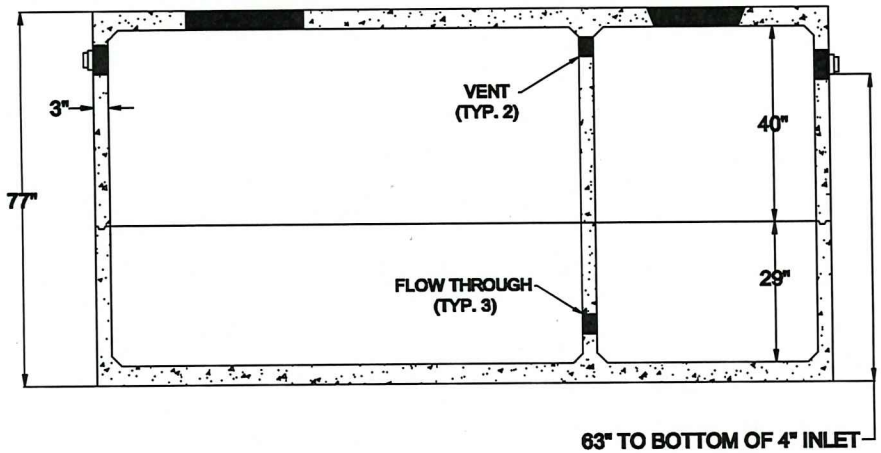


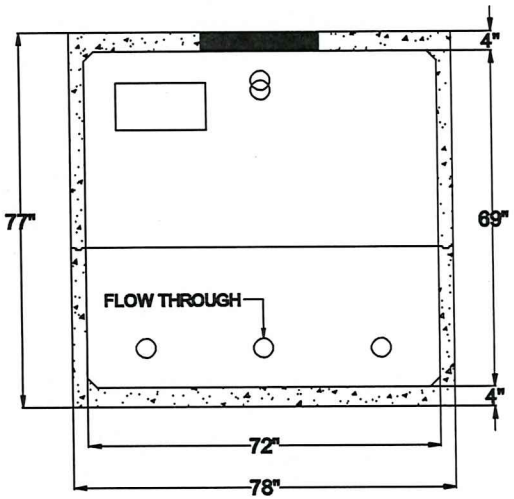


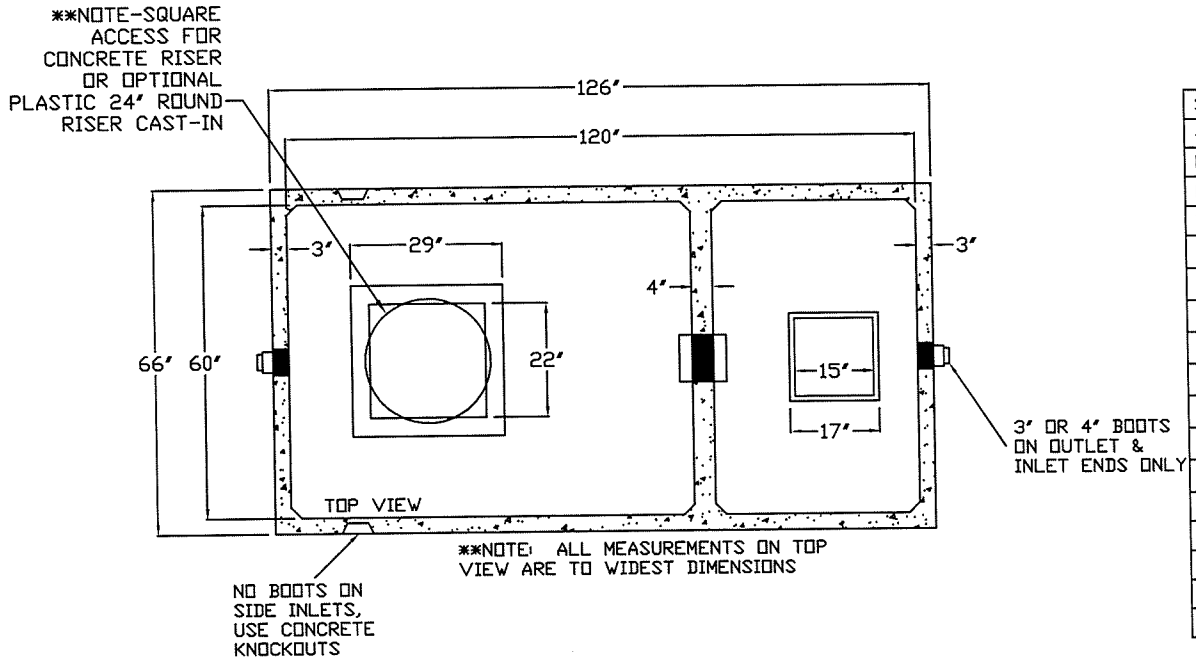
MODEL: MS NON-TRAFFIC 3000 PT
NON TRAFFIC MID SEAM PUMP TANK

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

- NC APPROVAL # : PT-2104
- LIQUID CAPACITY- 3,033 GALLONS
- GALLONS PER INCH-43.95
- PIPE PENETRATIONS - (MEETS ASTM C-923)
- CONCRETE - 5000 PSI MIN
- TANK WEIGHT - 17,320 #
- TOP - 9,320 #
- BOTTOM - 8,000 #
- REINFORCEMENT PER ENGINEER SPECS
- 1 $\frac{1}{4}$" BUYTL SEALANT CONTINUOUS IN JOINTS



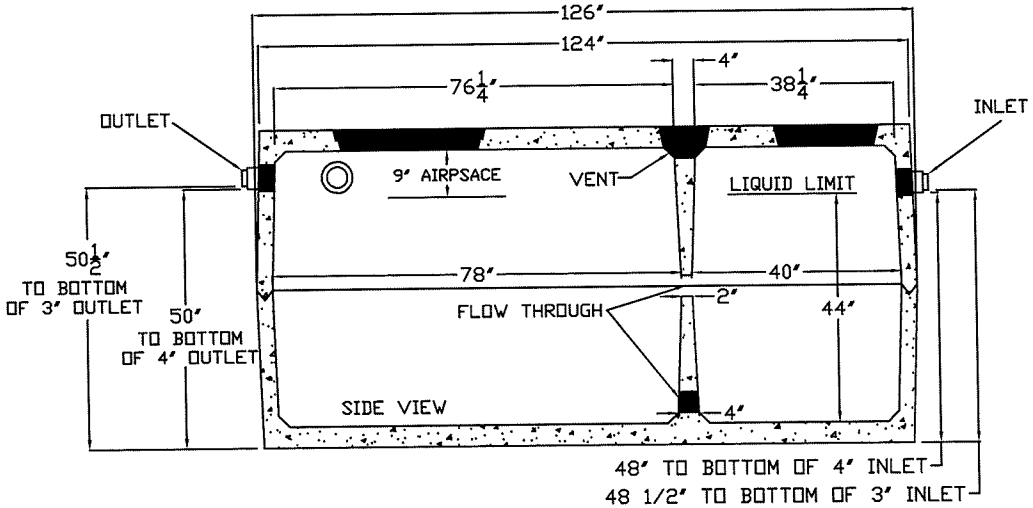


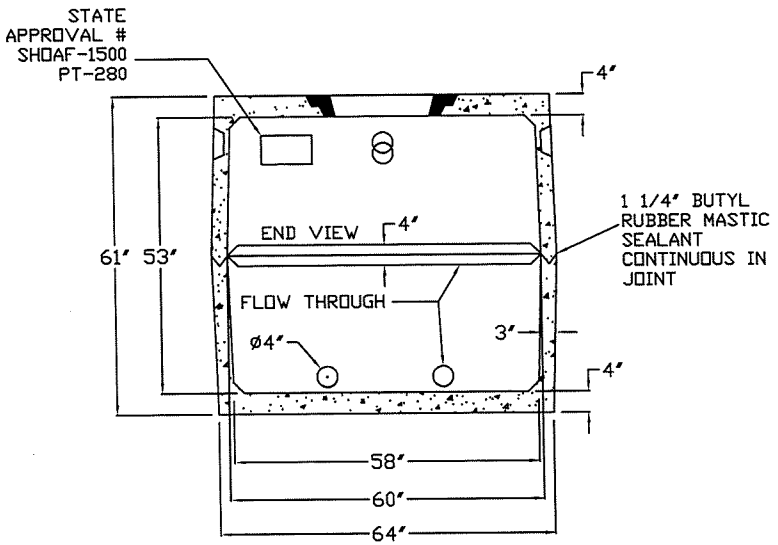


SHOAF PRECAST SEPTIC INC.	
4130 WEST US HWY 64	
LEXINGTON, NC 27295	
PHONE (336) 787-5826	
FAX (336) 787-2826	
WWW.SHOAFPRECAST.COM	
SHOAF-1500 NON TRAFFIC RATED	
PT-280 NON TRAFFIC	
LIQUID CAPACITY-1540 US GALLONS INCLUDING 9" AIRSPACE	
GALLONS PER INCH- 28.06 (AVGERAGE)	
TANK HEIGHT-61"	
BOTTOM OF TANK TO CENTER OF INLET-50"	
BOTTOM OF TANK TO CENTER OF OUTLET-52"	
LENGTH TO WIDTH RATIO-2 TO 1	
SIZE OF INLET & OUTLET-3" OR 4" PIPE	
TYPE OF INLET & OUTLET-POLYLOCK OR EQUAL (MEETS ASTM C-923)	
CONCRETE PSI-4000; TANK WEIGHT-11,500 LBS.	
REINFORCEMENT PER STATE CODE	

MODEL: MS 1500 PT
NON TRAFFIC
1500 Gallon Pump Tank

SCALE - N.T.S.





Access Risers, Lids, & Accessories

Applications

Our fiberglass access lids, PVC risers, and other tank accessories allow tank access without excavation. They're adaptable to virtually any tank, both new and existing. Lids and accessories fit most types of ribbed PVC pipe, including Ultra-Rib, Ultra-Corr, KOR FLO, and Perma-Loc. Preassembled risers and stock pipe lengths can be purchased from Orenco. Or stock lengths can be purchased locally and cut as needed. All components are designed to work well together.



Orenco's fiberglass access lids, risers, and other accessories are superior in quality, watertight, non-corroding, and lightweight yet strong. Custom imprinting is available on quantity orders of 24- and 30-in. diameter lids (610 and 760 mm).

To Order

Call your nearest Orenco Systems®, Inc. Distributor. For nearest Distributor, call Orenco at 800-348-9843, or visit www.orenco.com and click on "Distributor Locator."

APS-RLA-1
Rev. 4.2 © 10/05

Standard Features & Benefits

Fiberglass Lids

- Lids withstand 2500-lb wheel loads (1100 kg), stronger than any other lid on the market.
- While not designed for vehicular traffic, our lids have a breaking point greater than 8000 lb (3600 kg).
- Lids are fastened with stainless steel, tamper-resistant bolts (wrench included) to prevent accidental entry.
- Lids are an attractive green and blend in with landscaping. Custom colors and custom lid imprinting are available on quantity orders.
- Lids are flat to allow placement of backyard furnishings. No unsightly domes, no tripping.
- Lids are lightweight, watertight, non-skid, and non-corroding. Lid insulation and carbon filter vents are available options.
- Lids come in multiple diameters and are easy to install.

Risers & Accessories

- Risers come in various diameters and can be cast into a concrete tank, or bolted down with adapters.
- Adapter rings can also be cast right into a concrete tank.
- Risers and adapters can be easily bonded to fiberglass tanks with a structural adhesive.
- Grade rings allow installers to stack extensions onto risers in the field.
- Standard lengths in 6-in. (152-mm) increments are available, or custom risers can be cut in increments of 1-3 in. (25-76 mm), depending on diameter.
- Accessories such as adhesive, pipe grommets, cord grips, splice boxes, pipe cutting and drilling tools, insulation, vents, and fiberglass brackets are available.

Orenco Systems®
Incorporated

Changing the Way the World Does Wastewater®

www.orenco.com

A Complete Package of Tank Accessories

Fiberglass Lids

Available in the following diameters: 12, 18, 24, 30, 48 in. (460, 610, 760, 1220 mm). Lighter-duty lids available in 8-, 12-, and 15-in. diameters (200, 305, 380 mm). Custom imprinting available on 24-in. and 30-in. lids (610 and 760 mm).



PVC Risers

Available in the following diameters: 12, 18, 24, 30, 48 in. (305, 460, 610, 760, 1220 mm). Can be installed with adapters or cast into concrete tank. Lighter-duty PIP risers available in 8-, 12-, and 15-in. diameters (205, 305, and 380 mm).

Tank Adapters

Available in 24- and 30-in. diameters (610 and 760 mm). Can be cast into or bolted to concrete tank.



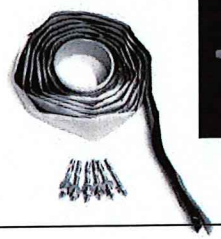
Fiberglass RRFTA adapter fits square openings.



ABS PRTA adapter fits round openings.

Bolt-Down Kits

For fastening tank adapter to tank. Kit includes stainless steel anchor bolts and butyl sealant.



Structural Adhesives

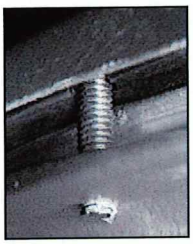
Choose from several types depending on application. Single- and two-component.



Lid Fasteners

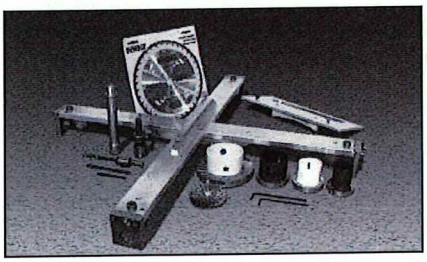
Self-tapping stainless steel bolt can be used on risers with and without bolt catches.





Cutting Jigs and Tools

For cutting Perma-Loc, Ultra-Rib, KOR FLO, and Ultra-Corr pipe in the field and preparing pipe for grommets/lid attachment.



Riser Extension Adapters (Grade Rings)

These easy-to-install adapters allow height adjustment of risers in the field.



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Distributed By:

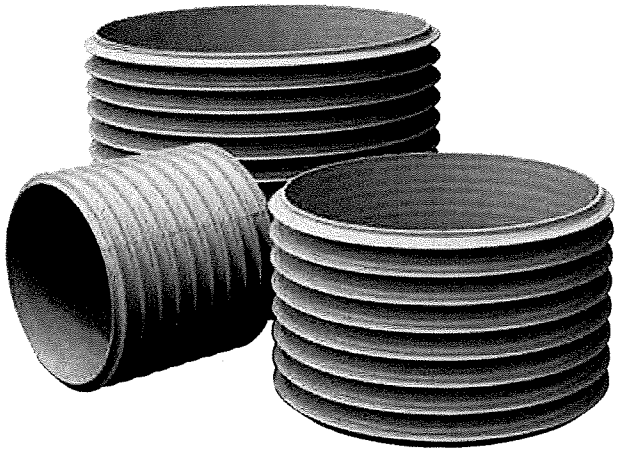
Technical Data Sheet

Access Risers – Ultra-Rib™

Orenco Systems® Incorporated
1-800-348-9843

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" diameters. They can be ordered in 3-inch increments in lengths up to 13 ft for 12" and 18" diameter risers, and up to 14 ft for 21" and 24" diameter risers.

Standard Models

RR12XX, RU18XX, RR21XX, RR24XX

Nomenclature

R □ □□ □□ + □ + □

- Riser
- Routing code:
  - U = Ultra-Rib™: 18"
  - R = Ultra-Rib™: 12", 21", 24"
- Riser diameter: 12"‡, 18"‡, 21", 24"
- Riser height (inches)
- Splice Box:
  - S = 1" grommet installed (for Orenco SB1 - SB4 splice boxes)
  - L = 1-1/4" grommet installed (for Orenco SB5, SB6 splice box)
  - S1 = SB1 attached
  - S2 = SB2 attached
  - S3 = SB3 atached
  - S4 = SB4 attached
  - L5 = SB5 attached
  - L6 = SB6 attached
  - SX = Predrilled hole for external splice box*
  - XS = Explosion-proof splice box for simplex pumps†
  - XD = Explosion-proof splice box for duplex pumps†
  - XT = Explosion-proof splice box for triplex pumps†
- Discharge grommet:
  - 10 = 1"
  - 12 = 1-1/4"
  - 15 = 1-1/2"
  - 20 = 2"

* Minimum riser height 18"
† Used in Class I Division I environments
‡ Not intended for use over pump vaults

Materials of Construction

Ultra-Rib™ PVC Pipe:	PVC

Specifications

Model	RR12XX	RU18XX	RR21XX	RR24XX
I.D.	11.74 in. (298 mm)	17.65 in. (448 mm)	20.5 in. (521 mm)	23.50 in. (597 mm)
Wall Thickness - excluding ribs	0.10 in. (3 mm)	0.19 in. (5 mm)	0.25 in. (6 mm)	0.20 in. (5 mm)
O.D. - including ribs	14.60 in. (371 mm)	19.44 in. (494 mm)	22.63 in. (575 mm)	28.50 in. (724 mm)
Weight per foot (meter)	5 lb (7.4 kg)	11 lb (16.4 kg)	15 lb (22.3 kg)	19 lb (28.3 kg)

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Submittal Data Sheet

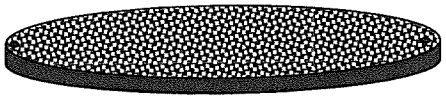
Fiberglass Access Lids

Orenco Systems® Incorporated
1-800-348-9843

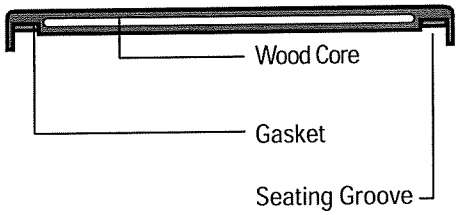
Applications

Orenco Fiberglass Access Lids are used as riser covers, pump basin covers, and access port covers. Lids fit "Perma-Loc," "Ultra-Rib," and KOR FLO type pipe.

Actual View



Cutaway View



General

Orenco Fiberglass Access Lids are molded using fiberglass reinforced polyester resin encapsulating a wood core. The finish is green and the top surface is textured to provide a nonskid surface. (Gasketed lids include a polyurethane gasket or EPDM o-ring, which is cast-in). Lid comes with either two or four 1/4" stainless steel flathead socket cap screws and a hex key wrench. Orenco Fiberglass Access Lids are capable of supporting a 2500 lb. wheel load; however, they are not designed or recommended for vehicular traffic.

Standard Models

FL18G-4BU, FL21G, FL24G, FL24-4B, FL24G-4BK, FL30G, FL48G

Nomenclature

FL □□ □

Indicates options:
G = gasket
V = vent
CF = carbon filter
I2 = 2" insulation
I4 = 4" insulation
4B = 4 bolt hole lid for Perma-Loc/Ultra-Rib pipe (24" only)
4BU= 4 bolt hole lid for Ultra-Rib pipe (18" only)
4BK= 4 bolt hole lid for KOR FLO pipe

Lid diameter: 18", 21", 24", 30", 48"

Fiberglass lid

Specifications

Dimensions	Model FL18	Model FL21	Model FL24	Model FL30	Model FL48
O.D. (in.)	20.0	22.5	26.25	32.0	53.875
Groove I.D. (in.)	17.5	20.75	23.5	29.5	47.5
Avg. Thickness (in.)	0.625	1.0	0.75	1.25	1.5

Options Available

Feature	Model Code Adder	Optional/Standard
Air Vent	V	Optional
Carbon Filter[1]	CF	Optional
Lid Insulation[2]	I2 or I4	Optional

[1]For more information on this option, refer to the Carbon Filters submittal data sheet, NSU-RLA-CF-1.

[2]Blue styrofoam; R-value per 2" increment is 10.

Materials of Construction

Fiberglass Reinforced Polyester
Wood Core
EPDM or Polyurethane Gasket

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AdvanTex®-AX20 Filter

Residential Technical Data Sheet

Applications

Orenco's AdvanTex® Treatment System* is an innovative technology for onsite treatment of residential wastewater. The heart of the System is the AdvanTex® Filter, a sturdy, watertight fiberglass basin filled with an engineered textile material. This lightweight, highly absorbent textile material treats a tremendous amount of wastewater in a small space. The AdvanTex® Treatment System is ideal for:

- Small sites
- System upgrades and repairs
- New construction
- Poor soils
- Nitrogen reduction
- Price-sensitive markets
- Pretreatment

For sizing, see "AdvanTex® Design Criteria," NDA-ATX-2.



The heart of the AdvanTex® Treatment System is this sturdy, watertight fiberglass basin filled with an engineered textile material.

**Covered by U.S. patent numbers 5,980,748; 5,531,894; 5,480,561; 5,360,556; 5,492,635; and 4,439,323. Additional patents pending.*

Features/Unique Specifications

To specify this product, require the following:

- Wastewater treatment to better than "Secondary" Treatment Standards
- Consistent treatment, even during peak flows
- Timer operation for flow monitoring, flow modulation, and surge control
- Fixed film textile media (a polyester plastic), operated in an unsaturated condition
- Consistent media quality
- Low maintenance beyond annual servicing
- Low energy consumption (under $1.25-2.50/month power cost at national average electric rate of $.08 kWh)
- Complete pre-manufactured package, ready-to-install
- Watertight construction, corrosion-proof materials, tamper-proof lid bolts
- Anti-flotation flanges
- Quiet operation

Standard Models

AX20, AX20N

(AX20 units carrying the NSF logomark are labeled AX20N, per NSF protocol.)

Physical Specifications

Approximate Dimensions**

Filter Basin Length	91 in.
Width	40 in.
Height	31 in.
Area (footprint)	20 sq. ft.
Filter Dry Weight	300 lbs.

***See AdvanTex® Treatment System drawings for exact dimensions*

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Changing the Way the World Does Wastewater®
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AdvanTex® Treatment System AXN Models meet the requirements of ANSI-NSF Standard 40 for Class I Systems.

ATD-ATX-AX-2
Rev. 1.3, 8/02
© Orenco Systems®, Inc.

Installation Manual

AdvanTex®
AX20 Treatment Systems

Residential Applications



Orenco SYSTEMS

1-800-348-9843
+1-541-459-4449
www.orenco.com

Orenco® SYSTEMS Installation Manual: AX20 Treatment Systems

How To Use This Manual ..... *Page 2*

Before You Begin ..... *Page 3*

Septic Tanks Used in AX20 Treatment Systems ..... *Page 3*

Standard System Components ..... *Page 4*

Installation Overview ..... *Page 5*

Installation Steps ..... *Page 5*

Step 1: Review or Sketch Site Plan ..... Page 6
Step 2: Make Excavation(s) ..... Page 7
Step 3: Prep and Set Septic Tank and Pump Basin ..... Page 8
Step 4: Install Tank Adapters and Risers (If Needed) ..... Page 9
Step 5: Test Tank and Adapter Seams for Watertightness ..... Page 9
Step 6: Prep and Set AX20 Unit ..... Page 10
Step 7: Install Pump Package in Septic Tank ..... Page 11
Step 8: Install Pump Package in Pump Basin ..... Page 11
Step 9: Install Recirculating Splitter Valve (RSV) ..... Page 12
Step 10: Connect Filtrate Return Line ..... Page 12
Step 11: Connect Recirc Transport Line ..... Page 12
Step 12: Connect Filtrate Discharge Line ..... Page 13
Step 13: Install Passive Air Vent ..... Page 13
Step 14: Mount and Wire Control Panel ..... Page 13
Step 15: Perform Operational Test ..... Page 14
Step 16: Backfill Installation ..... Page 15

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.

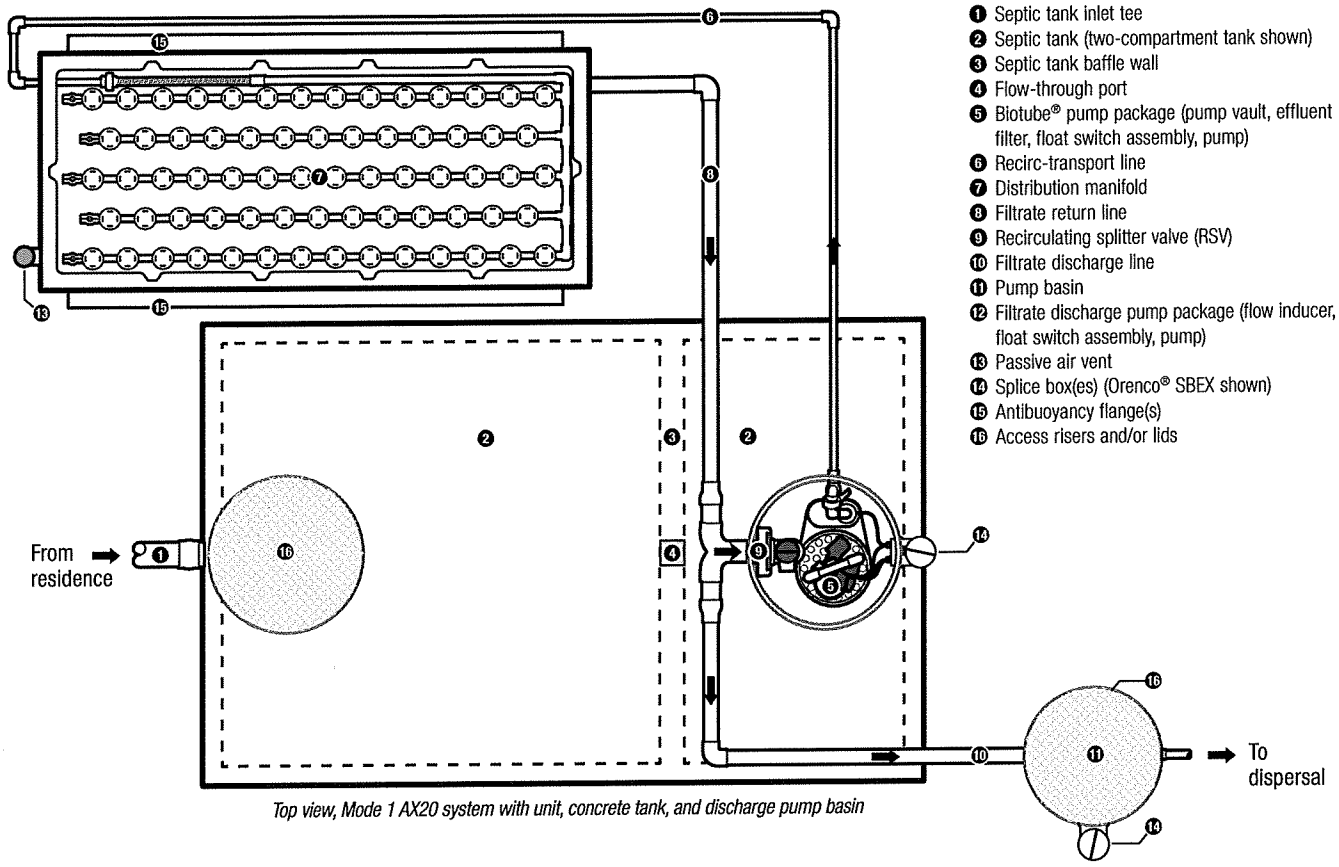
Note: *All pipe diameters provided are U.S. nominal IPS pipe sizes. If you are using metric pipe, you may need adapters to connect to the U.S. fittings supplied with AdvanTex Treatment Systems.*

Septic Tanks Used in AX20 Treatment Systems

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

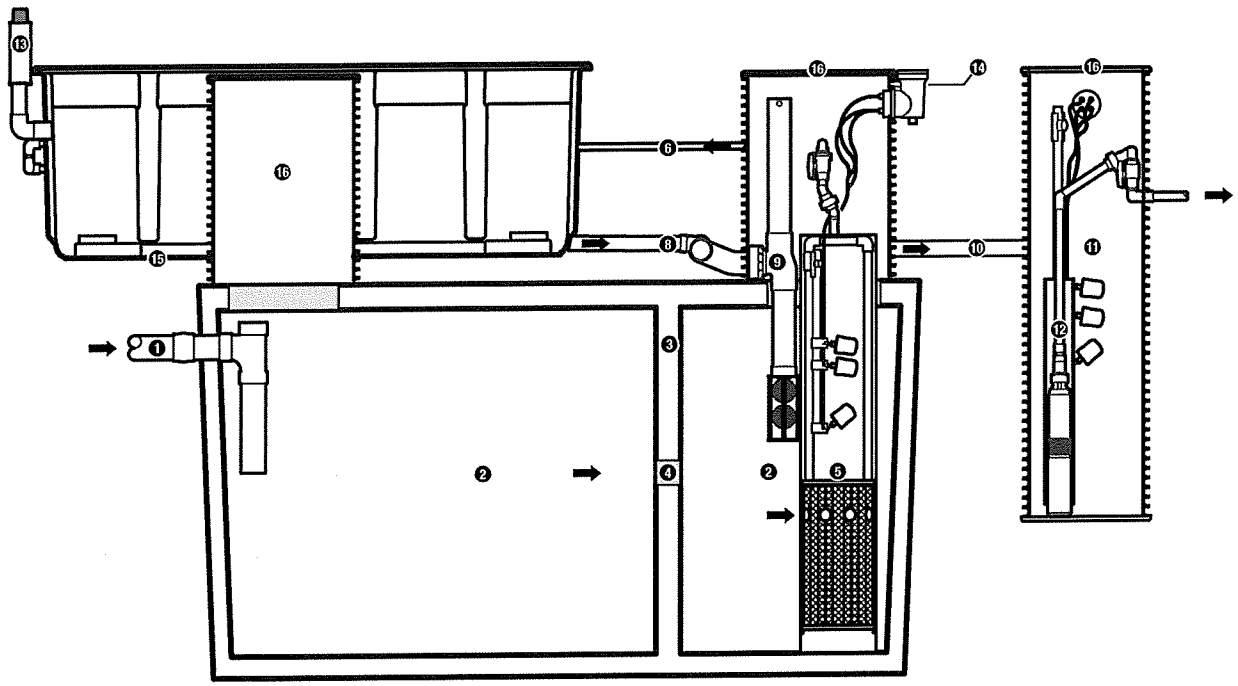
- The tank must be watertight and free of leaks.
- The tank must conform to the specifications of an authorized tank design for AdvanTex Systems. Call your local Dealer for specifics.
- The tank must meet all applicable regulatory requirements.

Standard System Components



1. Septic tank inlet tee
2. Septic tank (two-compartment tank shown)
3. Septic tank baffle wall
4. Flow-through port
5. Biotube® pump package (pump vault, effluent filter, float switch assembly, pump)
6. Recirc-transport line
7. Distribution manifold
8. Filtrate return line
9. Recirculating splitter valve (RSV)
10. Filtrate discharge line
11. Pump basin
12. Filtrate discharge pump package (flow inducer, float switch assembly, pump)
13. Passive air vent
14. Splice box(es) (Orenco® SBEX shown)
15. Antibuoyancy flange(s)
16. Access risers and/or lids

Top view, Mode 1 AX20 system with unit, concrete tank, and discharge pump basin



Side view, Mode 1 AX20 system with unit, concrete tank, and discharge pump basin

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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.

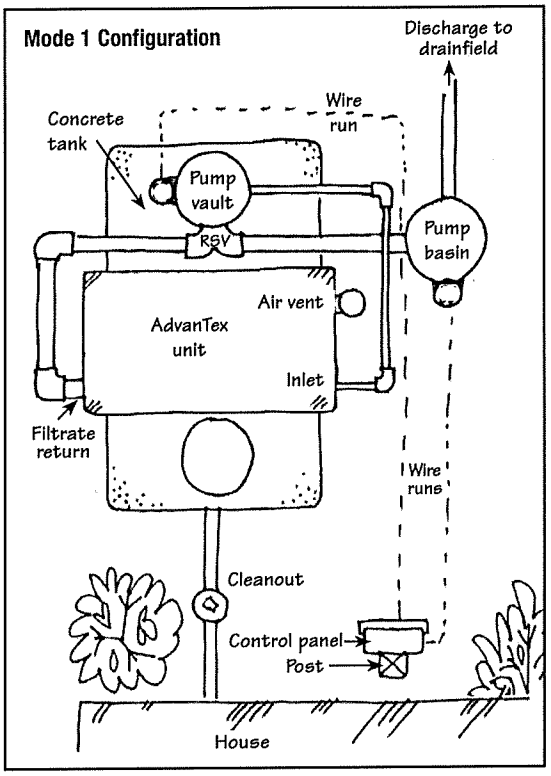
Step 13: Install the passive air vent on the AX20 unit.

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

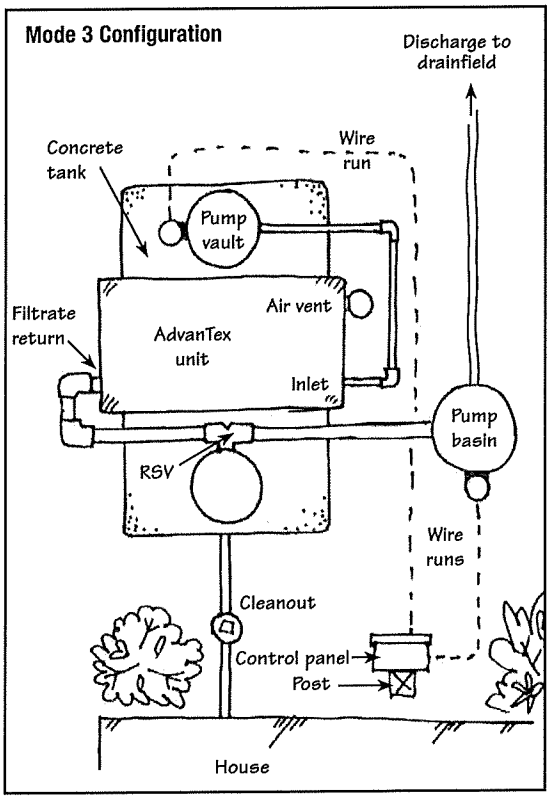
Step 15: Perform an operational test of the AdvanTex System.

