

Task B.10 Acceptance of System by Owner Report BHS-3

Conclusion of BHS-3 system monitoring occurred December 17, 2014. At that time, the homeowner indicated interest in keeping the experimental system and requested that we propose a long term maintenance entity. Therefore, an O&M manual was developed for the system (included as Attachment A) and a site visit on January 29, 2015 was arranged with Total Septic Services to go over the O&M manual and have them provide a maintenance contract proposal to the homeowner. A letter was sent February 9, 2015 (Attachment B) to the homeowner which outlined the FDOH requirements to leave the experimental system in place: (1) biennial operating permit (2) maintenance entity agreement [proposal from Total Septic was included] (3) execute and record in the public property records written notice (wastewater affidavit). The homeowner had not made a final decision on keeping the system as of the June 30th, 2015 FOSNRS contract end date, but the following summarizes additional Hazen activities to try to resolve the system ownership issue:

- April 24, 2015 Hazen met with Seminole County DOH to discuss the three experimental systems installed in Seminole County acceptance requirements and procedures. Hazen performed a system check.
- April 29, 2015 Conference call with homeowner, Elke Ursin (FDOH) and Hazen to discuss moving forward with homeowner acceptance of the system.
- May 6, 2015 Hazen performed O&M walk-through with the homeowner. Task C site close-out; groundwater wells were abandoned or left in place. Homeowner requested that the hydraulic unit box enclosure be replaced with a larger box.
- May 13, 2015 Total Septic visited the site to be able to provide an estimate for the hydraulic unit box enclosure replacement.
- May 21, 2015 Homeowner contacted Hazen that there was ponding in the BIO zone. Hazen met Total Septic at the site to fix and check the system. The feed line connection to a BIO zone drip line was fixed.
- June 4, 2015 Hazen met with another local septic contractor, Chris Brown, to go over the O&M manual, request a maintenance contract proposal, and hydraulic unit box enclosure installation proposal.
- June 8, 2015 Hazen ordered a new hydraulic unit box enclosure from HD Supply.
- June 18, 2015 New hydraulic unit enclosure delivered to BHS-3 site.
- June 30 – July 1, 2015 Chris Brown installed the new enclosure.
- July 2, 2015 Hazen checked the box installation and system. Homeowner indicated he wished to further discuss system acceptance/non-acceptance with FDOH.

Attachment A

OPERATION & MAINTENANCE (O&M) MANUAL

Experimental Two Stage Biofiltration Passive Nitrogen Reduction System

████████████████████ Longwood, FL



I _____ understand the concepts in this manual and received training in proper service of the system.

Signature: _____

Date: _____

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1.0 Introduction

This Operation and Maintenance (O&M) Manual describes the procedures that should be followed for proper operation and maintenance of the two-stage biofiltration passive nitrogen reduction system (PNRS) installed as part of the Florida Onsite Sewage Nitrogen Reduction Strategies Study (FOSNRS) at [REDACTED] Longwood, FL 32779. The nitrogen reducing onsite treatment system for the single family residence was installed in July 2013.

2.0 System Components and Operation

The two-stage PNRS system is configured as illustrated in Figure 1. A flow schematic of the system is shown in Figure 2. The complete as-built system drawings are included in the attached Appendix A.

The two-stage PNRS system operates on a two-step process for nitrogen reduction. The first step is called nitrification, where most nitrogen is converted from organic and ammonia forms to nitrate, NO_3 . This step requires oxygen and is completed in the Stage 1 Biofilter, which is a completely drained, unsaturated area filled with sand media. The media pores are air filled, and as the septic tank effluent (STE) percolates through this media the biological process nitrification occurs in which ammonia is oxidized to nitrite and nitrite is oxidized to nitrate. The second step in the process train is called denitrification, where most of the nitrate that is formed in the first step is converted to nitrogen gas. This step does not require oxygen and is completed in two areas: Stage 2a which is the lignocellulosic (wood product) and sand mixture layer below the Stage 1 biofilter and Stage 2b the elemental sulfur media tank. The media pores are filled with water, and as the Stage 1 effluent percolates through the lignocellulosic and sulfur media the biological process denitrification occurs in which nitrate is reduced to nitrogen gas.

The B-HS3 system consists of a 1,500 gallon two chamber concrete primary tank; 600 gallon concrete STE dose tank; a two zone drip system: 1) STE drip Zone - Stage 1 lined drip area that receives primary effluent and 2) BIO drip Zone that receives treated effluent from the Stage 2b biofilter; and a 1,050 gallon concrete Stage 2b saturated biofilter tank.

Household wastewater enters the 1st chamber of the primary tank and exits the second chamber as septic tank effluent through an effluent screen into the STE dose tank. The

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STE dose tank contents are pumped through the drip system hydraulic unit and discharged to the STE Zone - Stage 1 drip system. Effluent is dispersed above an 18-inch layer of mound sand (slightly limited sand) and proceeds downward through the sand media where nitrification occurs. Underlying the sand is a 9-inch layer of lignocellulosic and sand media mixture (Stage 2a) above a 30-mil PVC liner where there is the potential for denitrification to occur prior to the Stage 2b biofilter. The liner effluent is conveyed to the bottom of the Stage 2b biofilter containing elemental sulfur reactive media and flows upward through the media for additional treatment. The Stage 2b biofilter contains 12-inches of elemental sulfur mixed with oyster shell media. The outlet is above the media; therefore, denitrification occurs in the saturated environment. The denitrified effluent is pumped through the drip system hydraulic unit and discharged to the BIO Zone – the treated effluent drip irrigation system. The treated effluent is discharged to the natural soil. A flow schematic of the system is shown on Figure 2.

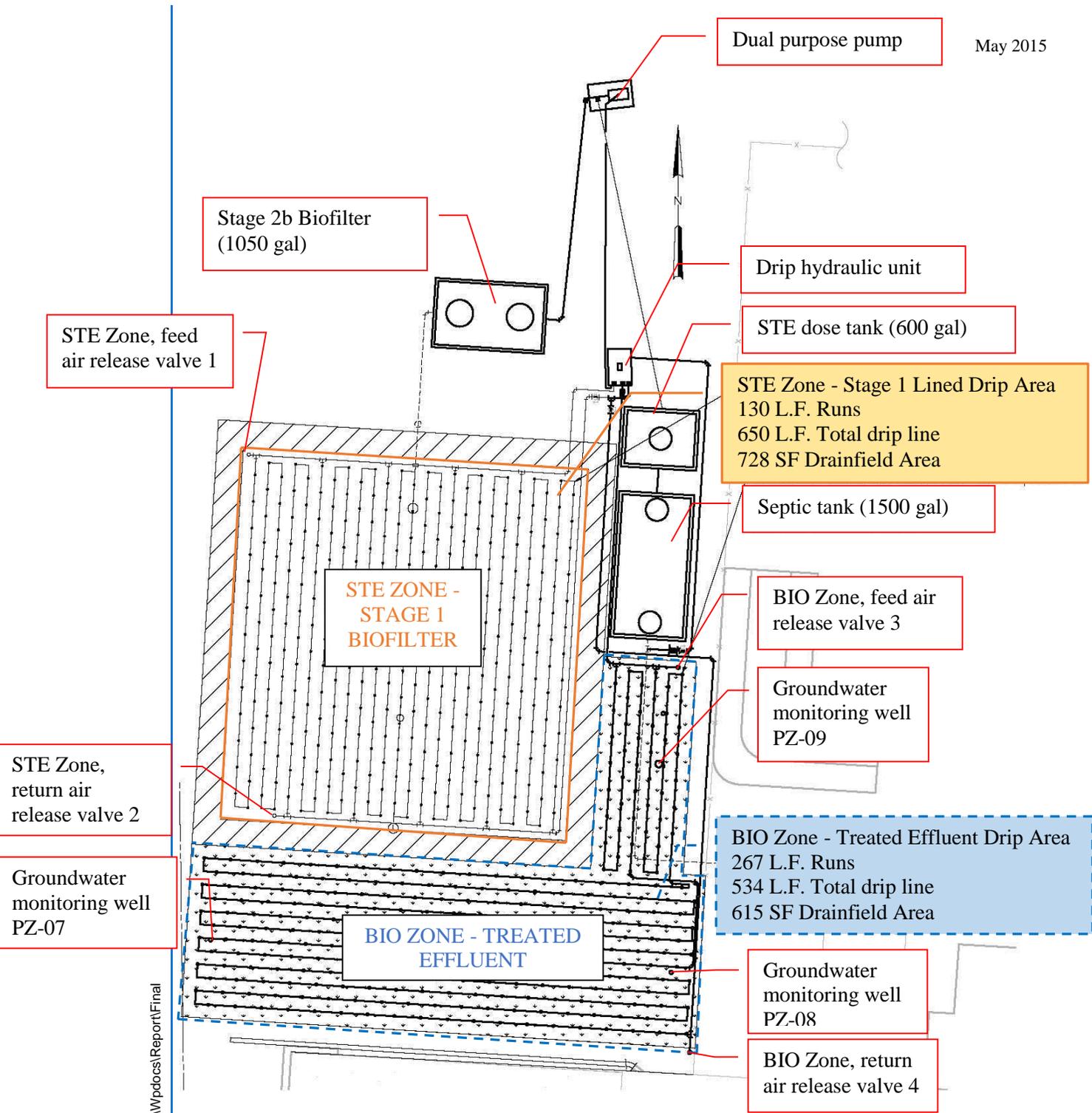


Figure 1
Plan view of System Layout

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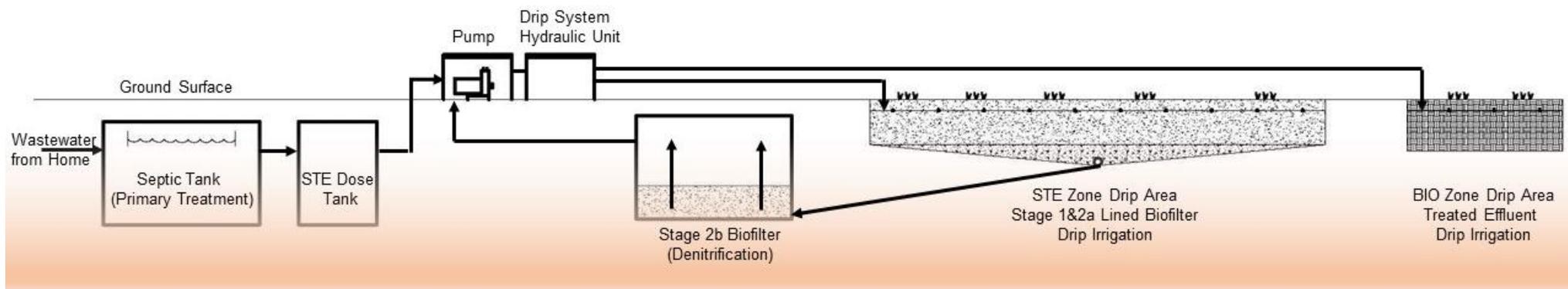


Figure 2
System Flow Schematic

2.1 Primary (septic) tank

The primary (septic) tank is a 1,500 gallon two chamber concrete tank with plastic manhole covers for access to both chambers (see Figure 3). The sewer pipe from the house was plumbed into the 4" D (diameter) inlet. Household wastewater enters the 1st chamber of the septic tank and exits the second chamber as septic tank effluent (STE) through an effluent screen into the STE dose tank. The effluent screen is a Polylok™, PL-68 (see Figure 4 and Appendix B).

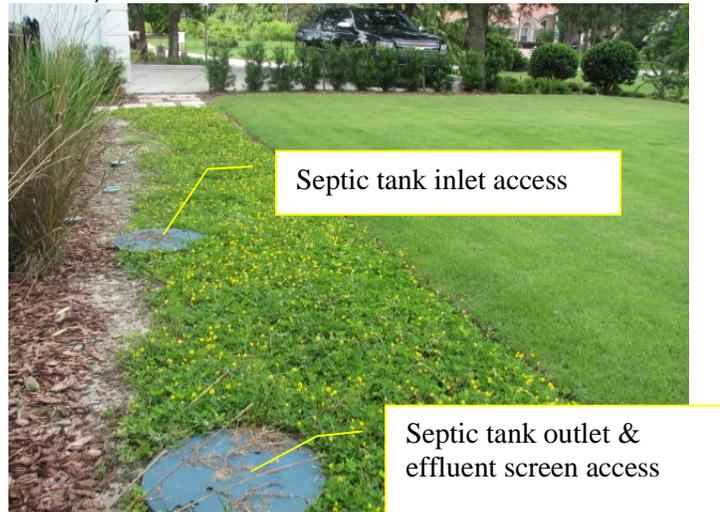


Figure 3
1,050 gallon, two chamber, primary tank

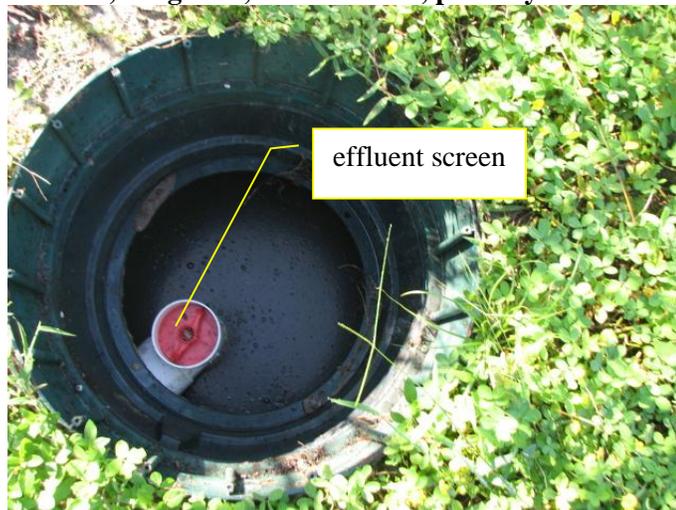


Figure 4
Primary tank effluent screen

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2.1.1 Primary (septic) Tank Maintenance

Septic Tank: The EPA recommends that the septic tank should be pumped at least every 3 to 5 years (EPA, 2002), depending on use and solids build-up. This can be handled by a licensed septic system contractor or the maintenance provider for the system.

Effluent Screen: The effluent screen is a Polylok™, PL-68 (see Appendix B) and will require maintenance every 6 months. This maintenance period could be extended if the screen does not show significant solids build up after 6 months. The effluent screen is removed from the outlet tee by grabbing the red handle at the top and twisting up (Figure 5). The effluent screen should be cleaned with a hose, inside the tank, to remove any solids captured on the screen.



Figure 5
Effluent screen removal

2.2 STE dose tank

The STE dose tank is a 600 gallon concrete tank with one plastic manhole cover for access (see Figure 6). Septic tank effluent flows by gravity into the STE dose tank via the 4”D inlet. The discharge pipe is connected to the effluent pump. Four mechanical float switches (see Figure 6) were installed to maintain the effluent level in the STE dose tank and are attached to a float tree installed in the STE dose tank and connected to the control panel. The height of the floats is adjustable.

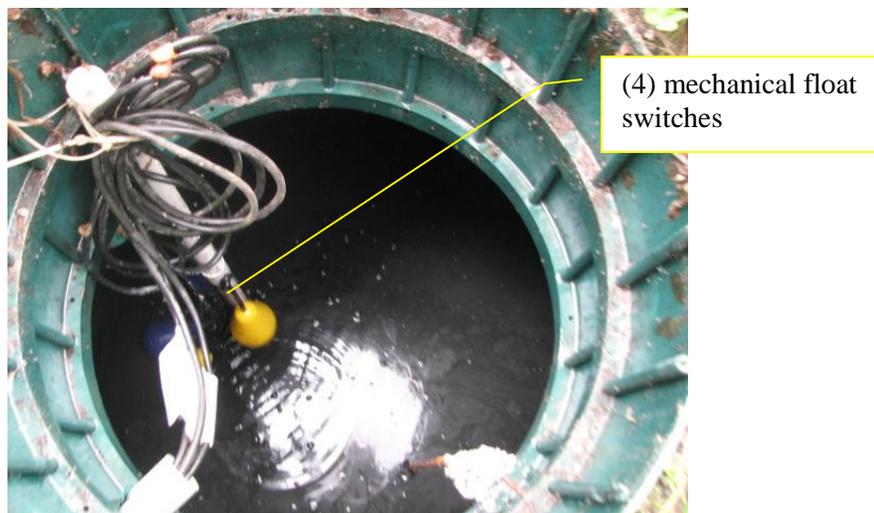


Figure 6
STE dose tank

2.2.1 STE Dose Tank Maintenance

STE Dose Tank: It is recommended that the STE dose tank be pumped out at the same frequency as the septic tank.

Mechanical Float Switches: The pump and float switches should be checked every six months and immediately if the control panel signals an alarm condition.

2.3 Centrifugal Pump

Both the STE dose tank and Stage 2b biofilter tank discharge pipes are connected to the effluent centrifugal pump shown in Figure 7. The centrifugal pump is a 1.5 HP, 77 gpm, 230V, 1 phase STA-RITE™ DHG (see Appendix C). There are two solenoid valves (see Appendix D) installed ahead of the pump which control the source tank that the pump pulls from to send to the drip system hydraulic unit. The STE dose tank solenoid valve 6 is located inside the pump enclosure (Figure 7) and the Stage 2b biofilter solenoid valve 7 is located outside of the pump enclosure in a valve box cover (Figure 7).

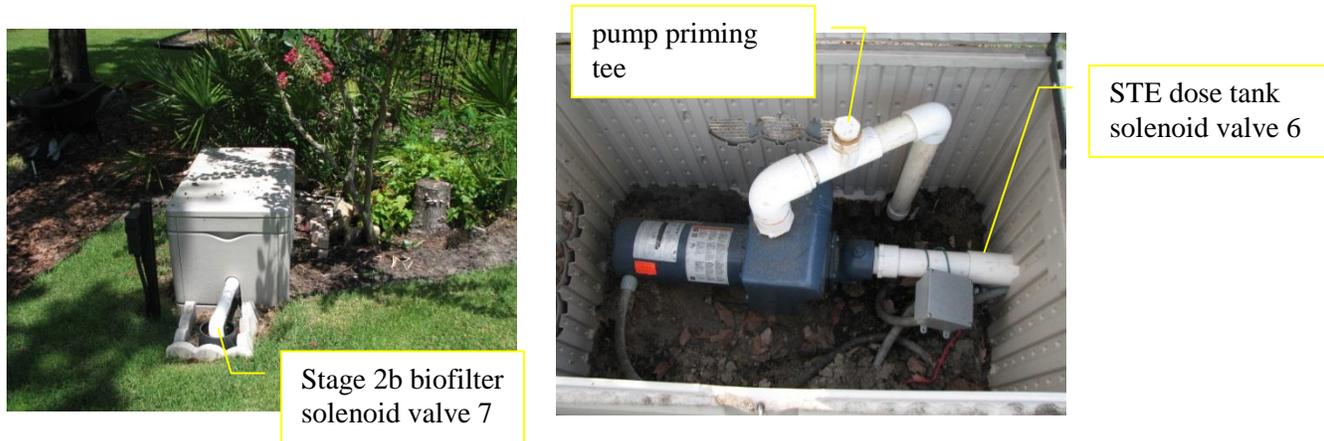


Figure 7
Pump and enclosure

2.3.1 Pump Operation

The pump is controlled by a timer to periodically dose the two zones of the drip system. The system controller allows for a timed pump cycle which can be overridden if the effluent levels are too low or too high in the source tank. If the floats indicate a low effluent level in the tank, the timed cycle is turned off to protect the pump. If the floats indicate a peak effluent tank level, then the pump cycles faster (the off cycle time is reduced) until the water level reaches the optimal range. An alarm will indicate if the water level goes above a critical high effluent tank level.

The household potable water use is recorded via a water meter (Meter 1) located in the front yard near the street in a valve box which includes indoor and outdoor water use. The household has a separate irrigation well which supplies the irrigation system; however the metered potable water use includes filling the pool, car washing, etc. Meter 1 readings can be used to track potable water use which can assist during a high level alarm condition.

Redundant Off (RO) Float: The water level must be high enough to overcome the “Redundant Off” (first float) in order for the pump to be permitted to run. The RO float is located near the bottom of the tank. The low water safety float switch (RO float) is normally in the up position to assure enough water is in the source tank (STE dose tank and Stage 2b biofilter tank).

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Dose Enable (EN) Float: When the water level rises high enough to overcome the (standard dose enable, 2nd from the bottom float) and the time clock has timed out the preset time delay of 180 minutes or 3 hours (standard rest between dosing cycles) the pump will activate and the lead zone is dosed. The pump will continue to run for the length of time set for the pump runtime (both zones are currently set at 370 seconds or 6.17 minutes). The pump will remain off until the internal time clock again times out the preset time delay (Standard Rest = 180 minutes) after which the pump will activate (as long as the EN float is still in the up position) and will run until the pump run timer finishes timing out. This process will repeat until the water level drops below the EN float and the pump run timer has timed out. The controller automatically alternates between the two zones.

PEAK Float: The control system is equipped with a “Peak Dose Enable” circuit to manage peak flows and excess water use. If the rising water activates the PEAK float (3rd from the bottom), the preset time delay changes to the Peak Rest which is set at 60 minutes or 1 hour. When the peak circuit has been deactivated (Peak float is in the down position), the normal pumping cycle will resume.

High Level (HI) Float: If the water level rises enough to overcome the high level (4th from the bottom) float, the audiovisual alarm will activate. The audio portion of the alarm may be silenced by pressing the Test-Normal-Silence switch (located on the outside of the control panel) to the silence position (see Section 2.10). The alarm circuit will auto reset when the HI float returns to its normal (down) position. Since a high water level condition can be caused by pump failure, excess infiltration, or an unusually large peak water use, the owner should call the maintenance entity to determine the cause of the alarm.

For the pump to be automatically actuated, the pump switch must be on "auto". The pump may also be operated in the "manual" position by flipping the switch inside the control panel to the “MAN” position (see Section 2.10). However to run the pump in the manual position, a source tank and zone should also be placed in manual after confirming there is enough water in the associated source tank (EN float is in the up position).

2.3.2 Pump maintenance

The pump and float switches should be checked during each maintenance site visit and immediately during an alarm condition. The pump should be checked to confirm that the target dose volume is being delivered to each of the drip zones. The volume and flowrate can be checked using the combined pumped flowmeter (Meter 2) located in the hydraulic unit (see Figure 8) following the hydraulic unit disc filters prior to the split between the two

zones. Meter 2 records the cumulative pumped flow in gallons pumped from both the STE dose tank and Stage 2b biofilter tank. Therefore, the measurement of Meter 2 includes both the STE flow from the household and the treated effluent flow from the Stage 2b biofilter. The flowrate during a dose can be monitored during the dose cycle with a stopwatch using Meter 2 to determine the gallons per minute.

STE Zone – from STE dose tank = 4.8 gpm

BIO Zone – from Stage 2b biofilter = 3.9 gpm

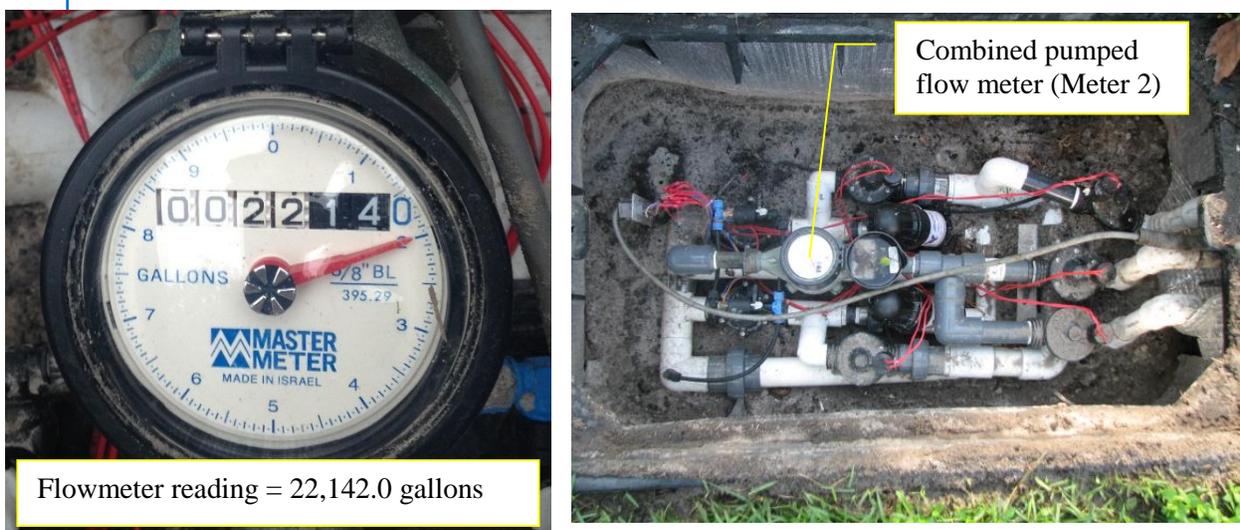


Figure 8
Combined pumped flow meter (Meter 2)

Meter 2 can also be used to determine the total volume dosed during a dose cycle using the calculation below:

$$(\text{Meter 2 reading after dose} - \text{Meter 2 reading before dose}) = \text{Dose Volume}$$

STE Zone – from STE dose tank = ~30 gallons per dose cycle

BIO Zone – from Stage 2b biofilter = ~24 gallons per dose cycle

The pump manual (see Appendix C) states that little or no maintenance to the pump is required other than possible replacement of shaft seal after a reasonable period of

operation. Also it is recommended to lubricate the motor according to the motor manufacturer's instructions.

Float switch operation should be checked in the control panel (see Appendix E and F), and the reading on the controller LCD screen should accurately register the float positions in the STE dose tank and Stage 2b biofilter being in the up or down position (see Figure 9 controller screen shots).

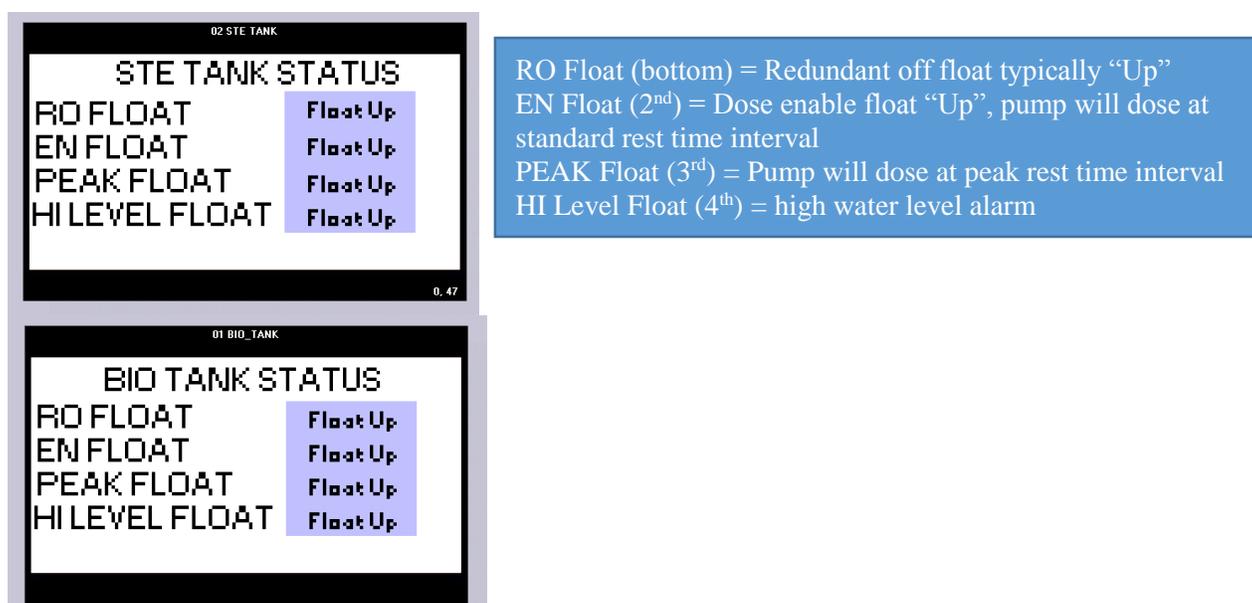


Figure 9
Float switch registers, screen shots of controller

2.4 Hydraulic Unit

As previously discussed, the B-HS3 system includes a 2-zone Perc-Rite™ drip system which incorporates filtration, time, and level controlled application of effluent to the two drip distribution zones. The system is operated by a controller, which is activated by level sensing devices (mechanical differential float switches) located in the STE dose tank (source tank for STE Zone) and Stage 2b biofilter (source tank for BIO Zone). When activated by a rising level of effluent in the source tank, the controller will enable the dispersal cycle as dictated by the time clock. The effluent is pumped through 100-micron

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disc filters located inside the hydraulic unit (see Figures 10 and 11) and then to the applicable drip dispersal zone (depending on the source tank).

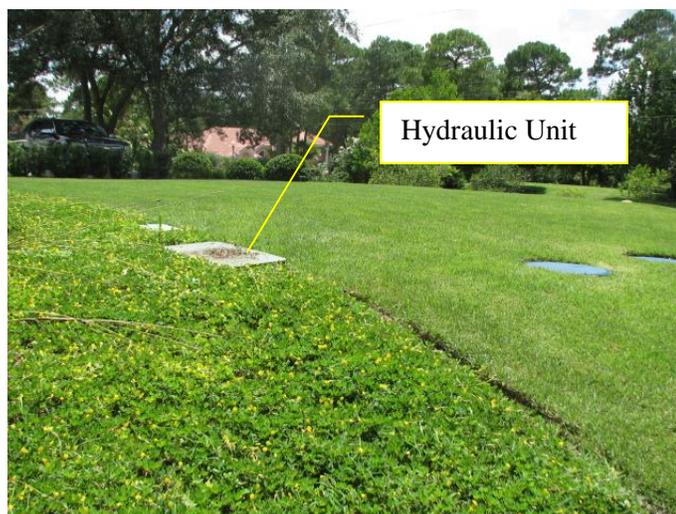


Figure 10
Hydraulic Unit Location

The disc filter backflushing schedule is triggered at the beginning of each dose cycle. The backflushing sequence is as follows. One filter valve closes, thus blocking the flow of unfiltered effluent to that filter. After a short delay, the other flushing valve opens, thereby backflushing the unused filter. The accumulated impurities discharge back into the primary tank. The closing and opening procedure of the filter and back flush valves (valves 1a, 1b, 2a and 2b) causes a change of flow within the unit to provide effluent from one filter to backflush the other filter. The backflush procedure lasts approximately fifteen seconds then the backflushing valve (1b and 2b) closes. Only after the first filter has completed its backflushing cycle, will the second filter begin its cycle of backflushing in the same manner as the first. Effluent will then be pumped through clean disc filters, then through the combined pumped flow meter (Meter 2) and finally through the zone valves (STE Zone valve 3 or BIO Zone valve 4) to the associated drip field supply line.

2.4.1 Hydraulic Unit maintenance

As described above, the disc filter system incorporates automated cleaning which is dependent on multiple solenoid valves opening and closing (see Figure 11 and Table 1). Therefore, if a solenoid valve fails, the automated cleaning sequence cannot occur.

During system start-up, a few of the solenoid valves had issues because of construction debris being lodged in the diaphragm of the valve (see Appendix D for solenoid valve tech sheet). As a result, a disc filter backflush solenoid valve coil failed and would not open. Following system troubleshooting, the cleaning of the diaphragm and installation of a new coil, the system required very little maintenance. Using the troubleshooting guide provided in Appendix G, a determination can be made if a solenoid coil needs to be replaced.

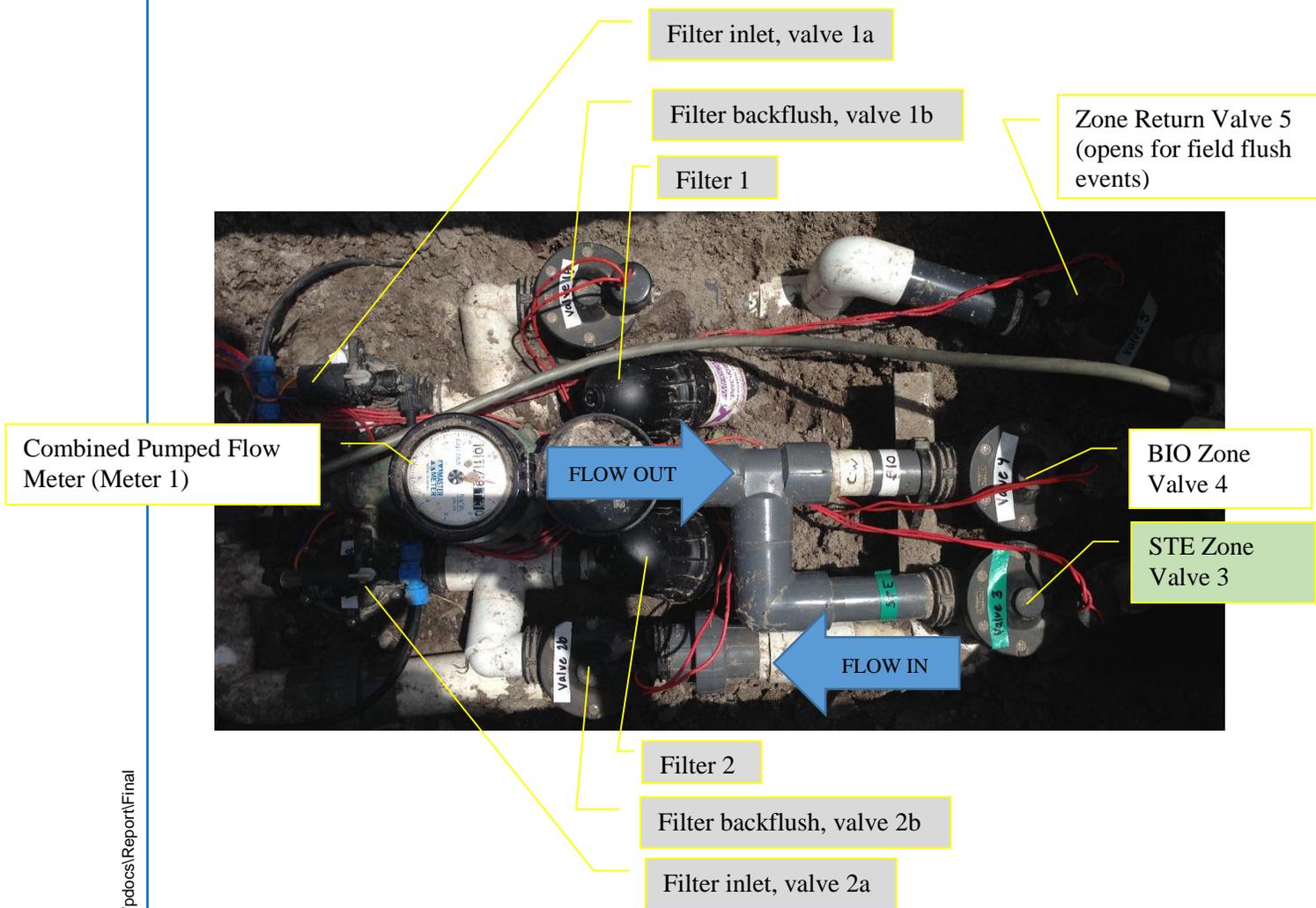


Figure 11
Hydraulic Unit

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As discussed, there are a total of nine solenoid valves in the system summarized in Table 1. Seven solenoid valves are located inside the hydraulic unit and two valves are installed ahead of the pump (see Section 2.3). The solenoid valves have normally closed (NC) coils but some have two red wires (Figure 12) and others have an orange and blue wire (Figure 13). It is important to replace a failed coil with a similar wiring coil.

Table 1
Solenoid Valves

ID No.	Valve ID	Coil Type	Description
1a	Filter 1 Inlet Valve 1a	S-390-3-D, 24 VAC NC (blue/orange wires)	Solenoid valve opens for flow to filter 1
1b	Filter 1 Backflush Valve 1b	S-390-2-R, 24 VAC NC (red/red wires)	Solenoid valve opens for filter backflushing
2a	Filter 2 Inlet Valve 2a	S-390-3-D, 24 VAC NC (blue/orange wires)	Solenoid valve opens for flow to filter 2
2b	Filter 2 Backflush Valve 2b	S-390-2-R, 24 VAC NC (red/red wires)	Solenoid valve opens for filter backflushing
3	STE Zone Valve 3	S-390-2-R, 24 VAC NC (red/red wires)	Solenoid valve opens for STE Zone dosing from STE dose tank
4	BIO Zone Valve 4	S-390-2-R, 24 VAC NC (red/red wires)	Solenoid valve opens for BIO Zone dosing from Stage 2b tank
5	Zone Return Valve 5	S-390-2-R, 24 VAC NC (red/red wires)	Solenoid valve opens during a field flush dose maintenance cycle (either zone), returns flow to primary tank
6	STE dose tank Valve 6	S-390-2-R, 24 VAC NC (red/red wires)	Ahead of pump, opens to allow pump suction from STE dose tank
7	Stage 2b biofilter Valve 7	S-390-2-R, 24 VAC NC (red/red wires)	Ahead of pump, opens to allow pump suction from Stage 2b biofilter tank



Figure 12
S-390-2-R Solenoid Valve Replacement Coils



Figure 13
S-390-3-D Solenoid Valve Replacement Coils

The disc filters in the hydraulic unit should be opened and visually inspected for proper operation. Replacement filters are shown in Figure 14.



Figure 14
Disc Filter

2.5 Drip Line

The drip field supply lines convey the effluent to the drip absorption zone that is being dosed where it is discharged below the soil surface through pressure compensating self-cleaning drip poly-tubing emitters (see Appendix H). The emitters are located every two feet in the tubing and emit 0.65 gallons per hour per emitter. The drip feed and return lines for each zone have an air release valve (four total) housed in a small valve box at the highest point of the manifold pipe (see Figure 1). The valve will close when the water pressure arrives at the valve during each dose. The air release valve allows air to reenter the tubing after each dose to allow the drip tubing to drain.

2.5.1 Drip Line maintenance

The dripper lines are automatically scoured (during field flushing) every 14 days. This function is activated by the controller, which opens the field flush valve (zone return valve 5, see Figure 11), thus allowing the flushed effluent to be returned to the primary tank. A

manual field flush cycle should be activated during the site visit after verifying that the source tank dose enable float is in the up position, then: (1) placing the desired Zone switch to manual (2) placing associated source tank switch to manual (3) placing the zone return valve in manual (4) placing pump switch to manual. See Section 2.10 for switch locations within the control panel.

