HAZEN AND SAWYER
Environmental Engineers & Scientists

Hazen and Sawyer, P.C.
10002 Princess Palm Avenue
Registry One Building, Suite 200
Tampa, Florida 33619
(813) 630-4498
Fax: (813) 630-1967

Florida Onsite Sewage Nitrogen Reduction Strategies Study

ACCEPTANCE OF SYSTEM OWNERSHIP AND RESPONSIBILTY

FDOH Permit Numbers: 42-QO[redacted]

Location (City/County): Ocklawaha, Florida; Marion County

Property ID #: [redacted]000-00

In November, 2013 an experimental onsite wastewater treatment system was installed at [redacted] Lane, Ocklawaha, Florida 32179 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) [redacted] 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: 2/6/15

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

By: Damann L. Anderson
Damann L. Anderson

Title: Vice President

Date: February 4, 2015

Operation & Maintenance (O&M) Manual

Experimental Two Stage Biofiltration Passive Nitrogen Reduction System

[redacted] Ocklawaha, FL

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

Signature: _____

Date: _____

Table of Contents

Section 1.0 Introduction 3

Section 2.0 System Components and Operation 3

2.1 Primary (Septic) Tank 7
2.1.1 Primary (Septic) Tank Maintenance 8
2.2 Pump Tank 9
2.2.1 Pump Tank Maintenance 10
2.3 Submersible Pump 11
2.3.1 Pump Operation 11
2.3.2 Flowmeters 12
2.3.3 Pump and Flowmeter Maintenance 13
2.4 Low Pressure Distribution Network 14
2.4.1 Low pressure distribution network maintenance 15
2.5 Stage 1 Biofilter 16
2.5.1 Stage 1 Biofilter Maintenance 16
2.6 Stage 2 Biofilter 17
2.6.1 Stage 2 Biofilter Maintenance 18
2.7 Bull Run™ Diversion Valve 18
2.8 Sampling Equipment 19

Section 3.0 Maintenance and Monitoring 22

Section 4.0 Inspection Checklist 22

Appendix A Record Drawings A-1

Appendix B Effluent Screen B-1

Appendix C Pump C-1

Appendix D Flowmeter D-1

Appendix E Media E-1

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] Ocklawaha, FL 32179. The nitrogen reducing onsite treatment system for the single family residence was installed in November 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, NO3. 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 of 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 that escapes into the atmosphere. This step does not require oxygen and is completed in the Stage 2 biofilter, the lignocellosic (wood product) layer in the liner below the Stage 1 biofilter. The media pores are filled with water, and as the Stage 1 effluent percolates through the lignocellulosic media the biological process denitrification occurs in which nitrate is reduced to nitrogen gas.

The B-HS7 system consists of a 900 gallon two chamber concrete primary tank; 300 gallon concrete pump tank; low-pressure distribution network, and an in-ground Stage 1 nitrification biofilter directly over a lined Stage 2 denitrification biofilter. Household wastewater enters the 1st chamber of the primary tank and exits the second chamber as septic tank effluent (STE) through an effluent screen into the pump tank. The pump tank contents are pumped through the low pressure distribution network and discharged to the Stage 1 biofilter. Effluent is dispersed above a 24-inch thick layer of native sand (slightly

limited sand) and proceeds downward through the sand media where nitrification occurs. Underlying the sand is a 12-inch layer of lignocellulosic media (Stage 2 biofilter) above a 30-mil PVC liner where there is the potential for denitrification to occur. The lined area was installed with a 6-inch lip around the outer perimeter. Therefore, approximately 6-inches of the lignocellulosic media is saturated promoting denitrification of the nitrified effluent. The treated effluent is discharged to the native soil along the perimeter of the liner. A flow schematic of the system is shown on Figure 2.

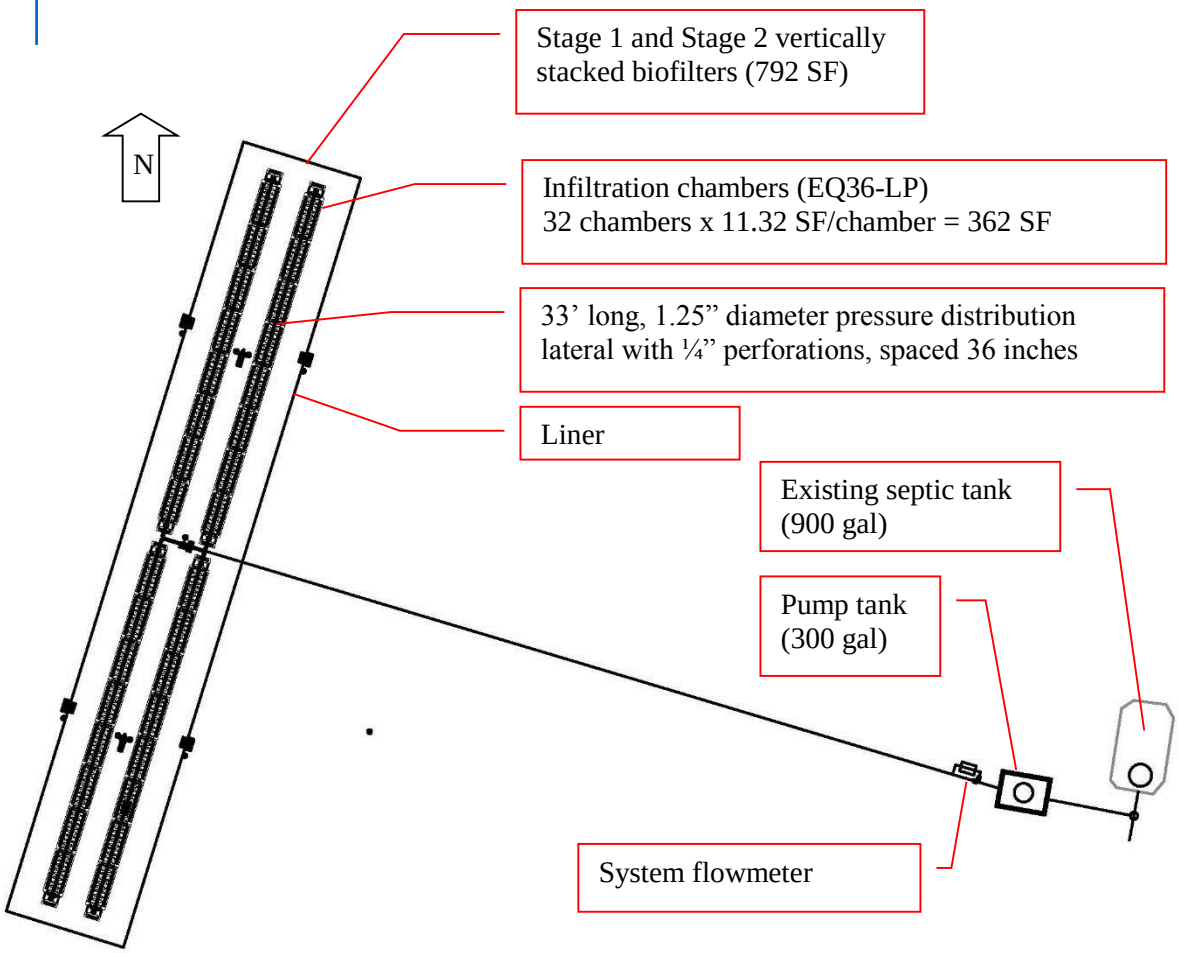


Figure 1
Plan view of System Layout

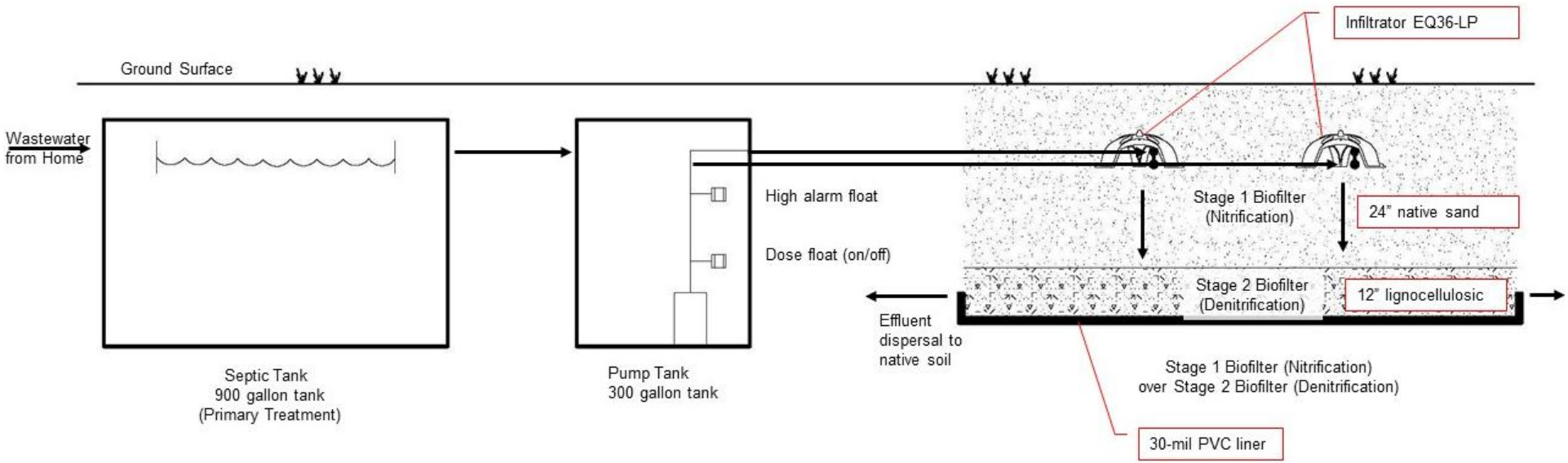


Figure 2
System Flow Schematic

2.1 Primary (Septic) Tank

The primary (septic) tank is a 900 gallon dual chamber concrete tank with a plastic manhole cover for access (Figure 3). The sewer pipe from the house was plumbed into the 4"D (diameter) inlet. Household wastewater enters the septic tank and exits as septic tank effluent (STE) through an effluent screen into the pump tank. The effluent screen is a Polylok™, PL-122 (Figure 4).

Figure 3
900 gallon, primary (septic) tank

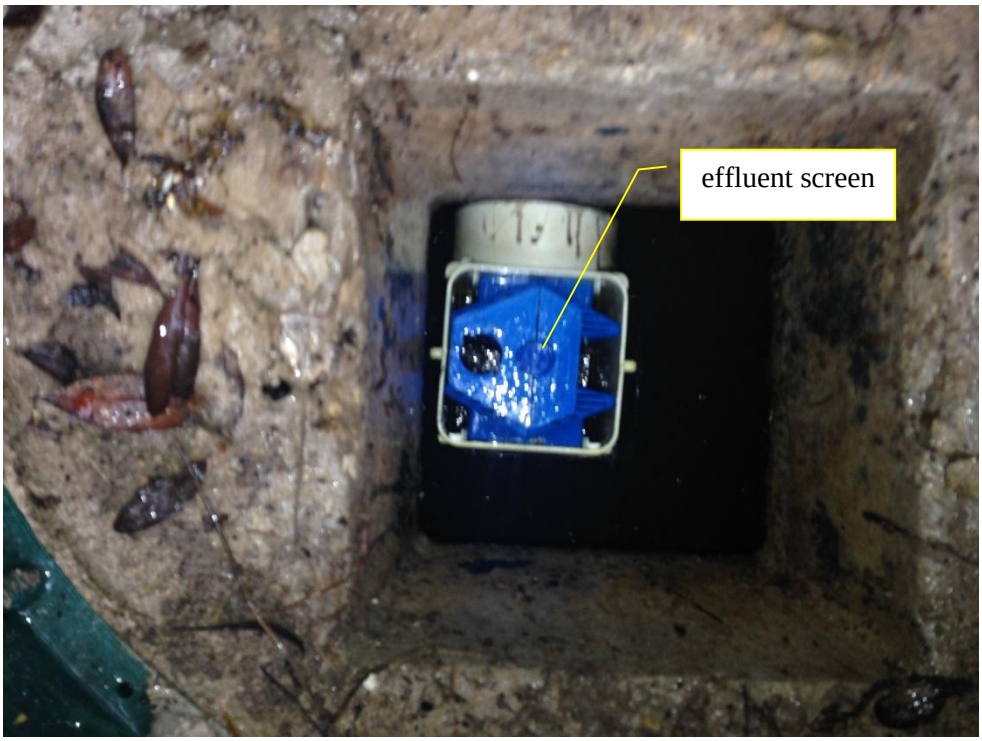


Figure 4
Primary (septic) tank effluent screen

2.1.1 Primary (Septic) Tank Maintenance

Primary (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-122 (see Appendix B) and will require annual maintenance. The effluent screen is removed from the outlet tee by grabbing it at the top and pulling up (see 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 Pump Tank

The pump tank is a 300 gallon concrete tank with one plastic manhole cover for access (see Figure 6). Septic tank effluent flows by gravity into the pump tank via the 4"D inlet. The standard outlet pipe connection was plugged since the pump discharge pipe was installed through the riser.

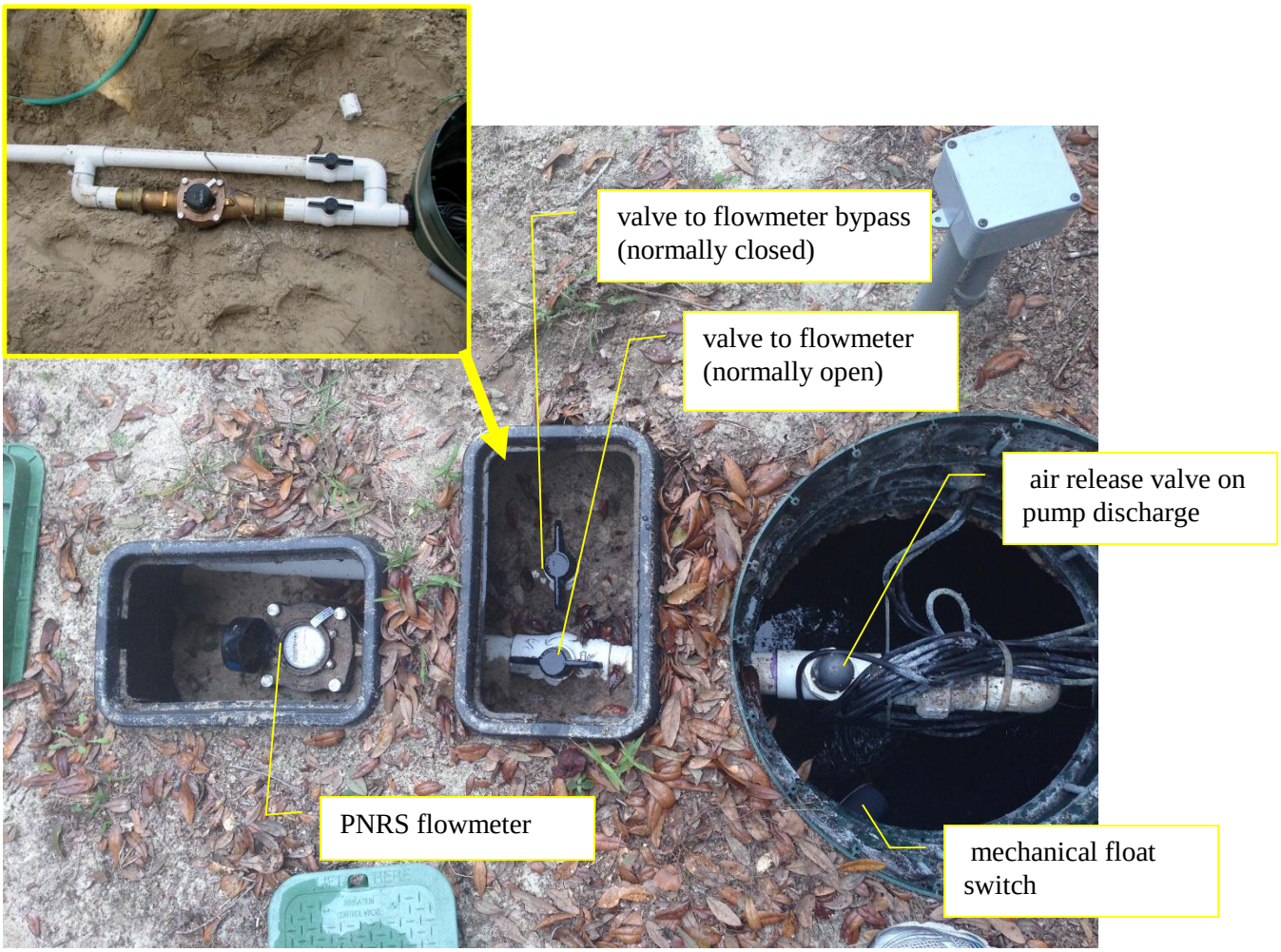


Figure 6
Pump tank and flowmeter

2.2.1 Pump Tank Maintenance

Pump 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 annually and immediately if the control panel signals a high alarm condition.