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

Installation Steps



Sample sketch of a Mode 1 configuration system layout



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 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.
  - ~ 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.*

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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.*

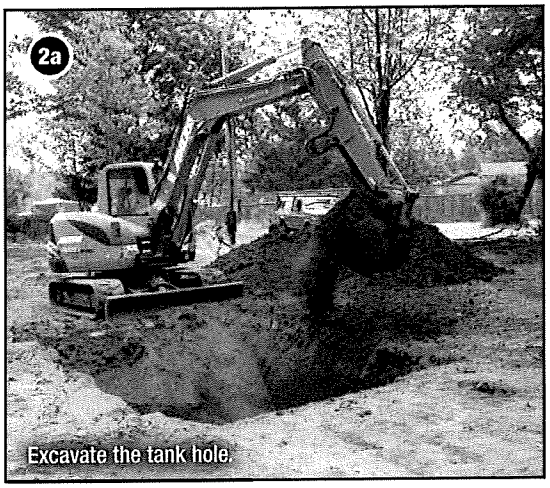
Key Point: A minimum fall of ¼ inch per foot (20 mm per m or 2%) is required from the invert of the AX20 filtrate outlet to the invert of the RSV's inlet and from the invert of the RSV's outlet to the invert of the pump basin's inlet or discharge tank's inlet.

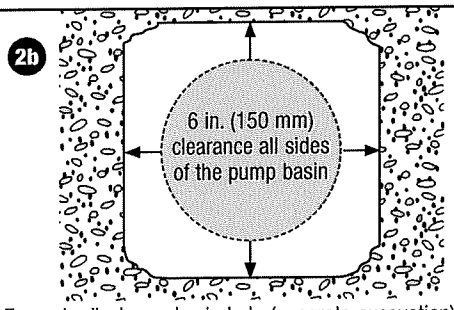
Step 2c: Excavate the AX20 hole, if it's being installed in a separate excavation.

- 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 antiflotation flanges) or 6 ft (with antiflotation 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.

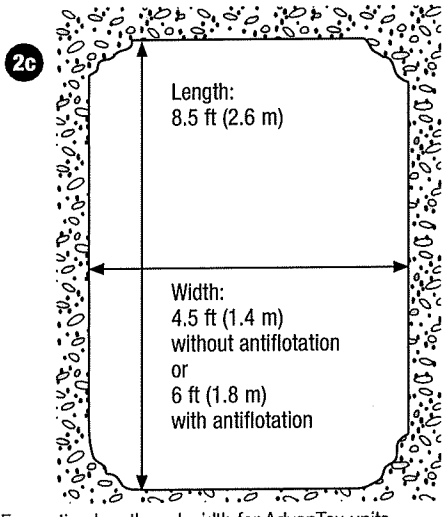
Key Points:

- 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.
- Antiflotation 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 antiflotation flanges, contact your Designer or a qualified engineer.

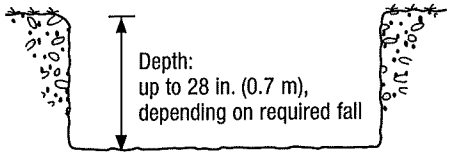




Example discharge basin hole (separate excavation)

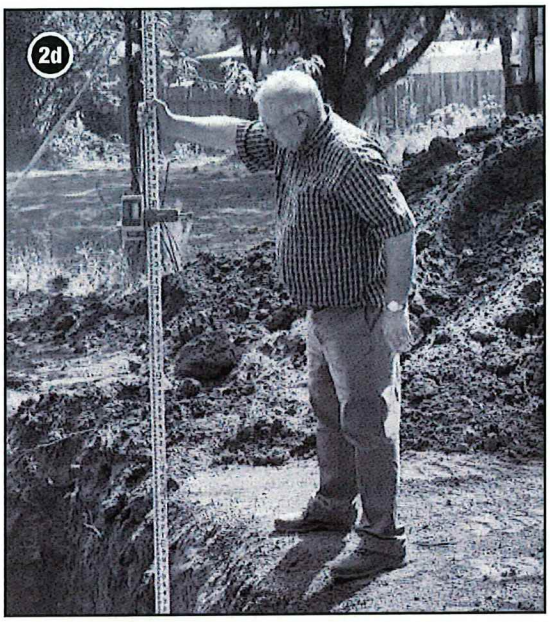


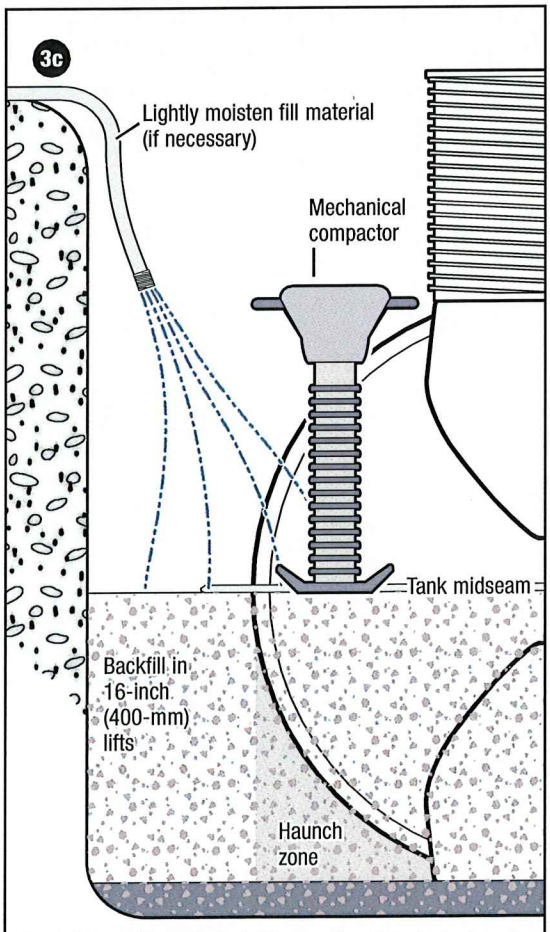
Excavation length and width for AdvanTex units (separate excavation)



Excavation depth for AdvanTex units (separate excavation)

Installation Steps





Partially backfill septic tank (Orenco fiberglass tank shown); from NIN-TNK-1, *Fiberglass Tank Burial.*

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 ≤ ½- to ≤ ¾-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.

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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.

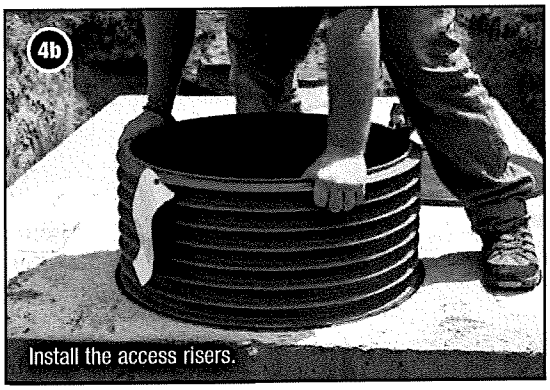
- For Orenco PRTA24 or PRTA30 Tank Adapters, see NIN-TA-PRTA-2, *PRTA24 and PRTA30 Tank Adapter.*
- For Orenco RRFTA or RRFTA30 Tank Adapters, see NIN-TA-RRFTA-1, *RRFTA and RRFTA30 Tank Adapter.*
- For Orenco FRTA30-FRP Tank Adapters, see NIN-TA-FRTA-1, *FRTA30-FRP Tank Adapter.*

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.



Install the access risers.

Step 5: Test Tank and Adapter Seams for Watertightness

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

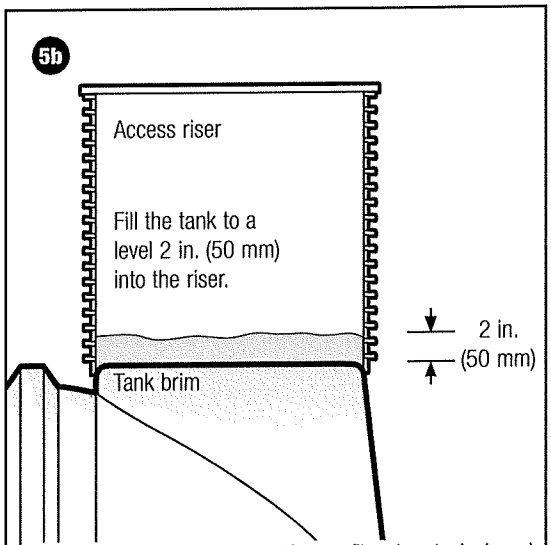
- Some manufacturers require you to partially or fully backfill around the tank before testing for watertightness.

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.

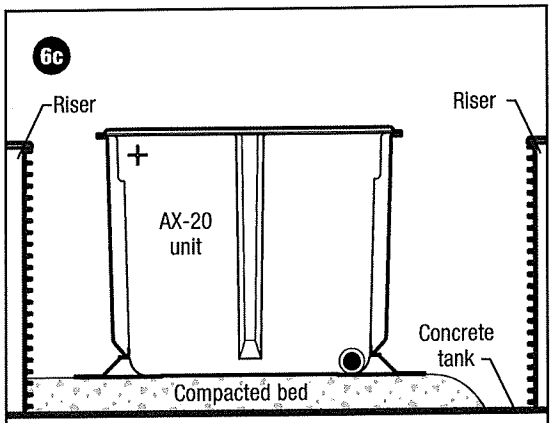


Test seams for watertightness (Orenco fiberglass tank shown), from NIN-RLA-RR-1, *PVC Riser Installation.*

Installation Steps







Place the AX20 unit on the bed of crushed rock, soil, or sand on top of the concrete tank.

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.

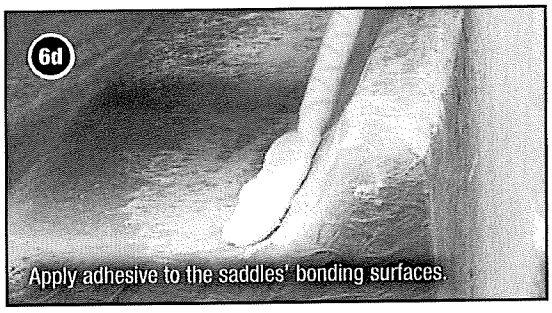
3: Sand the unit's bottom surface where it will rest on the saddles.

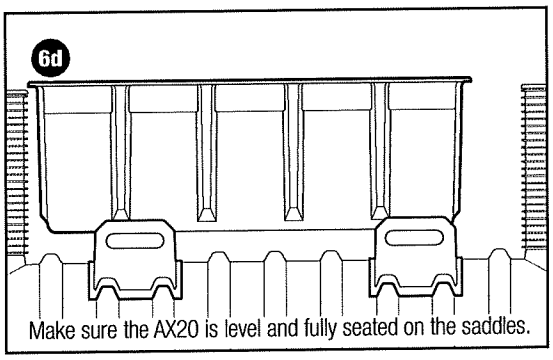
4: Wipe the unit's and saddles' bonding surfaces with acetone and a clean cloth.

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.

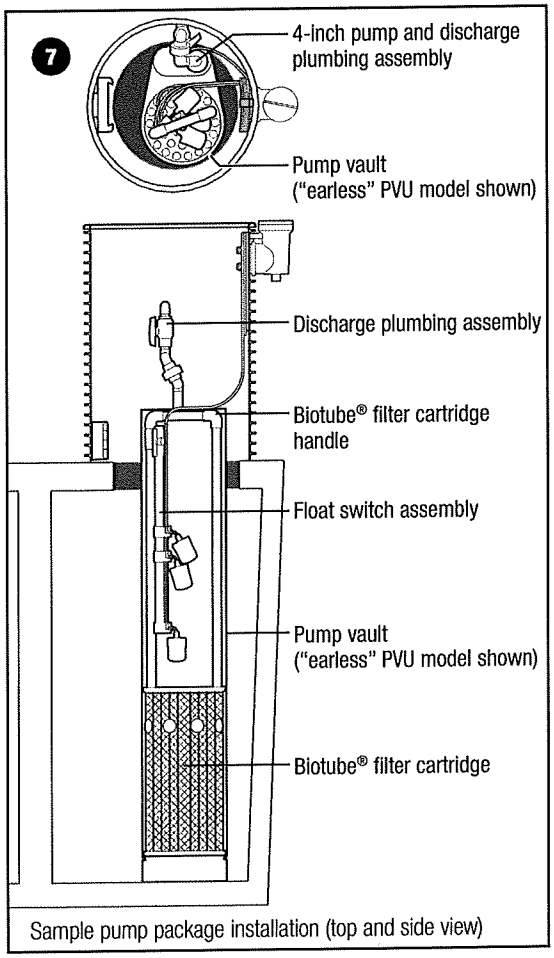
- For HV-style discharge plumbing, see NIN-HV-1, *Pump and Discharge Plumbing.*

Step 8b: Install the float switch assembly.

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

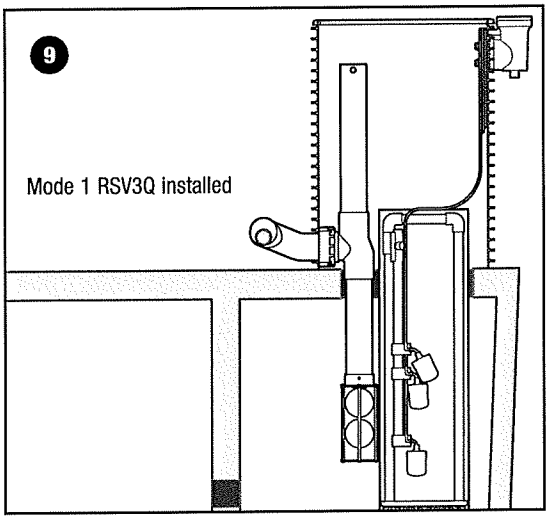
Step 8c: After you've installed the pump package components, test the pump basin for watertightness.

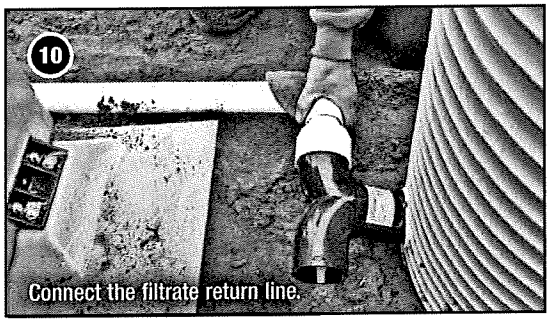
- For Orenco PVC pump basins, see NIN-PB-1, *PVC Basin Installation.*

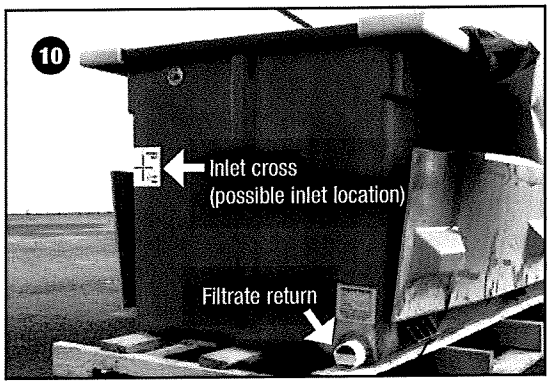


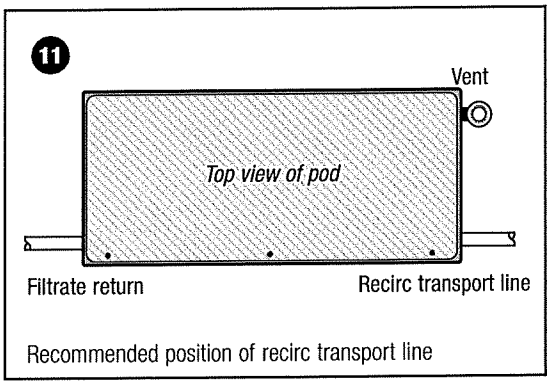
Sample pump package installation (top and side view)

Installation Steps









Recommended position of recirc transport line

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).

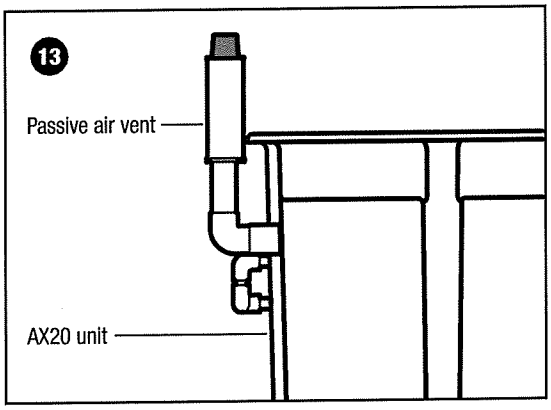
Step 12b: Mark the correct lengths and fall angles on the pipe and fittings.

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.

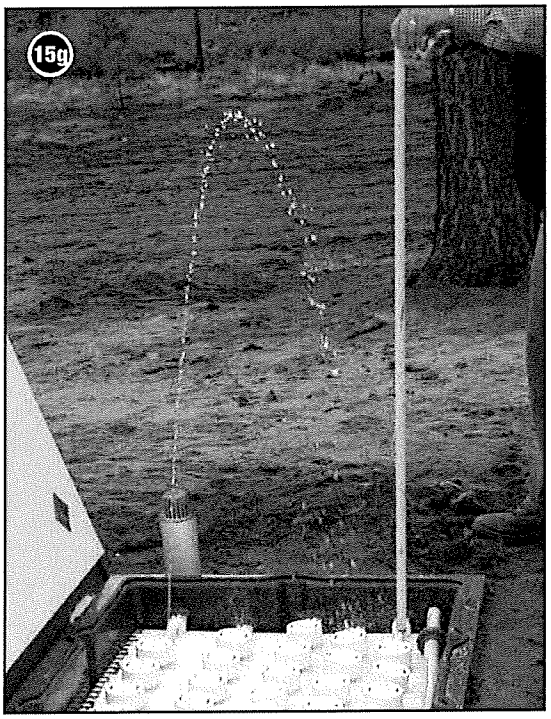
Step 14b: Route and install any necessary electrical conduit.

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.

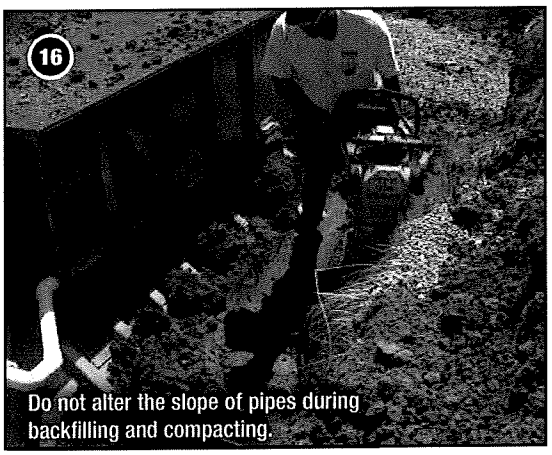
- The squirt height should measure approximately 3-5 ft (0.9-1.5 m).
- If the squirt height isn't at least 3 feet (0.9 m),
  - ~ Check for debris, breaks, or closed valves.
  - ~ Check the required voltage on the pump to be sure the pump has enough power.
- If the system doesn't pressurize correctly,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



Do not alter the slope of pipes during backfilling and compacting.

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 antiflotation 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 (> ¾-in. or 19-mm) rocks, sharp rocks, peat, or muck. In these cases, use ≤ ¾-in. (≤ 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 ¾-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).

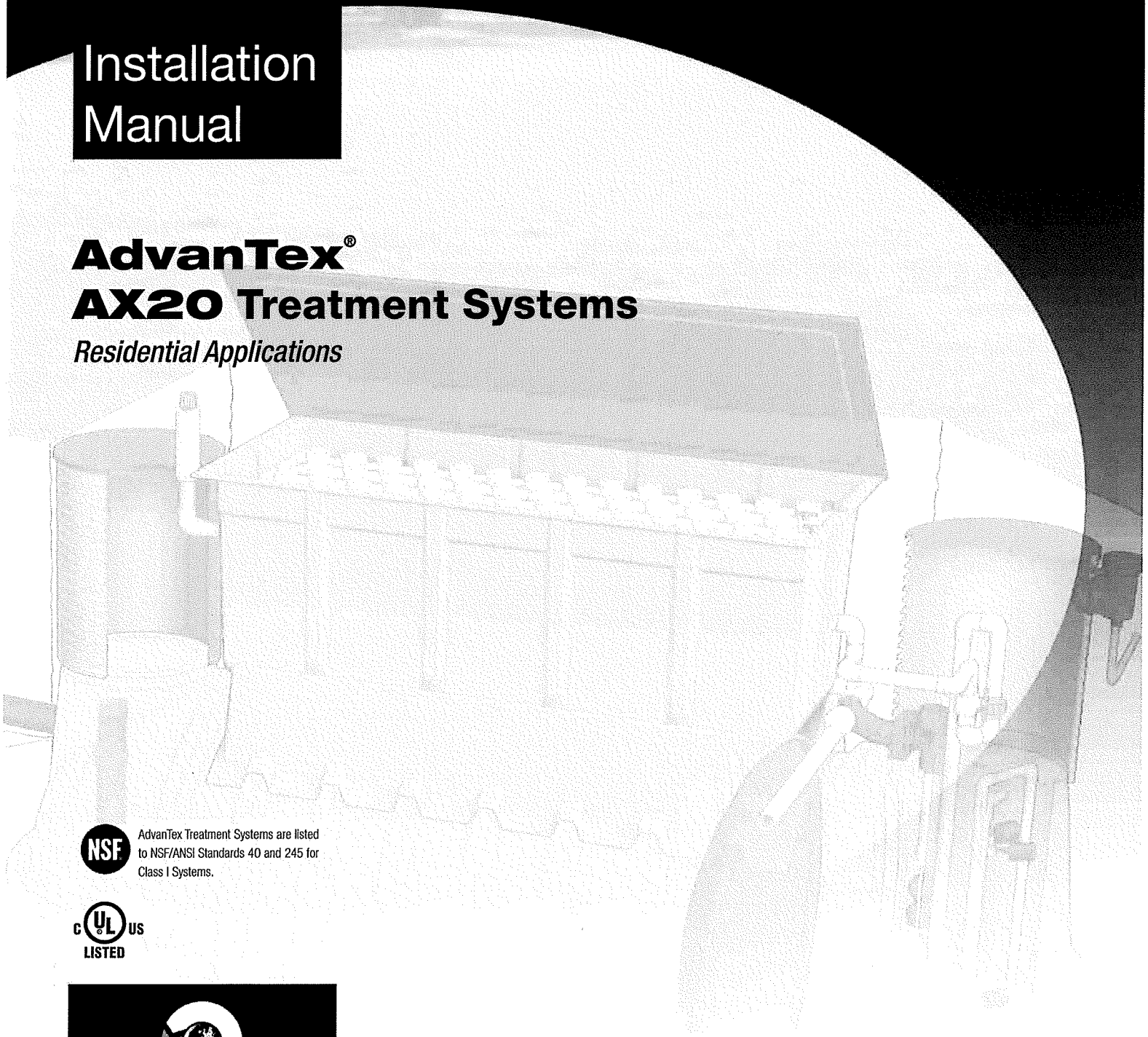
Step 16g: Before the system goes into use, contact the system's Service Provider and complete the system start-up together per AIM-OM-ATX-1, *AdvanTex O&M Manual: Start-Up and Routine Maintenance.*

* 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



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

c UL us LISTED

Orenco® SYSTEMS

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NIM-ATX-AX-1
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OPERATION & MAINTENANCE MANUAL

AdvanTex® Treatment Systems



For Service Providers of

AdvanTex® Treatment Systems

and for

Homeowner Reference

Another Carefully Engineered Treatment System by:

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Incorporated

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Your Expertise Matters

As the operator and service provider of an onsite wastewater treatment system, you play a crucial role. Property owners, neighbors, regulators, dealers, manufacturers . . . all rely on your efficient and effective work.

All onsite systems require servicing, from the simplest of standard stone-trench systems to the most complex tertiary treatment systems. Regular servicing optimizes the treatment process and ensures that onsite systems are a sustainable technology.

To make servicing easier, Orenco has configured the AdvanTex® Treatment System and its components to be one of the most trouble-free and service-friendly residential treatment systems on the market. We've also provided this O&M Manual. In it, you'll find valuable information about . . .

- The AdvanTex® System's configuration and treatment process
- Performance expectations (norms) at each stage in the treatment process
- System components
- Routine cleaning and maintenance procedures and frequencies
- Routine cleaning and maintenance checklist
- Testing procedures
- Troubleshooting tips
- Sample documentation
- Equipment and tools checklist

Operation and maintenance of an onsite treatment system requires an understanding of all the above information. So please read through this entire manual first, before providing any service. Then write in the Record of System Facts, on the back page. Reading the manual first and maintaining up-to-date records will save everyone time and money in the long-run.

Also, at start-up and periodically thereafter, we recommend that you get together with the system user to review the *Homeowner's Manual* that comes with the system, especially the "Do's and Don'ts." This will educate the user on preventive maintenance and on the operating and maintenance responsibilities of system users and authorized personnel, as well as service-related obligations of the manufacturer. Meeting periodically with the user will also allow you to track any significant changes in the household (e.g., number of occupants, changes in water use, use of detergents, disposal of cleaning compounds, etc.).

We're very proud of the AdvanTex® Treatment System. Like all our products, it has gone through extensive research, development, and field-testing. Then each component is built to written specifications and subjected to quality review, before shipping. In addition, our AXN models meet the requirements of ANSI-NSF Standard 40 for Class I Systems. If any component of this System does not meet your expectations, please call your authorized AdvanTex® Dealer.

AdvanTex® Treatment Systems

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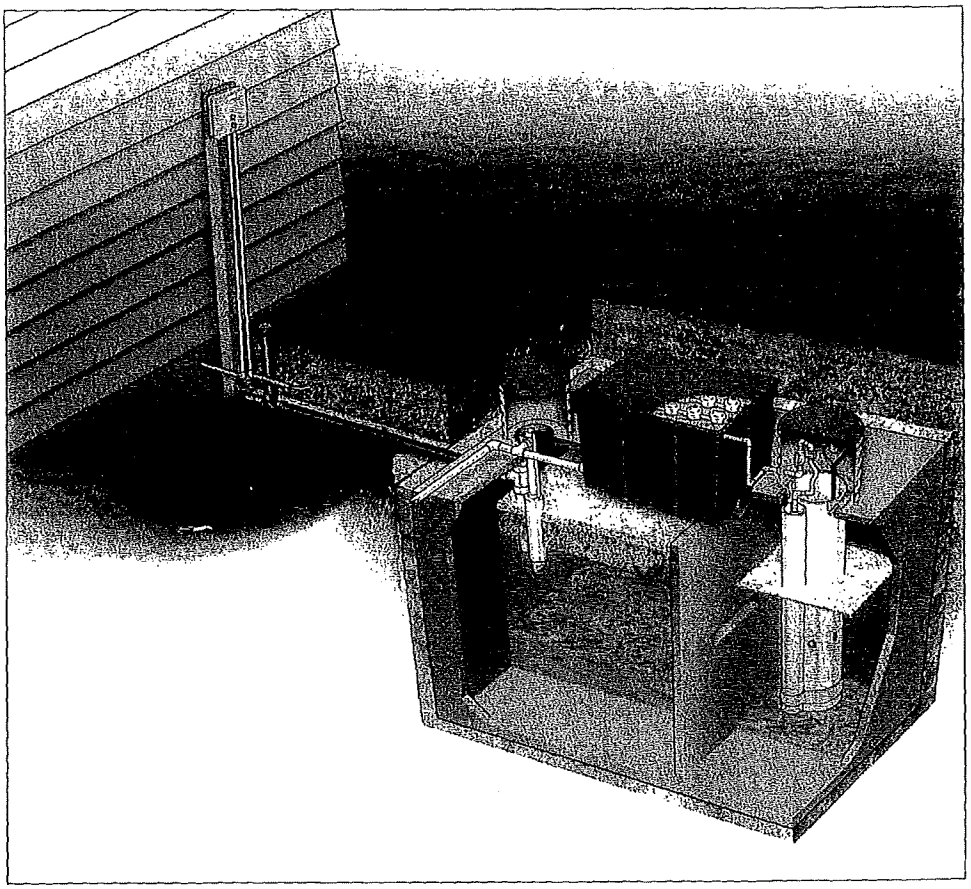
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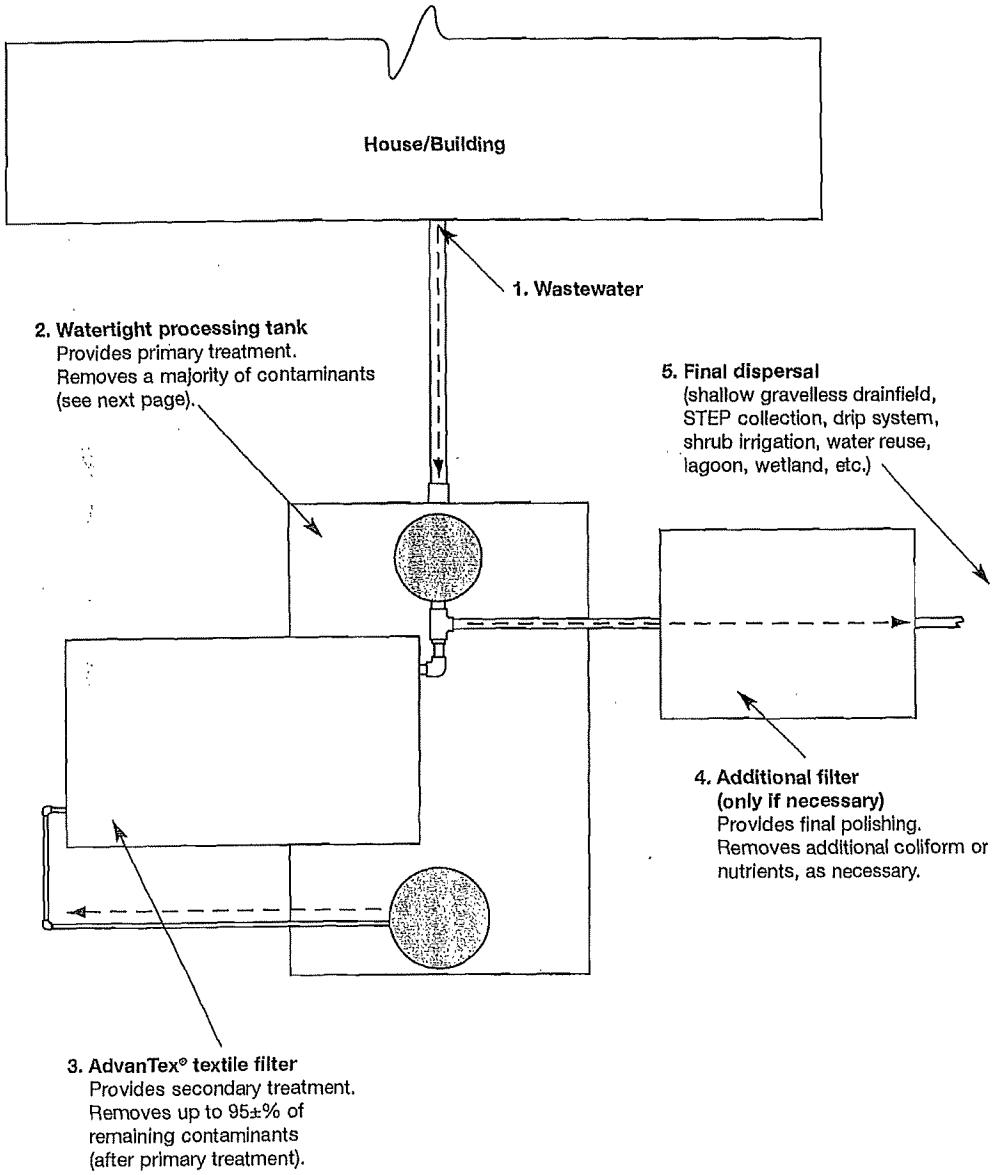
Typical System Configuration: 3D View, AX Series Filter



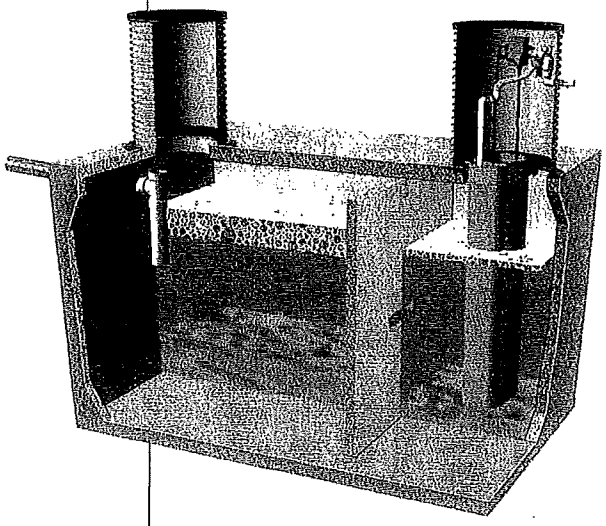
This 3D illustration shows a typical, back-yard configuration for the key elements of an AdvanTex® Treatment System, using an AX10 textile filter. While the AX20 filter pod is two times larger and the RX30** filter pod is three times larger, they can still be positioned on top of the processing tank.*

** AX stands for Aligned Textile (hanging style).*
*** RX stands for Random Textile (chip style).*

Typical System Configuration: Top View



Treatment Process and Performance Expectations: Processing Tank



Processing Tank

The processing tank provides primary wastewater treatment. The tank is an enclosed, watertight receptacle designed to collect wastewater; segregate settleable and floatable solids (sludge and scum); accumulate, consolidate, and store solids; digest organic matter; and discharge treated effluent. BOD (biochemical oxygen demand) removals of greater than 65% and TSS (total suspended solids) removals of greater than 70% are easily accomplished.