2.6 Stage 1 biofilter (STE Zone)

The STE dose tank effluent is pumped through the drip system hydraulic unit and discharged to the Stage 1&2a drip system (STE Zone). As depicted in Figure 1, the Stage 1 drip system (STE Zone) consists of a drip supply feed line on the north end of the STE Zone area with 25 laterals running north/south clustered into 5 runs (130 linear feet runs) for a total of 650 linear feet of drip line covering a 728 SF area. The drip return line runs on the south and east side of the STE Zone area and returns to the hydraulic unit. The feed line and return line were installed with air release valves (see Figures 1 and 15). In the STE Zone drip area, wastewater percolates downward through an 18-inch layer of unsaturated sand. The unsaturated pore spaces in the Stage 1 media will allow air to reach microorganisms attached to the media surfaces, enabling aerobic biochemical reactions to occur. The significant target reactions are aerobic oxidation (by microorganisms that oxidize organic material and reduce biochemical oxygen demand), hydrolysis and ammonification (releasing ammonia), and nitrification (biochemical conversion of ammonia to nitrate and nitrite). Of particular interest are the organic and ammonia nitrogen concentrations in first stage effluent (which should be low), as well as nitrate and nitrite (which should be high).

Underlying the sand is a 9-inch maximum thickness layer of Stage 2a media mixture of 50% lignocellulosic (see Appendix I) and 50% sand placed above the 30 mil PVC liner. The lignocellulosic media is a supplemental carbon source for denitrification, a blended urban waste wood from Mother's Organics, Inc., Thonotosassa, FL. Two observation ports installed with the bottom on the liner can be used to determine the water level within the lined area. The Stage 1&2a biofilter drip system area was prepared by grading a V-shape so that effluent would collect on the liner and flow to the center where a perforated pipe within a gravel underdrain conveys the effluent by gravity to the Stage 2b denitrification tank through a pipe boot within the liner.



STE Zone Feed
Air Release Valve
1 Box



Pump

STE Zone Return Air
Release Valve 2 Box

Figure 15
Stage 1&2a biofilter (STE Zone)

2.6.1 Stage 1 Biofilter Maintenance

The Stage 1 biofilter drip area should be checked for soggy, saturated conditions. If soggy/saturated conditions are present, the area should be checked for drip line failure, blow out areas, etc. Clogging of the filter surface will occur (a black biomat will form) which will slow infiltration. If the surface remains ponded between doses, insufficient aeration of the media will occur, lowering the effluent quality and life of the system. If the surface

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remains ponded between doses, the air release valves should be checked for proper operation (closing at the start of the dose cycle). If continued ponding persists the drip line in the area of the ponding should be investigated.

2.7 Stage 2b Biofilter

The Stage 1&2a effluent is conveyed to a Stage 2b biofilter which is a concrete 1,050 gallon single-chamber tank with two plastic manhole covers for access (see Figure 16). The purpose of this tank is to hold the Stage 2b elemental sulfur reactive media mixture (Appendix I) for additional treatment (denitrification). Wastewater flow is in an upward direction through the 12-inches of 90% elemental sulfur (99% pastille-shaped elemental sulfur GreenSun™ ES-99) and 10% oyster shell media (Remington Feed) mixture. Two stainless steel drivepoint samplers were installed for vertical profile sampling.

A 4”D outlet pipe was installed with an intake screen, a section of perforated pipe (see Figure 17) installed above the media. The 4”D outlet is connected to the pump suction line.



Figure 16
Stage 2b biofilter access

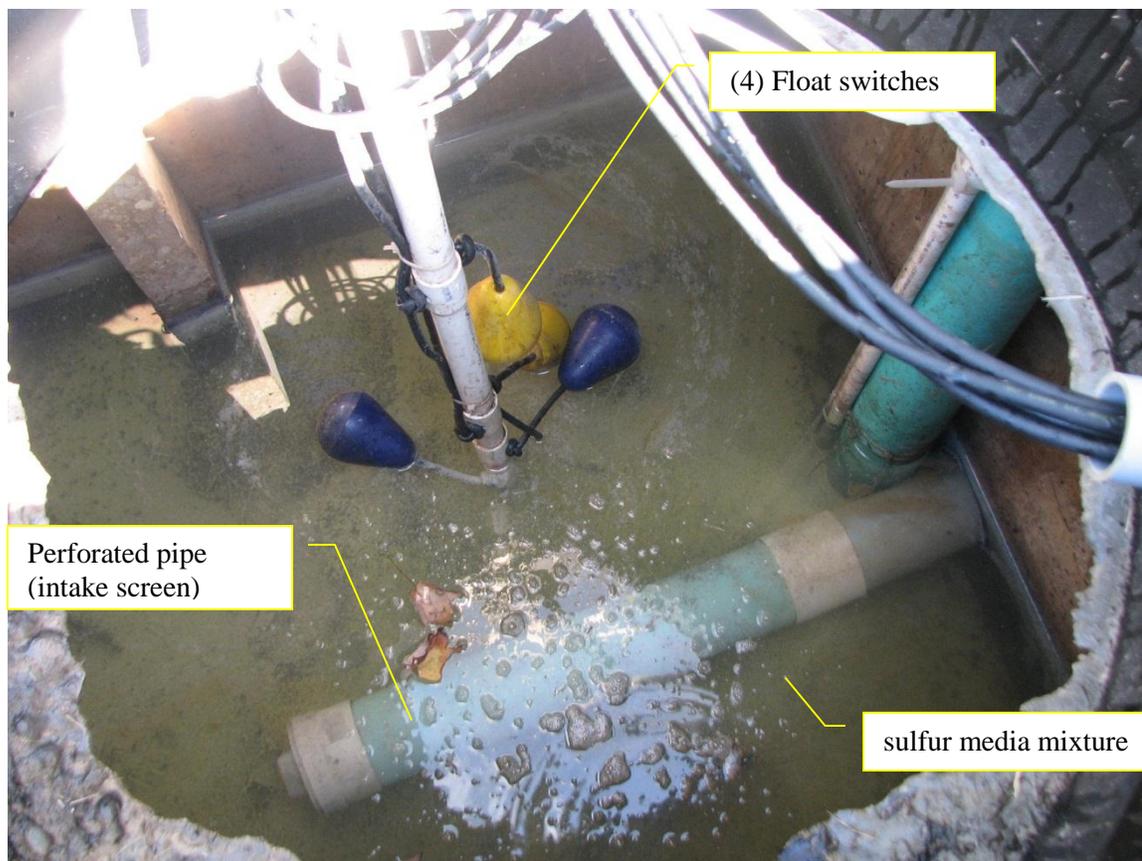


Figure 17
Stage 2b biofilter

2.7.1 Stage 2b biofilter maintenance

The Stage 2b biofilter should require little maintenance. The reactive media (elemental sulfur) is eventually consumed and must be replenished. Also the water level within the tank should be checked to be sure it is above the intake line but below the high level float.

2.8 Treated Effluent Drip Area (BIO Zone)

The Stage 2b biofilter tank effluent is pumped through the drip system hydraulic unit and discharged to the Treated Effluent drip system (BIO Zone). The Treated Effluent drip system (see Figure 18) consists of a drip supply feed line on the north and east end of the

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BIO Zone area with 18 laterals running north/south and east/west in a L-shape clustered into 2 runs (267 linear feet runs) for a total of 534 linear feet of drip line covering a 615 SF area as depicted in Figure 1. The drip return line also runs on the north and east side of the area to the hydraulic unit. The feed line and return lines were installed with air release valves (see Figure 1). In the BIO Zone - treated effluent drip area (Figure 19), the Stage 2b effluent percolates downward through sand. Three groundwater monitoring wells (see Figure 1) were installed for monitoring in the treated effluent drip area with the top of the screen located two feet below the drip emitters.

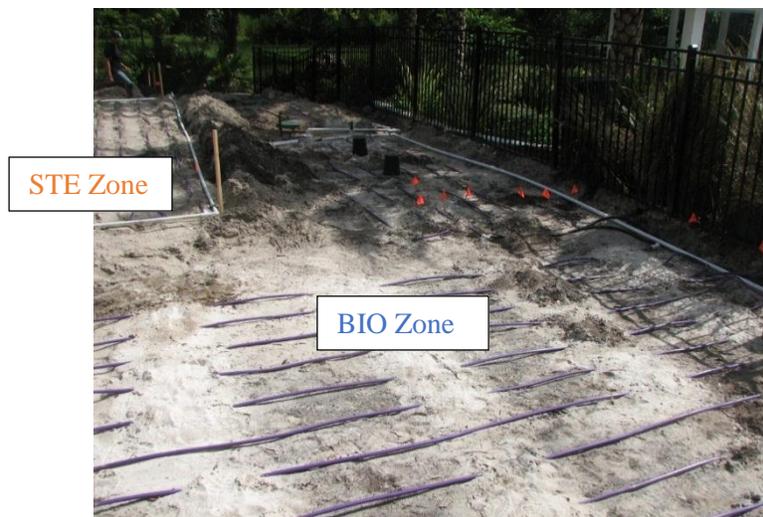


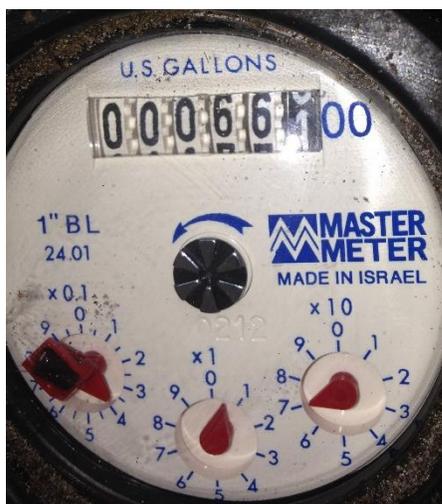
Figure 18
Treated Effluent Drip Area (BIO Zone)



Figure 19
Treated Effluent Drip Area (BIO Zone)

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The treated effluent flow meter (Meter 3) is located on the treated effluent drip system (BIO Zone) feed line near the hydraulic unit (see Figure 20). Meter 3 records the cumulative flow in gallons pumped from the Stage 2b biofilter tank to BIO Zone.



Flowmeter reading = 66,070.4 gallons

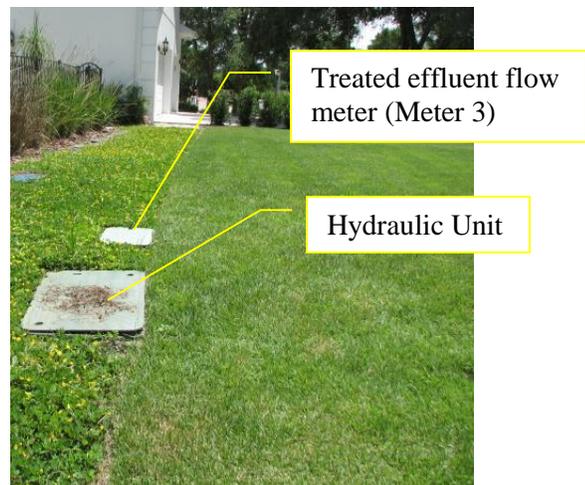


Figure 20
BIO Zone - Treated Effluent Flow Meter (Meter 3)

2.9 Flow Calculations

The daily wastewater volume supplied to the passive nitrogen removal system is the volume that is pumped to the lined Stage 1&2a biofilter (STE Zone); it is calculated by the difference between the readings of Meter 2 and Meter 3. This calculation does not account for water entering or leaving the Stage 1&2a biofilter (STE Zone) through hydrologic processes such as precipitation, irrigation, and evapotranspiration.

Flow calculations using the metered data:

Combined pumped flow = Meter 2

Treated effluent flow (BIO Zone) = Meter 3

Stage 1&2a biofilter wastewater flow (STE Zone) = Meter 2 – Meter 3

Additional STE Zone inputs/outputs = Meter 3 - [Meter 2- Meter 3]

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The average household potable water use since the PNRS system start-up through December 2014 was 116.6 gallons per day with periods of higher and lower flows. Since the PNRS system start-up, the average combined pumped flow (flow to the Stage 1&2a drip system and treated effluent drip system) was 282.6 gallons per day, the average calculated Stage 1&2a drip system (STE) flow was 145.3 gallons per day and the average treated effluent drip system (Stage 2b biofilter effluent) flow was 137.2 gallons per day. The calculated Stage 1&2a drip system (STE) flow includes pumped water used for field flushing of the drip lines, which is returned to the septic tank after flushing. This is the reason that the calculated STE flow is considerably higher than the flow measured by the household potable water meter. Actual system treated flow is closer to the potable water meter flow value.

The difference between the flow to the Stage 1&2a drip system (STE) and the treated effluent drip system (Stage 2b biofilter effluent) are due to water inputs and outputs. Water inputs include precipitation, applied STE, and any lawn irrigation water collected in the Stage 1&2a lined area. Water outputs include evapotranspiration. Higher treated effluent flow (water inputs) are likely attributed to precipitation and irrigation water collected in the lined area. Higher Stage 1&2a flow (water outputs) is likely attributed to evapotranspiration.

2.10 Control Panel

The control panel (Figure 21) houses the system controller (see Figure 22) which allows for a timed pump cycle which can be overridden if the effluent levels are too low or too high in the pump tank. An audio-visual alarm will indicate if the water level goes above a critical level.

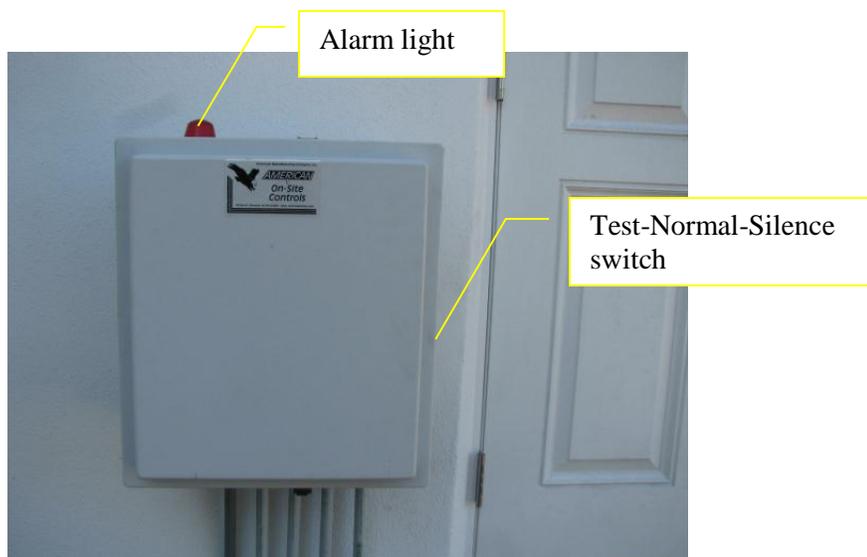


Figure 21
Control Panel Exterior

The controller data is accessed on the LCD screen (see Figure 22) which provides system status, cumulative cycles, cumulative field flushes, runtime data and alarms. Appendix F provides screenshots of the controller screens. The switches (Table 2) along the right side of the interior should be placed in the “Auto” position during normal operation.

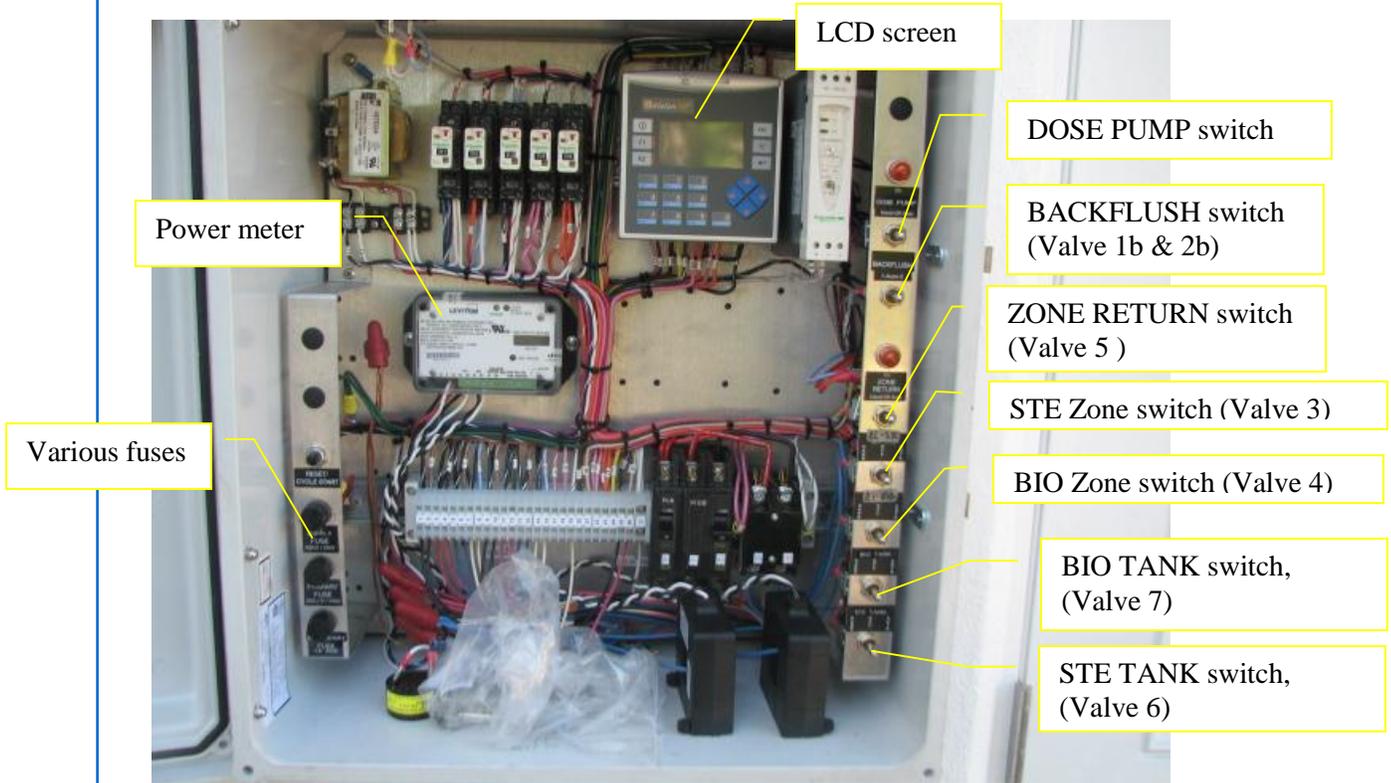


Figure 22
Control Panel Interior

**Table 2
Control Panel Switches**

Switch from the Top	Switch ID	Switches Left – Middle - Right	Description
1	DOSE PUMP	HAND – OFF - AUTO	Turns pump on/off
2	BACKFLUSH	1 – AUTO - 2	Opens disc filter backflush valves 1 = Solenoid Valve 1b, manual open AUTO – automatic operation 2 = Solenoid Valve 2b, manual open
3	ZONE RETURN	HAND – OFF - AUTO	Solenoid valve 5 opens for field flush return flow to primary tank
4	Z2–STE	HAND – OFF - AUTO	Solenoid valve 3 opens for flow to STE Zone drip system
5	Z1–BIO	HAND – OFF - AUTO	Solenoid valve 4 opens for flow to BIO Zone drip system
6	BIO TANK	HAND – OFF - AUTO	Solenoid valve 7 opens to allow pump suction from BIO tank (Stage 2b biofilter tank – treated effluent)
7	STE TANK	HAND – OFF - AUTO	Solenoid valve 6 opens to allow pump suction from STE dose tank

HAND = manual operation for troubleshooting
 AUTO = automatic operation for normal operation

3.0 Maintenance and Monitoring

The treatment system is relatively passive and should require little maintenance. Performance verification and monitoring should be performed routinely, as required by permitting agencies. The sulfur media is reactive and therefore must be replenished (see Appendix I). The media life is currently estimated as 20+ years of operation. Sulfur media replacement can be easily performed through the access manholes illustrated in Figure 14. Training videos on various system components can be viewed here:

<http://www.americanonsite.com/american/trainingmovies.html>

The monitoring equipment (summarized in Table 3) used during maintenance and/or monitoring are protected by valve box covers. The equipment locations on the site plan are shown in Figures 23 and 24.

**Table 3
Maintenance and Monitoring Equipment**

ID	Name	General Location	Distance (feet) from A, B, C or D (see Figure 23 & 24)			
			A	B	C	D ¹
ARV-1	Air Relief Valve 1	STE Zone – north	55.4	46.7		
ARV-2	Air Relief Valve 2	STE Zone – south	33.2	19.3		
ARV-3	Air Relief Valve 3	BIO Zone –north	31.0	41.2		
ARV-4	Air Relief Valve 4	BIO Zone – south				
LY-03	Suction Lysimeter 3	BIO Zone	27.4	38		
OP-N	Observation Port - North	STE Zone	54.3	51.4		
OP-S	Observation Port - South	STE Zone	25.6	17.8		
PZ-07	Groundwater well 7	BIO Zone	32.6	9.7		
PZ-08	Groundwater well 8	BIO Zone	8.5	29.5		
PZ-09	Groundwater well 9	BIO Zone	23.5	35.3		
SV-1a	Solenoid Valve 1a	Hydraulic Unit				
SV-1b	Solenoid Valve 1b	Hydraulic Unit				
SV-2a	Solenoid Valve 2a	Hydraulic Unit				
SV-2b	Solenoid Valve 2b	Hydraulic Unit				
SV-3	Solenoid Valve 3	Hydraulic Unit				
SV-4	Solenoid Valve 4	Hydraulic Unit				
SV-5	Solenoid Valve 5	Hydraulic Unit				
SV-6	Solenoid Valve 6	Pump Enclosure				
SV-7	Solenoid Valve 7	Pump Enclosure				
Downgradient groundwater monitoring network						
A7	PZA7-6,-8 and -11			3.0		
B6	PZB6-6,-8 and -11				8.6	
B8	PZB8-5,-7 and -10			35.6	27.7	
C6	PZC6-5,-7 and -10				49.0	
C10	PZC10-6,-8 and -10				67.0	
D4	PZD4-5, -7, and -10				89.0	36.4
D7	PZD7-6,-8 and -11				90.0	33.1
BKG-PZ04			Near lake in backyard, 3.3' west of property corner survey stake			

¹D is measured from the center of the manhole cover on stormwater catch basin.

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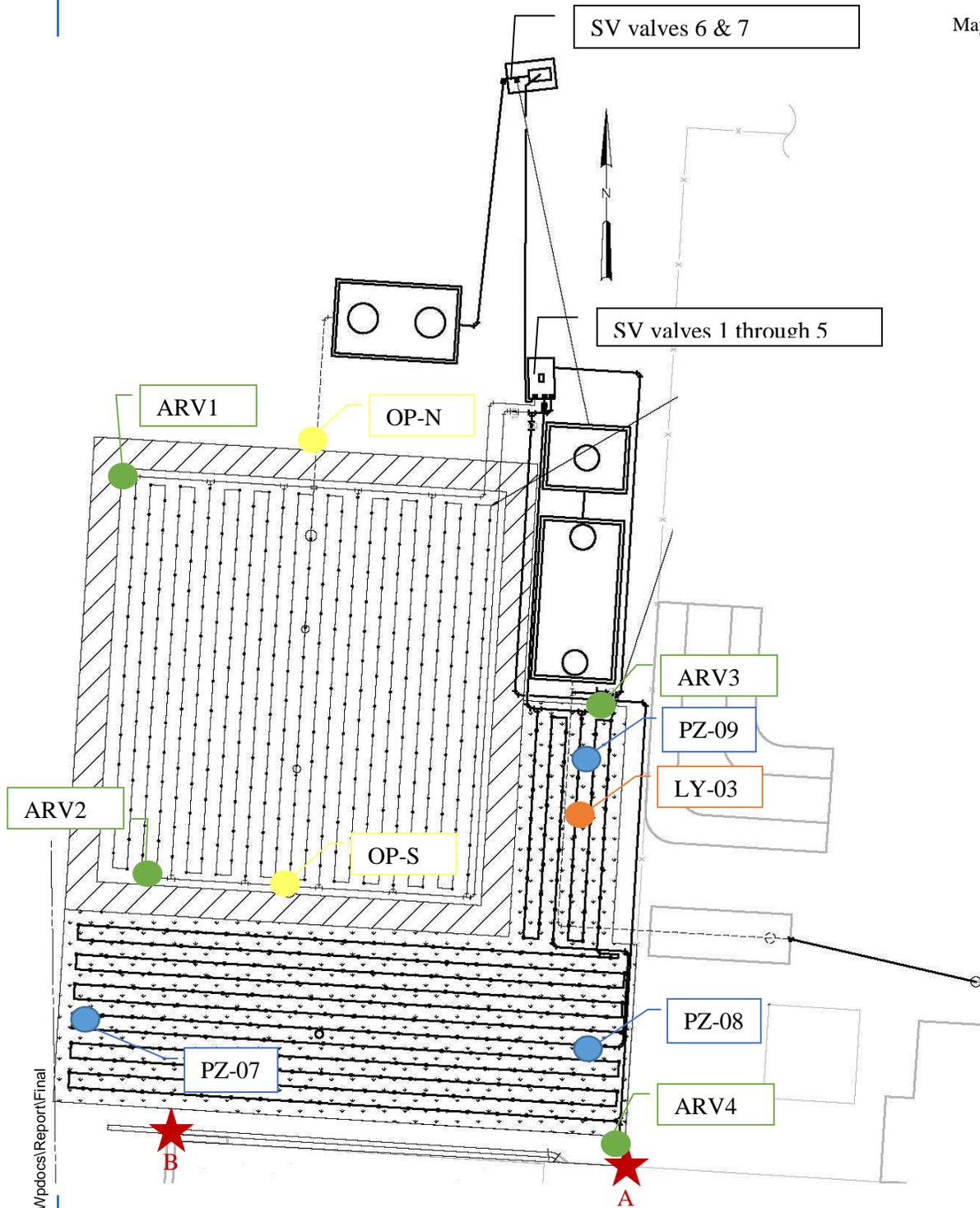


Figure 23
Monitoring and Maintenance Equipment

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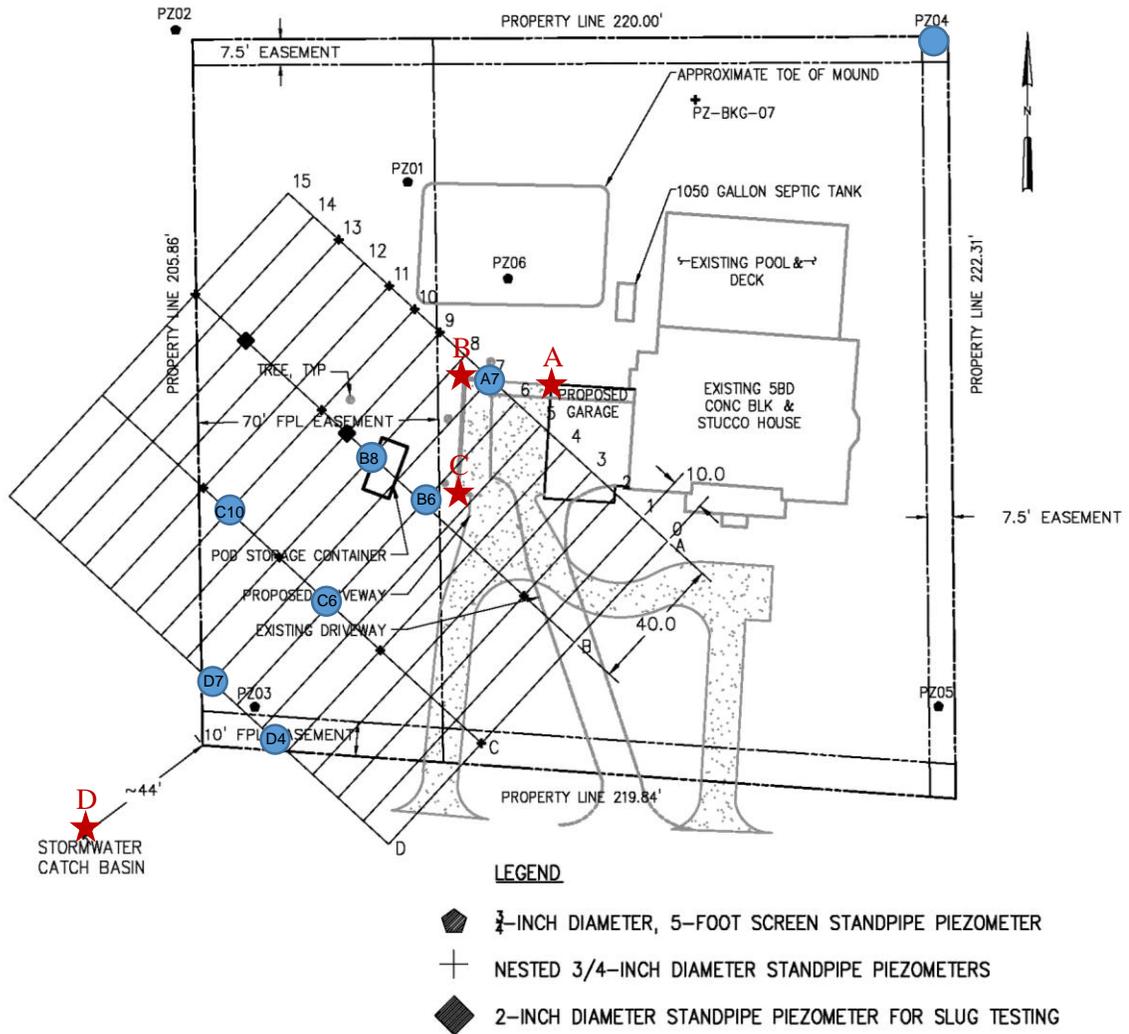


Figure 24
Groundwater Monitoring Network

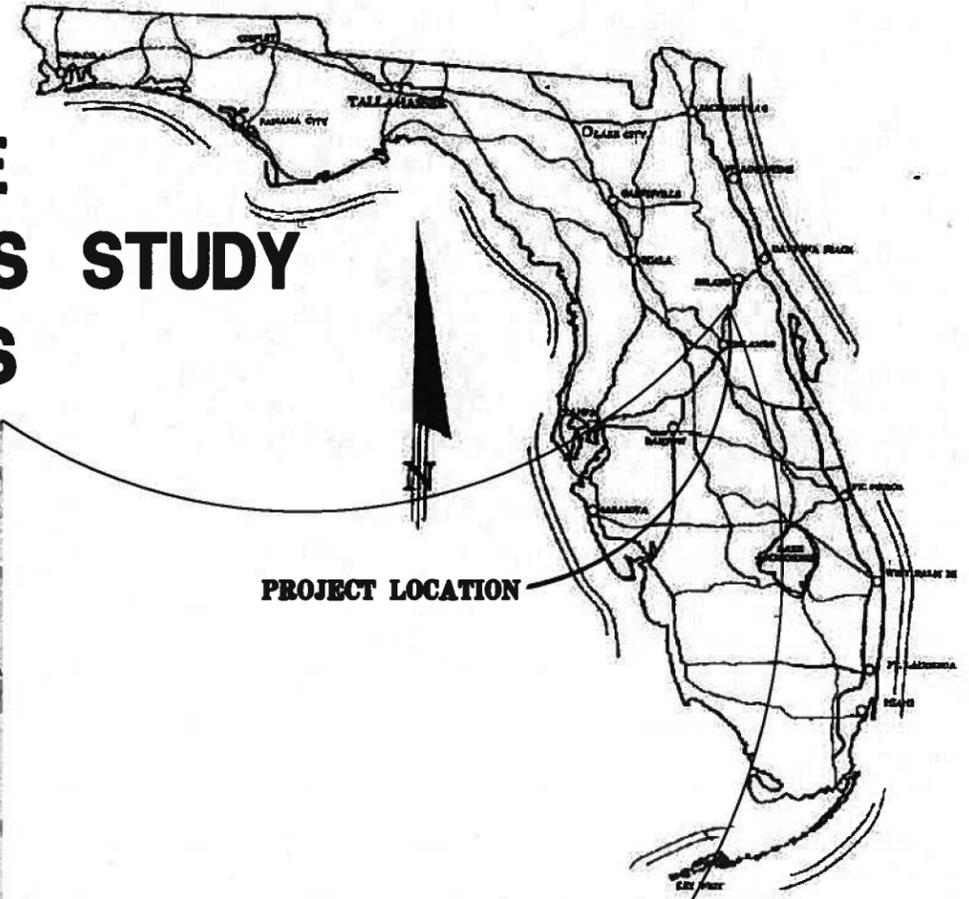
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4.0 Inspection Checklist

The following is a checklist of information that should be gathered during system inspection.

APPENDIX A
RECORD DRAWINGS

FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY B-HS3 RECORD DRAWINGS

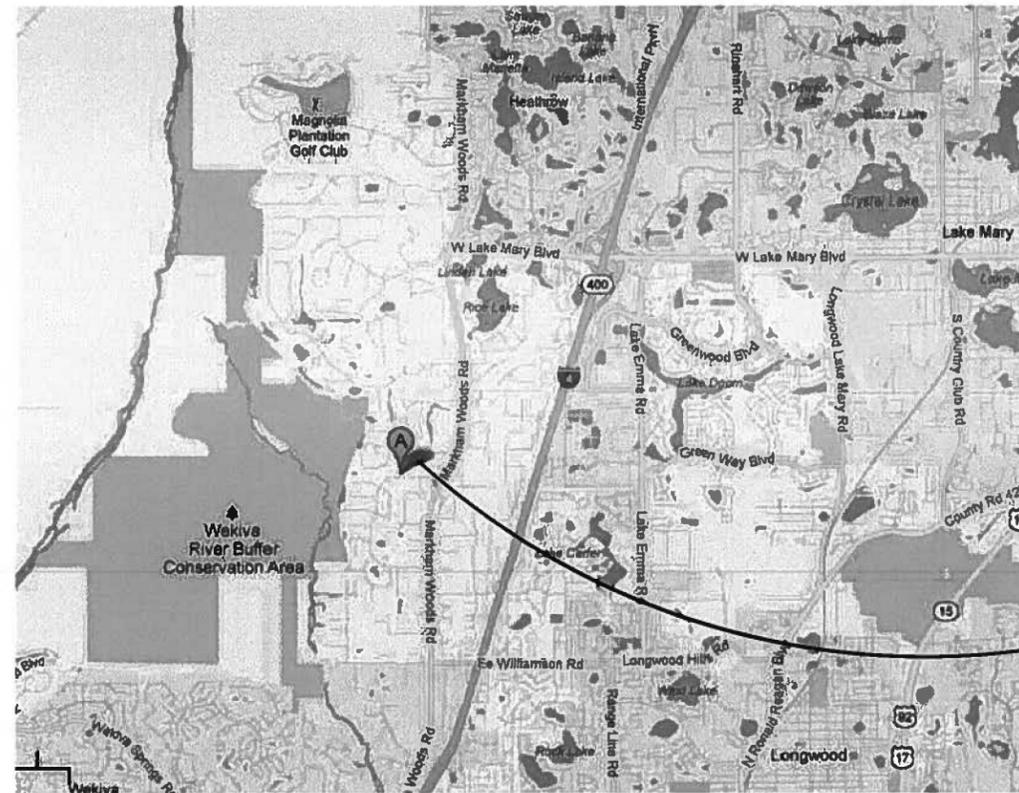


PROJECT LOCATION

PROJECT LOCATION
B-HS3
Longwood, FL

LIST OF DRAWINGS

SHEET COUNT	SHEET NUMBER	SHEET TITLE
GENERAL		
1	G-1	COVER SHEET AND INDEX OF DRAWINGS
CIVIL		
2	C-1	SITE PLAN
3	C-2	PROPOSED SYSTEM LAYOUT
4	C-3	STAGE 1 LINED DRIP SYSTEM
5	C-4	RECLAIMED WATER DISPERSAL DRIP SYSTEM
6	C-5	OVERALL SYSTEM CROSS SECTIONS
7	C-6	ADDITIONAL CROSS SECTIONS
8	C-7	ADDITIONAL CROSS SECTIONS
9	C-8	HYDRAULIC PROFILE



LOCATION MAP

N.T.S.

HAZEN AND SAWYER
Environmental Engineers & Scientists

10002 Princess Palm Ave., Suite 200
Tampa, Florida 33619
Certificate of Authorization Number: 2771

IN ASSOCIATION WITH



OTIS
ENVIRONMENTAL
CONSULTANTS, LLC

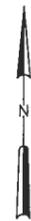
AET
Applied Environmental Technology



FLORIDA DEPARTMENT OF HEALTH
4052 BALD CYPRESS WAY, BIN A08
TALLAHASSEE, FLORIDA 32399-1713
(850)-245-4070

NOTICE

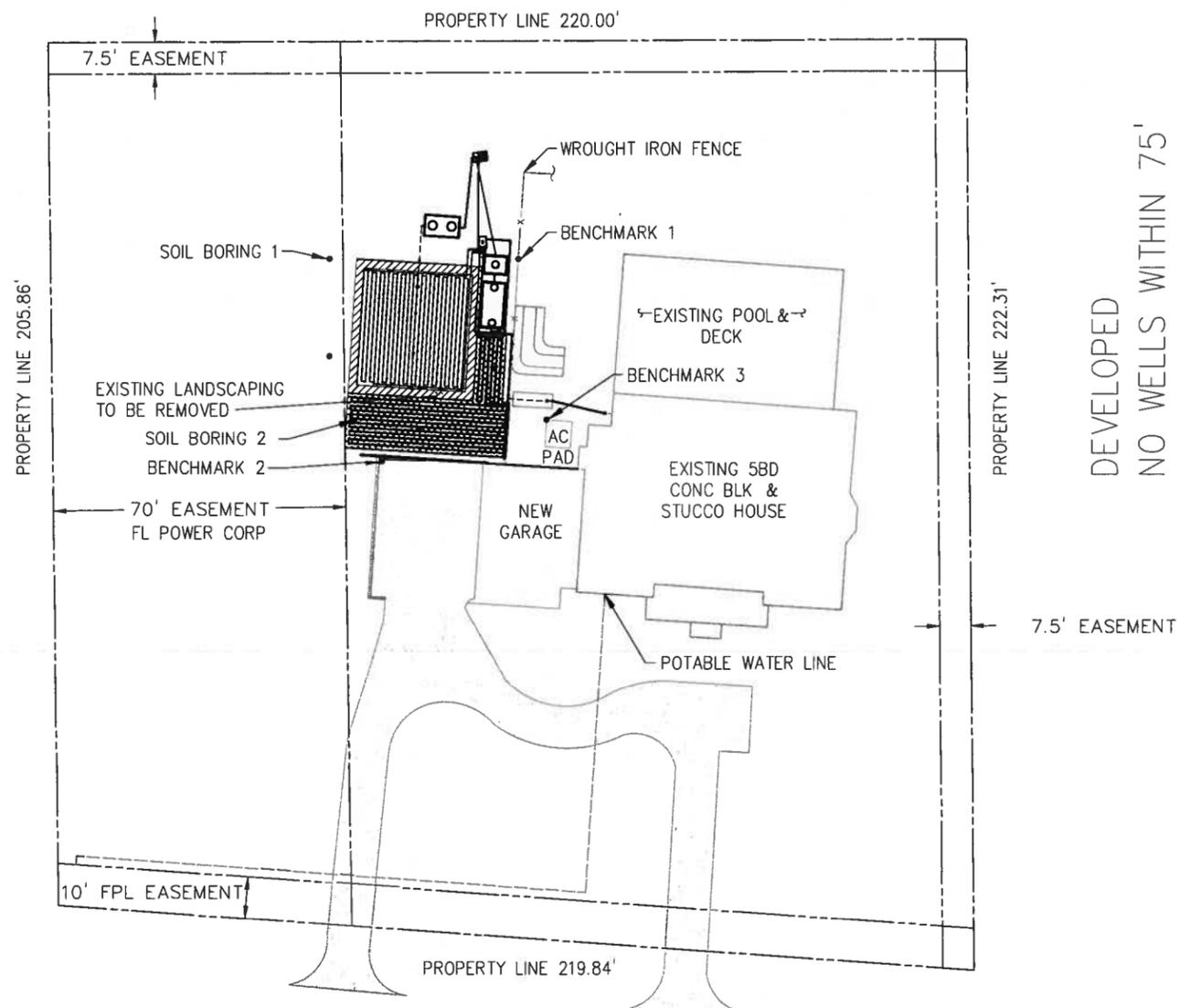
THESE "RECORD DRAWINGS" REPRESENT THE FINAL "AS BUILT" CONDITIONS OF THE CONSTRUCTION PROJECT BASED UPON FIELD OBSERVATION AND SUPPORTING PROJECT RECORDS. UNLESS OTHERWISE NOTED ON THE DRAWINGS, WORK SHOWN AS PROPOSED OR TENTATIVE HAS BEEN COMPLETED, AND DIMENSIONS SHOWN AS PROPOSED OR TENTATIVE ARE FINAL. NOTES DIRECTING THE CONTRACTOR TO PERFORM SPECIFIC TASKS REMAIN ON THE DRAWINGS AS A RECORD OF CONSTRUCTION ACTIVITIES.



