LINDBLOOM

Lindbloom Septic Design
PO Box 1666
Grass Valley, CA 95945

Date: June 15, 2026

Assessor's Parcel Number: 022-020-026

Owner/Applicant: Nevada County Health & Human Services

Property Location: 12875 Rattlesnake Road, Grass Valley

Proposed Use: Existing home and proposed attached ADU, which will serve 7 total occupants

Size of Property: 1.54± Acres

Water Supply: City water

Attached please find the requested calculations for the 100% Repair Area, a revised plot plan, and a designer certification.

Marc Lindbloom, R.E.H.S. #6884
(530) 888-7464

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DRIPFIELD CALCULATIONS
100% REPAIR AREA

1. Average percolation rate:	9.6 mpi at the 18" depth
2. Soil textural classification:	Clay Loam
3. Application rate: (pg. 8, Geoflow design manual)	0.4 gal/sq ft/day
4. Recommended application rate:	0.3 gal/sq ft/day
5. Square footage per occupant: (80 gal/occupant ÷ 0.3 gal/sq ft/day)	267 sq ft/occupant
6. Total square footage required: (267 sq ft/occupant x 7 occupants)	1,869 sq ft
7. Available area* (recommended Repair Area): (see plot plan)	4,000 sq ft

*Does not include the additional area to the north of the proposed ADU dripfield.

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REVISED SEPTIC PLAN

Updated to show reduced repair area and proposed drainage.

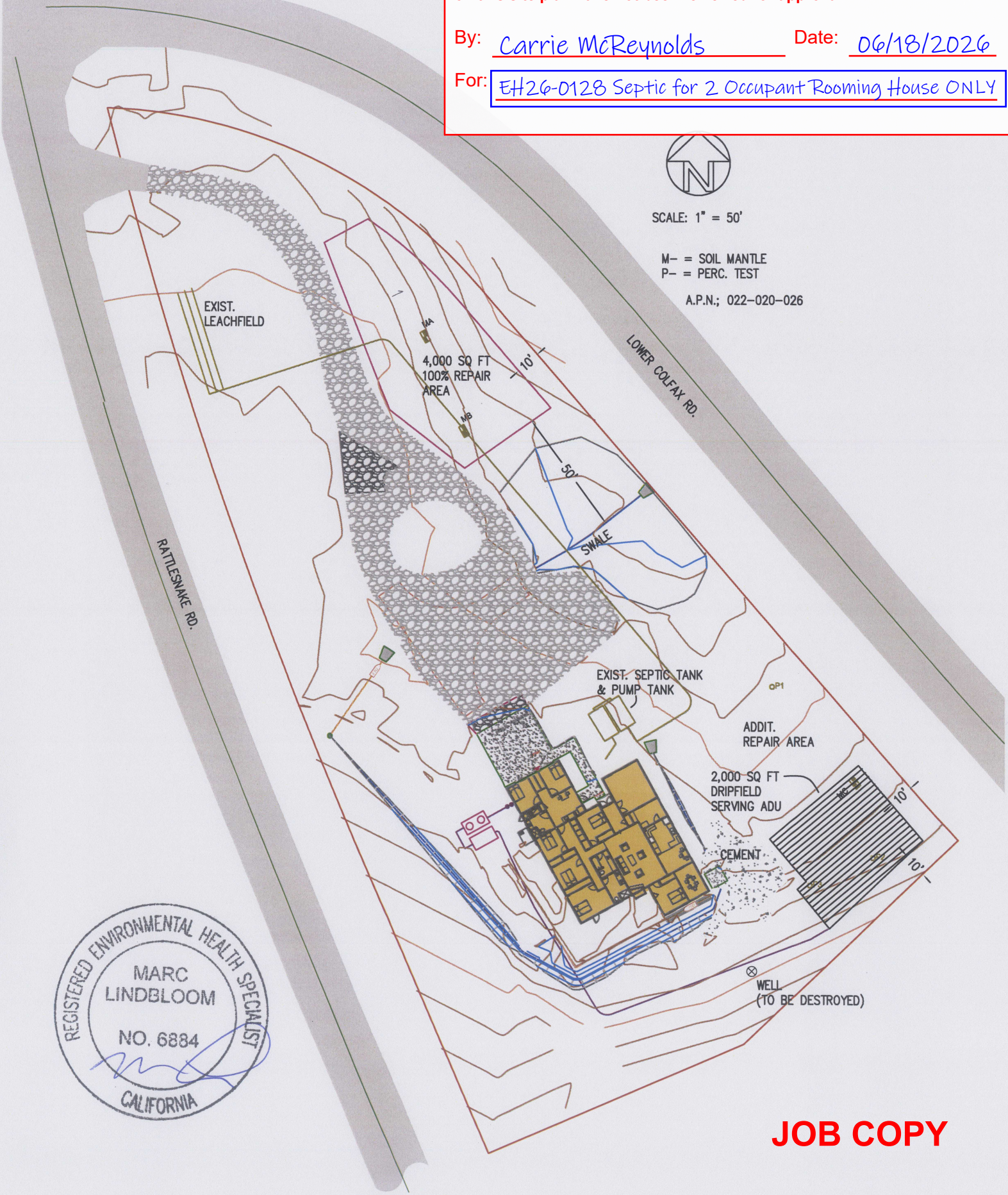
REVIEWED AND ACCEPTED

NEVADA COUNTY ENVIRONMENTAL HEALTH DEPARTMENT

Reviewed and accepted in conformance with NCDEH Local Area Management Plan (LAMP) and other applicable requirements. Structures on this site plan have not been reviewed for approval.

By: Carrie McReynolds Date: 06/18/2026

For: EH26-0128 Septic for 2 Occupant Rooming House ONLY



REGISTERED ENVIRONMENTAL HEALTH SPECIALIST
MARC LINDBLOOM
NO. 6884
CALIFORNIA

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NAVO & SONS, INC.

PO Box 975
815 Idaho-Maryland Rd.
Grass Valley CA 95945

"Your Septic System Specialist"
530 273-2964
530 885-6066
916 652-7665
www.navo.com

Certificate

I am a duly registered environmental Health Specialist in the State of California. My registration number is 6884. I have completely and thoroughly reviewed the site described as Assessor's Parcel Number 6884 and, in accordance with the County Land Use and Development Code, Chapter VI, and my field inspection and tests, the attached design is submitted.

I will make field inspections to determine that the facilities are constructed in accordance with my design. I hereby certify that these facilities as recommended and designed have been designed in accord with sound engineering principles, and satisfactory performance is expected. However, the state of the art sewage disposal system design is such that no guarantee can be made as to the length of time that satisfactory service will occur.

I understand that, prior to requesting a sewage disposal system construction permit final approval, I will have to certify in writing to the permit file that the installation described above has been installed in conformance with the construction design.

Date: 6/15/26

Marc Lindbloom, REHS #6884

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APN:

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Grass Valley CA 95945

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Certificate

I am a duly registered environmental Health Specialist in the State of California. My registration number is 7471. I have completely and thoroughly reviewed the site described as Assessor's Parcel Number 022-020-026 and, in accordance with the County Land Use and Development Code, Chapter VI, and my field inspection and tests, the attached design is submitted.

I will make field inspections to determine that the facilities are constructed in accordance with my design. I hereby certify that these facilities as recommended and designed have been designed in accord with sound engineering principles, and satisfactory performance is expected. However, the state of the art sewage disposal system design is such that no guarantee can be made as to the length of time that satisfactory service will occur.

I understand that, prior to requesting a sewage disposal system construction permit final approval, I will have to certify in writing to the permit file that the installation described above has been installed in conformance with the construction design.

Date: 2-26-26

Dave Slaughter

REGISTERED ENVIRONMENTAL HEALTH SPECIALIST
DAVID SLAUGHTER
REHS # 7471
EXP. 12/26
STATE OF CALIFORNIA

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ADU for 12875 Rattlesnake Rd Grass Valley

APN: 022-020-026

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Certificate

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I will make field inspections to determine that the facilities are constructed in accordance with my design. I hereby certify that these facilities as recommended and designed have been designed in accord with sound engineering principles, and satisfactory performance is expected. However, the state of the art sewage disposal system design is such that no guarantee can be made as to the length of time that satisfactory service will occur.

I understand that, prior to requesting a sewage disposal system construction permit final approval, I will have to certify in writing to the permit file that the installation described above has been installed in conformance with the construction design.

Dave Slaughter

Date: 2-26-26

REGISTERED ENVIRONMENTAL HEALTH SPECIALIST
DAVID SLAUGHTER
REHS #7471
EXP. 12/26
STATE OF CALIFORNIA

ADU for 12875 Rattlesnake Rd Grass Valley *APN: 022-020-026*

REVIEWED AND ACCEPTED

NEVADA COUNTY ENVIRONMENTAL HEALTH DEPARTMENT
Reviewed and accepted in conformance with NCDEH Local Area Management Plan (LAMP) and other applicable requirements. Structures on this site plan have not been reviewed for approval.

By: Carrie McReynolds Date: 05/26/2026

For: EH26-0128 Septic for 2 Occupant Rooming House ONLY

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Advantex RT Pretreatment with Geoflow Drip Design

March 7, 2026

To: Nevada County Health & Human Services
950 Maidu Ave
Nevada City Ca 95959

Reference: ADU for 12875 Rattlesnake Rd Grass Valley APN: 022-020-026

This design is used to apply for the installation permit with the County and get an estimated install price from your desired installer.

Project Details: Soil testing evaluation (results attached) were performed on 02/27/2025 & 01/15/2026 by us to establish a sewage disposal area for the ADU and repair area for both ADU and the Main house.

Calculations

This site is suited for a **"Advantex RT Pretreatment with Geoflow Drip"** sewage disposal system around soil test pits MC

The average percolation rate around these soil test pits is 9.6 mpi. *(see percolation data page)*

Recommend to install 2000 lineal feet to maximize the limited area (minimum 1000 LF is required) **"Geoflow Drip"** leach line will be required *(See Geoflow Dripfield Design for details) Also there may be a well in the vicinity of this system and per the County it will need to be abandoned*

Installation / Design Details:

"Advantex Pretreatment with Geoflow Drip" for: 2 occupants

(Minimum footage required) as shown on the approved site plan*: 1000 lineal feet (Recommend installing 2000 lineal feet to maximize the area)

Depth of Geoflow Drip lines *LEVEL ON COUNTOUR: 6"

Minimum Line separation: **2-feet on center**

Minimum required septic tank size: 1000 gallons

Minimum required discharge (pump) tank size: N/A

(See "Advantex/Geoflow drip Installation Guidelines" for installation details)

*Sewage flows are based on the requirements for a rooming house at 80 gal / person / day

Use this design to apply for the permit for installation and/or get an accurate installation price. If desired to have our installation division work up an installation, please contact our office.

Dave Slaughter, REHS #7471

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Percolation Data Sheet

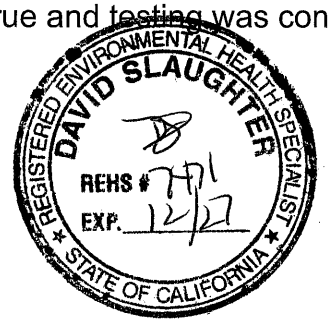
12875 Rattlesnake Rd Grass Valley, CA 95945 APN:022-020-026

	(P1)			(P2)			(P3)		
	Interval	Depth: 18"		Interval	Depth: 18"		Interval	Depth 18"	
1	0	34.25	Drop	0	33.50	Drop	0	34.50	Drop
2	10	32.75 (r) 34.25	1.50	10	32.13 (r) 34.38	1.38	10	30.50 (r) 35.00	4.00
3	10	32.75	1.50	10	32.75 (r) 34.38	1.63	10	31.00	4.00
4				10	33.25 (r) 34.00	1.13			
5				10	32.88	1.13			
6									
7									
8									
	Perc Rate (MPI)		6.7 ✓	Perc Rate (MPI)		8.9 ✓	Perc Rate (MPI)		2.5 ✓
Average Perc Rate using correction factor 1.59 = 9.6 ✓mpi (0.4 loading rate)									

(r) = Percolation test holes are refilled between each reading

Test Date: 01/21/2026
Test Conducted By: Cory Pavan

These percolation tests were performed under the guidelines set forth in County Sewage Disposal Technical Regulations. The statements made above are true and testing was conducted under the supervision of an Environmental Health Specialist.