The tank operates as a plug-flow type of reactor (fluid and particles enter and exit the tank in progressive sequence). Wastewater separates into three distinct layers: a floating scum layer, a bottom sludge layer, and a clear zone in between, which is relatively free of large solids. A pump vault with effluent filter located at the outlet end of the tank draws liquid effluent from the clear zone, and the filtered effluent is dosed to the next step in the treatment process . . . the AdvanTex® Textile Filter.

Because the AdvanTex® Treatment System operates in the recirculating mode, the filtrate from the Textile Filter returns to the processing tank in one of two ways: to the back (outlet end) of the tank in Mode 1 and to the front (inlet end) of the tank in Mode 3. This plumbing configuration affects effluent quality. Effluent quality is also contingent upon a number of other conditions inside the tank:

- strength and characteristics of incoming waste (see "Raw Influent," below)
- average flows within design range (typically 40-60 gallons per person per day)
- adequate long-term solids retention for thorough digestion
- watertightness of tank (for proper stratification of incoming waste to prevent treatment short circuiting and hydraulic overloading)
- proper size of tank (for minimum 24-hour hydraulic retention time through the tank's clear zone, at average flow rates and when sludge and scum are developed fully)

If the above conditions are met, you can expect the following treatment performance from the processing tank:

Performance Expectations: Processing Tank

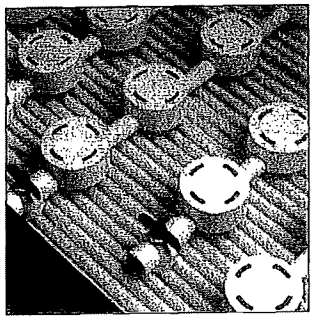
	BOD_5 mg/L	TSS mg/L	G&O mg/L
Raw Influent*	450	500	160
Septic Tank Screened Effluent*	130	30	15
Processing Tank Recirc/Blend Eff.**	15-40	10-20	5±

**Source: Crites & Tchobanoglous. Small and Decentralized Wastewater Management Systems, p. 180 and 183, 1998. McGraw-Hill.*

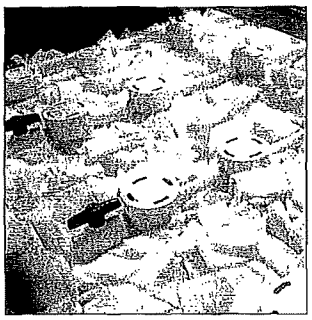
***Will vary with recirc ratios and mode configuration. The numbers here represent a recirc ratio between 3:1 and 5:1 and are derived from Orenco and third-party testing.*

Treatment Process and Performance Expectations: AdvanTex® Textile Filter

AX Series



RX Series



AdvanTex® Textile Filter

The AdvanTex® textile filter provides secondary wastewater treatment. The filter is a sturdy, watertight fiberglass basin filled with an engineered textile material. This lightweight, highly absorbent textile material treats a tremendous amount of wastewater in a small space.

The AdvanTex® filter operates in the recirculating mode, just like a recirculating sand or gravel filter, but loading rates are typically 5-20 times higher, for a number of reasons. For one thing, the textile media has a very large surface area—about 5 times greater than that of an equivalent volume of sand. Textile also has a greater void volume (for free-flow of oxygen) and greater water-holding capacity.

Wastewater percolates both through and between the textile media. A visible biological film normally develops on the filter medium within a few days. BOD_5 and TSS reductions occur almost immediately.

Within the filter, aerobic conditions exist that are ideal for microbes that convert ammonia to nitrate (nitrification). Other conditions exist, too, that result in further nitrogen reduction within the media. Some AdvanTex® filters are configured (Mode 3) so that the filtrate recirculates back to the high-carbon, low-oxygen environment at the inlet end of the processing tank, which is ideal for microbes that reduce nitrates to nitrogen gas (denitrification). Harmless nitrogen gas is then released freely back into the atmosphere. The acclimation period for nitrification may range from four to eight weeks, or longer in colder climates.

AdvanTex® filtrate effluent quality is dependent upon proper management of the recirc/blend effluent flowing into the filter (which, in turn, is dependent on the conditions described on the previous page). If proper conditions are met, and with typical average daily flows of 40-60 gallons per capita per day, you can expect the following treatment performance:

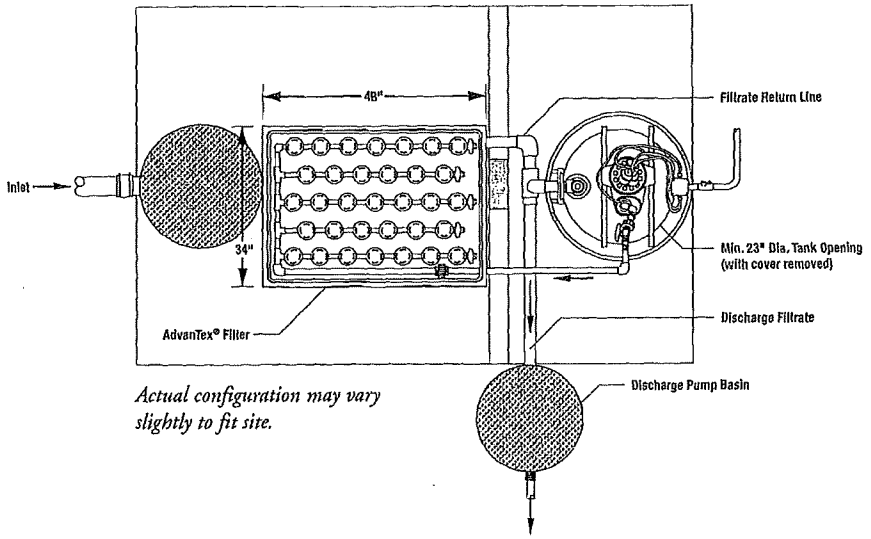
Performance Expectations:

	BOD_5 mg/L	TSS mg/L
AX filtrate[1]	15	15
AXN filtrate[2]	5	5
RX filtrate[1]	10	10

[1] *Design expectations, based on typical average influent characteristics and hydraulic loading rates; also based on Orenco and third party testing using grab samples. Performance and servicing frequencies will tend to vary relative to the mass load being treated. Procedures for treating excessively high loads will require engineering review. For more information, please review AdvanTex® Design Criteria.*

[2] *Actual performance results, based on a six-month accumulative average from NSF (National Sanitation Foundation) testing on the AX20N at 500 gpd, using composite sampling.* *See p. 17 for additional information on treatment performance.*

Typical Materials List AX Series



Actual configuration may vary slightly to fit site.

Orenco's AdvanTex®-AX Treatment Systems come in a variety of models and configurations. Following is a typical materials list (excluding the processing tank) for an AX series system that requires a recirculating splitter valve (RSV) and a pump basin (some do not).

Processing Tank Access Equipment

Two Access Risers necessary:

One 24" dia., w/Lid

One 30" dia., w/Lid & necessary Grommets

Treatment System Equipment

PVC Splice Box

Universal Biotube® Pump Vault

Discharge Assembly

Float Switch Assembly

Orenco Pump, 115V

MVP or VCOM AdvanTex® AXB Panel, 115V

Recirculating Splitter Valve Assembly

AdvanTex® AX10 Filter w/Vent Assembly

Anti-Flotation Flanges

Pump Basin Equipment

PVC Pump Basin, 24" dia., w/Lid

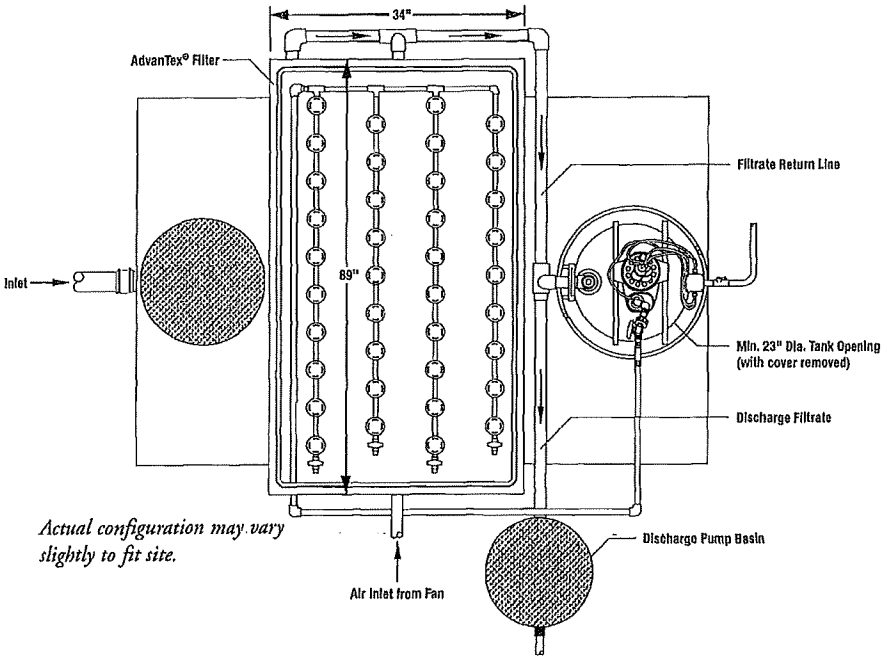
PVC Splice Box

Discharge Assembly

Float Switch Assembly

Orenco Pump, 115V

Typical Materials List RX Series



Orenco's AdvanTex®-RX Treatment Systems come in a variety of models and configurations. Following is a typical materials list (excluding the processing tank) for an RX series system that requires a recirculating splitter valve (RSV) and a pump basin (some do not).

Processing Tank Equipment

Two Access Risers necessary:

One 24" dia., w/Lid

One 30" dia., w/Lid & necessary Grommets

Treatment System Equipment

PVC Splice Box

Universal Biotube® Pump Vault

Discharge Assembly

Float Switch Assembly

Orenco Pump, 115V

MVP or VCOM AdvanTex® RXB Panel, 115V

Recirculating Splitter Valve Assembly

AdvanTex® RX30 Filter w/Ventilation Fan Assembly

Anti-Flotation Flanges

Pump Basin Equipment

PVC Pump Basin, 24" dia., w/Lid

PVC Splice Box

Discharge Assembly

Float Switch Assembly

Orenco Pump, 115V

Routine Cleaning & Maintenance Procedures

Orenco Systems® requires regular inspection and maintenance of AdvanTex® Treatment Systems as a condition of purchase. All activities are to be performed three-to-six months after system start-up; and an annual field-service inspection, including sampling, is to be scheduled in late spring or in early summer. For AXN systems, there is to be a minimum of four inspections during the first two years, and then annual inspections thereafter.

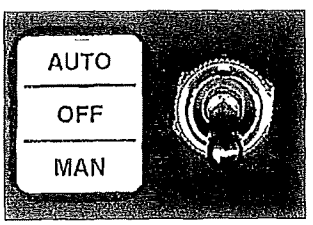
Following is a list of the routine cleaning and maintenance procedures we recommend or require. Failure to provide required maintenance will void the AdvanTex® Treatment System warranty.

Copies of inspection and maintenance reports, along with any additional documentation, must be forwarded to and retained by the Authorized AdvanTex® Treatment System Dealer who sold the system. If there is no Dealer, then the documentation must be forwarded to Orenco Systems, Inc., 814 Airway Avenue, Sutherlin, OR 97479, ATTN: Systems Engineering.

Control Panel/Pumps/Alarms

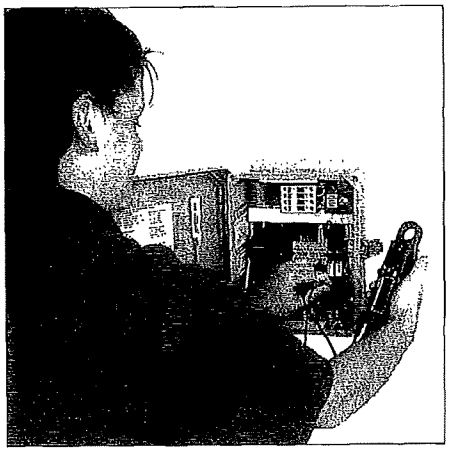
WARNING: Only qualified/certified electricians or service providers should perform maintenance on electrical equipment.

1 Check pump operations. Place the MOA switch (Manual, Off, Automatic) to Manual and make sure the pump runs. Then switch back to Automatic and continue to check the automatic operation of the alarm floats, the recirc timer on the floats, the discharge timer on/off, and timer overrides. Refer to the installation, operation, and setting instructions for the control panel that comes with the system. A set of instructions is stored in a plastic pocket on the inside of the panel door.



NOTE: Be sure to set the MOA switch back to Auto after testing.

2 Record motor run amps and voltages on the Field Maintenance Report Form. If the voltage drop exceeds National Electric Code (NEC) requirements, have an electrician verify the service line and check pump windings.

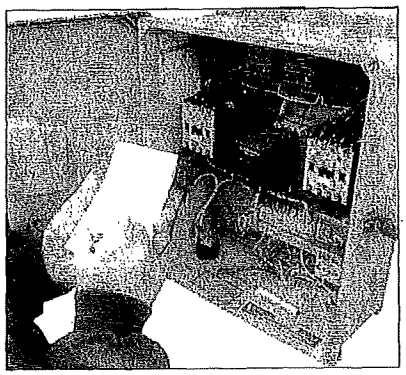


3 Verify that the programmable timer settings for all pumps are correct. If the timer settings have been changed, the current setting and date of change should be written on your Timer Setting Instructions and Record of System Facts, at the back of this Manual. Place the date and your initials by the recorded change.



4 Read and record the elapsed time meter (ETM) and cycle counter (CT) values (from the panel's logic controller or from the web-based telemetry software) on the Field Maintenance Report Form.

ETM's and CT's are valuable troubleshooting tools if problems occur with the system. ETM and CT data signal high water usage, low water usage or tank leakage, and excessive pumping, among other operating situations.



5 Confirm operation of audible and visual alarms per the installation, operation, and setting instructions for the control panel that comes with the system.

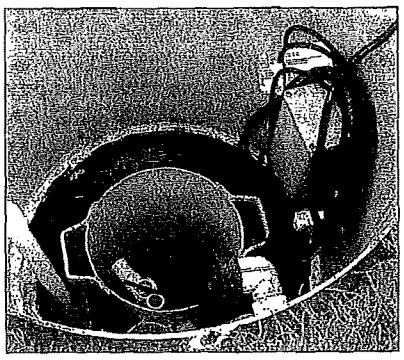
Pumping System

Pump systems should be inspected annually to ensure that they are operating properly. Unscrew the stainless steel bolts that fasten the fiberglass lid over the pumping equipment. Remove the fiberglass lid for an inspection that includes these steps:

1 Verify that there are no obvious holes or leaks in the riser or around the perimeter of the riser connection to the tank. Wetness or water marks may be an indication of weeping.

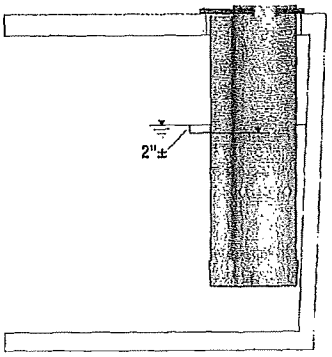
2 Inspect splice box to ensure lid and connections are secure.

3 Verify that floats are in good condition and properly secured to the float tree. Verify that float cords are neatly wrapped inside the riser so that they cannot interfere with the operation of the floats.



4 Verify float operation. With MOA switch in Automatic, simulate system operation by lifting the floats in the same order that the liquid would lift them (bottom first, top last).

5 Determine whether the Biotube® effluent filter needs cleaning by testing the change in the tank's liquid level when the pump is on. Turn the recirc pump on by flipping the MOA switch in the control panel to Manual. **Watch the liquid level inside the screened vault as the pump is running for about 30 seconds to determine if there is any noticeable liquid level differential between it and the tank liquid level.** Return the MOA switch to Auto. When the liquid level difference between the inside and outside of the vault is about two inches or more, or if the low-level alarm is activated, the Biotube® cartridge may need to be cleaned.

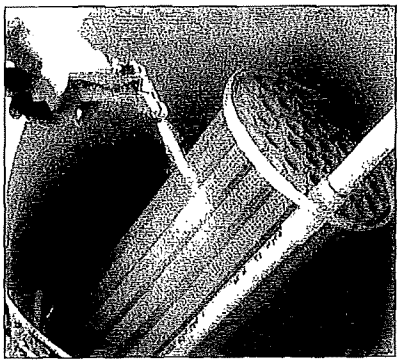


If the Biotube® needs cleaning, do the following:

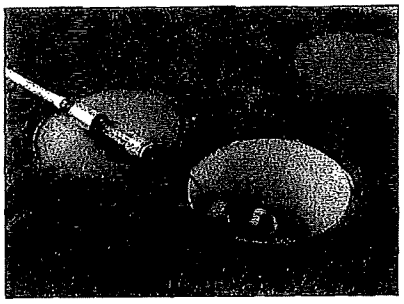
- Turn circuit breaker off at service panel
- Switch MOA and circuit breakers in control panel to "Off"
- Slide Biotube® cartridge out of vault
- If necessary, the RSV valve may be removed to allow room in the riser for cleaning the Biotube®
  - — Pull RSV out of its Quick Disconnect holster (see photo next page) and place it in a plastic trash can
  - — Hose off the trash can into the tank after replacing the RSV

NOTE: Refer to RSV installation instructions for details on how an RSV works.

- Hold Biotube® cartridge over open inlet of tank or primary compartment
- Carefully spray build-up into tank
- If there are significant solids in vault, remove and clean it too

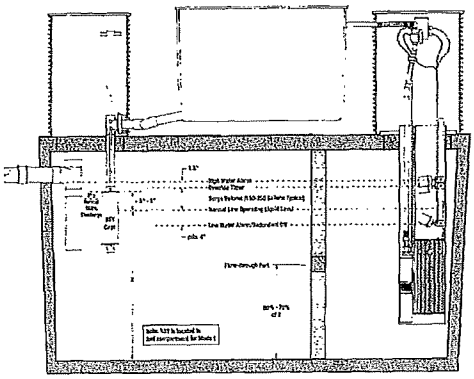


6 Pull the pump and place it on a cleanable surface, like the riser lid, or in a plastic trash can. Check the intake screen; wash off particles as necessary. Record the kinds of particles (cigarette butts, hair, lint, gum, kitty litter, cloth wipes, grease build-up, etc.) on the Field Maintenance Report form. Report findings to user (for education).



7 Visually inspect the Recirculating Splitter Valve and verify that the liquid level in the tank is within the normal range. If low, the ball mechanism could be jammed in the seated position. Remove, disassemble, and inspect. If high, the RSV may require cleaning because it is not making a tight seal when seated. Remove, disassemble, and inspect.

NOTE: The figure below shows the RSV adjacent to the inlet of the processing tank, which is typical for Mode 3 systems (Mode 1 systems have the RSV in the second compartment of the tank — the Recirc Chamber). To read dimensional specifications, see full-sized drawing in Installation Guide, Appendix 2.



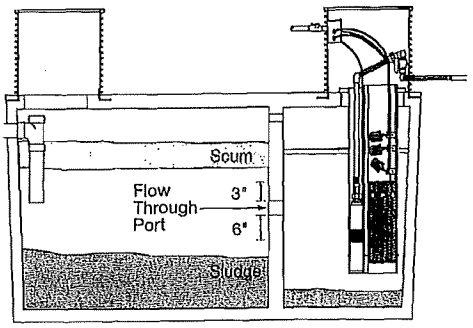
Processing Tank

1 If possible, verify no inlet flow when all household appliances are turned off. Access the inlet inspection port for visual verification of lack of flow. If the inlet inspection port is not readily accessible, then listen for trickling water at the access port. This could indicate faulty fixtures or leaky plumbing. Check building sewer cleanout for flow.

If faulty plumbing isn't the problem, the sound of trickling water could indicate I & I (infiltration and inflow) from ground or surface water. In that case, further investigation is necessary.

2 Inspect the processing tank for the following:

- Liquid depth (should be about 60-70% of the total inside depth of the tank)
- Odor (should be musty, not pungent)
- Color/consistency of scum (should be dark brown with a consistency that varies from dense and crusty to soft and amorphous)
- Effluent characteristics (should be no oily sheen or foam)
- Sludge and scum thickness (records should indicate typical growth accumulation of 1" of scum and 2" of sludge per year for 3-4 occupants)

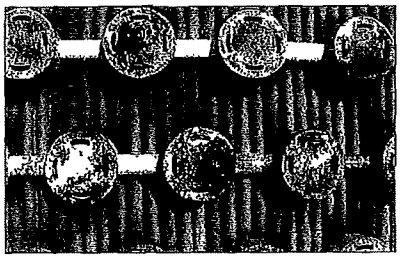


Measurements of solids accumulation help to determine when the septic tank needs pumping. A recommendation for pumping should be made when the bottom of the scum layer is within 3" of the flow-through port of the baffle or when there is an accumulation of sludge to a depth within 6" below the flow-through port. After the first year's measurement of septic tank sludge and scum thickness, measurements only need to be taken about every three years, until the thicknesses approach their maximum depths.

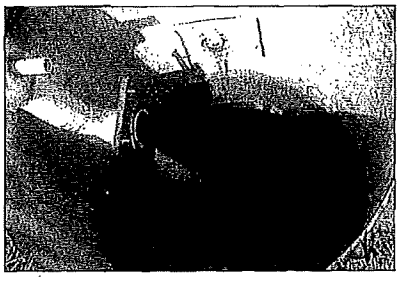
Textile Filter

1 Inspect for ponding.* The filter should not be saturated. Effluent should move freely through the media.

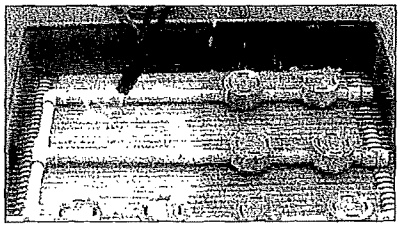
2 While manifold is pressurized, check for proper positioning of orifice shields over each orifice.



** If there is ponding in the textile filter because of a build-up of oil and grease, scrape a sample of the biomat and have it analyzed by an environmental lab to determine its characteristic. For the AX Series filter only: If there is ponding of indeterminate cause, coupled with a pungent odor, it may be necessary to clean the textile media. (Excessive cleaning will retard nitrification. Only clean as often as necessary.) The textile media hangs in individual sheets, and these sheets can be pulled out for cleaning (if necessary). First, remove the Recirculating Splitter Valve.*

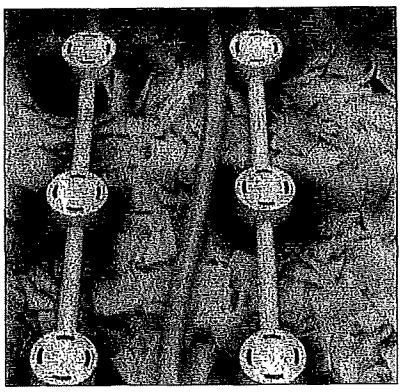


Use a hose or pressure washer, connected to the nearest spigot. Wash the biomat into the underdrain and it will flow back to the tank, as long as the Recirculating Splitter Valve has been removed. When done, replace RSV.

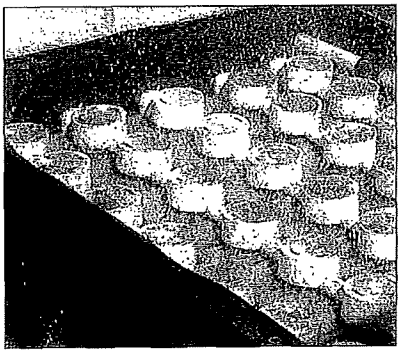


Remember: clean filter only if ponding and odor occur.

3 Verify that there is equal spray on and under all orifice shields. (Each orifice shield should show signs of organic biomat build-up on and underneath it.)



4 Check for clogged orifices (orifice shields without spray or biomat build-up underneath). You should be able to observe uniform water droplets dancing around orifice shields while dosing.



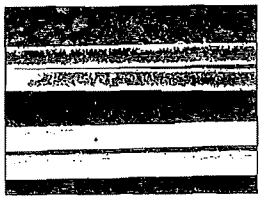
5 Assess the character and color of the biomat. If it seems appropriate, take a photo and comment on the growth and characteristics of the biological mat under and around the orifice shields. Biomats are natural and normally appear light-brown to dark-brown and gelatinous in texture. If the mat appears too light (yellowish with the texture of lard, wax, or margarine), the grease and oil concentrations should be checked.

6 Check the odor emitting from the filter. If a strong or offensive odor (e.g., smell of rotten eggs, rotten cabbage, etc.) is emitted, measure the DO level in the filtrate and recirculation chamber and adjust the recirc time, if necessary. (Normally, systems will smell musty, earthy, or moldy but not pungent).

7 Check squirt height and compare residual pressure against the start-up value. This may take longer than just cleaning and flushing the manifold, but will help establish frequency of cleaning.



If the squirt height is 40-50% higher than the start-up value, clean and flush the manifold. (A 50% increase in squirt height signals approximately 18% orifice blockage.) To flush laterals you can run the pump or use a bottle brush or pressure

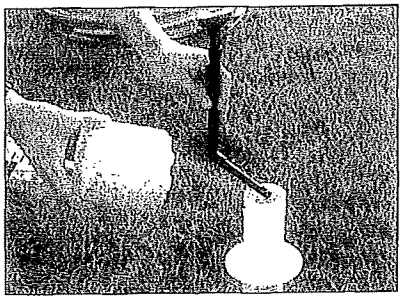


Flushing with pump

Flushing with pressure washer or bottle brush

washer. Brushing or pressure washing is best. (When flushing AX laterals, biosolids slough into the bottom of the filter, then return to the tank.) Verify again that all orifices are clear. Re-check squirt height.

8 For the RX Series filter only, verify ventilation fan operation and air flow. Use an anemometer (available through Orenco) to measure the air flowing through the system. 10-15 cubic feet per minute (cfm) per pod is typical. Record inlet flow and outlet flow, where applicable, to ensure there isn't a large difference between them. A large difference means that leaking or bypassing is occurring. Clean vent pipe as necessary.

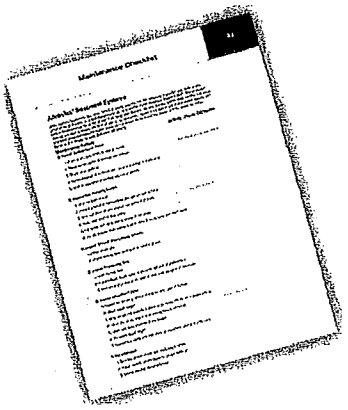


Miscellaneous

1 Exercise all mechanical valves. Fully open and close valves to ensure they have not failed or become stuck in one position.

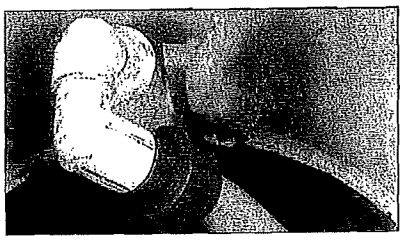
2 Before leaving the site . . .

a) Review the Maintenance Checklist that follows to ensure all activities have been performed.

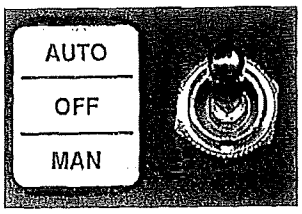


b) Be particularly careful to ensure the following:

- **valves are back in their recommended positions**



- **control panel has been set back to automatic and circuit breakers have all been switched back on**



- **household water lines have been turned back on (if they were turned off earlier in the visit for I & I evaluation)**
- **lids and lid bolts are properly in place and tightened**

Documentation

1 Complete all documentation and submit any required reports to the appropriate parties/ agencies. Be sure to send a copy to the AdvanTex® Dealer.



CAUTION! While providing O&M services, be sure to use proper personal protection equipment, such as rubber gloves and eye protection, as well as clothing, to cover parts of the body that will be exposed to wastewater or effluent. When finished, use proper personal hygiene.

Effluent Testing Procedures

Orenco Systems® recommends regular testing of effluent from AdvanTex® Treatment Systems as part of system maintenance. Copies of test results and additional comments/documentation must be forwarded to and retained by the Authorized AdvanTex® Treatment System Dealer who sold the system. If no Dealer was involved in the sale, then documentation must be forwarded to Orenco Systems, Inc., 814 Airway Avenue, Sutherlin, OR 97479, ATTN: Systems Engineering.

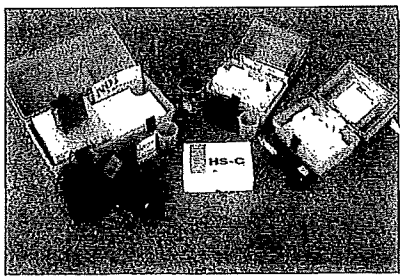
Protocol for Sampling, Testing, and Analysis

Sampling Locations — For residential systems, sample the discharge filtrate at the filtrate splitter valve. This location is illustrated on your system drawings. Pull the RSV out of its Quick Disconnect holster and lay it on a flat surface. Take the sample at the RSV inlet. (Don't run the pump manually to force a quick sample. Take the sample during normal system operation.)

Sampling Schedule — Typically schedule full-scale annual sampling events for spring.

Sampling and Storage Methods — Sampling equipment, minimum sample size, and storage procedures should conform to those recommended in the most current edition of *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association (APHA), available from the Water Environment Federation, 1-703-684-2400.

Analytical Methods — Analytical methods should conform to *Standard Methods*, cited above.



Routine Tests, Frequencies, and Typical Values

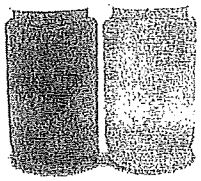
While regional requirements vary, Orenco recommends that the following effluent tests be performed three-to-six months after system start-up; and an annual field-service inspection, including sampling, is to be scheduled in late spring or in early summer. For AXN systems, there is to be a minimum of four inspections with sampling during the first two years, and then annual inspections with sampling thereafter.

These tests can be performed in the field; they cost very little and do not require lab work. However, they are very useful in assessing system performance and maintenance.

Parameter	Methodology	Typical Values*
Clarity	Visual[1]	Clear (15± JTUs or NTUs)
Odor	Sniff[2]	Non-offensive (musty is OK; rotten egg or cabbage is not OK)
Biotube®	Visual	No liquid level differential inside/outside vault; Norm: 1-2 year cleaning interval for recirculating systems
Oily film	Visual; inside the pump vault	None; no red, blue, green, or orange sheen
Foam	Visual; inside tank	None
pH	Field[3]	6-9

**Source: These typical values are recommended by various sources. Biotube® parameters are based on Orenco research and development.*

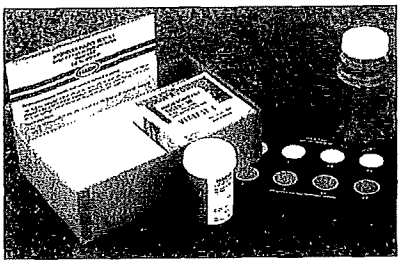
[1] *To check for clarity, service providers can carry a sample bottle of typical effluent, to compare against, or can use a portable turbidity meter.*



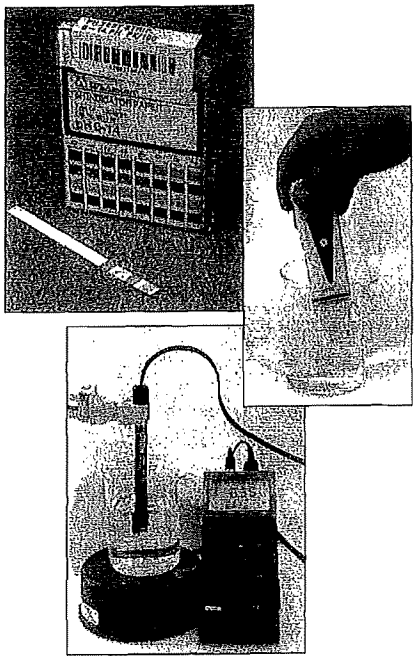
Always put effluent sample in a clear glass container or beaker to evaluate clarity. Using a small, removable sticker, write the date and place it low on the beaker.