UNDEVELOPED

DEVELOPED
NO WELLS WITHIN 75'

DEVELOPED
NO WELLS WITHIN 75'



- NOTES:
- POTABLE WATER PROVIDER IS UTILITIES, INC.
 - NO PERTINENT FEATURES WITHIN 75'.

DEVELOPED
NO WELLS WITHIN 75'

PROPOSED SITE PLAN

1"=20'



NOTICE

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Josef Edeback
6/23/13

PLOT DATE: 7/15/2013 4:08 PM BY: EDEBACK

DESIGNED	JEH
DRAWN	CMS
CHECKED	DBS
PROJ. ENGR.	JME
DLA	
APPROVED	

JOSEFIN EDEBACK-HIRST
Name: _____ Date: _____
Florida Professional Engineer's Registration Number: **69835**

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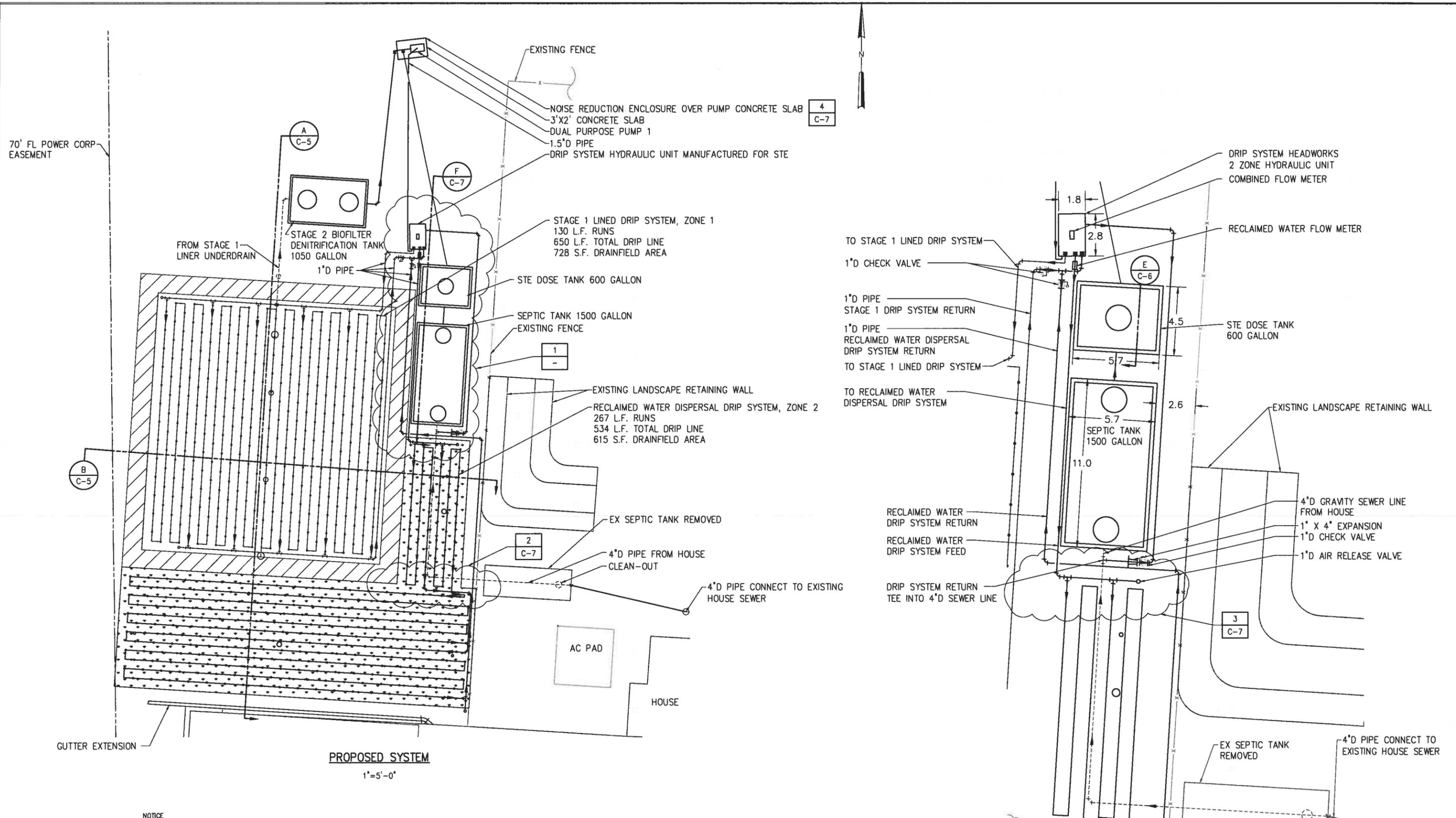


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(850)-245-4070

FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY
FOSNRS SITE B-HS3
SITE PLAN

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE	JUNE 2013
	H & S JOB NUMBER	44237-001
	CONTRACT NUMBER	CORCL
	DRAWING NUMBER	C-1

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PROPOSED SYSTEM
1"=5'-0"

SEPTIC TANK AREA
DETAIL 1
1"=3'-0"
1"=5'-0"

NOTICE

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DESIGNED	JEH
DRAWN	CMS
CHECKED	DBS
PROJ. ENGR.	JME
DLA	
APPROVED	

Josefin Edeback-Hirst
7/23/13

JOSEFIN EDEBACK-HIRST
Name: Josefin Edeback-Hirst Date: 7/23/13
Florida Professional Engineer's Registration Number: 69835

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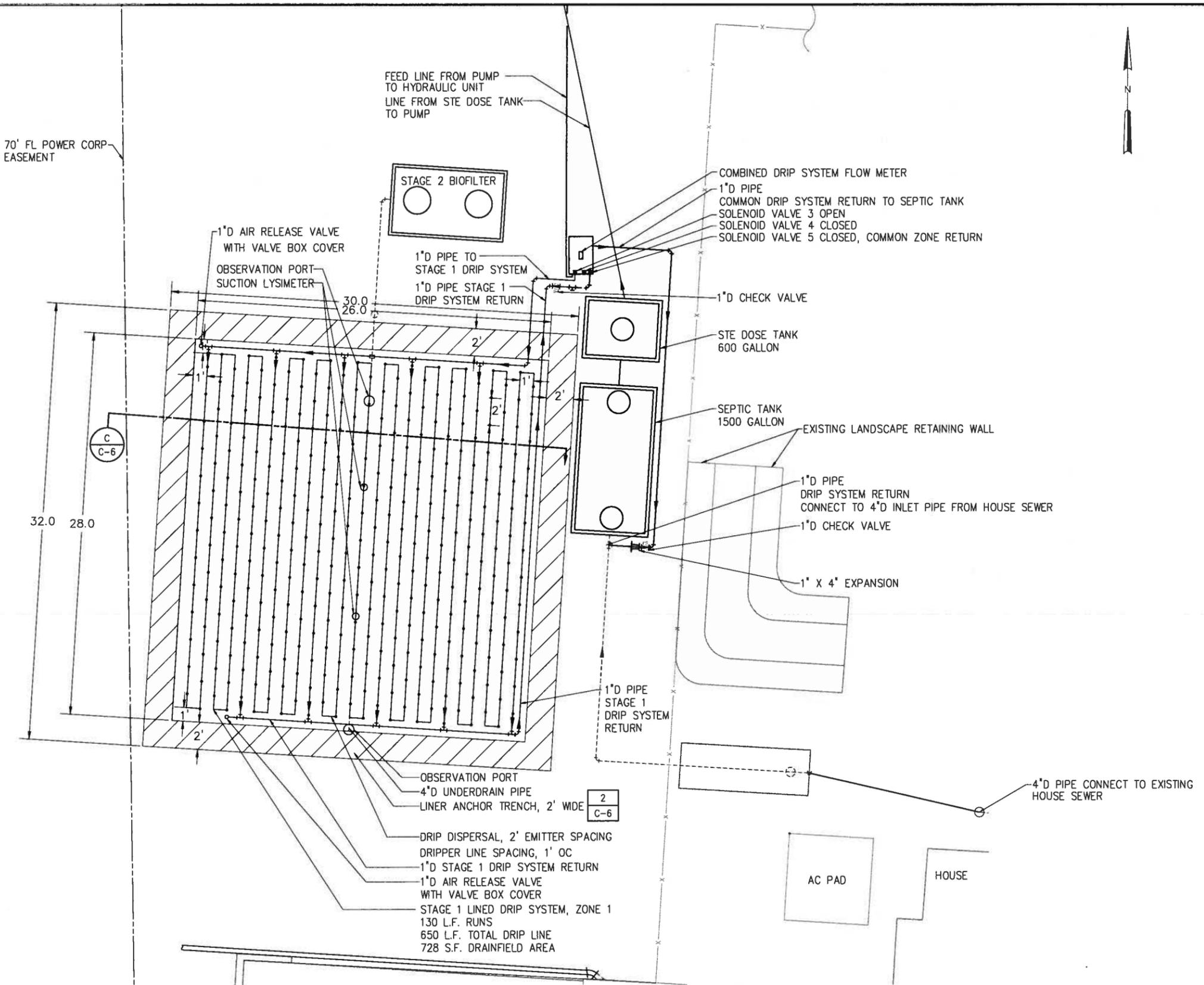


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FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY
**FOSNRS SITE B-HS3
PROPOSED SYSTEM LAYOUT**

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE	JUNE 2013
	H & S JOB NUMBER	44237-001
	CONTRACT NUMBER	CORCL
	DRAWING NUMBER	C-2

PLT DATE: 7/16/2013 4:08 PM BY: JEB/BAK



STAGE 1 LINED DRIP SYSTEM, ZONE 1

1"=4'-0"

NOTICE

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Josefin Edeback
7/23/13

DESIGNED	JEH
DRAWN	CMS
CHECKED	DBS
PROJ. ENGR.	JME
DLA	
APPROVED	

JOSEFIN EDEBACK-HIRST
 Name: _____ Date: _____
 Florida Professional Engineer's Registration Number: 69835

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 Certificate of Authorization Number: 2771

FLORIDA DEPARTMENT OF HEALTH
 4052 BALD CYPRESS WAY, BIN A08
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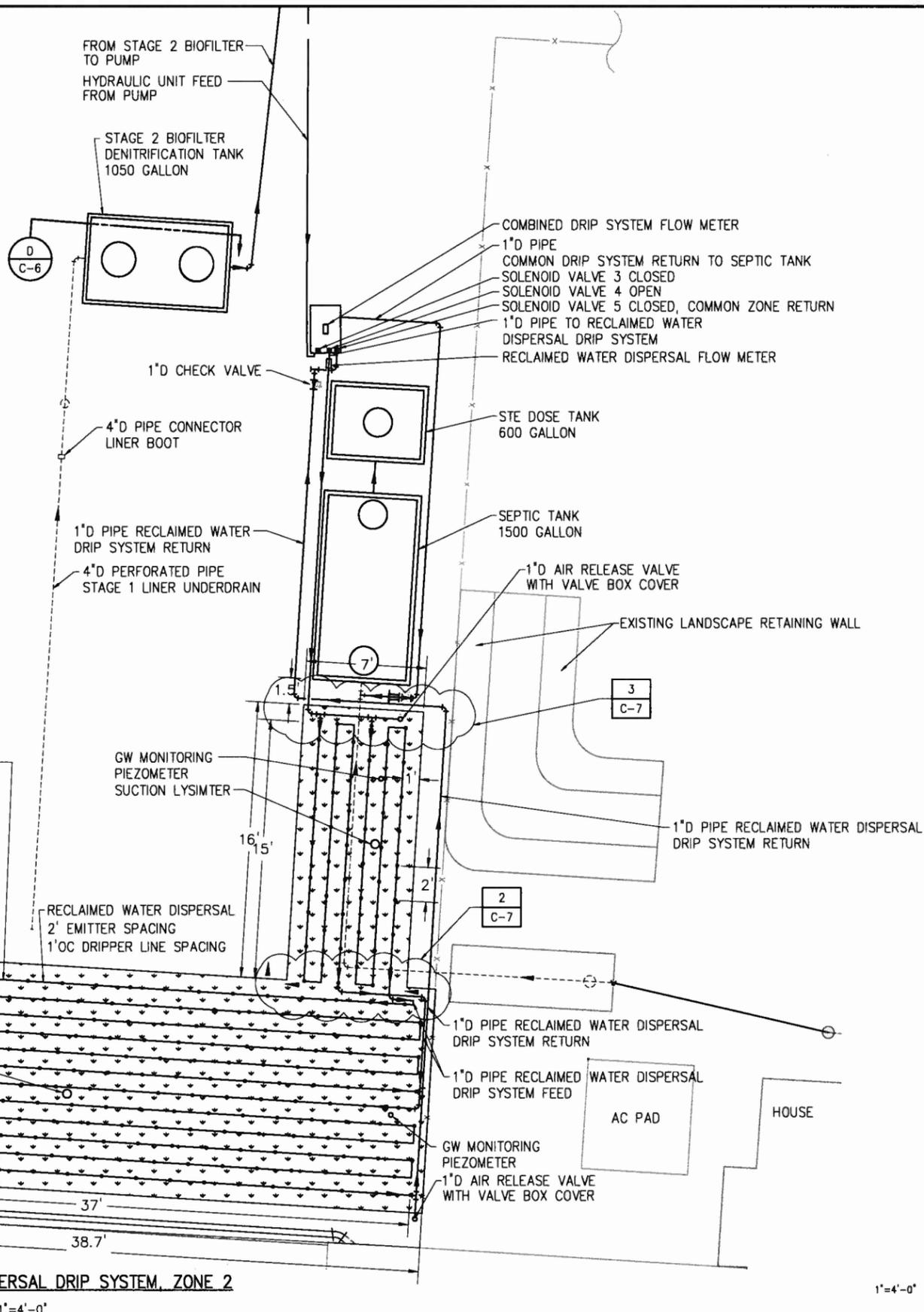
FLORIDA DEPARTMENT OF HEALTH
 FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY
FOSNRS SITE B-HS3
STAGE 1 LINED DRIP SYSTEM

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	H & S JOB NUMBER	44237-001
	CONTRACT NUMBER	CORCL
	DRAWING NUMBER	C-3

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70' FL POWER CORP. EASEMENT



RECLAIMED WATER DISPERSAL
DRIP SYSTEM
ZONE 2
267 L.F. RUNS
534 L.F. TOTAL DRIP LINE
615 S.F. DRAINFIELD AREA

RECLAIMED WATER DISPERSAL DRIP SYSTEM, ZONE 2

1"=4'-0"

NOTICE

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*Josef Edeback H-0
7/23/13*

DESIGNED	JEH
DRAWN	CMS
CHECKED	DBS
PROJ. ENGR.	JME
DLA	
APPROVED	

JOSEFIN EDEBACK-HIRST
Name: _____ Date: _____
Florida Professional Engineer's Registration Number: 69835

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Tampa, Florida 33619
Certificate of Authorization Number: 2771



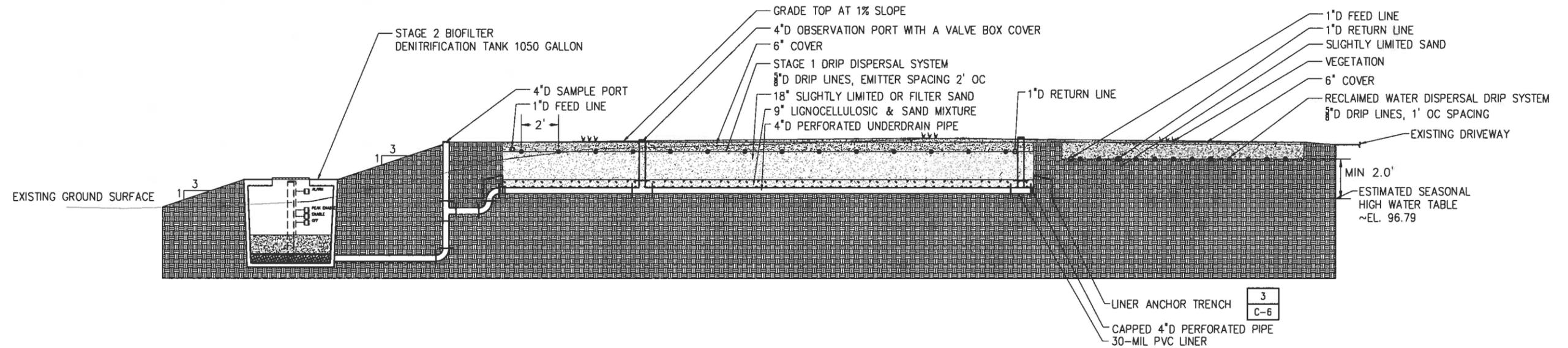
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(850)-245-4070

FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY
**FOSNRS SITE B-HS3
RECLAIMED WATER DISPERSAL DRIP SYSTEM**

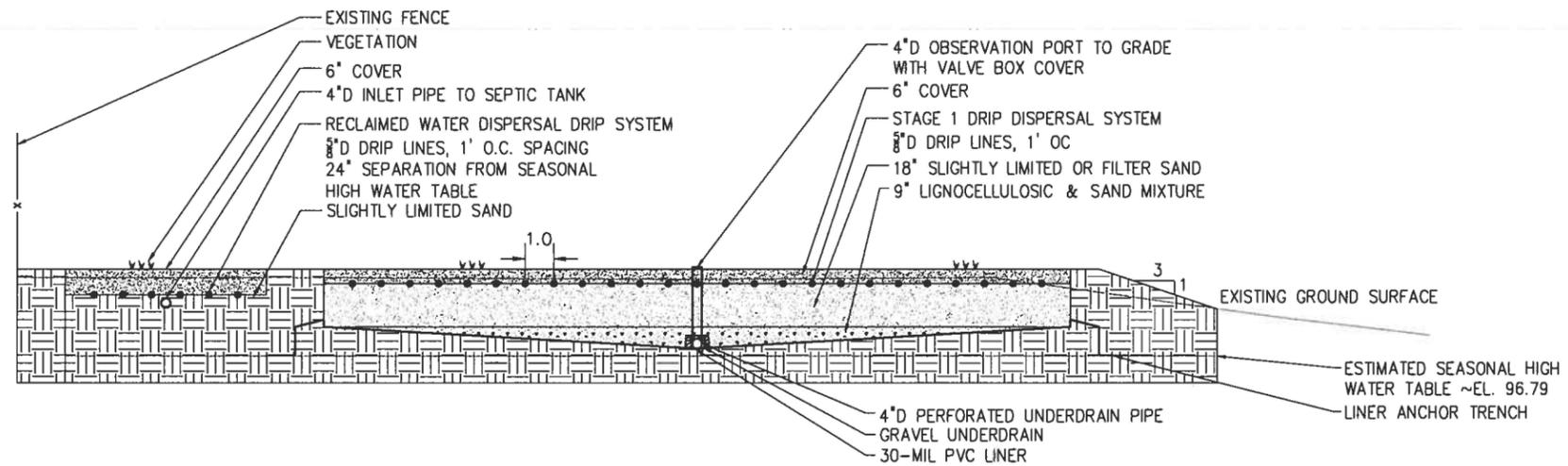
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	H & S JOB NUMBER 44237-001
	CONTRACT NUMBER CORCL
	DRAWING NUMBER C-4

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OVERALL SYSTEM
SECTION A
1" = 3"



OVERALL SYSTEM
SECTION B
1" = 3"

NOTICE

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Josef Eder-Hirst
7/23/13

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DESIGNED	JEH		
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CHECKED	DBS		
PROJ. ENGR.	JME		
DLA			
APPROVED			
NO.	ISSUED FOR	DATE	BY
3	RECORD DRAWINGS	06/13	JEH
2	REVISED PER RFI	05/13	JEH
1	PERMIT DOCUMENTS	03/13	JEH

NAME	DATE
JOSEFIN EDEBACK-HIRST	
FLORIDA PROFESSIONAL ENGINEER'S REGISTRATION NUMBER	69835

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TALLAHASSEE, FL 32399-1713
(850)-245-4070

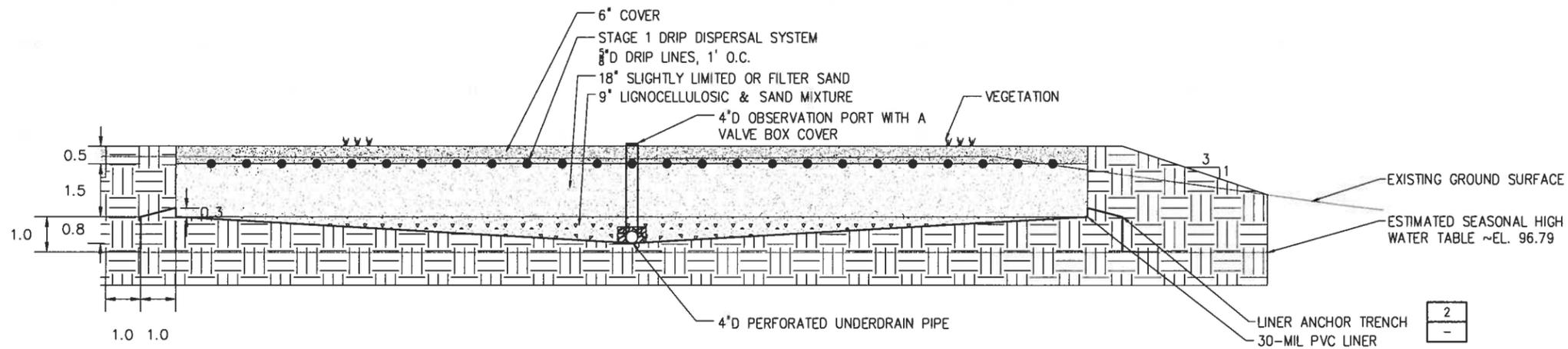
FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY
FOSNRS SITE B-HS3
OVERALL SYSTEM CROSS SECTIONS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE: JUNE 2013
H & S JOB NUMBER: 44237-001
CONTRACT NUMBER: CORCL
DRAWING NUMBER: C-5

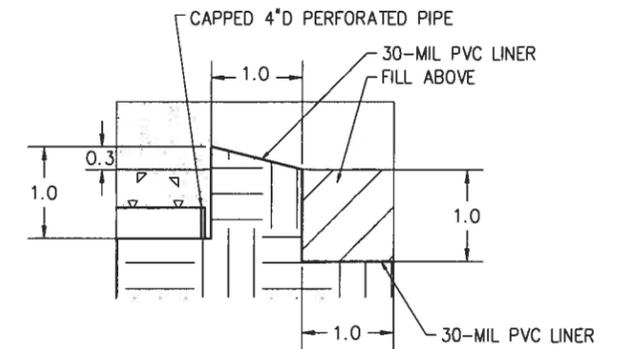
1" = 3'-0"

PLOT DATE: 7/19/2013 4:08 PM BY: EDEBACK



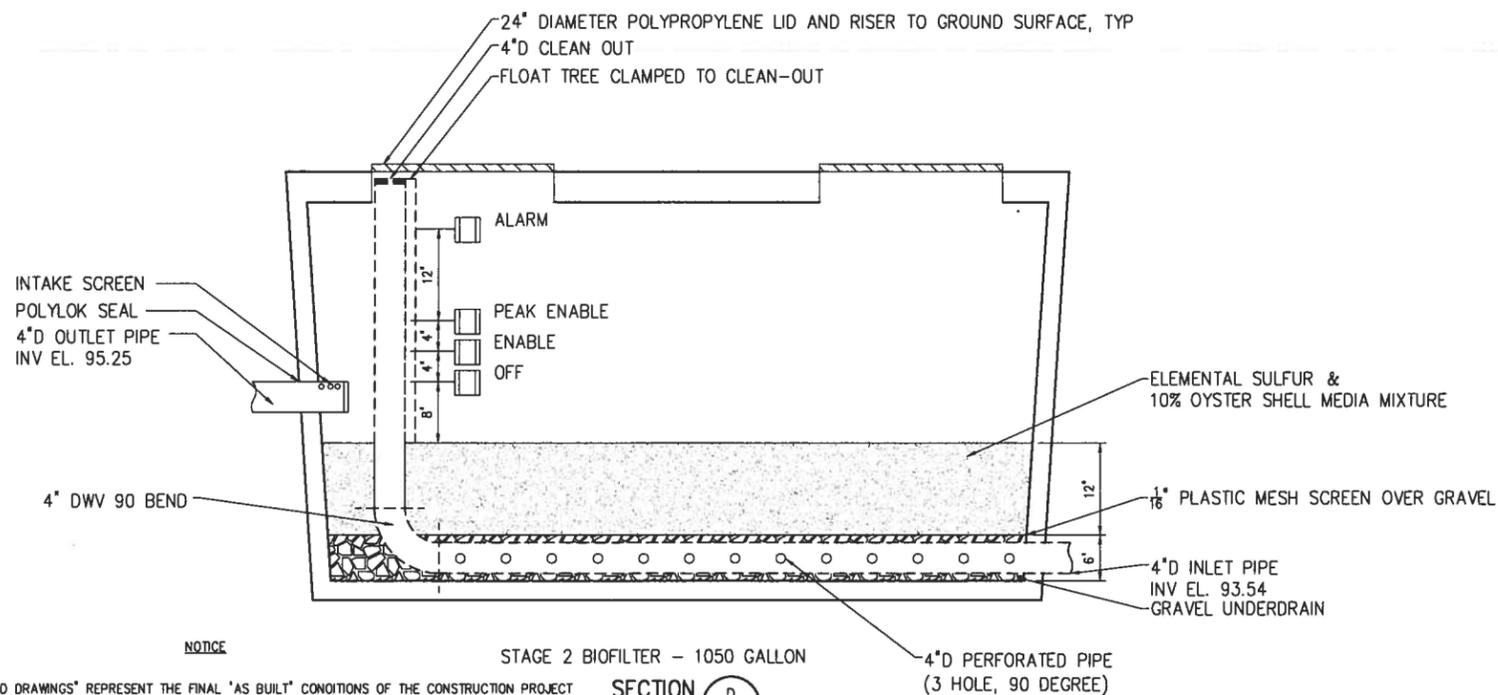
STAGE 1 LINED DRIP SYSTEM

SECTION C
1" = 2" C-3



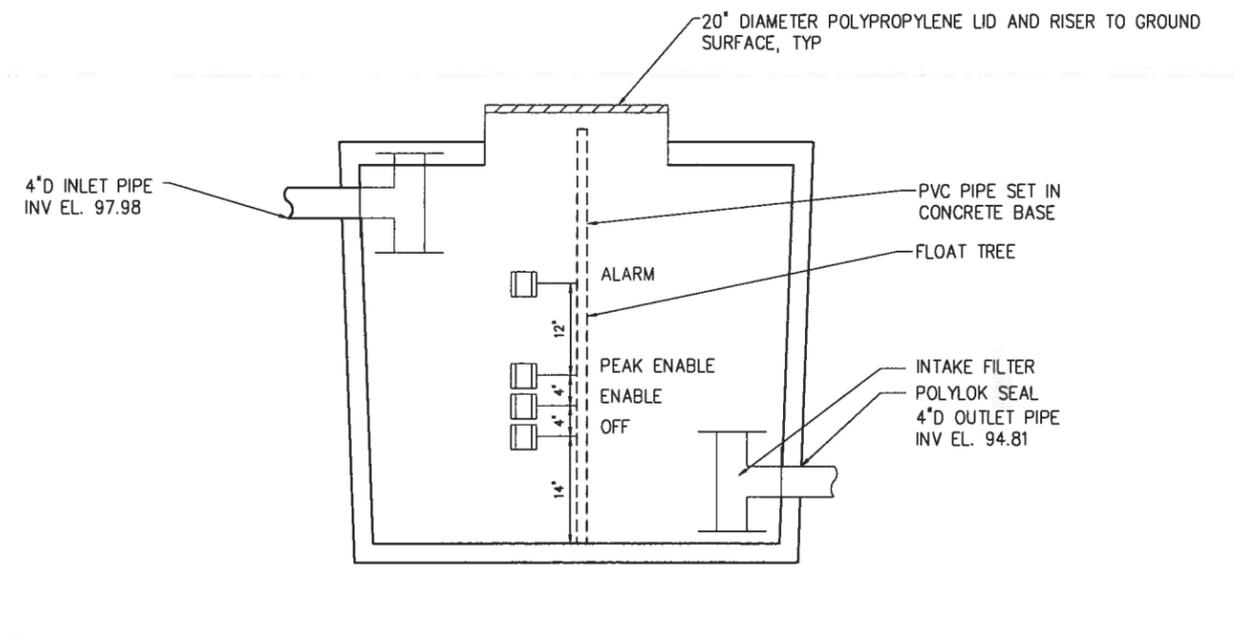
LINER ANCHOR TRENCH

DETAIL 2
1" = 1'-0" -



STAGE 2 BIOFILTER - 1050 GALLON

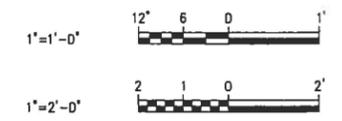
SECTION D
1" = 1" C-4



STE DOSE TANK - 600 GALLON

SECTION E
1" = 1" C-2

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PLOT DATE: 7/19/2013 4:08 PM BY: JEREMIAH

DESIGNED	JEH
DRAWN	CMS
CHECKED	DBS
PROJ. ENGR.	JME
APPROVED	DLA

Josefin Edeback
7/23/13

JOSEFIN EDEBACK-HIRST
Name: _____ Date: _____
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TALLAHASSEE, FL 32399-1713
(850)-245-4070

FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY

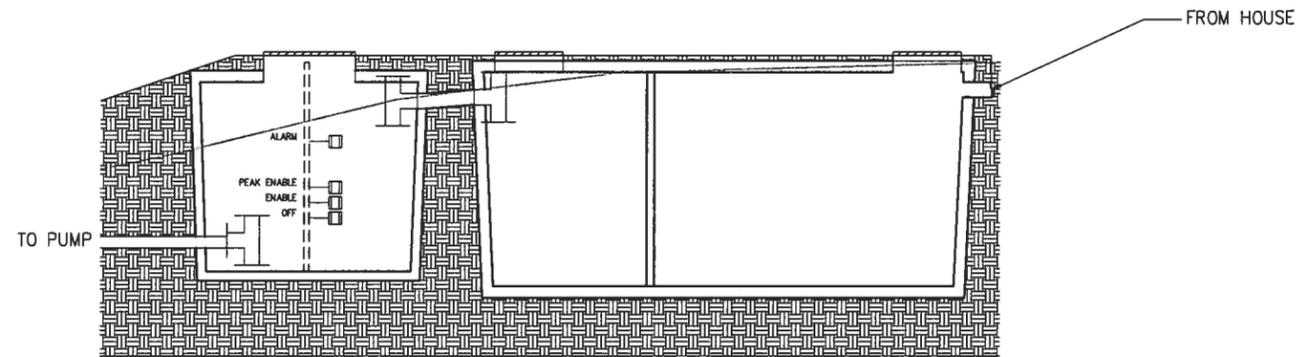
FOSNRS SITE B-HS3
ADDITIONAL CROSS SECTIONS

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	H & S JOB NUMBER	44237-001
	CONTRACT NUMBER	CORCL
	DRAWING NUMBER	C-6

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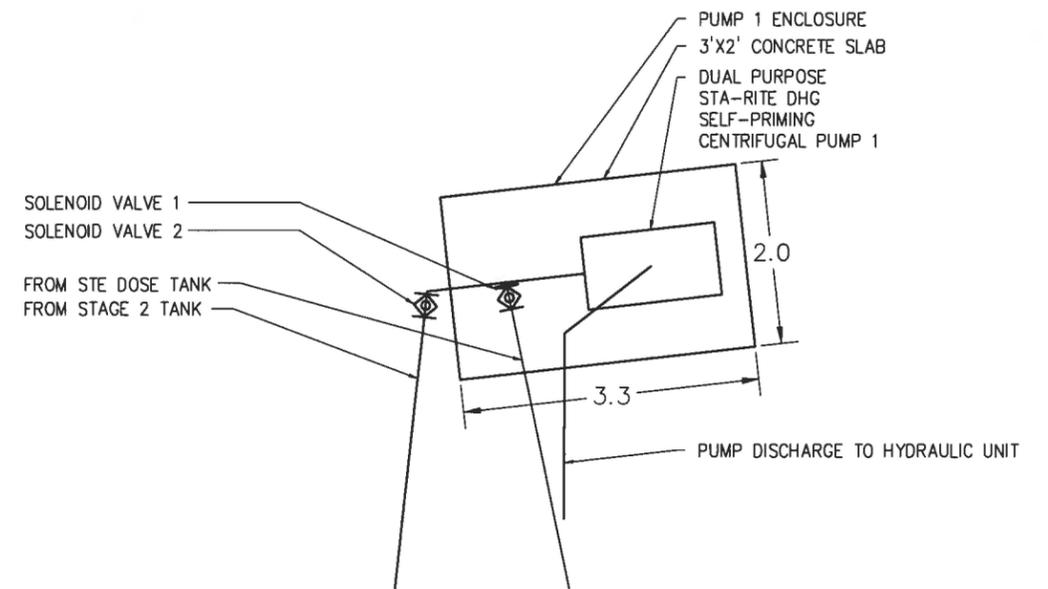
STE DOSE TANK - 600 GALLON
TANK TOP EL. 98.79
INLET INV EL. 97.98

SEPTIC TANK - 1500 GAL
TANK TOP EL. 99.10
INLET INV EL. 98.21
OUTLET INV EL. 98.04



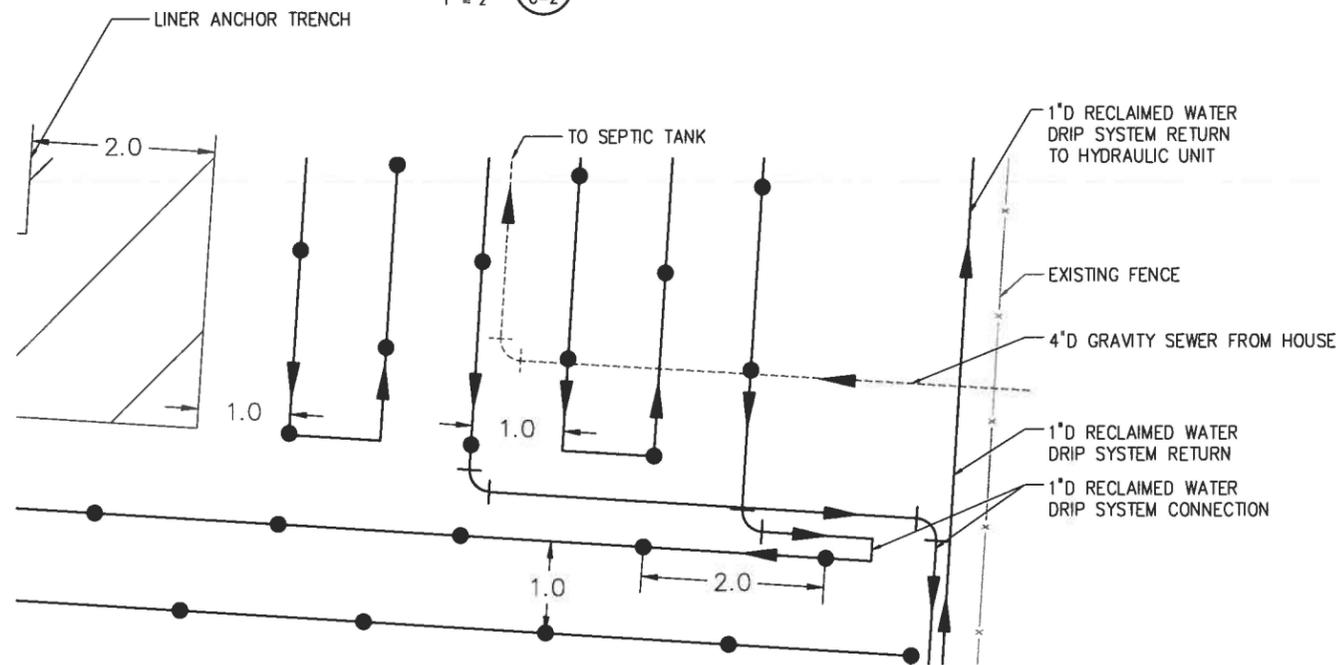
TANK AREA CROSS SECTION

SECTION $\frac{F}{C-2}$
1" = 2'