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NEVADA COUNTY CALIFORNIA
Community Development Agency
Environmental Health
PH: (530) 265-1222 ext. 3
FAX: (530) 265-9854
Env.Health@nevadacountyca.gov
950 Maidu Avenue Suite #170
Nevada City, CA 95959
www.nevadacountyca.gov/eh

Nevada County Soils Testing Mantle Logs

Permit No. EH25-0085 APN: 22-20-26 Date: 2-27-25 Site Address: 12875 Lake Spaulding

Consultant: _____ Nevada County Representative: Carla

Soil Mantle # MA Slope: _____% Aspect: _____
1st HORIZON Depth: 0 to 28
Texture: s ls sl sc scl l c cl sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: 2.5 Y 2 x 5/4
Redoximorphic Features: none few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: Free Water @ 28"
Same as SOIL MANTLE # _____, Horizon # _____

2nd HORIZON Depth: _____ to _____
Texture: s ls sl sc scl l c cl sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: _____
Redoximorphic Features: none few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: _____
Same as SOIL MANTLE # _____, Horizon # _____

3rd HORIZON Depth: _____ to _____
Texture: s ls sl sc scl l c cl sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: _____
Redoximorphic Features: none few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: _____
Same as SOIL MANTLE # _____, Horizon # _____

4th HORIZON Depth: _____ to _____
Texture: s ls sl sc scl l c cl sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: _____
Redoximorphic Features: none few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: _____
Same as SOIL MANTLE # _____, Horizon # _____

Effective Soil Depth : 28 Groundwater: NO YES @ depth: 28

Soil Mantle # _____ Slope: _____% Aspect: _____
1st HORIZON Depth: _____ to _____
Texture: s ls sl sc scl l c cl sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: _____
Redoximorphic Features: none few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: _____
Same as SOIL MANTLE # _____, Horizon # _____

2nd HORIZON Depth: _____ to _____
Texture: s ls sl sc scl l c cl sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: _____
Redoximorphic Features: none few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: _____
Same as SOIL MANTLE # _____, Horizon # _____

3rd HORIZON Depth: _____ to _____
Texture: s ls sl sc scl l c cl sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: _____
Redoximorphic Features: none few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: _____
Same as SOIL MANTLE # _____, Horizon # _____

4th HORIZON Depth: _____ to _____
Texture: s ls sl sc scl l c cl sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: _____
Redoximorphic Features: none few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: _____
Same as SOIL MANTLE # _____, Horizon # _____

Effective Soil Depth : _____ Groundwater: NO YES @ depth: _____

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Nevada County Representative Signature

Consultant Signature

NEVADA COUNTY CALIFORNIA
Community Development Agency
Environmental Health
PH: (530) 265-1222 ext. 3
FAX: (530) 265-9854
Env.Health@nevadacountyca.gov
950 Maidu Avenue Suite #170
Nevada City, CA 95959
www.nevadacountyca.gov/eh

Nevada County Soils Testing Mantle Logs

Permit No. EH25-0028 APN: 022-020-026 Date: 4-15-26 Site Address: 12475 Rattlesnake

Consultant: _____ Nevada County Representative: Cameron Reynolds

Soil Mantle # MB Slope: _____% Aspect: _____
1st HORIZON Depth: 0 to 28
Texture: s ls sl sc scl l c (cl) sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: 2.5YR 5/4
Redoximorphic Features: (none) few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: _____
Same as SOIL MANTLE # _____, Horizon # _____

2nd HORIZON Depth: 28 to 36
Texture: s ls sl sc scl l c cl sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: 7.5YR 4/6
Redoximorphic Features: none few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: Water @ 32" - pooling in
Same as SOIL MANTLE # _____, Horizon # _____

3rd HORIZON Depth: 36 to 45
Texture: s ls sl sc scl l (c) cl sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: _____
Redoximorphic Features: none few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: _____
Same as SOIL MANTLE # _____, Horizon # _____

4th HORIZON Depth: _____ to _____
Texture: s ls sl sc scl l c cl sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: _____
Redoximorphic Features: none few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: _____
Same as SOIL MANTLE # _____, Horizon # _____

Effective Soil Depth : 36 Groundwater: NO (YES) @ depth: 36

Soil Mantle # MC Slope: 2 % Aspect: SW
1st HORIZON Depth: 0 to 22
Texture: s ls sl sc scl l c cl sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: _____
Redoximorphic Features: none few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: _____
Same as SOIL MANTLE # MB, Horizon # 1

2nd HORIZON Depth: 22 to 46
Texture: s ls sl sc scl l c cl sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: 7.5YR 5/4
Redoximorphic Features: none few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: Water @ 46"
Same as SOIL MANTLE # _____, Horizon # _____

3rd HORIZON Depth: _____ to _____
Texture: s ls sl sc scl l c cl sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: _____
Redoximorphic Features: none few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: _____
Same as SOIL MANTLE # _____, Horizon # _____

4th HORIZON Depth: _____ to _____
Texture: s ls sl sc scl l c cl sic sicl sil si DRX IWRX MWRX DG
Rock Fragments: gravel _____% cobble _____% stone _____%
Color: _____
Redoximorphic Features: none few common many
RC Color _____ RD Color _____ RM Color _____
Structure: granular platy blocky prism f m c single grain massive
Soil Pores: none few common many f m c inters tubular
Moisture: Dry moist wet saturated **Consistency:** l vfr fr f vf ef
Plasticity: no sp mp vp **Stickiness:** ns ss ms vs
Roots: none few common many vf f m c
Boundary / Distinctness: a c g d **Topography:** s w i b
Notes: _____
Same as SOIL MANTLE # _____, Horizon # _____

Effective Soil Depth : 46 Groundwater: NO (YES) @ depth: 46

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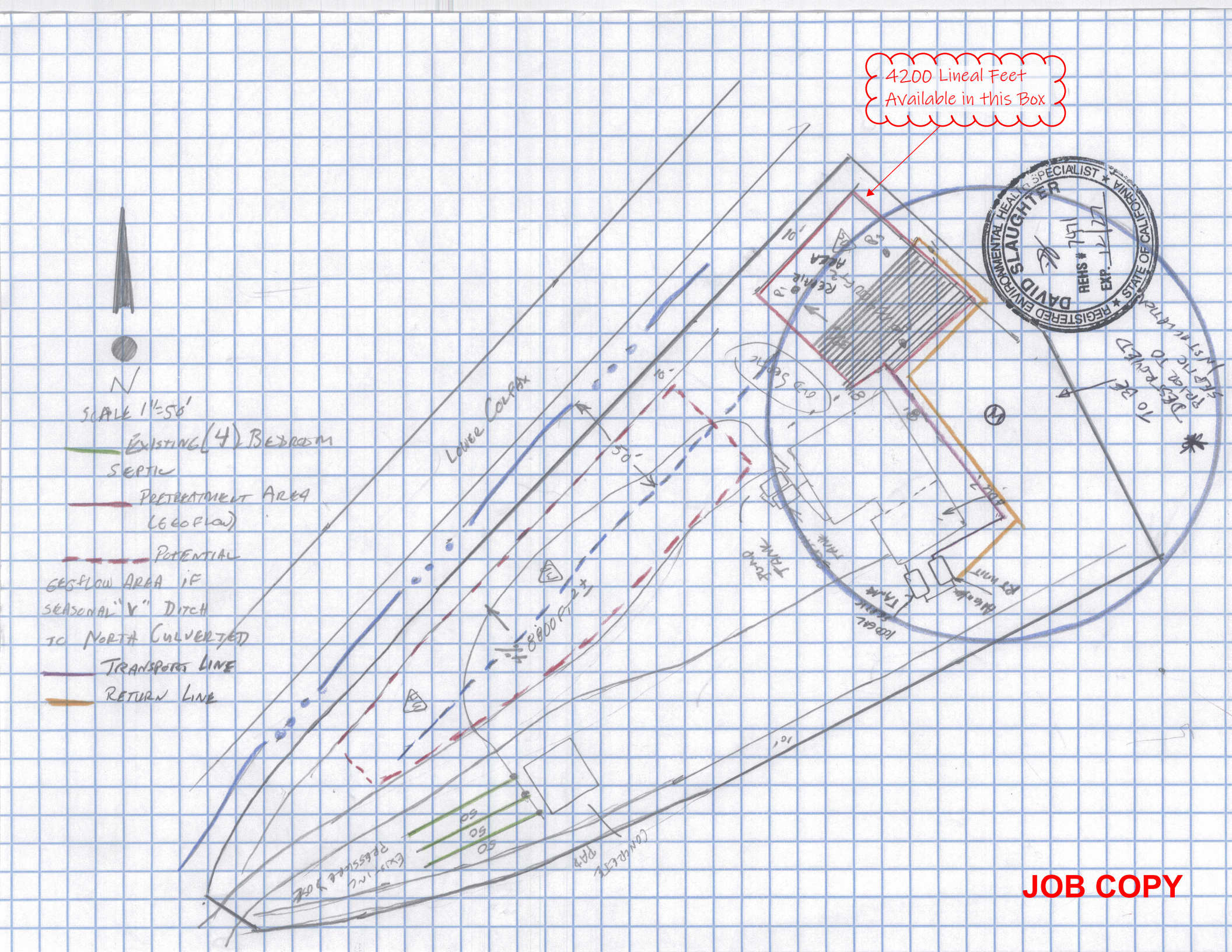
Nevada County Representative Signature

PT for 2nd TOM

Consultant Signature


4200 Lineal Feet
Available in this Box
N
SCALE 1"=50'
EXISTING (4) BEDROOM
SEPTIC
PRETREATMENT AREA
(600 FLOW)
POTENTIAL
600 FLOW AREA IF
SEASONAL "V" DITCH
TO NORTH CULVERTED
TRANSPORT LINE
RETURN LINE
LOUISE COLFAX
688 OPEN
REGISTERED ENVIRONMENTAL HEALTH SPECIALIST
DAVID SLAUGHTER
REHS #
EXP.
STATE OF CALIFORNIA
JOB COPY

Nevada County, CA

March 4, 2025

JOB COPY

Scale: 1:1,128

0 0.0075 0.015 0.03 mi

0 0.015 0.03 0.06 km

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Special Requirements For Advantex Filter Systems

1. This Advantex System must be installed by an Advantex manufacturer approved installer familiar with installing this type of system in this County. This septic system should be installed by a licensed contractor (Sanitation Systems C-42) or (General A).
2. This system requires **a Vericom Telemetry Control Panel, which needs a phone line (or internet) connection for remote telemetry as required by County Ordinance**. Please note: it does not require a dedicated phone line service.
3. This system requires annual maintenance and monitoring. **The owner must register this system with the County Environmental Health Department and contract with an Orenco certified and County approved "Certified Service Provider" for lifetime Monitoring & Maintenance**.
4. Your Certified Service Provider will be required to be at the final installation inspection, to make sure the system is programmed to my design and that it is operating normally.
5. This system requires a water supply for this site to have a pH between 6 and 8.
6. This report in not a construction permit. A permit to install this system must be obtained from the Department of Environmental Health.

This system has been designed in accordance with the latest industry recognized design standards and County code guidelines. However, the state of the art of sewage disposal design is such that no guarantee can be made as to the length of time that satisfactory service will occur.

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Advantex Design

This Advantex design utilizes an AXRT model Advantex Filter Pod which is designed to handle up to 450-gallons per day of effluent flow. The actual daily flow rate should be approximately 50% of the peak flow rate. For this design, a flow rate of 80 gal/person/day will be used. As part of the annual required maintenance, your Certified Service Provider will determine the actual flow rate so the recirculation ratio can be properly maintained.

Design sewage flows: (80 gal/person/day x **2** occupants)	**160 gallons/day**
Actual Flow Rate: (estimated)	**150 gallons/day**
Recirculation ratio: (the ratio that every unit of effluent moves through the filter)	**4 : 1**
Volume pumped per day: (300 gals / day x 4 (ratio))	**1200 gallons/day**
Pump run time: (1200 gals / day / 30 gals/min)	**40 minutes/day**
Dose Frequency:	**72 cycles/day**
Advantex dose time per cycle:	**.3 minutes on**
Time between doses:	**60 minutes off**
Volume per dose:	**10 gallons**
Override dose time per cycle:	**.3 minutes on**
Override time between doses:	**30 minutes off**

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Advantex Pod Pressure Distribution Design

Please Note: All pipes and fittings to be Scheduled 40 PVC unless otherwise noted

Design hydraulic head:	**5 foot**
Distribution lateral size:	**1" diameter**
Number of laterals per pod:	**5**
Length of Lateral:	**7-feet**
Hole size in lateral:	**1/8-inch diameter**
Holes per lateral:	**13 to 14**
Holes per pod:	**68**
Discharge rate per hole:	**.43 gals / minute**
Discharge rate:	**29.2 gals / minute**
Dose volume:	**5.84 gals**
Pressure line from Recirc Tank size:	**1" diameter**

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ADU for 12875 Rattlesnake Rd Grass Valley

APN: 022-020-026

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Advantex Hydraulic Calculations

Gallons per dose:	**10 gallons**
Doses Per day:	**72/day**
Pump Flow Rate:	**30 gallons / minute**

Head Loss Calculations

Elevation from recirc-tank to filter pod:	**0 +/- feet**
Pump level in tank:	**5 +/- feet**
Friction loss of 1" pump line: 40' per 100' @ 30 gal/min	**6 +/-**
Friction loss of 1" lateral: 2.69' per 100' @ 6 gal/min	**0.9 +/-**
Fitting friction loss:	**5 +/-**
Design head:	**5 +/-**
Total Head loss:	**21.9 +/-**

Use Orenco Systems, Inc. P300511, 1/2 hp, 115 volt, sewage effluent pump.
(this is capable of discharging 30 gpm @ 60' head loss with a total head of 112'