[2] *To check for odor, service providers can simply sniff the effluent sample or can use a sulfide measuring packet or an olfactory snifter device for detection of odors.*



[3] *To check for pH, service providers can use litmus paper, a pocket pH meter, or a benchtop pH meter.*



Supplemental Testing and Typical Values

If effluent is cloudy or smells pungent or if the biomat on the textile filter appears greasy, waxy, or oily, further tests and troubleshooting of the filtrate should be performed. The following filtrate tests provide invaluable information for troubleshooting and diagnosing problems and causes:

Parameter	Methodology	Typical Values (mg/L) AX[1]		RX[1]	
		Mode 1	Mode 3	Mode 1	Mode 3
BOD_5	Grab	15	15	10	10
TSS	Grab	15	15	10	10
TN	Grab	25	10-15	10-30	10-15
G&O	Grab	<1			
DO	Field[2]	2.5-6±			
pH	Field	6-8±			

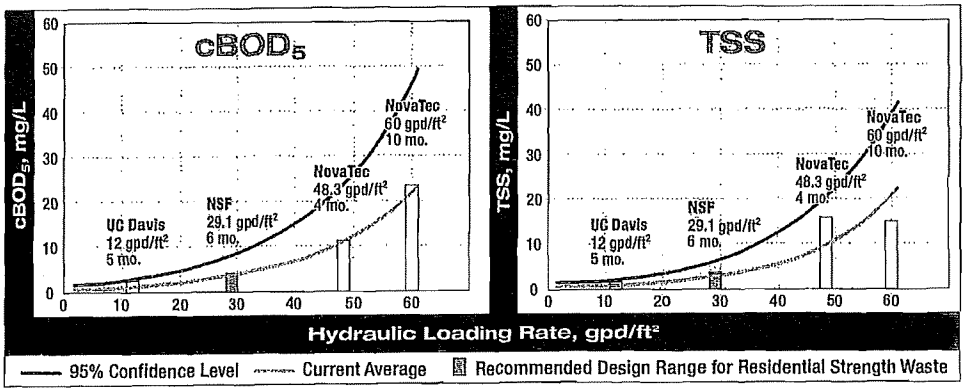
[1] *AX and RX values are based on Orenco and third party testing.*

[2] *To check for Dissolved Oxygen, use a DO meter, available from VWR Scientific, Cole Parmer, or HACH.*

Relationship Between Test Results and Loading Rates

As noted on p. 6-7, filtrate quality is dependent on a number of factors, including influent characteristics and loading rates. The following charts show how low-to-moderate loading rates produce BOD and TSS of <5mg/L, while higher loading rates produce BOD and TSS in the range of 15-25 mg/L.

Effluent Quality vs. Hydraulic Loading Rates
Third Party ANSI and NSF 40 Testing Results

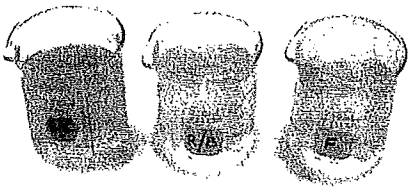


Troubleshooting Tips for Operators: Process Treatment

Once you know the typical values for wastewater treatment system performance (see pp. 6, 7, 16, and 17), you can be pro-active and troubleshoot non-typical process indicators, before system performance is affected.

Troubleshooting Effluent Quality

If your effluent samples are cloudy and color/turbidity is >15 units, do the following:



- Perform BOD_5 and TSS tests
- Check to ensure the recirc ratio isn't too high or the pump dose time isn't too long
- Check the effluent filter for clogging
- Interview user re: System abuse

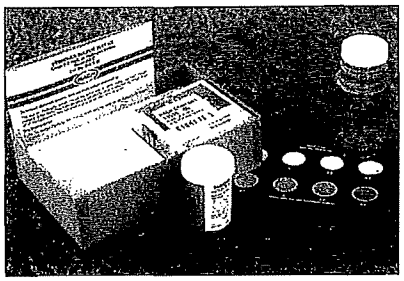
If performance continues to be poor, explore the following design remedies, in this order:

1. Expanded tankage (e.g., additional grease/oil tank)
2. Pretreatment (e.g., additional aeration)
3. Larger filter area (e.g., additional module)

Troubleshooting Odor

If the tank or textile filter smells like rotten eggs or cabbage:

- Check Dissolved Oxygen levels
- Use a DO meter or Colorimetric Kit
- Note filtrate DO levels that are <2.5 or >6 mg/L



Filtrate DO that's <2.5 mg/L indicates insufficient oxygen. If the filtrate DO is <2.5 mg/L:

- Check filter surface for evidence of clogging
- Check to ensure the pump is working
- Check to ensure the ventilation fan assembly is working (RX only)
- Check to ensure the recirc ratio isn't too low; increase if too low
- Check to ensure influent strength isn't too high (see AdvanTex® Design Criteria)
- Check to ensure hydraulic retention time isn't too high

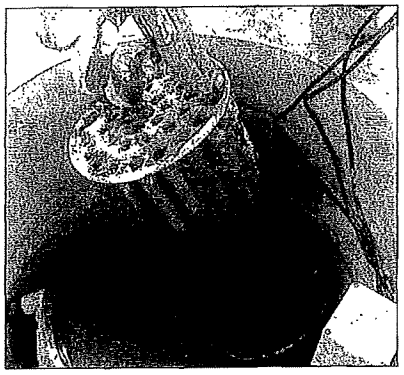
Filtrate DO that's >6 mg/L indicates excessive aeration. If the filtrate DO is >6 mg/L:

- Check to ensure recirc ratio isn't too high
- Check to see if influent flows are below normal
- If influent flows are below normal or recirc ratio is too high, reduce recirc ratio

Troubleshooting Biotube® Filter Clogging

If a visual inspection of the Biotube® filter for biomass build-up shows the need for cleaning more often than once every 1-2 years (which is typical for recirculating systems), try the following:

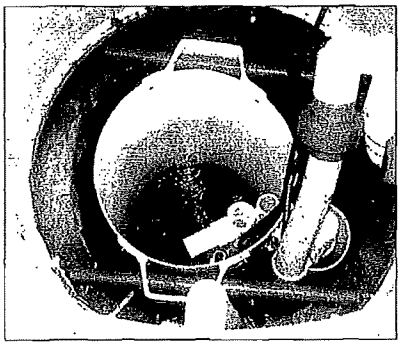
- Verify the pump isn't running too long (typically 3 cycles/hour)
- Ensure the recirc ratio isn't too high
- Verify normal DO levels; if high, reduce recirc ratio
- Check for below normal influent flows
- Check influent Grease & Oil and TSS; if excessive, a review of component sizes may be required



Troubleshooting Oily Film

All signs of oil or grease anywhere in the system (in the tank, in the vault, on the effluent or textile filter) must be investigated. Ask the system user to identify the probable source:

- Recent change of car oil?
- Canning meat or poultry?
- Excessive use of garbage disposal?
- Excessive use of bath or mineral oils? (Jacuzzi® tub?)
- Excessive use of detergents?



If the system user can't identify the probable source, try the following:

- Sample/test effluent for BOD_5 and Grease & Oil
- Sample/test at all process steps, including influent (if possible)
- Label, date, and photograph all samples
- Use standard glass beakers and set samples in front of a common, uniform background, when photographing
- Check biomat accumulation at AdvanTex® Filter
- Note if biomat is yellowish and wax-like or lard-like
- If so, scrape biomat sample for analysis
- Photograph/document biomat sample
- Send to lab with effluent samples

Note: Excessive Grease & Oil (>25 mg/L) is typically a design and management concern with commercial applications.

Troubleshooting Foam

Foam indicates that microbes are producing excessive gas byproducts. Foam rarely occurs in packed bed filters (and AdvanTex® is a packed bed filter). If foam is present:

- Verify the pump isn't running too long
- Ensure the recirc ratio isn't too high
- Ask residents about detergent use

O&M For Nitrogen Reduction

AdvanTex® Treatment Systems do an excellent job of reducing nitrogen, especially in the Mode 3 configuration, where Total Nitrogen* is typically reduced to 10 mg/L or less. Because many people purchase AdvanTex® for its nitrogen reducing capabilities, and because nitrogen reduction is a complex, many-staged process, it's important to understand the process, its related factors, the signs of effective nitrogen reduction, and how to keep the process optimized.

It's also important to know the Total Nitrogen limits required by the system user's permit. Some regulatory agencies have no requirement; some require a specific percentage reduction of a certain kind of nitrogen (90-95% nitrification of ammonia nitrogen, for example); and some require that Total Nitrogen be reduced to levels at or near drinking water quality at the point of final dispersal.

Finally, because influent characteristics greatly affect the amount of nitrogen reduction possible from any given system, it's vital to know the alkalinity of your waste source and the local/regional norms for organic and ammonia nitrogen.

The Process

In nitrogen reduction, ammonia is converted to nitrate and then reduced through bacterial action to nitrogen gas, which can be released harmlessly to the atmosphere. Optimum nitrogen reduction requires the following:

- Adequate alkalinity of approximately 250± mg/L or higher (lab test shows levels)
- pH of 6-8
- Filtrate DO level of 2.5-8 mg/L; Process tank DO level of <1 mg/L
- Adequate time for the nitrifying bacteria to develop (one to three months)
- Adequate temperature (below 40° F retards the process)
- Good organic removal

For a thorough description of the nitrogen reduction process, see the Appendix, page 28. In residential wastewater, the ammonia level is typically about 60 mg/L and the Total Nitrogen level is typically about 65 mg/L.

Signs of Effective Nitrogen Reduction

Service providers frequently ask us, "How do I know if my wastewater treatment system is reducing nitrogen?" A thorough description of key indicators is included in the Appendix. Following is a brief summary:

- Clear, odorless filtrate effluent (a "see and sniff" test is generally considered sufficient)
- Normal-looking biomat on the textile filter (light-brown to dark-brown and gelatinous in texture)

Additional Filtrate Tests Will Show...

- Typically, low BOD_5 and high clarity
- DO of 2.5-6 mg/L and odorless or odor that is not a nuisance
- Relatively low ammonia and high nitrate levels, since nitrification converts ammonia to nitrate

Troubleshooting Nitrogen Reduction

If you suspect that the System is not meeting expectations for nitrogen reduction, troubleshoot each of the critical factors that contribute to optimum nitrogen reduction, to determine a cause.

Filtrate Alkalinity Too Low

Available alkalinity determines the degree of nitrification possible for any wastewater treatment system, because it takes 7.14 parts alkalinity to nitrify 1 part ammonia.

** Total Nitrogen is the sum of organic and ammonia nitrogen, nitrate nitrogen, and nitrite nitrogen. (TN=ON + NH3-n + NO3-n + NO2-n ... or ... TN=TKN-n + NO3-n + NO2-n)*

If filtrate alkalinity is too low:

- Check the recirc ratio; a high recirc ratio increases alkalinity consumption*
- Check influent TKN or ammonia levels and source alkalinity

If a large quantity of nitrification is required, it may be necessary to add a buffering compound to the system, to raise alkalinity levels.

Filtrate pH Too Low

A pH level of <6 retards microbial activity of all kinds, including denitrification. If the filtrate pH level is too low:

- Check influent alkalinity level (pH drops when too much available alkalinity is consumed)
- Check recirc ratios; reduce if too high*
- Ask system user about chemical discharges into the system, including carpet cleaners, chlorine, and photo developing agents

Filtrate DO Levels Outside 2.5-6 mg/L Range

If your filtrate DO is too low (indicating insufficient oxygen), you may experience periodic sulfide odors during dosing events, or perhaps a more lasting smell within the filter pod. Try the following:

- Check for surface clogging/ponding and clean as necessary
- Check air flow in the ventilation fan assembly (RX only)
- Check the recirc ratio; if it's too low (<3:1±) increase as necessary*

If your filtrate DO is too high (indicating excessive aeration), it's likely that excessive recirculation or insufficient hydraulic retention time are factors. Try the following:

- Decrease the recirc ratio*

High Filtrate Ammonia Levels

Because ammonia is consumed during nitrification, high ammonia levels are a sign that something is remiss. Try the following:

- Check for surface clogging/ponding and clean as necessary
- Check for sufficient aeration (measure DO)
- Ensure no blockage of air flow into textile filter (indicated by thick biomat development or a build-up of grease and oils)
- Ensure no blockage in the manifold, causing...
  - — Localized hydraulic overloading, saturation
  - — Short circuiting
- Check for sufficient alkalinity; if insufficient, consider supplemental buffering. Call Orenco Engineering for assistance, if necessary.

Low Filtrate Nitrate Levels

Residential packed bed filters normally yield 95+ percent nitrification (ammonia to nitrate). Therefore the ammonia levels in the filtrate should be low and the nitrate levels higher. Some denitrication typically is experienced through the packed bed filter. So the normal nitrate level may vary. Be sure you are familiar with the mode of operation, as some AdvanTex® modes are configured to produce lower nitrate levels. If it appears that nitrification is dropping off:

- Check the recirc ratio; adjust as necessary* (high recirc ratios may drive pH too low for effective nitrification/denitrification and low recirc ratios may not provide sufficient aeration)
- Verify incoming ammonia levels
- Check recirc/blend for sufficient organic food source (high BOD — see Table, page 6 — may cause greater oxygen demand through the filter, reducing nitrification)

Adequate Time and Temperature

Nitrifying bacteria require one to two months to develop, and extremely cold temperatures (below 40° F) retard that process. If the AdvanTex® Treatment System has been installed in a very cold climate, nitrification may not "kick in" for several months until warmer temperatures are reached. Typically, a June-September installation provides the necessary temperatures for a 30-60 day nitrification start-up time. Once nitrifiers colonize, they typically continue to nitrify through normal winter conditions. Only in severely cold regions should additional insulation be necessary.

**Keep in mind that a recirc ratio that's too high can generate a highly aerobic biomat growth on the pump filter; and a recirc ratio that's too low can tend to liberate periodic odors during dosing events. So search for the optimum ratio (typically between 3 and 5:1)*

Tools, Equipment, and Spare Parts List

Many of the recommended maintenance and troubleshooting procedures require specialized tools, equipment, and spare parts. At a minimum, we recommend you keep the following items on hand:

Tools and Equipment

anemometer (call for information)

beakers or bottles

camera (preferably digital)

calculator

channel lock pliers—6" and 12"

crimping tool—10 to 22 AWG

drill (cordless with spare batteries, charger)

drill bit set—1/16" to 1/2"

electrical tester (voltage and amperage)

extension cord

flashlight with spare batteries/bulb

funnel

hacksaw with spare blades

hammer

heat gun (torch)

hole saw (vari-bits: 3/4" and 1-3/8")

hose with nozzle and backflow prevention device

pencil

Mirror on a Stick (available from Prototek)

pressure gauge (0 to 100 psi, 0 to 200 psi)

back-pack pressure washer (portable)

screwdriver set (straight blade and phillips)

shovel

SMOG device

SMUG device

snake (building sewer)

squirt-height gauge

stir sticks

tape measure

watch or stopwatch

wire strippers

wrench (24" pipe wrench)

wrench (lid bolt)

30 gal. garbage can

30 gal. garbage bags

Spare Parts

control panel parts:

— breakers

— contactors

— elapsed time meters

— event counters

fuses

epoxy

floats

heat shrink tubing

insulated butt connectors

king connectors

lid bolts

PVC fittings (3/4" to 2")

PVC glue/primer

PVC pipe (3/4" to 2")

wire nuts

Hygiene and Clean-Up

bleach/water solution

hand cleanser

paper towels

protective clothing

eye protection

rubber gloves

towels and rags

Miscellaneous

Patience and good humor!

AdvanTex® Treatment Systems

While regional regulations may vary, Orenco Systems requires that the following inspection and maintenance activities be performed, by a qualified provider, on all AdvanTex® Treatment Systems sold. All activities are to be performed three-to-six months after system start-up; and an annual field-service inspection, including sampling, is to be scheduled in late spring or in early summer. For AXN systems, there is to be a minimum of four inspections during the first two years, and then annual inspections thereafter. Copies of inspection and maintenance reports and additional comments/documentation are to be forwarded to the AdvanTex® Dealer, or if no Dealer, to Orenco Systems, 814 Airway Avenue, Sutherlin, OR 97479.

Maintenance Activity	Activity Check-Off/Notes
A) Inspect Control/Alarm Panel	
1) Check pump operations in manual mode	☐ _____
2) Check/record pump amperage and voltage	☐ _____
3) Check timer settings	☐ _____
4) Record elapsed time meter and counter readings (if applicable)	☐ _____
5) Confirm operation of audible and visual alarms	☐ _____
B) Inspect/Test Pumping System	
1) Verify no leaks in riser	☐ _____
2) Inspect splice box for moisture and secure connections	☐ _____
3) Verify condition of and correct operation of all floats	☐ _____
4) Verify neat wrap of float cords	☐ _____
5) Pull pump and clean intake screen if necessary	☐ _____
6) Visually inspect recirculating splitter valve and liquid level	☐ _____
C) Inspect Effluent Filters/Pump Screens	
1) Clean as needed	☐ _____
2) Visually inspect and comment on biomat growth	☐ _____
D) Inspect Processing Tank	
1) Verify no inlet flow	☐ _____
2) Inspect liquid depth, odor, scum color, effluent characteristics	☐ _____
3) Measure sludge and scum; recommend tank pumping, if necessary	☐ _____
E) Inspect AdvanTex® Filter	
1) Inspect for ponding; assess character and color of biomat	☐ _____
2) Check squirt height	☐ _____
3) Verify proper orifice position, equal spray under orifices, no clogged orifices	☐ _____
4) Check for odors; adjust recirculating time if necessary	☐ _____
5) Clean and flush manifold (if necessary)	☐ _____
6) Re-check squirt height	☐ _____
7) Inspect fan intake vent and clean as necessary (AdvanTex®-RX only)	☐ _____
F) Miscellaneous	
1) Exercise all iron, metal, and mechanical valves	☐ _____
2) Return valves, control panel to proper settings	☐ _____
3) Submit required documentation	☐ _____

Field Maintenance Report Form

Person Calling: _____

Date/Time Called: _____

Address: _____

Phone: _____

Service Calls

Type of System: _____

Meter Readings (refer to ETM/CT Log & Worksheet)

Days Since Last Reading: _____

Today's CT: _____

Today's ETM: _____

Frequency (CT/Days): _____

☐ Normal ☐ High ☐ Low

Duration (Min./Cycle): _____

☐ Normal ☐ High ☐ Low

Typical average daily flow: _____

Typical average weekly flow: _____

Pump Test

Pump #1: Tank Pump

Voltage at Rest: _____

Voltage while Pumping: _____

Amps while Pumping: _____

Pumping Head (Ft.): _____

Shutoff Head (Ft.): _____

Drawdown Time (Min. & Sec.): _____

Drawdown Depth (Inches): _____

Pump #2: Discharge Pump

Voltage at Rest: _____

Voltage while Pumping: _____

Amps while Pumping: _____

Pumping Head (Ft.): _____

Shutoff Head (Ft.): _____

Odor

Normal: ☐ Musty ☐ Earthy ☐ Moldy

Pungent: ☐ Sulfite ☐ Cabbage ☐ Decay

Method of Detection: _____

Squirt Height: _____

Valve Position at Departure

Hose & Valve Assembly: ☐ Open ☐ Closed

End of Laterals: ☐ Open ☐ Closed

Control/Alarm Switch at Departure

MOA: ☐ Manual ☐ Off ☐ Auto

CB: ☐ On ☐ Off

Repair: _____

Replace: _____

Operator Responding: _____

Date/Time Responded: _____

Total Field Time: _____

Total Travel Time: _____

Alarm Call Addendum

Conditions Leading to Call

☐ Alarm ☐ Tank Overflow

☐ Odor ☐ Surface Runoff

☐ Noise ☐ Sewage Backup

☐ Other: _____

Odor

Normal: ☐ Musty ☐ Earthy ☐ Moldy

Pungent: ☐ Sulfite ☐ Cabbage ☐ Decay

Date/Time Discovered: _____/_____

Method of Detection: _____

Alarm

☐ High Liquid Level

☐ Low Liquid Level

☐ Off

Pump

☐ On

☐ Off

Tank Liquid Level

☐ Normal

☐ High

☐ Low

Circuit Breaker

☐ On

☐ Off

☐ Tripped

☐ Switched

Cause of Malfunction

Mechanical	Physical or Process-Related
☐ Control Panel	☐ Power
☐ Pump	☐ Back Pressure
☐ Float Switch	☐ Air Bound
☐ Screened Vault	☐ Sludge & Scum
☐ Hose & Valve	☐ Clog
☐ Check Valve	☐ Infiltration/Inflow
☐ Building Sewer	☐ Exfiltration
☐ Service Line	☐ Siphoning
☐ Other: _____	☐ Other: _____

Repair: _____

Replace: _____

Observation: _____

Action: _____

Comment: _____

Field Sampling Report Form

Date: _____
Inspector: _____
Address: _____
System Type: _____

The following effluent tests can be easily and routinely performed in the field. Perform annually, or as frequently as necessary per the methodology indicated. For AXN systems, there is to be a minimum of four sampling events the first two years and then annual sampling thereafter. Record your results/observations in the space provided:

Parameter	Methodology	Typical	Field Observations	Pre-Test Lab Concurrence
Clarity	Visual[1]	Clear (15± JTUs or NTUs)	_____ _____	_____ _____
Odor	Sniff[2]	Non-offensive (no smell of rotten eggs or cabbage; a musty, earthy, or moldy odor is normal)	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Oily film	Visual; inside tank	None (no red, blue, green, or orange sheen)	_____ _____ _____	
Foam	Visual; inside tank	None	_____	
pH	Field	6-9	_____	
			Date_____	Date: _____
			_____ Signature Field Sampler	_____ Signature Lab Technician

[1] *To check for clarity, service providers can carry a lab-prepared sample bottle or bottles with known turbidities of 15 JTU s and 30 JTUs, to compare against, or can use a portable turbidity meter. Always put effluent sample in a clear glass container or beaker to evaluate clarity. Using a small, removable sticker, write the date, place it low on the beaker, and photograph for documentation.*

[2] *To check for odor, service providers can simply sniff the effluent sample with the assistance of an olfactory snifter device and/or sulfide odor measuring packet. Whenever possible, interview system users about odor occurrences and request user's assistance in verifying or detecting odors.*

ETM/CT Log & Worksheet

Electronic Time Meter Log

Date	ETM Reading	ETM Differential (Current - Prev.)	Number of Intervening Days	Duration: Minutes/Cycle (ETM Diff. / Interv. Days)

Comments: _____

_____

_____

Cycle Log

Date	Cycle Reading	CT Differential (Current - Prev.)	Number of Intervening Days	Frequency: Cycles/Day (CT Diff. / Interv. Days)

Comments: _____

_____

_____

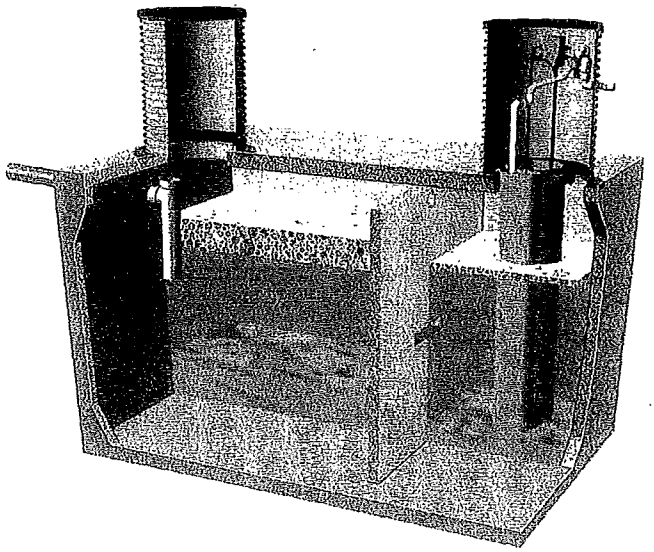
Scum & Sludge Monitoring

Two-Compartment Tank

Operator Responding: _____ Date/Time Responded: _____

Address: _____ Date of Installation: _____

Phone: _____ Date of Last Pumping: _____



First Compartment Scum

Date	Depth (Inches)	Rate of Accumulation

First Compartment Sludge

Date	Depth (Inches)	Rate of Accumulation

Second Compartment Scum

Date	Depth (Inches)	Rate of Accumulation

Second Compartment Sludge

Date	Depth (Inches)	Rate of Accumulation

Comments: _____

Appendix: The Nitrogen Reduction Process and Key Indicators

The Process

Nitrogen removal (or "nitrification/denitrification") is a biochemical process in which ammonia is converted to nitrate (nitrification) ($2NH_3$ converts to $2NO_3 + 3H_2O$) and then reduced through bacterial action (denitrification) to nitrogen gas, which can be released harmlessly to the atmosphere.

During the nitrification process, about 9 parts oxygen are consumed in converting 2 parts ammonia to nitrate. Therefore, depending on the concentration of ammonia, a considerable amount of air may be needed. Other processes, like biological (BOD) reduction, may occur simultaneously and further elevate the demand for aeration, especially if the organic level is suitably high.

In an abundance of air, all the aerobic or facultative microbes compete for their share of oxygen. When the organic concentration is high, the microbes that oxidize organic matter, primarily the heterotrophic bacteria, are aggressive and tend to outcompete other microbes for the available free oxygen in solution. The oxidation of ammonia is accomplished by autotrophic bacteria, which do not have as aggressive of a growth rate, so if there isn't an abundance of oxygen, nitrification suffers. Consequently, the nitrification process usually lags until the organic concentration is depleted or until sufficient oxygen is present. At a 2.5:1 BOD/TKN ratio, the nitrifiers may only make up about 10 percent of the microbial population. At 0.5:1 BOD/TKN, the nitrifiers make up about 35 percent of the population.

In a filtering process, the filter column must be deep enough, or the filter media must be efficient enough at filtering organic particles, to deplete organic concentrations to a level in which a sufficient population of nitrifiers will be sustained. The physical (dimensional) features of the filter will vary depending on the media's characteristics — void ratio, moisture holding capacity, and effective surface area per unit volume ratio.

Tankage, surge capacity, application rates, and loading characteristics are other design considerations that play a role in the sizing of the filter unit.

Performance Indicators

To judge the nitrogen-reducing performance (or potential) of any wastewater treatment system, be sure to check the following performance indicators:

Clear, Odorless Effluent

Simple, "see and sniff" tests can be performed easily in the field. Effluent from packed bed filters (recirculating textile filters, recirculating sand filters, intermittent sand filters) that are performing well should be clear (with turbidity ≤20 NTUs±) and odorless.

Tests for Ammonia and Nitrate Nitrogen

If your system is oxidizing ammonia to nitrate (nitrifying), lab tests should measure relatively low ammonia levels and relatively high nitrate levels in the filtrate. Because nitrification responds to many and varying conditions within the aerobic treatment processes, ammonia and nitrate nitrogen levels in the filtrate are the most ideal constituents to watch for any changes in performance. Start-up times can be plotted, optimum recirc ratios can be gauged, cleaning frequencies can be predicted, and nonvisible clogging or saturation detected by watching either of these constituents.

BOD

The nitrification process requires oxygen, which is why nitrification is enhanced when BOD is extremely low. Measures of filtrate BOD should be <15 mg/L, although higher BOD may not necessarily correlate with low levels of nitrification.

Dissolved Oxygen

Dissolved oxygen also provides critical information with which to diagnose how well a system is performing. Measures of Dissolved Oxygen should be in the range of 2.5 to 6 mg/L. If the

DO level drops, the degree of nitrification will normally drop as well, which could be a sign of blinding or saturated flow conditions — anything that might inhibit free air from flowing into the system. (Though it's quite possible to have low filtrate DOs and still have high effluent quality, as measured by BOD and TSS levels.)

Biological Growth on Filter

With "fixed film" treatment systems, biological growth on the filter media is natural. The biomat should appear light-brown to dark-brown in color and gelatinous in texture.

Influent Characteristics

Influent characteristics will greatly affect the amount of nitrogen reduction that is possible from any wastewater treatment system.

pH: For normal residential nitrogen loads, pH typically needs to be 6-8.

Alkalinity: Alkalinity is essential for nitrification. For each part ammonia that is nitrified, 7.14 parts alkalinity are consumed (buffering the acidity caused by the release of hydrogen ions). Consequently, if the degree of nitrification is less than expected, it could simply be that there isn't sufficient alkalinity to support more. Typical residential nitrification requires alkalinity above 250± mg/L for recirculating processes and double that for single pass processes. *Many wastewater streams do not have sufficient alkalinity to support complete nitrification.*

Wastewater streams without sufficient alkalinity to support complete nitrification may, depending on the type of process, cause a depletion in the alkalinity to the point where the pH correspondingly drops to a level that causes the microbial activity to degrade (<6±). Recirculating the effluent helps, since half the alkalinity can be restored in the recirc or process tank, wherever denitrification occurs (and adjusting the recirc ratios may also bring the pH back to preferred operating levels). But wastewater streams that are alkalinity-starved can't provide for 100% nitrification.

The use of low flush fixtures requires special consideration. Low flush fixtures tend to reduce hydraulic loads, which causes elevation of wastewater constituents (i.e., BOD, TSS, TKN, etc.). In this case, the available alkalinity in the water supply may not be adequate to accomplish the full level of nitrification desired.

These constraints exist for all wastewater treatment operations, regardless of whether the operation involves a suspended growth contact stabilization process or an attached growth packed bed filter. Packed bed systems will perform better, especially if they have a large attached growth surface area per unit volume ratio, because of the micro-sites near the attached side of the biomat, where denitrification typically occurs, returning some of the alkalinity. Textile packed bed filters, because of their large surface area per unit volume ratio, tend to perform even better. Nevertheless, additional buffering may be necessary to accomplish the level of nitrification desired.

Record of System Facts

(Record in Pencil)

Property Address

Property Owner Name(s)

Property Owner Phone

Property Owner E-Mail

Start-Up Date

AdvanTex® Model #

AdvanTex® Serial Number (on filter pod)

Control Panel Model #

Float Model #(s)

Pump(s) Model #(s)

Pump(s) Design Specifications:

_____ gpm _____ gpm

Design Flow

Tank(s) Size(s)

Recirc Ratio (start-up)

Recirc Timer Settings

Discharge Timer Settings (when applicable)

Initial Squirt Height

Dispersal Method

Distributed by:

Dealer Name

Dealer Phone

Engineer Name

Engineer Phone

Installer Name

Installer Phone

Service Provider Name

Service Provider Phone

Regulatory Authority

Permit # (if applicable)

Contact Name

Contact Phone

AdvanTex® Treatment System AXN Models meet the requirements of ANSI-NSF Standard 40 for Class I Systems.

Orenco Systems®
Incorporated

Changing the Way the World Does Wastewater®

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

AIM-OM-ATX
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Technical Data Sheet

External Splice Box

Orenco Systems® Incorporated
800-348-9843

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.