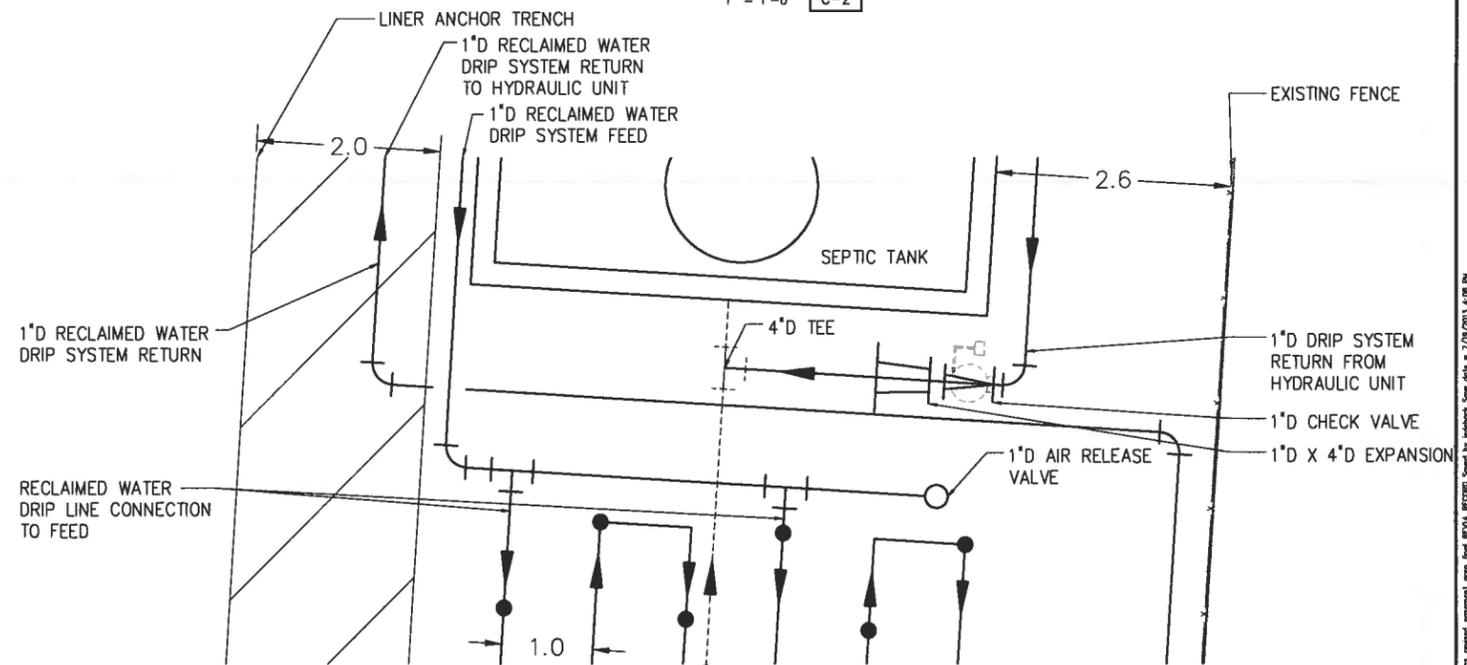
PUMP ENCLOSURE

DETAIL $\frac{4}{C-2}$
1" = 1'-0"



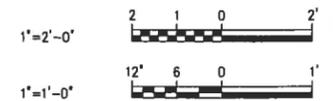
RECLAIMED WATER DISPERSAL SOUTHERN DRIP SYSTEM AREA

DETAIL $\frac{2}{C-2}$
1" = 1'-0"



4" GRAVITY SEWER FROM HOUSE SOUTH OF SEPTIC TANK

DETAIL $\frac{3}{C-2}$
1" = 1'-0"



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NOTICE

Josefin Edeback-Hirst
7/23/13

NO.	ISSUED FOR	DATE	BY	APPROVED
3	RECORD DRAWINGS	06/13	JEH	
2	REVISED PER RFI	05/13	JEH	
1	PERMIT DOCUMENTS	03/13	JEH	

DESIGNED	JEH
DRAWN	CMS
CHECKED	DBS
PROJ. ENGR.	JME
DLA	

JOSEFIN EDEBACK-HIRST
Name: _____ Date: _____
Florida Professional Engineer's Registration Number: 69835

HAZEN AND SAWYER
Environmental Engineers & Scientists
10002 Princess Palm Avenue
Regency One Building, Suite 200
Tampa, Florida 33619
Certificate of Authorization Number: 2771



FLORIDA DEPARTMENT OF HEALTH
4052 BALD CYPRESS WAY, BIN A08
TALLAHASSEE, FL 32399-1713
(850)-245-4070

FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY
**FOSNRS SITE B-HS3
ADDITIONAL CROSS SECTIONS**

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE	JUNE 2013
	H & S JOB NUMBER	44237-001
	CONTRACT NUMBER	CORCL
	DRAWING NUMBER	C-7

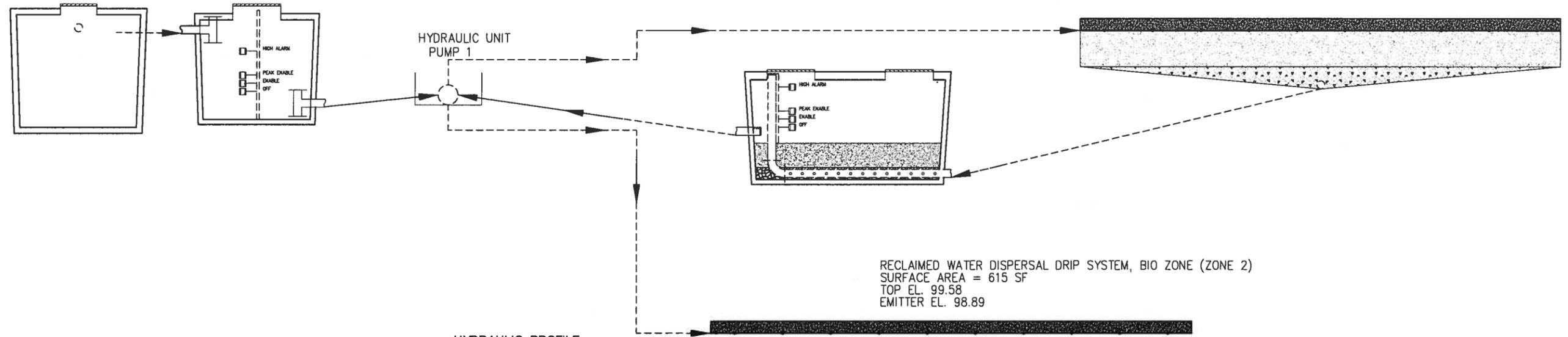
SEPTIC TANK - 1500 GAL
TANK TOP EL. 99.10
4" D INLET INV EL. 98.21
4" D OUTLET INV EL. 98.04

STE DOSE TANK - 600 GALLON
TANK TOP EL. 98.79
4" D INLET INV EL. 97.98
4" D OUTLET INV EL. 94.81

PUMP 1 ENCLOSURE

STAGE 2 BIOFILTER
DENITRIFICATION TANK 1050 GALLON
TANK TOP EL. 98.50
4" D INLET INV EL. 93.54
4" D OUTLET INV EL. 95.25

STAGE 1 LINED DRIP SYSTEM, STE ZONE (ZONE 1)
SURFACE AREA = 728 SF
TOP EL. 99.72
EMITTER EL. 99.28
4" D OUTLET INV EL. 97.02



HYDRAULIC PROFILE

NTS

RECLAIMED WATER DISPERSAL DRIP SYSTEM, BIO ZONE (ZONE 2)
SURFACE AREA = 615 SF
TOP EL. 99.58
EMITTER EL. 98.89

DESIGN CALCULATIONS

A. FLOW CALCULATIONS

NUMBER OF BEDROOMS = 5
BUILDING AREA = 4940 SF
 $Q = (4 \text{ BR} \times 100 \text{ GPD/BR}) + ((4940 \text{ SF} - 3300 \text{ SF}) \times 60 \text{ GPD}/750 \text{ SF}) = 580 \text{ GPD}$
F.A.C. MINIMUM DESIGN FLOW = 580 GPD

B. TREATMENT DESIGN

STAGE 1 LINED DRIP SYSTEM = 0.8 GPD/SF = 725 SF REQUIRED
STAGE 2 BIOFILTER = 1050 GAL TANK = 32.3 SF
RECLAIMED WATER DISPERSAL DRIP SYSTEM = 0.8 GPD/SF = 725 SF - 25% REDUCTION FOR EFFLUENT QUALITY = 544 SF REQUIRED

C. HYDRAULIC LOADING RATE

STAGE 1 DRIP SYSTEM = 0.8 GAL/DAY-SF
RECLAIMED WATER DISPERSAL DRIP SYSTEM = 0.8 GAL/DAY-SF

D. DUAL PURPOSE PUMP (TWO MODES OF OPERATION)

1. FLOW FROM STE DOSE TANK TO STAGE 1 LINED DRIP SYSTEM
2. FLOW FROM STAGE 2 BIOFILTER TO RECLAIMED WATER DISPERSAL DRIP SYSTEM

FUNCTIONAL CONTROL DESCRIPTIONS:

1.01 THE REQUIREMENT

- A. Furnish, test, install and place in satisfactory operation all PLC control strategies, operator interface programming, and related programming as noted herein.
- B. The PLC programming and operator interface is to be fully tested at the manufacturer's shop prior to shipping. Once delivered, the programming is to be checked out prior to operation of the system and is to be demonstrated to the Engineer that the programs perform all functions as intended.
- C. All control functions are to be performed by the PLC. The operator interface is to be used for manual override of equipment, adjustment of setpoints, and to download stored data from the PLC.

1.02 OPERATOR INTERFACE

- A. The PLC shall communicate with a web-based telemetry reporting service.

1.03 DUAL-PURPOSE PUMP 1

The controller shall control solenoids #1 and #3 for dosing ZONE 1 and Solenoids #2 and #4 when dosing ZONE 2.

A. STE ZONE (ZONE 1) - Stage 1 Drip System

Control Description:

STE DOSE TANK REDUNDANT OFF (bottom float) must be enabled for PUMP 1 to function.

STE DOSE TANK STANDARD DOSE ENABLE (second float from bottom) when enabled initiates a dosing cycle to disperse water into the designated ZONE 1 area as long as the ZONE 1 rest timer has timed out (adjustable in whole minutes). PUMP 1 will continue to run for the length of time set on the pump run timer (adjustable in seconds). After the pump run time elapses, PUMP 1 will then shut off and remain off until the standard rest cycle times out. This process will repeat until the water level drops below the "STANDARD DOSE ENABLE" float. When the "STANDARD DOSE ENABLE" float drops PUMP 1 will continue to run until the run timer times out.

STE DOSE TANK PEAK DOSE ENABLE (third float from bottom) when enabled, manages peak flows and excessive water levels. If the rising water level activates the "PEAK DOSE ENABLE" float, the "STANDARD DOSE ENABLE" timer is overridden to discharge the water at 100% of

STE DOSE TANK PEAK DOSE ENABLE (third float from bottom)

CONTINUED:
the maximum design capacity into ZONE 1 until the water in the STE DOSE TANK subsides enough to disable the float. Normal pumping cycles will then resume. When the "PEAK DOSE ENABLE" float has returned to the down position the standard pumping cycle will resume.

STE DOSE TANK HIGH ALARM (fourth float from bottom), if the water level rises enough to overcome the HIGH level float, the audio/visual alarm shall be activated.

B. BIO ZONE (ZONE 2) - Reclaimed Water Dispersal Drip System

Control Description:

STAGE 2 BIOFILTER TANK REDUNDANT OFF (bottom float) must be enabled for PUMP 1 to function.

STAGE 2 BIOFILTER TANK STANDARD DOSE ENABLE (second float from bottom) when enabled initiates a dosing cycle to disperse water into the designated ZONE 2 area as long as the ZONE 2 rest timer has timed out (adjustable in whole minutes). PUMP 1 will continue to run for the length of time set on the pump run timer (adjustable in seconds). After the pump run time elapses, PUMP 1 will then shut off and remain off until the standard rest cycle times out. This process will repeat until the water level drops below the "STANDARD DOSE ENABLE" float. When the "STANDARD DOSE ENABLE" float drops PUMP 1 will continue to run until the run timer times out.

STAGE 2 BIOFILTER TANK PEAK DOSE ENABLE (third float from bottom) when enabled, manages peak flows and excessive water levels. If the rising water level activates the "PEAK DOSE ENABLE" float, the "STANDARD DOSE ENABLE" timer is overridden to discharge the water at 100% of the maximum design capacity into ZONE 2 until the water in the STAGE 2 BIOFILTER TANK subsides enough to disable the float. Normal pumping cycles will then resume. When the "PEAK DOSE ENABLE" float has returned to the down position the standard pumping cycle will resume.

STAGE 2 BIOFILTER TANK HIGH ALARM (fourth float from bottom), if the water level rises enough to overcome the HIGH level float, the audio/visual alarm shall be activated.

NOTICE

THESE "RECORD DRAWINGS" REPRESENT THE FINAL "AS BUILT" CONDITIONS OF THE CONSTRUCTION PROJECT BASED UPON FIELD OBSERVATION AND SUPPORTING PROJECT RECORDS. UNLESS OTHERWISE NOTED ON THE DRAWINGS, WORK SHOWN AS PROPOSED OR TENTATIVE HAS BEEN COMPLETED, AND DIMENSIONS SHOWN AS PROPOSED OR TENTATIVE ARE FINAL. NOTES DIRECTING THE CONTRACTOR TO PERFORM SPECIFIC TASKS REMAIN ON THE DRAWINGS AS A RECORD OF CONSTRUCTION ACTIVITIES.

Josefin Edeback-Hirst
7/23/13

PLOT DATE: 7/10/2013 4:08 PM BY: JEDBACK

DESIGNED	JEH
DRAWN	CMS
CHECKED	DBS
PROJ. ENGR.	JME
DLA	
APPROVED	

JOSEFIN EDEBACK-HIRST
Name: _____ Date: _____
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HYDRAULIC PROFILE

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APPENDIX B
EFFLUENT SCREEN

PL-68 Filter and Tee

PL-68 is much more than just an effluent filter. The housing can also be used as an inlet baffle (tee) or an outlet baffle. The housing is designed to accept Polylok’s snap in gas deflector to deflect gas bubbles away from the tee and to keep the solids in the tank.

Features:

- Offers 68 linear feet of 1/16” filter slots, which significantly extends time between cleaning.
- Accepts 3/4” PVC handle.
- Locks in any 360° position when used with PL-68 Tee.
- PL-68 Housing can be used as an inlet or outlet tee.
- Gasket prevents bypass.

PL-68 Installation:

Ideal for residential waste flows up to 800 gallons per day (GPD). Easily installs in any new or existing 4” outlet tee.

1. Locate the outlet of the septic tank.
2. Remove the tank cover and pump tank if necessary.
3. Glue the filter housing to the outlet pipe, or use a Polylok Extend & Lok if not enough pipe exists.
4. Insert the PL-68 filter into tee.
5. Replace and secure the septic tank cover.

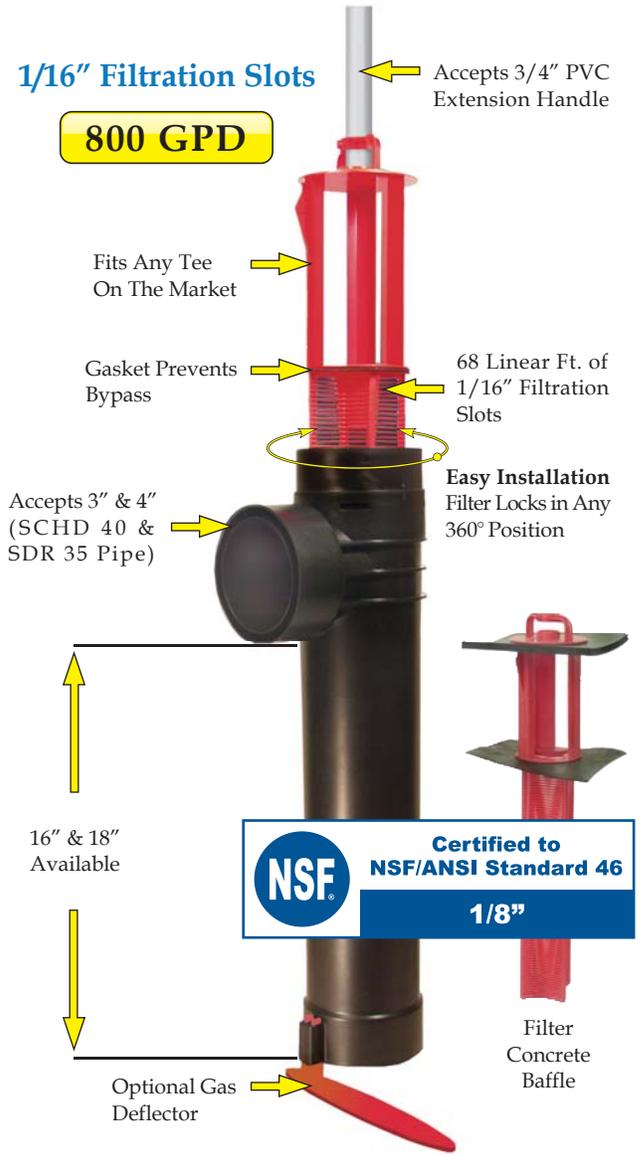
PL-68 Maintenance:

The PL-68 Effluent Filter will operate efficiently for several years under normal conditions before requiring cleaning. It is recommended that the filter be cleaned every time the tank is pumped, or at least every three years.

1. Do not use plumbing when filter is removed.
2. Pull PL-68 out of the tee.
3. Hose off filter over the septic tank. Make sure all solids fall back into septic tank.
4. Insert filter back into tee/housing.

Related Products:

PL-68 Filter Concrete Baffle
 Extend & Lok™



Extend & Lok™
 Easily installs into existing tanks.



Spacer Bushing
 4" SCHD 40 to SDR 35



Spacer Bushing
 4" SCHD 40 to 110mm Pipe



2" Extender

APPENDIX C
PUMP

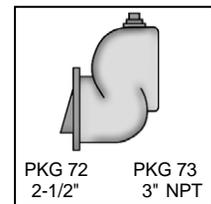
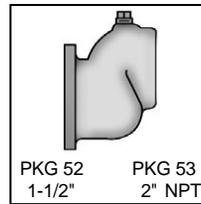
Self-Priming Centrifugal Pumps

ORDERING INFORMATION

HIGH HEAD						
Catalog Number	HP	Pipe Tapping Sizes		Motor Voltage	Phase	Approx. Wt. Lbs.
		Suction Flanges	Pump Discharge			
DHE	1	PKG 52	1-1/2"	115/230	1	65
DHE3	1	PKG 52	1-1/2"	208-230/460	3	65
DHF	1-1/2	PKG 52	1-1/2"	115/230	1	72
DHF3	1-1/2	PKG 52	1-1/2"	208-230/460	3	72
DHG	2	PKG 53	2"	115/230	1	113
DHG3	2	PKG 53	2"	208-230/460	3	113
DHHG	2-1/2	PKG 53	2"	115/230	1	120
DHHG3	2-1/2	PKG 53	2"	208-230/460	3	120
DHH	3	PKG 53	2"	230	1	144
DHH3	3	PKG 53	2"	208-230/460	3	144
DHJ	5	PKG 72	1/2"	230	1	184
DHJ3	5	PKG 72	1/2"	208-230/460	3	184
MEDIUM HEAD						
DMG	2	PKG 52	1-1/2"	115/230	1	86
DMG3	2	PKG 52	1-1/2"	208-230/460	3	86
DMMG	2-1/2	PKG 53	2"	115/230	1	93
DMMG3	2-1/2	PKG 53	2"	208-230/460	3	93
DMH	3	PKG 72	2-1/2"	230	1	137
DMH3	3	PKG 72	2-1/2"	208-230/460	3	137
DMJ	5	PKG 73	3"	230	1	184
DMJ3	5	PKG 73	3"	230/460	3	184

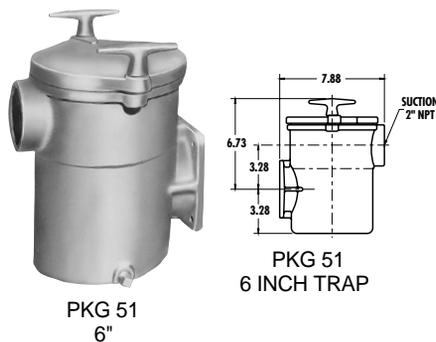
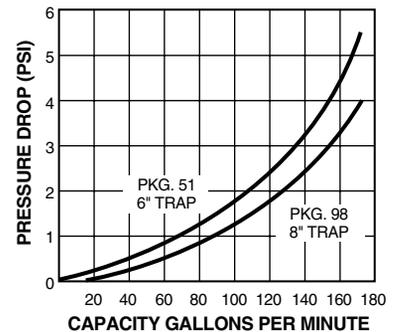
SUCTION FLANGES (order separately – required for suction tap sizes)

Package 52 –	Package 53 –	Package 72 –	Package 73 –
1-1/2"	2"	2-1/2"	3"



6" AND 8" TRAP PACKAGES

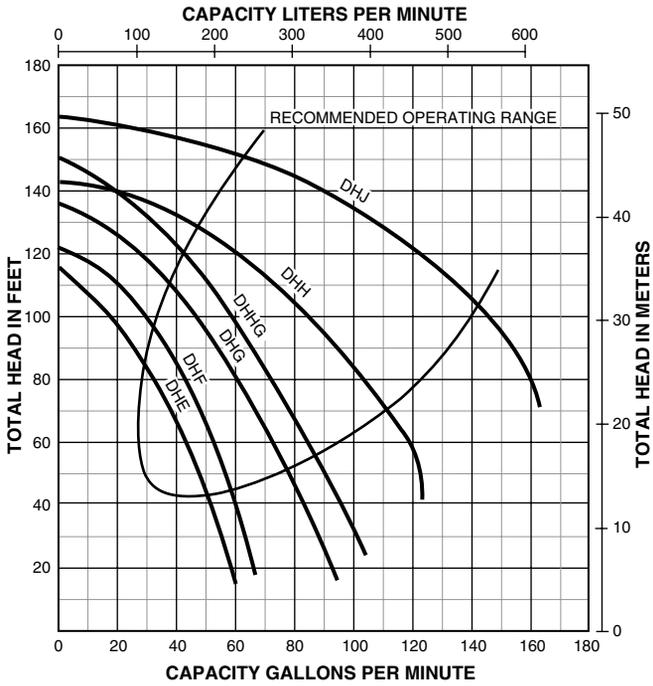
Catalog Number	Description	Suction Port Size	Approx. Wt. Lbs.
PKG 51	6" Cast Iron T rap with Basket (For C, CC, and D Series Pumps)	2" NPT	20
PKG 76	Cast Iron Flange for Remote Installation	3" NPT	4
PKG 98	8" Cast Iron T rap with Basket (For C, CC, and D Series Pumps)	3" NPT	40



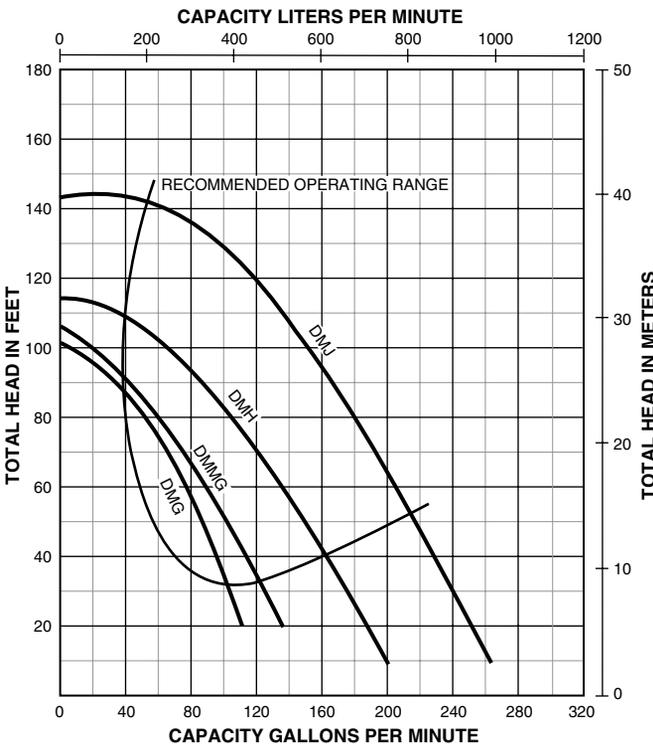


Self-Priming Centrifugal Pumps

PUMP PERFORMANCE – HIGH HEAD



PUMP PERFORMANCE – MEDIUM HEAD

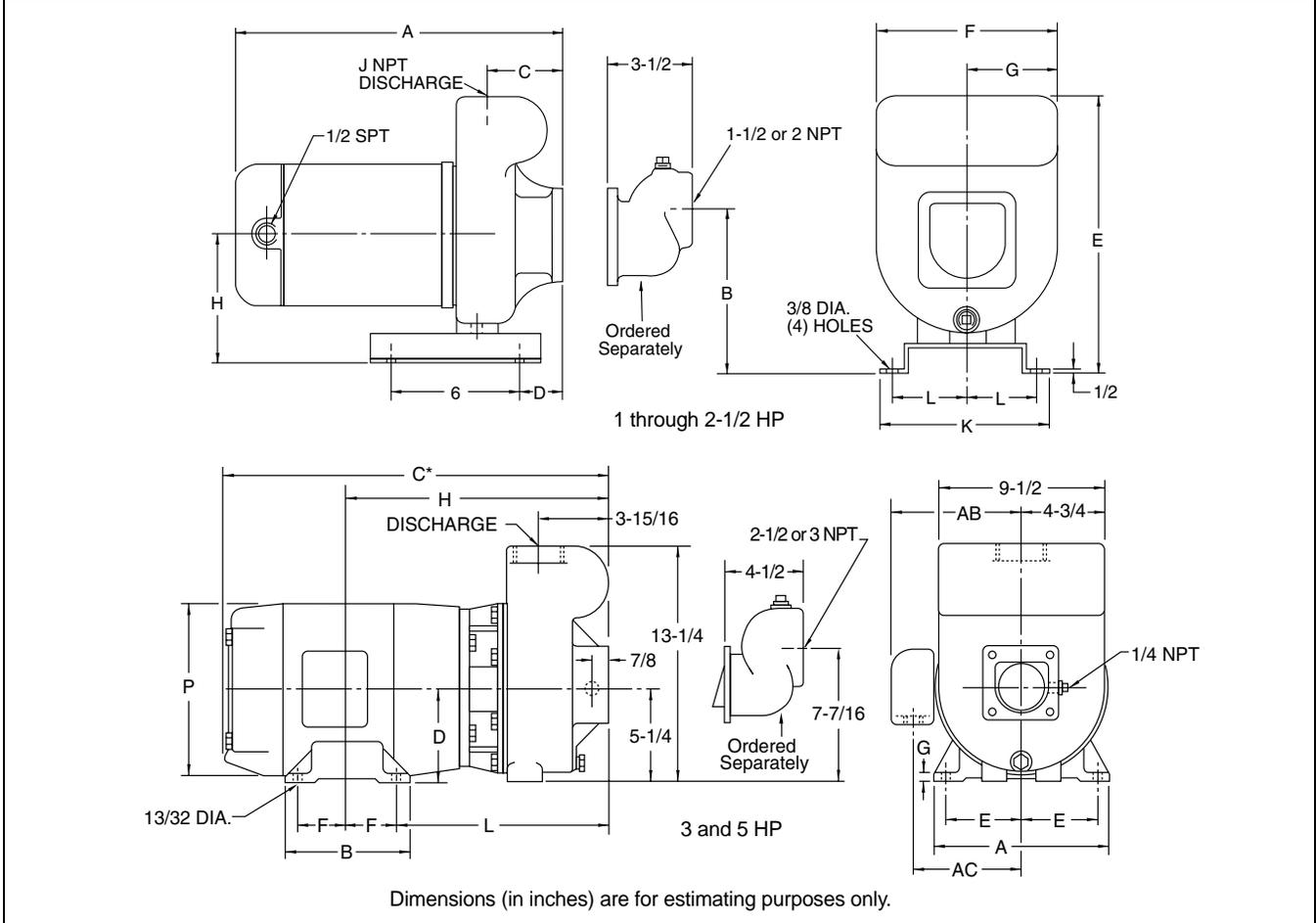


PUMP PERFORMANCE (Capacity in Gallons Per Minute)

HIGH HEAD		Discharge		Suction Lift in Feet				
Cat. No.	HP	PSI	Feet Head	5'	10'	15'	20'	25'
		DHE	1	20	46.2	46	43	41
		30	69.3	35	32	29	25	21
		40	92.4	19	15	-	-	-
		50	115.5	-	-	-	-	-
		60	138.6	-	-	-	-	-
DHF	1-1/2	20	46.2	55	53	51	49	48
		30	69.3	45	42	39	36	32
		40	92.4	31	27	22	15	-
		50	115.5	-	-	-	-	-
		60	138.6	-	-	-	-	-
DHG	2	20	46.2	77	74	71	68	65
		30	69.3	63	60	56	53	49
		40	92.4	48	44	40	36	30
		50	115.5	30	20	13	-	-
		60	138.6	-	-	-	-	-
DHHG	2-1/2	20	46.2	89	85	82	80	76
		30	69.3	75	72	68	64	60
		40	92.4	60	57	51	49	42
		50	115.5	42	37	31	25	20
		60	138.6	14	-	-	-	-
DHH	3	20	46.2	-	-	-	112	109
		30	69.3	109	103	98	92	89
		40	92.4	90	75	74	69	62
		50	115.5	62	51	42	32	20
DHJ	5	20	46.2	-	-	-	-	-
		30	69.3	-	-	-	-	-
		40	92.4	146	141	136	130	122
		50	115.5	122	114	105	99	85
		60	138.6	81	70	50	30	-
MEDIUM HEAD		20	46.2	84	79	74	69	63
DMG	2	30	69.3	60	53	46	35	20
		40	92.4	22	-	-	-	-
		50	115.5	-	-	-	-	-
DMMG	2-1/2	20	46.2	103	96	90	80	70
		30	69.3	70	60	50	46	30
		40	92.4	30	18	5	-	-
		50	115.5	-	-	-	-	-
DMH	3	20	46.2	149	140	136	124	119
		30	69.3	116	108	99	85	76
		40	92.4	75	65	51	26	-
DMJ	5	20	46.2	214	209	202	194	182
		30	69.3	185	179	172	165	158
		40	92.4	153	146	139	130	120
		50	115.5	119	107	95	80	50

Self-Priming Centrifugal Pumps

OUTLINE DIMENSIONS



DIMENSIONS IN INCHES – 1 THROUGH 2-1/2 HP

Catalog Number	HP	A	B	C	D	E	F	G	H	J	K	L
DHE	1	14-13/16	7-1/16	3-1/2	4	11-7/8	7-7/8	3-15/16	5-13/16	1-1/2	7-1/2	3-3/8
DHF	1-1/2	15-11/16	7-1/16	3-1/2	4	11-7/8	7-7/8	3-15/16	5-13/16	1-1/2	7-1/2	3-3/8
DHG	2	17-11/16	7-13/16	3-15/16	3-13/16	14-3/8	9-1/2	4-3/4	6-9/16	2	7-1/2	3-3/8
DHHG	2-1/2	18-11/16	7-13/16	3-15/16	3-13/16	14-3/8	9-1/2	4-3/4	6-9/16	2	7-1/2	3-3/8
DMG	2	16-15/16	7-1/16	3-1/2	4	11-7/8	7-7/8	3-15/16	5-13/16	1-1/2	7-1/2	3-3/8
DMMG	2-1/2	17-15/16	7-1/16	3-1/2	4	11-7/8	7-7/8	3-15/16	5-13/16	2	7-1/2	3-3/8

DIMENSIONS IN INCHES – 3 AND 5 HP

Catalog Number	HP	A	B	C*	D	E	F	G	H	L	P	AB	AC
DHH	3	9	6	20-3/4	4-1/2	3-3/4	2-1/4	1/2	15	12-3/4	9-3/4	8-1/8	6-1/2
DHJ	5	9	7	21-3/4	4-1/2	3-3/4	2-3/4	1/2	15-1/2	12-3/4	9-3/4	9	7
DMH	3	9	6	20-3/4	4-1/2	3-3/4	2-1/4	1/2	15	12-3/4	9-3/4	8-1/8	6-1/2
DMJ	5	9	7	21-3/4	4-1/2	3-3/4	2-3/4	1/2	15-1/2	12-3/4	9-3/4	9	7

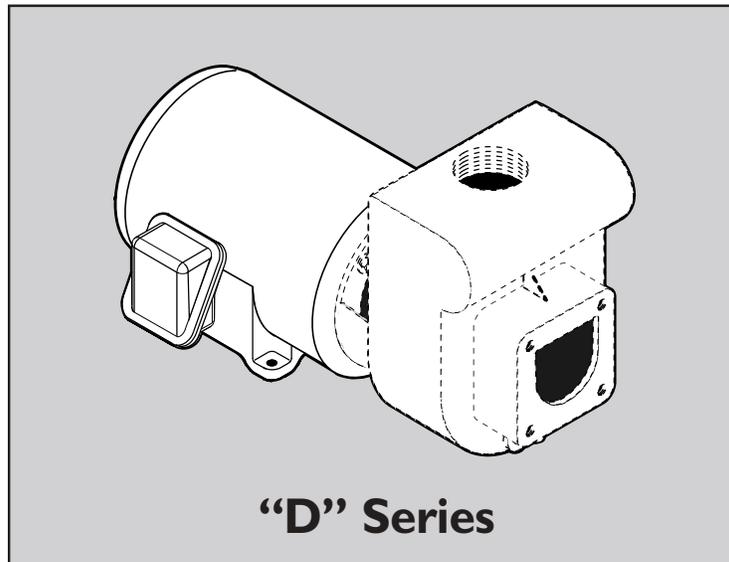
*Overall length (C) is shown for single-phase motors. Three-phase motors are slightly smaller. Dimensions are for estimating purposes only.



293 Wright Street, Delavan, WI 53115

OWNER'S MANUAL

Self-Priming Centrifugal Pumps



Installation/Operation/Parts

*For further operating, installation,
or maintenance assistance:*

Call 1-262-728-5551

READ AND FOLLOW SAFETY INSTRUCTIONS!

⚠ This is the safety alert symbol. When you see this symbol on your pump or in this manual, look for one of the following signal words and be alert to the potential for personal injury:

⚠ DANGER warns about hazards that **will** cause serious personal injury, death or major property damage if ignored.

⚠ WARNING warns about hazards that **can** cause serious personal injury, death or major property damage if ignored.

⚠ CAUTION warns about hazards that **will** or **can** cause minor personal injury or property damage if ignored.

The label **NOTICE** indicates special instructions which are important but not related to hazards.

Carefully read and follow all safety instructions in this manual and on pump.

Keep safety labels in good condition.

Replace missing or damaged safety labels.

Make workshops childproof; use padlocks and master switches; remove keys.

GENERAL SAFETY

⚠ CAUTION **Do not touch an operating motor.** Modern motors are designed to operate at high temperatures. To avoid burns when servicing pump, allow it to cool for 20 minutes after shut-down before handling.

Do not allow pump or any system component to freeze. To do so will void warranty.

Pump water only with this pump.

Periodically inspect pump and system components.

Wear safety glasses at all times when working on pumps.

Keep work area clean, uncluttered and properly lighted; store properly all unused tools and equipment.

Keep visitors at a safe distance from the work areas.

⚠ WARNING **Pump body may explode if used as a booster pump unless relief valve capable of passing full pump flow at 75 psi is installed.**

<p>⚠ WARNING</p> 
<p>Hazardous voltage. Can shock, burn, or cause death.</p> <p>Ground pump before connecting to power supply. Disconnect power before working on pump, motor or tank.</p>

- ⚠** Wire motor for correct voltage. See “Electrical” section of this manual and motor nameplate.
- ⚠** Ground motor before connecting to power supply.
- ⚠** Meet National Electrical Code, Canadian Electrical Code, and local codes for all wiring.
- ⚠** Follow wiring instructions in this manual when connecting motor to power lines.

<p>⚠ WARNING</p> 	<p>Hazardous pressure! Install pressure relief valve in discharge pipe.</p> <p>Release all pressure on system before working on any component.</p>
--	---

Thank you for purchasing a top quality, factory tested pump.

	Page
General Safety	2
Warranty	3
Installation	4-5
Electrical	6-7
Service	8-10
Repair Parts	11-12

LIMITED WARRANTY

Sta-Rite Industries warrants to the original consumer of the products listed below, that they will be free from defects in material and workmanship for the Warranty Period from the date of original installation or manufacture as noted.

Product	Warranty Period
Water Systems Products – jet pumps, small centrifugal pumps, submersible pumps and related accessories	<i>whichever occurs first:</i> 1 year from date of original installation, or 2 years from date of manufacture
Hydro-Flow Filters	1 year from date of purchase
Signature 2000® Fibrewound Tanks	5 years from date of original installation
Pro-Source™ Steel Pressure Tanks	5 years from date of original installation
Pro-Source™ Epoxy-Lined Tanks	3 years from date of original installation
Sump/Sewage/Effluent Products	1 year from date of original installation, or 2 years from date of manufacture

Our warranty will not apply to any product that has been subject to negligence, misapplication, improper installation or maintenance. In the event a three phase submersible motor is operated with single phase power through a phase converter, or if three-leg ambient compensated, extra-quick trip overload relays of recommended size are not used, our warranty is void.

Buyer’s only remedy and Sta-Rite Industries’ only duty is to repair or replace defective products (at Sta-Rite Industries’ choice). Buyer agrees to pay all labor and shipping charges associated with this warranty and to request warranty service through the installing dealer as soon as a problem is discovered. If warranty service is requested more than 30 days after the Warranty Period has ended, it will not be honored.

STA-RITE INDUSTRIES SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, OR CONTINGENT DAMAGES WHATSOEVER.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES. IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL NOT EXTEND BEYOND THE WARRANTY PERIOD PROVIDED HEREIN.

Certain states do not permit the exclusion or limitation of incidental or consequential damages or the placing of limitations on the duration of an implied warranty, therefore, the limitations or exclusions herein may not apply. This warranty sets forth specific legal rights and obligations, however, additional rights may exist, which may vary from state to state.

Supersedes all previous publications.