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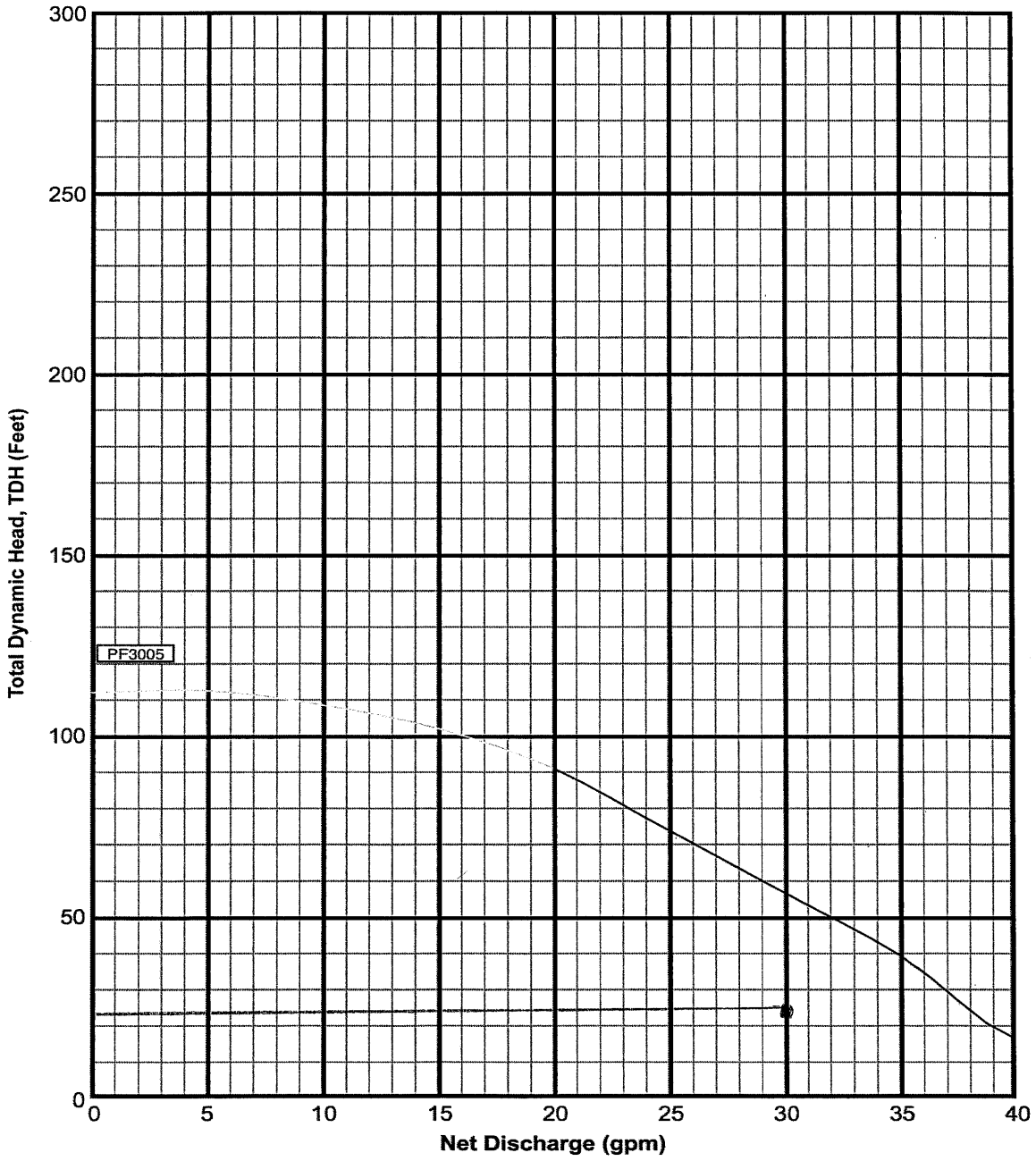
Advantex Pump Curve

Pump Curve

for PF3005



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ADU for 12875 Rattlesnake Rd Grass Valley *APN: 022-020-026*

PUMP SIZING

Job Description:	*128 75 Rattlesnake*
Contact:	*NC*
Prepared by:	*DS*
Date:	*2/20/2026*

Please fill in the shaded areas and drop down menus:
This spreadsheet is a guide for small systems with residential waste & is not a complet
Pressure losses may be grossly overstated, particularly if designing with WASTEFLOW
The letters on the diagram(right) match the letters in section 2 below.

Worksheet - Pump Sizing

Section 1 - Summary from Worksheet 1		
Flow required to dose field	2.21	gpm
Flow required to flush field	6.29	gpm
Flow required to dose & flush field	8.50	gpm
Filter	BioDisc Battery 2	
No. of Zones	1	zones
Zone valve	-	
Dripline	Wasteflow PC - 1/2gph	
Dripline longest lateral	29.41	ft.

Section 2	Ft of head	Pressure
A. Flush line **- Losses through return line**	**A.** Flush	
Select Pipe from dropdown menu	PVC schedule 40	
Select Flush Line Diameter	2" inch	
Length of return line	220 ft.	
Equivalent length of fittings	5 ft.	
Elevation change. (if downhill enter 0)	**0** ft.	
Pressure loss in 100 ft of pipe	0.10 ft.	0.04 psi
Total pressure loss from end of dripline to return tank	*0.2 ft.*	0.10 psi
B. Dripline **- Losses through Wasteflow dripline**	**B.** Dripline **- Losses through Wasteflow dripline**	
Length of longest dripline lateral	**29** ft.	
Minimum dosing pressure required at end of dripline	23.10 ft.	10.00 psi
Loss through dripline during flushing	0.12 ft.	0.05 psi
Total minimum required dripline pressure	*23.22 ft.*	10.05 *psi*
A+B. Minimum Pressure required at beginning of dripfield	**A+B.** Minimum Pressure required at begi	
CALCULATED pressure required at beginning of dripf	*23.44 ft.*	10.15 *psi*
SPECIFIED pressure at beginning of dripfield (from w	**57.8 ft.**	25.00 *psi*
Great! SPECIFIED Pressure is greater than CALCULATED Pressure requirement. Go to next step		
C. Drip components **- Losses through headworks**		
Filter	11.1 ft.	4.80 psi
Zone valve pressure loss (not in diagram)	- ft.	- psi
Flow meter pressure loss (not in diagram)	ft.	- psi
Other pressure losses	ft.	- psi
Total loss through drip components	**11.09 ft.**	4.80 psi
D. Supply line **- Minimum Pressure head required to get from pump tank to top of dripfield**		
Select Pipe from dropdown menu	PVC schedule 40	
Select Supply line diameter	2" inch	
Length of supply line	200 ft.	
Equivalent length of fittings	5 ft.	
Height from pump to tank outlet	5 ft.	
Elevation change. (if downhill enter 0)	0 ft.	
Pressure loss/gain in 100 ft. of pipe	0.17 ft.	0.07 psi
Total gain or loss from pump to field	***5.4 ft.***	2.32 psi
Total dynamic head	**74.2 ft.**	32.12 *psi*
Pump capacity * - Field Flush Flow	**8.5 gpm**	32.12 *psi*
- Field Dose Flow	**2.2 gpm**	
- Filter Flush Flow	**40.0 gpm**	40.00 *psi*
Pump Model Number		
Voltz / Hp / phase		

* Note: Pump capacity flow assumes flow in dripline does not change during a dose cycle. With Wasteflow Cla
For more accurate flows please see Geoflow's **Flushing worksheet**.
If you need assistance designing for this additional flow, please
a. See Geoflow flushing worksheet or
b. Contact Geoflow at 800-828-3388.

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FIELD FLOW

Job Description:	*128 75 Rattlesnake*
Contact:	*NC*
Prepared by:	*DS*
Date:	*20-Feb-26*

Please fill in the shaded areas and drop down menus:

This spreadsheet is a **guide** for **small** systems with **residential** waste & is not a co

Worksheet 1- Field Flow

Total field

Total Quantity of effluent to be disposed per day	160	gallons / day
Hydraulic loading rate	0.4	gallons / sq.ft. / da
Minimum Dispersal Field Area	400	square ft.
Total Dispersal Field Area	1,000	square ft.

Flow per zone

Number of Zones	**1**	zone(s)
Dispersal area per zone	1,000	square ft.
Choose line spacing between WASTEFLOW lines	2	ft.
Choose emitter spacing between WASTEFLOW emitt	2	ft.
Total linear ft.per zone (minimum required)	500	ft. per zone
Total number of emitters per zone	250	emitters per zone
Select Wasteflow dripline (16mm)	Wasteflow PC - 1/2gph	dripline
	Wasteflow Classic	
	Wasteflow PC - 1/2gph	
	Wasteflow PC - 1 gph	
Pressure at the beginning of the dripfield	25	psi
Feet of Head at the beginning of the dripfield	57.75	ft.
What is the flow rate per emitter in gph?	0.53	gph
Dose flow per zone	**2.21**	**gpm**

Note: A few States or Counties require additional flow for flushing. Please check your local regulati

Flush velocity calculation below is for PC dripline. Classic dripline requires less flow to flush than P

Please refer to Geoflow's spreadsheet "Design Flow and Flush Curves" at www.geoflow.com or call

If required, choose flush velocity	0.5	ft/sec
How many lines of WASTEFLOW per zone?	17	lines
Fill in the *actual* length of longest dripline lateral	29	ft.
Flush flow required at the end of each dripline	0.37	gpm
Total Flow required to achieve flushing velocity	6.29	gpm
Total Flow per zone- worst case scenario	**8.50**	**gpm**

Select Filters and zone valves

Select Filter Type	BioDisc Self Flushing Battery	
Recommended Filter (item no.)	BioDisc Battery 2	40-70 gpm / 40 psi
Select Zone Valve Type	Hydraulic	-
Recommended Zone Valve (item no.)	0	0

Note minimum pressure of 25 psi required for Hydraulic valves.Check pressure in Cell D28

Dosing

Number of doses per day / zone:	12	doses
Timer ON. Pump run time per dose/zone:	6.02	mins:secs
Timer OFF. Pump off time between doses	1:53	hrs:mins
Per Zone - Pump run time per day/zone:	1:12	hrs:mins
All Zones - Number of doses per day / all zones	12	doses / day

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Geoflow Dripfield Design

Soil textural classification:	**Clay Loam**
Average percolation rate:	**9.6 mpi**
Percolation Depth:	**18"**
Hydraulic loading rate:	**.4 gal/square ft/day**
(See Geoflow Design Manual, pg. 8)	
Minimum absorption area for 2 bedroom:	**2000SF**
(300 gal/day / 6.66 gal/sq ft/day)	
Design Depth and separation:	**6 inches deep**
Dripline spacing:	**24 inches on center**
Dripline required: (2000 sq ft / 2 foot spacing)	**1000 lineal feet**
Emitter spacing:	**24 inches on center**
Total Emitters:	**500**
Emitter flow rate:	**.53 gallon/hour (7-60 psi)**
(see Geoflow Design Manual, pg. 30)	
Total flow rate per hour: (500 x .53 gal/hr)	**265 gallons/hour**
Total flow rate per min: (265 gals/hr / 60 min)	**4.41 gals/minute**
Maximum daily pump time:	**36.28 minutes/day**
(160 gallons/day / 4.41 gallons/minute)	

Timer settings

Standard Timer	**1.51 minutes on**
	1 hour off
Override Timer	**1.51 minutes on**
	30 minutes off

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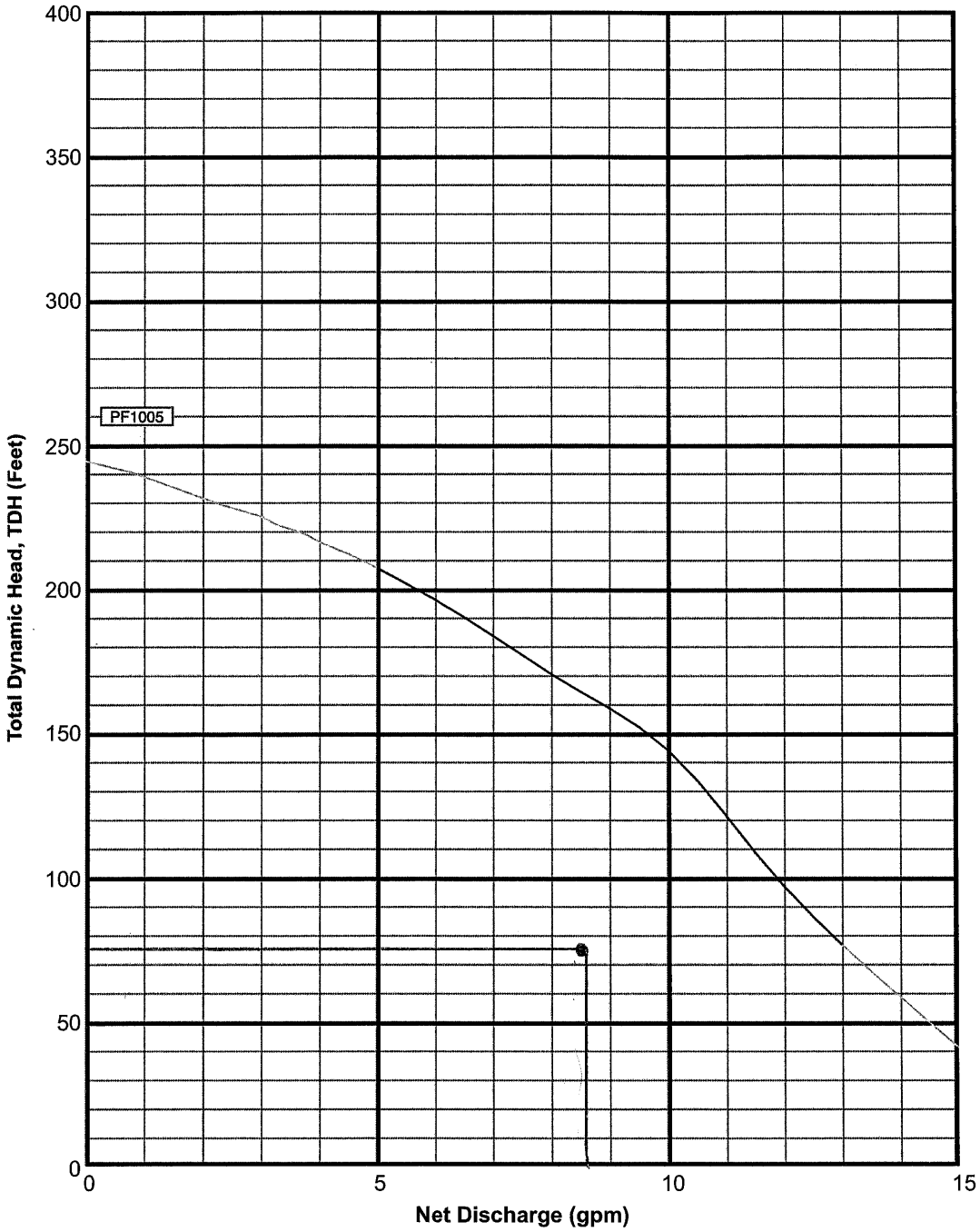
ADU for 12875 Rattlesnake Rd Grass Valley *APN: 022-020-026*