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 cm^3) 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

Nomenclature

SBEX1-4 - ☐

- ☐: Blank = no divider plates; P = divider plates
- SBEX1-4: External splice box



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

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External Splice Box (continued)

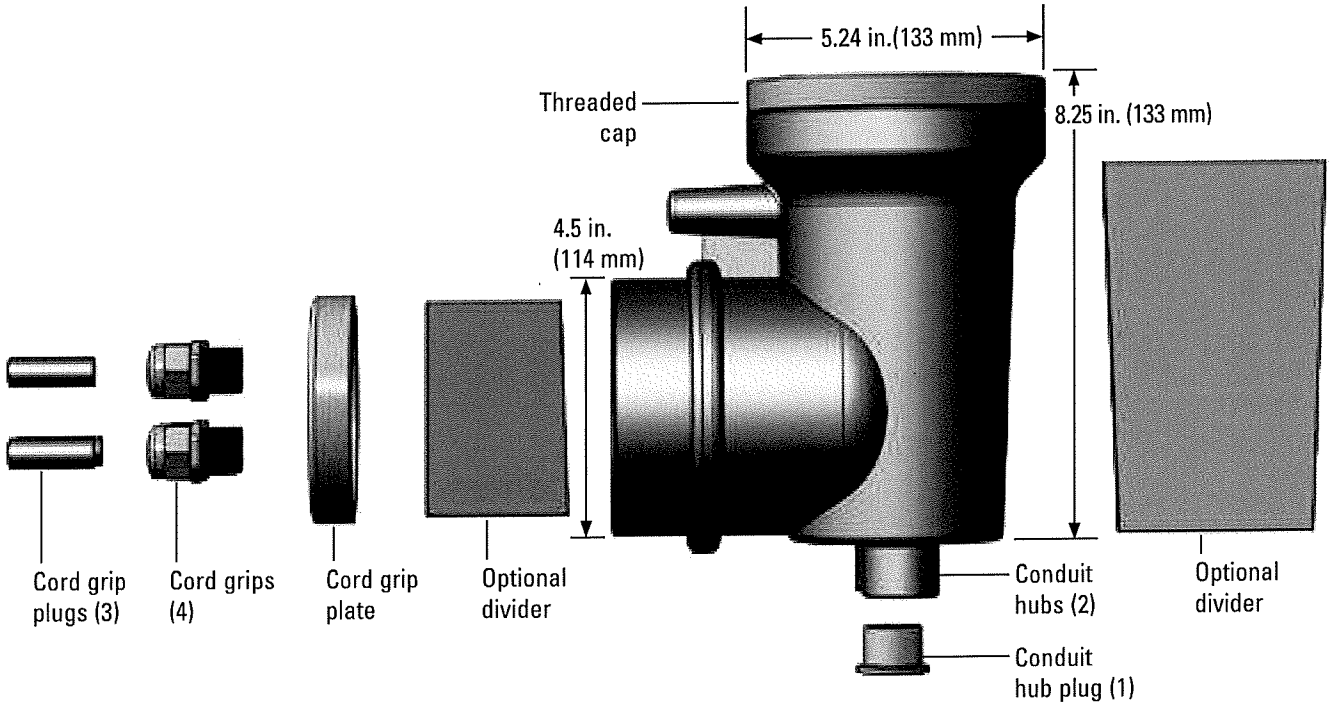
Physical Specifications

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)
Diameter 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*



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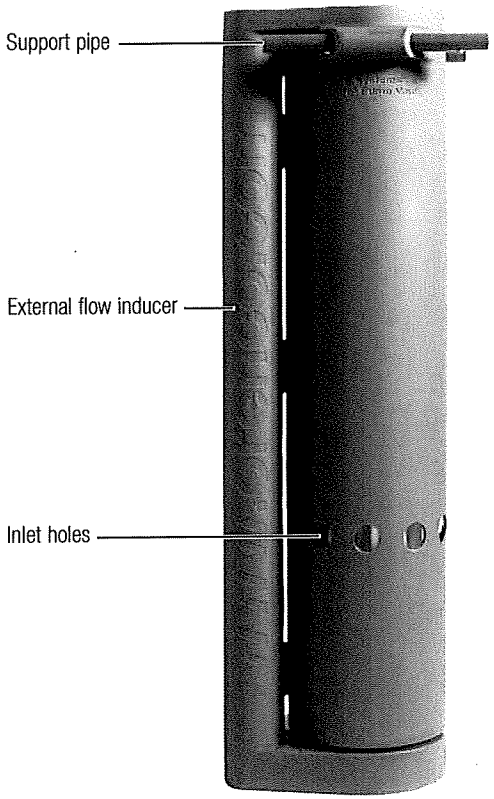
Orenco SYSTEMS **Technical Data Sheet**

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

PVU ☐ ☐ ☐ - ☐ ☐ - ☐

- Support pipe length:
  - Blank = standard, for 24" (600 mm) riser
  - L = long, for 30" (750 mm) riser
  - NB = no support pipe bracket (earless)
- Inlet hole height, standard:
  - 13" (330 mm)
  - 18" (457 mm)
  - 19" (482 mm)
  - 25" (635 mm)
- Cartridge height, standard:
  - 18" (457 mm)
  - 24" (610 mm)
  - 36" (914 mm)
- Vault height:*
  - 48" (1219 mm)
  - 57" (1448 mm)
  - 68" (1727 mm)
  - 72" (1829 mm)
  - 84" (2134 mm)
  - 95" (2413 mm)
  - or custom specification
- Biotube® filter mesh:
  - Blank = 1/8" (3.2 mm) mesh
  - P = 1/16" (1.6 mm) mesh
- Universal Pump Vault

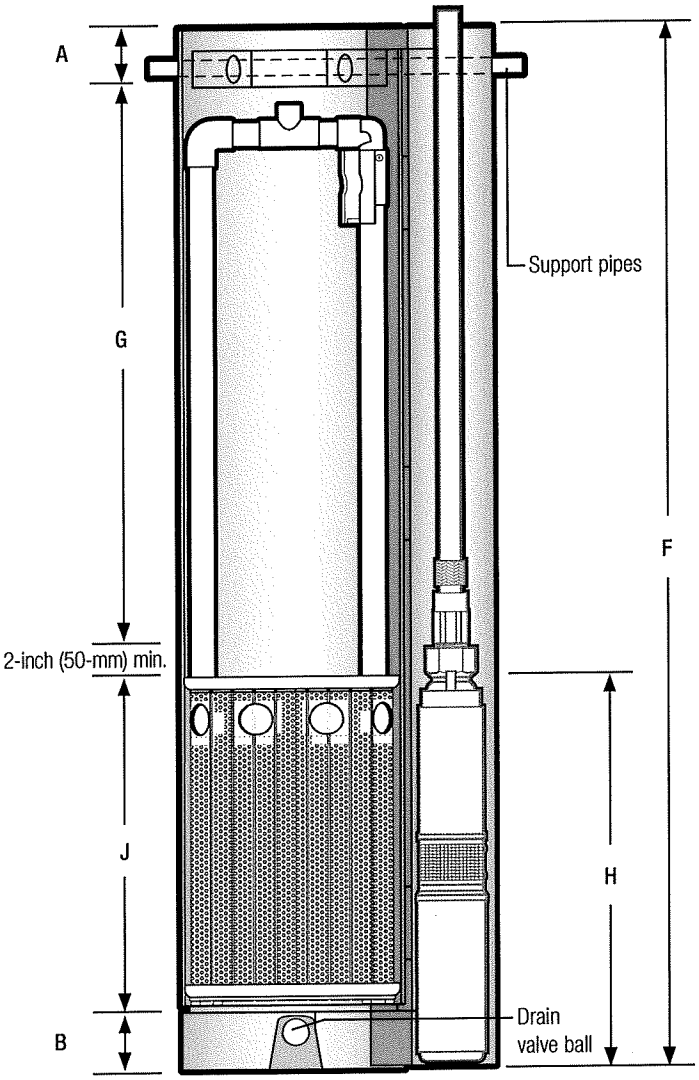
* Custom heights from 42" to 135" available

Tank Access and Riser Diameters

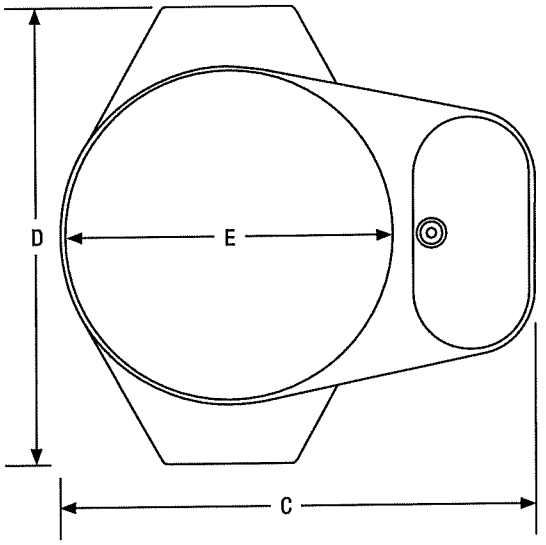
Diameter, in. (mm)	PVU with simplex pump	PVU with duplex pumps
Tank access, minimum	19 (483)	19 (483)
Tank access, recommended	20 (508)	20 (508)
Riser, minimum	24 (600)	30 (750)

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



Side view cutaway



Top view

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, ft^2 (m^2)	4.4 (0.4)	4.4 (0.4)	5.9 (0.5)	5.9 (0.5)	9.0 (0.84)
Filter surface area, ft^2 (m^2)	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.*

Orenco Systems® Inc., 814 Airway Ave., Sutherlin, OR 97479 USA • 800-348-9843 • 541-459-4449 • www.orenco.com

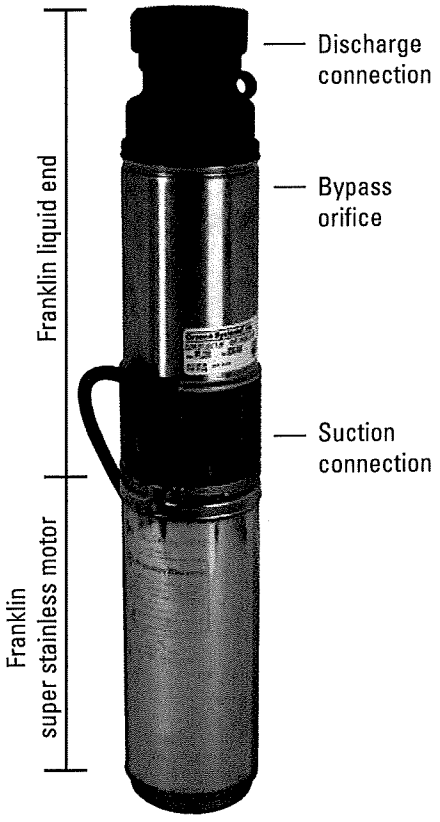
PF Series High-Head Effluent Pumps

Technical Data Sheet

Applications

Our submersible High-Head 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; and all standard 60-Hz PF Series models are CSA certified to the U.S. and Canadian safety standards for effluent pumps, meeting UL requirements.

Orenco's High-Head 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.



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*
- 1/8-inch (3-mm) bypass orifice (patent pending) 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-, 20-, and 30-gpm models; floating stack design on 50-gpm models
- Super stainless Franklin Electric motor, rated for continuous use and frequent cycling
- Type SOOW motor cable (suitable for Class I, Division 1 and Division 2 applications)
- Five-year warranty from date of manufacture against defects in materials or workmanship

* Not applicable to 5-hp models

Standard Models

See specifications chart, pages 2-3, for a complete list.

Nomenclature

PF□□ □□ □ □-□□ PF1010-12

Cord length:
Blank = 10'
20 = 20'
30 = 30'
50 = 50'

Note: Three-phase cords available only in 10-foot or 30-foot lengths.

Voltage (nameplate):
1 = 115 (1/2 hp only)
200 = 200
2 = 230 (220 if 50 Hz)
4 = 460

Frequency:
1 = single-phase 60 Hz
3 = three-phase 60 Hz
5 = single-phase 50 Hz

Horsepower:
05 = 1/2 hp
07 = 3/4 hp
10 = 1 hp
15 = 1-1/2 hp
20 = 2 hp
30 = 3 hp
50 = 5 hp

Nominal flow (gpm):
10
20
30
50

Pump (PF Series)

C SP US
LR80980

Orenco Systems®
Incorporated

Changing the Way the World Does Wastewater®

800-348-9843
www.orenco.com

NTD-PU-PF-1
Rev. 1.5, 5/08
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PF Series High-Head Effluent Pumps (continued)

Specifications

60 Hz

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)	0.5 (0.37)	1	115	120	12.7	12.7	6	1 1/4 in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF100512	10 (0.6)	0.5 (0.37)	1	230	240	6.3	6.3	6	1 1/4 in. GFP	23.0 (660)	16 (406)	26 (12)	300
PF10053200	10 (0.6)	0.5 (0.37)	3	200	208	3.8	3.8	6	1 1/4 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 1/4 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 1/4 in. GFP	25.4 (645)	17 (432)	31 (14)	300
PF101012[4, 5]	10 (0.6)	1 (0.75)	1	230	240	9.6	9.6	9	1 1/4 in. GFP	27.9 (709)	18 (457)	33 (15)	100
PF10103200[4, 5]	10 (0.6)	1 (0.75)	3	200	208	5.5	5.5	9	1 1/4 in. GFP	27.3 (693)	18 (457)	37 (17)	300
PF102012[6, 7, 8]	10 (0.6)	2 (1.49)	1	230	240	12.1	12.1	18	1 1/4 in. SS	39.5 (1003)	22 (559)	48 (22)	100
PF10203200[6, 8]	10 (0.6)	2 (1.49)	3	200	208	8.7	8.7	18	1 1/4 in. SS	37.9 (963)	20 (508)	44 (20)	300
PF200511	20 (1.5)	0.5 (0.37)	1	115	120	12.3	12.5	4	1 1/4 in. GFP	22.3 (566)	18 (457)	25 (11)	300
PF200512	20 (1.5)	0.5 (0.37)	1	230	240	6.4	6.5	4	1 1/4 in. GFP	22.5 (572)	18 (457)	26 (12)	300
PF20053200	20 (1.5)	0.5 (0.37)	3	200	208	3.7	3.8	4	1 1/4 in. GFP	22.3 (566)	18 (457)	26 (12)	300
PF201012[4, 5]	20 (1.5)	1 (0.75)	1	230	240	10.5	10.5	7	1 1/4 in. GFP	28.4 (721)	20 (508)	33 (15)	100
PF20103200[4, 5]	20 (1.5)	1 (0.75)	3	200	208	5.8	5.9	7	1 1/4 in. GFP	27.8 (706)	20 (508)	33 (15)	300
PF201512[4, 5]	20 (1.5)	1.5 (1.11)	1	230	240	12.4	12.6	9	1 1/4 in. GFP	34.0 (864)	24 (610)	41 (19)	100
PF20153200[4, 5]	20 (1.5)	1.5 (1.11)	3	200	208	7.1	7.2	9	1 1/4 in. GFP	30.7 (780)	20 (508)	35 (16)	300
PF300511	30 (1.9)	0.5 (0.37)	1	115	120	11.8	11.8	3	1 1/4 in. GFP	21.3 (541)	20 (508)	28 (13)	300
PF300512	30 (1.9)	0.5 (0.37)	1	230	240	6.2	6.2	3	1 1/4 in. GFP	21.3 (541)	20 (508)	25 (11)	300
PF30053200	30 (1.9)	0.5 (0.37)	3	200	208	3.6	3.6	3	1 1/4 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 1/4 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 1/4 in. GFP	24.6 (625)	21 (533)	30 (14)	300
PF301012[4]	30 (1.9)	1 (0.75)	1	230	240	10.4	10.4	6	1 1/4 in. GFP	27.0 (686)	22 (559)	32 (15)	100
PF30103200[4]	30 (1.9)	1 (0.75)	3	200	208	5.8	5.8	6	1 1/4 in. GFP	26.4 (671)	22 (559)	33 (15)	300
PF301512[4, 5]	30 (1.9)	1.5 (1.11)	1	230	240	12.6	12.6	8	1 1/4 in. GFP	32.8 (833)	24 (610)	40 (18)	100
PF30153200[4, 5]	30 (1.9)	1.5 (1.11)	3	200	208	6.9	6.9	8	1 1/4 in. GFP	29.8 (757)	22 (559)	34 (15)	300
PF302012[4, 5, 7]	30 (1.9)	2 (1.49)	1	230	240	11	11	10	1 1/4 in. SS	35.5 (902)	26 (660)	44 (20)	100
PF30203200[4, 5]	30 (1.9)	2 (1.49)	3	200	208	9.3	9.3	10	1 1/4 in. SS	34.0 (864)	24 (610)	41 (19)	300
PF303012[6, 7, 8]	30 (1.9)	3 (2.23)	1	230	240	16.8	16.8	14	1 1/4 in. SS	44.5 (1130)	33 (838)	54 (24)	100
PF303032[6, 8]	30 (1.9)	3 (2.23)	3	230	240	10	10.1	14	1 1/4 in. SS	44.3 (1125)	27 (686)	52 (24)	300
PF305012[6, 7, 8]	30 (1.9)	5 (3.73)	1	230	240	25.6	25.8	23	1 1/4 in. SS	66.5 (1689)	53 (1346)	82 (37)	100
PF305032[6, 8]	30 (1.9)	5 (3.73)	3	230	240	16.6	16.6	23	1 1/4 in. SS	60.8 (1544)	48 (1219)	66 (30)	300
PF500511	50 (3.2)	0.5 (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)	0.5 (0.37)	1	230	240	6.2	6.2	2	2 in. SS	20.3 (516)	24 (610)	27 (12)	300
PF50053200	50 (3.2)	0.5 (0.37)	3	200	208	3.7	3.7	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
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 (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 (0.75)	3	200	208	5.7	5.7	4	2 in. SS	26.4 (671)	26 (660)	39 (18)	300
PF501512[4]	50 (3.2)	1.5 (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)	1.5 (1.11)	3	200	208	7	7	5	2 in. SS	29.3 (744)	26 (660)	35 (16)	300
PF503012[4, 5, 7, 8]	50 (3.2)	3 (2.23)	1	230	240	17.7	17.7	8	2 in. SS	43 (1092)	37 (940)	55 (25)	100
PF503032[4, 5, 8]	50 (3.2)	3 (2.23)	3	230	240	10.4	10.4	8	2 In SS	40 (1016)	30 (762)	46 (21)	300
PF50303200[4, 5, 8]	50 (3.2)	3 (2.23)	3	200	208	13.1	13.1	8	2 in. SS	43.4 (1102)	30 (762)	55 (25)	300
PF505032[6, 8]	50 (3.2)	5 (3.73)	3	230	240	16.5	16.5	13	2 in. SS	59.3 (1506)	49 (1245)	64 (29)	300
PF751512	75 (4.7)	1.5 (1.11)	1	230	240	12.1	12.3	4	2 in. SS	33.4 (848)	30 (762)	44 (20)	100

See notes on following page.

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PF Series High-Head Effluent Pumps (continued)

50 Hz 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
PF100552	10 (0.6)	0.5 (0.37)	1	220	230	3.9	4.1	6	1 1/4 in. GFP	23 (584)	17 (432)	26 (12)	300
PF100752	10 (0.6)	0.75 (0.56)	1	220	230	6.2	6.2	9	1 1/4 in. GFP	26.8 (658)	17 (432)	30 (14)	300
PF300552	30 (1.9)	0.5 (0.37)	1	220	230	4.1	4.1	4	1 1/4 in. GFP	22.5 (572)	19 (483)	26 (12)	300
PF300752	30 (1.9)	0.75 (0.56)	1	220	230	6.1	6.1	5	1 1/4 in. GFP	24.8 (630)	19 (483)	29 (13)	300
PF301052	30 (1.9)	1 (0.75)	1	220	230	7.4	7.4	7	1 1/4 in. GFP	28.4 (721)	20 (508)	32 (15)	100
PF301552[4, 5]	30 (1.9)	1.5 (1.11)	1	220	230	9.3	9.3	8	1 1/4 in. GFP	35.4 (899)	24 (610)	40 (18)	100
PF500552	50 (3.2)	0.5 (0.37)	1	220	230	4	4	2	2 in. SS	20.3 (516)	25 (635)	29 (13)	300
PF500752	50 (3.2)	0.75 (0.56)	1	220	230	6.3	6.4	3	2 in. SS	23.7 (602)	25 (635)	31 (14)	300
PF501052	50 (3.2)	1 (0.75)	1	220	230	7.3	7.4	4	2 in. SS	27 (686)	26 (660)	35 (16)	100
PF501552	50 (3.2)	1.5 (1.11)	1	220	230	9.1	9.1	5	2 in. SS	32.5 (826)	30 (762)	42 (19)	100

[1] GFP = glass-filled polypropylene; SS = stainless steel. The 1 1/4-in. NPT GFP discharge is 2 7/8 in. octagonal across flats; the 1 1/4-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 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 included with pump. Custom control panel required.

[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 assures moisture-free windings. All thrust absorbed by Kingsbury-type thrust bearing. Rated for continuous duty. Protected against thermal overload and equipped with surge arrestors for added security.

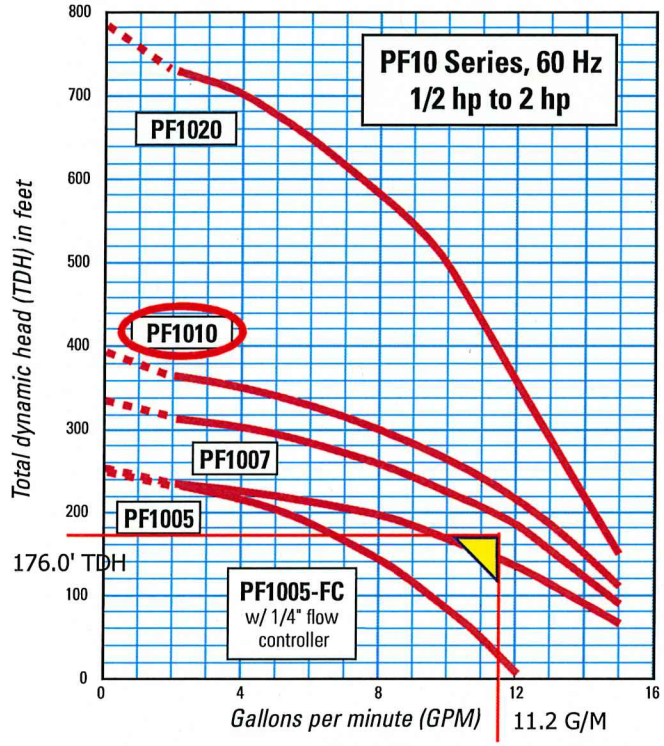
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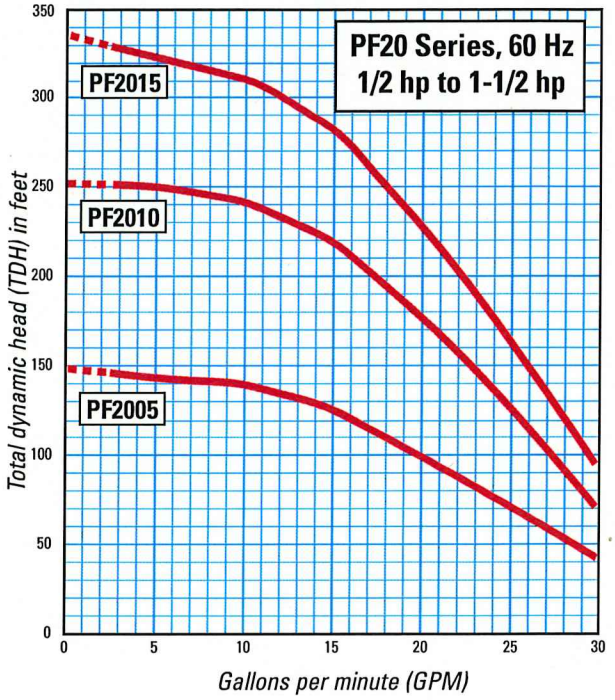
PF Series High-Head Effluent Pumps (continued)

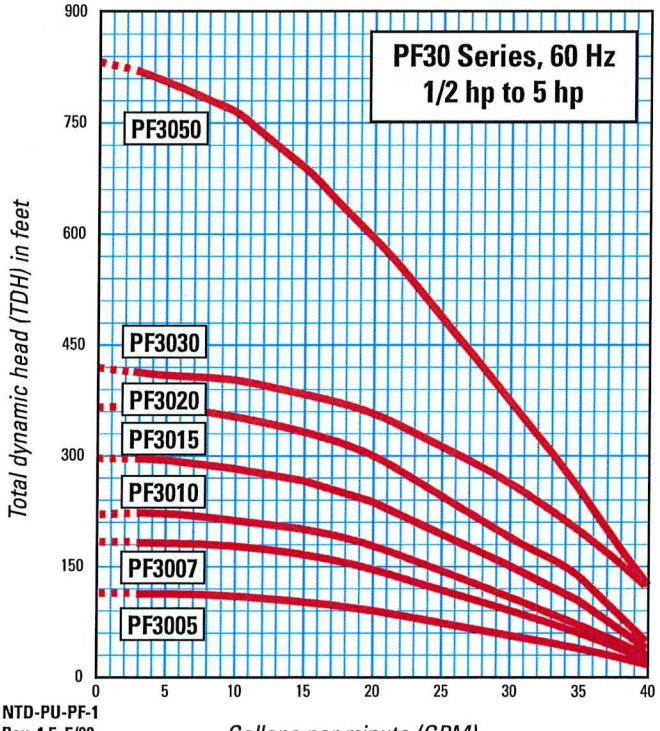
Using a Pump Curve

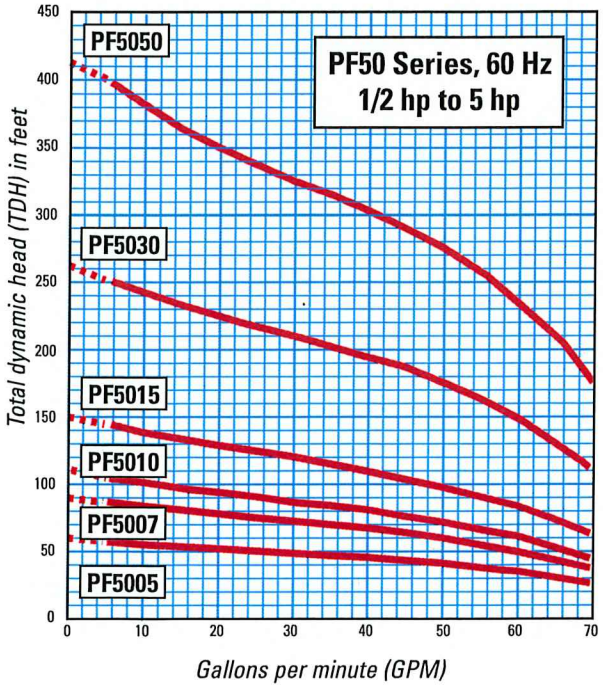
A *pump curve* helps you determine the best pump for your system. Pump curves show the relationship between flow (gpm or L/sec) and pressure (total dynamic head, or TDH), providing a graphical representation of a pump's optimal performance range. Pumps perform best at their *nominal flow rate*—the value, measured in gpm (or L/sec), expressed by the first two numerals in an Orenco pump nomenclature. At low flow rates, TDH varies from pump to pump, so it is represented as a dashed line in the pump curves. For most accurate pump specification, use Orenco's PumpSelect™ software.

60 Hz Models





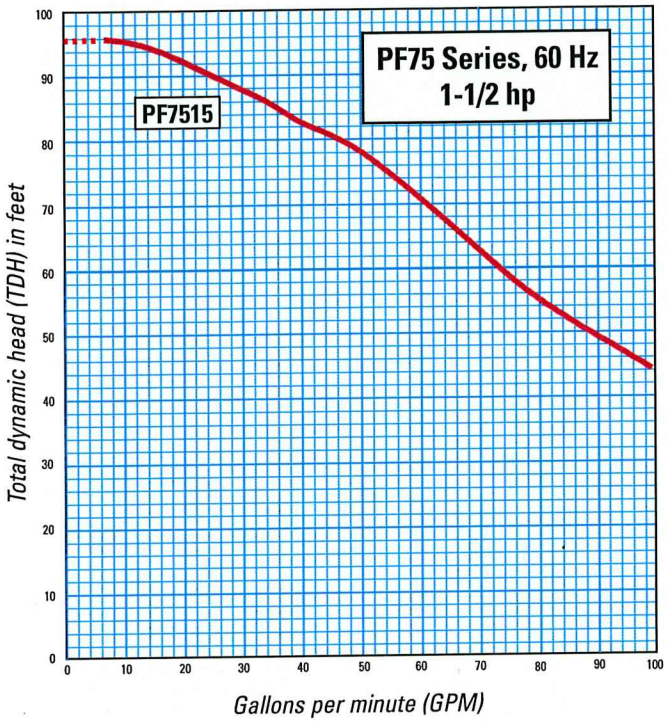




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PF Series High-Head Effluent Pumps (continued)

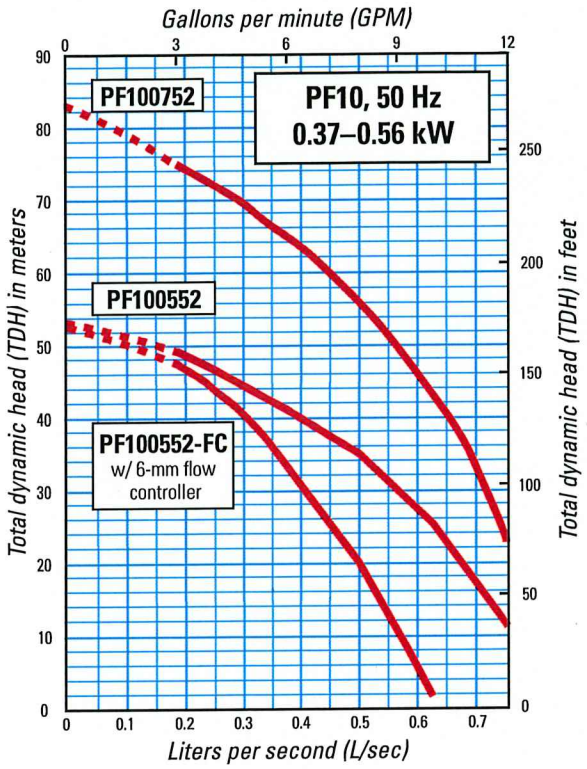
60 Hz Models (continued)

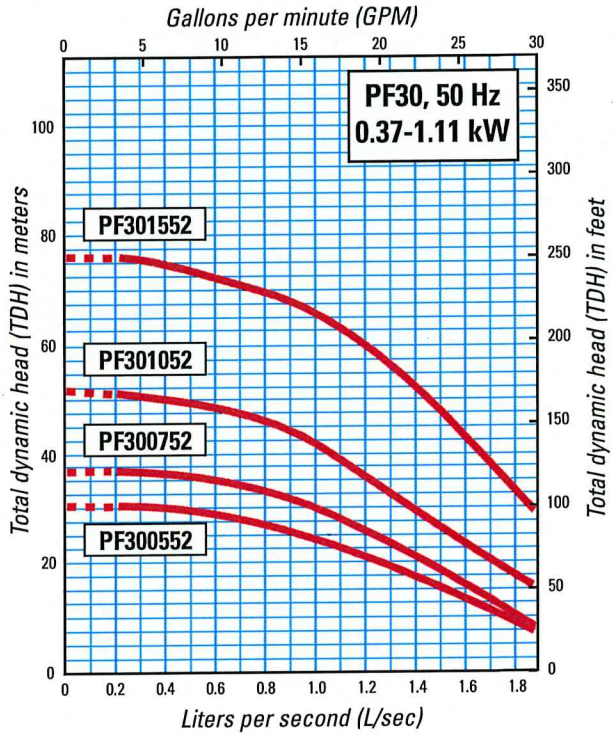


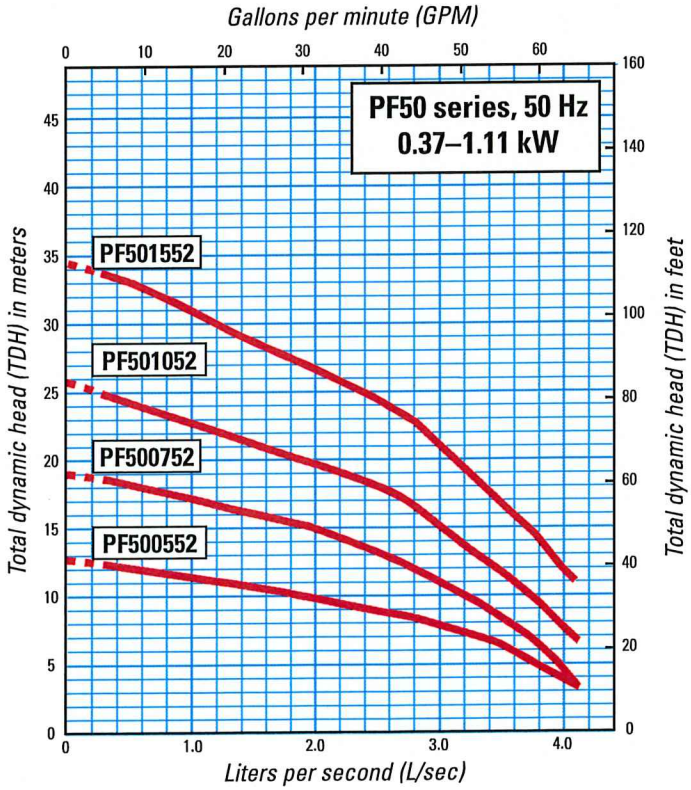
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PF Series High-Head Effluent Pumps (continued)

50 Hz Models







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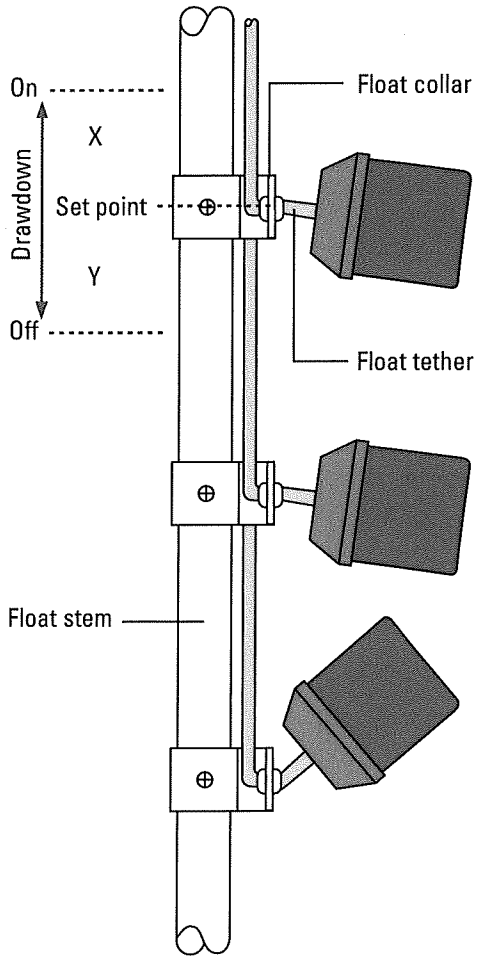
Technical Data Sheet

Float Switch Assemblies

Orenco Systems® Incorporated
800-348-9843

Applications

Float switches are used to signal liquid level positions for alarm and pump control applications. Orenco float switch assemblies can be mounted in pump vaults, effluent screens, pump basins, and risers.



The "On" and "Off" positions describe normally open floats. For normally closed floats, the functions are reversed.

Materials of Construction

Float housing	Impact-resistant, noncorrosive PVC plastic for use in liquids up to 140° F (60° C)
Float cord, A and T models	Flexible 2-conductor (UL, CSA) SJOOW; Super Vu-Tron® Supreme, yellow
Float cord, All other models	Flexible 2-conductor (UL, CSA) SJOW; water-resistant (CPE); neoprene coating
Float collar	ABS

General

All models listed are UL listed and CSA certified for use in water or sewage. "A" model float switches are also CE certified for sale in European Union countries. Non-mercury float switches (models B, C, D, L, N, P, V and X) are used where components containing mercury are prohibited.