Sta-Rite Industries, 293 Wright St., Delavan, WI 53115

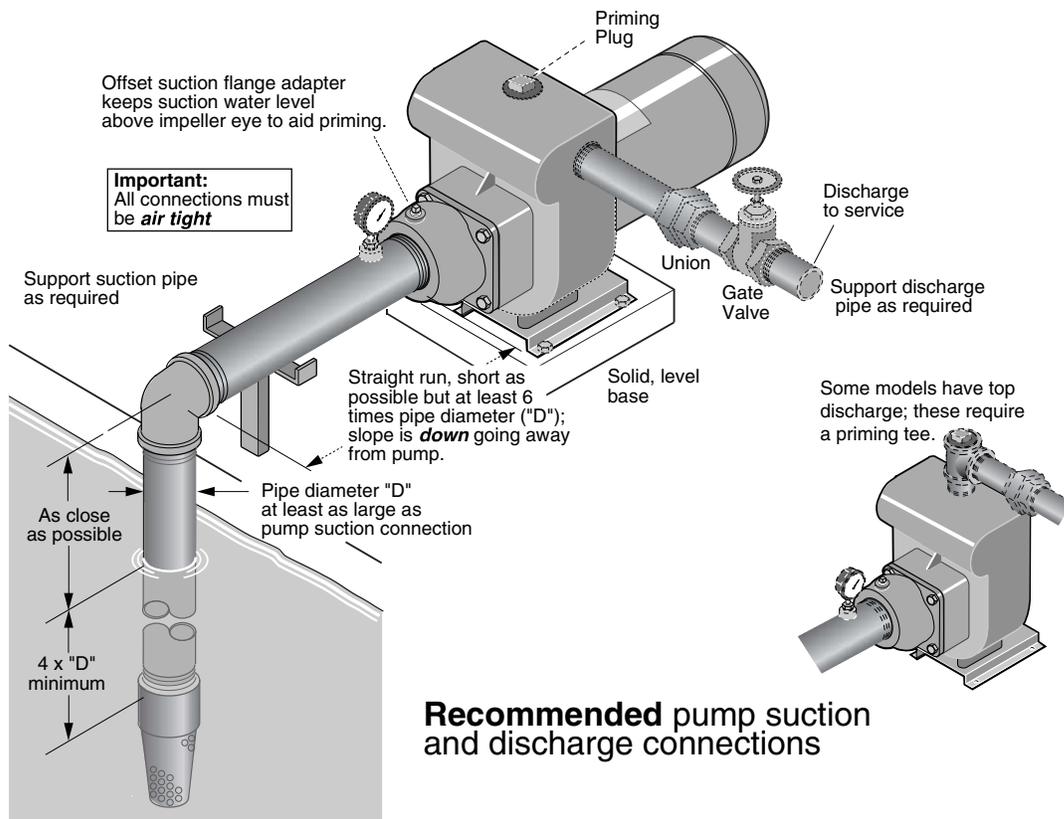


Figure 1

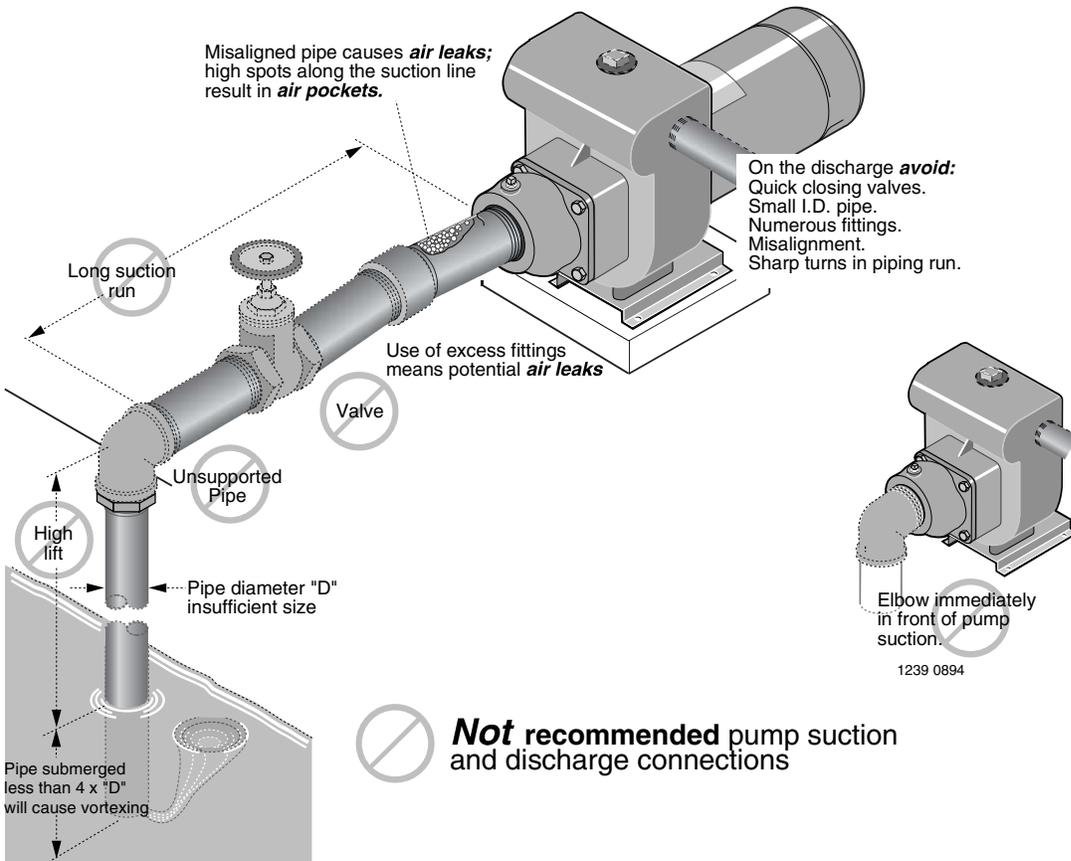


Figure 2

LOCATION OF UNIT

Locate the pump as near the liquid source as possible, using a short, direct suction pipe. Keep the static suction lift (vertical distance between the center line of the pump and the liquid level) to a minimum. Mount the pump on a solid, level foundation, which provides a rigid and vibration-free support. It should be located where the unit is readily accessible for service and maintenance. The pump should be protected against flooding and excessive moisture.

PIPING

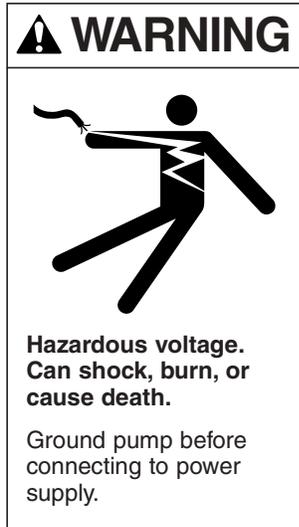
Both suction and discharge piping should be independently supported at a point near the pump to avoid strains being placed on the pump. Start all piping at pump to avoid strains left by a gap at last connection.

SUCTION PIPING

The suction pipe must be kept free of leaks. The suction pipe must have a gradual slope upward to the pump. Avoid any fittings which may cause an air trap. On units that have a suction fitting, a check valve is a built-in feature and no foot valve is required.

DISCHARGE PIPING

A gate valve and union should be installed in the discharge line. For removal of the pump for service, close the gate valve, and disconnect at union.



⚠ WARNING Disconnect power at service panel before connecting motor. Single phase motors come factory wired for 230 volt operation. Do not alter wiring in single phase motors. Match motor voltage to power supply voltage. Do not connect three phase motors to single phase power supply or single phase motors to three phase power supply.

- ⚠ Ground motor before connecting to electrical power supply.
- ⚠ Failure to ground motor can cause severe or fatal electrical shock hazard.
- ⚠ Do not ground to a gas supply line.
- ⚠ To avoid dangerous or fatal electrical shock, turn OFF power to motor before working on electrical connections.
- ⚠ Supply voltage must be within $\pm 10\%$ of nameplate voltage. Incorrect voltage can cause fire or seriously damage motor and voids warranty. If in doubt consult a licensed electrician.
- ⚠ Use wire size specified in Wiring Chart. If possible, connect pump to a separate branch circuit with no other appliances on it.

WIRING

- Step 1. Install, ground, wire and maintain this pump in accordance with your local electrical code and all other codes and ordinances that apply. Consult your local building inspector for local code information.
- Step 2. Ground the pump permanently using a wire of size and type specified by local or National Electrical Code.
 - ⚠ **Do not ground to a gas supply line.**
- Step 3. Connect ground wire first. Connect to ground first, then to green grounding terminal provided (identified as GRD or \oplus). Make ground connection to this terminal. **Do not** connect motor to electrical power supply until unit is permanently grounded; otherwise serious or fatal electrical shock hazard may be caused.
- Step 4. For best ground connection, connect to a grounded lead in the service panel or to a metal underground water pipe or well casing at least 10 ft. long. If plastic pipe or insulated fittings are used, run ground wire directly to the metal well casing or use ground electrode furnished by the power company.

⚠ CAUTION Before using pump, check your motor nameplate for voltage. Your electric supply voltage and the stamped nameplate voltage **must agree**. Motors stamped 200 volts only or 230 volts only, **must be used with that voltage only**. Motors stamped with two voltages (for example 230/460 volts), may be used with either supply voltage. For these motors check connections against wiring diagram on motor nameplate and make any changes necessary to agree with your supply voltage. If in doubt, call a licensed electrician. Incorrect voltage will cause serious damage to the motor.

Some models are equipped with three phase motors. Three phase motors require magnetic starters.

To check motors for proper rotation: The shaft can be seen through the motor - pump adapter bracket. A mark can be made on the shaft to make it easier to notice rotation. Jog the motor (start it briefly) and note the rotation. It should rotate clockwise when viewed from the motor-end. If rotation is not clockwise, see motor nameplate for hookup information. BE SURE power is off to the motor when working on electrical connections.

⚠ CAUTION Motor normally operates at high temperature and will be too hot to touch. Before handling pump or motor, stop motor and allow it to cool for 20 minutes.

TABLE I – Recommended Wire and Fuse Sizes

MOTOR HP	PHASE	VOLTS	MAX. LOAD AMPS	BRANCH FUSE* RATING AMPS	DIAMETER IN FEET FROM MOTOR TO METER					
					0' TO 50'	51' TO 100'	101' TO 200'	201' TO 300'	301' TO 400'	401' TO 500'
					WIRE SIZE					
3	1	230	17.0	25	12	12	12	10	8	8
3	1	200	19.6	30	10	10	10	10	8	8
3	3	200	11.0	15	14	14	14	12	10	10
3	3	230	9.6	15	14	14	14	12	12	10
3	3	460	4.8	15	14	14	14	14	14	14
5	1	230	28.0	40	8	8	8	8	6	6
5	1	200	32.2	50	8	8	8	8	6	6
5	3	200	17.5	25	10	10	10	10	8	8
5	3	230	15.2	20	12	12	12	10	10	8
5	3	460	7.6	15	14	14	14	14	14	14

*A Fusetron is recommended instead of a fuse in any motor circuit.

IMPORTANT: BE SURE lead wire opening on end of motor is fully sealed when conduit or a pressure switch is not used. Failure to seal it properly will allow dirt, rain, bugs, etc. to enter back compartment of motor through conduit opening and cause switch malfunction.

⚠ CAUTION **Never run pump dry.** Running pump without water may cause pump to overheat, damaging seal and possibly causing burns to persons handling pump. Fill pump with water before starting.

⚠ WARNING **Never run pump against closed discharge. To do so can boil water inside pump,** causing hazardous pressure in unit, risk of explosion and possibly scalding persons handling pump.

PRIMING THE PUMP

A tee installed in the discharge opening of the pump, and provided with a priming plug at the top position, will enable you to fill the pump with liquid. Once filled and the priming plug replaced, the pump will prime. The pump should prime itself time after time, as long as the built-in check valve functions.

MAINTENANCE

Little or no maintenance to pump is required other than possible replacement of shaft seal after a reasonable period of operation (see Page 10).

Lubricate motor according to motor manufacturer's instructions. Periodic greasing is required for most motors.

PUMP STORAGE

Drain pump to prevent freezing.

Keep motor dry and loosely covered. Do not wrap with plastic sheeting; trapped moisture could cause corrosion or insulation deterioration.

NOTE: A good rust inhibitor in the liquid end of cast iron pumps is recommended to prevent excessive corrosion.

PUMP START-UP AFTER STORAGE

Replace all drain plugs and close all drain valves in system.

Be sure all connections are tightly sealed.

After initial check is made, fill pump according to "Priming the Pump," above.

SHAFT SEAL REPLACEMENT

IMPORTANT: The highly polished and lapped faces of the seal are easily damaged. **Follow instructions and handle the seal with care.**



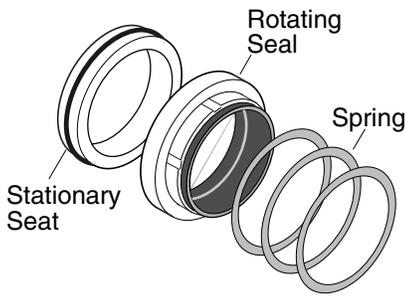
WARNING
Hazardous
voltage

Be sure unit is grounded and power disconnected before attempting any work on pump or motor.

REMOVAL OF OLD SEAL

Refer to Figure 3 for Mechanical Seal parts indentificaiton.

- Step 1. Disconnect all power to pump.
- Step 2. Close isolation valves to cut pump off from system.
- Step 3. Drain pump; be sure to vent pump.
- Step 4. Remove motor hold down bolts and bolts holding adapter/seal plate (Key No. 6, Page 11) to pump body (Key No. 20). Slide motor, adapter/ seal plate and impeller (Key No. 12) backward to clear pump body.
- Step 5. Remove impeller screw and washer from end of shaft and slide impeller off of shaft.
- Step 6. Unbolt adapter/seal plate from motor.
- Step 7. Use two screwdrivers (Figure 4) or bearing puller to carefully separate motor from adapter/seal plate, bringing rotating half of seal (Key No. 10) off with adapter/seal plate. Shaft sleeve (Key No. 2A) may come off with seal.
- Step 8. Use hammer, if necessary, to drive shaft sleeve out of seal. Clean up shaft sleeve with emery paper if necessary.
- Step 9. Place adapter/seal plate face down on bench and drive old stationary half of seal out of adapter/seal plate by carefully taping with screwdriver and hammer (Figure 5).
- Step 10. Use a wire brush to thoroughly clean adapter/seal plate cavity. Be sure all dust and grime are out of seal cavity before installing new seal.



1419 1294
Figure 3

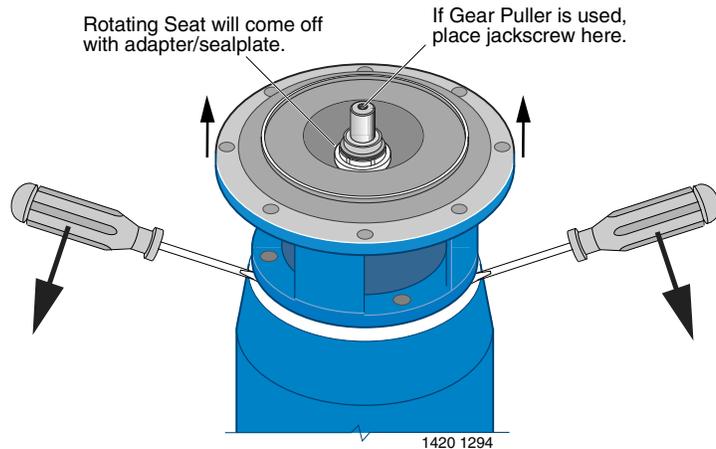


Figure 4

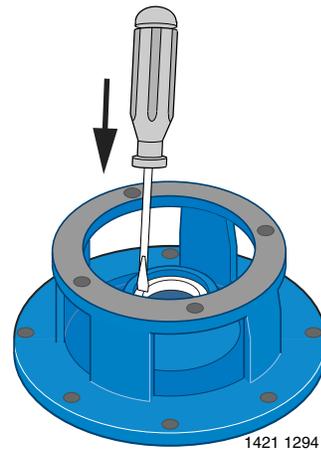


Figure 5

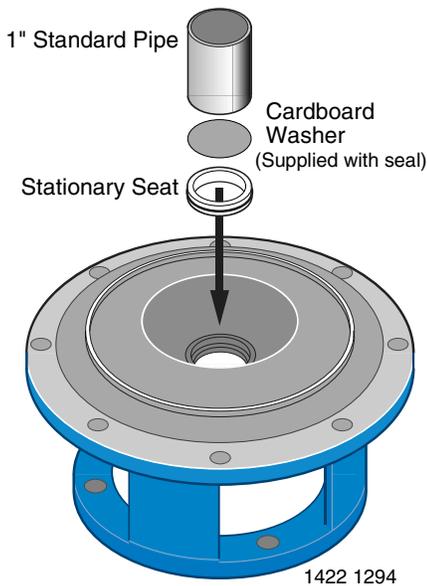
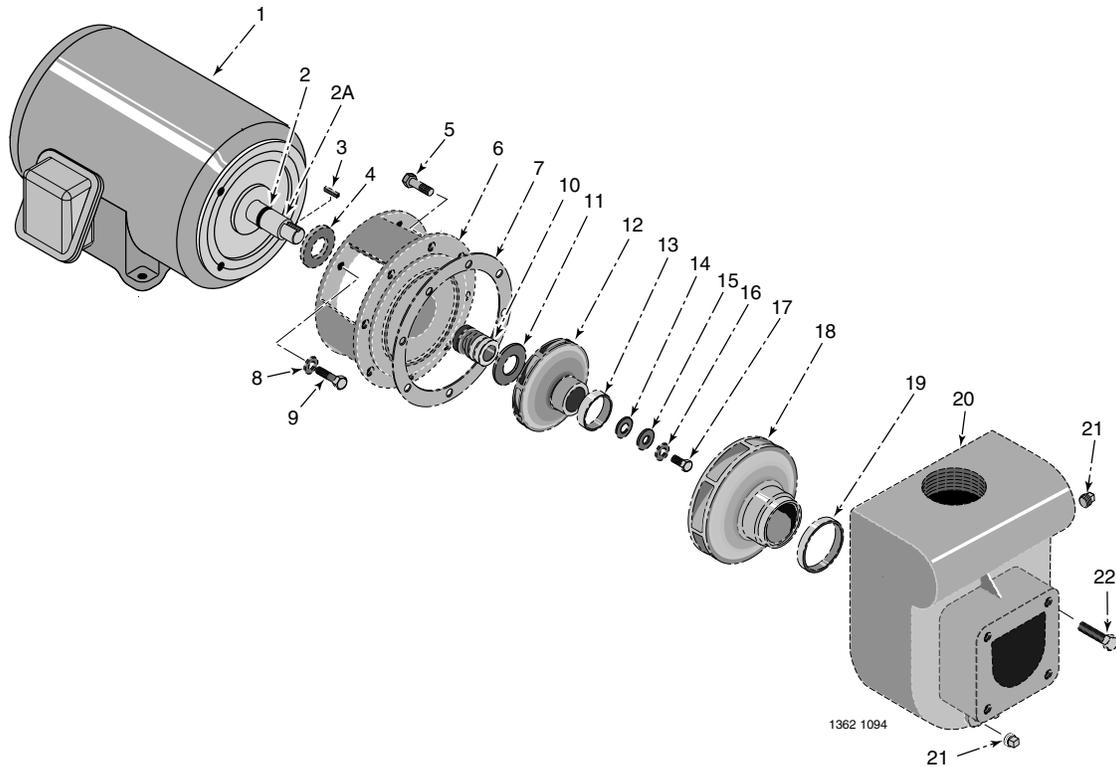


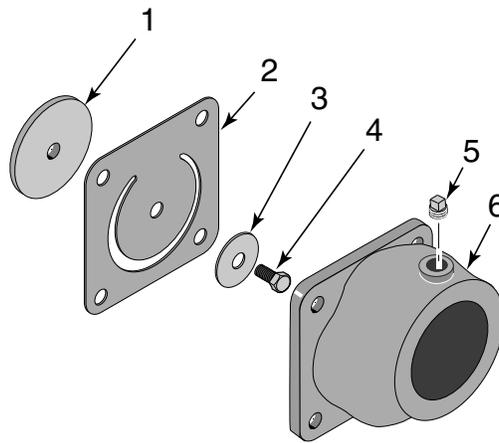
Figure 6

INSTALLING NEW SEAL

- Step 1. **IMPORTANT:** Seal faces are highly polished and lapped. **Handle with care.** Any mar, nick or scratch on seal face will cause it to leak. **BE SURE** to install with polished faces toward each other.
- Step 2. Clean polished surface of ceramic seat with clean cloth.
- Step 3. Wet O-Ring around ceramic seat with liquid soap.
- Step 4. Press stationary (ceramic) half of seal into cavity firmly and squarely with thumb pressure. If it does not seal properly, remove and place **face up** on bench. Re-clean adapter/seal plate cavity. Seal should now seat correctly.
- Step 5. If seal does not seat after recleaning adapter/seal plate cavity, place a cardboard washer over polished face of seal and **carefully** press into place using a piece of 1" standard pipe as a press. (Figure 6). **NOTE: BE SURE** you do not scratch seal face.
- Step 6. Dispose of cardboard washer and recheck seal face to be sure it is free of dirt, foreign particles, scratches and grease.
7. Inspect shaft and shaft sleeve to be sure they are clean.
 8. Re-install O-Ring, shaft sleeve and slinger (Key No. 4) on shaft. **NOTE:** A small amount of grease or Never-Seez under shaft sleeve will help prevent shaft and sleeve from freezing together when pump is in service.
 9. Remount adapter/seal plate to motor, being careful not to scratch seal face.
- Step 10. Apply liquid soap to inside diameter and outside face of rubber drive ring on rotating half of seal.
- Step 11. Slide seal assembly onto shaft sleeve (sealing face first) far enough so that seal spring is located on shaft sleeve. **NOTE: Be careful not to nick carbon seal face when passing it over end of shaft sleeve.**
- Step 12. Slide impeller and gaskets (Key Nos. 12 and 11) onto shaft with key (Key No. 3) in position. Be sure to maintain proper order as shown in Exploded View, Page 11.
- Step 13. Install washer, gaskets, and impeller screw (Key Nos. 14, 15, 16, 17) on end of shaft and tighten screw until it is snug. This should locate seal in place and bring seal faces together.
- Step 14. Re-install motor, adapter and impeller assembly on volute, using new gasket (Key No. 7).
- Step 15. Re-install motor hold-down bolts.
- Step 16. Check all bolts for tightness.
- Step 17. Pumps below water level: Close drains; open isolation valves to fill pump. Pumps above water level: Prime pump. Open isolation valves if they were closed at disassembly.
- Step 18. When pump is full, close air vents.
- Step 19. Reconnect power to pump and system is ready for operation.



Key No.	Part Description	No. Used	3 HP	5 HP	3 HP	5 HP
			DMH-171 DMH3-171 DM2H-171 DM2H3-110 DM2H3-171	DMJ-172 DMJ3-172 DM2J-172 DM2J3-172	DHH-169 DHH3-169 DH2H-112 DH2H3-112 DH2H3-169	DHJ-170 DHJ3-170 DH2J-113 DH2J3-170
1	Motor - 60 Cycle - 230V, Single Phase	1	C218-177	C218-180	C218-177	C218-180
1	Motor - 60 Cycle - 230/460V, Three Phase	1	C218-179	C218-182	C218-179	C218-182
1	Motor - 60 Cycle - 200V, Single Phase	1	C218-191	C218-192	C218-191	C218-192
1	Motor - 60 Cycle - 200V, Three Phase	1	C218-178	C218-181	C218-178	C218-181
2	O-Ring	1	U9-265	U9-265	U9-265	U9-265
2A	Sleeve	1	C23-58	C23-58	C23-58	C23-58
3	Key - Square	1	U65-42A	U65-42A	U65-42A	U65-42A
4	Water Slinger - Single Phase	1	C69-15	C69-15	C69-15	C69-15
4	Water Slinger - 230/460V, Three Phase	1	C69-16	C69-15	C69-16	C69-15
4	Water Slinger - 200 V, Three Phase	1	C69-15	C69-15	C69-15	C69-15
5	Capscrew - 3/8 - 16 x 7/8" Lg.	8	U30-73ZP	U30-73ZP	U30-73ZP	U30-73ZP
6	Adapter	1	C2-66	C2-66	C2-66	C2-66
7	Gasket - Adapter	1	C20-46	C20-46	C20-46	C20-46
8	Lockwasher - 3/8"	4	U43-12ZP	U43-12ZP	U43-12ZP	U43-12ZP
9	Capscrew - 3/8 - 16 x 7/8" Lg.	4	U30-73ZP	U30-73ZP	U30-73ZP	U30-73ZP
10	Shaft Seal	1	U109-220	U109-220	U109-220	U109-220
11	Gasket - Seal	1	C20-101	C20-101	C20-101	C20-101
12	Impeller	1	C5-246	C5-247	C5-248	C5-249
13	Wear Ring	1	J23-5	C23-14	J23-5	J23-5
14	Gasket	1	C20-100	C20-100	C20-100	C20-100
15	Washer - Impeller	1	C43-45SS	C43-45SS	C43-45SS	C43-45SS
16	Gasket	1	C43-46	C43-46	C43-46	C43-46
17	Screw - Impeller - 3/8 - 16 x 3/4" Lg.	1	U30-72SS	U30-72SS	U30-72SS	U30-72SS
18	Volute Diffuser (w/Wear Ring, Key No. 13)	1	C101-126	C101-126B	C101-132	C101-132
19	Diffuser Ring	1	C21-2	C21-2	C21-2	C21-2
20	Pump Body	1	C76-12	C76-12C	C76-12B	C76-12
21	Pipe Plug - 1/4" NPT	2	U78-941ZPV	U78-941ZPV	U78-941ZPV	U78-941ZPV
22	Capscrew - 5/16 - 18 x 3/4" Lg.	4	U30-60ZP	U30-60ZP	U30-60ZP	U30-60ZP

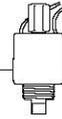


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SUCTION FLANGE ASSEMBLY

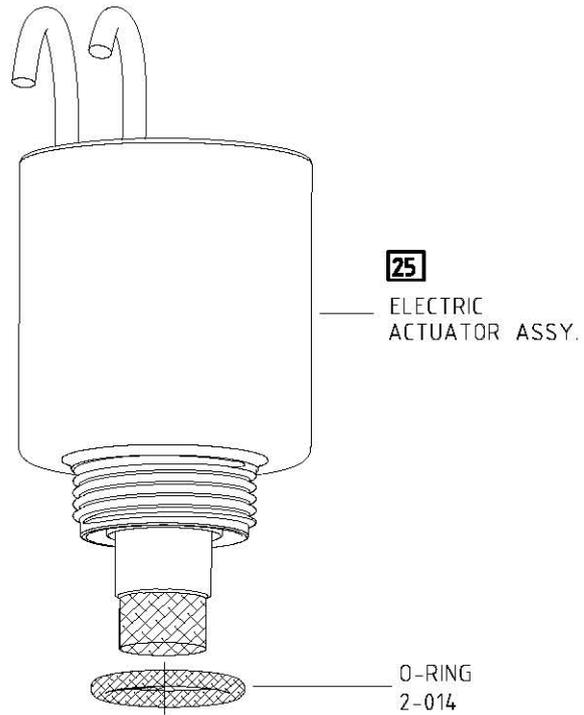
Key No.	Part Description	No. Used	Part Symbol
1	Valve Plate	1	C61-5SS
2	Gasket - Flange	1	C20-15
3	Valve Washer	1	C43-15SS
4	Machine Screw 1/4-20 x 1/2"	1	U30-50SS
5	Pipe Plug - 1/4" NPT Sq. Hd.	1	U78-57SSS
6	Suction Flange 2" NPT	1	C3-22A
6	Suction Flange 2-1/2" NPT	1	C3-74
6	Suction Flange 3" NPT	1	C3-74B
•	Nut, 1/4-20, Hex	1	BC120-15
	Suction Flange Assembly- Complete 1-1/2" NPT		C203-22
	Suction Flange Assembly- Complete 2" NPT		C203-22A

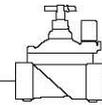
APPENDIX D
SOLENOID VALVES



S-390 2-Way Solenoid Actuator

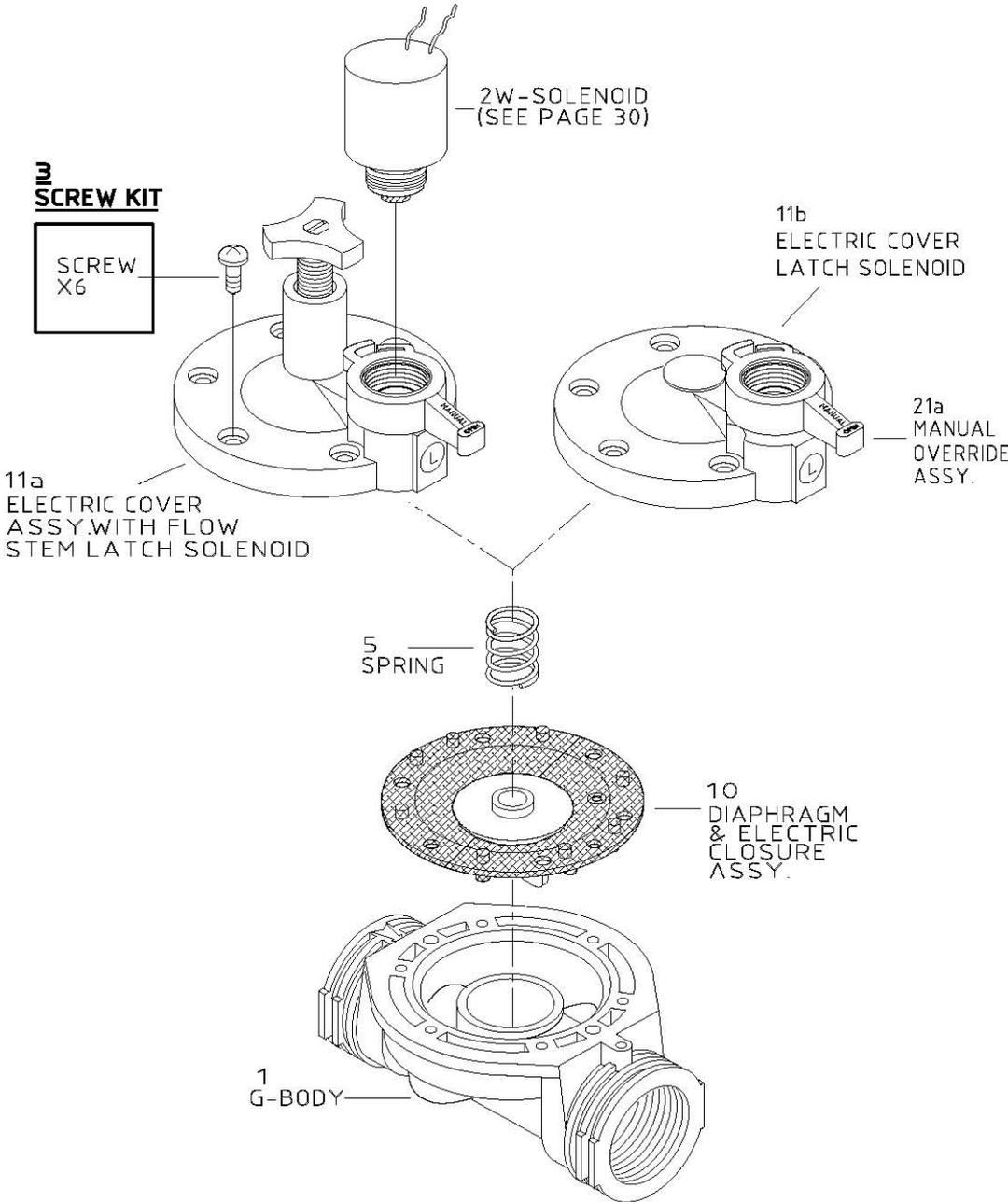
S-392 2-Way Latching Solenoid Actuator





G-Pattern Electric Control Valve Latch Solenoid Model

Sizes: 3/4-1"; DN20-25



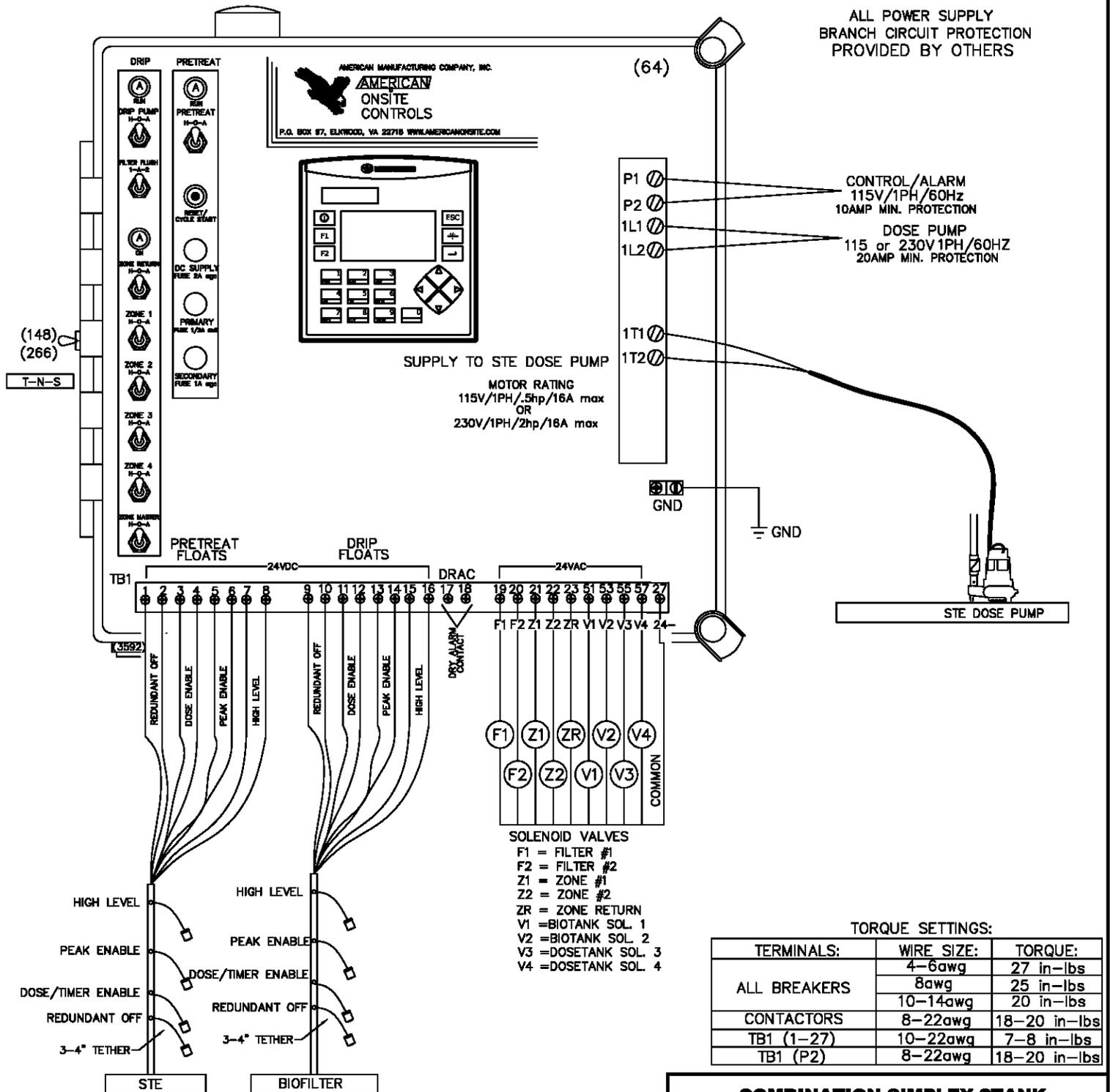
APPENDIX E
CONTROL PANEL MANUAL & WIRING DIAGRAM



AMERICAN ONSITE CONTROLS

AMERICAN MANUFACTURING COMPANY INC.
P.O BOX 97 ELKWOOD, VA 22718-0097
(800) 345-3132 www.americanonsite.com

ALL POWER SUPPLY
BRANCH CIRCUIT PROTECTION
PROVIDED BY OTHERS



NOTES:

- PLEASE REVIEW ALL PAGES AND INSERTS IN THIS MANUAL BEFORE ATTEMPTING TO INSTALL ANY CONTROL EQUIPMENT.
- DASHED LINES MAY REPRESENT OPTIONAL EQUIPMENT.
- REFER TO BACKPLATE LAYOUT ON PAGE 7 FOR DETAILED COMPONENT TORQUE SPECIFICATIONS
- PEAK/TIMER OVERRIDE FLOAT MUST BE A WIDE ANGLE SWITCH



COMBINATION SIMPLEX 2TANK

INSTALLATION GUIDE FOR "CDP0" SERIES COMBINATION CONTROL SYSTEM
1 PHASE OPTIONS A,J,L,X (2TANK)

MODEL#: CDP022-SAB124-AJLRX (2TANK)

DWG#: X9337

REVISION: -

DATE: 05/07/13

DRAWN BY: JHT

APPROVED

FILE PATH:

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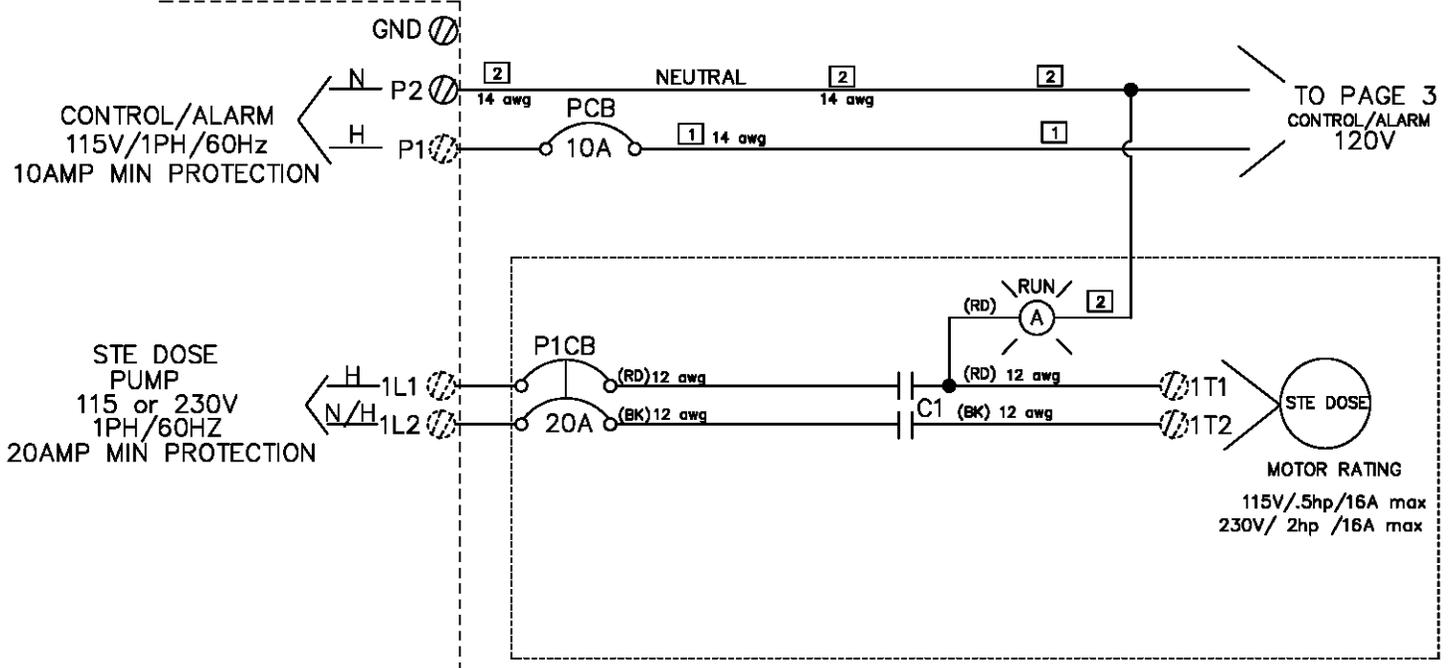
1

POWER SUPPLY INSTALLATION SCHEMATIC

NOTES:
ALL WIRES ARE 18 awg
UNLESS OTHERWISE NOTED.