Pump Curve

for PF1005



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Geoflow Hydraulic Calculations

Head Loss Calculations

Elevation from discharge tank to drip field:	**0 +/- feet**
Pump level in tank:	**5 +/- feet**
Friction loss of 2" pump line: See geo-flow worksheet	**5.4 +/-**
Friction loss drip line: See geo-flow worksheet	**0.2 +/-**
Head needed at start of drip: See geo-flow worksheet	**57 +/-**
Filter / Headwork friction loss:	**11.1 +/-**
Zone friction loss:	**0 +/-**
Fitting Friction Loss:	**0 +/-**
Total Head loss:	**74.2 +/-**

Use Orenco Systems, Inc. PF1005. ½ hp, 115 volt, sewage effluent pump.
(this is capable of discharging 15 gpm @ 43 head loss with a total head of 248')

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ADU for 12875 Rattlesnake Rd Grass Valley *APN: 022-020-026*

Technical Data Sheet

Orenco® PF-Series 60Hz, 1-Phase Pumps

Applications

Orenco's 60Hz, 1-phase, 4in (100mm) Submersible Effluent Pumps are designed to transport screened effluent (with low TSS counts) from septic or dosing tanks. These pumps are engineered using lightweight, corrosion-resistant stainless steel and polymers, and are field serviceable and repairable with common tools. They're also CSA and UL certified to US and Canadian safety standards for effluent pumps.

PF-Series pumps are used in a variety of applications, including pressurized drainfields, packed-bed filters, mounds, aerobic units, effluent irrigation, liquid-only (effluent) sewers, wetlands, lagoons, and more. These pumps are designed to be used with a Biotube® pump vault or after a secondary treatment system.

C SA US
LR80980
LR2053896

Powered by **Franklin Electric**

General

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

- Minimum 24-hour run-dry capability (liquid end) with no deterioration in pump life or performance*
- 1/8in (3mm) bypass orifice to ensure flow recirculation for motor cooling and to prevent air binding
- 1/8in (3mm) mesh intake screen to limit solids
- Liquid-end repair kit availability for better long-term cost to own
- TRI-SEAL™ floating impeller design on 10, 20, and 30gpm (0.6, 1.3, and 1.9L/sec) models; floating stack design on 50 and 75gpm (3.2 and 4.7L/sec) models
- Franklin Electric Super Stainless motors are rated for continuous use and frequent cycling, with surge arrestors, hermetically sealed motor housing for moisture-free windings, and Kingsbury-type thrust bearing for thrust absorption
- Thermal overload protection trips at 203-221°F (95-105°C) for 1-phase motors through 1.5hp (1.12kW)
- Type SOOW 600V motor cable (model PF751512 uses 14 AWG, SJOOW, 300V cord)

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

Standard Models

See Specifications on page 2 for a list of standard pumps. For a complete list of available pumps, call Orenco.

Product Code Diagram

PF [10] [05] [1] [1] [CV] - [ ] - [ ]

- Pump, PF-Series
- Nominal flow, gpm (L/sec): 10 = 10 (0.6); 20 = 20 (1.3); 30 = 30 (1.9); 50 = 50 (3.2); 75 = 75 (4.7)
- Horsepower (kW): 05 = 1/2hp (0.37); 07 = 3/4hp (0.56); 10 = 1hp (0.75); 15 = 1 1/2hp (1.12); 20 = 2hp (1.50); 30 = 3hp (2.24); 50 = 5hp (3.73)
- Frequency: 1 = 1-phase, 60Hz
- Voltage, nameplate: 1 = 115*; 2 = 230
- Check valve: Blank = no internal check valve; CV = internal check valve†
- Cord length, ft (m):‡ Blank = 10 (3); 20 = 20 (6); 30 = 30 (9); 50 = 50 (15)
- CLK = ClickTight™ compatible

* 1/2hp (0.37kW) only
† Available for 10gpm (0.6L/sec), 1/2hp (0.37kW)
‡ Note: 20ft cords are available only for pumps through 1 1/2hp

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Specifications

Pump Model	Design gpm (L/sec)	Horsepower (kW)	Phase	Nameplate voltage	Actual voltage	Design flow amps	Max amps	Discharge size and material[1]	Length in (mm)	Min. liquid level in (mm)[2]	Weight lb (kg)[3]	Rated cycles per day
PF100511 [9]	10 (0.6)	0.50 (0.37)	1	115	120	12.7	12.7	1¼in GFP	23.0 (584)	16 (406)	26 (12)	300
PF100511CV [9]	10 (0.6)	0.50 (0.37)	1	115	120	12.7	12.7	1¼in GFP	23.0 (584)	16 (406)	26 (12)	300
PF100512 [9]	10 (0.6)	0.50 (0.37)	1	230	240	6.3	6.3	1¼in GFP	23.0 (584)	16 (406)	26 (12)	300
PF100712 [4,5,9]	10 (0.6)	0.75 (0.56)	1	230	240	8.3	8.3	1¼in GFP	25.9 (658)	17 (432)	30 (14)	300
PF101012 [5,6,9]	10 (0.6)	1.00 (0.75)	1	230	240	9.6	9.6	1¼in GFP	27.9 (709)	18 (457)	33 (15)	100
PF200511 [9]	20 (1.3)	0.50 (0.37)	1	115	120	12.3	12.5	1¼in GFP	22.3 (566)	18 (457)	25 (11)	300
PF200512 [9]	20 (1.3)	0.50 (0.37)	1	230	240	6.4	6.5	1¼in GFP	22.5 (572)	18 (457)	26 (12)	300
PF201012 [4,5,9]	20 (1.3)	1.00 (0.75)	1	230	240	10.5	10.5	1¼in GFP	28.4 (721)	20 (508)	33 (15)	100
PF201512 [4,5]	20 (1.3)	1.50 (1.12)	1	230	240	12.4	12.6	1¼in GFP	34.0 (864)	24 (610)	41 (19)	100
PF300511 [9]	30 (1.9)	0.50 (0.37)	1	115	120	11.8	11.8	1¼in GFP	21.3 (541)	20 (508)	28 (13)	300
PF300512 [9]	30 (1.9)	0.50 (0.37)	1	230	240	6.2	6.2	1¼in GFP	21.3 (541)	20 (508)	25 (11)	300
PF300712 [9]	30 (1.9)	0.75 (0.56)	1	230	240	8.5	8.5	1¼in GFP	24.8 (630)	21 (533)	29 (13)	300
PF301012 [4,9]	30 (1.9)	1.00 (0.75)	1	230	240	10.4	10.4	1¼in GFP	27.0 (686)	22 (559)	32 (15)	100
PF301512 [4,5]	30 (1.9)	1.50 (1.12)	1	230	240	12.6	12.6	1¼in GFP	32.8 (833)	24 (610)	40 (18)	100
PF302012 [5,6,7]	30 (1.9)	2.00 (1.49)	1	230	240	11.0	11.0	1¼in SS	35.5 (902)	26 (660)	44 (20)	100
PF303012 [5,6,7,8]	30 (1.9)	3.00 (2.23)	1	230	240	16.8	16.8	1¼in SS	44.5 (1130)	33 (838)	54 (24)	100
PF305012 [5,6,7,8]	30 (1.9)	5.00 (3.73)	1	230	240	25.6	25.8	1¼in SS	66.5 (1689)	53 (1346)	82 (37)	100
PF500511 [9]	50 (3.2)	0.50 (0.37)	1	115	120	12.1	12.1	2in SS	20.3 (516)	24 (610)	27 (12)	300
PF500512 [9]	50 (3.2)	0.50 (0.37)	1	230	240	6.2	6.2	2in SS	20.3 (516)	24 (610)	27 (12)	300
PF500712 [9]	50 (3.2)	0.75 (0.56)	1	230	240	8.5	8.5	2in SS	23.7 (602)	25 (635)	31 (14)	300
PF501012 [9]	50 (3.2)	1.00 (0.75)	1	230	240	10.1	10.1	2in SS	27.0 (686)	26 (660)	35 (16)	100
PF501512 [4]	50 (3.2)	1.50 (1.12)	1	230	240	12.5	12.6	2in SS	32.5 (826)	30 (762)	41 (19)	100
PF503012 [4,5,7,8]	50 (3.2)	3.00 (2.23)	1	230	240	17.7	17.7	2in SS	52.0 (1321)	37 (940)	55 (25)	100
PF505012 [5,6,7,8]	50 (3.2)	5.00 (3.73)	1	230	240	26.2	26.4	2in SS	77.0 (1956)	55 (1397)	64 (29)	100
PF751012 [9]	75 (4.7)	1.00 (0.75)	1	230	240	9.9	10.0	2in SS	27.0 (686)	27 (686)	34 (15)	100
PF751512	75 (4.7)	1.50 (1.12)	1	230	240	12.1	12.3	2in SS	33.4 (848)	30 (762)	44 (20)	100

1. GFP = glass-filled polypropylene; SS = stainless steel. The 1 1/4in NPT GFP discharge is 2 7/8in octagonal across flats; the 1 1/4in NPT SS discharge is 2 1/8in octagonal across flats; and the 2in NPT SS discharge is 2 7/8in hexagonal across flats. Discharge is NPT threaded receptacle-style port, US 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 10ft (3m) cord.

4. High-pressure discharge assembly required.

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

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

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

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

9. ClickTight™ compatible.

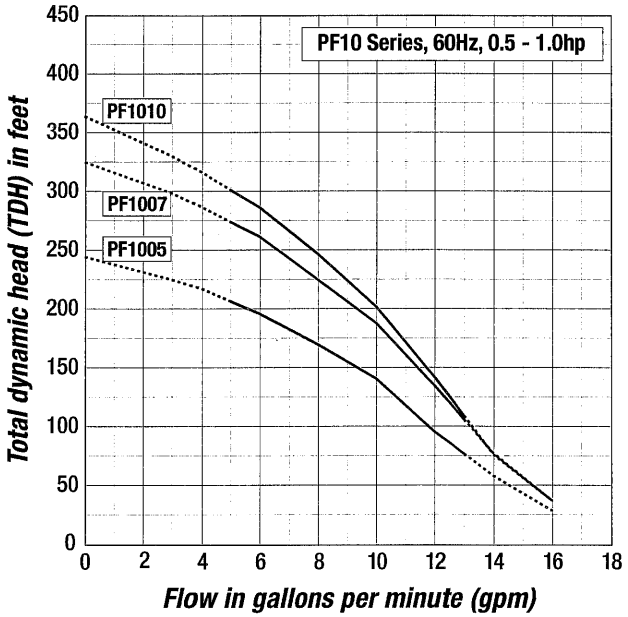
Materials of Construction

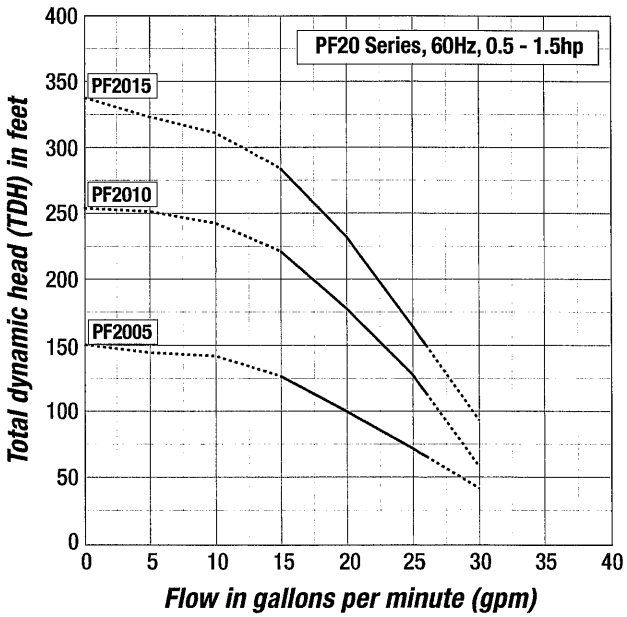
Discharge	Glass-filled polypropylene or stainless steel
Discharge bearing	Engineered thermoplastic (PEEK)
Diffusers	Glass-filled PPO (SABIC's NORYL™ GFN3 resin)
Impellers	Celanese's Celcon® acetal copolymer on 10, 20, and 30gpm models; 50gpm impellers are NORYL GFN3 resin
Intake screen	Polypropylene
Suction connection	Stainless steel
Drive shaft	7/16in hexagonal stainless steel, 300 series
Coupling	Sintered stainless steel, 300 series
Shell	Stainless steel, 300 series
Motor	Franklin Electric motor filled with deionized water and propylene glycol for constant lubrication. Stainless steel shell.