2.3 Submersible Pump

The pump tank discharge pipe is connected to the effluent submersible pump shown in Figure 7. The submersible pump is a 0.5 HP, 115V, 1 phase Liberty™ LE51A (see Appendix C).

Figure 7
Submersible Liberty™ pump

2.3.1 Pump Operation

One wide-angle piggyback float switch attached to the pump controls the effluent level in the pump tank. The height of the float is adjustable to calibrate a target dose volume. An additional float switch is connected to an audible/visual alarm (Figure 8) installed next to the power meter box to alarm for a high water level in the pump tank (pump failure).

Dose Enable (EN) Float: When the water level rises high enough to overcome the (dose enable, bottom float) the pump will activate and the low pressure distribution system is dosed. The pump will continue to run until the dose enable float drops down. The pump will remain off until the water level rises again to overcome the dose enable float.

High Level (HI) Float: If the water level rises enough to overcome the high level (top) float, the audiovisual alarm will activate. The audio portion of the alarm may be silenced

by pressing the Test-Normal-Silence switch on the high level alarm panel (see Figure 8) to the silence position. The alarm circuit will auto reset when the HI float returns to its normal (down) position. A high water level condition can be caused by pump failure, excess infiltration, or an unusually large peak water use.

Figure 8
High level alarm panel

2.3.2 Flowmeters

One inline flowmeter was installed following the pump discharge (Figure 9) with a bypass for maintenance/cleaning of the flowmeter (see Appendix D).

Figure 9
PNRS Flowmeter

2.3.3 Pump and Flowmeter Maintenance

The pump and float switches should be checked during each inspection and immediately during an alarm condition. Troubleshooting guidelines and a technical data sheet for the pump are included in Appendix C.

The pump and flowmeter should be checked to confirm that the target dose flowrate is being delivered to the low pressure distribution system. The flowmeter (Figure 9) records the cumulative pumped flow in gallons pumped from the pump tank. The flowrate during a dose can be monitored during the dose cycle with a stopwatch using the flowmeter to determine the gallons per minute (gpm). The target flowrate is approximately 60 gpm. If the dose flowrate is less than 40 gpm, then the flowmeter strainer (Appendix D) and pump screen should be checked for clogging.

The pump manual (see Appendix C) states that little or no maintenance to the pump is required other than checking for debris and/or build up which may interfere with pump or float switch operation. The float must be able to move freely through its complete travel without any restrictions.

2.4 Low Pressure Distribution Network

The 2”D pipe downstream of the flowmeter is reduced to 1.5”D in the center manifold of the low pressure distribution network (Figure 10). The manifold is connected to 4 laterals of perforated pipe (Figure 10) which distribute septic tank effluent over native sand inside 32 Infiltrator EQ36-LP™ (Figure 11) low profile chambers (8 chambers per lateral). The 1.25”D laterals were installed with 0.25-inch perforations spaced 36 inches with the holes positioned upward. When the laterals are pressurized, effluent flows out of the orifices at an even rate. Above the chambers, 12-inches of native sand cover was installed to support wheel loads of 16,000 lbs per axle per the manufacturer. This will allow the homeowner to continue to operate a small tractor in the area.

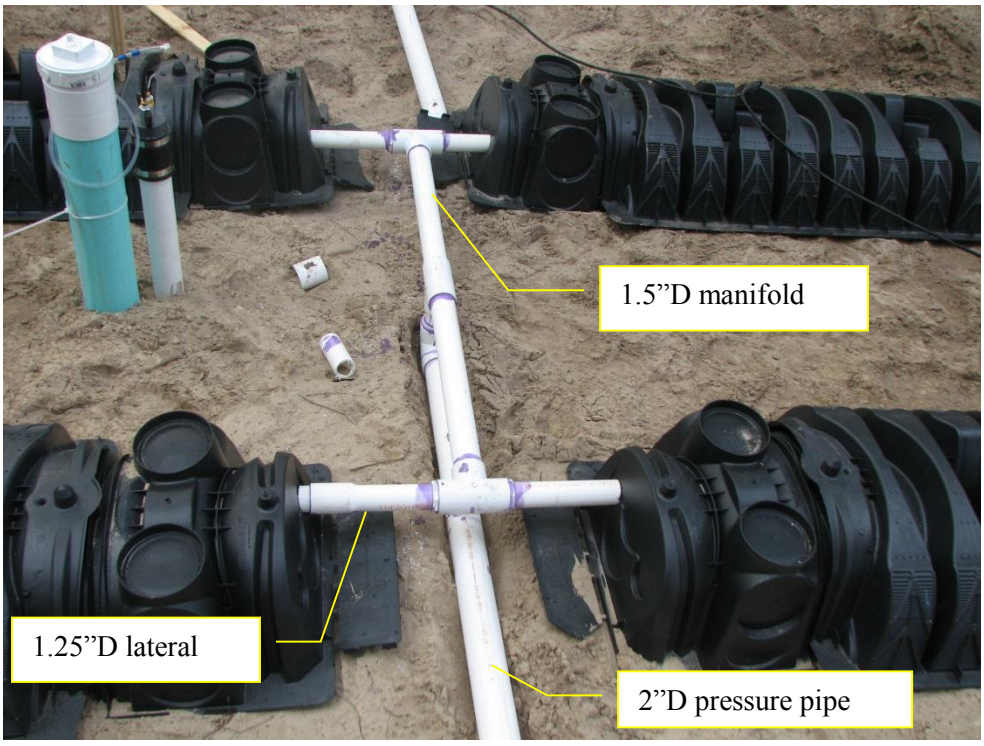


Figure 10
Center manifold of low pressure distribution network

Figure 11
Infiltrator chambers

2.4.1 Low Pressure Distribution Network Maintenance

The distribution laterals can be flushed by opening the end caps of each lateral which are installed under valve box covers (Figures 12 and 13).

Figure 12
Lateral end cap installation

Figure 13
Lateral end cap access

2.5 Stage 1 Biofilter

In the two-stage biofilter process, a first stage unsaturated biofilter is followed in series by a second stage biofilter operated in a water saturated mode. Septic tank effluent will be applied to the top of the first stage media through the low pressure distribution network, resulting in a downward percolation of wastewater over and through the media biofilter bed. The unsaturated pore spaces in the first stage 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).

2.5.1 Stage 1 Biofilter Maintenance

The Stage 1 biofilter area should be checked for soggy, saturated conditions. If soggy/saturated conditions are present, the area should be checked for lateral line failure, blow out areas, etc. Clogging of the filter surface can 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 continued ponding persists the lateral line in the area of the ponding should be investigated.

2.6 Stage 2 Biofilter

Underlying the sand is a 12-inch thick layer of Stage 2 lignocellulosic media (see Appendix E) placed above the 30 mil PVC liner (see Figure 14). The liner was installed with a 6 inch lip around the outside perimeter. Above the liner, approximately a ½-inch sand layer was installed to protect the liner during construction. The lignocellulosic media is a supplemental carbon source for denitrification, a blended urban waste wood from Wood Resource Recovery, Ocala, FL. Three observation ports (Figure 15) installed with the bottom of the port on the liner can be used to determine the water level within the lined area. To separate the top of the lignocellulosic media and bottom of the native sand layer a plastic mesh screen (1/16-inch) was installed above the lignocellulosic media.

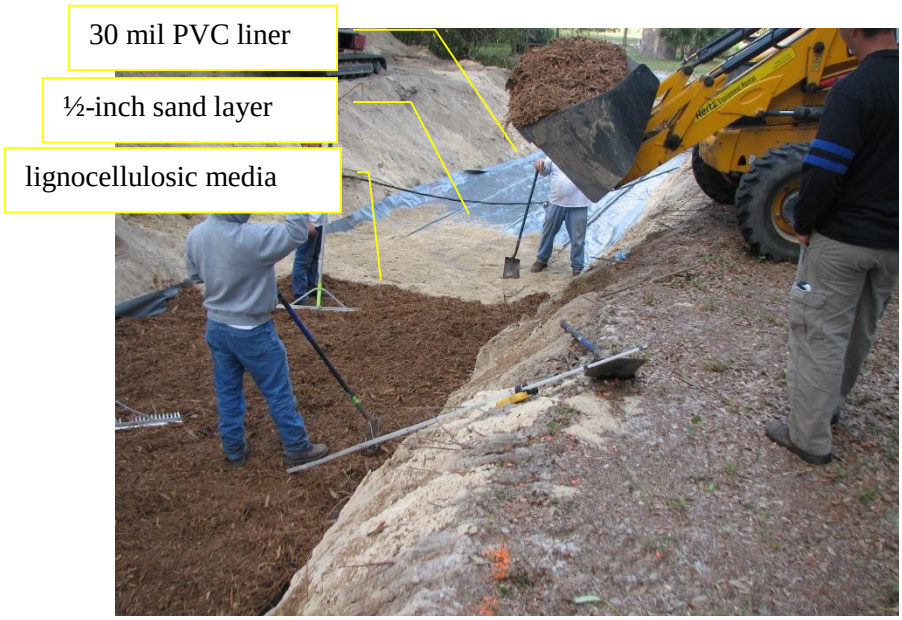


Figure 14
Lined area

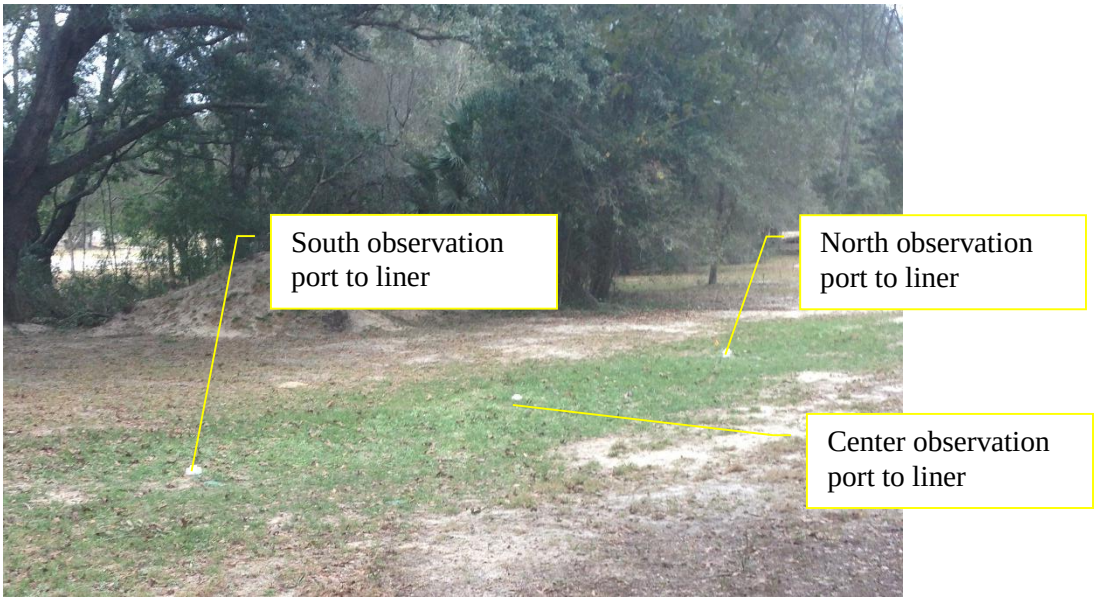


Figure 15
Observation ports for Stage 2 biofilter water level

2.6.1 Stage 2 Biofilter Maintenance

The Stage 2 biofilter should require little maintenance. The water level within the lined area should be checked. A water level higher than the liner overflow elevation (if less than 50.5 inches from the top of the observation ports) may indicate a problem in the drainfield.

2.7 Bull Run™ Diversion Valve

A Bull Run™ diversion valve (Figure 16) was installed following the septic tank outlet to allow the flow to either be completely directed to the new PNRS (to the pump tank) or to the pre-existing drainfield. A riser pipe was installed to grade over the diversion valve, so that the valve can be turned after installation is complete. The diversion valve is turned with a wrench on a rod which is long enough to reach with the riser installed. The diversion valve should be switched to the drainfield in the event of an emergency (power failure, etc.).

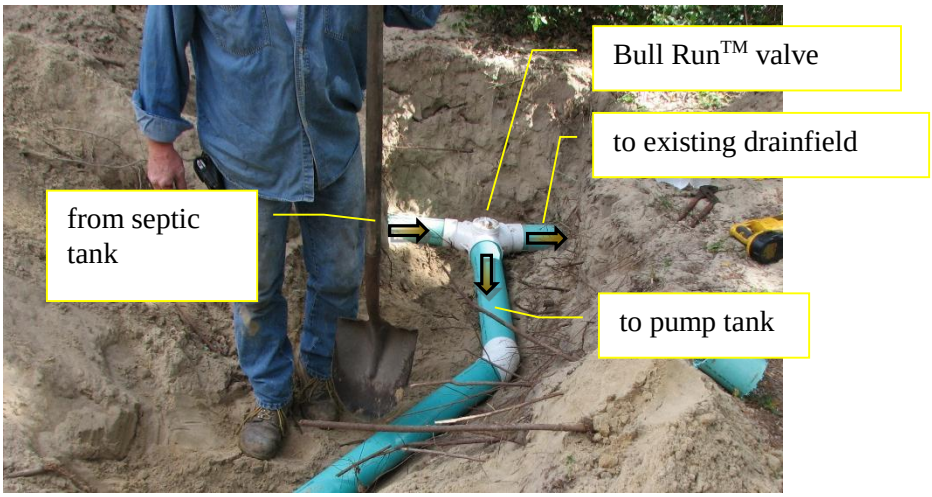


Figure 16
Bull Run™ valve

2.8 Sampling Equipment

Various types of monitoring equipment were installed as depicted in plan view (Figure 17) and cross section (Figure 18). The equipment were labeled based on the effluent sampled: Stage 1 biofilter effluent (ST1); Stage 2 biofilter effluent (ST2); treated effluent perimeter of the liner (EFF) which is based on bottom elevation (see Figure 18). The next abbreviation in the label is the type of equipment: stainless steel drivepoints (DP) and ceramic cup suction lysimeters (SL).