ALL POWER SUPPLY
BRANCH CIRCUIT PROTECTION
MUST BE PROVIDED BY OTHERS

NOTE:
H= HOT LEG
N= NEUTRAL



POWER SUPPLY INSTALLATION NOTES:

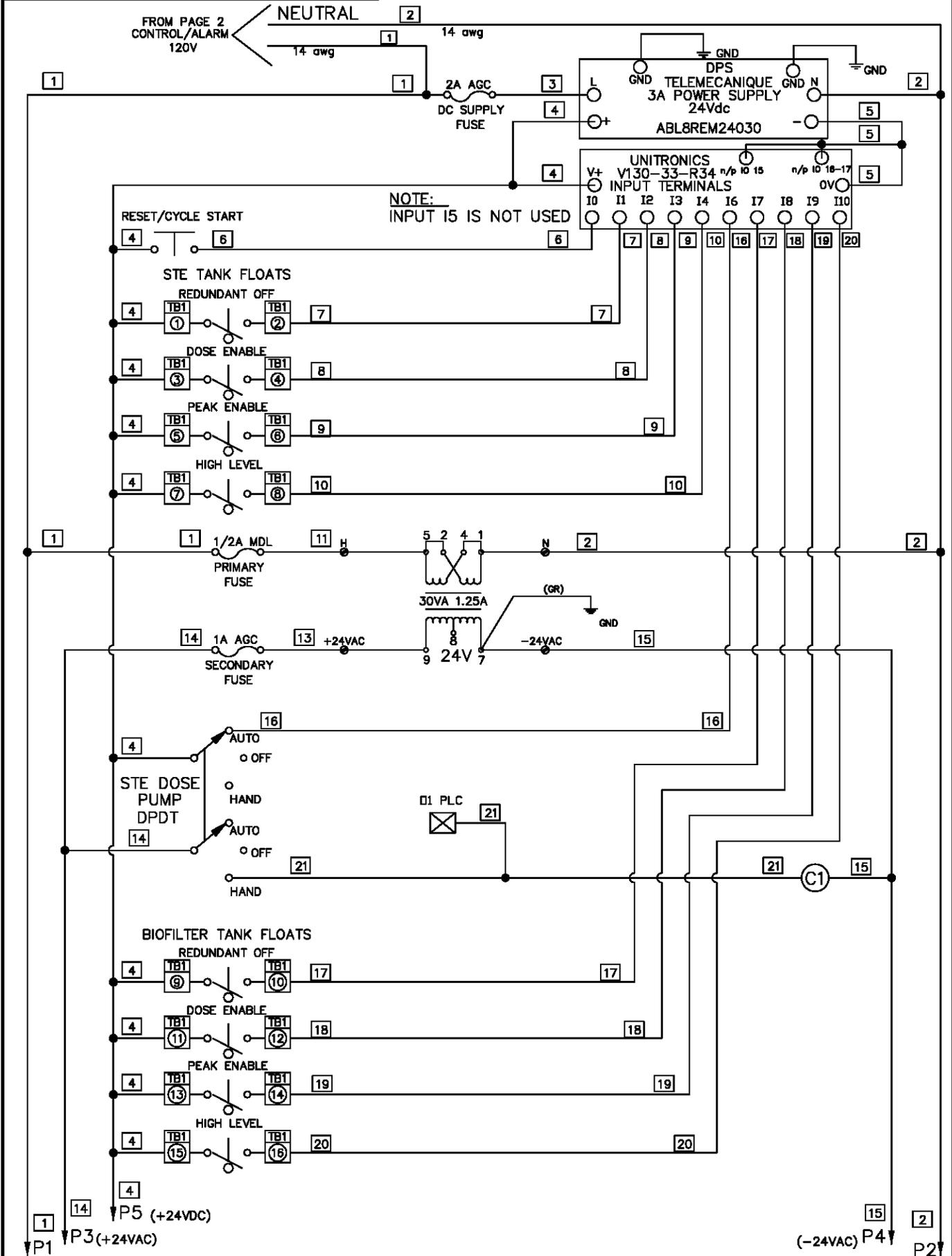
1. DASHED LINES (---) REPRESENT TERMINALS, EQUIPMENT, AND/OR OPTIONS THAT MAY OR MAY NOT BE PRESENT IN EACH SYSTEM COVERED BY THIS MANUAL.
2. BRANCH CIRCUIT PROTECTION MUST BE PROVIDED BY OTHERS. CONSULT NEC AND/OR LOCAL CODES.
3. SINGLE (1) PHASE PUMP MOTORS MUST HAVE INTEGRAL THERMAL OVERLOAD PROTECTION.
4. TEMPERATURE RATING OF FIELD INSTALLED COPPER CONDUCTORS MUST BE AT LEAST 140°F (60°C).
5. FOR PUMPS THAT REQUIRE EXTERNAL CAPACITOR INSTALLATION KITS, SEE "K" PACK INSTALLATION INSERT PROVIDED.
6. PUMP SUPPLY MUST MATCH REQUIRED PUMP VOLTAGE. CONDUIT ENTRANCE MUST MATCH ENCLOSURE RATING.
7. PUMP AND PANEL VOLTAGE CODE MUST BE EQUIVALENT TO INCOMING PUMP AND CONTROL POWER SUPPLIES.
8. OVERLOAD/MOTOR PROTECTOR UNITS MAY REQUIRE ADJUSTMENT TO MATCH PUMP FULL LOAD AMPS (FLA).
9. SEPARATE OVERLOAD (O.L.) NOT REQUIRED WHEN MOTOR PROTECTORS (MP) ARE SUPPLIED.
10. THE MANUFACTURER RECOMMENDS THAT CONTROL/ALARM SUPPLY BE SEPARATE FROM THE PUMP SUPPLY.
11. UNITS WITH BREAKERS DO NOT REQUIRE SEPARATE PUMP SUPPLIES. A SINGLE SUPPLY MAY BE USED, BUT IT MUST BE SIZED TO HANDLE THE CURRENT REQUIREMENTS OF BOTH PUMPS.
12. THE WIRE CHART SHOULD BE USED IN CONJUNCTION WITH INSTALLTION SCHEMATICS FOR TROUBLESHOOTING PURPOSES ONLY.
13. REFER TO BACKPLATE LAYOUT ON PAGE 7 FOR THE REQUIRED TORQUE SETTINGS FOR EACH COMPONENT.

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AMERICAN MANUFACTURING COMPANY INC. ELKWOOD, VIRGINIA 22718	MODEL#: CDP022-SAB124-AJLRX (2TANK)	DATE: 05/07/13
	DWG#: X9337	PAGE 2

INSTALLATION SCHEMATIC

NOTES:
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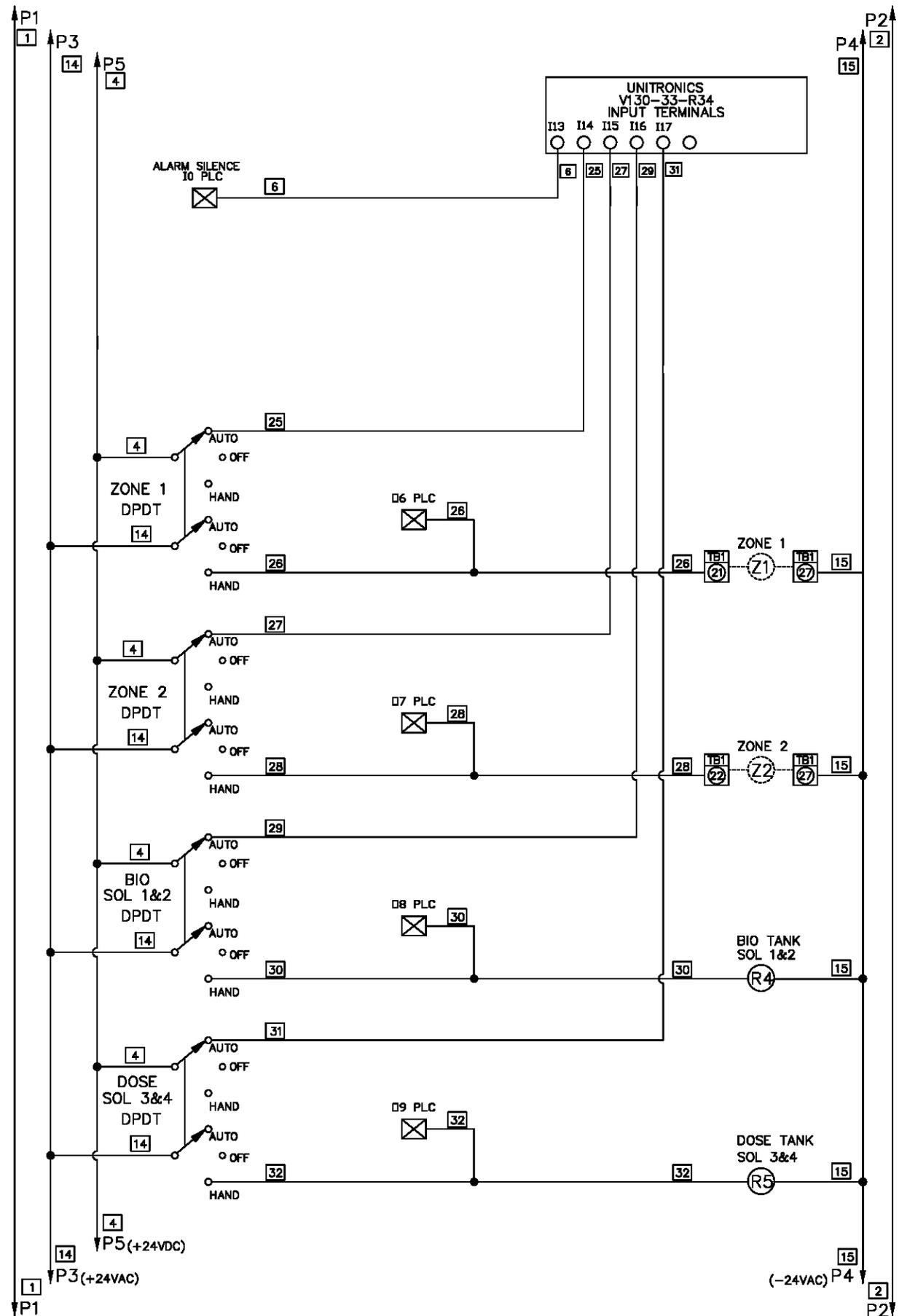
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ELKWOOD, VIRGINIA 22718

MODEL#: CDP022-SAB124-AJLRX (2TANK)
DWG#: X9337

DATE: 05/07/13
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INSTALLATION SCHEMATIC

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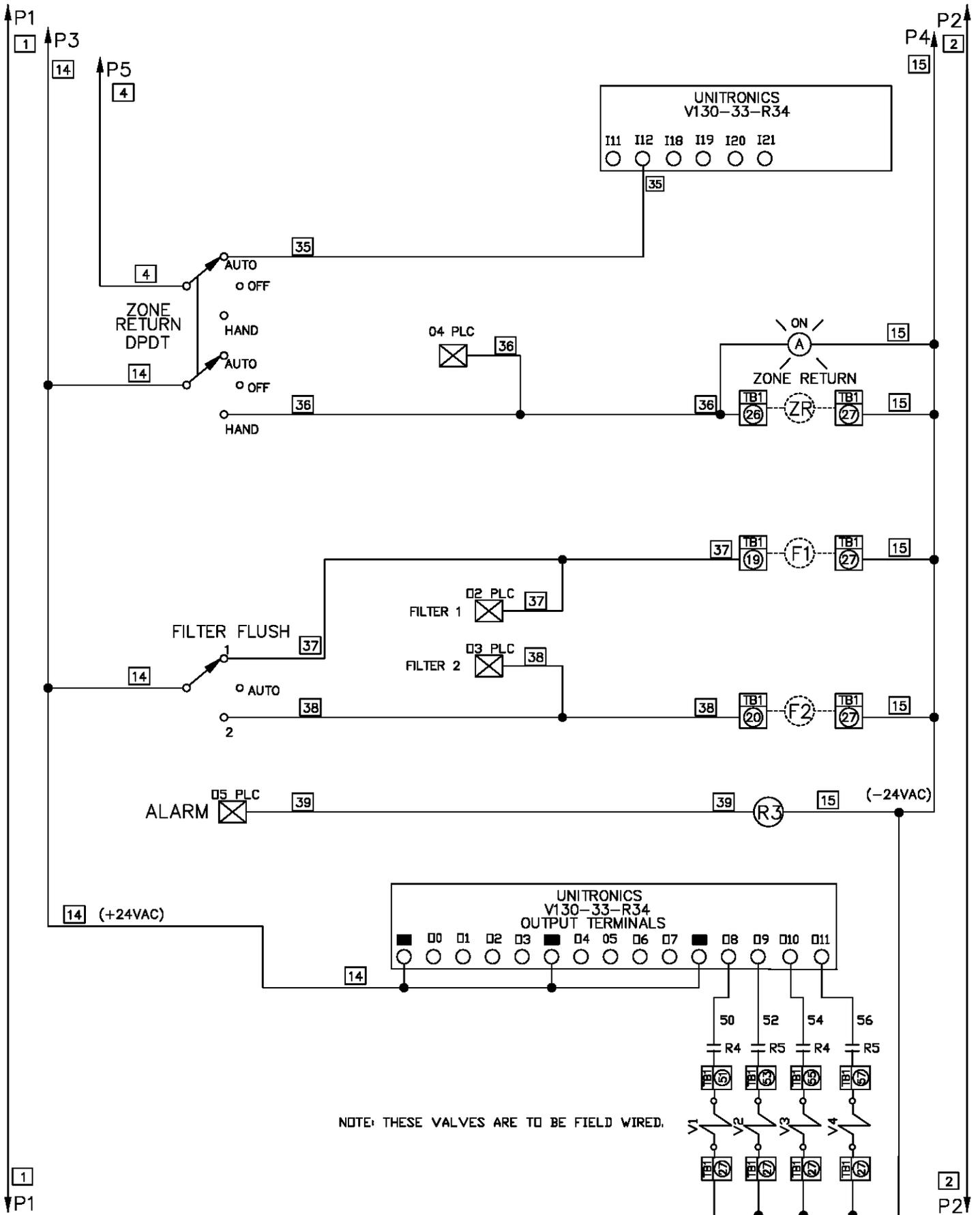
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MODEL#: CDP022-SAB124-AJLRX (2TANK)
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INSTALLATION SCHEMATIC

NOTES:
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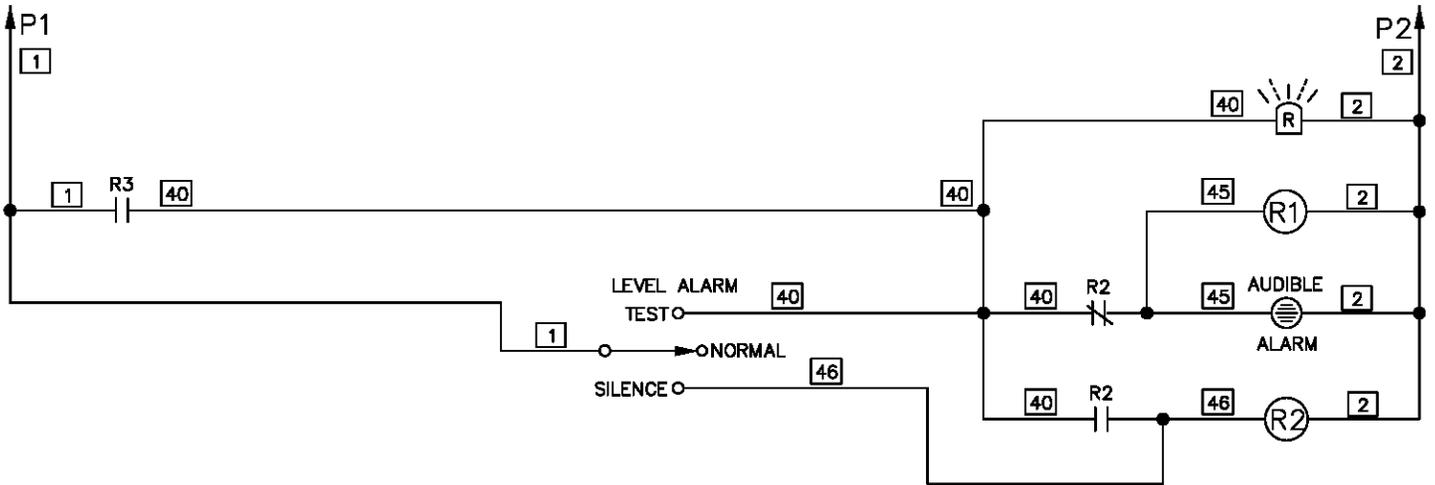
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ELKWOOD, VIRGINIA 22718

MODEL#: CDP022-SAB124-AJLRX (2TANK)
DWG#: X9337

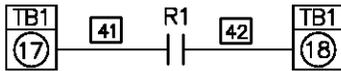
DATE: 05/07/13
PAGE 5

INSTALLATION SCHEMATIC

NOTES:
ALL WIRES ARE 18 awg
UNLESS OTHERWISE NOTED.



DRY ALARM CONTACTS



MICROPROCESSOR I/O

INPUT

I0	- RESET/CYCLE START
I1	- STE REDUNDANT OFF
I2	- STE DOSE ENABLE
I3	- STE PEAK ENABLE
I4	- STE HIGH LEVEL
I5	-
I6	- STE DOSE PUMP AUTO
I7	- BIOFILTER REDUND OFF
I8	- BIOFILTER ENABLE

INPUT

I9	- BIOFILTER PEAK ENABLE
I10	- BIOFILTER HIGH LEVEL
I11	-
I12	- ZONE RETURN AUTO
I13	- ALARM SILENCE
I14	- ZONE 1 AUTO
I15	- ZONE 2 AUTO
I16	- SOL 1&3 AUTO
I17	- SOL 2&4 AUTO

OUTPUT

O0	-
O1	- STE DOSE PUMP
O2	- FILTER 1
O3	- FILTER 2
O4	- ZONE RETURN
O5	- ALARM

OUTPUT

O6	- ZONE 1
O7	- ZONE 2
O8	- SOL#1TANK#1
O9	- SOL#2TANK#2
O10	- SOL#3TANK#1
O11	- SOL#4TANK#2

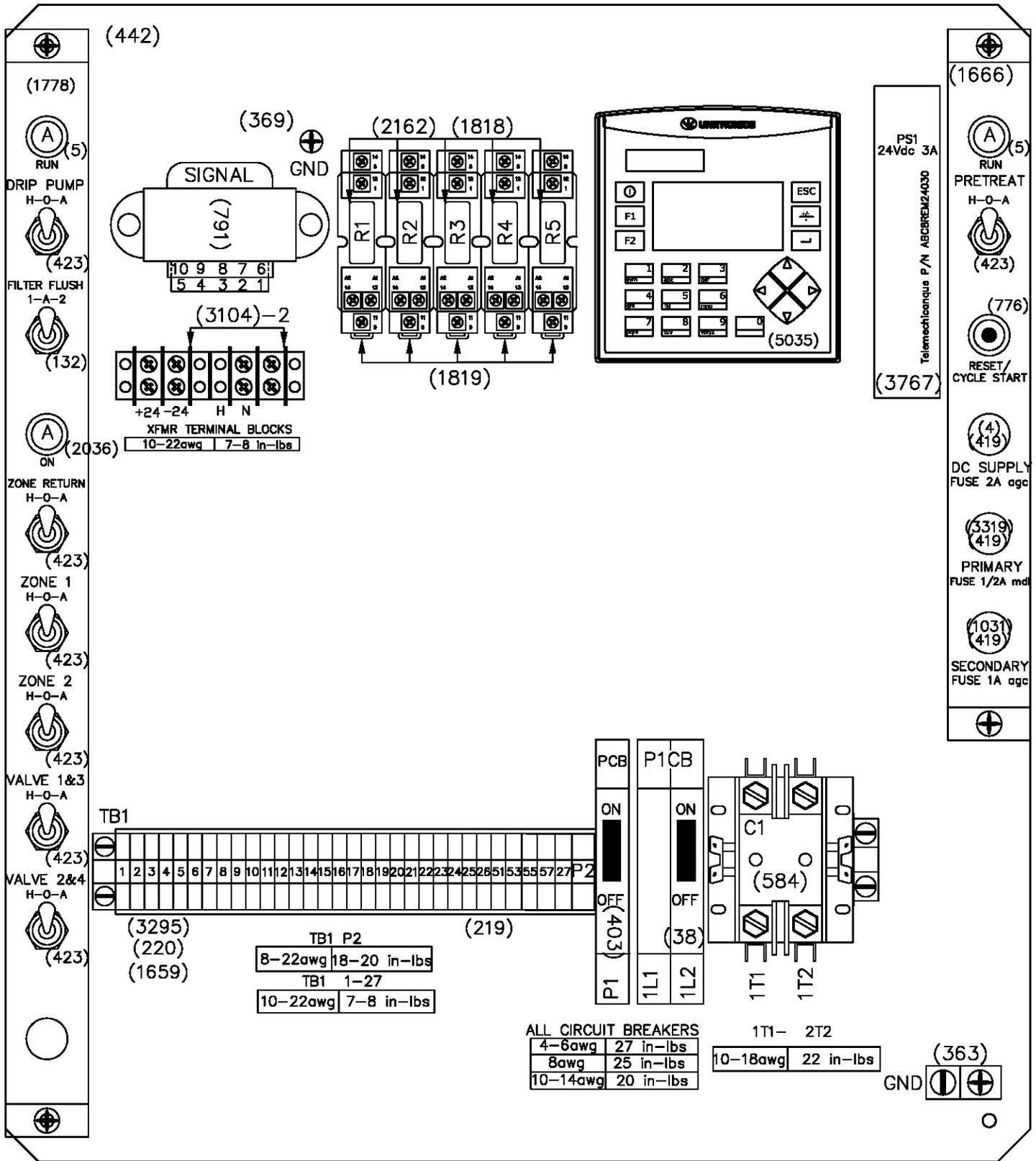
WIRE COLOR CODE

(BK)-BLACK	(GRS)-GREEN STRIPE
(BKS)-BLACK STRIPE	(PK)-PINK
(BR)-BROWN	(PKS)-PINK STRIPE
(BRS)-BROWN STRIPE	(PP)-PURPLE
(DB)-DARK BLUE	(PPS)-PURPLE STRIPE
(DBS)-DRK BLUE STRIPE	(RD)-RED
(GR)-GREEN	(RDS)-RED STRIPE
(GY)-GRAY	(TNS)-TAN STRIPE
(GYS)-GRAY STRIPE	(WH)-WHITE
(LB)-LIGHT BLUE	(WHS)-WHITE STRIPE
(LBS)-LT BLUE STRIPE	(YL)-YELLOW
(OR)-ORANGE	(YLS)-YELLOW STRIPE
(ORS)-ORANGE STRIPE	
(TN)-TAN	

(**SEE NOTE 12**)

BACK PLATE LAYOUT

(64) (148)(3592)
(3560)(266)(629)



BACKPLATE NOTES:

1. (xxxx) DENOTES ITEM NUMBER FOR ALL INSTALLED COMPONENTS
2. INSTALLERS MUST FOLLOW TORQUE SPECIFICATION PROVIDED. TERMINALS ARE LISTED ALONG WITH ACCEPTABLE WIRE SIZES AND MINIMUM/MAXIMUM TORQUE SETTINGS.

SHORT CIRCUIT RATINGS:
PRETREAT POWER CIRCUIT
5kA rms @ 230Vmax
DRIP POWER CIRCUIT
5kA rms @ 230Vmax

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AMERICAN MANUFACTURING COMPANY INC.
ELKWOOD, VIRGINIA 22718

MODEL#: CDPO22-SAB124-AJLRX (2TANK)
DWG#: X9337

DATE: 05/07/13
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APPENDIX F

CONTROLLER SCREEN SHOTS





Figure F-1
Screen 1: Start-up Display
Up/Down Arrows to Move to other Screens

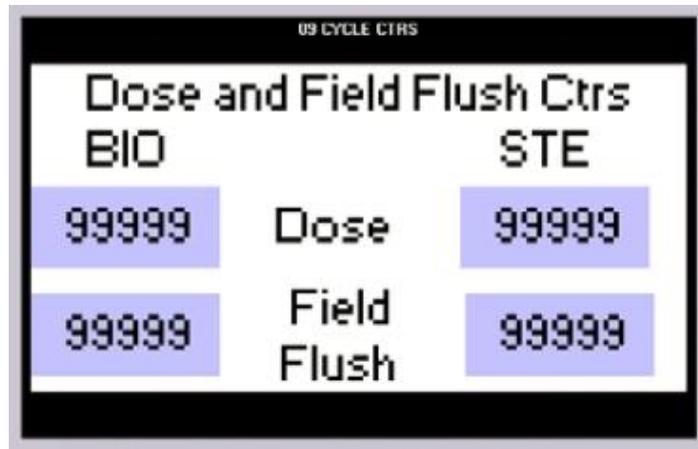


Figure F-2
Screen 2: Cumulative Dose and Field Flush Counter per Zone

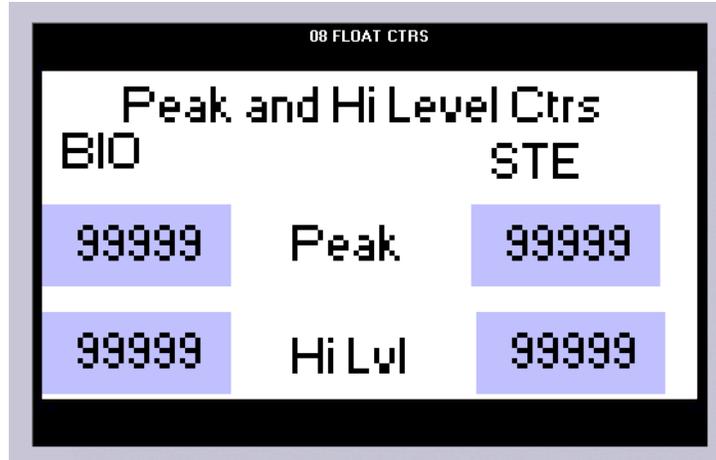


Figure F-3
Screen 3: Peak and High Float Level Counters

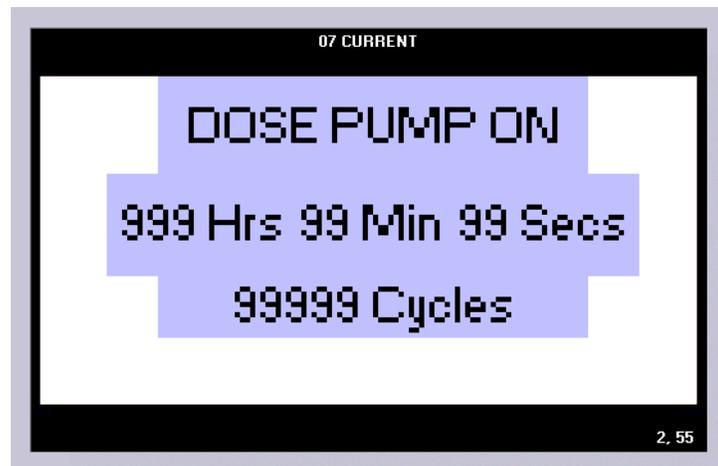


Figure F-4
Screen 4: Current Pump Status

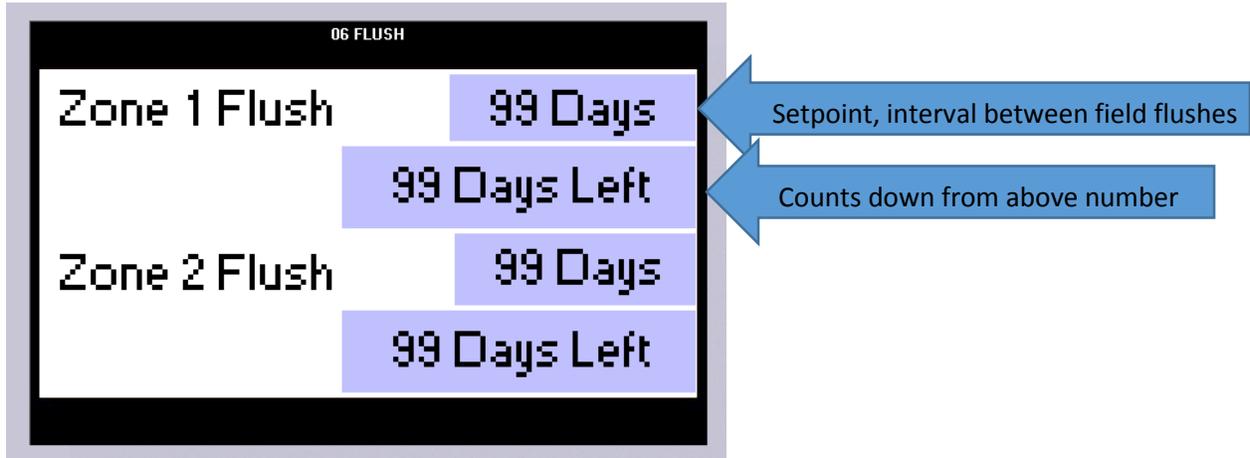


Figure F-5

Screen 5: Field Flush Setpoint and Status

***To adjust, use arrows to navigate to field you would like to change, push ↵, enter new number, push ↵

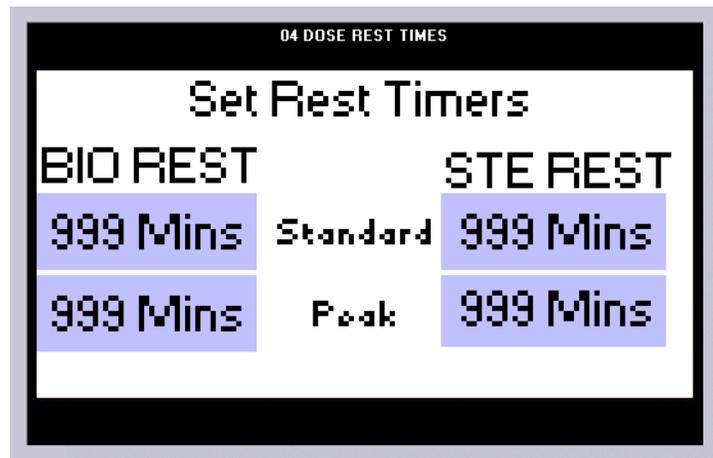


Figure F-6

Screen 6: Dose Rest Time Setpoints

***To adjust, use arrows to navigate to field you would like to change, push ↵, enter new number, push ↵

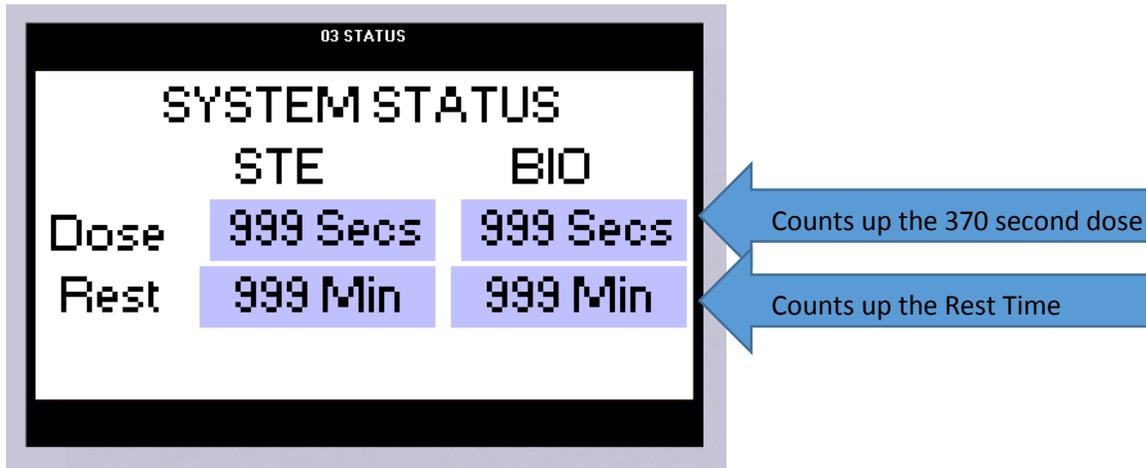


Figure F-7
Screen 7: System Status, Current Dose and Rest Time for each Zone

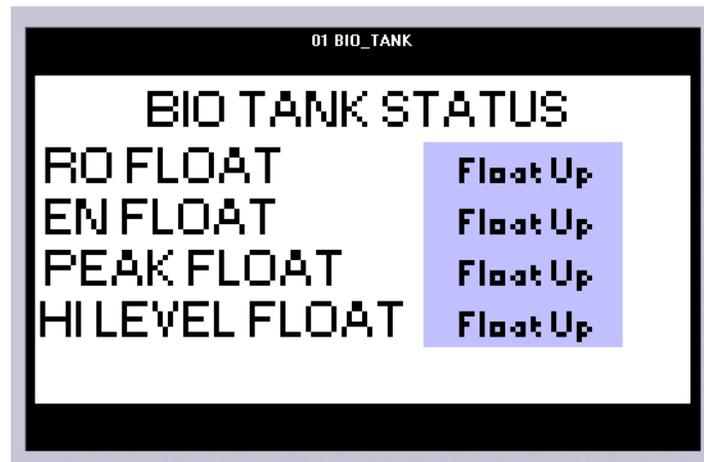


Figure F-8
Screen 8: Stage 2b Biofilter Tank Floats Status Screen

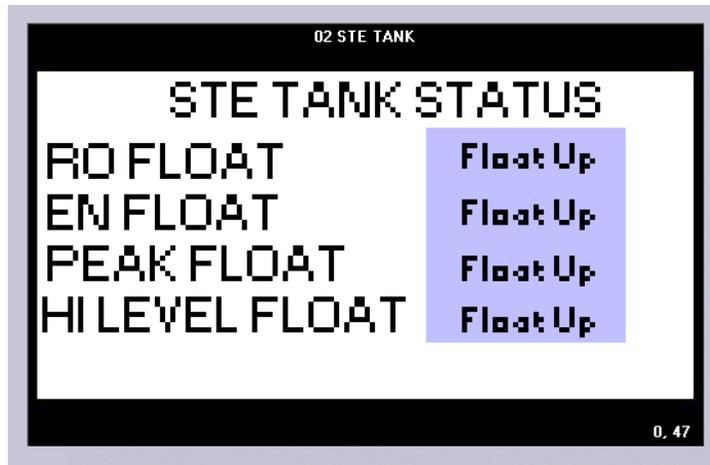


Figure F-9
Screen 9: STE Dose Tank Floats Status Screen



Figure F-10
Screen 10: Reset Counters Screen

***** Press Key 2 and Key 5 to Reach this Screen, then Press Enter to Reset**



Figure F-11
Screen 11: Alarm Screen

APPENDIX G
HYDRAULIC UNIT TROUBLESHOOTING

Hydraulic Unit Troubleshooting Guide

Test if there is return flow

1. Put all the switches to off position
2. Check float status for each tank (STE dose tank and BIO tank)
3. Pick source tank (STE or BIO) make sure dose enable float is up, place tank source in hand
4. Place dose pump in hand – pump should dead head against closed valves, no return flow to primary tank inlet, flowmeter should not be spinning
 - a. If there is return flow to primary tank, could be filter backwash valves or zone return valve
 - b. If flowmeter is spinning, could be either zone valve
5. Turn off pump

Test each Zone

1. Tank source, in hand
2. Place associated zone (with chosen tank source) in hand
3. Place dose pump in hand – this is a manual zone dose, no return flow to primary tank, flowmeter should be spinning
 - a. If there is return flow to primary tank, check zone return valve
 - b. If flowmeter is not spinning, need to check zone valve
4. Turn off pump

Test Filter Backwash

1. Tank source, in hand
2. Dose pump, in hand
 - a. Should be no return flow to primary tank (like above test)
3. Place filter switch to 1 or 2
 - a. Should be high return flow seen in inlet tee of primary tank
4. Place filter switch back to AUTO
 - a. Watch return flow to primary tank, should decrease gradually to no flow
5. Switch to other filter 1 or 2
 - a. Should be high return flow seen in inlet tee of primary tank
6. Place filter switch back to AUTO
 - a. Watch return flow to primary tank, should decrease gradually to no flow

APPENDIX H

DRIP LINE

AMERICAN ONSITE PRODUCTS

BIOLINE DRIP TUBING

The world's most advanced continuous self-cleaning, pressure-compensating dripperline for wastewater.



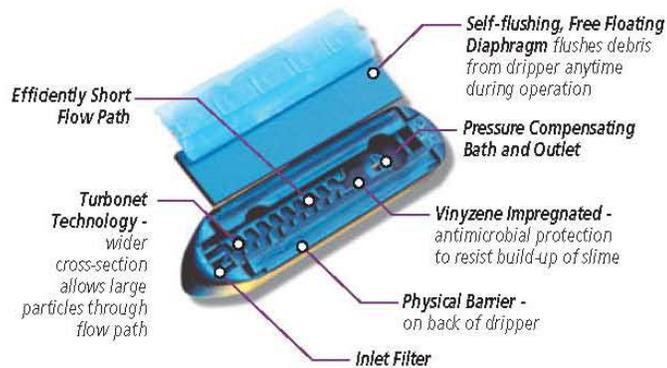
Applications

- Can be used with domestic septic tank effluent of 220/220 (ppm) BOD/TSS with proper design, filtration and operation
- Typically installed following a treatment process
- Reuse applications including municipally treated effluent designated for irrigation

Features/Benefits

- Pressure Compensation - all drippers deliver equal flow, even on sloped or rolling terrain.
- Unique Flow Path - Turbonet technology provides more control of water and a high resistance to clogging.
- Continuous Self-Flushing Dripper Design - flushes debris, as it is detected - throughout operation, not just at the beginning or end of a cycle. Ensures uninterrupted dripper operation.
- Single Hole Dripper Outlet from Tubing:
 - Better protection against root intrusion
 - Allows the dripperline to be used in subsurface applications without need for chemical protection
- Drippers Capture Water Flow From the Center of the Tubing - ensures that only the cleanest flow enters the dripper.
- Built-In Physical Root Barrier - drippers are protected from root intrusion without the need for chemical protection. Water exits dripper in one location while exiting the tubing in another.
- Three Dripper Flow Rates - provides the broadest range of flow rates available. Allows the designer to match the dripperline to any soil or slope condition.
- Bioline Tubing is Completely Wrapped in Purple - the complete tubing is purple, easily identifying it as a non-potable, regardless of how the tubing is installed.
- Vinyzene-Impregnated Drippers - prevents buildup of microbial slime.
- Can be used subsurface - Bioline can be installed on-surface, under cover or subsurface.
- No Special Storage Requirements - does not degrade if stored outdoors.
- Techfilter Compatible - an optional level of protection, provides a limited lifetime warranty against root intrusion.

EXPLODED VIEW OF BIOLINE DRIPPER



Specifications

- Dripper flow rates: 0.4, 0.6 or 0.9 GPH
 - Dripper spacings: 12", 18" or 24" dripper spacings and blank tubing
 - Pressure compensation range: 7 to 70 psi (stainless steel clamps recommended above 50 psi)
 - Maximum recommended system pressure: 50 psi
 - Tubing diameter: 0.66" OD, 0.57" ID
 - Tubing color: Purple color indicates non-potable
 - Coil lengths: 500' or 1,000' (Blank tubing in 250')
 - Recommended filtration: 120 mesh
 - Bending radius: 7"
 - UV resistant
 - Tubing material: Linear low-density polyethylene
- Additional flow, spacings, and pipe sizes available by special order. Please contact Netafim USA Customer Service for details.