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, expressed by the first two numerals in an Orenco pump nomenclature. These graphs use solid lines to show the optimal pump operation range. Dashed lines indicate flow rates outside of the optimal range for each pump. For the most accurate pump specifications, use Orenco's PumpSelect™ software.

Pump Curves





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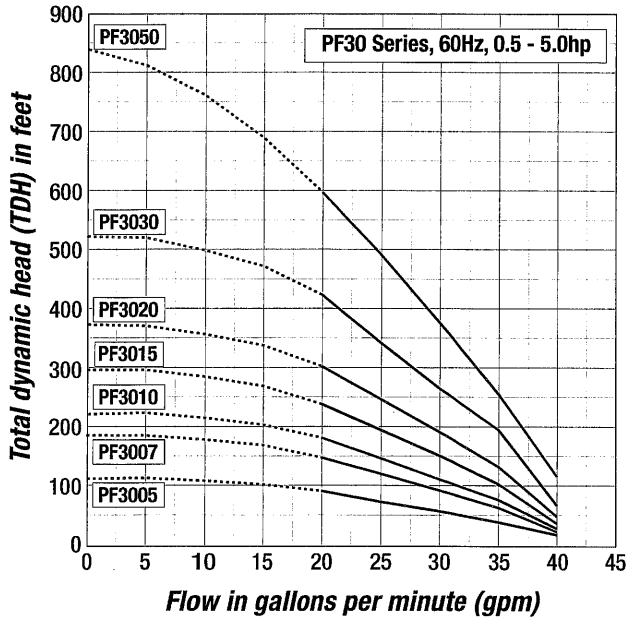
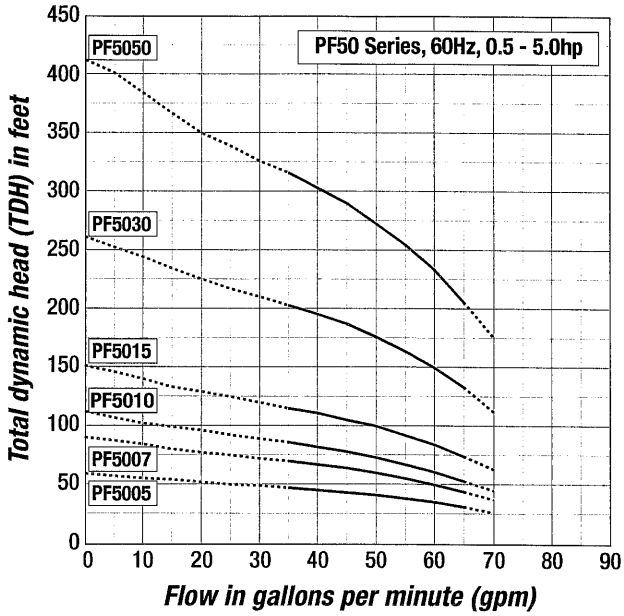
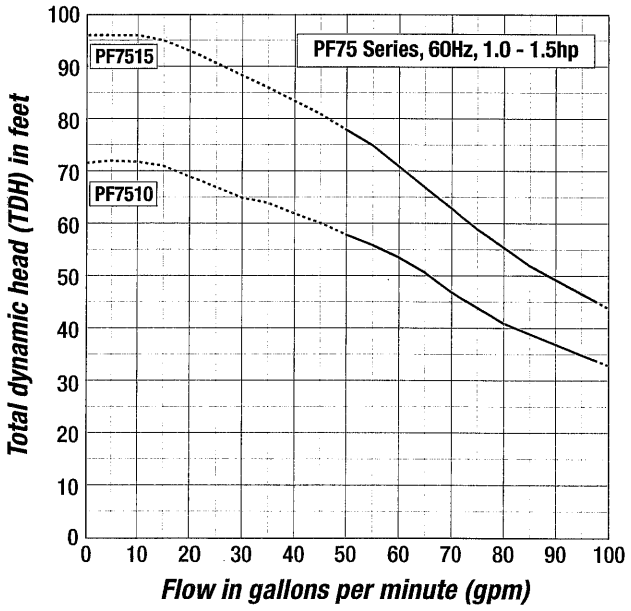
Pump Curves, cont.







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Site Preparation & Installation

1. Flag all setback requirements prior to construction and maintain flagging for inspection. Maintain all County setbacks.

2. All vegetation shall be removed from the designated drip field area. Be careful to avoid removing/ disturbing the native grade.

3. The dripfield will be 6-inches deep

Advantex / Drip System Material Specifications

Septic tank: We recommend installing septic tank with a 4-inch inlet and outlet sanitary tees. **(for minimum size requirements** *see page 1 "Installation/ Design Details*)

Septic tank shall be installed with an effluent filter in second chamber of the tank and water-tight risers over each lid as specified in the local sewage ordinance. Risers to extend to the ground surface and be equipped with gas tight, bolt down, and fiberglass lids.

Risers shall be caulked at the septic tank surface in order to be watertight. Minimum diameter of risers to be 24" and shall extend a minimum of 2" beyond the septic tank lids.

Treatment System: One Advantex AX20RT, Mode 1B/10, treatment system pod with OSI Pro Step effluent pumping system with built in pump vault and processing tank.

Recirc tank pump: Orenco Systems Inc. effluent pump or equivalent. (see "Advantex Hydraulic Calculations" and "Advantex pump curve" for pump details

Discharge tank pump: Orenco Systems Inc., sewage effluent pump or equivalent.

Pump screen and vault: The pump (in the pump tank) shall sit in an Orenco Systems, Inc., Biotube PVU screened pump vault or equivalent. see "Geoflow Hydraulic Calculations" and "Geoflow pump curve" for pump details

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Pump discharge assembly: Hose and valve assembly shall include a 1 1/4" diameter high-pressure PVC flexible discharged assembly, Orenco System, Inc. model HV 125 BCX-PR or equivalent. Discharge pump line shall have an in-line check valve, threaded union, ball valve, and anti-siphon valve.

Water level and alarm floats: Water level control float switches shall be Orenco Systems, Inc. MF-3v for recirculation tank and pump tank, or equivalent (see pump tank cross-section). Float switch and wires shall be securely attached to a rigid upright riser, so that they will not slip or tangle. A high level alarm float, on / off float, and redundant off / low-level alarm float shall be provided. Pump and alarm shall be on separate electrical circuits.

Control panel: Use Orenco System, Inc., VCOM Advantex AX20BT Control Panel, 115 volt. Which needs a phone line (or internet) connection for remote telemetry as required by County Ordinance. Please note: it does not require a dedicated phone line service.

Air Vent: Use Orenco Systems, Inc. passive air vent assembly.

Recirculation Splitter Valve Assembly: Use Orenco Systems, Inc., model for Mode 1 design

Discharge pipe: Transport pipe and fittings shall be 1" PVC DWV schedule 40 pipe. All pipes shall be solvent welded watertight. (for more detail see

Distribution and Return system: All piping and fittings to be 1" Schedule 40 PVC, unless otherwise specified. All bends in pump line to be 45-degree elbows where possible. All piping and fittings also to be solvent welded watertight. Ends of each lateral shall be fitted with a clean-out, clean-out shall be accessible with a riser box extending to finish grade (see detail).

Headworks (Filter /flush valve assembly): Manual Headworks - Use a Geoflow, Inc. WHW-1f-Man. Headworks assembly will include Vortex filter, 2 manual valves, air vent, pressure gauge, and poly box to surface

Drip Line: Use Geoflow Inc., Waste flow Pressure Compensating drip line, (1/2-inch diameter line with emitters 24" on center), part number WFPC 16-2-24.

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Vacuum breaker assembly: Install air/vacuum relief valves at the highest point of each subfield for both the supply manifold and the flush manifold. Also install a vacuum breaker above all check valves installed. Use Geoflow Inc., ARV 05 air/vacuum relief valves with tee and 8" or larger Carson boxes.

Check valves: Install spring check valves at the mid-point of both the supply manifold and flush manifold as a means of preventing drain-down from the supply line and flush line. These valves will divide the drip field into two subfields.

Electrical Components: There shall be 2 circuits suppled to the pump system; one for the pump and a separate one for the panel. Please refer to local electrical codes for installation of the electrical components. *(see control panel and wiring for more details)*

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Advantex Installation Guidelines

1. Flag all setback requirements prior to construction and maintain flagging for inspection. Maintain all County setbacks.

2. Check the site location for proper installation of the Septic tank, RT unit.

3. Excavate the septic tank, RT Unit, excavate the RT hole 12-inches wide and longer than the unit dimensions. Provide a minimum 3-inch base of sand or pea gravel under the septic tank, and RT unit.

4. Install access risers on the septic tank. Align grommets and splice box to ensure proper pod installation. Seal riser to the tank. Seal is to be watertight.

5. Install the passive air vent using 2-inch PVC pipe fittings that protrudes through the filter wall. Be sure the vent line is sloped to drain into the textile filter. Do not allow bellies.

6. Attach the electrical splice box to the RT unit. Place the pump and discharge assembly into the flow inducer.

7. Check the float locations for proper setting. The bottom float should be positioned as close to the top of the biotube cartridge as possible. The top float should be set 1-inch to 2-inches below the invert of the tank inlet to allow for a surge volume of 200-300 gallons. See attached detail.

8. Install the electrical control panel to the structure. See wiring diagram for details.

9. Carefully backfill the tank excavation and around the RT unit with clean soil. Compact around the filter pod in 12-inch lifts. Slope to allow surface to shed away from the filter and tanks.

10. System Start Up: Verify all pump and float operations on both manual and automatic settings. To facilitate quick testing of the automatic operation, temporarily set the programmable timer to short intervals, but no shorter than 15 second on, 15 seconds off. When you check the low level alarm float, the pump is inoperable when the float activates. Verify this by manual operation.

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16. Flush out the filter pod laterals to remove any construction debris. Check orifice squirt, head should be 2-feet or higher.

17. **Setting the programmable timer:** There are two sets of timers to control the pump cycle, Normal setting and Override. The override timer will activate when the high water alarm float is in the up position.

Drip Installation Guidelines

1) Flag all setback requirements prior to construction and maintain flagging for inspection. Maintain all County setbacks.

2) All Geoflow drip systems require: 100 micron / 150 mesh filter, Filter flush valve, Field flush valve, and Air vent in each zone. Please note: all Waste flow Classic drip system requires pressure regulation.

3) Handle your drip line and components with care. ROOTGUARD is temperature sensitive. To assure a long life, store the drip lines out of direct sunlight in a cool place. This should be a consideration when installing the system in very hot and sunny areas. Your system life span will increase if it is buried an extra two or three inches below the soil surface, to avoid the warm temperature extremes.

4) All drip field construction shall be done in accordance with Local rules and regulations.

5) No utilities, cable wire, drain tile, etc. shall be located in drip field.

6) Fence off entire drip field prior to any construction.

7) System is not to be installed when ground is wet or frozen.

8) Divert all downspouts and surface waters away from drip field or into curtain drains.

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9) Excavation, filling & grading should have been finished before installation of subsurface drip system.

10) Be sure you have everything required for the installation before opening trenches. Pre-assemble as many sets of components as practical above ground and in a comfortable place. Compression or Lockslip adapters should be glued to PVC tees, riser units should be pre-assembled, the sub-main manifold with tees can be pre-assembled & used to mark the beginning & end of WASEFLOW lines.

11) For particularly tough soil conditions moisten the soil the day before opening trenches or installing WASTEFLOW. Remember it is much easier to install the system in moist soil. The soil should be moist but still allow the proper operation of the installation equipment and not cause smearing in the trenches. The soil surface should be dry enough so that the installation equipment maintains traction.

12) Mark the four corners of the field. The top two corners should be at the same elevation and the bottom two corners should be at a lower elevation. In freezing conditions the bottom dripline must be higher that the supply and return line elevation at the dosing tank.

13) Install a watertight dosing tank. In freezing conditions the dosing tank should be at the lowest elevation of the entire system. Install watertight riser on the dosing tank.

14) Determine the proper size for the supply and return manifold. See worksheet.