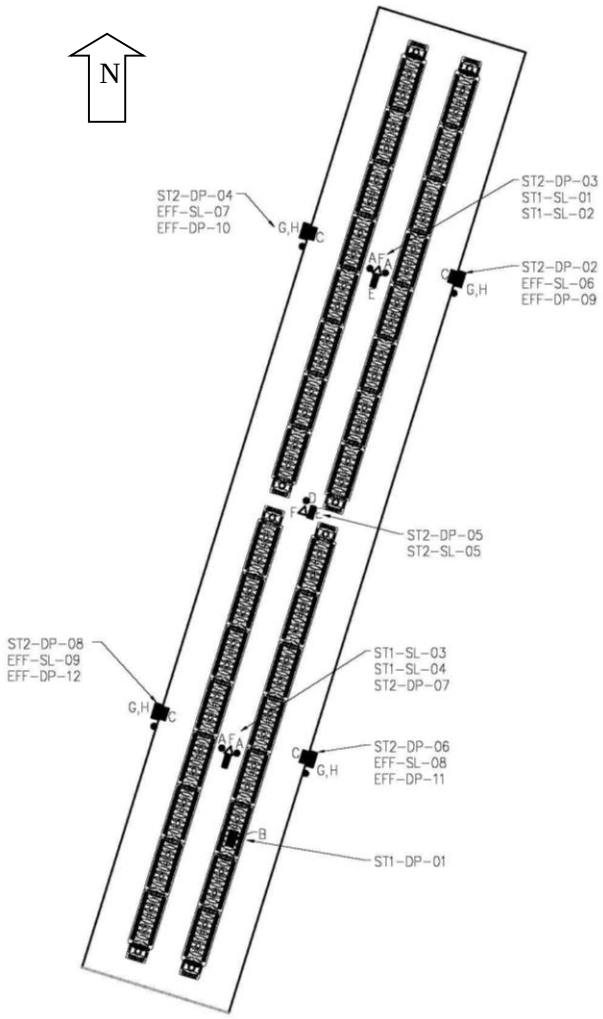
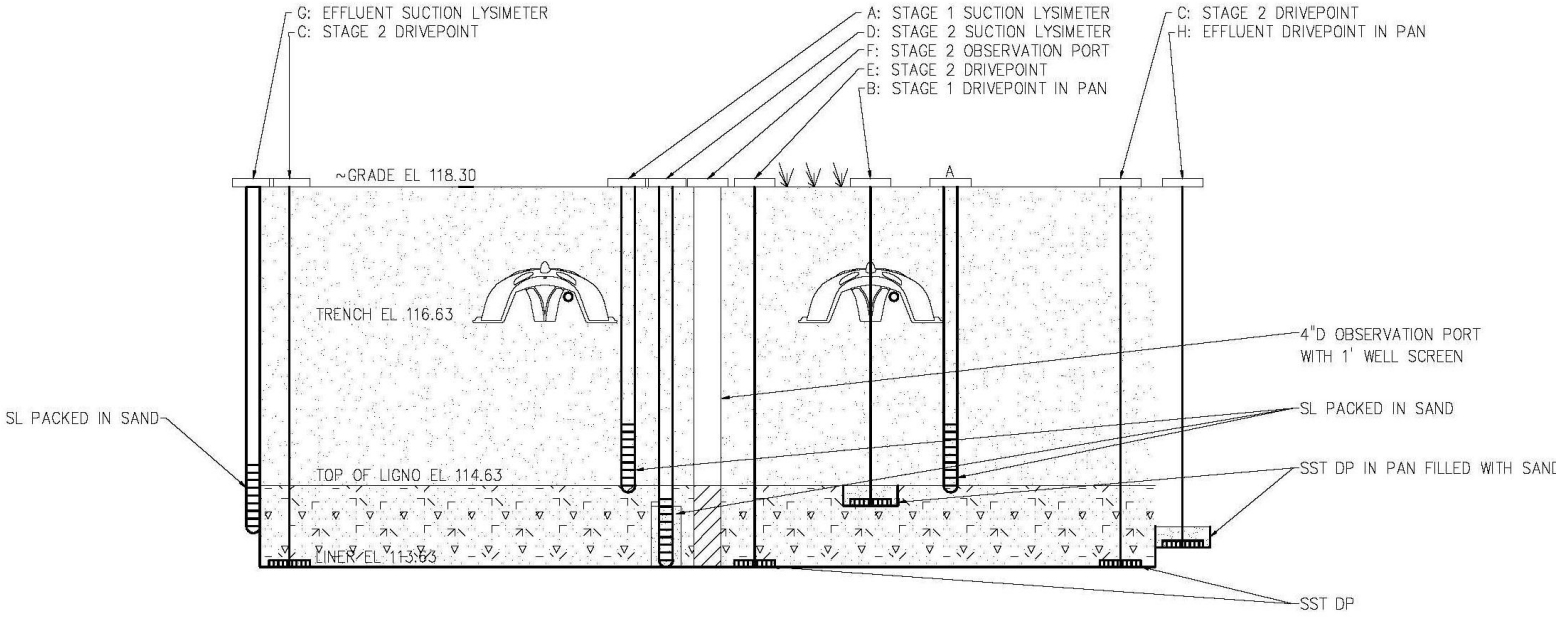


Figure 17
Plan View of Sample Equipment Locations



ID	MONITORING NETWORK SUMMARY	BOTTOM ELEV
	STE	
	(1) PUMP TANK	
	STAGE 1, NITRIFICATION	
	CENTER OF EACH TRENCH	
A	(4) SL PACKED IN SAND	114.63
B	(1) SST DP & LY IN PAN PACKED WITH SAND	114.38
	STAGE 2, DENITRIFICATION	
	EDGE OF LINED AREA	
C	(4) SST DP	113.63
	CENTER OF LINED AREA	
D	(1) SL PACKED IN SAND	113.63
E	(3) SST DP	113.63
F	(3) OBERVATION PORT TO LINER	113.63
	TREATED EFFLUENT	
	OUTSIDE LINER	
G	(4) SL	114.13
H	(4) SST DP & LY IN PAN PACKED WITH SAND	113.88

Figure 18
Cross Section of Sample Equipment Locations

3.0 Maintenance and Monitoring

The treatment system is passive and requires little maintenance. Performance verification and monitoring should be performed routinely, as required by permitting agencies. The lignocellulosic media is reactive and therefore will be consumed. The media life is currently estimated as 20+ years of operation. The lignocellulosic media source and MSDS sheets are provided in Appendix E.

4.0 Inspection Checklist

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

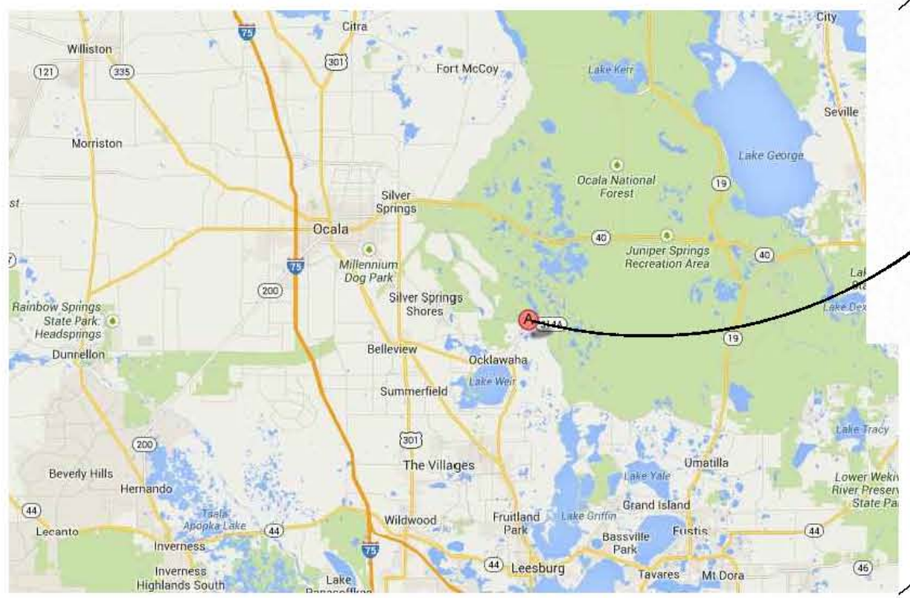
Inspection Form			
Owner:	[redacted]	Service Provider:	
Address:	[redacted]	Address:	
City, St, Zip:	Ocklawaha, FL 32179	Phone:	
Tax Map No.:	[redacted]000-00	Certification No.:	
Health Dept. ID:	42-SO-[redacted]	Date/Time:	
SYSTEM MEASUREMENTS			
Household water meter reading:			
Water use since last reading (gpd):			
SYSTEM MAINTENANCE			
Primary (septic) tank			Comments:
	effluent filter		
	Scum/sludge condition		
Pump tank			
	Scum/sludge condition		
	Flowmeter reading prior to dose:		
	Fill pump tank with water to manually initiate dose cycle		
	Flowmeter reading prior to dose:		
	Dose flowrate (target >40 gpm) =		
Stage 1 biofilter			
	Odors? Soggy, saturated or ponding?		
	biomat present in observation ports?		
Stage 2 biofilter			
	Water level check: inches below top of observation port (target >50.5 inches)		
	Water level north observation port =		
	Water level center observation port =		
	Water level south observation port =		
Repairs to system:			
Comments:			

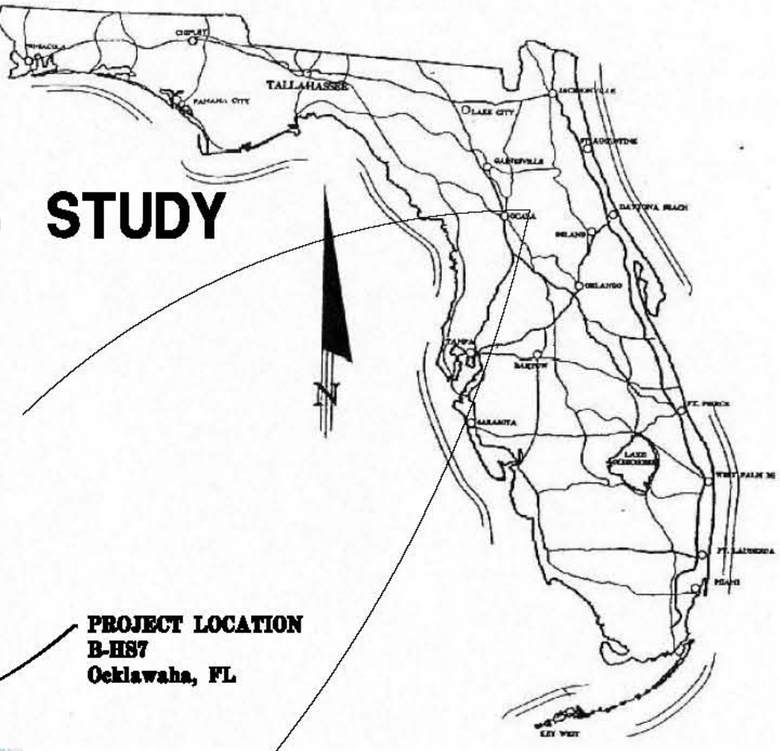
APPENDIX A
RECORD DRAWINGS

FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY
B-HS7 RECORD DRAWINGS

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	CROSS SECTIONS
5	C-4	SYSTEM FLOW DIAGRAM
6	C-5	MONITORING NETWORK





LOCATION MAP

N.T.S.

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.

HAZEN AND SAWYER
Environmental Engineers & Scientists

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

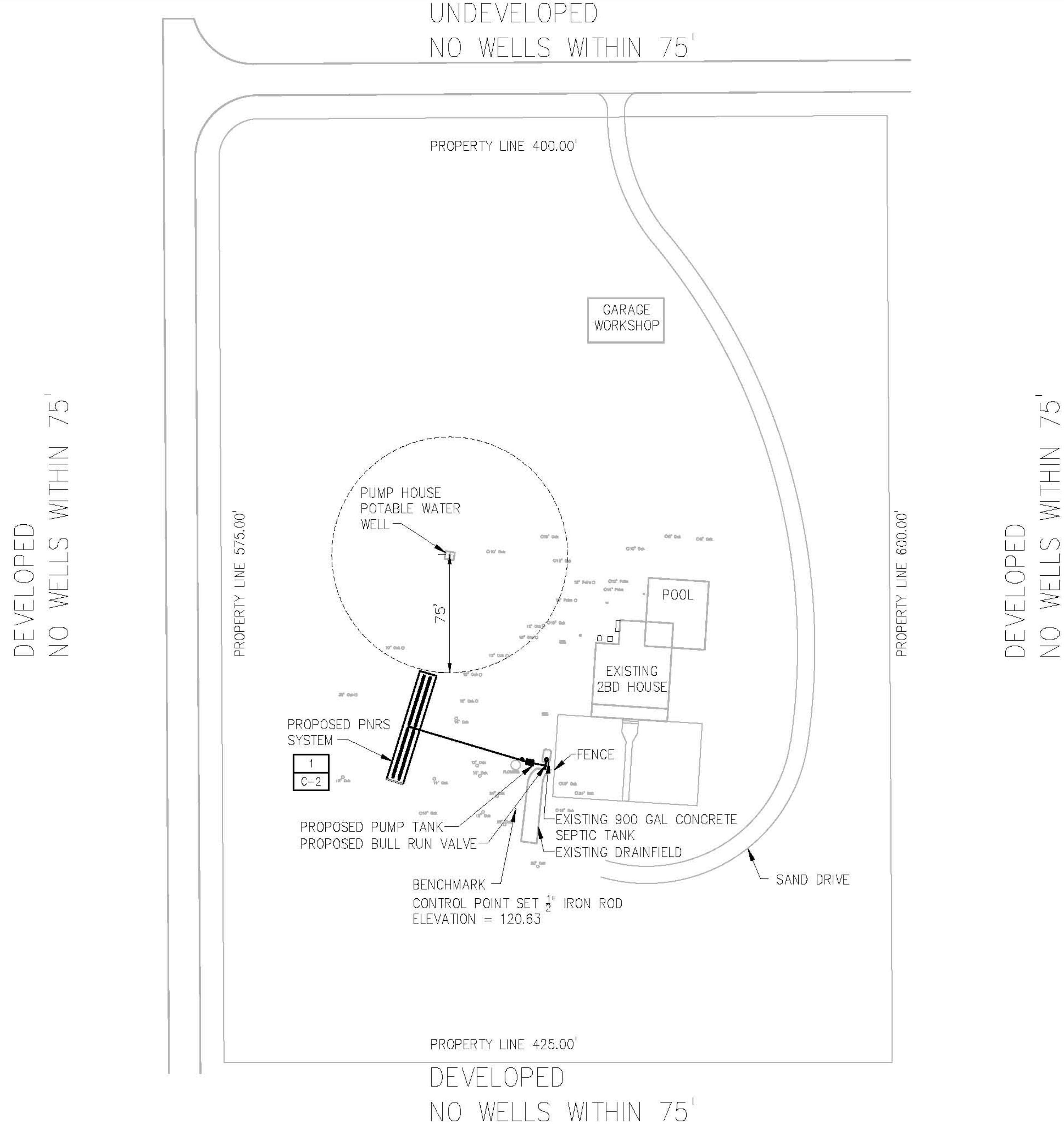
IN ASSOCIATION WITH

OTIS ENVIRONMENTAL CONSULTANTS, LLC

AET
Applied Environmental Technology

Florida HEALTH

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



PROPOSED SITE PLAN

1"=40'

1"=40'-0"   40 20 0 40'

NOTICE

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NO.	ISSUED FOR	DATE	BY
2	RECORD DRAWINGS	12/13	JEH
1	PERMIT DOCUMENTS	10/13	JEH

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

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

HAZEN AND SAWYER
Environmental Engineers & Scientists
10002 Princess Palm Avenue
Registry 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 STRATIGIES STUDY