AMERICAN ONSITE PRODUCTS

BIOLINE TECHNICAL SPECIFICATIONS

BIOLINE DOSING CHART Maximum Length (feet) of a Single Lateral

Dripper Spacing		12"			18"			24"		
Dripper Flow Rate (GPH)		0.4	0.6	0.9	0.4	0.6	0.9	0.4	0.6	0.9
Inlet Pressure (psi)	15	292	233	175	410	322	247	510	405	308
	25	397	312	238	558	438	335	660	550	423
	35	486	365	279	656	514	394	760	649	497
	45	520	407	311	732	574	439	880	725	555

Lateral lengths are calculated for operation while dosing, and allow for the pressure at the end of the dripperline to be 7 psi or greater. These data do not take scouring velocity into account.

BIOLINE FLUSHING CHART Maximum Length of a Single Lateral (feet) Allowing for 2 fps Scouring Velocity

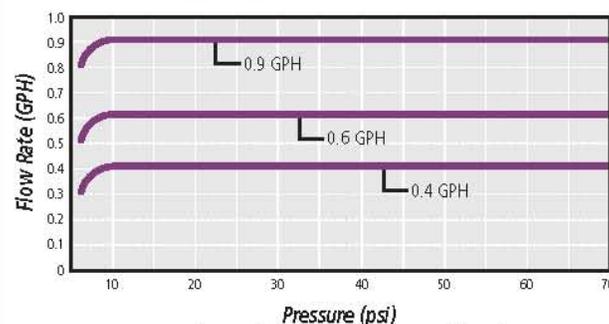
Dripper Spacing		12"			18"			24"		
Dripper Flow Rate (GPH)		0.4	0.6	0.9	0.4	0.6	0.9	0.4	0.6	0.9
Inlet Pressure (psi)	15 Inlet 8Δ	115	100	85	160	140	120	210	190	170
	25 Inlet 18Δ	200	170	140	270	230	200	360	320	280
	35 Inlet 28Δ	260	210	180	360	300	250	470	410	350
	45 Inlet 38Δ	310	250	210	420	350	290	560	490	420

Lateral lengths are calculated to achieve 2 fps scouring velocity and pressure at the distal end of the lateral to be 7 psi.

BIOLINE Flow per 100 Feet

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

BIOLINE Dripper Flow Rate vs. Pressure



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

AMERICAN ONSITE PRODUCTS

BIOLINE TECHNICAL SPECIFICATIONS (CONT.)

BIOLINE DRIPPER OPERATION

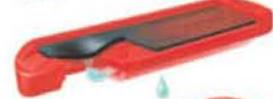
Bioline's **continuous** self-cleaning, pressure compensating dripper is a fully self-contained unit molded to the interior wall of the dripper tubing.

As shown at right, Bioline is continuously self-cleaning during operation, not just at the beginning and end of a cycle. The result is dependable, clog-free operation, year after year.

1. Regulating mode



2. Initiation of flushing cycle



3. Flushing cycle



4. Regulating mode



CROSS SECTION OF BIOLINE DRIPPER

Shows how effluent enters the dripper from the center of the flow where it is the cleanest.



BIOLINE Specifying Information

SAMPLE MODEL NUMBER

A Bioline Dripperline = **08WRAM** **08WRAM.6-24 V**

1 **Dripper Flow Rate**
0.4 GPH = .4
0.6 GPH = .6
0.9 GPH = .9

2 **Dripper Spacing**
12" = 12
18" = 18
24" = 24

3 **Coil Length**
500' = V500
1,000' = V

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

BIOLINE Ordering Information

Flow Rate	Dripper Spacing	Coil Length	Model Number
0.4 GPH	12"	1,000'	08WRAM.4-12V
		500'	08WRAM.4-12V500
0.4 GPH	18"	1,000'	08WRAM.4-18V
		500'	08WRAM.4-18V500
0.4 GPH	24"	1,000'	08WRAM.4-24V
		500'	08WRAM.4-24V500
0.6 GPH	12"	1,000'	08WRAM.6-12V
		500'	08WRAM.6-12V500
0.6 GPH	18"	1,000'	08WRAM.6-18V
		500'	08WRAM.6-18V500
0.6 GPH	24"	1,000'	08WRAM.6-24V
		500'	08WRAM.6-24V500
0.9 GPH	12"	1,000'	08WRAM.9-12V
		500'	08WRAM.9-12V500
0.9 GPH	18"	1,000'	08WRAM.9-18V
		500'	08WRAM.9-18V500
0.9 GPH	24"	1,000'	08WRAM.9-24V
		500'	08WRAM.9-24V500
Blank Tubing 17mm		250'	08WRAM-250

APPENDIX I
MEDIA

SOURCES OF MEDIA

STAGE 2a (Lignocellulosic)

Mothers Organics
Contact: Steve Magriby
6727 CR 579
Seffner, FL 33584
Phone 813-628-0600 FAX 813-628-0664
steve.mothersorganics@gmail.com

STAGE 2b (SULFUR)

Southern Agricultural Insecticides, Inc.
Contact: Darrin Diem
7400 Bayshore Road
Rubonia, FL 34221
(941) 722-3285 Office (941) 723-2974 Fax
darrin.diem@southernag.com.

STAGE 2b (OYSTER SHELL MIXED WITH SULFUR)

Shell's Feed & Garden Supply
9513 Nebraska Ave.
Tampa, FL 33612
813-932-9775
Email: customerservice@shellsfeed.com

GUARANTEED ANALYSIS

Sulfur (S) 99.5%

Plant nutrients derived from elemental sulfur.

PRODUCT DESCRIPTION

GreenSun® ES99 is a pastille-shaped form of elemental sulfur which is formulated using new and improved methods as compared to other conventional granulation methods. This material is formed from pure molten sulfur, is very easy to handle, and has a low dust content (<0.5%) allowing for maximum safety during industrial handling processes. Because of its superior quality, **GreenSun® ES99** is uniquely adapted for a wide array of industrial applications, including but not limited to steel making, mining, fruit processing, pulp and paper, and other industries that require sulfur.

PHYSICAL PROPERTIES

Density	76 lbs/ft ³
Granule Size	SGN 260
Color	Bright yellow
Fines content at manuf.	<0.5%
Impurities (carbon, ash)	<0.05%
Angle of repose	29 degrees

GENERAL APPLICATION AND USE RECOMMENDATIONS

GreenSun® ES99 is an excellent choice for industrial processes that require burning sulfur. Recommendations vary as to each individual industrial use and application.

HANDLING AND STORAGE

GreenSun® ES99 should be stored and blended (if applicable) in a well-ventilated location to minimize accumulation of dust. Always use stringent dust control procedures to prevent a concentration of flammable dust from reaching a spark or flame source. **GreenSun® ES99** should not be blended or stored with strong oxidizing agents. Avoid the use of augers due to fracturing of the material. Avoid inhalation of dust if possible. Avoid contact with skin and eyes. Wear proper protective equipment when handling. Dispose of used bags in accordance with local, state, and federal regulations.

KEEP OUT OF REACH OF CHILDREN.



WARNING: This product contains substances known to the State of California to cause cancer, birth defects, or other reproductive harm.

CONDITIONS OF SALE: CoreAgri, LLC (Company) warrants that this product conforms to the chemical description of the label and is reasonably fit for the purposes stated on the label when used in accordance with the directions under normal use. This warranty does not extend to the use of this product contrary to label instruction, or under abnormal use conditions, or under conditions not reasonably foreseen by the Company.

THE COMPANY DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF FITNESS OR MERCHANTABILITY. THE COMPANY SHALL NOT BE LIABLE FOR CONSEQUENTIAL, SPECIAL, OR INDIRECT DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, AND THE COMPANY'S SOLE LIABILITY AND BUYER'S AND USER'S EXCLUSIVE REMEDY SHALL BE LIMITED TO THE REFUND OF THE PURCHASE PRICE. BUYER AND SELLER ACKNOWLEDGE AND ASSUME ALL RISKS AND LIABILITY RESULTING FROM HANDLING, STORAGE AND USE OF THIS PRODUCT. THE COMPANY DOES NOT AUTHORIZE ANY AGENT OR REPRESENTATIVE TO MAKE ANY OTHER WARRANTY, GUARANTEE OR REPRESENTATION CONCERNING THIS PRODUCT.

NOTICE: Information about the components of this fertilizer material may be obtained by writing to CoreAgri, LLC, PO Box 1027, Arroyo Grande, CA 93421 and giving the lot number which is found on the container.

F1741



Manufactured by:
COREAGRI, LLC
PO Box 1027
Arroyo Grande, CA 93421
800•385•4715
www.coreagri.com

NET WEIGHT: 50 POUNDS (22.68 KG)

Copyright© CoreAgri, LLC

MATERIAL SAFETY DATA SHEET

SECTION 1. PRODUCT AND COMPANY INFORMATION

Trade Name (as labeled): CoreSulphur ES99

Common Name: Elemental Sulfur 99.5%

Manufactured By: CoreSulphur, Inc.
PO Box 1027
Arroyo Grande, CA 93421

Business Phone: (805) 202-4371

Emergency Phone: INFOTRAC – (800) 535-5053

Date of Preparation: December, 2009
Updated September, 2011

SECTION 2. COMPOSITION AND INFORMATION ON INGREDIENTS

Chemical Name	CAS #	Exposure Limits In Air	
		ACGIH TVL (ppm)	OSHA PEL (ppm)
Sulfur	7704-34-9	NA	NA
NE = Not Established		NA = Not Available	

SECTION 3. EMERGENCY/HAZARDS OVERVIEW

Emergency Overview: Bright yellow colored, free flowing pastille with a possible slight sulfur odor. Dust may cause mild irritation. Sulfur trioxide fumes at temperatures above 1067 °F. Not D.O.T. regulated.

Symptoms Of Over Exposure:

Eyes: Sulfur dust may cause severe irritation with prolonged exposure.
Skin: Prolonged or repeated exposure to sulfur dust may cause skin irritation.
Inhalation: Sulfur dust may cause breathing difficulties and irritation of mucous membranes.
Ingestion: Solid sulfur can be digested in fairly large amounts without injury.
Injection: Not possible.

SECTION 4. FIRST-AID MEASURES

<u>If Inhaled:</u>	Remove to fresh air. If breathing becomes difficult, contact a medical physician. Give artificial respiration if victim is not breathing and obtain immediate medical attention.
<u>If Ingested:</u>	Seek Medical Attention. Do not induce vomiting unless directed to do so by a medical professional. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow. If vomiting occurs, keep head lower than hips to prevent introduction of fluid into the lungs.

<u>In Case Of Skin Contact:</u>	Wash thoroughly with soap and water. Remove contaminated clothing and wash before reuse. Seek medical attention if skin becomes irritated.
<u>In Case Of Eye Contact:</u>	Flush immediately with water for at least 15 minutes, lifting the upper and lower eyelids occasionally. Call a physician if eye irritation persists.
Victims of chemical exposure and all rescuers must be taken for medical attention. Take a copy of label and MSDS to physician or health professional with victim.	

SECTION 5. FIRE-FIGHTING MEASURES

Flash Point:	Pure liquid sulfur, 370 °F. Impure liquid sulfur, 428 °F.
LEL Flammable Limits:	35 gm/m ³ .
UEL Flammable Limits:	1400 gm/m ³ .
Auto Ignition Temperature:	Dust Clouds, 374 °F.
Extinguishing Media:	Use any standard agent suitable for surrounding structural fire or for other chemicals that may be involved. Fine water sprays and/or dry chemical agent. CO ₂ , dry chemicals, or sand.
Fire Extinguishing Media to Avoid:	Hoses and extinguishers with pressure streams should be avoided where solid sulfur is dusty or where it may create a further hazard by raising more dust clouds.
Unusual Fire And Explosion Hazards:	Sulfur trioxide fumes at temperatures above 1067 °F. Dust suspended in air is readily ignited by flame, static electricity, or friction spark. Every reasonable step must be taken to minimize dust formation. Dust tight casings should be equipped with explosion relief vents. Sparkless electrical equipment is recommended. Handling equipment must be grounded or bonded to avoid static electricity. Keep away from sources of flame or sparks. Detailed recommendations in Manufacturing Chemists Association SD-74 and National Safety Council 612 Bulletins covering "Sulfur" should be followed when handling GreenSun ES 99.5%.
Special Firefighting Procedures:	Wear positive pressure, self-contained breathing apparatus (SCBA) and goggles. Avoid exposure to smoke or fumes.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Spill And Leak Response: Pick up dry spills by scooping, shoveling, or vacuuming and place into containers for reuse or disposal. The minimum personal protective equipment should include rubber gloves, rubber apron, and chemical goggles. Gas masks or SCBA gear may be required. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Keep material out of sewers, storm drains, and surface waters. Comply with all applicable government regulations on spill reporting, handling, and waste disposal. For landfill disposal, mix with limestone 3 times the weight of sulfur.

SECTION 7. STORAGE AND HANDLING

Storage Practices: Store in a cool (above 40 °F), dry, well-ventilated area away from incompatible materials. Solid becomes corrosive to metals when stored wet. Product will physically break down when exposed to moisture.

Handling Practices: Wash thoroughly after handling. Avoid contact with eyes, skin, and clothing. Wash with soap and water after handling.

Work/Hygiene Practices: Avoid getting chemicals ON YOU or IN YOU. Wash hands with soap and water after handling chemicals. Do not eat or drink around or while handling chemicals. Keep out of reach of children.

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Ventilation/Engineering Controls: Use of local exhaust is recommended at product transfer points and where dusty conditions exist.

Respiratory Protection: For normal product handling, use any NIOSH approved air-purifying dust respirator. For extremely dusty conditions, a full facepiece purifying particulate respirator is recommended.

Eye Protection: Chemical dust/splash goggles or full-face shield to prevent eye contact. As a general rule, contact lenses should not be worn when working with chemicals because they contribute to the severity of an eye injury.

Hand Protection: Wear cotton or canvas protective glove to prevent contact. Rubber gloves may be used if product may become wet or moist.

Body Protection: Use body protection appropriate for task. Chemical-resistant coveralls and rubber aprons are generally acceptable.

Other Protective Measures: An eyewash and safety shower should be nearby and ready for use.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

<p><u>Appearance:</u> Bright yellow colored pastille.</p> <p><u>Odor:</u> May have slight sulfur odor.</p> <p><u>pH:</u> Neutral when dry.</p> <p><u>Water Solubility:</u> Insoluble</p> <p><u>Density:</u> 76 lbs/ft³.</p> <p><u>Specific Gravity (H₂O = 1):</u> Solid, 2.07 gm/ml</p>	<p><u>Boiling Point:</u> 832 °F.</p> <p><u>Crystallization Point:</u> NA.</p> <p><u>Freezing Point:</u> 246 °F.</p> <p><u>Vapor Pressure:</u> Solid, less than 0.0001 mm. hg at 68 °F</p> <p><u>Vapor Density (air = 1):</u> >1.</p> <p>NA = Not Available.</p>
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SECTION 10. STABILITY AND REACTIVITY

Stability: Stable.

Conditions To Avoid: Fire and dust explosions.

Incompatibility: Alkaline materials, or mixtures with chlorates, nitrates, or other oxidizing agents.

Hazardous Polymerization: Will not occur.

SECTION 11. TOXICOLOGICAL INFORMATION

Toxicity Data: NA.

Acute Effects:

Eyes: Mild irritant. May cause redness, tearing and/or burning.
Skin: Mild irritant, especially with prolonged exposure or when in contact with moisture.
Ingestion: Nausea and upset stomach
Inhalation: Moderate irritation of nose and throat from dust. May cause dry coughing, wheezing, chest tightness, and burning of mucous membranes.

Chronic Effects: None known.

SECTION 12. ECOLOGICAL INFORMATION

Environmental Stability: Sulfur, is stable in the environment. Its transport in the environment depends upon the exact compound, the pH, the soil type, and the salinity. All work practices should be aimed at eliminating environmental contamination.

SECTION 13. DISPOSAL CONSIDERATIONS

Do not contaminate lakes, streams, ponds, estuaries, oceans, or other waters by discharge of waste effluents or equipment rinsate. Dispose of waste effluents according to federal, state, and local regulations. For landfill disposal, mix with limestone 3 times the weight of sulfur.

SECTION 14. TRANSPORTATION INFORMATION

This product is not regulated per CFR 49 (Special Provisions 172.102 pt 30)

SECTION 15. REGULATORY INFORMATION

SARA Reporting Requirements: This material does not contain toxic chemicals subject to reporting requirements of Section 313, Title III of the Superfund Amendments and Reauthorization Act of 1986.

California Proposition 65: WARNING. This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

SECTION 16. OTHER INFORMATION

The information and recommendations herein are taken from data contained in independent, industry recognized references including NIOSH, OSHA, ANSI, and NFPA. This information is, as of date listed above, true and accurate to the best of CoreSulphur, Inc. knowledge. It is intended for use by persons possessing technical knowledge and at their own discretion and risk. Since actual use is beyond our control, no guarantee, express or implied, and no liability is assumed by CoreSulphur, Inc. in conjunction with the use of this information. Actual conditions of use and handling may require consideration of information other than, or in addition to, that which is provided herein.

MATERIAL SAFETY DATA SHEET

SECTION I: IDENTIFICATION OF PRODUCT

COMPANY: **Diversity Technologies Corp.** DATE: Apr. 1, 2002
8750 – 53rd Ave. PHONE: 780-468-4064
Edmonton, AB T6E 5G2 FAX: 780-469-1899

PRODUCT NAME: **SAWDUST**

PRODUCT USE: Oil well drilling fluid additive
CHEMICAL FAMILY: Wood by-product CAS #: None

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

WHMIS CLASSIFICATION: Not a controlled product under WHMIS.
WORKPLACE HAZARD: Not applicable.

TRANSPORTATION OF DANGEROUS GOODS (TDG)

PROPER SHIPPING NAME: Not regulated under TDG
TDG CLASSIFICATION: Not applicable
UN NUMBER (PIN): Not applicable
PACKING GROUP: Not applicable

SECTION II: HAZARDOUS INGREDIENTS

<u>INGREDIENT</u>	<u>PERCENT</u>	<u>CAS NUMBER</u>	<u>LD₅₀Oral-Rat</u>	<u>LC₅₀Inhal-Rat</u>	<u>ACGIH-TLV</u>
Contains no WHMIS controlled ingredients					

SECTION III: HEALTH HAZARDS

ROUTE OF ENTRY: EYE CONTACT SKIN INHALATION INGESTION
EYE CONTACT: Mechanical irritant.
SKIN CONTACT: No effects expected. Abrasion may occur with prolonged contact.
INGESTION: No toxic effects expected.
INHALATION: Possible irritation of nasal passages, throat and bronchial passages.
People with existing respiratory problems should avoid wood dust.
CARCINOGENICTY: Not applicable
TERATOGENICITY: Not applicable
REPRODUCTIVE TOXICITY: Not applicable
MUTAGENICTY: Not applicable

INCOMPATIBILITY (CONDITIONS TO AVOID):	Incompatible with oxidizers. Avoid open flames and high temperatures.
CONDITIONS OF REACTIVITY:	Contact with strong oxidizers. May undergo autoignition at high temperatures.
HAZARDOUS DECOMPOSITION PRODUCTS:	Thermal decomposition will result in the following: Water, carbon dioxide, formic acid, acetic acid, carbon monoxide, methane, wood coal and aldehydes.
HAZARDOUS POLYMERIZATION:	WILL NOT OCCUR [XX] MAY OCCUR []

SECTION VIII: PREVENTATIVE MEASURES

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:	Suggest NIOSH approved dust mask. OEL = 5 mg/m ³ for non-allergenic wood dust.
VENTILATION:	General mechanical sufficient for normal conditions of use.
PROTECTIVE GLOVES:	Suggest PVC or rubber.
EYE PROTECTION:	Suggest goggles.
OTHER PROTECTIVE EQUIPMENT (Specify):	Long-sleeve shirt and coveralls. Ensure eye wash station and emergency shower available.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Eye and respiratory protection suggested when handling this material. Store in a cool dry area away from incompatibles and open flames.

STEPS TO BE TAKEN IN CASE THE MATERIAL IS SPILLED OR RELEASED

Wear suitable protective equipment. Eliminate ignition sources. Sweep up and collect uncontaminated material for repackaging. Sweep up and collect contaminated material in approved containers for disposal.

WASTE DISPOSAL METHOD

Dispose/incinerate in accordance with all federal, provincial and local regulations. It is the responsibility of the user to determine if material meets the criteria of hazardous waste at the time of disposal.

SECTION IX: PREPARATION

THE INFORMATION CONTAINED HEREIN IS GIVEN IN GOOD FAITH, BUT NO WARRANTY EXPRESSED OR IMPLIED, IS MADE.

DATE ISSUED:	April 1, 2002	BY:	Product safety committee
SUPERSEDES:	March 29, 1999		

**Diversity Technologies Corp. is the parent company of
Canamara-United Supply Ltd., Hollimex Products Ltd. and Canamara SDS**

MATERIAL SAFETY DATA SHEET

WOOD DUST

Company Name, Address

TRADE NAME: Wood Dust
SYNONYMS: None
CAS. NO.: None
DESCRIPTION: Particles generated by any manual or mechanical cutting or abrasion process performed on wood.

PHYSICAL DATA

Boiling PointNot Applicable
Specific Gravity.....Variable
(Dependent on wood species and moisture content).
Vapor Density.....Not Applicable
% Volatiles by Volume.....Not Applicable
Melting Point.....Not Applicable
Vapor Pressure.....Not Applicable
Solubility in H₂O (% by wt.).....Insoluble
Evaporation Rate -
(Butyl Acetate=1).....Not Applicable
pH.....Not Applicable
Appearance & Odor.....Light to dark colored
granular solid
Color and odor are dependent on the wood species and time since dust was generated.

FIRE & EXPLOSION DATA

Flash Point.....Not Applicable
Autoignition Temperature.....Variable
(typically 400-500°F)
Explosive Limits in Air.....40 grams/m³ (LEL)
Extinguishing Media.....Water, CO₂, Sand
Special Fire Fighting
Procedures.....Wet down with water
Wet down wood dust to reduce likelihood of ignition or dispersion of dust into the air.
Remove burned or wet dust to open area after fire is extinguished.
Unusual Fire &
Explosion Hazard.....Strong to severe
explosion hazard
(if wood dust "cloud" contacts an ignition source)

HEALTH EFFECTS DATA

Exposure Limit.....ACGIH TLV^(R):
TWA - 5.0 mg/m³;

STEL_(15 min.) - 10 mg/m³ (softwood)
TWA - 1.0 mg/m³;
(certain hardwoods such as beech and oak)
OSHA PEL: TWA (see Footnote 1) -
(total dust) - 15.0 mg/m³

(respirable factor) - 5.0 mg/m³
Skin & Eye Contact.....Eye Irritation &
Allergic Contact
Dermatitis
(Wood dust can cause eye irritation.
Various species of wood dust can elicit allergic contact dermatitis in sensitized individuals)

Ingestion.....Not Applicable
Skin Absorption.....Not known to occur
Inhalation.....May cause:
nasal dryness, irritation & obstruction.
Coughing, wheezing, & sneezing: sinusitis & prolonged colds have also been reported.

Chronic Effects.....May cause:
Wood Dust, depending on species, may cause dermatitis on prolonged repetitive contact; may cause respiratory sensitization and/or irritation. IARC classifies wood dust as a carcinogen to humans (Group 1). This classification is based primarily on IARC's evaluation of increased risk in the occurrence of adenocarcinomas of the nasal cavities and paranasal sinuses associated with exposure to wood dust. IARC did not find sufficient evidence to associate cancers of the oropharynx, hypopharynx, lung, lymphatic and hematopoietic systems, stomach, colon, or rectum with exposure to wood dust.

REACTIVITY DATA

Conditions Contributing
to Instability.....Stable
(under normal Conditions)
Incompatibility.....Avoid Contact with:

oxidizing agents, drying oils and flame. Product may ignite at temperatures in excess of 400° F.

Hazardous Decomposition

Products.....Thermal-oxidative degradation of wood produces: irritating & toxic fumes and gases, including CO, aldehydes and organic acids.

Conditions Contributing to

Polymerization.....Not Applicable

PRECAUTIONS AND SAFE HANDLING

Eye Contact.....Avoid

Skin Contact.....Avoid:
Repeated or Prolonged Contact with Skin. Careful bathing and Clean clothes are indicated after exposure.

Inhalation.....Avoid:
Prolonged or Repeated breathing of Wood Dust in Air.

Oxidizing agents and drying oils.....Avoid contact

Open flame.....Avoid

GENERALLY APPLICABLE CONTROL MEASURES

Ventilation.....Provide:
adequate general and local exhaust ventilation to maintain healthful working conditions.

Safety Equipment.....Wear goggles or safety glasses.
Other protective equipment such as gloves and approved dust respirators may be needed depending upon dust conditions.

EMERGENCY AND FIRST AID PROCEDURES

Eyes.....Flush with water to remove dust particles. If irritation persists, get medical attention.

Skin.....Get Medical advice
If a rash or persistent irritation or dermatitis occur, get medical advice where applicable before returning to work where wood dust is present.

Inhalation.....Remove to fresh air.
If persistent irritation, severe coughing, breathing difficulties occur, get medical advice before returning to work where wood dust is present.

Ingestion..... Not Applicable

SPILL/LEAK CLEAN-UP PROCEDURES

Recovery or Disposal.....Clean-up:
Sweep or vacuum spills for recovery or disposal; avoid creating dust conditions. Provide good ventilation where dust conditions may occur. Place recovered wood dust in a container for proper disposal.

FOOTNOTE

Footnote 1: In AFL-CIO v. OSHA 965 F. 2d 962 (11th Cir. 1992), the court overturned OSHA's 1989 Air Contaminants Rule, including the specific PELs for wood dust that OSHA had established at that time. The 1989 PELs were: TWA - 5.0 mg/m³; STEL (15 MIN.) - 10.0 mg/m³ (ALL SOFT AND HARD WOODS, EXCEPT WESTERN RED CEDAR); WESTERN RED CEDAR: TWA - 2.5 mg/m³. Wood dust is now officially regulated as an organic dust under the Particulates Not Otherwise Regulated (PNOR) or Inert or Nuisance Dust categories at PELs noted under Health Effects Information section of this MSDS. However, a number of states have incorporated provisions of the 1989 standard in their state plans.

IMPORTANT

The information and data herein are believed to be accurate and have been compiled from sources believed to be reliable. It is offered for your consideration, investigation and verification. There is no warranty of any kind, express or implied, concerning the accuracy or completeness of the information and data herein. The supplier of this form will not be liable for claims relating to any party's use of or reliance on information and data contained herein regardless of whether it is claimed that the information and data are inaccurate, incomplete or otherwise misleading.



Sawdust & Shavings

Material Safety Data Sheet

Product Name: Screened Sawdust, Screened Shavings

SECTION I--DIVISION AND LOCATION

Pioneer Sawdust
621 Fulton Street
Salt Lake City, Utah 84104
Telephone: (801) 972-4432

SECTION II--HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Ingredients in Product: Kiln Dried White Pine Wood
Chemical Name and Synonyms: Cellulosic Wood Fibre
Chemical Family: Cellulose
Molecular Formula: Complex

SECTION III--PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point: N/A
Vapor Pressure: N/A
Vapor Density: N/A
Solubility in Water: Insoluble
Specific Gravity: (WATER = 1): <1
Melting Point: N/A
Evaporation Rate: N/A
Appearance: Yellowish particles of wood/sawdust
Odor: None to typical wood smell

SECTION IV--FIRE AND EXPLOSION DATA

Flash Point: N/A
Flammable Limits: Slight when exposed to flames
Extinguishing Media: Drychemical, Waterspray, Foam
Special Fire Fighting Procedures: None
Unusual Fire and Explosion Hazards: Avoid CO2 blast. Spontaneous heating possible. Avoid hot, humid storage. Do not disperse in air, as this could lead to dust explosion.

SECTION V--REACTIVITY DATA

Stability: Stable
Incompatibility (Material to Avoid): Strong oxidizing agents
Hazardous Decomposition or By-products: Unknown
Hazardous Polymerization: Will not occur

SECTION VI--HEALTH HAZARD DATA

Permissible Concentrations (AIR): Unknown
Effects of Overexposure: Allergies, dermatitis (skin irritation)
Toxicological Properties: Unknown

EMERGENCY FIRST AID PROCEDURES

Eyes: Flush with large amounts of water, consult an eye physician
Skin Contact: Wipe off excess, wash with soap and water
Inhalation: Remove from area
If Swallowed: Call physician immediately

TEL
(801) 972-4432
Toll Free: (800) 962-7632

FAX
(801) 975-7076

EMAIL
info@pioneersawdust.com

Salt Lake City, UT
Headquarters/Distribution Center
621 Fulton Street
Salt Lake City, UT 84104-4327
PO Box 27861
Salt Lake City, UT 84127-0861

San Leandro, CA
DMS Warehouse
1956 Williams Street
San Leandro, CA 94577

www.pioneersawdust.com



FOR OVER 100 YEARS WE HAVE RECYCLED WOOD WASTE TO PRODUCE QUALITY PRODUCTS

No trees are fallen to supply us with our sawdust. We recycle clean wood waste to produce our sawdust, shavings and sweeping compounds.



SECTION VII--PRECAUTIONS FOR SAFE HANDLING AND USE

Procedures for Clean-up: Handle as normal solid waste. Scoop up and place in waste container, vacuum, or wet clean.

Waste Disposal Method: Waste material can be buried in an approved landfill or handled as inert waste in accordance with Federal, State, and Local Environmental Regulations

SECTION VIII--SPECIAL PROTECTION INFORMATION

Ventilation Type Required (Local, Mechanical, Special): Use adequate ventilation in volume to keep dust concentration below TLV (5mg/m³).

Respiratory Protection: NIOSH approved Dust to Mist Respirator

Eye Protection: Safety glasses or goggles

Other Protective Equipment: N/A

SECTION IX--SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing: Store dry at ambient temperature. Avoid moisture.

Other Precautions: None

.....
We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind, express or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use.
.....

Preparer: Duncan H. Brockbank

Original Date: 12/04/85 (by Norman L. Brockbank)

Revision Date:

Supersedes:

APPENDIX J
AMERICAN MANUFACTURING
OWNER'S MANUAL

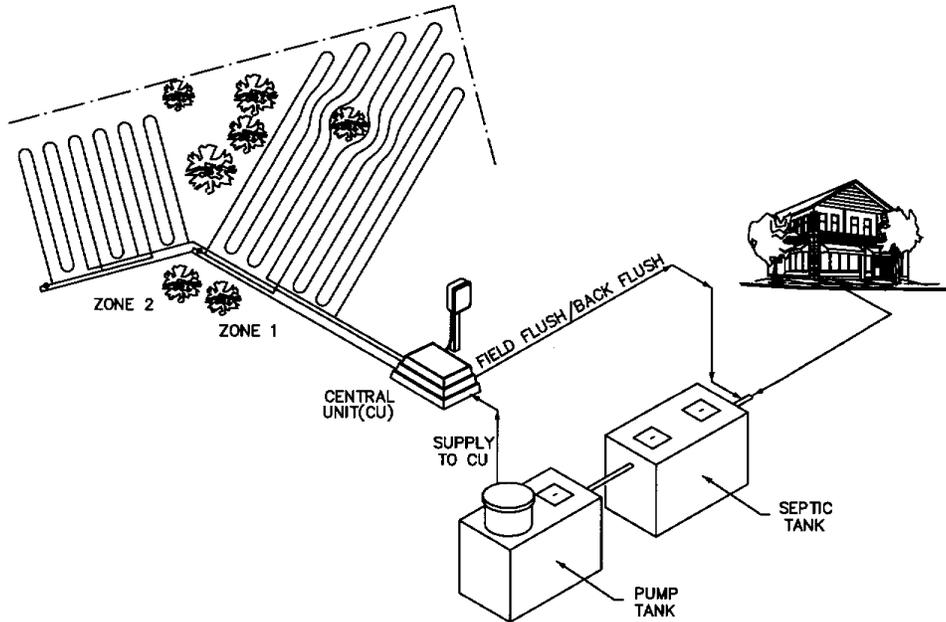
Owner's Manual

AMERICAN "PERC-RITE"®

WASTEWATER DRIP SYSTEMS

2 ZONE or 4 ZONE
SIMPLEX or DUPLEX

PATENT #'s: 5,200,065 ; 5,984,574B ; 6,261,452B1



OWNER'S NAME

HEALTH DEPT. ID NO.

LOCATION

NAME

STREET NAME

CITY, STATE ZIP

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MANUFACTURED BY:
AMERICAN MANUFACTURING COMPANY INC.
5517 WELLINGTON ROAD, GAINESVILLE, VA. 20155
1-800-345-3132

AMERICAN MANUFACTURING LIMITED WARRANTY

For one year (12 months) after the date of purchase, American Manufacturing Company, Inc. will repair or replace any product or portion thereof which proves to be defective due to materials or workmanship of American Manufacturing. We reserve the right to repair or replace defective materials at our discretion. This warranty does not cover the following conditions:

1. Defects or problems caused by improper installation or maintenance of materials.
2. Abuse, neglect or accidental damage of products.
3. Normal maintenance or upkeep of products.
4. Lighting, war, floods, or other acts beyond our control.
5. Misapplication of our products for their designed purpose, or misapplication according to local, state or national codes when in effect.
6. American Manufacturing Company or its representatives are not responsible for the labor for the replacement of defective parts.

Defective or warranted materials must be returned to us or a place designated by American Manufacturing. All returns must be accompanied by a return authorization number supplied by American Manufacturing.

American Manufacturing will in no way be responsible for any losses or damages incurred by failure of equipment, parts or service. NOTE: Some states do not allow exclusion of damages so this may not apply to you. There are no other warranties written or implied.

INTRODUCTION

Congratulations! You are now the owner of a state of the art wastewater treatment and recycling system by American Manufacturing Company, Inc. We have been in business for over 20 years and are considered one of the leaders in the On-Site Wastewater industry. With a staff having over 100 years collective experience in providing solutions to new sites and sites in need of repair, we are able to deliver an ecological, economical, easy to install and off-the-shelf **Perc-Rite® Drip** to owners like yourself.

When and How to use manual

This owner's manual should be read cover to cover initially, and then as needed to answer any questions or assist the owner in fulfilling their maintenance and inspection responsibilities.

When and Where to call for assistance or get additional information

If at any time you have a question about the **Perc-Rite® Drip** or observe any alarm or unusual condition, you should call your qualified service representative or installing contractor as soon as possible. The owner should record in the back of this manual, the contact name and telephone number of the qualified service representative and installing contractor. If further assistance is needed, call American Manufacturing Company, Inc. at 800-345-3132, or visit us at www.americanonsite.com.

Overview of Manual

The manual is organized to cover safety precautions and warnings, an overview of the **Perc-Rite® Drip** components, and the owner's responsibility. A startup log and limited warranty are in the back of this manual.

SAFETY PRECAUTIONS AND WARNINGS

The owner or operator of the **Perc-Rite® Drip** should take precautions consistent with operators working with sewage and/or electricity while working with, or around any of the system components.

Electrical Hazards

The **Perc-Rite® Drip** incorporates pump(s), float switches, relays and many electrical components that use 230 volts, 120 volts or 24 volts AC. Improper use of equipment can cause an electrical shock and may lead to serious injury or death.

Sewage Hazards

Proper attention should be given to cleanup when working in and around the septic and pump tanks and wastewater handling equipment to insure that disease causing bacteria are not transmitted to persons or contact surfaces. The septic and pump tanks can allow for a toxic buildup of poisonous gasses that can lead to serious injury or death if inhaled.

Heavy Lifting Hazards

The owner and/or operator should exercise proper caution when lifting heavy system components, such as pump tank lids. Improper lifting of heavy components can lead to loss of limb and/or mobility.

OWNER'S RESPONSIBILITY

Preventative Maintenance

The drip field area should receive only the most passive type yard uses. No use is recommended when conditions are wet. Under no conditions are any autos or heavy machinery to be allowed on the site.

In order to prevent erosion, the site should be established and maintained as a healthy lawn, or if wooded, mulched and stabilized. Erosion of the site and the adjacent areas should be controlled and eliminated. Surface waters should be diverted away from all components.

Scheduled Inspections

Within a month of operation the owner should contact the installer to have the system inspected for proper startup. After three months of operation the drip field should be walked and the system inspected. Symptoms to look for on the field walk inspection are patches of wetness. If symptoms are identified, notify your service provider immediately. The drip field should be walked & inspected at least annually.

A trained professional service provider, your American Dealer, should inspect the septic tank and pump chambers at least once a year. The septic tank should be pumped when the sludge level reaches 25% or approximately 12 inches, or when the scum layer on top is excessive. The flow meter reading in the hydraulic unit should be recorded with the date on a quarterly basis.

Alarms - Notifying Service Provider of alarm events

The system controller is equipped with an audiovisual alarm-to-alarm high water level condition. The high level alarm may be silenced by pressing the "silence" button on the side of the control. Since a high water level condition can be caused by pump failure, excessive infiltration, or an unusually large peak water use, the owner should call the service provider to determine the cause of the alarm prior to requesting service.

If at any time there are any indications of failure, such as the flow meter not moving during a dose or wetness in the area of the drip field, notify your service provider immediately.

Monitor & Regulate waste input to septic tanks

Since all processes in this sewage disposal system use biological activity to treat the wastewater, only typical biodegradable household wastes are to be disposed of in drains leading to the septic tank. Never dispose of pesticides, oil or grease based products, or non-fecal solids (especially feminine hygiene products) into the system. Minimize disposal of high strength over-the-counter type products such as bleach, and do not use colored toilet tissue.

OVERVIEW OF PERC-RITE® DRIP SYSTEM

The *Perc-Rite® Drip System* is a unique fluid handling system for dispersal of effluent wastewater in soil systems. The system incorporates filtration, time and level controlled application and ultra low rate drip distribution. In conditions where aerobic dispersal, such as "Low Pressure Distribution", of septic effluent is required or where land application with the use of conventional soil absorption fields are not acceptable, this system offers a unique method for subsurface distribution of the waste water effluent.

The *Perc-Rite® Drip System* will accommodate virtually any type of pretreatment process, whether septic tank (anaerobic), aerobic, lagoon, or any type of treatment facility. Only primary treatment (the removal of large settleable solids) of sewage is necessary for the operation of the system. Local soil and site conditions may require additional treatment for excessive organics, oil and grease or other contaminants.

Since the installation of the field distribution lines causes very little soil disturbance and effluent discharge volume from each emitter hole is insignificant, the installation of the system has very little site impact even in established lawns or park areas. After installation there are virtually no visible indications that the installation site is being used for disposal purposes. This system is especially suited for landscaped or wooded areas near buildings, trailer parks, apartment complexes or residential subdivisions.