15) Install PVC supply line from the dosing tan, uphill through one lower and one upper corner stake of the dispersal field. Please refer to State plumbing codes for depth of burial.

16) Paint a line between the two remaining corner stakes.

17) Install the Geoflow WASTEFLOW drip line from the supply line trench to the painted line, on the surface of the pre-scarified soil. Upon reaching the painted line cut the drip line 9' above the cap. Tape the end of the drip line to prevent debris from entering. The tubing expands in warm temperatures and contracts

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in cold temperatures. If installing during the warmer months, be sure to allow some play in the tubing so it will not pull out of the fittings when it gets cold. Continue this process until the required footage of pipe is installed. Geoflow drip line must be spaced according to specification (2 ft. is standard). Take care not to get dirt into the lines.

18)If the system is looped, install the looped ends with Geoflow plain tubing or flex PVC. If in a cold climate be sure to pitch these slightly so they do not hold water and freeze. The loops are to be installed on the outside of the measured field.

19)Install the supply header with tees lined up at each Geoflow line. Hook up the Geoflow lines to the supply header. Do not glue WASTEFLOW drip line. Lock-slip Fittings Installations

20)Hold the fitting in one hand and position the tubing with the other hand.

21)Move the sleeve back, and push the tubing onto the exposed stem as far as possible.

22)Push the sleeve out over the tubing and thread the sleeve onto tubing, as though tightening a nut to a bolt. Hand tighten. Do not use tools.

23)Test the connection to make sure the sleeve threads have gripped the tubing tightly.

24)Install the filter headworks between the field and the pump tank on the supply line. Insulate the box in freezing conditions. When using an open bottom headworks box, place a rodent barrier down first. This can be made from bricks, paving stones, chicken wire, 3 layers of filter fabric or a 6" minimum depth of 1" gravel. Support the pipes entering and exiting the headworks with gravel.

25)If using a pressure regulator, install it downstream of the filter headworks, just ahead of the dispersal field, on the supply line. Install the pressure regulator inside a small valve box for easy access. *Insulate the box in freezing conditions.

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26) Install the floats in the dosing tank and wire up to the timer control. The timer control should be set to pump no more than the design flow, do not set to match the treatment capacity.

27) Install the pump. Fill the dosing tank with fresh water and turn on the pump. Check for flow out the ends of all of the Geoflow lines. Let the pump run for about five minutes to flush out any dirt. Shut off the pump and tape the ends of the lines.

28) Dig the return header ditch along the line painted on the ground and back to the pre-treatment tank. Start the return header at the farthest end from the dosing tank. The return line must have slope back to the treatment tank, septic tank or pump tank.

29) Install the return header and connect all of the Geoflow lines. Do not to kink the drip line.

30) Install air vacuum breakers at the highest points in the dispersal field. Use pipe dope or Teflon tape and hand tighten. Use a 6" minimum depth of 1" gravel below the boxes to keep rodents out. Insulate in freezing climates.

31) Install a ball or solenoid field flush valve on the return line to the pretreatment or pump tank unless a pre-assembled Waste flow Headworks is being used. If a Headworks was installed on the supply line, connect the return line back through the Headworks box. Support the return pipe before it enters the Headworks with gravel. If using electric solenoid valves, connect the valve common and an individual output wire to the solenoid leads using watertight electrical connectors.

32) Allow glue fittings 1 – 2 hours to set. Open the field flush valve and turn on the pump to flush lines then close the valve and check the field and all piping and connections for leaks. Turn off the system o Check filters and valves for construction debris.

33) Turn on the pump and check:
1) Pressure at the air vacuum breaker(s) against design pressure.
2) Check the pressure in the WASTEFLOW Headworks. It should be 10-45 psi.

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3) If pressure gauges are on each side of the filter, note these for benchmark differential pressure across the filter. If using a manual valve for field flushing, crack it open until at least one PSI is lost or design pressure is reached and leave in that position.
4) Flow rates from draw down on tank. Compare to design flow. o Wet spots in the field. If any sections are particularly wet, determine if they are caused by faulty connections, drippers or shallow burial.
5) Check that solenoid valves are functioning. Close the internal manual bleed after flushing the system. If solenoid will not close, first clean the solenoid with caution not to lose small spring, and if this fails, open the bonnet and clean the inside.

34) Establish vegetation cover as specified.

35) Provide owner with final as-built diagrams flow, measurements and pressure readings at startup.

36) Provide controller records at startup, including elapsed time meter, pump counts, secondary override counts, high water counts and primary float counts.

37) Solenoid Valve Installation and Operation
1) Wrap male adapters with 2 wraps of Teflon tape and thread the adapters into the valve inlet and outlet 1 turn past hand tight. CAUTION: over tightening may cause damage to the valve.
2) The solenoid is located on the downstream side of the valve.
3) Flush the laterals by opening the internal manual bleed lever on the downstream side of the solenoid. Turn the flow control stem fully open (counterclockwise) for flow control models.
4) Check that solenoid valves are functioning.

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Advantex Geoflow Drip Inspection

In addition to inspections conducted by Environmental Health, the design consultant will conduct inspections of the critical steps of the construction process. Upon completion, the design consultant will certify to the Health Department that the system was installed in accordance to the approved design. Please note: A minimum of 48 hours notice is required for any requested inspections for the designer and your certified service provider. A minimum of 24 hours notice is required by Environmental Health Department Inspections.

1. **Pre-construction** - Prior to arrival the location of the various components of the system are to be marked out by flagging, stakes or paint on-site.

2. **Drip Field & Advantex Filter Flow/Operation Test** - After the tanks, Advantex RT Unit, drip field and all plumbing/electrical connections installed. A watertight test is required, it would be done at this time.

3. **Final Inspection/Sign-off** - Your Certified service provider is required to be at this inspection to program and sign off the system. Please note: for final certificate of completion, this system will need to be connected to the Certified Service Provider and calling in.

The above inspections are expected to take up to 1 hour and are included in our original design costs and are at no additional charge. Additional time or inspection will be charged out at our normal inspection rate.

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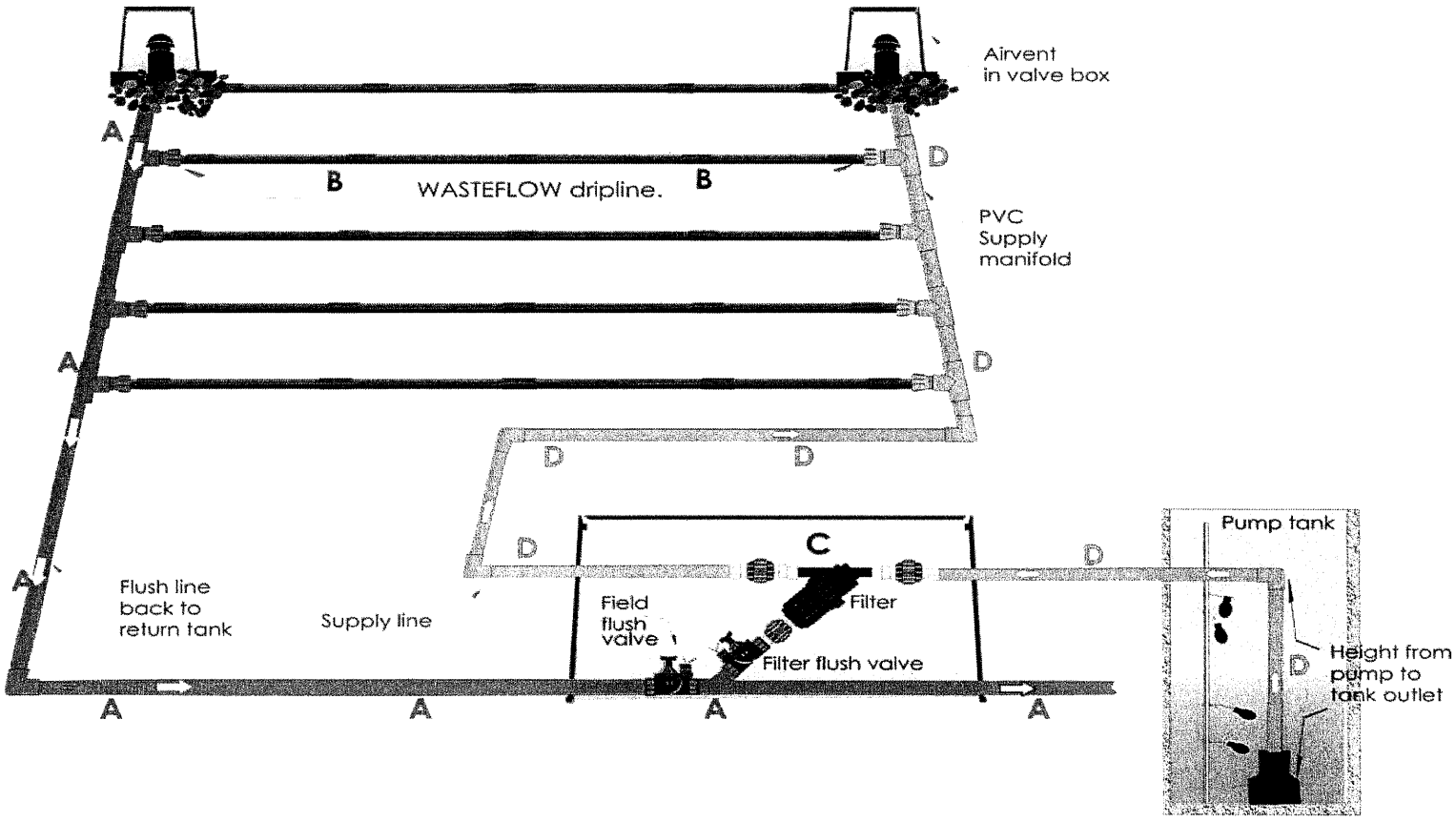
Geoflow Dripfield Layout



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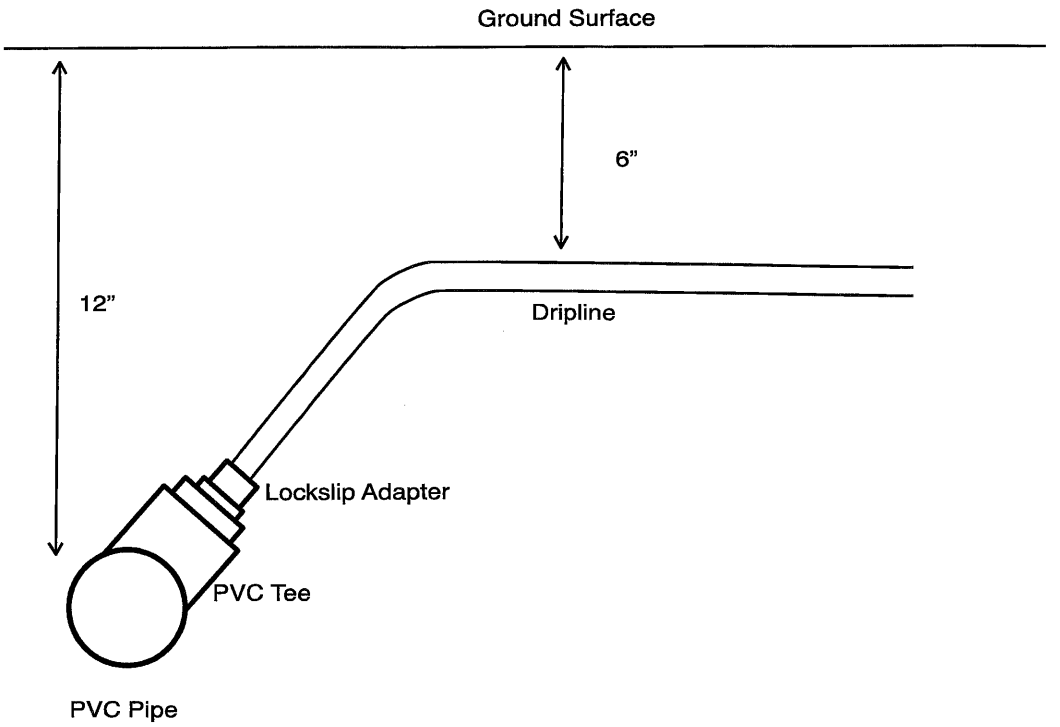
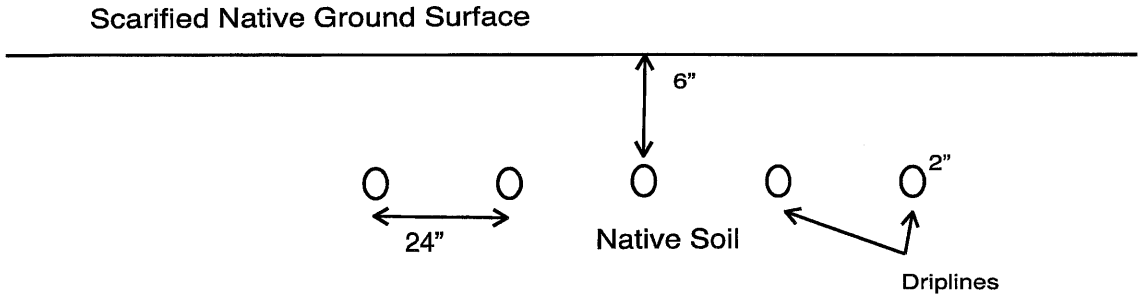
Manifold - Drip line Connection (not to scale)