FOSNRS SITE B-HS7
SITE PLAN

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

DATE DECEMBER 2013
H & S JOB NUMBER 44237-001
CONTRACT NUMBER CORCL
DRAWING NUMBER C-1

PLOT DATE: 12/9/2013 3:41 PM BY: JEDEBACK

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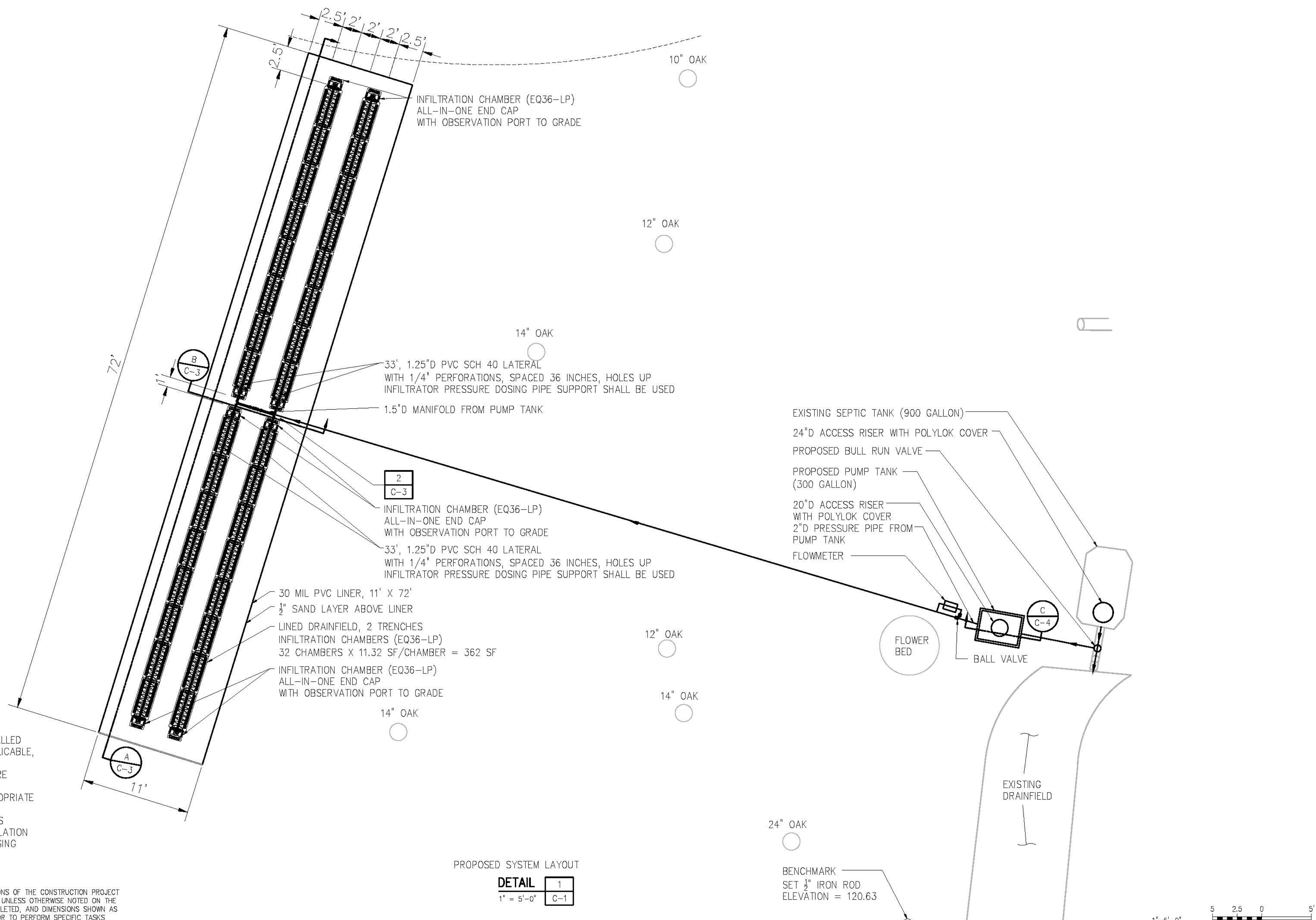

PROPOSED SYSTEM LAYOUT

DETAIL 1 / C-1

1" = 5'-0"

NOTES:

1. ALL VALVES AND FLOWMETER SHALL BE INSTALLED WITH VALVE BOX COVER, WITH RISER AS APPLICABLE, FOR ACCESS AT GROUND SURFACE.
2. ALL VALVES SHALL HAVE A MINIMUM PRESSURE RATING OF 90 PSI.
3. ALL TANK LIDS SHALL BE SEALED WITH APPROPRIATE SEALANTS TO ENSURE WATER TIGHTNESS.
4. WET-RUN PRESSURE CHECK IS REQUIRED. THIS SHOULD BE DONE PRIOR TO CHAMBER INSTALLATION WITH THE USE OF INFILTRATOR PRESSURE DOSING PIPE SUPPORT.

NOTICE

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NO.	ISSUED FOR	DATE	BY
2	RECORD DRAWINGS	12/13	JEH
1	PERMIT DOCUMENTS	10/13	JEH

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

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

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

Florida HEALTH

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 STRATIGIES STUDY

FOSNRS SITE B-HS7
PROPOSED SYSTEM LAYOUT

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

DATE DECEMBER 2013
H & S JOB NUMBER 44237-001
CONTRACT NUMBER CORCL
DRAWING NUMBER C-2

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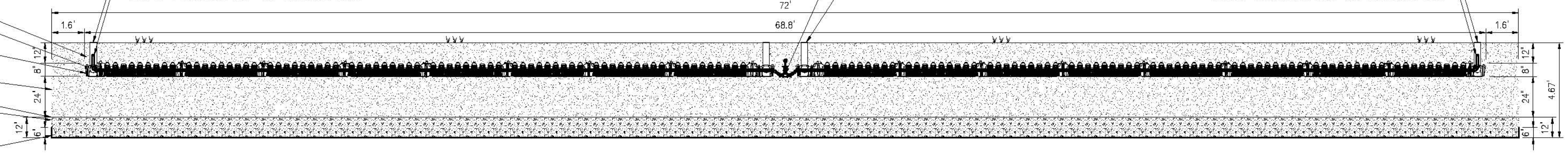
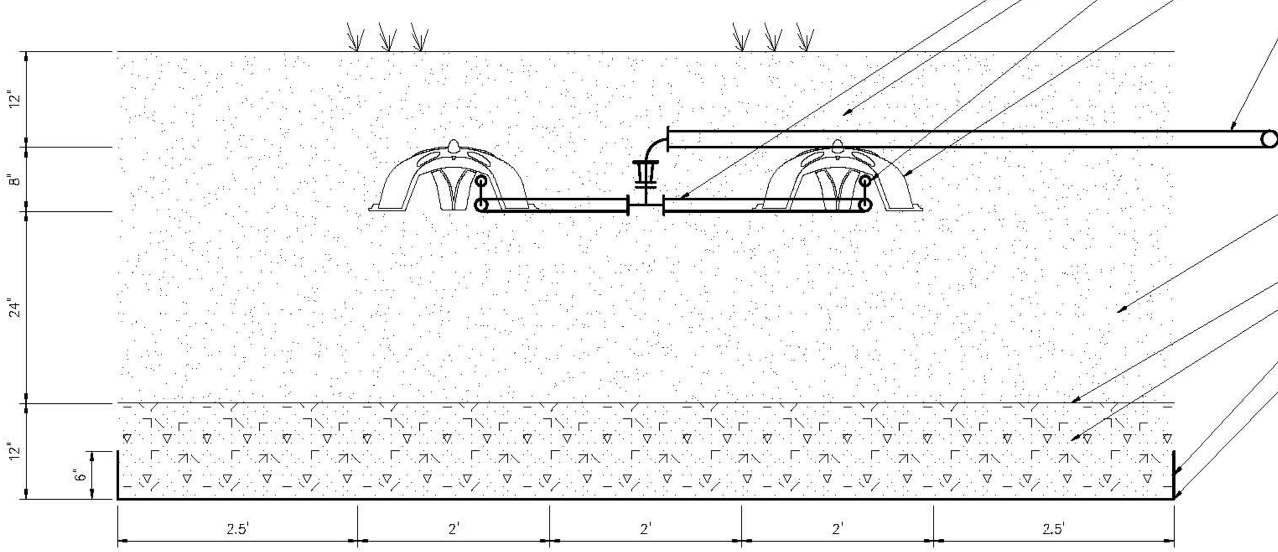


LINED DRAINFIELD

SECTION A / C-2

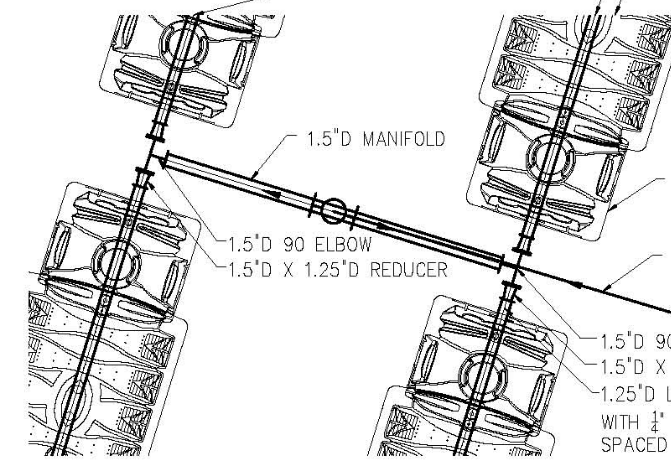
1" = 3'



LINED DRAINFIELD

SECTION B / C-2

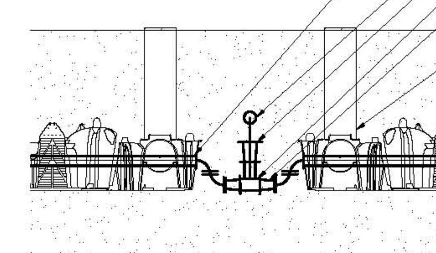
1" = 1'



CENTRAL MANIFOLD DISTRIBUTION NETWORK

DETAIL 2 / C-2

1" = 1'-0"



CENTRAL MANIFOLD DISTRIBUTION NETWORK

DETAIL 3 / –

1" = 1'-0"

1"=3'-0" — 3' 1.5 0 3'

1"=1'-0" — 12" 6 0 1'

NOTICE

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NO.	ISSUED FOR	DATE	BY
2	RECORD DRAWINGS	12/13	JEH
1	PERMIT DOCUMENTS	10/13	JEH

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

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

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

Florida HEALTH

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 STRATIGIES STUDY

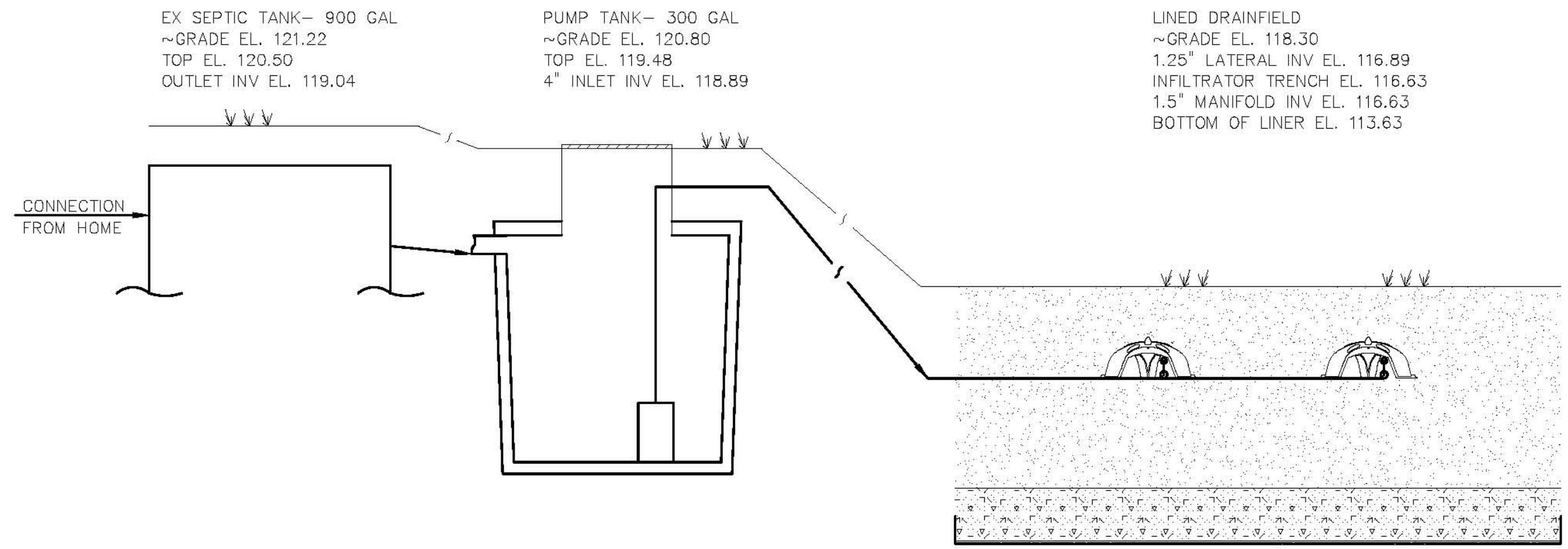
FOSNRS SITE B-HS7
CROSS SECTIONS

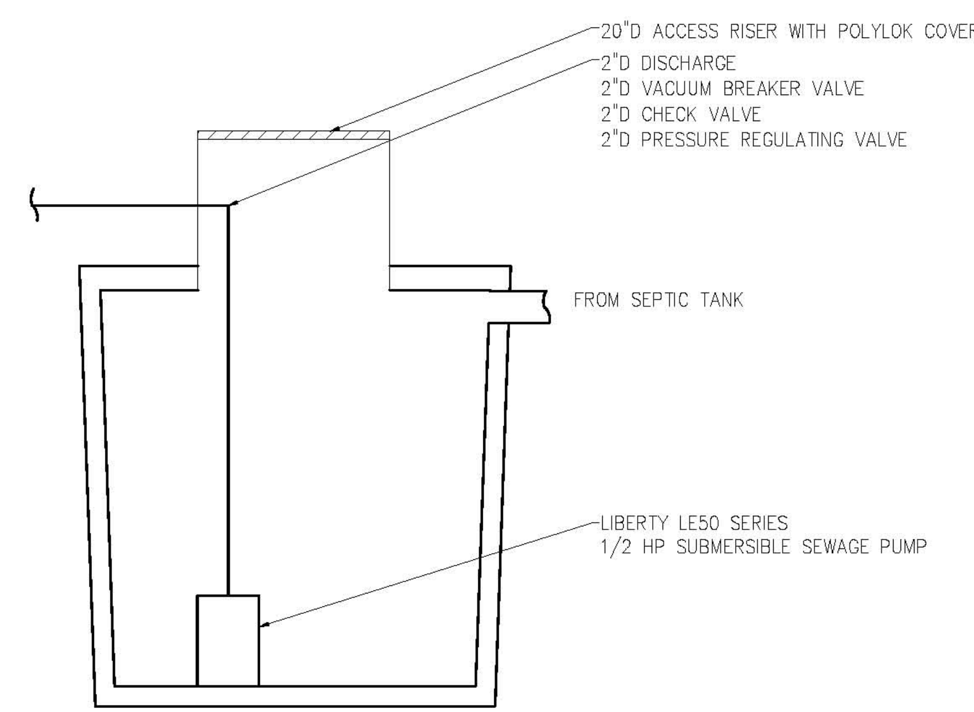
THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE DECEMBER 2013
H & S JOB NUMBER 44237-001
CONTRACT NUMBER CORCL
DRAWING NUMBER C-3

PLOT DATE: 12/9/2013 3:41 PM BY: JEDEBACK

File = O:\44237-000-TPA\44237-001\Drawings\Task B\Homesites\BHS7_15740 SE 112th Lane\Permit_drawings\BHS7_permit_drawings_recorddrawings_rev Saved by jedeback Save date = 12/8/2013 3:40 PM





PUMP TANK (300 GALLON)

SECTION C / C–2

1" = 1'

DESIGN CALCULATIONS

A. FLOW CALCULATIONS
- NUMBER OF BEDROOMS = 2
- BUILDING AREA = 2112 SF
- F.A.C. MINIMUM DESIGN FLOW = 300 GPD

B. TREATMENT DESIGN
- TRENCH ABSORPTION SURFACE, SAND = 0.80 GAL/SF–DAY = 375 SF
- INFILTRATOR CHAMBERS EQ36–LP = 32 CHAMBERS X 11.32 SF/CHAMBER = 362 SF
- LOW PRESSURE DISTRIBUTION = 4, 33 FT LATERALS
- LINED AREA = 11' X 72' = 792 SF

1'=1'–0" 12" 6 0 1'