Float switches are typically ordered in assemblies that include one or more switches mounted on a 1-inch PVC float stem. ABS float collars are used to provide secure mounting that is easily adjustable. "A" and "T" model float switches use Super Vu-Tron® electrical cords for superior chemical and water resistance.

Standard Models

A, B, C, D, G, L, N, P, T, V, X

Nomenclature

MF □ □ - □ □ □ □

Cord length option:
Blank = 10 ft (3 m), standard
20 = 20 ft (6 m)
30 = 30 ft (9 m)
50 = 50 ft (15 m)

Application:
FS = field set
FTL = elbow-style (base-inlet filters only)
PB = pump basin
V = pump vault (standard float settings)
VC = pump vault (custom float settings)

Float stem length:
Blank = no float stem (floats and collars only)
19, 21, 27, 33, 37, 39, 45, 51, 57, 66 = stem length, in.
5, 11 = stem length, in. (for elbow-style float brackets)

Float color code and function:
Blank = no color code
B = blue (pump on)
G = green (pump or override timer on/off)
P = purple (lag pump on/enable)
R = red (pumps/ timer on/off)
W = white (redundant off, low level alarm)
Y = yellow (high level alarm)
YG = yellow-green (high level alarm, override timer on/off)
YP = yellow-purple (high level alarm, lag pump on/enable)

Float switch models (listed in order from the top of the float stem down):
A, B, C, D, G, L, N, P, T, V, X

Number of float switches (when using multiples of the same float switch model):
Blank = no multiples of the same float switch model

Float switch assembly

Nomenclature Examples

When ordering float switch assemblies, remember to list float switches from the top of the float stem down. An "MFABT-" nomenclature indicates one "A" switch at the top of the stem, one "B" in the middle of the stem, and one "T" switch at the bottom of the stem; an "MF2AT-" indicates "A" switches at the top and middle of the stem, and one "T" switch at the bottom of the stem.

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Float Switch Assemblies

Signal- and Motor-Rated Float Switch Matrix

Float	State[1]	Type[2]	IR[3]	Volts	Amps	hp	Tether	X	Y	Drawdown[4]
Signal-rated mercury floats[5] (for control switch applications)										
A Model[a]	Normally open	Mercury	Yes	n/a	n/a	n/a	2.00 in.	n/a	n/a	n/a
T Model	Normally closed	Mercury	Yes	n/a	n/a	n/a	2.00 in.	n/a	n/a	n/a
Signal-rated mechanical floats[5] (for control switch applications)										
L Model[a]	Normally open	Mechanical	Yes	n/a	n/a	n/a	2.00 in.	1.50 in.	1.50 in.	3.00 in.
N Model[b]	Normally closed	Mechanical	No	n/a	n/a	n/a	2.00 in.	1.50 in.	1.50 in.	3.00 in.
P Model[b]	Normally open	Mechanical	No	n/a	n/a	n/a	2.00 in.	1.50 in.	1.50 in.	3.00 in.
V Model[a]	Normally open	Mechanical, small drawdown	Yes	n/a	n/a	n/a	2.00 in.	< 1 in.	< 1 in.	< 1 in.
X Model	Normally closed	Mechanical, small drawdown	Yes	n/a	n/a	n/a	2.00 in.	< 1 in.	< 1 in.	< 1 in.
Motor-rated floats[5] (for pump switch applications)										
B Model[b]	Normally open	Mechanical	No	120V	13A	1/2 hp	2.00 in.[c]	2.50 in.	1.50 in.	4.00 in.
				240V	13A	1 hp	3.00 in.	3.00 in.	1.50 in.	4.50 in.
							4.00 in.	3.25 in.	1.50 in.	4.75 in.
C Model[b]	Normally open	Mechanical	No	120V	13A	1/2 hp	2.00 in.	3.00 in.	2.50 in.	5.50 in.
				240V	15A	2 hp	3.00 in.[c]	3.50 in.	3.00 in.	6.50 in.
							4.00 in.	4.00 in.	3.50 in.	7.50 in.
							5.00 in.	4.50 in.	4.00 in.	8.50 in.
							6.00 in.	5.25 in.	4.25 in.	9.50 in.
D Model[b]	Normally open	Mechanical	No	120V	15A	3/4 hp	2.00 in.[c]	3.00 in.	2.50 in.	5.50 in.
				240V	15A	2 hp	3.00 in.	3.50 in.	3.00 in.	6.50 in.
							4.00 in.	4.00 in.	3.50 in.	7.50 in.
							5.00 in.	4.50 in.	4.00 in.	8.50 in.
							6.00 in.	5.25 in.	4.25 in.	9.50 in.
G Model	Normally open	Mercury	Yes	120V	15A	3/4 hp	2.00 in.	1.50 in.	3.00 in.	4.50 in.
				240V	15A	2 hp	3.00 in.[c]	1.75 in.	3.00 in.	4.75 in.
							4.00 in.	2.00 in.	3.50 in.	5.50 in.

a. Suitable for use with VCOM and MVP.
b. Suitable for use with potable water.
c. Standard tether length

Notes

[1] State: normally open or normally closed
The default state of a float — normally open or normally closed — refers to the contact positions in the float when the float is resting (down). Float switches have an internal contact. The terms "normally open" (N/O) and "normally closed" (N/C) refer to the state of the float switch contact in the down position. A normally open float switch has an open contact (off) in the down position and a normally closed float switch has a closed contact (on) in the down position. Different panel functions require different types of float switches. Most applications require float switches that are normally open. One notable exception is the redundant off and low-level alarm function that requires a normally closed float switch, except with MVP and VCOM panels.

[2] Type
Floats have mechanical or mercury contactor types. The important distinction between these is that mercury floats are not rated for potable water.

[3] IR (intrinsically safe relay)
Approved for use with intrinsically safe, Class I, Division 1 applications, where reliable float switch operation with very low current is required.

[4] Drawdown
Drawdown (in inches) refers to the difference in liquid level between a float switch's activation and deactivation points. Drawdown can be altered by adjusting the tether length of the float switch cord. When selecting float switches, keep in mind that any float switch that can directly start and stop a pump (one that has no motor contactor in the control panel) should have a drawdown capability, to avoid rapid cycling of the pump.

[5] Signal-rated or motor-rated
Every float has a maximum amount of current it can handle. Exceeding these limits may cause premature failure. Signal-rated or "control" floats are used to activate pump control panels and alarms. Only low amperage signals pass through these float switches, hence the float switch is "signal-rated." All Orenco panels that use motor contactors can use signal-rated float switches. In some systems, a float switch is used to directly start and stop a pump. In this application, the current that is running the pump passes through the float switch as well, and the float switch must be "motor-rated." In most instances, a motor-rated float switch can be used as a signal float switch.

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Float Switch Assemblies

Orenco Systems® Incorporated
1-800-348-9843

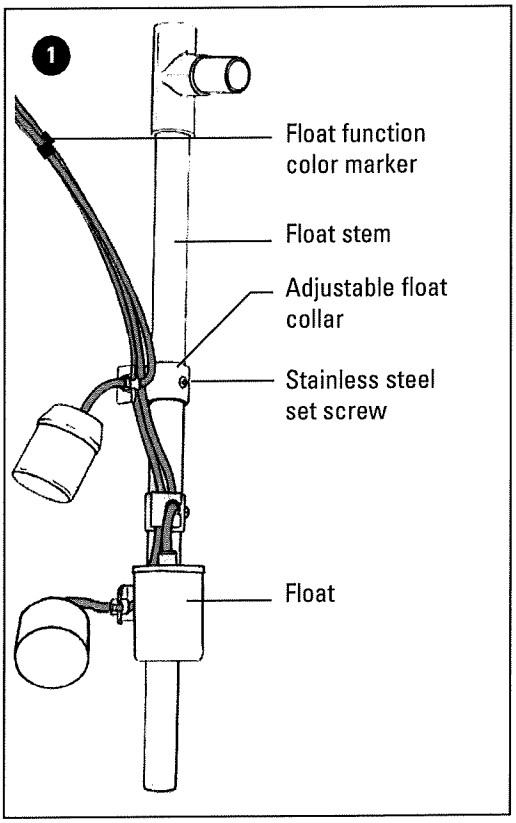
Installation, Operation and Maintenance Instructions
Model MF___

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.

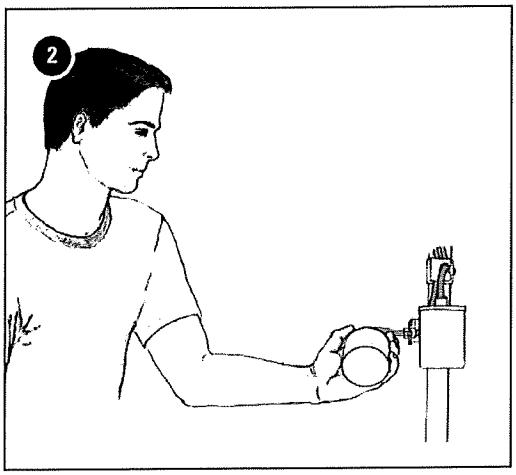
Step 1:

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 Orenco Systems® Inc. or your local dealer for assistance.



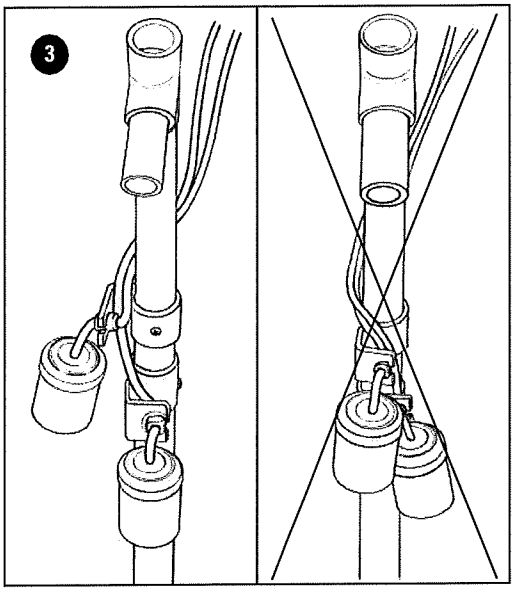
Step 2:

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.



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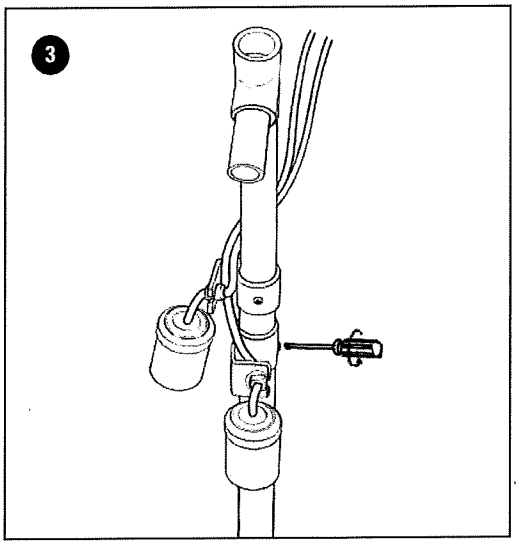
Installation Instructions (continued)



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.

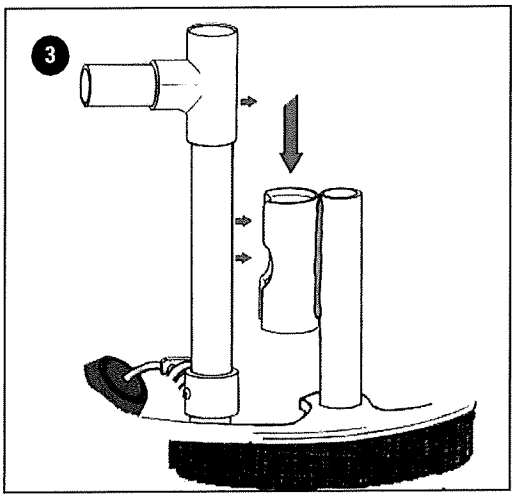


Step 4:

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.

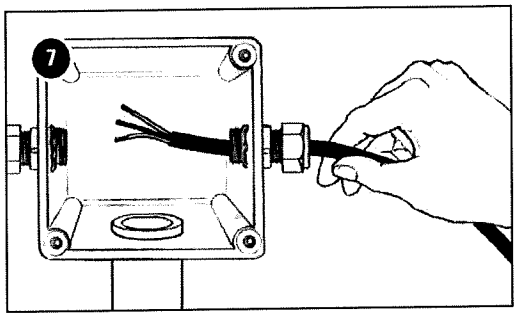
Step 6:

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.

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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.

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Maintenance Instructions

Orenco Systems®
Incorporated
1-800-348-9843

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.

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xylem
Let's Solve Water

TECHNICAL BROCHURE
B3888D3 R2



WS_D3 Series

Model 3888D3

SUBMERSIBLE SEWAGE PUMPS

GOULDS
WATER TECHNOLOGY
a xylem brand

FEATURES

Impeller: Cast iron, ASTM A48, Class 30, two vane semi-open, non-clog design with pump out vanes for mechanical seal protection. Balanced for smooth operation. Silicon bronze impeller is an option.

Casing: Heavy duty gray cast iron, ASTM A48, Class 30. Volute type casing with 3", 125#, ANSI flanged, horizontal discharge. Compatible with A10-30 cast iron or A10-30B cast iron and brass (non-sparking) guide rail assembly.

Dual Mechanical Seals: Silicon carbide vs. silicon carbide outer seal and ceramic vs. carbon inner seal, stainless steel metal parts, BUNA-N elastomers. Upper and lower shaft seals are positioned independently and are separated by an oil-filled chamber.

Shaft: 300 series stainless steel keyed design.

Fasteners: 300 series stainless steel.

Capable of running dry temporarily without damage to seals or motor.

APPLICATIONS

Used in a variety of residential, commercial and industrial applications such as:

- Sewage systems, Flood and Pollution Control, Dewatering/Effluent, Farms, Hospitals, Trailer Courts, Motels

SPECIFICATIONS

Pump:

- Maximum solid size: 2.5"
- Discharge size: 3", 125 # ANSI flange
- Maximum capacity: 470 GPM
- Maximum total head: 65 feet
- 300 Series stainess steel fasteners
- 20' Power cord
- Standard silicon carbide/silicon carbide outer seal

Motor:

- Maximum ambient temperature: 104° F (40° C) continuous duty, 140° F (60° C) intermittent duty
- Rated for continuous duty when fully submerged
- Insulation: Class F
- 60 Hertz
- Single row ball bearings
- 300 Series stainless steel keyed shaft

Single Phase:

- 1.5 - 5 HP; 208 and 230 volts
- Built-in thermal overloads with automatic reset
- Built-in capacitors

Three Phase:

- 1.5 - 5 HP; 200, 230, 460 and 575 volts
- Class 10 overload protection must be provided in control panel

MOTORS

- Fully submerged in oil-filled chamber: High grade turbine oil surrounds motor for more efficient heat dissipation, permanent lubrication of bearings and mechanical seal for complete protection against outside environment.
- Class F insulation
- Designed for Continuous Operation: Pump ratings are within the motor manufacturer's recommended working limits and can be operated continuously without damage when fully submerged.
- Bearings: Upper and lower heavy duty ball bearing construction for precision positioning of parts and to carry thrust loads.
- Power Cable: Severe duty rated, oil and water resistant. Epoxy seal on motor end provides secondary moisture barrier in case of outer jacket damage and to prevent oil wicking. 20 foot standard with optional lengths available.
- O-ring: Assures positive sealing against contaminants and oil leakage.

AGENCY LISTINGS

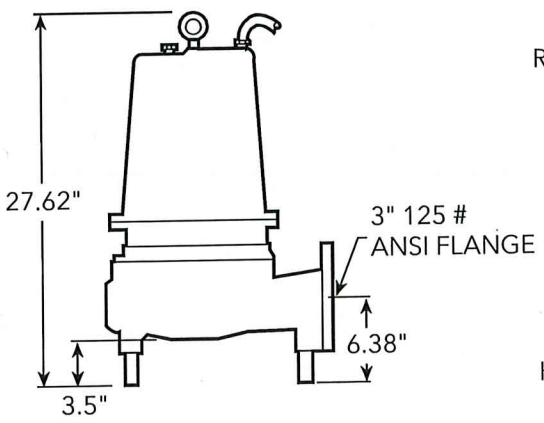
Tested to UL 778 and CSA 22.2 108 Standards
By Canadian Standards Association
File #LR38549

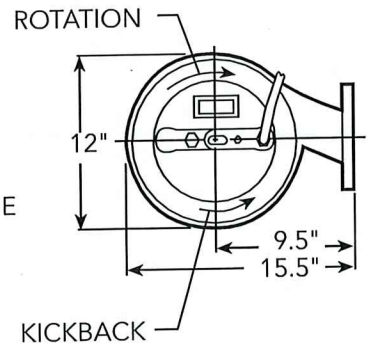
MODEL AND MOTOR INFORMATION

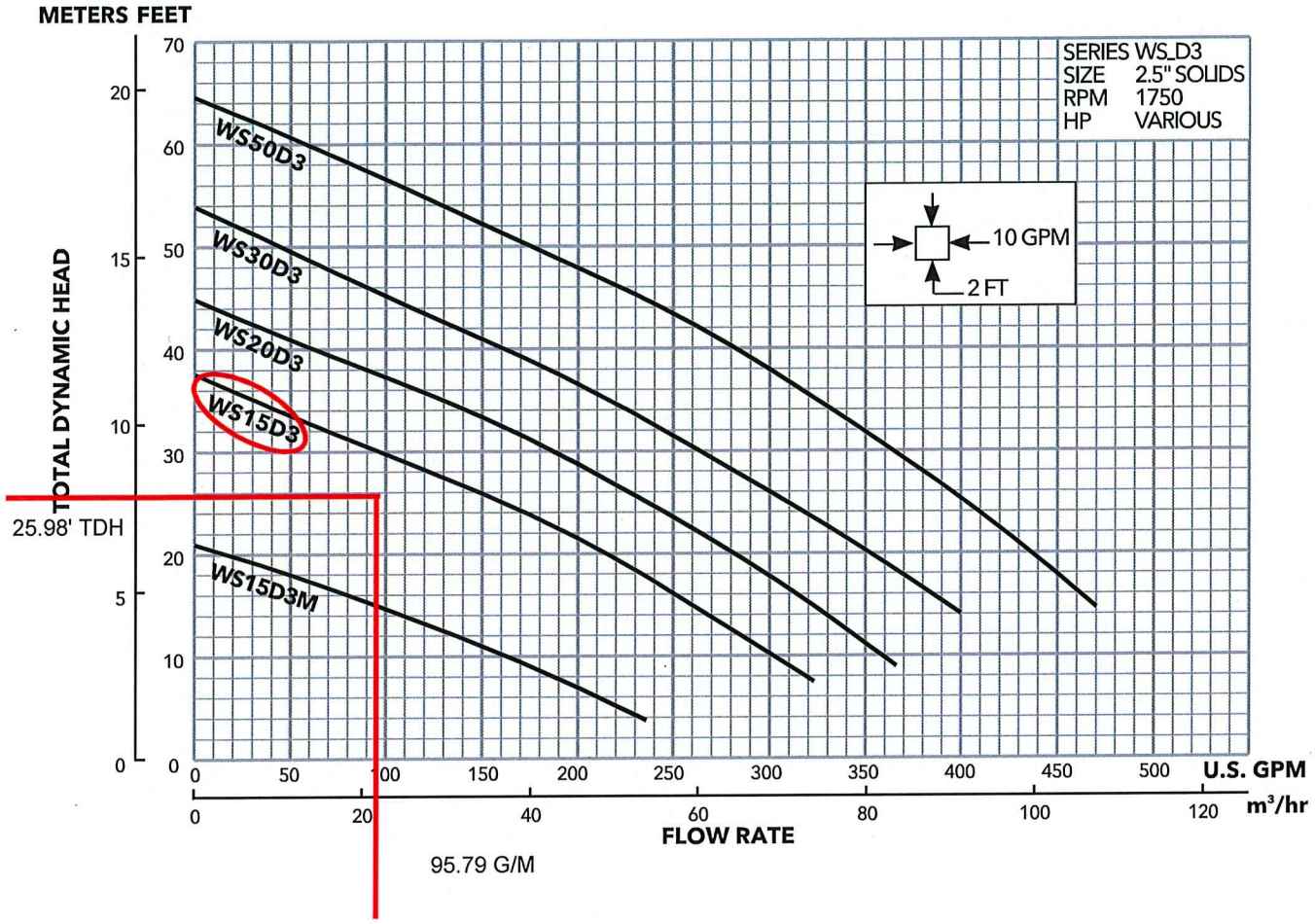
Order Number	HP	Phase	Volts	RPM	Impeller Diameter (in.)	Maximum Amps	Locked Rotor Amps	KVA Code	Power Cable	Full Load Motor Efficiency %	Resistance		Weight (lbs.)
											Start	Line-Line	
WS1518D3M	1.5	1	208	1750	5.25	15.0	50.8	B	14/3	80	1.1	0.9	192
WS1512D3M			230			12.5	29.5	E		70	1.4	1.8	
WS1538D3M		3	200			11.5	40.9	H	14/4	81	NA	1.7	190
WS1532D3M			230			10.0	40.0	F		83		2.3	
WS1534D3M			460			5.0	20.0	F		83		9.3	
WS1537D3M			575			4.0	14.4	H		74		14.8	
WS1518D3		1	208		6.50	15.0	50.8	B	14/3	80	1.1	0.9	192
WS1512D3			230			12.5	29.5	E		70	1.4	1.8	
WS1538D3		3	200			11.5	40.9	H	14/4	81	NA	1.7	190
WS1532D3			230			10.0	40.0	F		83		2.3	
WS1534D3			460			5.0	20.0	F		83		9.3	
WS1537D3			575			4.0	14.4	H		74		14.8	
WS2018D3	2	1	208		7.00	19.0	50.8	B	14/3	80	1.1	0.9	196
WS2012D3			230			16.0	36.9	D		75	1.4	1.5	
WS2038D3		3	200			11.5	40.9	H	14/4	81	NA	1.7	194
WS2032D3			230			10.0	40.0	F		83		2.3	
WS2034D3			460			5.0	20.0	F		83		9.3	
WS2037D3			575			4.0	14.4	H		74		14.8	
WS3018D3	3	1	208		7.25	25.5	50.8	B	10/3	80	1.1	0.9	205
WS3012D3			230			21.5	46.4	C		79	1.0	1.0	
WS3038D3		3	200			15.2	53.8	G	10/4	85	NA	1.3	200
WS3032D3			230			12.0	49.5	H	14/4	83		1.9	
WS3034D3			460			6.0	24.8	H		83		7.5	
WS3037D3			575			4.8	17.3	G		78		11.6	
WS5012D3	5	1	230		8.00	26.5	57.7	A	10/3	80	1.0	0.8	210
WS5038D3		3	200			18.8	73.9	F	10/4	84	NA	0.9	205
WS5032D3			230			16.4	63.6	E		85		1.2	
WS5034D3			460			8.2	31.8	E	14/4	85		4.8	
WS5037D3			575			6.8	22.8	E		80		7.4	

DIMENSIONS

(All dimensions are in inches. Do not use for construction purposes.)







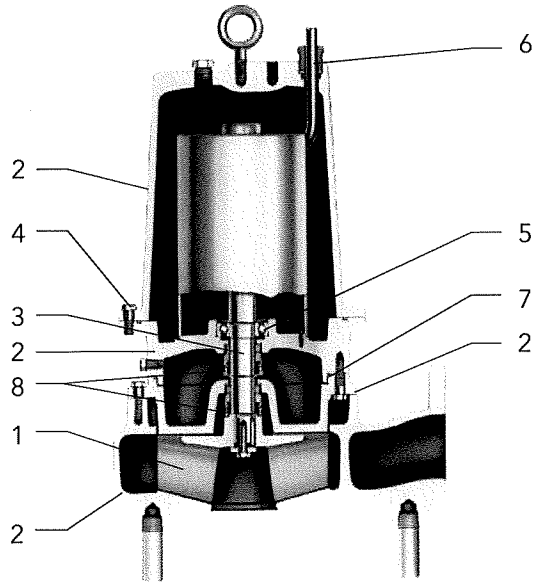
PERFORMANCE RATINGS (gallons per minute)

Series No.		WS15D3M	WS15D3	WS20D3	WS30D3	WS50D3
Total Head Feet of Water	HP	1½	1½	2	3	5
	RPM	1750				
	10	160	300			
	15	90	260	320		
	20		210	280	350	435
	25		160	235	310	400
	30		100	185	265	360
	35			130	210	325
	40			60	160	280
	45				100	230
	50					170
	55					115
	60					60

APPLICATION DATA AND CONSTRUCTION DETAILS

Maximum Solid Size		2.5"
Minimum Casing Thickness		5/16"
Casing Corrosion Allowance		1/8"
Maximum Working Pressure		30 PSI
Maximum Submergence		50 feet
Minimum Submergence		Fully submerged for continuous operation
		6" below top of motor for intermittent operation
Maximum Environmental Temperature		40° C (104° F) continuous operation, 60° C (140° F) intermittent operation
Power Cable - Type (See Motor Information for AWG data/size.)		Type SJTOW: single phase, 1½ and 2 HP
		Type STOW: single phase, 1½ - 3 HP and 5 HP, 460 V
		Type STOW: single phase, 3 and 5 HP, three phase 5 HP, 230 V
Motor Cover, Bearing Housing, Seal Housing, Casing		Gray Cast Iron - ASTM A48, Class 30
Impeller - Standard, Optional		Gray Cast Iron - ASTM A48 or Cast Bronze - ASTM B584 C87600
Motor Shaft		AISI 300 Series Stainless Steel
Motor Design		NEMA 56 Frame, oil filled with Class F Insulation
Motor Overload Protection		Single phase: on winding thermal overload protection auto reset
		Three phase: requires Class 10 overloads in control panel
External Hardware		300 Series Stainless Steel
Impeller Type		Semi-open with pump out vanes on back shroud
Oil Capacity - Seal Chamber		1.5 quarts
Oil Capacity - Motor Chamber		1½-5 HP single and three phase: 7 quarts
Mechanical Seals - Standard	Upper	Carbon/Ceramic; Type 21
	Lower	Silicon Carbide/Silicon Carbide; Type 31
Mechanical Seals - Optional Lower		Silicon Carbide/Tungsten Carbide; Type 31

MATERIALS OF CONSTRUCTION



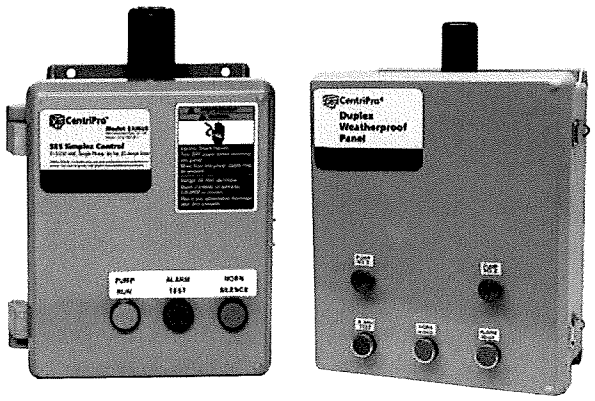
Item No.	Part Name		Material			
			Standard		Optional	
1	Impeller, non-clog		1003		1179	
2	Castings		1003			
3	Shaft-keyed		300 Series SS			
4	Fasteners		300 Series SS			
5	Ball bearings		Steel			
6	Power cable		STOW, 20 feet		Additional lengths	
7	O-ring		BUNA-N			
8	**Outer Mech. Seal**	**Service**	**Rotary**	**Station-ary**	**Elasto-mers**	**Metal Parts**
	OPT	Heavy duty	Silicon Carbide	Tungsten Carbide	BUNA-N	300 Series SS
	STD	Mild abrasives	Silicon carbide		BUNA-N	300 Series SS

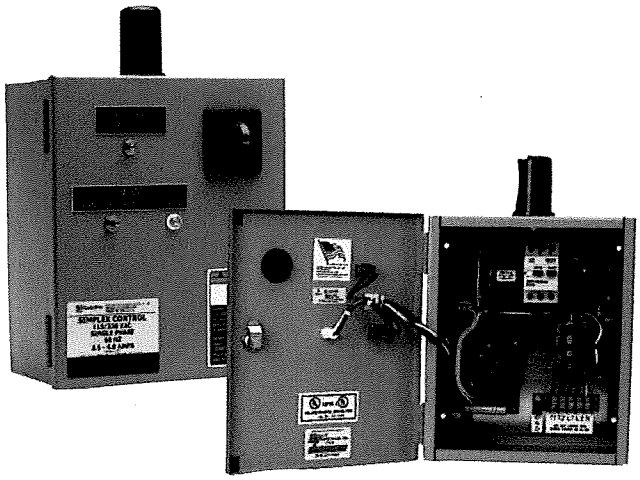
Material Code	Engineering Standard
1003	Cast iron – ASTM A48 Class 30
1179	Silicon bronze – ASTM C87600

STANDARD PANEL OPTIONS

Pump Order Number	Boulay Series		Disconnect Style	
	Simplex	Duplex	Simplex	Duplex
WS1518D3M	S10020	D10020	CSD11016	CDD11016
WS1512D3M	S10020	D10020	CSD11016	CDD11016
WS1538D3M	S31016	D31016	CSD31016	CDD31016
WS1532D3M	S31016	D31016	CSD31016	CDD31016
WS1534D3M	S34063	D34063	CSD34063	CDD34063
WS1537D3M	S34063	D34063	CSD34063	CDD34063
WS1518D3	S10020	D10020	CSD11016	CDD11016
WS1512D3	S10020	D10020	CSD11016	CDD11016
WS1538D3	S31016	D31016	CSD31016	CDD31016
WS1532D3	S31016	D31016	CSD31016	CDD31016
WS1534D3	S34063	D34063	CSD34063	CDD34063
WS1537D3	S34063	D34063	CSD34063	CDD34063
WS2018D3	S10020	D10020	CSD11620	CDD11620
WS2012D3	S10020	D10020	CSD11620	CDD11620
WS2038D3	S31016	D31016	CSD31016	CDD31016
WS2032D3	S31016	D31016	CSD31016	CDD31016
WS2034D3	S34063	D34063	CSD34063	CDD34063
WS2037D3	S34063	D34063	CSD34063	CDD34063
WS3018D3	S12136	D12127	CSD12232	CDD12232
WS3012D3	S12136	D12127	CSD12025	CDD12025
WS3038D3	S31016	D31016	CSD31016	CDD31016
WS3032D3	S31016	D31016	CSD31016	CDD31016
WS3034D3	S34063	D34063	CSD34063	CDD34063
WS3037D3	S34063	D34063	CSD34063	CDD34063
WS5012D3	S12136	D12127	CSD12232	CDD12232
WS5038D3	S31620	D31620	CSD31620	CDD31620
WS5032D3	S31620	D31620	CSD31620	CDD31620
WS5034D3	S36310	D36310	CSD36310	CDD36310
WS5037D3	S36310	D36310	CSD36310	CDD36310

Note: All panel part numbers above have additional available features, see page 7 for more information.
Note: Panel part numbers above do not include float switches.





BOULAY SERIES

- NEMA 4X outdoor rated enclosure
- Red alarm beacon
- HOA selector switch
- Through door pump run light(s)
- Through door alarm test and horn silence button
- Single phase models handle 120, 208 and 230V service
- Three phase models handle 200, 230, 460 and 575V service
- Accepts single or dual power feed
- See brochure "BCP3 R11" for additional information on simplex models
- See brochure "BCP4 R14" for additional information on duplex models information

DISCONNECT STYLE

- NEMA 4X outdoor rated enclosure, NEMA 1 also available
- Red alarm beacon
- Through door HOA selector switch
- Through door control on/off switch
- Through door main disconnect switch
- Single phase models handle 120, 208 and 230V service
- Three phase models handle 200, 230, 460 and 575V service
- Accepts single or dual power feed
- See brochure "BCPSDWWP R3" for additional information

Xylem |'zīləm|

1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced analytics solutions for water, electric and gas utilities. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

For more information on how Xylem can help you, go to www.xyleminc.com

xylem
Let's Solve Water

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www.xylem.com/goulds

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INFILTRATOR®
systems inc.

Quick4
CHAMBER SYSTEMS

The Quick4® Standard Chamber

Quick4® Series





The Quick4® Standard Chamber fits in a 36" wide trench and is ideal for curved or straight systems. It features the patent-pending Contour Swivel Connection™ which permits turns up to 15°, right or left. The MultiPort™ endcap allows multiple piping options and eliminates pipe fittings. The chamber's four-foot length provides optimal installation flexibility.