1"

Dripline Side-view (not to scale)



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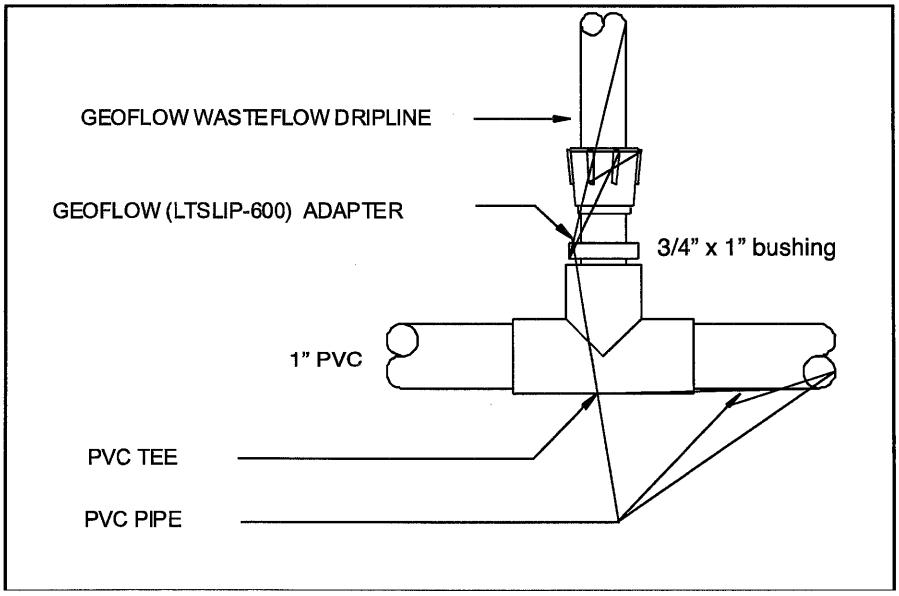
Air Vacuum Breaker Schematic

Manifold Connection (PVC to Adapter) Schematic



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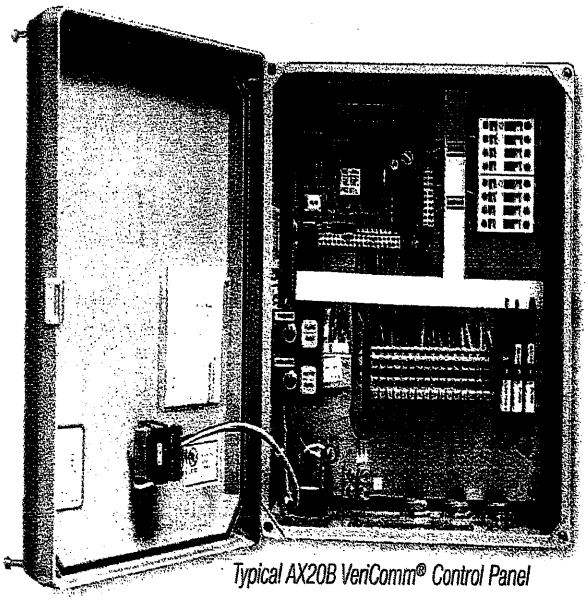
VeriComm AX20B Control Panel & Wiring Details

Orenco Brand VeriComm Control Panel
(please note equivalent panel can be used)



Typical AX20B VeriComm® Control Panel
Standard Models: VCOM AX20B1, VCOM AX20B2

VeriComm AX20B remote telemetry control panels are used in Advantex AX20 Treatment Systems with two pumps for timed recirculation and pump discharge. Coupled with the web-based VeriComm Monitoring System, these affordable control panels give the ability to remotely monitor and control treatment system operation, with realtime efficiency to wastewater system operator and maintenance organizations, while remaining invisible to the homeowner. AX20B panels allow remote operators to change system parameters, including timer settings, from web interface. Interlocked controls prevent recirculation pump operation if there is a high- level alarm on the discharge side These 60-Hz simplex panels are UL-listed and UL-C listed.

- 120-VAC control circuit breaker
- 120-or 120/240-VAC pump circuit breaker
- Motor-start contactor for pump circuit
- Automatic/Off/Manual (Auto/Off/Man) toggle switch
- 7/8-inc red visible alarm
- 95 dB audible alarm
- Automatic alarm silence reset
- Type 4X (IP 66) rated enclosures
- Pump motors used with these panels require internal overload protection

Status Light Indicators

- Flashing green LED for normal operation
- Yellow LEDs for status of digital inputs
- Red LEDs for status of digital outputs and modem activity

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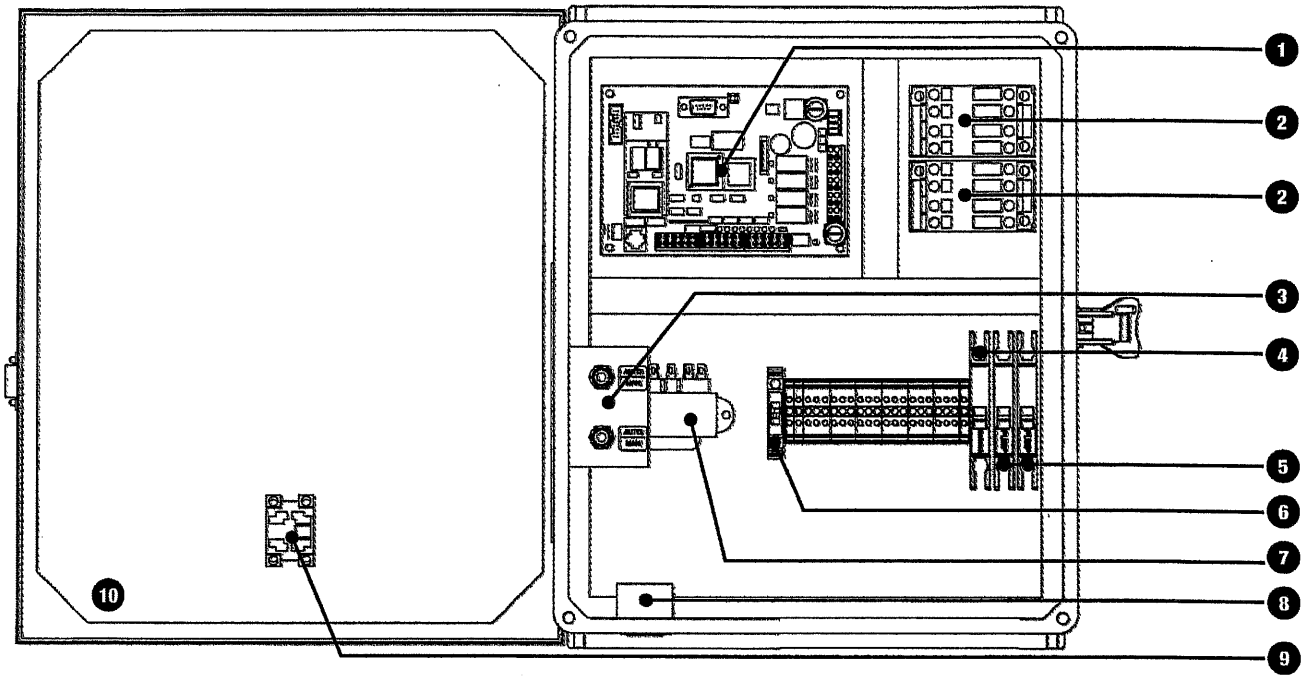

Standard Components

Feature	Specifications
1. VeriComm® Remote Telemetry Unit*	ATRTU-100: 36/18 VAC (center tap transformer); 8 digital inputs, 4 analog inputs, 4 digital outputs, 0 analog outputs, on-board modem (2400 baud); LED input and output indicators; 1-year battery backup of data and program settings
2. Motor-Start Contactors	120 V, 16 FLA, 1 hp (0.75 kW), 60 hz; 2.5 million cycles at FLA (5 million at 50% of FLA) 240 V, 16 FLA, 3 hp (2.24 kW), 60 hz; 2.5 million cycles at FLA (5 million at 50% of FLA)
3. Toggle Switch	Single-pole, single-throw, momentary manual switch; 20 A, 3/4 hp (0.75 kW)
4. Controls Circuit Breaker	10 A, OFF/ON switch; single-pole 120 V; DIN rail mounting with thermal magnetic tripping characteristics (240 V units are available for international markets)
5. Pump Circuit Breaker	20 A, OFF/ON switch; single-pole 120 V or double-pole 240 V; DIN rail mounting with thermal magnetic tripping characteristics
6. Fuse	250 VAC, 1 A
7. Transformer	120 VAC primary, 36 VCT @ 0.85 A secondary
8. Audible Alarm	95 dB at 24 in. (610 mm), warble-tone sound
9. Visual Alarm	7/8-in. (22-mm) diameter red lens; "Push-to-silence;" UL Type 4X rated, 1 W LED light, 120 V
10. Panel Enclosure	Measures 13.51 in. high × 11.29 in. wide × 5.58 in. deep (343 × 287 × 135 mm). UL Type 4X rated. Constructed of UV-resistant fiberglass; hinges and latch are stainless steel.

Recommended Breaker & Wire Size

Pump Motor Size	Breaker Size	Wire Size	Max Distance*
120 VAC 1/2 hp	20 amp	10 AWG	105 ft
240 VAC 1/2 hp	15 amp	14 AWG	161 ft
3/4 hp	20 amp	14 AWG	130 ft
1 hp	20 amp	12 AWG	172 ft
1-1/2 hp	20 amp	12 AWG	126 ft

* *This is the maximum distance from this sub-panel to the pump motor for the recommended wire size. Distance is based on 3% maximum voltage drop from sub-panel to load at maximum recognized pump motor amps at 75° C.*

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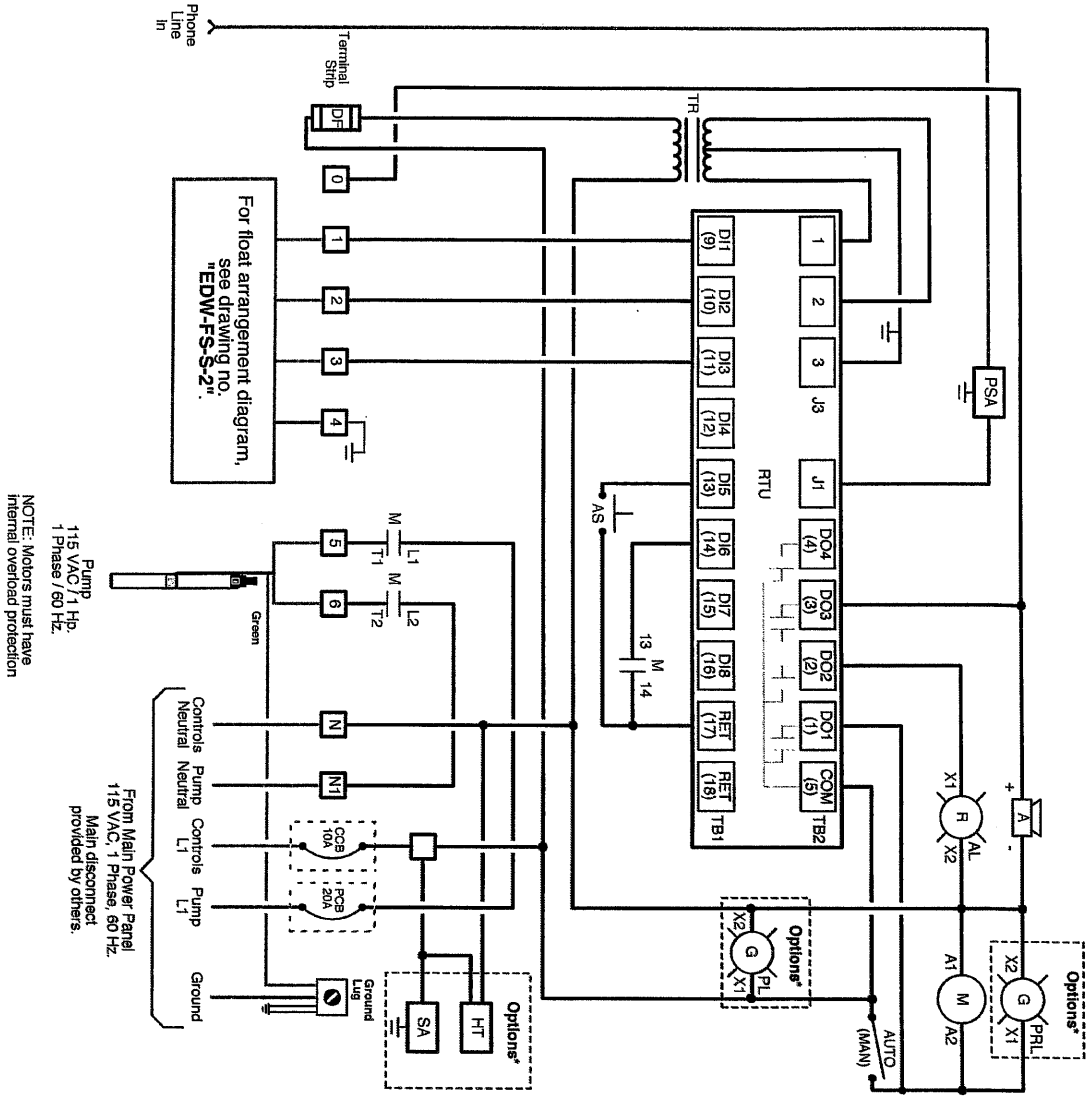
Control Panel Wiring Diagram
Model VCOM-S1 PTRO



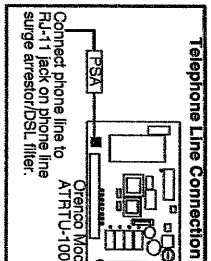
Key

- = Factory Wire
- = Field Wire
- = Alternate Field Wire
- A = Audio Alarm, 115 VAC
- AL = Alarm Light
- AS = Audio Silence Switch
- CCB = Controls Circuit Breaker
- DF = Fuse, 120VAC/1A
- M = Motor Contactor
- PCB = Pump Circuit Breaker
- PSA = Phone Line Surge Arrester
- RTU = ATRTU-100 Controller
- TL = Terminal Link
- TR = Transformer 120-36/18VAC

*Options

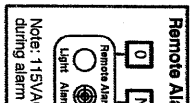
- HT = Heater
- PL = Power Light
- PRL = Pump Run Light
- SA = Surge Arrester

Telephone Line Connection



Connect phone line to RJ-11 jack on phone line surge arrestor/DSL filter.