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

JOSEFIN EDEBACK–HIRST
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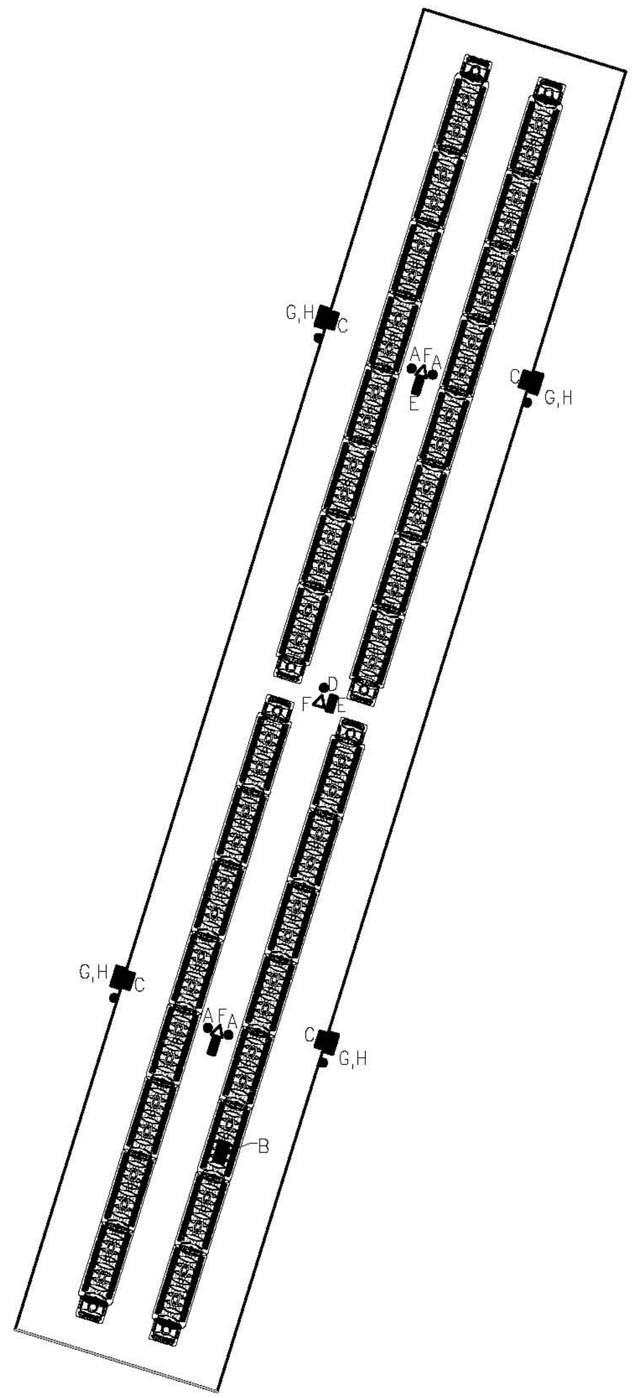
(850)-245-4070

FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATIGIES STUDY

FOSNRS SITE B–HS7
SYSTEM FLOW DIAGRAM

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

DATE DECEMBER 2013
H & S JOB NUMBER 44237–001
CONTRACT NUMBER CORCL
DRAWING NUMBER C–4

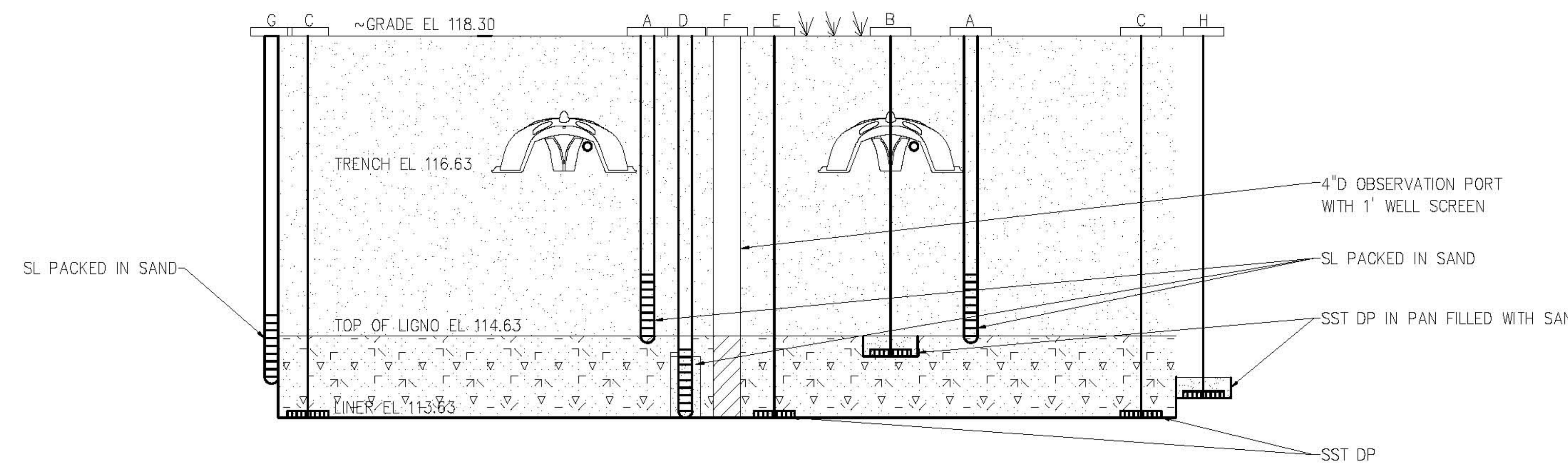


PROPOSED MONITORING NETWORK

DETAIL 1 / C-1

1" = 5'-0"

- ● 2"D SUCTION LYSIMETER (SL) PACKED IN SAND
- ▬ 6"L STAINLESS STEEL DRIVEPOINT (SST DP)
- ▣ 6"L STAINLESS STEEL DRIVEPOINT (SST DP) IN PAN
- △ 4"D OBSERVATION PORT



ID	MONITORING NETWORK SUMMARY	BOTTOM ELEV
	STE	
	(1) PUMP TANK	
	STAGE 1, NITRIFICATION	
	CENTER OF EACH TRENCH	
A	(4) SL PACKED IN SAND	114.63
B	(1) SST DP & LY IN PAN PACKED WITH SAND	114.38
	STAGE 2, DENITRIFICATION	
	CENTER OF EACH TRENCH	
C	(4) SST DP	113.63
	CENTER OF LINED AREA	
D	(1) SL PACKED IN SAND	113.63
E	(3) SST DP	113.63
F	(3) OBERVATION PORT TO LINER	113.63
	TREATED EFFLUENT	
	OUTSIDE LINER	
G	(4) SL	114.13
H	(4) SST DP & LY IN PAN PACKED WITH SAND	113.88

1"=5'-0"   5 2.5 0 5'

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FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATIGIES STUDY

FOSNRS SITE B-HS7
MONITORING NETWORK

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

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

PLOT DATE: 12/9/2013 3:41 PM BY: JEDEBACK

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APPENDIX B
EFFLUENT SCREEN

POLYLOK™ Inc.
Innovations in Precast, Drainage & Wastewater Products
Zabel® A Division of Polylok Inc.

PL-122 Effluent Filter

PL-122 Filter

The PL-122 was the original Polylok filter. It was the first filter on the market with an automatic shut-off ball installed with every filter. When the filter is removed for regular servicing, the ball will float up and prevent any solids from leaving the tank. Our patented design cannot be duplicated.

Features:

- Offers 122 linear feet of 1/16" filter slots, which significantly extends time between cleaning.
- Has a flow control ball that shuts off the flow of effluent when the filter is removed for cleaning.
- Has its own gas deflector ball which deflects solids away.
- Installs easily in new tanks, or retrofits in existing systems.
- Comes complete with its own housing. No gluing of tees or pipe, no extra parts to buy.
- Has a modular design, allowing for increased filtration.

PL-122 Installation:

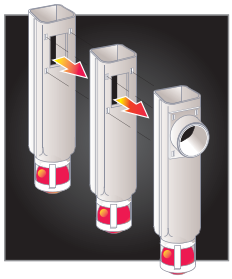
Ideal for residential waste flows up to 3,000 gallons per day (GPD). Easily installs in any new or existing 4" outlet tee.

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-122 filter into tee.
5. Replace and secure the septic tank cover.

PL-122 Maintenance:

The PL-122 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-122 cartridge 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.



Polylok offers the only filter on the market where you can get more GPD by simply snapping our filters together!

Patent Numbers
6,015,488 & 5,871,640

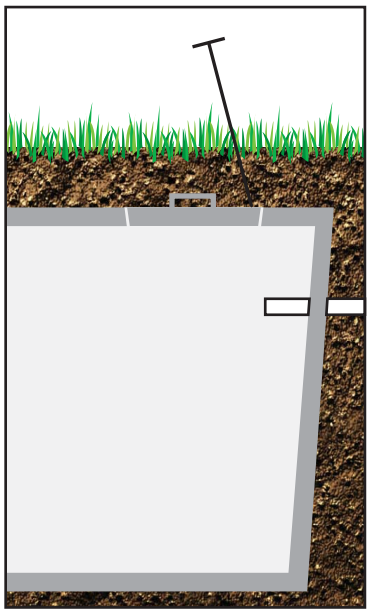
Filter Ready Adapter
Connects to Septic Tank Wall

Outdoor SmartFilter® Alarm
Polylok, Zabel & Best filters accept the SmartFilter® switch and alarm.

POLYLOK™ Inc.
Innovations in Precast, Drainage & Wastewater Products
Zabel® A Division of Polylok Inc.

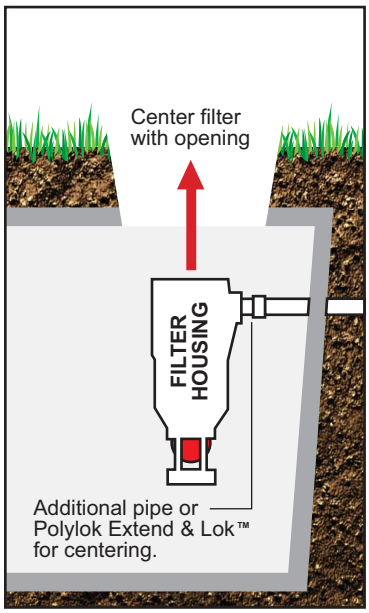
INSTALLATION INSTRUCTIONS
PL-122/PL-525/PL-625 FILTER

INSTALLATION INSTRUCTIONS

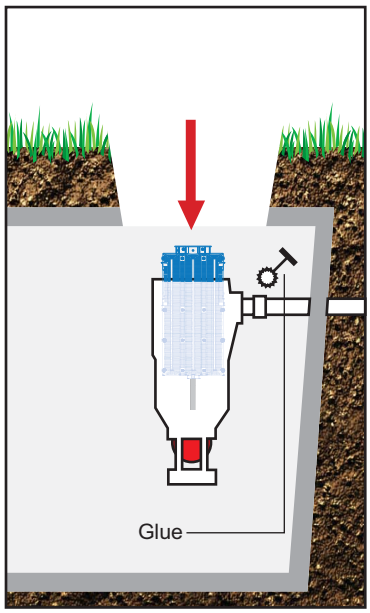


Step 1:
(A) Locate the outlet of the septic tank.
(B) Remove tank cover and pump tank if necessary.

NSF Certified to NSF/ANSI Standard 46 1/8”

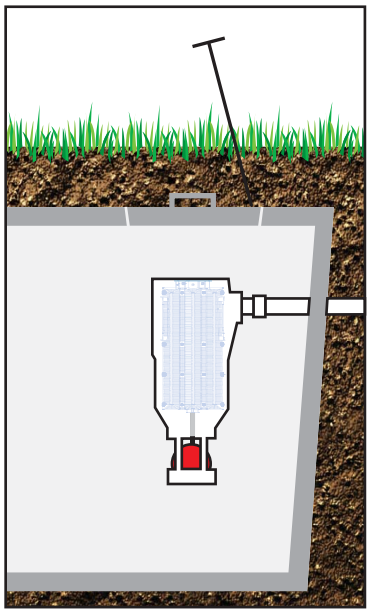


Step 2:
(A) Before installation, place the filter housing on to the outlet pipe.
(B) Make sure that the housing is positioned so the filter can be removed from the tank for maintenance and service.



Step 3:
(A) Glue the filter housing on the outlet pipe.
(B) Insert the filter cartridge in the housing, making sure the filter cartridge is properly aligned and completely inserted in the housing.

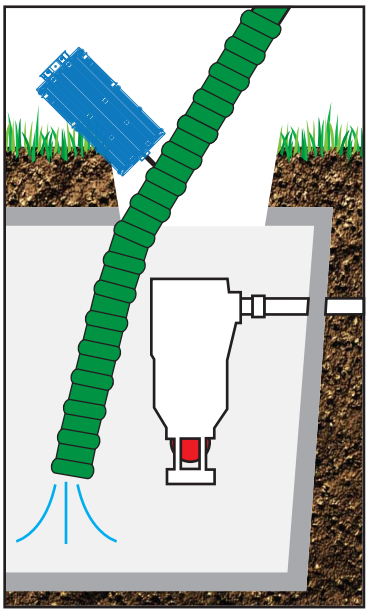
MAINTENANCE INSTRUCTIONS



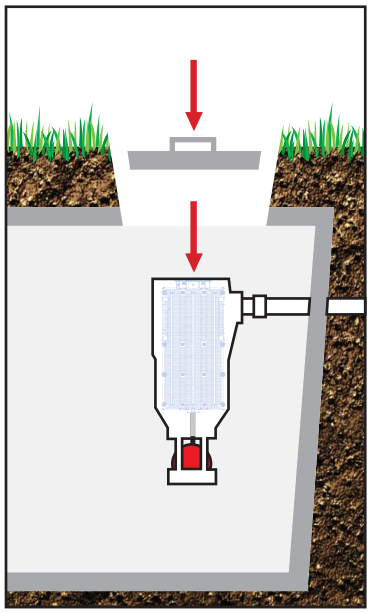
Step 1:
Locate the outlet of the septic tank.

DO NOT USE PLUMBING WHEN FILTER IS REMOVED

USE RUBBER GLOVES WHEN CLEANING FILTER



Step 2:
(A) Remove tank cover and pump if necessary.
(B) Pull the filter out of the housing.
(C) Hose off the filter over the septic tank. Make sure all solids fall back into the septic tank.



Step 3:
(A) Insert the filter cartridge back into the the housing making sure the filter is properly alighed and completely inserted.
(B) Replace septic tank cover

Polylok, Inc. 3 Fairfield Blvd. Wallingford, CT 06492 Toll Free: 877.765.9565 Fax: 203.284.8514 www.polylok.com

POLYLOK™ Inc.
Innovations in Precast, Drainage & Wastewater Products
Zabel® A Division of Polylok Inc.

INSTALLATION INSTRUCTIONS
PL-525/PL-625 FILTER

PL-122/PL-525/PL-625 FEATURES & BENEFITS

PL-625 PL-525 PL-625

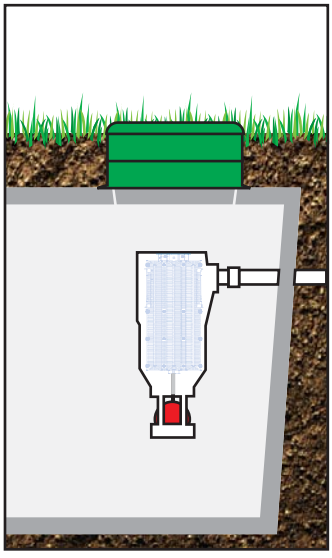
The PL-122/PL-525/625 Effluent Filter should operate efficiently for several years under normal conditions before requiring cleaning. It is recommended that the filter be cleaned every time the tank is pumped or at least every three years. If the installed filter contains an optional alarm, the owner will be notified by an alarm when the filter needs servicing. Servicing should be done by a certified septic tank pumper or installer.