Chamber Benefits:

- Advanced contouring connections swivel up to 15°, right or left
- Latching mechanism allows for quick installation
- Four-foot chambers are easy to handle and install
- The Quick4 Standard Chamber supports wheel loads of 16,000 lbs/axle with only 12" of cover
- Certified by the International Association of Plumbing and Mechanical Officials (IAPMO)

IAPMO R&T

MultiPort Endcap Benefits:

- Tear-out seals on inlet ports provide a tight fit to the pipe
- Eight molded-in inlets/outlets allow for maximum piping flexibility
- Eliminates pipe fittings
- Fits on either end of the Quick4 Standard Chamber

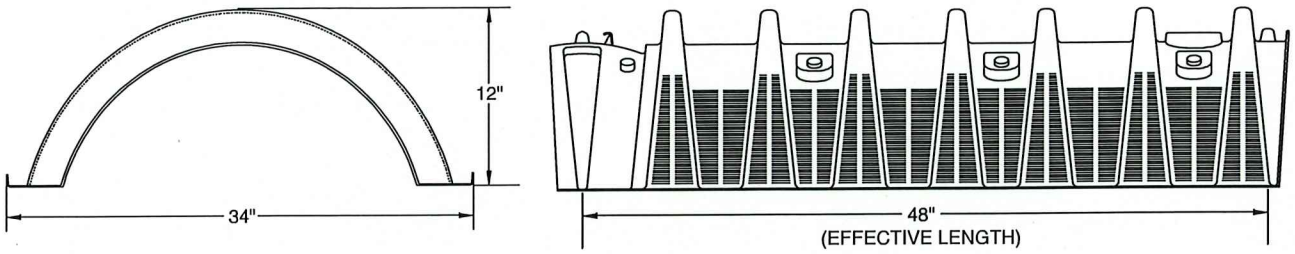
APPROVED in _____

Quick4® Series

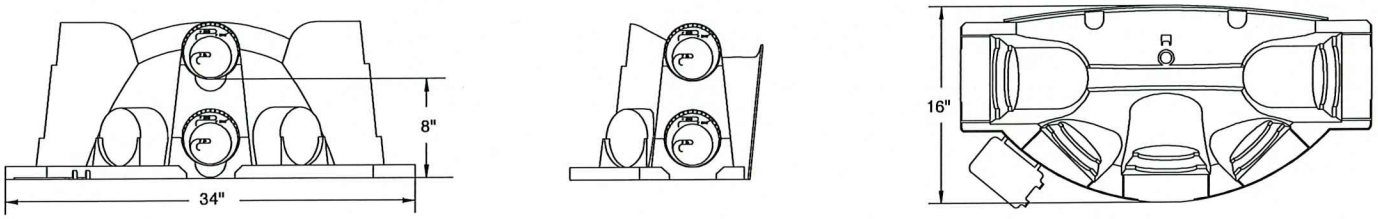
Because installations are faster with Quick4 chambers, you save on heavy equipment operation and labor.

Quick4® Series

Quick4 Standard Chamber

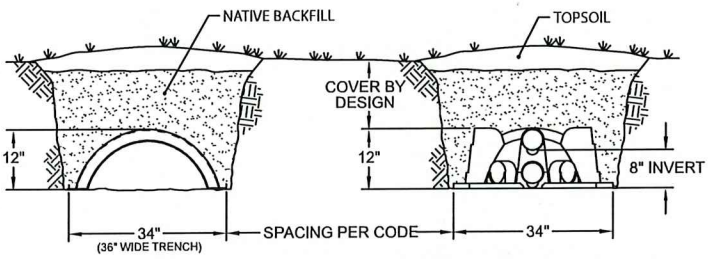


MultiPort EndCap



FRONT VIEW SIDE VIEW TOP VIEW

Typical Trench View



Quick4® Standard Chamber Specifications	
Size	34"W x 53"L x 12"H (864 mm x 1346 mm x 305 mm)
Effective Length	48" (1219 mm)
Louver Height	8" (203 mm)
Storage Capacity	43 gal (163 L)
Invert Height	8" (203 mm)

INFILTRATOR SYSTEMS, INC. STANDARD LIMITED WARRANTY

(a) The structural integrity of each chamber, endcap and other accessory manufactured by Infiltrator ("Units"), when installed and operated in a leachfield of an onsite septic system in accordance with Infiltrator's instructions, is warranted to the original purchaser ("Holder") against defective materials and workmanship for one year from the date that the septic permit is issued for the septic system containing the Units; provided, however, that if a septic permit is not required by applicable law, the warranty period will begin upon the date that installation of the septic system commences. To exercise its warranty rights, Holder must notify Infiltrator in writing at its Corporate Headquarters in Old Saybrook, Connecticut within fifteen (15) days of the alleged defect. Infiltrator will supply replacement Units for Units determined by Infiltrator to be covered by this Limited Warranty. Infiltrator's liability specifically excludes the cost of removal and/or installation of the Units.

(b) THE LIMITED WARRANTY AND REMEDIES IN SUBPARAGRAPH (a) ARE EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE UNITS, INCLUDING NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE

(c) This Limited Warranty shall be void if any part of the chamber system is manufactured by anyone other than Infiltrator. The Limited Warranty does not extend to incidental, consequential, special or indirect damages. Infiltrator shall not be liable for penalties or liquidated damages, including loss of production and profits, labor and materials, overhead costs, or other losses or expenses incurred by the Holder or any third party. Specifically excluded from Limited Warranty coverage are damage to the Units due to ordinary wear and tear, alteration, accident, misuse, abuse or neglect of the Units; the Units being subjected to vehicle traffic or other conditions which are not permitted by the installation instructions; failure to maintain the minimum ground covers set forth in the installation instructions; the placement of improper materials into the system containing the Units; failure of the Units or the septic system due to improper siting or improper sizing, excessive water usage, improper grease disposal, or improper operation; or any other event not caused by Infiltrator. This Limited Warranty shall be void if the Holder fails to comply with all of the terms set forth in this Limited Warranty. Further, in no event shall Infiltrator be responsible for any loss or damage to the Holder, the Units, or any third party resulting from installation or shipment, or from any product liability claims of Holder or any third party. For this Limited Warranty to apply, the Units must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and Infiltrator's installation instructions.

(d) No representative of Infiltrator has the authority to change or extend this Limited Warranty. No warranty applies to any party other than the original Holder.

The above represents the Standard Limited Warranty offered by Infiltrator. A limited number of states and counties have different warranty requirements. Any purchaser of Units should contact Infiltrator's Corporate Headquarters in Old Saybrook, Connecticut, prior to such purchase, to obtain a copy of the applicable warranty, and should carefully read that warranty prior to the purchase of Units.

INFILTRATOR® systems inc.

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P.O. Box 768
Old Saybrook, CT 06475
860-577-7000 • Fax 860-577-7001
1-800-221-4436
www.infiltratorsystems.com

U.S. Patents: 4,759,661; 5,017,041; 5,156,488; 5,336,017; 5,401,116; 5,401,459; 5,511,903; 5,716,163; 5,588,778; 5,839,844 Canadian Patents: 1,329,959; 2,004,564 Other patents pending.
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Contact Infiltrator Systems' Technical Services Department for assistance at 1-800-221-4436

NORTH CAROLINA DEPARTMENT
OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH
ON-SITE WATER PROTECTION SECTION

INNOVATIVE WASTEWATER SYSTEM APPROVAL

INNOVATIVE WASTEWATER SYSTEM NO: IWWS 2004-3-R4

Issued To:	Sam Carter, Government Relations Manager Orenco Systems, Inc. 814 Airway Avenue Sutherlin, Oregon 97479 Tel: 1-800-348-9843; Fax: 541-459-2884 http://www.orenco.com
For:	AdvanTex® Treatment Systems
Approval Date:	April 6, 2005 June 29, 2007 December 7, 2007 July 18, 2008 May 9, 2011

In accordance with General Statute 130A-343, 15A NCAC 18A .1969 and .1970, a proposal by Orenco Systems, Inc. for an updated approval of subsurface wastewater systems utilizing the AdvanTex Treatment systems has been reviewed, and found to meet the standards of an Innovative system when all of the following conditions are met:

I. General

A. Scope of this Innovative Approval
   1. Use, design, and construction requirements for the AdvanTex Treatment systems (AX20 and AX100) to meet TS-I or TS-II effluent quality standards pursuant to Rule 15A NCAC 18A .1970.
   2. Operation, maintenance, and monitoring requirements of the AdvanTex Treatment systems and associated subsurface systems to ensure the treatment performance standards shall be met.

B. This Innovative System Approval is applicable to domestic strength sewage systems (non-industrial wastewater) utilizing AdvanTex Treatment systems that have a design flow not exceeding 3,000 gallons per day (gpd).

   Use of AdvanTex Treatment systems for facilities with an influent waste strength that exceeds domestic septic tank quality effluent standards pursuant to Rule 15A NCAC 18A .1970(b) may be proposed by Orenco Systems, Inc and a North Carolina Professional Engineer to the Department for review and approval on a case-by-case basis, prior to permitting by the local health

department (LHD). The system design must include the proposed raw wastewater strength (BOD_5, COD, TN, TSS, fats, oils and grease, etc.), the expected organic loading rate (in pounds of BOD), and hydraulic loading rate on the pretreatment system, and the calculations, references, and any other needed information to support the proposed design.

C. Any site utilizing these systems shall have sufficient alkalinity to perform the proper amount of nitrification. The influent shall not have a pH or toxins that significantly inhibit microbial growth.

D. Use of AdvanTex Treatment systems that have a design flow exceeding 3,000 gpd may be permitted after approval by the Department, on a case-by-case basis, in accordance with the Large Systems State Review/Approval Process (Rule 15A NCAC 18A .1938).

II. Advanced Treatment Performance Standards (TS-I and TS-II)

AdvanTex Treatment systems are designed, installed, operated and maintained to meet TS-I or TS-II effluent standards in accordance with Rule .1970. Refer to Rule .1970(a) Table VII - Effluent Quality Standards for Advanced Pretreatment Systems for treatment performance levels.

III. Siting Criteria

AdvanTex Treatment systems and associated drainfields shall be sited and sized in accordance with Rule .1970 for TS-I or TS-II systems. Drip irrigation systems used with AdvanTex Treatment systems, shall be sited and sized in accordance with the manufacturer specific drip approval.

IV. Design Criteria

A. The system consists of a septic tank, a recirculation tank, and AdvanTex fixed-film media pod(s) as specified in Table 1 below. See Attachment A for example drawings of unit configurations.

Table 1

Design Flow (gallons per day)	Minimum Septic Tank Size* (gallons)	Minimum Recirculation Tank Size (gallons)	Minimum AdvanTex Units**
≤ 500	1,000	1,000	1 AX20
501 - 600	1,500	1,000	2 AX20
601 - 750	2,000	1,000	2 AX20
751 – 1,000	2,500	1,500	2 AX20
1,001 – 1,500	3,750	2,000	3 AX20
1,501 – 2,000	5,000	2,500	4 AX20 Dual Bulb UV
2,001 – 2,500	6,250	3,000	1 AX100 Dual Bulb UV
2,501 – 3,000	7,500	3,500	2 AX100 Dual Bulb UV

* Multiple tanks, in series, may be used for systems larger than 600 gpd.

**Single-Bulb UV system shall be provided after the AdvanTex units for TS-II systems with flows of 1,500 gpd or less; dual-bulb UV system shall be provided after the AdvanTex units for TS-II systems with flows of 1,501 to 3,000 gpd.

1. All tanks shall be approved by the Department and Orenco Systems, Inc. specifically for the use with AdvanTex Treatment systems. As part of this approval, all tanks (septic and recirculating) will have an inlet sanitary tee that is visible and accessible from the riser opening.
2. The septic tank shall be equipped with a Department approved, appropriately sized Orenco effluent filter on the outlet end.
3. The recirculation tank will contain the recirculating splitter valve and the Biotube screened pump vault.
4. A drainback configuration without a pump check valve is required for the forcemain.
5. The recirculating pumps are Orenco 4-inch turbine effluent pumps. The pumps that accompany the different configurations are:

# of AdvanTex Filter Units	Type of AdvanTex Filter Unit	# of Recirc Pumps	Pump Nominal Flow Rate (gpm)	Horse Power	Voltage
1	AX20	1	30	1/2	115V or 230V
2	AX20	1	50	1/2	115V or 230V
3	AX20	1	75	1/2	115V or 230V
4	AX20	2 (duplex)	50	1/2	115V or 230V
1	AX100	2 (duplex)	50	3/4	115V or 230V
2	AX100	2 (duplex)	50	3/4	115V or 230V

6. The AdvanTex pod is equipped with a set of vertical geotextile sheets with low pressure pipe wastewater distribution above the sheets. The low pressure pipe distribution operates at 3 to 5 feet of pressure head. The pods may be placed above the tanks, but shall not obstruct the tank accesses. Two air vents for the pod are required, one is located on the pod and the other is located on the discharge cleanout.
7. Filtrate from the AdvanTex pod flows by gravity into either the recirculation tank or the ultraviolet (UV) disinfection system dependent upon the recirculation tank level. UV piping shall always be installed, but controls, ballast, wiring, and bulbs shall only be required to be installed for TS-II systems.
8. As an option to enhance nitrogen removal for TS-II systems, a portion of the nitrified wastewater may be diverted back to the septic tank where conditions are most optimal for denitrification. The daily volume of nitrified wastewater delivered back to the septic tank shall be determined on a case-by-case basis by the system designer (for new systems) or the ORC (for existing systems), and shall not exceed 50% of the daily volume pumped to the AdvanTex filters.
   a. For existing systems, the ORC shall notify the LHD of the proposed modifications to the system, including an explanation of why the modifications are being proposed and a drawing showing how the wastewater will be diverted back to the septic tank. The Operator in Responsible Charge (ORC) shall than coordinate with the LHD for scheduling site visits (as needed) prior to, during, and after system modification.
   b. For existing systems, the percentage returned to the septic tank may be required to be reduced (below the currently designed percentage) if effluent $CBOD_5$ sampling and testing per Section VI.F.2 indicates that effluent $CBOD_5$ levels are not in compliance with Rule .1970(o)(1)(D).
   c. Acceptable methods for diverting wastewater back to the septic tank for new and existing systems shall include the following:

i. A stub connection at the recirculating pump hose and valve assembly to divert a portion of each dose to the septic tank. A flow control disk with appropriately-sized orifice will be placed in a union in the septic tank return line to control the proportion of flow returned to the septic tank. A pressure monitoring port (a tee with a threaded fitting to mount a stand pipe or tube) will be placed in the septic tank return line preceding the flow control disk. A stand pipe or tube mounted in the port can be used to measure pressure at the flow control disk. The measured pressure allows the actual rate of septic tank return flow through the flow control disk orifice to be calculated. A gate valve will be placed in the line upstream of the pressure monitoring port, to allow further adjustment of the return flow delivered to the septic tank.

ii. A stub connection at the recirculating pump hose and valve assembly to divert a portion of each dose to the septic tank, with a gate valve in the piping where it returns to the septic tank, to control the percentage of each dose diverted to the septic tank. The operator shall set the valve to obtain the desired percentage split, and verify the return flow to the septic tank by direct measurement.

iii. A "split" filter pod with a baffle placed in the floor to divide the pod into two separate compartments, one draining to the septic tank, and the other to the recirculating splitter valve, through separately plumbed outlets. The removable baffle shall be placed at the bottom of the pod such that a 50:50 split or smaller percentage split to the septic tank is obtained, as determined by the system designer. The location of the baffle wall and percentage split can be adjusted as determined to be needed based on demonstrated system performance.

9. The UV system shall be rated for the appropriate discharge rate from the AdvanTex unit. Audible and visible alarms for bulb failure will be provided.
10. The UV disinfection system (optional for TS-I, required for TS-II) will be one of the following:
    a. 0-1,500 gpd: "UV The Disinfector®" or the Salcor 3G, or the Orenco UV Unit.
    b. 1,501-3,000 gpd: Dual Bulb "UV The Disinfector®", or Salcor 3G (2 units), or Orenco UV Unit (2 units).
    c. Other UV systems specifically approved by the Department and Orenco Systems, Inc
11. AdvanTex Treatment systems will utilize the TCOM or VeriComm® telemetry control panel. The control panel is in a NEMA 4X enclosure, and shall be located within 30 feet of the recirculation tank. Separate control and alarm circuits will be provided. The Telemetry Control Panel shall be connected to an active phone line capable of dialing a "1-800" number. The operator of the system must be able to access the panel directly on site and shall be available, with 24-hour notice, to the LHD in the event that the LHD needs to access the control panel.
12. All access riser hatches shall be secured by approved tamper-resistant stainless steel bolts supplied by the manufacturer. Riser construction, attachment to tanks and security systems shall be pre-approved by the Department in accordance with the Orenco Systems, Inc approvals for septic tank and pump tank risers, as applicable.
13. Buoyancy calculations shall be completed by a North Carolina professional engineer for AdvanTex AX100 pods, associated tankage, and/or the UV basin if they intersect the seasonal high water table. Additional concrete ballast may be required. In addition the instructions for anti-floatation in the AdvanTex Treatment System Installation Manuals shall be followed. Orenco Systems, Inc, can submit a pre-engineered anti-buoyancy design by a NC Professional Engineer for approval by the Department that could be used instead of site specific anti-buoyancy designs for sites that meet the limitations of the pre-engineered design.

14. The panel controlling the drainfield dosing pumps shall be provided by the Orenco Systems, Inc. and be designed to meet the daily, 7-day, and 30-day monitoring requirements of Rule .1970, unless the drainfield panel is provided by a distribution system manufacturer other than Orenco Systems, Inc. If so, the other manufacturer's panel shall meet these same monitoring requirements, and its alternate use for this purpose shall have the concurrence of Orenco Systems, Inc. and the system designer.
15. A spigot or sampling port shall be placed on the force main from the final dosing tank to provide for effluent sampling
16. The 7-day and 30-day readings will be stored in the VeriComm control panel records. The ORC will be able to access this information when they are at the site. The VeriComm panel, TCOMM Telemetry control panel, or approved equal shall be used for pressure manifolds, LPP systems, and drip irrigation systems.

B. AdvanTex Treatment systems shall be designed by either an Orenco Systems, Inc. certified designer or a North Carolina Professional Engineer.

V. Installation and Testing Procedures

A. A preconstruction conference shall be required to be attended by the system designer, Orenco certified installer, and LHD, prior to beginning construction of the AdvanTex Treatment system.

B. The AdvanTex Treatment system shall be located in compliance with the horizontal setback requirements of Rule .1950(a) and Rule .1970 and shall be located to prevent surface/subsurface water inflow/infiltration. The drainfield horizontal setback requirements are in accordance with Rule .1970, as appropriate for TS-I or TS-II systems.

C. All AdvanTex Treatment systems shall be installed according to directions provided by the manufacturer in the "Installation Manual" and instructions found on Orenco Systems, Inc. CAD drawings of each system. Additionally, all AdvanTex Treatment systems and components used with, but not manufactured by Orenco Systems, Inc., shall be installed in accordance with all applicable regulations and manufacturer instructions.

D. All individuals/companies installing AdvanTex Treatment systems shall be in possession of all necessary permits and licenses before attempting any portion of a new or repair installation. The company/individual must be a Level IV installer and Orenco Systems, Inc, certified.

E. Watertightness of the tanks and any dosing tanks shall be demonstrated by a 24-hour leakage test conducted at the installation site after being installed below ground and prior to backfilling. A water level change of 1/2 inch or more within a 24" riser over 24 hours, or visual observation of leakage shall be cause for failure of the watertightness test. Initial water level shall be 2" above the riser/adapter seam.

F. For TS-II systems designed to have nitrified wastewater returned to the septic tank, the distribution of flow to the AdvanTex pod(s) and to the septic tank shall be measured during start-up and set to be in accordance with the system design with start-up settings recorded.

G. The Orenco Systems, Inc. certified Operator in Responsible Charge (ORC) shall startup the AdvanTex unit for each installation and shall provide an installation and startup acceptance letter to the LHD prior to issuance of the operation permit.

H. Specified site preparation steps and construction specifications for the ground absorption system shall be strictly adhered to, including specified depth of trenches in relation to site limiting conditions, cover material specifications (if needed), trench installation method, etc.

I. Prior to Operation Permit issuance, the final Health Department construction inspection shall include at least the following checks:
   1. Observation of the system watertightness testing.
   2. Testing the controls and alarm settings.
   3. Recording all pump model numbers and time clock settings.
   4. Checking to ensure the two air vents on the pod are installed and functional.
   5. Checking the pressure head on the pod wastewater distribution system.
   6. Checking that return flow to the septic tank has been set per design and recorded, when applicable.
   7. Confirming that the riser hatches have tamperproof bolts, and/or riser lock ring.

VI. Operation, Maintenance and Testing

A. AdvanTex Treatment systems shall be classified, at a minimum, as a Type Va system in accordance with Table V(a) of Rule. 1961(b). Management and inspection shall be in accordance with Rules .1961 and .1970.

B. All Orenco AdvanTex Treatment systems require an operation and maintenance agreement between the system owner and Orenco Systems, Inc. or its authorized representative, as per Rule .1970. The system shall be inspected by a certified subsurface operator. The certified operator shall be either an employee of Orenco Systems, Inc. or authorized in writing by Orenco Systems, Inc. to operator and maintain the system. The operator must have proper equipment and training to access and program VeriComm or TCOMM Control panels on site.

C. All AdvanTex Treatment systems shall be maintained according to the latest revision of the AdvanTex Operation and Maintenance Manual as published by Orenco Systems, Inc.

D. At each AdvanTex Treatment system inspection, the ORC shall, at a minimum, observe, monitor, and record the following:
   1. Wastewater level in all the tanks.
   2. Sludge and scum levels in the septic tank and sludge level and grease presence in pump tank.
   3. Clogging of effluent filter in Biotube® pump package in the recirculation tank.
   4. Watertightness of tanks, risers and pipe connections at the tanks.
   5. Operation of pumps, floats, valves, electrical controls, and alarms.
   6. Pumping frequency from pump impulse counters and elapsed run time meters.
   7. Drainfield pump delivery rate (drawdown test), determination of the average pump run time, and drainfield dosing volume.
   8. Any structural damage, accessibility issues, adequate ventilation, excess odors, ponding of effluent, insect infestations, vegetative growth over the drainfield, or surfacing of effluent on the drainfield area.
   9. Sample of AdvanTex Treatment system effluent collected from the sampling point to check for effluent clarity and odor and a sample of influent, as required.
   10. Pump cycle and run time meters and any water meter readings.
   11. Current set-up for TS-II nitrogen removal enhancement (percent returned to septic tank), and recommendation for modifications (if needed).

12. System operating conditions, from the review of VeriComm or TCOMM stored data for indication of flow variances, clogging of filter distribution system, or other abnormal conditions.

E. The ORC shall also conduct additional observations, measurements, monitoring, and maintenance activities as specified in the Operation Permit and as recommended by the manufacturer.

F. Sampling and Testing
1. All sampling shall be done in accordance with Rule .1970(n)(3) and (5). AdvanTex Treatment systems shall be sampled annually (semi-annually for systems with design flow of 1,501 to 3,000 gpd).
2. All systems shall be tested for effluent $CBOD_5$ and NH_4-N and shall be tested in the field for turbidity. Systems specified to meet the TS-II standard shall have the effluent analyzed for TN (TKN and NO_3-N) and the influent analyzed for TKN. Systems specified to meet the TS-II standard with design flows of 1,501 to 3,000 gpd shall also have the effluent analyzed for fecal coliform.
3. Additional sampling of effluent or influent may be determined to be necessary by the ORC during a system inspection to assist with troubleshooting or to verify system performance.
4. Effluent samples for drip disposal systems or other pressurized dispersal systems shall be collected from a tap on the drainfield forcemain (prior to spin filters for drip systems). The preferred location of the tap is in the pump tank discharge assembly. The sampling shall not commence until at least 30 seconds of continuous discharge through the sample tap has occurred.
5. Influent samples shall be taken from the inlet sanitary tee into the recirculation tank.

G. Notification and Performance of Maintenance and Repairs
1. The ORC shall alert Orenco Systems, Inc, the LHD, and the system owner within 48 hours of needed maintenance or repair activities including, but not limited to, landscaping, tank sealing, tank pumping, pipe or control system repairs, media replacement, and/or adjustments to any other system component.
2. The ORC shall notify the system owner, the Orenco North Carolina authorized representative, and the LHD whenever the pump delivery rate efficiency and/or average pump run time are not within 25% of initial measurements conducted prior to system startup.
3. System troubleshooting and needed maintenance shall be provided to maintain the pump delivery rate and average pump run time within 25% of initial measurements conducted during system startup.
4. The septic tank will be pumped as needed upon recommendation of the ORC and in accordance with the AdvanTex Treatment System Operation & Maintenance Manual for preferred pumping intervals. However, at a minimum, the septic tank will be pumped whenever the solids level exceeds 25% of the tank's total liquid working capacity or the scum layer is more than 4 inches thick.
5. The tanks shall be pumped by a properly permitted septage management firm, and the septage handled in accordance with 15A NCAC 13B .0800.
6. The ORC shall notify the LHD and system owner in writing whenever repairs are indicated. All maintenance activities shall also be recorded in the ORC reports provided to the LHD.

H. Reporting
1. The ORC shall provide a completed written report to the system owner and the LHD within 30 days of each inspection. At a minimum, this report shall specify:
   a. The date and time of inspection,

b. System operating conditions observed according to Section VI.E,
c. System operating conditions measured according to Section VI.E and VI.F,
d. Results from any laboratory analysis of any influent and effluent samples,
e. Maintenance activities performed since the last inspection report,
f. An assessment of overall system performance,
g. A list of any improvements or maintenance needed,
h. A determination of whether the system is malfunctioning, and the specific nature of the malfunction,
i. Any changes made in system settings, based on recommendations of the manufacturer, and
j. A summary report of data retrieved from the VeriComm or TCOMM panel verifying actual flow and operating conditions.

VII. Responsibilities and Permitting Procedures

A. Prior to the installation of an AdvanTex Treatment system at a site, the owner or owner's agent shall fill out an application at the LHD for the proposed use of this system. The LHD shall issue an Improvement Permit or an Authorization to Construct or amend a previously issued Authorization to Construct allowing for the use of an AdvanTex Treatment system.

B. The Improvement Permit and Authorization to Construct shall contain all conditions the site approval is based upon, including the proposed use of the Innovative system. The operation permit will include all conditions as specified in the Improvement Permit and Authorization to Construct.

C. When a special site evaluation is required pursuant to Rule .1970(p)(1) or a drip approval, an evaluation and written, sealed report from a Licensed Soil Scientist regarding the site shall be provided to the LHD. The report shall contain the information specified in Rule .1970(p)(2) and "Requirements for Submittals of Soil Reports and Pretreatment and/or Dispersal System Designs". The LHD may request the assistance of their Regional Soil Scientist in evaluating this report prior to Improvement Permit issuance.

D. The AdvanTex Treatment system shall be designed by one of the following: an Orenco Systems, Inc. authorized designer or a North Carolina Professional Engineer.

E. Prior to the issuance of an Authorization to Construct for an AdvanTex Treatment system, a design submittal prepared by an authorized designer or North Carolina Professional Engineer shall be submitted for review and approval by the LHD. The design submittal shall include the information specified in "Requirements for Submittals of Soil Reports and Pretreatment and/or Dispersal System Designs".

F. A North Carolina Professional Engineer is required for all systems exceeding 1,000 gpd or as otherwise required for a drip system. All design submittals shall be accompanied by a letter from Orenco Systems Inc. or its North Carolina authorized representative.

G. It is recommended that local authorized environmental health practitioners attend a design training session offered by the manufacturer/authorized representative prior to permitting the system. Also, at the request of the LHD, a Regional Engineer will review the design.

H. The Orenco Systems, Inc. authorized installer and authorized designer must certify in writing that the system was installed in accordance with the approved design prior to Operation Permit issuance.

I. A North Carolina Professional Engineer shall certify in writing that a system required to be designed by an engineer was installed in accordance with the approved plans and specifications prior to Operation Permit issuance.

J. For sites required to be evaluated by a Licensed Soil Scientist or Professional Geologist (see Section VII.C), the health department may specify as a condition on the Improvement Permit and Authorization to Construct that a Licensed Soil Scientist or Professional Geologist oversee critical phases of the drainfield installation and certify in writing that the installation was in accordance with their specified site/installation requirements prior to the Operation Permit issuance.

K. The ORC shall be present during the final inspection of the system prior to the issuance of the operation permit. The ORC shall be certified both as a NC Subsurface Operator and an authorized AdvanTex Treatment system Operator.

L. On an annual basis, Orenco Systems Inc., shall provide a report to the On-Site Water Protection Section including the number and location of new system installations during the previous year, and effluent data and operator reports for each operational AdvanTex Treatment system installed in North Carolina under this Innovative Approval. These reports shall provide information to the Department based upon the monitoring data and observations made from the Innovative systems installed pursuant to this Approval. This should include an assessment of system performance in relation to the established treatment performance standards; an assessment of physical and chemical properties of the materials used to construct the system, in terms of strength, durability, and chemical resistance to loads and conditions experienced; recommended areas of applicability for the system; and any conditions and limitations related to the use of the system.

VIII. Repair of Systems

The provisions of 15A NCAC 18A .1961 (c) shall govern the use of the AdvanTex Treatment system for repairs to existing malfunctioning wastewater systems.

Approved By: _____ Date: _____

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH
ON-SITE WASTEWATER SECTION

INNOVATIVE WASTEWATER SYSTEM APPROVAL

INNOVATIVE WASTEWATER SYSTEM NO: IWWS-2004-01
FOR: **Flow Equalization System**

APPROVAL DATE: July 6, 2004

In accordance with NCGS 130A-343 and 15A NCAC 18A .1969, a flow equalization system has been found to meet the standards of an innovative system and is approved for use, subject to the conditions of this innovative approval. A notice of this proposed approval has been published in the North Carolina Register and the Department has received public comment on the application for over 30 days after the date of publication in the Register. This approval, including the specifications of circumstances in which use of a flow equalization system is appropriate and conditions and limitations related its use, reflects the Department's consideration of all public comment received.

I. Permitting:

Flow Equalization systems may be used for *non-residential* facilities that regularly and predictably operate at less than full capacity. Examples of applicable facilities include:

- Churches,
- Schools,
- Offices,
- Flea Markets, and
- Stadiums

Other facilities may be permitted for flow equalization when specifically approved by the State on a case-by-case basis.

This approval does not include flow equalization prior to pre-treatment devices.

The local health department shall issue an Improvement Permit or Construction Authorization allowing for the use of the proposed innovative system upon a finding that all provisions of this approval and all other applicable rules shall be met. The Construction Authorization shall contain conditions regarding the design, installation, and use of the flow equalization system. The Operation Permit shall specify system components, requirements for O&M, and restrictions on operation of the facility.

Use of flow equalization in systems that have a design flow exceeding 3000 gallons per day or when the criteria of this innovative approval are proposed not to be followed may be considered for review and approval by the State on a case-by-case basis, prior to permitting by the local health department.

II. Flow Equalization Terms:

a. Equalized Daily Flow (EQ) - The total volume of wastewater generated by flow events at the facility during the flow equalization cycle divided by the number of days in the cycle.
b. Flow Equalization Cycle – The time period in which wastewater will be stored and dosed. Ex. 7day cycle, 14 day cycle, etc.
c. Flow Event – An event in the flow equalization cycle in which wastewater will be generated. Ex/ church service, sporting event, day of operation, etc.
d. Orifice Control Device – A calibrated flow restriction placed in the supply line prior to the nitrification field that allows the flow to be controlled.
e. Flow Balance – A daily account of the amount of stored effluent in the equalization tank which is derived from the incoming flow, residual storage, and the outgoing flow. The flow balance shows the day of the week, the amount of wastewater generated, the amount of wastewater dosed, and the residual amount of effluent left in the dosing tank each day. At the end of the flow equalization cycle, the sum of the incoming flow should equal the sum of the amount dosed.

III. System Description:

a. Minimum pretreatment by septic tank and effluent filter as required in 15A NCAC 18A .1952.
b. Grease Trap as required in 15A NCAC 18A .1955(k)
c. Equalization/Pump Tank
d. Timer Control Panel
e. Pump
f. Pressure Manifold, LPP distribution system, other pressure dispersal devices, or an Orifice Control Device when serial distribution is utilized
g. Nitrification Field

IV. Siting Criteria:

The Flow Equalization System with timed dosing may be utilized on sites that meet the following criteria.

a. Sites classified suitable or provisionally suitable in accordance with rules .1939 .1948;
b. Sites reclassified provisionally suitable in accordance with Rule .1956;
c. Sites meeting the criteria for low pressure pipe systems in accordance with Rule .1957(a)(2); or

d. Sites meeting the criteria for Innovative Systems set forth in Rule .1969, or other sites meeting the requirements for systems specifically approved by the State.