The *Perc-Rite® Drip System* is operated via a "state of the art" controller, which is activated by level sensing devices (standard mechanical differential float switches) located in a dosing tank downstream from the pretreatment process or processes (typically a septic tank). When activated by the rising level of effluent in the dosing tank, the controller will enable the disposal cycle, and as dictated by the time clock, pump the effluent through a 115-micron disc filter and then to final drip dispersal.

Drip Tubing

The drip field supply line conveys the effluent to the drip absorption zone that is being dosed where it is discharged below the soil surface through a patented chemical-resisting pressure compensating self cleaning "drip" poly-tubing emitter. The emitters or "drippers" are located every two feet in the tubing and emit 0.65 gallons per hour per emitter. The dripper lines are automatically scoured (forward flushed) every 25 dosing cycles. This function is activated by the controller, which opens the field flush valve, thus allowing the flushed effluent to be returned to the pretreatment tank. The duration of this cycle is approximately three minutes. The flushing cycle produces a high

velocity cleansing/scouring action by the effluent along the inside walls of the dripper tubing and P.V.C. Manifolds. The tubing emitters are self-cleaning and require no maintenance.

The construction of the drip tubing is unique in that the internal diaphragm and labyrinth provide for an exact amount of effluent to be discharged from each of its emitters, which are spaced at two-foot intervals along the entire length of the drip tubing. Each emitter maintains a constant flow over pressure ranges of 7 to 70 psi. Because the effluent is distributed at an ultra low rate, large quantities of effluent may be economically distributed over large areas during controlled periods of time without saturating the surrounding soil.

Air Release Valves

The drip field return line conveys the effluent from the drip absorption zone (used to "flush" or clean the tubing) back to the pretreatment device. Each zone will have an air release valve housed in a small valve box at the highest point of the return manifold pipe. This valve will close when the water pressure arrives at the valve during each dose. The air release valve allows air to reenter the tubing after each dose to allow the tubing to drain. This also prevents the uphill tubing from draining water into the downhill tubing and overloading downhill tubing.

In the event of damage to the air release valve, effluent may leak from the system. This condition should be fixed immediately by replacing damaged parts. Air release valves should not be covered with soil or other material and should always be accessible to the service personnel.

Sequence of Operation: PERC-RITE® DRIP SYSTEM

The pump control panel is equipped with four float switches to control the timed doses to be discharged. The four float switches, "Redundant Off", "Standard Dose Enable", "Peak Dose Enable" (optional), and "High Level" function as follows:

Redundant Off - The water level must be high enough to overcome the "Redundant Off" (first & bottom) float in order for the pump to be permitted to run.

Standard Dose Enable - When the water level rises high enough to overcome the "Standard Dose Enable" (second) float and the time clock has timed out the preset time delay of 180 minutes (rest between dosing cycles for two zone designs) the pump will activate and the lead zone is dosed. The pump will continue to run for the length of time as adjusted on the pump run timer and then shut off. The pump will remain off until the internal time clock again times out the preset time delay (180 minutes) after which the pump will activate (as long as the "Standard Dose Enable" float is still up) and will run until the pump run timer finishes timing out. This process will repeat until the water level drops below the "Standard Dose Enable" float and the pump run timer has timed out. The rest time automatically varies with the number of Zones.

Peak Dose Enable - The control system will be equipped with a "Peak Dose Enable" circuit to manage peak flows and excess water use. If the rising water level activates the "Peak Dose Enable" (third) float, the "Pump - Off - Pump & Alarm" switch is set to "Pump", and the preset time delay has exceeded 108 minutes ("Peak Dose Enable" rest between cycles for two zone designs), the lead zone will be dosed. When the peak circuit has been deactivated the normal pumping cycle will resume. If the rising water level activates the "Peak Dose Enable" (third) float, the "Pump - Off - Pump & Alarm" switch is set to "Pump & Alarm", and the preset time delay has exceeded 108 minutes ("Peak Dose Enable" rest between cycles for two zone designs), the lead zone will be dosed and the "Peak Dose Enable" alarm will be activated. The audio portion of the alarm may be silenced by pressing the Test-Normal-Silence switch to the silence position. When the "Peak Dose Enable" float has returned to the down position the alarm will be deactivated and the normal pumping cycle will resume. The rest time automatically varies with the number of Zones.

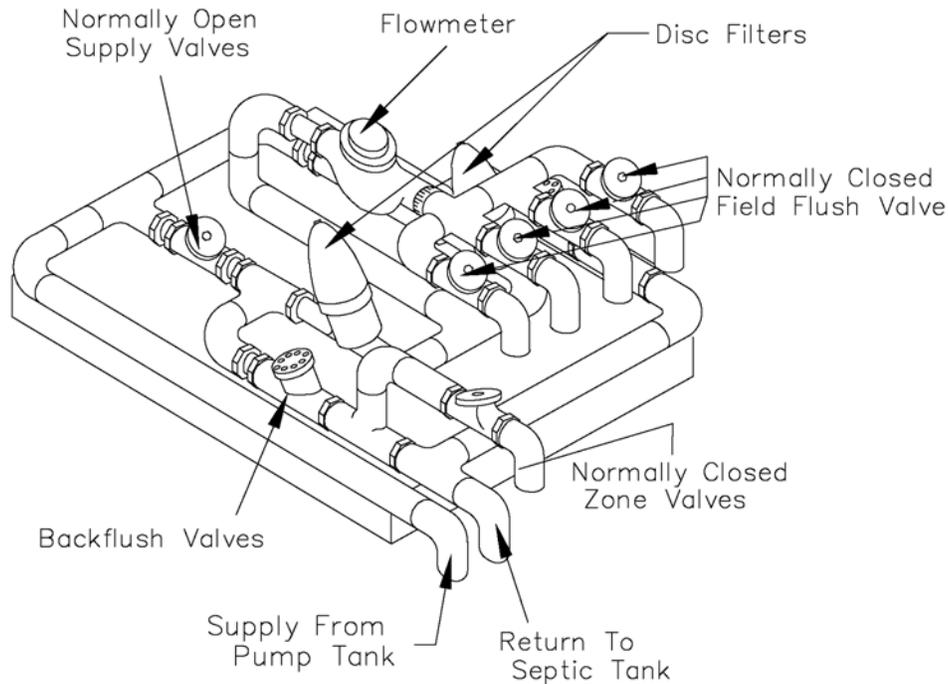
High Level - If the water level rises enough to overcome the "High Level" (fourth) float, the audiovisual alarm will activate. The audio portion of the alarm may be silenced by pressing the Test-Normal-Silence switch (located on the outside of the control panel) to the silence position. The alarm circuit will auto reset when the "High Level" float returns to its normal (down) position. The high-level alarm float is a wide-angle float in order to latch the alarm signal.

CONTROLLER

The "state of the art" controller is enclosed in an outdoor electrical control box located near and connected to the hydraulic unit. The control panel uses 115 or 230 volt power and the microprocessor has 120V and 24V AC inputs and relay outputs for automatic operation of the *Perc-Rite® Drip System*. When in the "Hand" or "Off" position, the manual switches (Hand-Off-Auto) on the door of the control panel completely bypass the microprocessor. The "Hand" position will allow manual operation of the component in the event of a microprocessor failure.

NOTE:

THE HOMEOWNER ASSUMES FULL RESPONSIBILITY FOR CONDITIONS OR MALFUNCTIONS DUE TO CHANGES IN PUMP RUN TIME BY ANYONE OTHER THAN A QUALIFIED SERVICE REPRESENTATIVE. LEAVING THE PUMP CONTROL IN THE "HAND" POSITION WILL FORCE THE PUMP TO RUN CONTINUOUSLY AND MAY RESULT IN PUMP FAILURE.



Hydraulic Unit

The submersible pump delivers unfiltered effluent through each filter. The filter backflushing schedule is triggered at the beginning of each dose cycle. The backflushing sequence is as follows. One filter valve closes, thus blocking the flow of unfiltered effluent to that filter. After a short delay, the other flushing valve opens, thereby backflushing the unused filter. The accumulated impurities discharge back into the pretreatment unit. The closing and opening procedure of the filter and back flush valves causes a change of flow within the unit to provide effluent from one filter to backflush the other filter. The backflush procedure lasts approximately fifteen seconds then the back flushing valve closes. Only after the first filter has completed its backflushing cycle, will the second filter begin its cycle of backflushing in the same manner as the first. Effluent will then be pumped through clean disc filters, then through the **flow meter** and finally through the zone valves to the drip field supply line. During extended dose times the disc filters are re-backwashed to assure optimum operation.

System Parameters Simplex System w/ 1 or 2 Zones & 2 Disc Filters

- a. System Fail indicated by high level alarm or unusual wetness in the field.
- b. Standard Rest time between doses = 180 minutes, 4 doses per day per zone.
- c. Peak Rest time between doses = 108 minutes, 6.6 doses per day per zone.
- d. Flow meter on hydraulic unit (record periodically to monitor activity).
- e. To remove pump or zone from service place its' control switch to "off".

System Parameters Simplex & Duplex System w/ 4 Zones & 2 Disc Filters

- a. System Fail indicated by high level alarm or unusual wetness in the field.
- b. Standard Rest time, 4 doses per day per zone;
 - 4 zones in use doses = 90 minutes,
 - 3 zones in use doses = 120 minutes,
 - 2 zones in use doses = 180 minutes,
- c. Peak Rest time between doses
 - 4 zones in use doses = 54 minutes,
 - 3 zones in use doses = 72 minutes,
 - 2 zones in use doses = 108 minutes,
- d. Flow meter on hydraulic unit (record periodically to monitor activity).
- e. To remove pump or zone from service place its' control switch to "off".

AMERICAN "PERC-RITE"[®]

WASTEWATER DRIP SYSTEMS

2 ZONE or 4 ZONE
SIMPLEX or DUPLEX
CONTROLLER

SIEMENS MICROPROCESSOR - INPUTS AND OUTPUTS

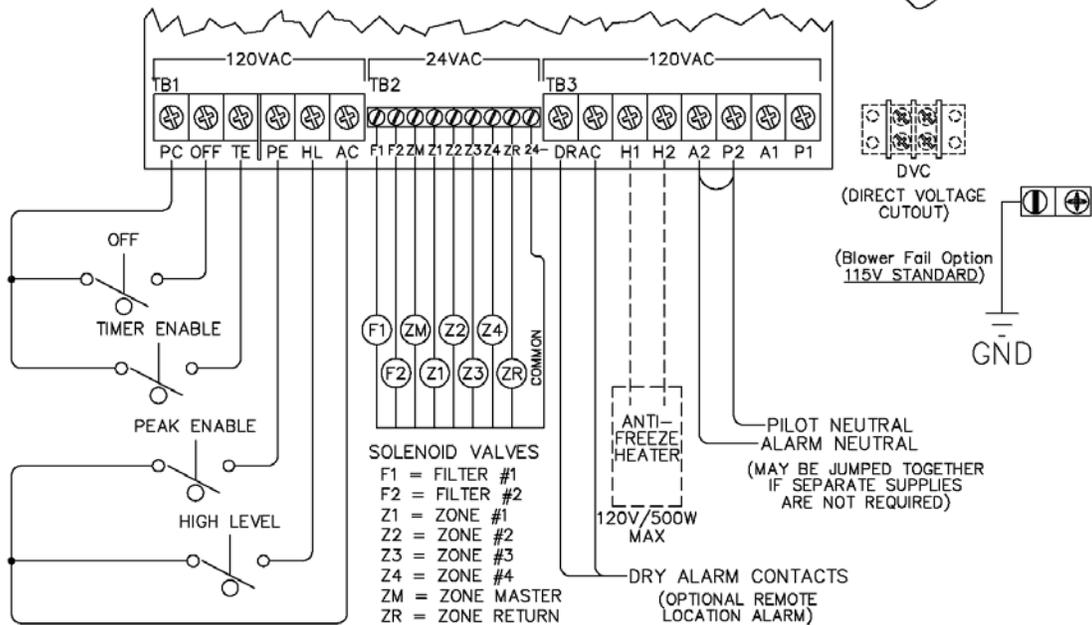
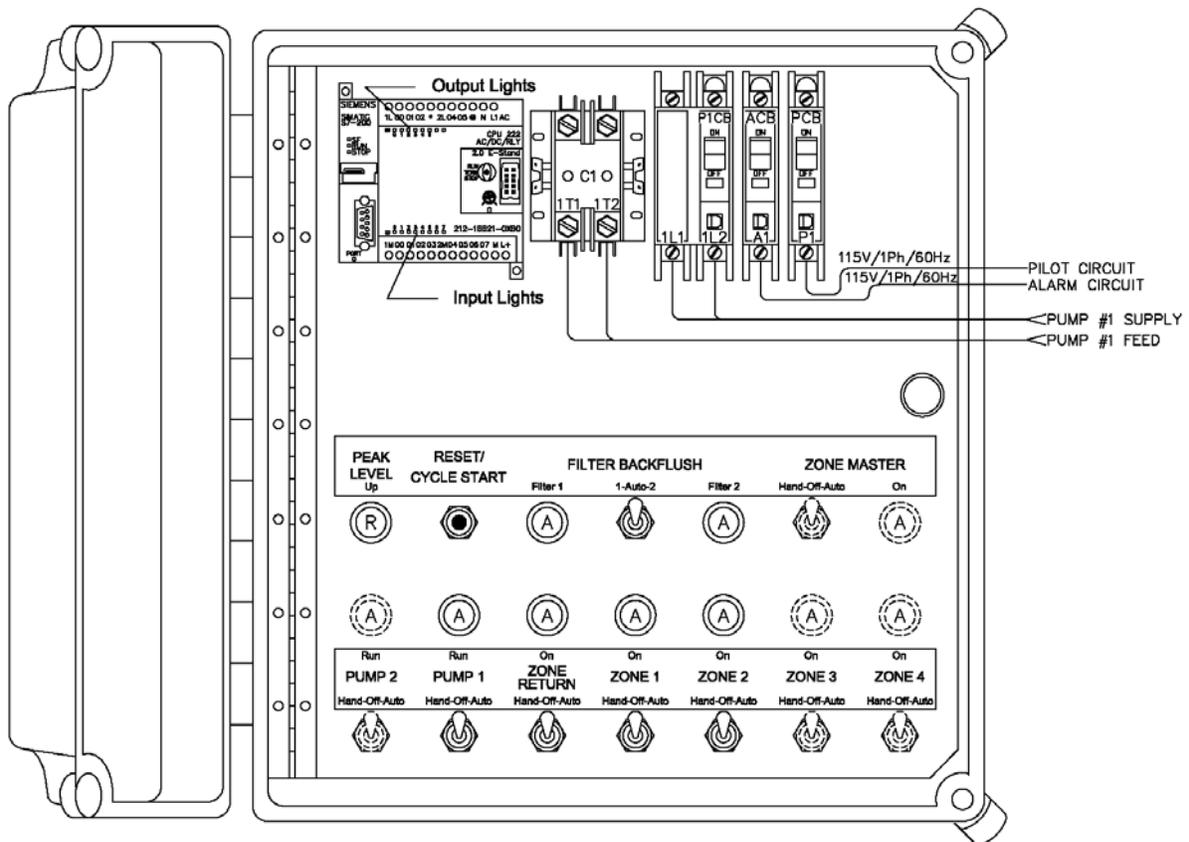
The Siemens microprocessor has inputs on the bottom and outputs on top. The two zone units have 8 inputs (0-7) and 6 outputs (0-5). The three and four zone has the following;

Output	Q0	.0	.1	.2	.3	.4	.5	.6	.7	Q1	.0	.1				
Input	I0	.0	.1	.2	.3	.4	.5	.6	.7	I1	.0	.1	.2	.3	.4	.5

MICROPROCESSOR - INPUTS AND OUTPUTS

R E F A	R E F B	R E F C		R E F A	R E F B	R E F C	
Input I0	Input I0	Input I0	Description	Output Q0	Output Q0	Output Q0	Description
.0	.0	.0	DOSE CUTOUT	.0	.0	.0	PUMP 1
.1	.1	.1	OFF LEVEL FLOAT	.1	.1	.1	ZONE RETURN
.2	.2	.2	DOSE ENABLE FLOAT	.2	.2	.2	FILTER 1
.3	.3	.3	PEAK ENABLE FLOAT	.3	.3	.3	FILTER 2
.4	.4	.4	RESET/CYCLE START	.4	.4	.4	FIELD 1
.5	.5	.5	PUMP 1	.5	.5	.5	FIELD 2
.6	.6	.6	ZONE 1 VALVE		.6	.6	FIELD 3
.7	.7	.7	ZONE 2 VALVE		.7	.7	FIELD 4
	.0	.0	ZONE 3 VALVE		.0	.0	PUMP 2
Input I1	Input I1	Input I1		Output Q1	Output Q1	Output Q1	
	.1	.1	ZONE 4 VALVE		.1	.1	ZONE MASTER
	.2	.2	PUMP 2				
	.3	.3	CURRENT SENSOR				
	.4	.4	HIGH LEVEL (OPTION)				
	.5	.5	AUX. INPUT 1				

References: "REF A " is Two Zone Simplex System
 "REF B " is Four Zone Simplex System
 "REF C " is Four Zone Duplex System



- 1) Leave switches in "Auto" or "Off" - Never leave switches in "Hand" or "On" position. The Off position will take component out of service.
- 2) To Silence Alarm - On outside of control push "Test-Off-Silence" switch to "Silence" and release.
- 3) Leave power "on" - There is a strip heater in the hydraulic unit which is powered by the control panel. Power must be left on to protect unit from freezing.
- 4) To start automatic cycle - Push and hold "Reset" button for over 5 seconds until an automatic cycle starts. Then release button.
- 5) Manual Operation - Place "H-O-A" (hand-off-auto) switch to "Hand". This position is like an "on switch" and should operate the individual component regardless of other conditions.

Name: _____

Date: _____

Owners' Address: _____

American Perc-Rite® Drip Startup Log				USER LOG			
Line No.	As-Built Value	Description	Number of Zones: ____	Date	Date	Date	Date
1		BEDROOMS					
2		GALLONS PER DAY					
3		TEXTURE GROUP					
4		GPD/FT2 DESIGN SOIL LOADING RATE					
5		TOTAL LINEAR FEET TUBING					
6		GPD/LF FT DESIGN TUBING LOADING RATE					
7		METER READING					
8		ZONE 1 LINEAR FEET OF TUBING					
9		ZONE 1 NUMBER OF FIELD FLUSH CONNECTIONS					
10		ZONE 1 GPM DOSING FLOW RATE					
11		ZONE 1 GPM TOTAL FLUSHING FLOW RATE					
12		ZONE 1 RUN TIME					
13		ZONE 2 LINEAR FEET OF TUBING					
14		ZONE 2 NUMBER OF FIELD FLUSH CONNECTIONS					
15		ZONE 2 GPM DOSING FLOW RATE					
16		ZONE 2 GPM TOTAL FLUSHING FLOW RATE					
17		ZONE 2 RUN TIME					
18		ZONE 3 LINEAR FEET OF TUBING					
19		ZONE 3 NUMBER OF FIELD FLUSH CONNECTIONS					
20		ZONE 3 GPM DOSING FLOW RATE					
21		ZONE 3 GPM TOTAL FLUSHING FLOW					
22		ZONE 3 RUN TIME					
23		ZONE 4 LINEAR FEET OF TUBING					
24		ZONE 4 NUMBER OF FIELD FLUSH CONNECTIONS					
25		ZONE 4 GPM DOSING FLOW RATE					
26		ZONE 4 GPM TOTAL FLUSHING FLOW					
27		ZONE 4 RUN TIME					
28		PEAK ENABLE CYCLE COUNTER					
29		HIGH LEVEL CYCLE COUNTER					
30	CONTRACTOR STARTUP REPRESENTATIVE:						
	STARTUP DATE:						

CONTRACTORS NAME & PHONE:

Note to Owner: Any changes to pump run timer should be recorded in manual on this page.

AMERICAN MANUFACTURING COMPANY, INC.

P.O. BOX 97, ELKWOOD, VA 22718-0097, 1-800-345-3132

APPENDIX K
AMERICAN MANUFACTURING
CHECKLISTS



American Manufacturing Company, Inc.

P.O. Box 97, Elkwood, VA 22718

800-345-3132 ~ www.americanonsite.com

Owner:	_____	Service Provider:	_____
System Address:	_____	Address:	_____
	Longwood, FL 32779		_____
PIN/Const. Permit/ Health Dept. ID:	_____	Phone:	_____
Tax Map No.:	_____	Certification No.:	_____
Sub Div.:	_____	Lot No.:	_____
		Date:	_____

INSPECTION AND OPERATION PROCEDURE PERC-RITE® ONSITE DRIP DISPERSAL SYSTEM

I. Monitoring Inspection Event Scheduled () Unscheduled ()

II. Operational Inspection

- A. Field Conditions
 - 1. Walk the field and record any visible wet spots from the drip system.
- B. Controller
 - 1. Lights and manual switch positions.
 - a. Open the control panel and open the lid to the hydraulic unit and pump tank. Make sure all manual switches are in the automatic position. With Microprocessor on, verify power light and run light are on.
 - 2. Microprocessor input: See table in owners manual. Verify float and auto inputs.
 - 3. Microprocessor output: Verify there is output only when in automatic operation. You may start automatic cycle with "Reset/Stop" button.
- C. Pump Tank Liquid Level Float Switches
 - 1. Check liquid level in the pump tank to confirm switch operation.
 - 2. If a float is down, its light should be off. Raise alarm float to activate alarm. Lower float and reset alarm condition.
- D. Pump and Valve Operation
 - 1. Place pump "Hand-Off-Auto" switch in the "Hand" position to dead head pump against valves. Then open (optional) master valve. Flow meter should not turn indicating there are no leaks
 - 2. With the pump running, place each zone valve in the "Hand" (open) position one at a time to check operation. With one zone valve open, flow should register on the flow meter. When the zone valve closes (off position), the flow should stop.
 - 3. With one zone valve open and flowing, close and reopen (optional) master valve to check operation.

4. With the pump in the "Hand" position open the filter backwash valve for filter one and two for ten seconds then close. There should be no flow registering in the flow meter and you should hear the valves open and close. The backwash return valve diaphragm will rise then lower during backflush.
5. Open one zone valve and dose a zone until flow slows to design flow then open zone return to see flow increase, close to see flow slow.
6. Return all switches to the automatic position

E. Hydraulic Unit

1. Examine all hydraulic components for leaks, tubing crimps and other problems.
2. Test heater if installed for cold climates.

III. Capacity Maintenance Inspections Zone Dose Flow Rates

A. Extended Check – Zone Dose Rates

1. Open the air release valve boxes and inspect. Make sure each air release closes during the dose with no water leaks after air is evacuated and valve is seated.
2. Determine how many zones are in operation and the Startup flow rates from the installation records.
3. With the pump in the "Hand" position, select the first zone by placing the zone valve switch in the "Hand" position. After pressurization time, check flow rates by reading the flow meter for a timed minute. Repeat for all zones. Report any excess flow variances from original flow rates.
4. After the final zone is checked, place the "Zone Return" valve in the "Hand" position while the "Zone Valve" is still in the "Hand" position and verify that the flow rate increased to provide field flushing.
5. Return appropriate switches to the automatic position.
6. Press reset button for 5 seconds and check automatic zone dosing time.

B. Hydraulic Unit

1. Examine for soundness.
2. Measure solids level in all tanks.

C. Inspect Treatment System

IV. Reporting

- A. Provide the summary report to customer showing gallon flow to each field along with pertinent operating information and suggestions.
- B. Place signed and dated inspection report to customer file, input inspection report into "Carmody" file with and regulatory agency as needed.
- C. Have backup records available and be prepared to discuss operation and maintenance specifics with customer personnel.

V. **Operator Signature** _____ Date: _____

VI. **Owners Signature** _____ Date: _____

Perc-Rite® Dealers are authorized to reproduce forms in this manual as needed for each site.
Additional comments (use back of copy if necessary):



American Manufacturing Company, Inc.

P.O. Box 97, Elkwood, VA 22718
800-345-3132 ~ www.americanonsite.com

Owner: _____ Service Provider: _____
System Address: _____ Address: _____
Longwood, FL 32779 _____
PIN/Const. Permit/ Health Dept. ID: _____ Phone: _____
Tax Map No.: _____ Certification No.: _____
Sub Div.: _____ Lot No.: _____ Date: _____

PERC-RITE® REPORTING RECORD FOR DRIP DATA MONITORING

- A. System is operating satisfactory upon **Arrival**. yes () or no ()
- R. The system was **Repaired** prior to leaving. check if yes ()
- D. System service has been **Deferred** (until next inspection). check if yes ()
- F. System is **Flagged** (service required prior to next inspection). check if yes ()

	(Y) / (N)	A	R	D	F			
*Using A through F above, answer 1 through 11 below in their corresponding boxes.								
1. Components appear to be in good repair.	() / ()	_____	_____	_____	_____			
2. System operates within design limits.	() / ()	_____	_____	_____	_____			
3. Current usage (avg. gpd)		_____						
4. All lids, access hatches, & risers are safe & secure.	() / ()	_____	_____	_____	_____			
5. Pump operates correctly.	() / ()	_____	_____	_____	_____			
6. Control operates correctly.	() / ()	_____	_____	_____	_____			
7. Level sensor operates correctly.	() / ()	_____	_____	_____	_____			
8. Filters function properly.	() / ()	_____	_____	_____	_____			
9. Previous flow meter reading. Date ___/___/___	Reading	_____						
10. Current flow meter reading.	Reading	_____						
11. Zone Dose Startup GPM.	Z1	_____	Z2	_____	Z3	_____	Z4	_____
12. Zone Dose Current GPM.	Z1	_____	Z2	_____	Z3	_____	Z4	_____
13. Dripline flushes properly.	() / ()	_____	_____	_____	_____			
14. No evidence of surfacing in field.	() / ()	_____	_____	_____	_____			
15. Manufact. check list was performed satisfactorily (where applicable).	() / ()	_____	_____	_____	_____			
16. Summarize Corrective Measures and/or Adjustments Performed (Comments).		_____						

The above list of questions are prepared for entry into the Carmody Service tracking system and I attest this information I have provided is true and accurate to the best of my knowledge.

Operator Signature _____ Date _____
Owner Signature _____ Date _____

Owner's signature attests receipt of completed report copy.

Attachment B

February 9, 2015

████████████████████
████████████████████
Longwood, FL 32779

Dear ████████████████████

Thank you for participating in the Florida Department of Health Florida Onsite Sewage Nitrogen Reduction Strategies project. The project has been very successful and the data gathered from your system has been a significant part of this success, and we appreciate your cooperation and involvement in the project.

As outlined in the agreement between Hazen and Sawyer, P.C. (H&S) and ████████████████████ H&S has to date been responsible for permitting, construction, modifications, operation, maintenance, monitoring, and inspections of the experimental onsite wastewater treatment system installed at ████████████████████ Longwood, FL 32779. The study period has now ended. As indicated in the agreement, H&S is responsible for transferring ownership and responsibility for the experimental system at study termination, or removal of the system if desired by the homeowner.

To leave the experimental system in place, there are three requirements per Chapter 64E-6.027, Florida Administrative Code: (1) a biennial operating permit, (2) a maintenance entity agreement, and (3) the property owner has executed and recorded in the public property records at the county courthouse, a written notice that informs all subsequent property owners of the use of the performance-based treatment system, and of the requirement for the system to be maintained, in perpetuity, in compliance with all lawful requirements.

The biennial operating permit shall be obtained from the Seminole County DOH, and the associated biennial fee is \$150. The existing operating permit expires August 12, 2015. H&S will pay the renewal fee through August 12, 2017; however, thereafter it will be the property owner's responsibility.

To date, H&S has been the permitted maintenance entity for the experimental system. There are two options for establishing a maintenance entity for the experimental system:

- Establish a new maintenance entity agreement with a septic tank contractor which will inspect the system every six months. H&S will assist you with establishing an agreement.
- per 381.0065(4): A property owner who personally performs construction, maintenance, or repairs to system serving his or her own owner-occupied single-family residence is exempt from registration requirements for performing such construction, maintenance, or repairs on that residence, but is subject to all permitting requirements (Aerobic treatment unit maintenance entity permit per annum \$25). H&S will train you and assist with the initial application.

If you have additional questions regarding the Chapter 64E-6.027, Florida Administrative Code, please contact Elke Ursin with the Florida Department of Health at (850) 245-4070.

Please sign, date and return the enclosed Acceptance of System Ownership and Responsibility form to me. Please return the form in the enclosed envelope, as a scan to jhirst@hazenandsawyer.com or fax to 813-630-1967.

Please call with any questions or concerns at 813-630-4498.

**Very Truly Yours,
Hazen and Sawyer, P.C.**

Josefin Hirst, P.E.
Senior Principal Engineer

Cc: E. Ursin, FDOH; D. Anderson, H&S;

Hirst, Josefin

From: Hirst, Josefin
Sent: Wednesday, April 29, 2015 3:26 PM
To: [REDACTED]
Cc: Anderson, Damann L.; 'Ursin, Elke'
Subject: Seminole County permit fees
Attachments: [REDACTED] Letter_Acceptance_rev_April29_2015.pdf; 2-2015_ac20-26.pdf; Seminole_PBTS_publicrecord.pdf

Good afternoon John,

As discussed, please find attached the revised letter which outlines what FDOH will require long term for the nitrogen reduction system with the revised permit fees. The current permit fees can be found in the Seminole County Administrative Code Section 20.26 [Health Department] pages 8 and 9:

- Page 8: Aerobic Treatment Unit Maintenance [to be your own maintenance entity]
 - State Fee = \$25.00
 - County Fee = \$50.00 annually
 - Total Fee = \$75.00 annually
- Page 9: Annual Operating Performance Permits for Performance Based Systems
 - State Fee = \$100 biennial
 - County Fee = \$100.00 annually
 - Total Fee = \$150.00 annually; \$300 biennial

Below is a link to the Seminole County Administrative Code.

<http://cdn.seminolecountyfl.gov/departments-services/county-attorneys-office/administrative-code.shtml>

The latest fee resolutions were adopted February 24, 2015.

Also during a meeting with Seminole DOH last week, we were provided confirmation that the attached wastewater affidavit form can be used for the public record requirement.

Best regards,
Josefin

Josefin E. Hirst, PE

Senior Principal Engineer | Hazen and Sawyer

10002 Princess Palm Avenue, Registry One Building, Suite 200, Tampa, FL 33619

813 630-4498 (main) | 919 906-9536 (cell)

jhirst@hazenandsawyer.com | hazenandsawyer.com

From: Hirst, Josefin
Sent: Monday, February 09, 2015 2:36 PM
To: [REDACTED]
Cc: Anderson, Damann L.
Subject: Onsite wastewater treatment system

Hi John,

April 29, 2015

████████████████████
████████████████████
Longwood, FL 32779

Dear ████████████████████

Thank you for participating in the Florida Department of Health Florida Onsite Sewage Nitrogen Reduction Strategies project. The project has been very successful and the data gathered from your system has been a significant part of this success, and we appreciate your cooperation and involvement in the project.

As outlined in the agreement between Hazen and Sawyer, P.C. (H&S) and ████████████████████ H&S has to date been responsible for permitting, construction, modifications, operation, maintenance, monitoring, and inspections of the experimental onsite wastewater treatment system installed at ████████████████████ Longwood, FL 32779. The study period has now ended. As indicated in the agreement, H&S is responsible for transferring ownership and responsibility for the experimental system at study termination, or removal of the system if desired by the homeowner.

To leave the experimental system in place, there are three requirements per Chapter 64E-6.027, Florida Administrative Code: (1) a biennial operating permit, (2) a maintenance entity agreement, and (3) the property owner has executed and recorded in the public property records at the county courthouse, a written notice that informs all subsequent property owners of the use of the performance-based treatment system, and of the requirement for the system to be maintained, in perpetuity, in compliance with all lawful requirements.

The biennial operating permit shall be obtained from the Seminole County DOH, and the associated biennial fee is \$300. The existing operating permit expires August 12, 2015. H&S will pay the renewal fee through August 12, 2017; however, thereafter it will be the property owner's responsibility.

To date, H&S has been the permitted maintenance entity for the experimental system. There are two options for establishing a maintenance entity for the experimental system:

- Establish a new maintenance entity agreement with a septic tank contractor which will inspect the system every six months. H&S will assist you with establishing an agreement.
- per 381.0065(4): A property owner who personally performs construction, maintenance, or repairs to system serving his or her own owner-occupied single-family residence is exempt from registration requirements for performing such construction, maintenance, or repairs on that residence, but is subject to all permitting requirements (Aerobic treatment unit maintenance entity permit associated annual fee is \$75). H&S will train you and assist with the initial application.

If you have additional questions regarding the Chapter 64E-6.027, Florida Administrative Code, please contact Elke Ursin with the Florida Department of Health at (850) 245-4070.

Please sign, date and return the enclosed Acceptance of System Ownership and Responsibility form to me. Please return the form in the enclosed envelope, as a scan to jhirst@hazenandsawyer.com or fax to 813-630-1967.

Please call with any questions or concerns at 813-630-4498.

**Very Truly Yours,
Hazen and Sawyer, P.C.**

Josefin Hirst, P.E.
Senior Principal Engineer

Cc: E. Ursin, FDOH; D. Anderson, H&S;

Florida Onsite Sewage Nitrogen Reduction Strategies Study

ACCEPTANCE OF SYSTEM OWNERSHIP AND RESPONSIBILITY

FDOH Permit Numbers: 59-S2- [REDACTED]

Location (City/County): Longwood, Florida; Seminole County

Property ID #: [REDACTED]

In July, 2013 an experimental onsite wastewater treatment system was installed at [REDACTED] Longwood, Florida 32779 as part of the Florida Department of Health Onsite Sewage Nitrogen Reduction Strategies Study. As outlined in the agreement between Hazen and Sawyer, P.C. and [REDACTED] Hazen and Sawyer has to date been responsible for permitting, construction, modifications, operation, maintenance, monitoring, and inspections of this experimental nitrogen reduction system over an 18 month study period. This study period has now ended. As indicated in the agreement, Hazen and Sawyer is responsible for transferring ownership and responsibility for the experimental system at study termination, or removal of the system if desired by the homeowner. This agreement documents the decision by the homeowner and replaces the previous homeowner agreement.

OWNER: I (We) _____ hereby do agree to the transfer of complete ownership and operational responsibilities for the referenced FDOH permitted experimental system, and agree to accept all conditions and responsibilities of the permit. I hereby release FDOH and Hazen and Sawyer, P.C. from any and all responsibility or liability for the performance or non-performance of this system after the date this acceptance of system agreement is signed by both parties below.

OWNER: I (We) _____ hereby do not agree to the transfer of complete ownership and operational responsibilities for the referenced FDOH permitted experimental system, and wish the system to be restored to its original condition.

HOMEOWNER

By: _____
[REDACTED]

Date: _____

HAZEN AND SAWYER, P.C.
10002 Princess Palm Avenue
Registry One, Suite 200
Tampa, FL 33619

By: 
_____ Damann L. Anderson

Title: Vice President

Date: February 9, 2015

**STATE OF FLORIDA
DEPARTMENT OF HEALTH
APPLICATION FOR ONSITE SEWAGE TREATMENT AND DISPOSAL SYSTEM OPERATING PERMIT**

Authority: Chapter 381, F.S. & Chapter 64E-6, F.A.C.

Application/Permit Number _____

New: _____ Amended: _____ Renewal: _____

Aerobic: _____ Commercial: _____ Industrial/Manufacturing: _____

GENERAL INFORMATION

Property Owner: _____
Work Telephone: _____ Home phone: _____
Address of Owner: _____ City: Longwood State FL Zip 32779
Owner's Agent: _____
Agent's Address: _____ City: _____ State _____ Zip _____
Agent's Phone: _____ Property Street Address: _____
City: Longwood State _____ Zip 32779
Section: 23 Township: 20 Range: 29 Parcel: _____ Lot: 73 Block: / Subdivision: _____ Unit: _____

EXISTING SYSTEM INFORMATION

Please complete those items shown below which are applicable to the existing permitted onsite sewage disposal system serving the above referenced property: Onsite Sewage Treatment and Disposal System Construction Permit Number (if known): _____
Septic Tank(s)/Aerobic Unit 1500 gallons Grease Trap(s) _____ gallons Dosing Tank 525 gallons
Drainfield size is 615 square feet installed in a: standard subsurface _____ filled _____ mound system drip
The drainfield layout is in trenches _____ absorption bed _____ other X (describe) drip line 1' OC spacing
Onsite Well? Yes _____ No X System Setback to Wells _____ ft. Lot Size 47,045 Square Feet
Estimated sewage flow into system 580 Gallons/Day Based on Table 1, 64E-6.008 Under TRAP Review
Number of businesses or dwellings (circle one) which are being served by this onsite sewage disposal system 1
Additional Comments: Experimental system with Stage 1 biofilter (lined drip system 812 SF area) and Stage 2 Biofilter (37 SF area) with reclaimed water dispersal drip system (615 SF mound area).

COMMERCIAL/INDUSTRIAL/MANUFACTURING FACILITY

Please attach a business survey form for each business which is or will be served by the onsite sewage disposal system. Briefly describe the type of activities that will be supported by the onsite sewage system serving this property. _____

What is the zoning designation for the property? _____ Give a description of the zoning and examples of approved businesses in this type of zoning: _____

AEROBIC TREATMENT UNIT

Date of aerobic system installation approval: _____ / _____ / _____ Is the aerobic treatment unit still under the manufacturer's initial two year warranty? Yes _____ No _____ Aerobic Unit Manufacturer: _____
Type of Aerobic Unit: _____ Class I: _____ Class II: _____ Above 1500 Gallon Capacity: _____
Construction/Installation Permit Number: _____ Are multiple aerobic units used on the site: Yes _____ No _____
Is there an active service agreement on the aerobic treatment unit? Yes _____ No _____ Please Attach a Copy of the Agreement
If yes, when does the service agreement expire? _____ / _____ / _____
Who is the authorized service company providing maintenance to your unit?
Company Name _____ Phone Number _____
Address _____ City _____ State _____ Zip _____

I hereby certify that the above information is accurate and a reflection of the actual conditions existing on the above referenced property. I understand that any change of occupancy or tenancy at the above location will require me to file an amendment to this operating permit.

Applicant's signature: _____ Date _____ / _____ / _____

Application Status:
Disapproved: _____ Date _____ / _____ / _____ Reason: _____

By: _____ Title: _____ CHD

Approved: _____ Date _____ / _____ / _____

By: _____ Title: _____ CHD

Wastewater Affidavit

The property described below uses a performance-based system for the onsite treatment of wastewater. This system must be maintained, in perpetuity, in compliance with all lawful requirements per the Seminole County Department of Health. County Health Department personnel shall have the "Right of Entry" during normal business hours for sampling and inspection purposes.

Property Owner: [REDACTED]

Legal Address: [REDACTED]

Property/Tax ID: [REDACTED]

The property owner shall execute and record this statement in the public property records in the county in which the property is located.

State of Florida

County of Seminole

The foregoing instrument was acknowledged before me this _____ day of _____ 2015 by _____, Owner, and subscribed by:

(Name of Notary)

(Owner/Agent)

Item prepared by: _____
Address: _____