Features & Benefits:

Certified to NSF/ANSI Standard 46
1/8”

- Rated for 10,000 GPD
- PL-122 = 122 Linear Feet of 1/16” Filtration
  PL-525 = 525 Linear Feet of 1/18” Filtration
  PL-625 = 625 Linear Feet of 1/32” Filtration
- Accepts 4” and 6” SCHD. 40 pipe
- Built in Gas Deflector
- Automatic Shut-Off Ball when Filter is Removed
- Alarm Accessibility
- Accepts PVC Extension Handle

RECOMMENDED PRODUCTS



Risers & Riser Covers

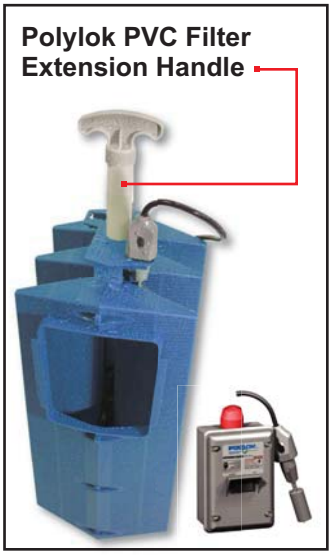
Polylok risers bring your septic tank cover to grade. This allows locating and servicing your filter easier and time saving by elimi-nating digging to find tank entrance.

Extend & Lok™

Polylok Extend & Lok™ is a simple, easy to use solution that can extend the inlet or outlet pipe and make filter and/or baffle installation a snap.
Fits 3” and 4” pipe.

Riser Safety Screens

Polylok safety screens prevent tragic accidents from happening by children and pets falling into open septic tank entrances.



Filter Alarm Panel and SmartFilter™ Control Switch

Polylok filter alarm panels and switchs provid a visual and audible notification of impending filter and tank servicing.

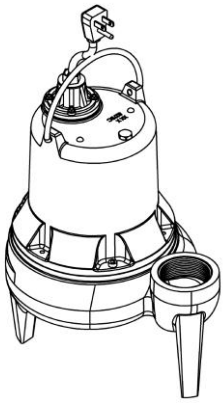
For a full list of Polylok products please visit our web site at: **www.polylok.com**

Polylok, Inc. 3 Fairfield Blvd. Wallingford, CT 06492 Toll Free: 877.765.9565 Fax: 203.284.8514 www.polylok.com

APPENDIX C

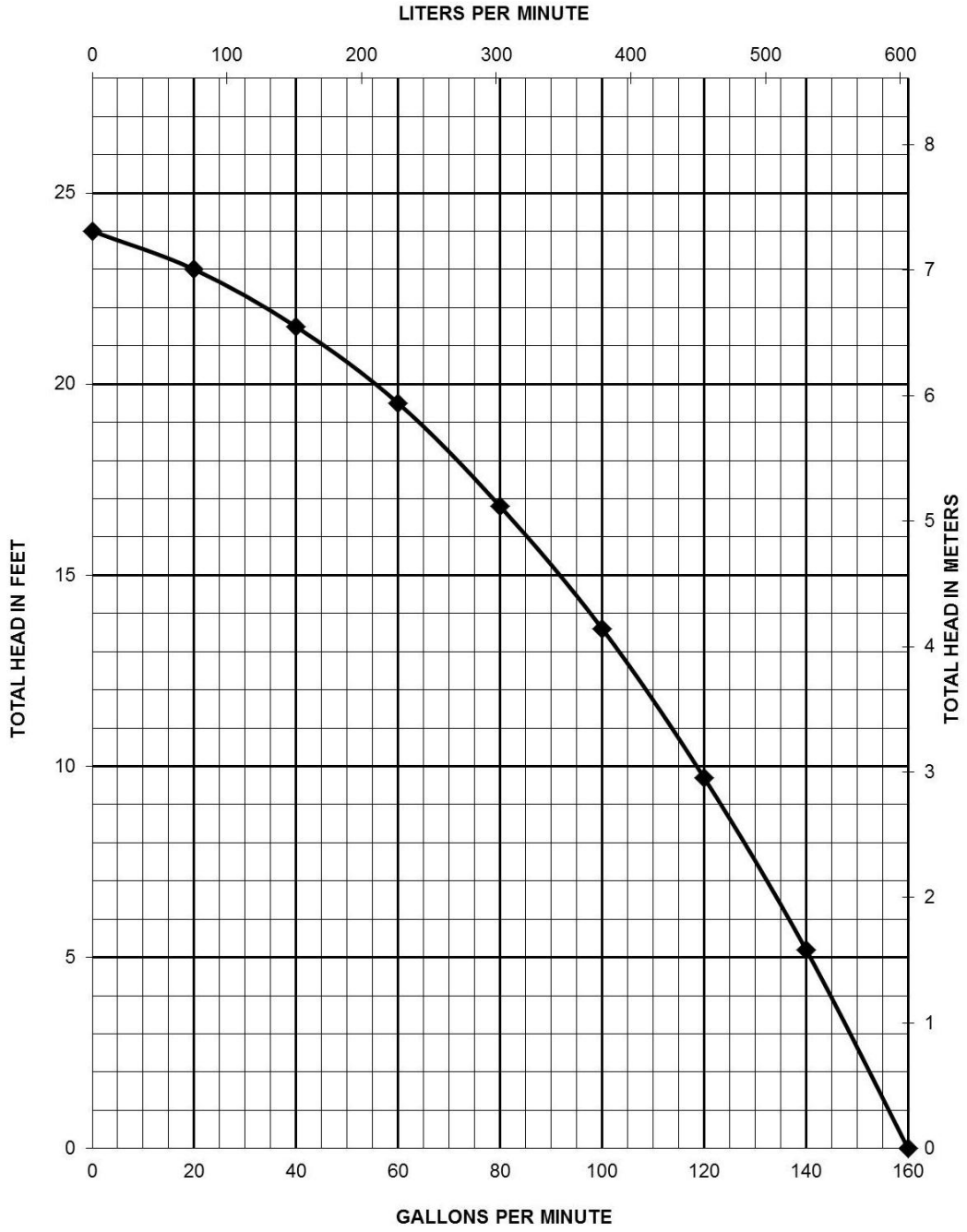
PUMP

Liberty Pumps®



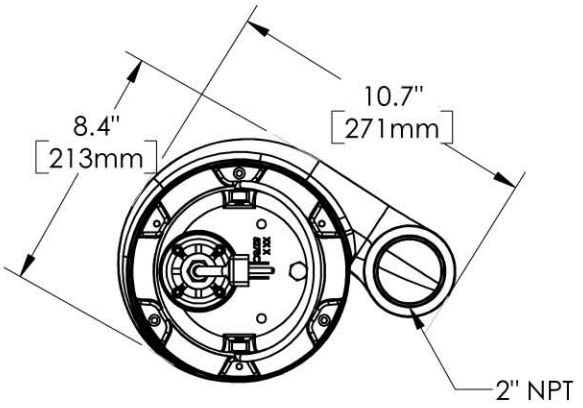
Pump Specifications

LE50 Series
½ HP Submersible Sewage Pump

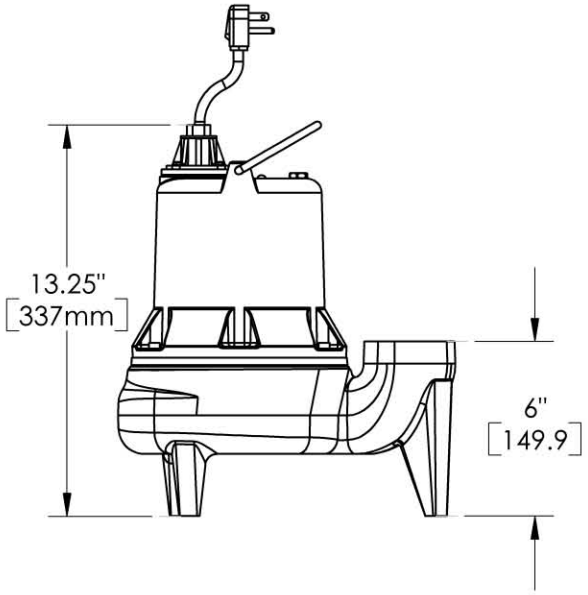


Liberty Pumps®

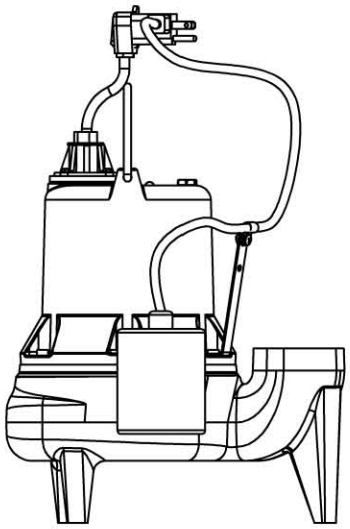
LE50-Series Dimensional Data



CORDS - 230V, OR 115V



PIGGY BACK - AUTOMATIC VERSION



APPLICATION | DO NOT SCALE DRAWING

DWG. NO.
LE50 SERIES DIMENSIONAL

SIZE A | NOVEMBER 14 / 2006 | REV. A

SCALE:1:5 | WEIGHT: 43 LBS | SHEET 1 OF 1

LE50-Series Electrical Data

MODEL	HP	VOLTAGE	PHASE	SF	FULL LOAD AMPS	LOCKED ROTOR AMPS	THERMAL OVERLOAD TEMP	STATOR WINDING CLASS	CORD LENGTH FT	DISCHARGE	AUTOMATIC
LE51A	1/2	115	1	1.00	12	22.5	105˚C 221°F	B	10	2"	YES
LE51A -2	1/2	115	1	1.00	12	22.5	105˚C 221°F	B	25	2"	YES
LE51M	1/2	115	1	1.00	12	22.5	105˚C 221°F	B	10	2"	NO
LE51M-2	1/2	115	1	1.00	12	22.5	105˚C 221°F	B	25	2"	NO
LE52A	1/2	208-230	1	1.00	6.8	12	105˚C 221°F	B	10	2"	YES
LE52A-2	1/2	208-230	1	1.00	6.8	12	105˚C 221°F	B	25	2"	YES
LE52M	1/2	208-230	1	1.00	6.8	12	105˚C 221°F	B	10	2"	NO
LE52M-2	1/2	208-230	1	1.00	6.8	12	105˚C 221°F	B	25	2"	NO

LE50-Series Technical Data

IMPELLER	2 VANE ENGINEERED THERMOPLASTIC ELASTOMER 2” SOLIDS HANDLING
SOLIDS HANDLING SIZE	2”
PAINT	POWDER COAT
MAX LIQUID TEMP	60˚C 140˚F
MAX STATOR TEMP	130˚C 266˚F
THERMAL OVERLOAD	105˚C 221˚F
POWER CORD TYPE	SJTW
MOTOR HOUSING	CLASS 25 CAST IRON
VOLUTE	CLASS 25 CAST IRON
SHAFT	STAINLESS
HARDWARE	STAINLESS
ORINGS	BUNA N
MECHANICAL SEAL	UNITIZED CERAMIC CARBON
WEIGHT	43 LBS

LE50-Series Specifications

1.01 GENERAL:

The contractor shall provide labor, material, equipment, and incidentals required to provide_____(QTY) centrifugal pumps as specified herein. The pump models covered in this specification are Series LE50 single phase pumps. The pump furnished for this application shall be model _____as manufactured by Liberty pumps.

2.01 OPERATING CONDITIONS:

Each submersible pump shall be rated at 1/2 hp_____volts, single phase, 60 Hz. 1725 RPM. The unit shall produce_____G.P.M. at _____ feet of total dynamic head.

The submersible pump shall be capable of handling residential sewage with 2" solid handling capability. The submersible pump shall have a shut-off head of 24 feet and a maximum flow of 141 GPM @ 5 feet of total dynamic head.

The pump shall be controlled with:

_____A piggy back style on/off float switch.

_____A NEMA 4X outdoor simplex control panel with three float switches and a high water alarm.

_____A NEMA 1 indoor simplex control panel with three float switches and a high water alarm.

_____A NEMA 4X outdoor duplex control panel with three float switches and a high water alarm.

_____A NEMA 1 indoor duplex control panel with three float switches and a high water alarm.

_____A NEMA 4X outdoor duplex control panel with four float switches and a high water alarm.

_____A NEMA 1 indoor duplex control panel with four float switches and a high water alarm.

3.01 CONSTRUCTION:

Each centrifugal sewage pump shall be equal to the C US certified Series LE50 SERIES pumps as manufactured by Liberty Pumps, Bergen NY. The castings shall be constructed of class 25 cast iron. The motor housing shall be oil filled to dissipate heat. Air filled motors shall not be considered equal since they do not properly dissipate heat from the motor. All mating parts shall be machined and sealed with a Buna-N o-ring. All fasteners exposed to the liquid shall be stainless steel. The motor shall be protected on the top side with sealed cord entry plate with molded pins to conduct electricity eliminating the ability of water to enter internally through the cord. The motor shall be protected on the lower side with a unitized ceramic/carbon seal with stainless steel housings and spring. The pump shall be furnished with stainless steel handle.

4.01 ELECTRICAL POWER CORD

The submersible pump shall be supplied with 10 or 25 feet of multiconductor power cord. It shall be cord type SJTW, capable of continued exposure to the pumped liquid. The power cord shall be sized for the rated full load amps of the pump in accordance with the National Electric Code. The power cable shall not enter the motor housing directly but will conduct electricity to the motor by means of a water tight compression fitting cord plate assembly, with molded pins to conduct electricity. This will eliminate the ability of water to enter internally through the cord, by means of a damaged or wicking cord.

5.01 MOTORS

Single phase motors shall be oil filled, permanent split capacitor, class B insulated NEMA B design, rated for continuous duty. At maximum load the winding temperature shall not exceed 130 degrees C unsubmerged. Since air filled motors are not capable of dissipating heat they shall not be considered equal. The pump motor shall have an integral thermal overload switch in the windings for protecting the motor. The capacitor circuit shall be mounted internally in the pump.

6.01 BEARINGS AND SHAFT

An upper and lower ball bearing are required. Both bearings shall be permanently lubricated by the oil, which fills the motor housing. The motor shaft shall be made of 300 or 400 series stainless steel and have a minimum diameter of .50".

7.01 SEALS

The pump shall have a unitized carbon / ceramic seal with stainless steel housings and spring equal to Crane Type 6A. The motor plate / housing interface shall be sealed with a Buna-N o-ring.

8.01 IMPELLER

The impeller shall be engineered thermoplastic elastomer, with pump out vanes on the back shroud to keep debris away from the seal area. It shall be threaded to the motor shaft.

9.01 CONTROLS

All units can be supplied with CSA and UL approved automatic wide angle tilt float switches. The switches shall be equipped with piggy back style plug that allows the pump to be operated manually without the removal of the pump in the event that a switch becomes inoperable. Manual Pumps are operable by means of a pump control panel.

10.01 PAINT

The exterior of the casting shall be protected with Powder Coat paint.

11.01 SUPPORT

The pump shall have cast iron support legs, enabling it to be a free standing unit. The legs will be high enough to allow 2” solids to enter the volute.

12.01 SERVICEABILTY

Components required for the repair of the pump shall be shipped within a period of 24 hours.

13.01 FACTORY ASSEMBLED TANK SYSTEMS WITH GUIDE RAIL AND QUICK DISCONNECT DISCHARGE

_____Guide factory mounted rail system with pump suspended by means of bolt on quick disconnect which is sealed by means of nitrile grommets or o-rings. The Discharge piping shall be schedule 80 PVC and furnished with a check valve and PVC shut-off ball valve. The Tank shall be wound fiberglass or roto-molded plastic. An inlet hub shall be provided with the fiberglass systems.

_____Stainless steel Guide Rail

_____Zinc plated steel Guide Rail

_____"diameter of basin size

_____"height of basin size

_____"distance from top of tank to discharge pipe outlet

_____Fiberglass cover

_____Structural foam polymer cover

_____Steel cover

_____Simplex System with Outdoor panel and alarm

_____Duplex System with Outdoor panel and alarm

_____Simplex System with Indoor panel and alarm

_____Duplex System with Indoor panel and alarm

_____Separate Outdoor Alarm

_____Remote Outdoor Alarm

14.01 TESTING

The pump shall have a ground continuity check and the motor chamber shall be Hi-potted to test for electrical integrity, moisture content and insulation defects. The motor and volute housing shall be pressurized, and an air leak decay test is performed to ensure integrity of the motor housing. The pump shall be run, voltage current monitored, and the tester checks for noise or other malfunction.