Remote Alarm Connections

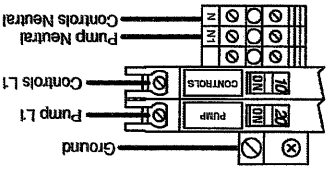


Note: 115VAC signal is present during alarm conditions.

For VCOM-S PTRO operation description, see drawing no. "EIN-CP-OP-504".

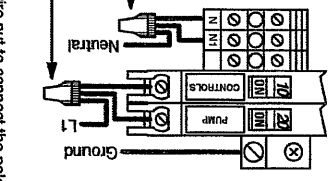
Power Wiring Options

Two Circuits



Factory default. Wire as shown.

One Circuit



Use one wire nut to connect the pole of the pump circuit breaker together with the controls breaker and with the incoming L1 power line. Use another wire nut to connect the neutral block of the pump with the controls neutral block and with the incoming neutral line.

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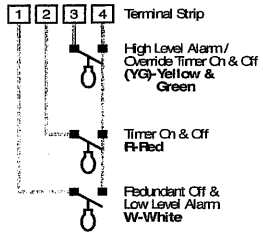
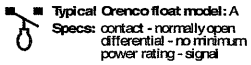
Float & Splice Box Wiring Diagram

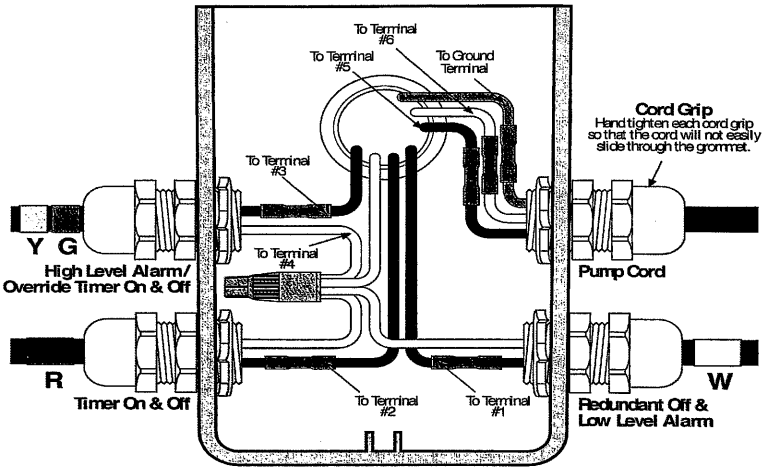
Float Arrangement



Float Types



Splice Box Wiring



Float Tag Colors

Y - Yellow	**R** - Red
P - Purple	**O** - Orange
B - Blue	**E** - Grey
G - Green	**W** - White

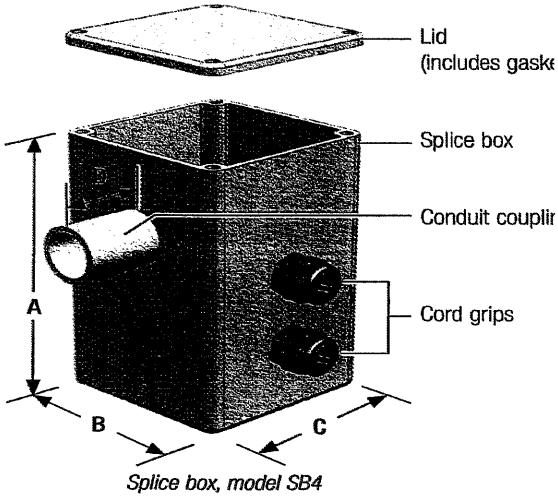
Note: Multi-function floats will have more than one marker

Attention: Failure to follow splicing instructions will void warranty

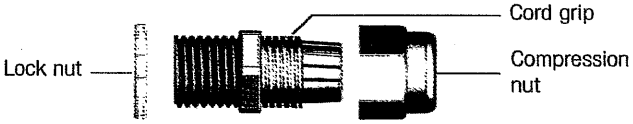
* Refer to drawing EIN-SB-SB-1 for splicing instructions.

Key

Control Panel Series	Float Function Color Code	Splice Box Model	Drawing No.
VCOM-S PTRO	(YG)RW	SB4	EDW-FS-S-2



Splice box, model SB4



*Heyco cord grip**, exploded view*

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ADU for 12875 Rattlesnake Rd Grass Valley

APN: 022-020-026

NAVO & SONS, INC.
PO Box 975
815 Idaho-Maryland Rd.
Grass Valley CA 95945

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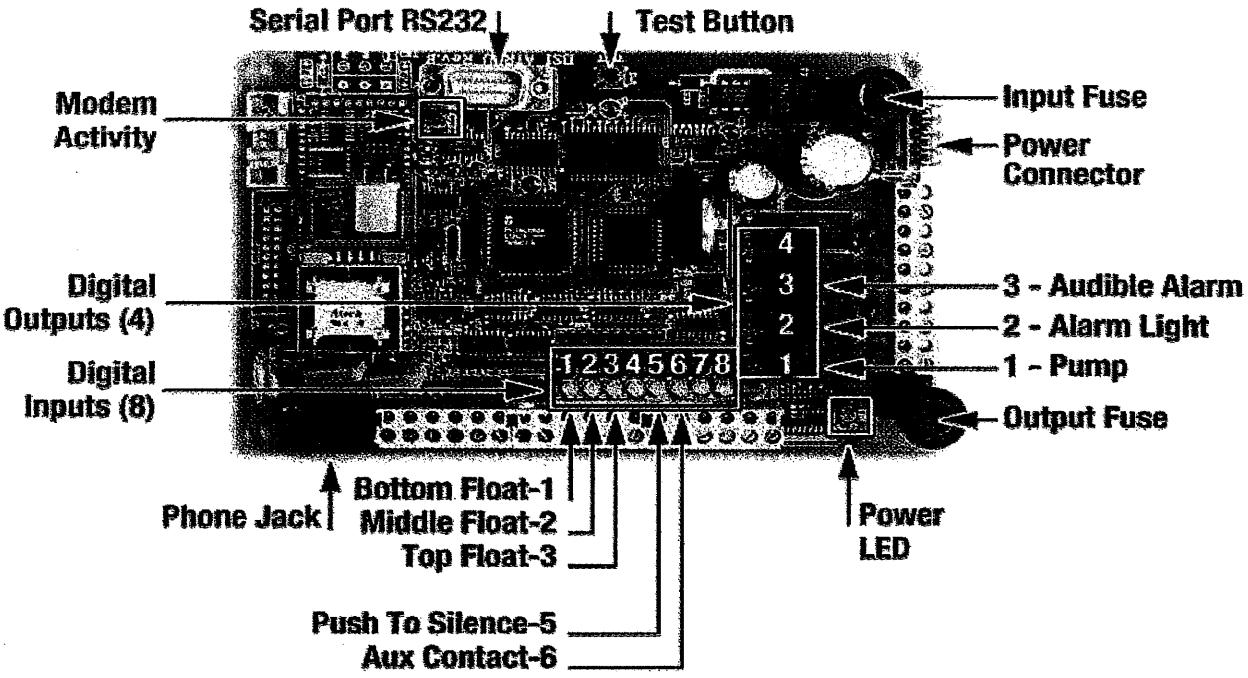
Input & Output Definitions

The following inputs and outputs have been used with your control panel:

(Fig.1)



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Advantex GeoFlow Drip Maintenance and Limitations

This septic system **requires annual maintenance and monitoring for the life of the system** and registration with the County for annual maintenance and monitoring.

In order to get your septic "finaled", you (owner) will need the following:

A Maintenance & Monitoring Agreement (with a register Certified Service Provider (CSSP)),

Right of Entry/ Operating Permit (county forms).

For details see the attached maintenance and monitoring requirements.

This septic system is required be installed by an Advantex certified, licensed contractor (A, C-36, or C-42). Preferably familiar with installation of this system. This report in not a construction permit. A permit to install this system must be obtained from the Department of Environmental Health.

Septic tank maintenance should include pumping the septic and cleaning the effluent filter annually. Because the septic tank maintenance is critical to the over-all performance of the sewage disposal system, failure to perform this maintenance can lead to sedimentation and premature failure of the leach lines.

The pump screen should be removed and rinsed off every year. Also the pump, pump float, alarm float, and alarm should be checked for proper operation yearly.

The primary and 100% repair area must be protected from vehicular traffic, corrals, animal enclosures, stables, structures, below or above ground pools, or any other activity that causes alterations such as grading, cuts/fills, etc. Failure to do so may void this report.

Please note that all roof drainage should be diverted away from the septic tank, pump tank, and leach field. Irrigation in the area of the leach trenches should be kept to a minimum to avoid saturating the soil. Drip irrigation should be used.

Also we recommend water conservation should be enlisted for household water use

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to maximize the life expectancy of the absorption trenches. Also take care of any household leaks immediately to avoid unnecessary saturating of the leach trenches.

This system has been designed in accordance with the latest industry recognized design standards and County code guidelines. However, the state of the art of sewage disposal design is such that no guarantee can be made as to the length of time that satisfactory service will occur.

Advantex with Drip Maintenance & Monitoring

This septic system **requires annual maintenance and monitoring for the life of the system** and registration with the County for annual maintenance and monitoring.

In order to get your septic "finaled", you (owner) will need the following:

A Maintenance & Monitoring Agreement (with a register Certified Service Provider (CSSP)),

Right of Entry/ Operating Permit (county forms).
Your Certified Service Provider shall perform the following annually and issue the report to the County Environmental Health Department.

1. Check phone line (or internet connection) for proper operation.
2. Measure crust and sludge in all compartments. The septic tank needs to be pumped on a routine basis every 3 to 5 years, or as needed (when solids are 25%-33%) depending on system usage.
3. Check risers, lids, and seal for proper fit and operation. Check for infiltration. Evaluate inlet tee for buildup inside, and intact with proper slope. Clean inside if needed.
4. Pull splitter valve and hose off in the inlet side of the septic tank.
5. Check water clarity coming out of the filter pod.
6. Disconnect both pump unions.

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7. Check all floats and alarms from proper operation.

8. The effluent filter and Bio-tube filter should be removed and hosed down into the septic tank solid side annually to remove any scum and buildup.

9. Manually run both pumps until water clarity improves and reconnect the pumps.

10. Open filter pod. Flush lines by opening ball valves (one at a time) with pump running. Clean out any clogged orifices. Check squirt height in filter pod and adjust to designer specifications.

11. Check for bio-mat on textiles and make sure filter pod is draining properly. Check air vent for proper operation.

12. Reinsert splitter valve and make sure effluent is getting from splitter valve to discharge tank.

13. Check and record discharge 30-day average, cycles per day, and runtime per cycle. Measure water height in discharge tank and manually run discharge pump for average cycle time. Re-measure water level. Then calculate gallons per cycle by multiplying by cycles per day to calculate average daily usage. Reset recirculation ratio to 4 to 1.

Continue to Geoflow Drip Leach Line Maintenance & Monitoring

14. The discharge pump and alarm floats should be manually activated annual to verify proper operation.

15. Record the reading on the pump cycle counter biannually, once in the middle of summer and once at mid winter. (Once by your service provider and once by the homeowner). This will allow for approximate water quality usage of wastewater.

16. Pull and clean Vortex (or disk filter) into inlet side of the septic tank. Reinstall filter.

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17. Check solenoid valves for proper operation, by manually running discharge pump and opening valves one at a time with toggle switch in control panel and checking for flow back into tank on return line. If manual back-flush, back-flush leach field by opening valve on return line in headworks box and manually running pump for 15 minutes. Close valve.

18. Check pressure on return line with pressure gauge. Compare pressure to previous readings (off startup report)

19. Visually inspect drip field for proper drainage, vegetation and any signs of surfacing.

20. Log all information on report for County