V. System Sizing and Design Criteria:

a. Septic Tank & Effluent Filter: The septic tank and effluent filter shall be designed and constructed in accordance with Rule .1952, .1953, and .1954 and sized in accordance with .1952 (b) (2) where "Q" is the largest projected 24 hour waste flow in the flow equalization cycle.
b. Grease Traps: The grease trap shall be designed and constructed in accordance with Rules .1952, .1953, .1954 and .1955 (k)(3) and (k)(4). Grease traps at churches with kitchens shall be sized at a minimum of 1 gallon/seat [in the dining area]. The minimum liquid capacity of any grease trap shall be 1,000 gallons.
c. Equalization/Pump Tank: The pump dosing tank shall be sized to allow for:

   i. Pump submergence: Effluent volume that covers the pump and the motor housing, or in accordance with pump manufacturer's suggestions, but in no case shall less than 12 inches of effluent remain in the tank at all times. The pump intake shall be at least 5" from the interior bottom of the tank;
   ii. Minimum Dose Volume: Minimum dose required based on the size of the nitrification field (see below);
   iii. Equalization Volume: The highest cumulative volume of effluent as indicated by the flow balance calculation;
   iv. High-Water Level Alarm: The high-water alarm shall be set to activate at or above the equalization volume; and
   v. Emergency Storage Volume: Effluent volume that equals Q as defined in V(a).

d. Pump: In addition to the applicable requirements of 1952(c)(2), (3) and (4) the pump shall be sized to deliver the minimum required flow at the total dynamic head. The pump shall also deliver a flow that meets or exceeds a scour velocity of 2 feet/second, using $Q = (V)(2.45d^2)$, where V = scour velocity = 2 feet/second and d = inside pipe diameter in inches. The minimum delivery rate at a residual operating pressure of 2 feet shall be at least:

   i. 13 GPM for 1-½ inch Sch 40 pipe,
   ii. 21 GPM for 2 inch Sch 40 pipe,
   iii. 46 GPM for 3 inch Sch 40 pipe

e. Control Panel: The control panel shall meet State approval and meet the specifications set forth in Rule .1952 (c)(6) with the additional requirements of:

   i. High-water level alarm event counter
   ii. Timer over-ride counter

iii. Pump event counter
iv. Pump elapsed time meter
v. Magnetic motor contactor
vi. HOA switch
vii. Control circuit fuse
viii. Alarm circuit fuse
ix. Float switch terminal block
x. For each pump, either a:
- Programmable timer with variable controls for setting the on and off times from .05 seconds to 30 hours, or
- a repeat cycle timer that afford the amount of control needed for pump run time and off time.
xi. Circuit breaker for each pump
xii. Circuit breaker for the alarm /control circuit
xiii. NEMA 4X Alarm strobe beacon
xiv. NEMA 4X Alarm Horn (83 decibels @ 3' minimum) w/ auto reset
xv. NEMA 4X Exterior Horn Test/ Normal/Silence Switch
xvi. Ground lug
xvii. 2 Lockable Hasps or one lockable hasp & 2 captive screws opposite the hinges of the NEMA 4X enclosure
xviii. Pump Run light

Controls shall require the pump enable float switch to be activated (minimum dose volume present) before the start of any pump cycle. Cycles shall be shut off by the run timer or the low-water cut-off float (not by deactivation of the enable float).

Approved flow equalization panel models shall be listed on the On-Site Wastewater Section web page. (http://www.deh.enr.state.nc.us/oww).

f. Alternating duplex or sequencing multiplex pumps are required for any system with 3000 gallons or more per any 24-hour flow period (Q>3000 gallons), the system requires 2000 linear feet or more of nitrification line, or the equalized daily flow is 1500 gallons or greater. The control panel shall meet the additional requirements of .1952 (c)(7) and include a programmable timer for each pump. The control panel shall be designed to sequence dosing events between pumps. The HOA switches in duplex and multiplex panels shall enable the operator to shut off one or more fields with the fields remaining in service dosed automatically, sequentially and uniformly.

g. Remote alarms and telemetry may be specified on a system-specific basis.

h. The control panel shall be mounted within 10 feet of the pump tank and at a height to allow the Operator in Responsible Charge (ORC) to easily adjust and observe the timer control device and other appurtenances of the control panel (e.g., center of box to be 3 to 5 feet above finished grade).

i. Pressure manifold, low-pressure pipe distribution or drip distribution shall be required for all flow equalization systems. Serial distribution may be used for retrofitting existing serial distribution systems if the effluent flows through an orifice control device before the flow becomes gravity (orifice shall be minimum of ¾-inch for 1-1/2-inch supply line, 1-inch for 2-inch supply line in order to achieve minimum 2-fps scour velocities). An accessible turn-up with a threaded cap and regulating valve shall be provided prior to the orifice control device to allow regulation of the flow (note: do not adjust flow to be less than necessary to achieve 2-fps scour velocity).

j. Floats: The following floats shall be provided and shall meet the requirements of Rule .1952 (c)(5)

   i. A low - level / redundant-off switch shall prevent the pump from running in the event the level in the tank is below the pump intake.
   ii. A timer-enabling switch shall be set at or above the pump submergence level and shall not allow for partial doses.
   iii. A high-level alarm shall activate after the equalization volume is exceeded. If there is a controlled delay before alarm activation, the delay shall be no more than 5 minutes. After being silenced, the alarm horn shall automatically reset and shall be audible with each high level event. The alarm event counter shall record each activation of the alarm.
   iv. A timer override switch located at or above the alarm shall dose no more than a designed dose event to the drainfield. The alarm shall re-activate at each override event. The timer override float may be integral with the alarm float.

   Other sensor devices may be utilized as approved by the State but must meet all four float actions.

k. Dosing Volume: The dosing volume shall be calculated based on the size of the nitrification fields and the number and frequency of the dosing events desired per day. The minimum and maximum pump run times shall be in accordance with pump manufacturer's recommendations. The dosing volume shall be calculated based on 40 to 80 percent of the drainline pipe volume for conventional systems and 5 to 8 times the lateral volume for low-pressure pipe or drip systems.

l. Drain field: The equalized daily flow (EQ) shall be calculated by adding the design daily flow for each event as determined by Rule .1949 in the flow equalization cycle and then dividing by the number of days in the cycle. Under this approval, the maximum number of equalization days is 14 unless otherwise approved by the State on a case by case basis. The nitrification field shall be sized by dividing the equalized daily flow (EQ) by the LTAR as determined in .1955, .1956 and 1957.

Example #1 (Church):

Assume: 200-seat church with a kitchen. The daily design flow is 5 gallons/seat. The site has a clay (Group IV) soil. The church has services on Sunday and Wednesday with extracurricular events (weddings, reunions, suppers, etc.) on Saturdays. Sunday attendance: 200 members; Wednesday attendance: 100 members and Saturday events: 200 members.

Day	Attendance	Daily Flow
Sunday	200 members	1000 gallons
Wednesday	100 members	500 gallons
Saturday	200 members	1000 gallons
Weekly Total:		2500 gallons

Equalization cycle is 1 week (7 days)

Equalized Daily Flow: 2500 gallons/7 days = 358 gallons/day
The drainfield is sized for a daily waste flow of 358 GPD.
Trench bottom area is: 358 gpd/0.25 LTAR = 1432 ft^2.

Linear footage: 1432 ft^2/3 feet wide trenches = 477 ft.

Dose Volume: 179 gallons (58% of 4" corrugated drainline capacity)

Flow Balance:

Day	In	Out	Residual
Saturday	**1000 gal.***	358 gal.	642 gal
Sunday	1000 gal.	358 gal.	**1284 gal.****
Monday	0	358 gal	926 gal.
Tuesday	0	358 gal	568 gal.
Wednesday	500	358 gal	710 gal
Thursday	0	358 gal	352 gal
Friday	0	358 gal	0
Total:	2500 gal.	2506 gal	0 gal

Pump Tank Sizing
Assuming a pump height of 18" and a tank with 30 gallons per inch:

Pump submergence volume = 540 Gallons
Dose Volume = 179 Gallons

Equalization Volume = 1284 Gallons **
Emergency Storage Volume = 1000 Gallons *(highest daily flow)
Adding the volumes yields a required dosing /equalization tank volume of 3003 Gallons.

Dosing Regime: 179 gallons every 12 hours. Given a measured pump delivery rate of 40 gpm, the repeat cycle timer would be set at 4.5 minutes "on" and 12 hours (or 11.9 hours) "off".

Example #2 (Day School):

Assume: 200-student day school (no food service or gym). The daily design flow is 10 gallons/student. The site has a clay (Group IV) soil. The school has classes Monday through Friday

Day	Attendance	Daily Flow
Monday	200 students	2000 gallons
Tuesday	200 students	2000 gallons
Wednesday	200 students	2000 gallons
Thursday	200 students	2000 gallons
Friday	200 students	2000 gallons
Weekly Total:		10,000 gallons

Equalization cycle is 1 week (7 days)

Equalized Daily Flow: 10,000 gallons/7 days = 1429 gallons/day
The drainfield is sized for a daily waste flow of 1429 GPD.
Trench bottom area is: 1429 gpd/0.3 LTAR = 4763 ft^2.

Linear footage: 4763 ft^2/3 feet wide trenches = 1588 ft.

Dosing Volume: 714.5 gallons (69% of 4" corrugated drainline capacity)

Flow Balance:

Day	In	Out	Residual
Monday	2000*	1429 gal	571 gal.
Tuesday	2000	1429 gal	1142 gal
Wednesday	2000	1429 gal	1713 gal
Thursday	2000	1429 gal	2284 gal
Friday	2000	1429 gal	2855 gal**
Saturday	0	1429 gal.	1426 gal
Sunday	0.	1429 gal	**0 gal.**
Total:	10,000 gal.	10,003 gal	0 gal

Pump Tank Sizing
Assuming a pump height of 20" and a tank with 125 gallons per inch:

Pump submergence volume = 2500 Gallons
Dosing Volume = 715 Gallons
Equalization Volume = 2855 Gallons **
Emergency Storage Volume = 2000 Gallons *(highest daily flow)
Adding the volumes yields a required dosing / equalization tank volume of 8070 Gallons.

Dosing Regime: 714.5 gallons every 12 hours. Given a measured pump delivery rate of 62 gpm, the repeat cycle timer would be set at 11.5 minutes "on" and 12 hours (or 11.8 hours) "off".

Example #3 (Flea Market):

Assume: A 200-vendor flea market with 25,000 square feet of covered floor space (120 gpd/1000 sq.ft. of covered floor space). The site has a clay (Group IV) soil. The flea market operates on Friday, Saturday, and Sunday.

Day	Daily Flow
Friday	3000 gallons
Saturday	3000 gallons
Sunday	3000 gallons
Weekly Total:	9000 gallons

Equalization cycle is 1 week (7 days)

Equalized Daily Flow: 9000 gallons/7 days = 1286 gallons/day
The drainfield is sized for a daily waste flow of 1286 GPD.
Trench bottom area is: 1286 gpd/0.3 LTAR = 4287 ft^2.

Linear footage: 4287 ft^2/3 feet wide trenches = 1429 ft.

Dosing Volume: 429 gallons (46% of 4" corrugated drainline capacity)

Flow Balance:

Day	In	Out	Residual
Friday	**3000 gal.***	1286 gal.	1714 gal
Saturday	3000 gal.	1286 gal.	3428 gal
Sunday	3000 gal	1286 gal	**5142 gal****
Monday	0	1286 gal	3856 gal.
Tuesday	0	1286 gal	2570 gal.
Wednesday	0	1286 gal	1284 gal
Thursday	0	1286 gal	0 gal
Total:	9000 gal.	9002 gal	0 gal

Pump Tank Sizing
Assuming a pump height of 20" and a tank with 125 gallons per inch:

Pump submergence volume = 2500 Gallons
Dosing Volume = 429
Equalization Volume = 5142 Gallons **
Emergency Storage Volume = 3000 Gallons *(highest daily flow)
Adding the volumes yields a required dosing / equalization tank volume of 11,071 Gallons.

Dosing Regime: 429 gallons every 8 hours. Given a measured pump delivery rate of 50 gpm. The repeat cycle timer would be set at 8.6 minutes "on" and 8 hours (or 7.86 hours) "off".

VI. Installation and Testing Procedures:

a. A pre-construction conference shall be required to be attended by the system designer, installer, local health department, licensed soil scientist and registered professional engineer, as applicable, prior to beginning construction of the flow equalization system.

b. The septic tank, dosing tank, risers, and pipe penetrations shall be demonstrated to be watertight by a 24-hour leak test (no measurable leakage in 24 hours). The test shall be run with risers and inlet/outlet pipes installed.

c. Care shall be taken during system installation to prevent extraneous debris from entering the tanks, supply lines or distribution network. Supply lines, manifolds and orifice control devices shall be flushed out prior to system startup.

d. A pump delivery rate shall be measured and the timer control device adjusted according to the measured delivery rate to achieve the equalized daily flow. The time dosing control panel manufacturer's recommendations shall be followed for system start-up. The timer control device shall be setup per the system design specifications in accordance with the measured pump delivery rate by the operator in responsible charge (ORC). All floats, counters, meters, timers, and alarms shall be tested for functionality. If needed the control panel manufacturer's representative shall be present during system start-up.

e. All other mechanical components, pump(s), pump cycling, filters, etc., as applicable must be demonstrated to be fully operable in accordance with their design.

VII. Operation, Maintenance and Monitoring Requirements

a. System management entity shall be comparable to a Type V system in Rule .1961(b), Table V (b). Inspection/maintenance and reporting frequency requirements shall be as (unless more frequent visits are required based on the pretreatment or effluent distribution system and specified in the Operation Permit):

Equalized Flow	ORC Insp. Interval	LHD Insp. Interval
<1500 gpd	2/year	1/year
1500 – 3000 gpd	4/year	1/year
3000 – 10000 gpd	12/year	1/year
> 10000 gpd	1/week	1/year

If telemetry is provided and the ORC response time is 2 hours or less per the maintenance contract, the inspection frequency may be reduced as follows (unless more frequent visits are required based on the pretreatment or effluent distribution system and specified in the Operation Permit):

Equalized Flow	ORC Insp. Interval	LHD Insp. Interval
<1500 gpd	1/year	1/year
1500 – 3000 gpd	2/year	1/year
3000 – 10000 gpd	6/year	1/year
> 10000 gpd	1/14 days	1/year

b. The Operator in Responsible Charge (ORC) shall provide monitoring reports to the local health department within 30 days of each required inspection. The ORC shall maintain a log of all malfunction incidences/notifications, observations, maintenance activities, and meter readings of pump run events, pump run times, override events, and high-level alarm events at each visit. Minimum maintenance during each required inspection shall include visual observation of the drainfield, checking/cleaning filter screen(s), measuring delivery rate, and recording flow meter reading, pump run times, cycle counts, high-level events, and water meter readings where applicable. At least once per year, orifice control devices shall be flushed, pressure head measurements made, and solids accumulation in the tanks shall be measured and recorded. Necessary adjustments to timer settings shall be pre-approved by the local health department, and adjustment times noted in the monitoring log and reports.

c. The ORC shall also conduct other additional observations, measurements, monitoring, and maintenance activities as specified in the Operation Permit and as recommended by the timer control panel manufacturer.

VIII. Responsibilities and Permitting Procedures:

a. An application for a Flow Equalization system shall include everything as required in Rule .1937 and at least the following information:

   i. A floor plan of the facility with a plumbing fixture schedule,
   ii. Days of operation,
   iii. Frequency of regular and special events,
   iv. Number of employees,
   v. Number of people in attendance at events,
   vi. Trips per day,
   vii. Parking capacity,
   viii. Building code occupancy limits for the structures, and
   ix. Any other information required to calculate an accurate design flow.

b. All systems shall be designed by a North Carolina registered professional engineer; local health department authorized agent or by an individual with advanced pump system training. The system shall be designed by a professional engineer when:

   i. pretreatment components have not received prior state approval, or
   ii. daily event flow (or Q) is 3,000 gallons per day or greater, or
   iii. duplex pumps are otherwise required per Rule .1952 (duplex pumps are required if linear footage of nitrification trenches exceeds 2000 feet) or this approval (equalized daily flow is 1500 gallons per day, or greater),
   iv. when either the septic tank or equalization tank volume exceeds 6000 gallons, or
   v. at any site proposed for flow equalization if so specified by the local health department.

   When required, plans and specifications shall be prepared, reviewed and approved in accordance with Rules .1938 (e) and (f).

c. Prior to the issuance of an Authorization to Construct for a Flow Equalization system with time dosing, site specific plans and specifications shall include:

   i. Septic tank, effluent filter, grease tank (if applicable), and dosing tank specifications including the specification that all tanks shall be state approved.
   ii. Preparation of a Flow Balance spreadsheet.
   iii. Level sensing devices (float) elevation (feet above sea level or in relation to the interior bottom of the tank) detail showing redundant "off", timer enable, high-level "on" and timer over-ride settings.
   iv. Specific plans and specifications for the control panel, with preliminary pump run time and pump off time specified.
   v. Effluent Pump specifications: (gpm @ TDH).

vi. Flow specifications for the distribution device (Pressure manifold, LPP network, drip network, or orifice control device if serial distribution is used).

d. The system shall be installed by a contractor who is registered to install systems in the county of the installation. The contractor shall coordinate the installation with the designer and the local health department.

e. Prior to issuance of an operation permit a contract for operation and maintenance shall be executed between the system owner and an ORC as required in accordance with Rule .1961(b). A condition of the operation permit shall be that a contract for operation and maintenance with an ORC shall remain in effect for as long as the system is to remain in use.

f. The Operation Permit shall contain conditions such as:

1. Maximum flow (includes)
   i. Equalized Daily Flow
   ii. Flow Equalization Cycle
   iii. Flow Event
2. Number of events per equalization period,
3. Limitations on attendance or usage of the facility,
4. Hours of operation,
5. Number of days between events,
6. Initial timer settings,
7. Measured pump delivery rate,
8. Other contingencies such as a contract with a certified pumper, and
9. The Operator in Responsible Charge may reset the timer settings only after approval from the Local Health Department.

g. For systems required to be designed by a professional engineer or by an individual with advanced pump system training, the designer must certify in writing that the system was installed in accordance with the approved plans and specifications prior to Operation Permit issuance.

IX. Repair of System:

The provisions of 15A NCAC 18A .1961 shall govern the use of the Flow Equalization System for repairs to existing malfunctioning wastewater systems.

Approved by: _____ **Date:** _____

MECKLENBURG COUNTY
LAND USE AND ENVIRONMENTAL SERVICES
Payment Receipt

Receipt Information

Date:	07/01/25	**Amount:**	200.00
Receipt #:	155997	**Tendered:**	200.00
Check / Auth #:	VISA 018877	**Returned:**	0.00
Received By:	MOORES		

Account Information

Account #: 200000
Contractor: CALEB CARPENTER
Attn:
Address:
Address:
City/State/Zip: ,

Item	Description	Quantity	Unit Price	Total Price
0734	Septic Construction Authorizat 3130 CAMPUS RIDGE	1	200.00	200.00

Permit#

----------Outstanding Balances----------

Month-To-Date	Prior Month	30 Days	60 Days	90 Days	Balance

MECKLENBURG COUNTY
LAND USE AND ENVIRONMENTAL SERVICES
Payment Receipt

Receipt Information

Date:	07/01/25	**Amount:**	200.00
Receipt #:	155998	**Tendered:**	200.00
Check / Auth #:	VISA 018877	**Returned:**	0.00
Received By:	MOORES		

Account Information

Account #: 200000
Contractor: CALEB CARPENTER
Attn:
Address:
Address:
City/State/Zip: ,

Item	Description	Quantity	Unit Price	Total Price
0703	Septic Operational Permit 3130 CAMPUS RIDGE	1	200.00	200.00

Permit#

----------Outstanding Balances----------

Month-To-Date	Prior Month	30 Days	60 Days	90 Days	Balance

FEE: 200.00
DATE: 7/1/2025

CONSTRUCTION AUTHORIZATION FOR AN ON-SITE WASTEWATER TREATMENT & DISPOSAL SYSTEM

MECKLENBURG COUNTY
GROUNDWATER & WASTEWATER SERVICES

FILE NUMBER: 12036B

PERMIT NUMBER: 30014902

PARCEL NUMBER: 21506107

JOB LOCATION INFORMATION

ADDRESS: 3130 CAMPUS RIDGE RD

CITY: MATTHEWS **STATE: NC** **ZIP:** 28105

ISSUED TO: DENNIS & ROBIN HARKEY

CONSTRUCTION AUTHORIZATION ISSUANCE DATE: 7/1/2025

CONSTRUCTION AUTHORIZATION CONDITIONS

1. WASTEWATER SYSTEM CONSTRUCTION AND INSTALLATION MUST MEET ALL CONDITIONS AND SPECIFICATIONS AS SET FORTH IN IMPROVEMENT PERMIT NUMBER 30014902, AND THE ATTACHED SITE PLAN WITH SYSTEM DETAILS. CONSTRUCTION AND INSTALLATION MUST ALSO MEET ALL REQUIREMENTS SET FORTH IN THE RULES GOVERNING SANITARY SEWAGE COLLECTION, TREATMENT, AND DISPOSAL AND ANY OTHER APPLICABLE RULES AND LAWS.

2. A PRE-CONSTRUCTION MEETING MUST BE SECURED PRIOR TO INSTALLATION OF THE SEPTIC TANK SYSTEM. THE INSTALLER OF THE SYSTEM SHALL BE A LICENSED SEPTIC TANK CONTRACTOR WITH THE NORTH CAROLINA ONSITE WASTEWATER CONTRACTOR INSPECTOR CERTIFICATION BOARD.

3. ANY ALTERATION IN SITE OR SOIL CONDITIONS (INCLUDING LOCATION OF STRUCTURES AND APPURTENANCES) OR MODIFICATION IN USE, DESIGN WASTEWATER FLOW, OR WASTEWATER CHARACTERISTICS AS SPECIFIED IN THE ASSOCIATED IMPROVEMENT PERMIT AND APPLICATION, MAY SUBJECT THIS CONSTRUCTION AUTHORIZATION AND ASSOCIATED PERMIT(S) TO REVOCATION.

4. THIS CONSTRUCTION AUTHORIZATION AS PROVIDED IN G.S. 130A-335(f) AND G.S. 130A-336(b) SHALL BE VALID FOR A PERIOD EQUAL TO THE VALIDITY OF THE IMPROVEMENT PERMIT, AND MAY BE ISSUED AT THE SAME TIME THE IMPROVEMENT PERMIT IS ISSUED.

Authorized Agent Signature April Baumgarner

MECKLENBURG COUNTY
LAND USE AND ENVIRONMENTAL SERVICES
Payment Receipt

Receipt Information

Date:	09/04/24	**Amount:**	450.00
Receipt #:	150685	**Tendered:**	450.00
Check / Auth #:	VISA 08498G	**Returned:**	0.00
Received By:	RAMSEMA		

Account Information

Account #: 200000
Contractor: BHATT RONAK
Attn:
Address:
Address:
City/State/Zip: ,

Item	Description	Quantity	Unit Price	Total Price
0735	Improv Permit Appl-Comm 3116 CAMPUS RIDGE RD	1	450.00	450.00

Permit#

----------Outstanding Balances----------

Month-To-Date	Prior Month	30 Days	60 Days	90 Days	Balance
			2,737.50		

Mecklenburg County Groundwater & Wastewater Services
3205 Freedom Dr. Suite 8000 Charlotte, NC 28208
Phone: (980) 314-1680 Fax: (704) 336-6894

Septic System Pre-Construction Meeting Checklist

File # 120368 App# 14903 Tax Parcel# 215-061-07

Property Owner: Tetra Supporting Organization Inc

Job Location Address: 316 Campus Ridge Rd

City: Matthews State: NC Zip Code: 28105

1. Does System design match facility, flow & wastewater characteristics?

   ☒ YES ☐ NO

   Comments: _____

2. Is there sufficient available space for the septic systems initial and repair areas?

   ☒ YES ☐ NO

   Comments: _____

   _____

3. Can the septic system be installed per the permit conditions and drawing on file?

   ☒ YES ☐ NO

   Comments: _____

   _____

*If "NO" is checked for any of the above the existing permit may need to be revoked.

Permission is hereby given to ☒ install ☐ alter ☐ repair an on-site wastewater treatment & and disposal system, with subsurface soil absorption and effluent discharge meeting all of the construction requirements of 15A NCAC 18A .1900 which are in effect on the date of granting this approval. **System shall not be installed while soils are in wet condition.**

April Barngarner
Authorized Agent

9/3/25
Date

Scott Simmons | David DeCaron
Others Present

Mecklenburg County Groundwater & Wastewater Services
3205 Freedom Dr. Suite 8000, Charlotte, NC 28208
Phone: (980) 314-1680 Fax: (704) 336-6894

NC DHHS
Division of Environmental Health
On-Site Wastewater Section

OPERATION PERMIT for an ON-SITE WASTEWATER TREATMENT & DISPOSAL SYSTEM

File #: 12036B Permit #: 14902 Tax Parcel #: 215-061-07

Property Owner: Telra Supporting Organization INC

Job Location Address: 3116 Campus Ridge Rd

City: Matthews State: NC Zip Code: 28105

Operation Permit Issuance Date: 12/18/25 Contractor Name: Stanley Env.

Permitted Design Flow: 581 GPD Liquid Capacity of Dosing Tank: 3000 gallons

Liquid Capacity of Septic Tank: 2000 gallons Tank Manufacture Shoaf Effluent Pump Model: Goulds WS1512 03 1.5HP.

Drainfield Installation ☐ N/A

Trench Depth: 30 inches

Trench Width: 3 feet

Line Spacing: 9 feet (O.C.)

Total line length: 775 feet

# of Lines: 11 @ various feet

Depth of Media: 12 inches (Type) CHM36

Depth of Cover: 18 inches

Distribution Device: P-Manifold

Inspection Dates

Tank(s) Inspected: 11/6/25

Excavation Inspected: 9/10/25

Pump & Controls Inspected: 12/19/25

SKETCH OF SYSTEM INSTALLATION
(As-Built Drawing)

"Installed per consultant design. See Attached.

Bed Installation *(For Repair Installations ONLY.)* ☒ N/A

Bed Depth: _____ inches

Bed Width: _____ feet

Total line length: _____ feet

# of Lines: _____ @ _____ feet

Depth of Media: _____ inches (Type) _____

Depth of Cover: _____ inches

Distribution Device: _____

Water Supply Source

☒ Municipal ☐ Private Well ☐ Community Well

☐ Other _____

System Installation Setbacks

Distance from Building Foundation: 10 feet

Distance from Property Line: 10 feet

Distance from Water Supply Source: 10 feet

The undersigned has inspected the Septic Tank System described above, and certifies it has been ☒ installed ☐ altered ☐ repaired ☒ as detailed in the plot above ☐ in accordance with the permit issued and meets the provisions of 15A NCAC 18A. 1900, "Laws and Rules for Sewage Treatment and Disposal Systems" in effect on the date of issuance of the permit. The issuance of this Operation Permit does not in any way guarantee that the system will operate properly or relieve any person now or hereafter owning, controlling, or using such system from any liability resulting from the failure of the system to operate properly. This document is issued subject to those restrictions and conditions shown on the permit(s) and the provisions of 15A NCAC 18A. 1900 in addition to those listed below under "Comments." This document shall be null and void if any information contained in the application is untrue or if any additions are made to the property which would increase the requirements for said system.

Notice: Disturbance of the designated repair area may result in the Suspension or Revocation of this permit.

Comments: System Classification & Type: Va. / P / CHM36 / NA / P.T.

DENR Authorized Agent: April Burngarner Signature: April Burngarner

Mecklenburg County Groundwater & Wastewater Services
3205 Freedom Dr. Suite 8000, Charlotte, NC 28208
Phone: (980) 314-1680 Fax: (704) 336-6894

NC DHHS
Division of Environmental Health
On-Site Wastewater Section

OPERATION PERMIT for an ON-SITE WASTEWATER TREATMENT & DISPOSAL SYSTEM

File #: 12036B Permit #: 14902 Tax Parcel #: 215-061-07

Property Owner: Tetra Supporting Organization INC

Job Location Address: 3116 Campus Ridge Rd

City: Matthews State: NC Zip Code: 28105

OPERATION PERMIT CONDITIONS:

I. Performance: System shall perform in accordance with 15A NCAC 18A .1961.

II. Monitoring: System shall be monitored as required by 15A NCAC 18A .1961.

III. Maintenance: Ground absorption sewage treatment and disposal systems shall be checked, and the contents of the septic tank removed, periodically from all compartments, to ensure proper operation of the system. The contents shall be pumped whenever the solids level is found to be more than 1/3 of the liquid depth in any compartment.

IV. Operation: System shall be operated in accordance with 15A NCAC 18A .1961.

System Classification: Va

*Operation Permits for Type V and VI systems expire five (5) years from the date of issuance (in accordance with Table V(a)). The system owner must contact GWS six (6) months prior to expiration for permit renewal.

Subsurface system operator required: Yes ☒ No ☐

☒ This type of system requires the system owner to maintain a contract with a certified operator to perform system inspection, maintenance, and reporting as required in 15A NCAC 18A .1961. and Table V(a). The system owner is responsible for all fees associated with these services.

☐ System does not require inspection by GWS on a routine frequency.

☐ System requires inspection by GWS once every five (5) years. The system owner is responsible for all fees associated with the inspection.

☐ System requires inspection by GWS once every three (3) years. The system owner is responsible for all fees associated with the inspection.

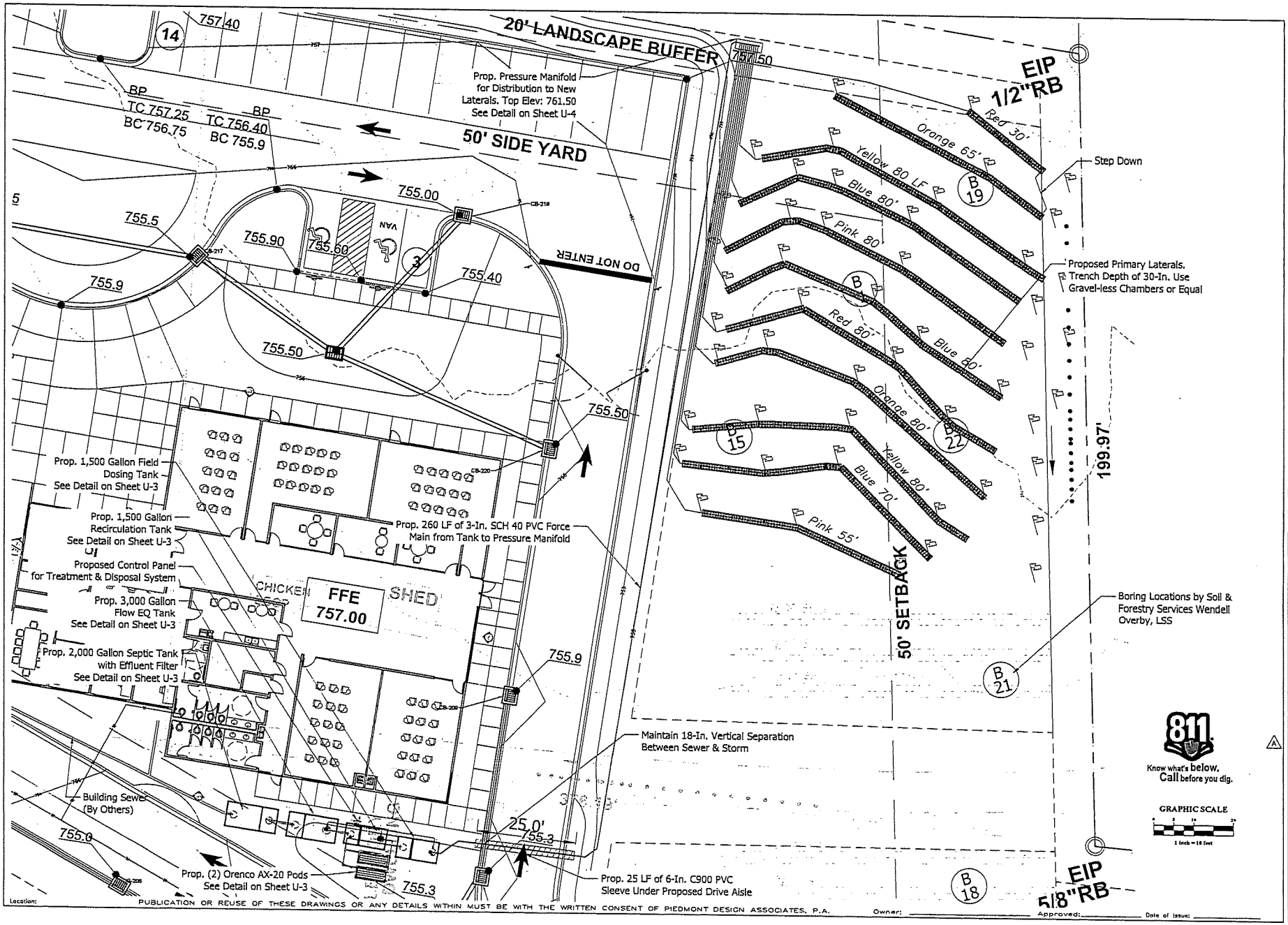
☒ System requires inspection by GWS once every twelve (12) months. The system owner is responsible for all fees associated with the inspection.

☐ System requires inspection by GWS once every six (6) months. The system owner is responsible for all fees associated with the inspection.

V. Other:

DENR Authorized Agent: April Bumgarner Date: 12/19/25

Signature: April Bumgarner



PUBLICATION OR REUSE OF THESE DRAWINGS OR ANY DETAILS WITHIN MUST BE WITH THE WRITTEN CONSENT OF PIEDMONT DESIGN ASSOCIATES, P.A.

Location: Owner: Approved: Date of Issue:

PIEDMONT DESIGN Associates, P.A.

PREPARED FOR:
TELRA SUPPORTING ORGANIZATION, INC.
4150 MCKEE ROAD
CHARLOTTE, NC 28270
704-727-2530

SEPTIC SYSTEM AREA PLAN
TELRA INSTITUTE HIGH SCHOOL
3116 CAMPUS RIDGE ROAD
MATTHEWS, MECKLENBURG COUNTY, NORTH CAROLINA

REVISIONS	BY
A 9/17/24 PER COMMENTS BY LEA AND MCM DE. 9/17/2024	DMD

Date: 8/19/24
Scale: 1" = 10 FT, 1' CONTOURS
Drawn: DMD
Checked: DLM
Project: 2024-08-01
Job: 2024-08-01
Sheet: U-2
A 9/17/24