15.01 QUALITY CONTROL

The pump shall be manufactured in an ISO 9001 certified Facility.

16.01 WARRANTY

Standard limited warranty shall be 3 years.

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Installation Manual

7035000M

Heavy Duty Submersible Effluent/Dewatering Pumps

***Do not throw away or lose this manual.**

Models

250-Series	1/3 HP
280-Series	1/2 HP
290-Series	3/4 HP
FL30-Series	1/3 HP
FL50-Series	1/2 HP
FL60-Series	6/10 HP
FL70-Series	3/4 HP
FL100-Series	1 HP
FL150-Series	1-1/2 HP
FL200-Series	2 HP

Contents

- General Information
- Dewatering/Sump Applications
- Effluent Applications
- Electrical Service and Operation
- Maintenance and Troubleshooting
- Warranty

IMPORTANT:

Prior to installation, record Model, Serial Number, and Code Number from pump nameplate for future reference.

MODEL _____

SERIAL _____

CODE _____

INSTALLATION DATE _____

7000 Apple Tree Avenue
Bergen, NY 14416
Phone: (800) 543-2550
Fax: (585) 494-1839
www.libertypumps.com

1. General Information

Before Installation, read the following instructions carefully. Each Liberty pump is individually factory tested to assure proper performance. By closely following these instructions, potential operating problems should be eliminated, providing years of trouble-free service.

⚠ WARNING

- **Risk of electric shock**. Always disconnect the pump from the power source before handling or making adjustments.
- The electrical connections and wiring for a pump installation should only be made by qualified personnel.
- This pump is supplied with a grounding conductor and grounding-type attachment plug. To reduce the risk of electric shock, be certain that it is connected only to a properly grounded receptacle.
- Always wear rubber boots when water is on the floor and you must unplug the pump.
- DO NOT bypass grounding wires or remove ground prong from attachment plugs.
- DO NOT use an extension cord.
- Always use a replacement power cord assembly of the same length and type as originally installed on the Liberty product. Using a cord of improper gauge or length may lead to exceeding the electrical rating of the cord and could result in death, injury, fire or other significant failure.
- This pump requires a separate, properly fused and grounded branch circuit. Make sure the power source is properly sized for the voltage and amperage requirements of the pump, as noted on the nameplate.
- The electrical outlet shall be within the length limitations of the pump power cord, and at least 4 feet above floor level to minimize possible hazards from flood conditions.
- The installation must be in accordance with the National Electric Code, Uniform Plumbing Code, International Plumbing Code, as well as all applicable local codes and ordinances.
- Sump and sewage pumps often handle materials which could cause illness or disease. Wear adequate protective clothing when working on a used pump or piping.
- Never enter a pump basin after it has been used. Sewage and effluent can emit several gases which are poisonous.
- Keep clear of suction and discharge openings. To prevent injury, never insert fingers into pump while it is plugged in.
- DO NOT use this product for flammable or corrosive liquid.
- DO NOT use this product in applications where human contact with the pumped fluid is common (such as swimming pools, fountains, etc.)
- NEVER dispose of materials such as paint thinner or other chemicals down drains, as they can chemically attack and damage pump components, potentially causing product malfunction or failure.

⚠ CAUTION

- **DO NOT use pumps in water over 140°F (60°C).**
- DO NOT use pumps in mud, sand, cement, oil or chemicals.
- DO NOT modify the pump in any way.
- DO NOT lift or carry pump by power cord.
- DO NOT remove any tags from pump or cords.
- If pump is installed during construction before power is available, it must be protected from the environment to prevent water from entering through the cord plug end, etc.

Tools Required:

- Pipe wrench
- Regular screw driver
- Hacksaw (For replacement or removal of existing rigid piping.)

Removal of old pump

⚠ WARNING Disconnect old pump from power source before handling.

Separate the discharge pipe at either the check valve or at the union. If neither a check valve nor a union is part of the existing discharge pipe, cut the pipe with a hacksaw and remove the pump (A union or check valve will need to be installed at this cut).

MODEL SPECIFICATIONS

Model	HP	Volts	Full Load Amps	Solids Handling	Automatic or Manual	Shut-off Head	Factory Switch Setting	
							Turn-on	Turn-off
250*	1/3	115	5.2	1/2”	Manual*	22 ft.	*	*
251	1/3	115	5.2	1/2”	Automatic	22 ft.	11”	4-1/2”
253	1/3	115	5.2	1/2”	Automatic	22 ft.	11”	4-1/2”
257	1/3	115	5.2	1/2”	Automatic	22 ft.	7”	3-1/2”
250HV*	1/3	230	2.6	1/2”	Manual*	22 ft.	*	*
251HV	1/3	230	2.6	1/2”	Automatic	22 ft.	11”	4-1/2”
257HV	1/3	230	2.6	1/2”	Automatic	22 ft.	7”	3-1/2”
280*	1/2	115	8.0	3/4”	Manual*	37 ft.	*	*
281	1/2	115	8.0	3/4”	Automatic	37 ft.	13”	7”
283	1/2	115	8.0	3/4”	Automatic	37 ft.	13”	7”
287	1/2	115	8.0	3/4”	Automatic	37 ft.	9-1/2”	4”
280HV*	1/2	208-230	4.0	3/4”	Manual*	37 ft.	*	*
281HV	1/2	208-230	4.0	3/4”	Automatic	37 ft.	13”	7”
283HV	1/2	208-230	4.0	3/4”	Automatic	37 ft.	13”	7”
287HV	1/2	208-230	4.0	3/4”	Automatic	37 ft.	9-1/2”	4”
290*	3/4	115	10.4	3/4”	Manual*	48 ft.	*	*
291	3/4	115	10.4	3/4”	Automatic	48 ft.	13”	7”
293	3/4	115	10.4	3/4”	Automatic	48 ft.	13”	7”
297	3/4	115	10.4	3/4”	Automatic	48 ft.	9-1/2”	4”
290HV*	3/4	208-230	5.3	3/4”	Manual*	48 ft.	*	*
291HV	3/4	208-230	5.3	3/4”	Automatic	48 ft.	13”	7”
293HV	3/4	208-230	5.3	3/4”	Automatic	48 ft.	13”	7”
297HV	3/4	208-230	5.3	3/4”	Automatic	48 ft.	9-1/2”	4”
FL31M*	1/3	115	10.5	3/4”	Manual*	19 ft.	*	*
FL31A	1/3	115	10.5	3/4”	Automatic	19 ft.	12”	5”
FL32M*	1/3	208-230	5.5	3/4”	Manual*	19 ft.	*	*
FL32A	1/3	208-230	5.5	3/4”	Automatic	19 ft.	12”	5”
FL51M*	1/2	115	12	3/4"	Manual*	55 ft.	*	*
FL51A	1/2	115	12	3/4"	Automatic	55 ft.	13”	6”
FL52M*	1/2	208-230	6.5	3/4"	Manual*	55 ft.	*	*
FL52A	1/2	208-230	6.5	3/4"	Automatic	55 ft.	13”	6”
FL62M*	6/10	208-230	8.2	3/4"	Manual*	65 ft.	*	*
FL62A	6/10	208-230	8.2	3/4"	Automatic	65 ft.	13”	6”
FL63M*	6/10	208-230 3PH	5.6	3/4"	Manual*	65 ft.	*	*
FL64M*	6/10	440-480 3PH	2.8	3/4"	Manual*	65 ft.	*	*
FL72M*	3/4	208-230	10.5	3/4"	Manual*	77 ft.	*	*
FL72A	3/4	208-230	10.5	3/4"	Automatic	77 ft.	13”	6”
FL73M*	3/4	208-230 3PH	7.5	3/4"	Manual*	77 ft.	*	*
FL74M*	3/4	440-480 3PH	3.5	3/4"	Manual*	77 ft.	*	*
FL102M*	1	208-230	12	3/4”	Manual*	90 ft.	*	*
FL102A	1	208-230	12	3/4”	Automatic	90 ft.	15”	8”
FL103M*	1	208-230 3PH	9	3/4”	Manual*	90 ft.	*	*
FL104M*	1	440-480 3PH	4.5	3/4”	Manual*	90 ft.	*	*
FL105M*	1	575 3PH	3.3	3/4”	Manual*	90 ft.	*	*
FL152M*	1-1/2	208-230	15	3/4”	Manual*	110 ft.	*	*
FL152A	1-1/2	208-230	15	3/4”	Automatic	110 ft.	15”	8”
FL153M*	1-1/2	208-230 3PH	10.6	3/4”	Manual*	110 ft.	*	*
FL154M*	1-1/2	440-480 3PH	5.3	3/4”	Manual*	110 ft.	*	*
FL155M*	1-1/2	575 3PH	4.9	3/4”	Manual*	110 ft.	*	*
FL202M*	2	208-230	15	3/4”	Manual*	130 ft.	*	*
FL202A	2	208-230	15	3/4”	Automatic	130 ft.	15”	8”
FL203M*	2	208-230 3PH	10.6	3/4”	Manual*	130 ft.	*	*
FL204M*	2	440-480 3PH	5.3	3/4”	Manual*	130 ft.	*	*
FL205M*	2	575 3PH	4.9	3/4”	Manual*	130 ft.	*	*

* **Note:** Manual models (“M” suffix) and 3 phase models, as designated above, require a separate approved pump control device or panel for automatic operation. Operation of these models will be according to the control selected. Make sure the electrical specifications of the control selected properly match the electrical specifications of the pump. 3 phase models require overload elements selected or adjusted in accordance with the control or panel instructions.

WARNING:
Always use a replacement power cord assembly of the same length and type as originally installed on the Liberty product. Using a cord of improper gauge or length may lead to exceeding the electrical rating of the cord and could result in death, injury, fire or other significant failure.

2. Dewatering / Sump Applications

1. For ordinary ground water pumping applications, a sump pit of not less than 14" in diameter is recommended. Vertical float (VMF) models (257, 287 and 297) may be used in a minimum 10" diameter sump; however, a larger diameter pit is preferred as it allows for a longer pump cycle and reduced switch cycling. The minimum depth of the pit should be 18".

2. If the pit is not already enclosed on the bottom, provide a hard level bottom of bricks or concrete. DO NOT place the pump directly on earth, gravel or debris since this can cause excessive wear of the impeller and possible jamming. ***"The Brick"*** (sold by Liberty Pumps as part # 4445000) is a pre-molded stable platform designed to fit your submersible pump. It raises the pump 2.5" off the bottom of the pit, reducing the potential for jamming from rocks and debris. Contact your local distributor to order. Remove all debris from the bottom of the sump pit before installation of the pump. A sump pit cover is suggested for safety and to prevent foreign objects from entering the pit.

3. Set the pump in the pit making sure the switch has adequate clearance and will not hang-up on the pit wall. The float must be **free to move throughout its travel** and not contacting the pump body, piping, or other objects. A 1-1/2" threaded discharge is provided for connection of the discharge pipe. Do not reduce the discharge size to below 1-1/2". Schedule 40 PVC pipe is recommended; however, flexible discharge hose kits may be used for temporary installations.

4. Connect the pipe or the discharge hose to the discharge of the pump. HAND TIGHTEN ONLY. Over tightening may cause the pump housing to crack. Install a union or other means of separating the discharge line just above the floor to facilitate removal of the pump if necessary. A check valve is recommended just above or in place of the union to prevent the backflow of water after each pump cycle. (All Liberty effluent/dewatering pumps come equipped with an air bleed hole in the base of the pump to help prevent airlock. A small spray of water from this hole is normal while pump is running.)

5. Connect additional piping as needed to direct the discharge to the desired location. Discharge should be kept as short as possible with a minimum number of turns. Check all connections for security.

6. Install a union or other means of separating the discharge pipe just above the floor to facilitate removal of the pump if necessary. **A check valve is recommended just above, or in place of, the union to prevent the backflow of water after each pump cycle.**

7. If a check valve is used, **a 1/8" anti-airlock hole should be drilled in the discharge pipe just above the pump's discharge outlet to prevent pump "airlock" (see Fig. 1)**

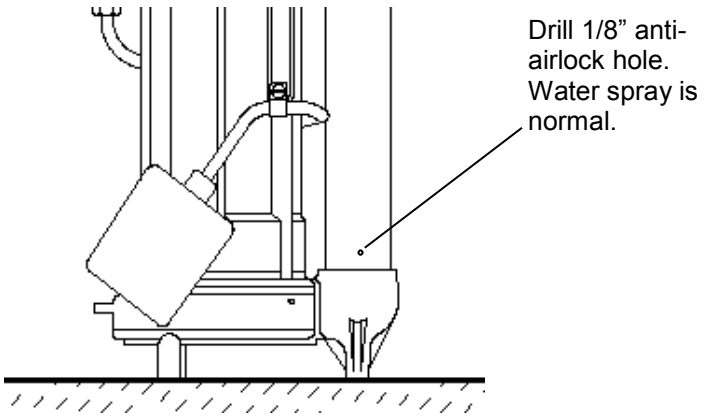


Fig. 1 – Anti-airlock hole position

8. For added protection, consider the addition of a back-up pump such as ***Liberty's SJ10 SumpJet***, as well as an alarm such as ***Liberty's ALM-2*** in applications where loss of pump function could result in property damage. If an alarm is used, it must be connected to a separate electrical circuit.

3. Effluent Applications

Vertical Magnetic Float (VMF) models (257, 287 and 297) are not recommended for effluent applications due to their short On/Off cycle. Wide angle float models are better suited for effluent applications and are easily adjustable for different On/Off levels.

The basin required for effluent applications must be sealed and vented to meet health and plumbing code requirements. Proper basin size and basin materials for effluent applications vary depending on the type of effluent system and local codes. Check with your local codes official prior to purchasing and installing the basin. Follow the manufacturer's recommended guidelines for installation of your specific basin. A minimum diameter of 18" and depth of 24" is required for proper pump operation, but larger basins are preferred for longer pump cycles and increased switch life. Installation should be at a sufficient depth to ensure that all plumbing is below the frost line. If this is not feasible, delete the check valve and size the basin and/or adjust the pump differential to accommodate the additional backflow.

⚠ WARNING These pumps are not to be installed in locations classified as hazardous in accordance with the National Electric Code, ANSI/NFPA 70, or where prohibited by local codes.

A. **Simplex (One Pump) Systems (see Fig. 2):** Set the pump in place making sure the float has adequate clearance to the side wall of the basin. The float must be **free to move throughout its travel** and not contacting the pump body, piping, or other objects. If an optional control device or float is used, follow the directions for mounting that accompany the optional control. Connect the discharge pipe to the pump's threaded discharge. IMPORTANT: DO NOT REDUCE THE DISCHARGE PIPE SIZE BELOW THAT WHICH IS PROVIDED ON THE PUMP. Contact Liberty Pumps or other qualified person if you have questions regarding proper pipe sizes and flow rates. Mount the basin cover making sure it is properly sealed.

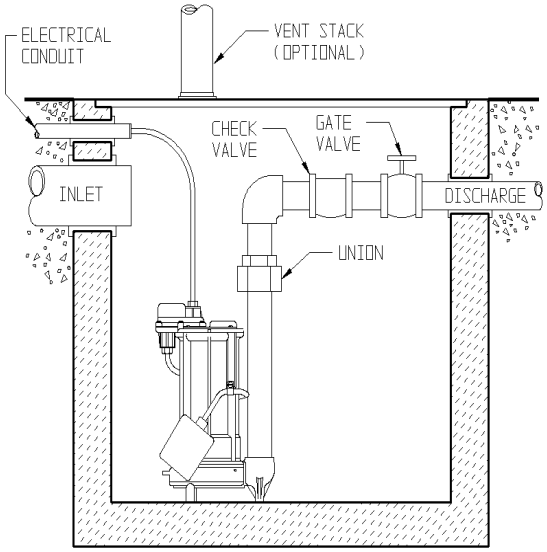


Fig. 2 – Typical Installation Simplex System
This is a recommended installation only. Variations may apply.

Installation of Discharge: After the pump has been mounted, install the discharge line. A union should be installed to facilitate pump removal if necessary. A free-flow swing check valve is recommended after the union to prevent the backflow of liquid after each pumping cycle. A gate valve should follow the check valve to allow periodic cleaning of the check valve or removal of the pump. The remainder of the discharge line should be as short as possible with a minimum number of turns, to minimize friction head loss. Contact Liberty Pumps or other qualified person if you have questions regarding proper pipe sizes and flow rates.

(All Liberty effluent/dewatering pumps come equipped with an air bleed hole in the base of the pump to help prevent airlock. A small spray of water from this hole is normal while pump is running.)

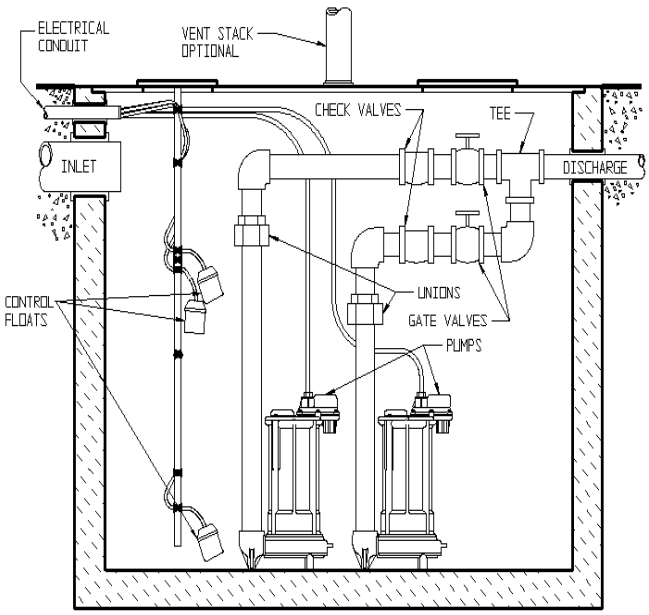


Fig. 3 – Typical Installation Duplex System
This is a recommended installation only. Variations may apply.

B. **Duplex (Two Pump) Systems (see Fig. 3):** Set both pumps in place in the bottom of the basin. The duplex control used will include 3 or 4 floats that will either be tethered to one of the discharge pipes or to an independent rod or bracket. Follow the instructions provided with your duplex control device. Each float must be **free to move throughout its travel** and not

contacting the pump body, piping, or other objects. Connect an individual discharge pipe to each pump. IMPORTANT: DO NOT REDUCE THE DISCHARGE PIPE SIZE BELOW THAT WHICH IS PROVIDED ON THE PUMP. Contact Liberty Pumps or other qualified person if you have any questions regarding proper pipe sizes and flow rates. To eliminate fluid recycling in duplex installations, it is necessary to have a check valve on each discharge line prior to tying the two discharges into one common line. Depending on the height of your basin, the check valves may either be installed inside the basin or outside the basin. Mount the basin cover(s) making sure they are properly sealed.

Installation of Remaining Discharge: Unions or flexible connectors should be installed to facilitate removal of the pump if necessary. Free-flow swing check valves should be installed on each discharge after the union and prior to the gate valve to prevent the back flow of liquid or gas. A check valve on each discharge line, prior to tying into one common line, is necessary to prevent the recycling of fluid from one pump to the other. A gate valve is recommended after the check valve to allow for periodic cleaning of the check valve or removal of the pump. The remainder of the discharge line should be as short as possible with a minimum number of turns to minimize friction head loss. Contact Liberty Pumps or other qualified person if there are questions regarding proper pipe size or flow rates. (All Liberty effluent/dewatering pumps come equipped with an air bleed hole in the base of the pump to help prevent airlock. A small spray of water from this hole is normal while pump is running.)

4. Electrical Service and Operation

⚠ WARNING

- **Risk of electric shock.** Always disconnect the pump from the power source before handling or making adjustments.
- The electrical connections and wiring for a pump installation should only be made by qualified personnel.
- This pump is supplied with a grounding conductor or a grounding type attachment plug. To reduce the risk of electric shock, be certain that the grounding conductor is connected only to a properly grounded control panel or, if equipped with a grounding type plug that it is connected to a properly grounded, grounding type receptacle.
- DO NOT bypass grounding wires or remove ground prongs from attachment plugs.
- DO NOT use an extension cord.
- This pump requires separate, properly fused and grounded branch circuit. Make sure the power source is properly sized for the voltage and amperage requirements of the motor, as noted on the pump nameplate.
- The electrical outlet or panel shall be within the length limitations of the pump power cord, and at least 4 feet above floor level to minimize possible hazards from flood conditions.
- The installation must be in accordance with the National Electric Code and all applicable local codes and ordinances.

⚠ CAUTION When the risk of property damage from high water levels exists, an independent high water alarm or back up pump system should be installed.

All FL-Series automatic models (designated with the letter "A") and Models 253, 283 and 293, come factory-equipped with a float switch mounted to the pump. These models come with two cords - one to the float switch and the other to the pump motor. The switch cord has a series (piggyback) plug enabling the pump (motor) cord to be plugged into the back of it. The purpose of this design is to allow manual operation of the pump.

For manual operation, or in the event of switch failure, the pump cord can be separated and plugged into the electrical outlet, directly bypassing the switch **(see Fig. 4)**

Fig. 1 Piggyback plug installation.

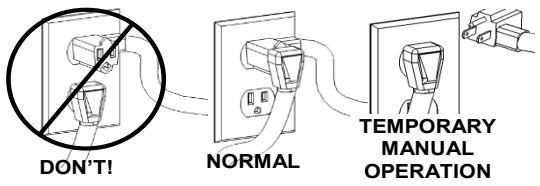


Fig. 4 – Temporary manual operation

For automatic operation using Liberty's supplied switch, the two cords should be interconnected and plugged into a separately fused grounded outlet of proper amp capacity for your selected pump model. (See Section 1, General Information or the pump nameplate for electrical specifications of your model.) Both cords are equipped with 3-prong plugs and must be plugged into a properly grounded 3-wire receptacle. DO NOT REMOVE THE GROUND PRONGS.

⚠ WARNING 208-230V single phase pumps shall only be operated without the float switch by using the circuit breaker or panel disconnect.

⚠ CAUTION Do not let the pump run dry.

The turn-on/turn-off levels vary depending on model. (See model specifications chart on page 3 for the "factory" preset level of your specific model.) Other pumping differentials may be obtained by tethering the switch cord to the discharge pipe. NOTE: A minimum cord length of 3-1/2" from the tether point to the top surface of the float is required for proper switch operation. If using a differential other than the factory setting, be sure that when the pump shuts off, at least 3-1/2" of fluid is left in the basin so the impeller remains submerged. **(Models 251, 257, 281, 287, 291, and 297 have factory-preset switches that are not adjustable.)**

Manual pumps with no switch are intended to be run using an approved liquid level control or approved motor control with correct rating that matches motor input in full load amperes. Regardless of the control type, be sure that when the pump shuts off, at least 3-1/2" of fluid is left in the basin so the impeller remains submerged.

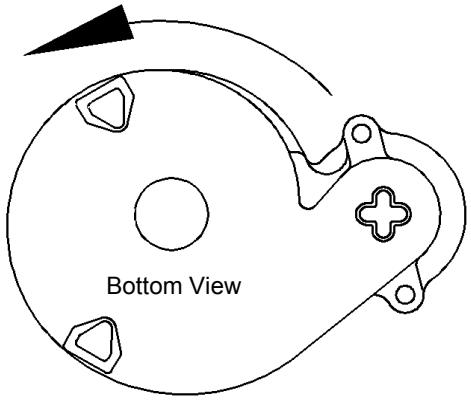
NOTE: For automatic operation with optional control devices: If the pump(s) are to be operated by either a simplex or duplex control panel or other optional control device, follow the installation instructions provided with the control and make the power connections per those instructions. If necessary, certain models may be run without a separate control.

⚠ WARNING 208-230V single phase pumps shall only be operated without the float switch by using the circuit breaker or panel disconnect.

⚠ CAUTION Do not let the pump run dry.

3 Phase Pump Models (FL63, FL64, FL73, FL74, FL103, FL104, FL105, FL153, FL154, FL155, FL203, FL204, FL205)

⚠ CAUTION For 3-Phase pumps, check for proper rotation before installing pump into basin **(see Fig. 5).**



Check three phase pumps for proper rotation prior to installing pump(s) in basin. To change rotation, reverse any two of the three power leads to the pump. Code the wires for reconnection after installation.

Fig. 5 – Proper impeller rotation, three phase models

If a single phase pump is to be wired directly into a control device or junction box, and it is necessary to remove the plugs, have a certified electrician do the wiring in accordance with the National Electric Code and applicable local codes. See **Fig. 6** for direct wire installation of single phase, automatic pumps.

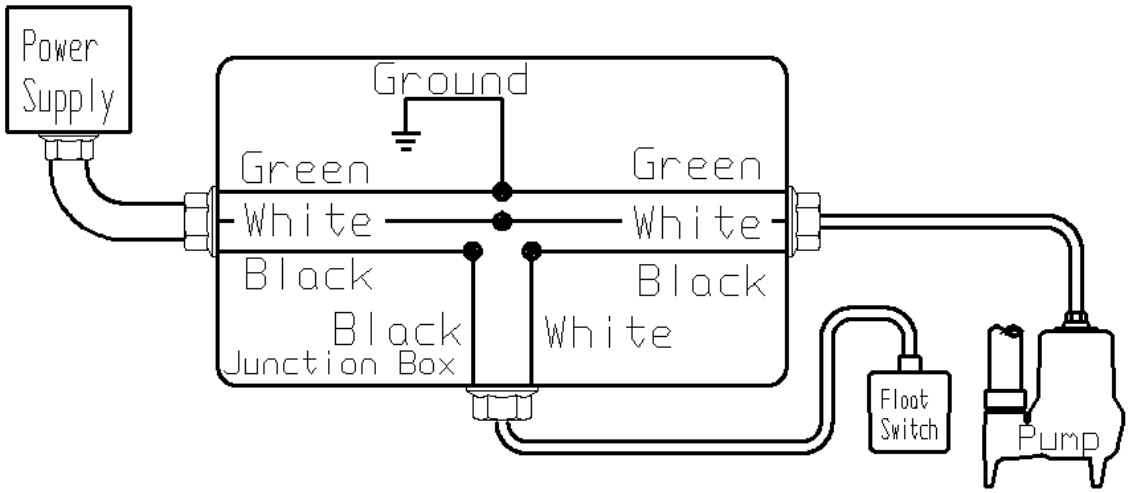


Fig. 6 – Direct Wiring of 120V or 208-230V Single Phase, Automatic Pumps

WARNING **For 208-230V installations:** Install a double pole disconnect near the pump installation. One side of the line going to the pump is always "hot", whether the float switch is in the "On" or the "Off" position. Use of a double pole disconnect will allow both hot legs to be de-energized.

5. Maintenance

WARNING **Risk of electric shock.** Always disconnect the pump from the power source before handling or making adjustments.

WARNING **Always disconnect the pump from power source before handling.** This guide is designed to help identify reasons for potential operating problems. It is not a service guide. **Dismantling of pump voids warranty.** Servicing of pump other than simple cleaning of pump inlet or impeller should be referred to the factory or its authorized service centers.

1. **Submersible Models:** Submersible pump models have sealed permanently lubricated bearings and require no additional lubrication.

2. **Pump should be <u>checked frequently</u> for debris and/or build up which may interfere with pump or float switch operation.** The float must be able to move freely through its complete travel without any restrictions. Pour enough water into the sump to activate the pump periodically (at least every 3 months) when not normally in use to verify proper function.

NOTE: The manufacturer assumes no responsibility for damage or injury due to disassembly in the field.

6. Troubleshooting

Problem	Cause	Correction
Pump will not run.	• Blown fuse or other interruption of power; improper voltage.	• Check that the unit is securely plugged in. Have an electrician check all wiring for proper connections and adequate voltage and capacity.
	• Switch is unable to move to the “turn on” position due to interference with the side of basin or other obstruction	• Position the pump or switch so that it has adequate clearance for free operation.
	• Insufficient liquid level.	• Make sure the liquid level is allowed to rise enough to activate switch(s).
	• Defective switch.	• Remove and replace switch.
Pump will not turn off.	• Switch(s) unable to move to the “turn off” position due to interference with the side of basin or other obstacle.	• Position the pump or switch so that it has adequate clearance for free operation.
	• Defective switch.	• Remove and replace switch.
Pump runs or hums, but does not pump.	• Discharge is blocked or restricted.	• Check the discharge line for foreign material, including ice if the discharge line passes through or into cold areas.
	• Check valve is stuck closed or installed backwards.	• Remove check valve(s) and examine for freedom of operation and proper installation.
	• Gate or ball valve is closed.	• Open gate or ball valve.
	• Total lift is beyond pump's capability.	• Try to route piping to a lower level. If not possible, a larger pump may be required. **Consult the factory.**
	• Pump impeller is jammed or volute casing is plugged.	• *Remove the pump from the basin. Detach the pump base and clean the area around the impeller. Reassemble and reinstall.
Pump runs periodically when fixtures are not in use.	• Check valve was not installed, is stuck open or is leaking.	• Remove check valve(s) and examine for freedom of operation and proper installation.
	• Fixtures are leaking.	• Repair fixtures as required to eliminate leakage.
Pump operates noisily.	• Foreign objects in the impeller cavity.	• *Remove the pump from the basin. Detach the pump base and clean the area around the impeller. Reassemble and reinstall.
	• Broken impeller.	• Consult the factory for information regarding replacement of impeller.
	• Worn bearings.	• Return pump to the factory or authorized repair station for repair.
	• Piping attachments to building are too rigid.	• Replace a portion of the discharge line with rubber hose or connector.

7. 3 Year Limited Warranty

*__NOTE:__ Liberty Pumps, Inc. assumes no responsibility for damage or injury due to disassembly in the field. Disassembly, other than at Liberty Pumps or its authorized service centers, automatically voids warranty.

Liberty Pumps, Inc. warrants that pumps of its manufacture are free from all factory defects in material and workmanship for a period of 3 years from the date of purchase. The date of purchase shall be determined by a dated sales receipt noting the model and serial number of the pump. The dated sales receipt must accompany the returned pump if the date of return is more than 3 years from the "CODE" (date of manufacture) number noted on the pump nameplate.

The manufacturer's obligation under this Warranty shall be limited to the repair or replacement of any parts found by the manufacturer to be defective, provided the part or assembly is returned freight prepaid to the manufacturer or its authorized service center, and provided that none of the following warranty-voiding characteristics are evident.

The manufacturer shall not be liable under this Warranty if the product has not been properly installed; if it has been disassembled, modified, abused or tampered with; if the electrical cord has been cut, damaged or spliced; if the pump discharge has been reduced in size; if the pump has been used in water temperatures above the advertised rating, or water containing sand, lime, cement, gravel or other abrasives; if the product has been used to pump chemicals or hydrocarbons; if a non-submersible motor has been subjected to excessive moisture; or if the label bearing the serial, model and code number has been removed. Liberty Pumps, Inc. shall not be liable for any loss, damage or expenses resulting from installation or use of its products, or for consequential damages, including costs of removal, reinstallation or transportation.

There is no other express warranty. All implied warranties, including those of merchantability and fitness for a particular purpose, are limited to three years from the date of purchase.

This Warranty contains the exclusive remedy of the purchaser, and, where permitted, liability for consequential or incidental damages under any and all warranties are excluded.

Liberty Pumps

7000 Apple Tree Avenue
Bergen, NY 14416
Phone: (800) 543-2550
Fax: (585) 494-1839
www.libertypumps.com

Check List for Low Pressure Distribution Networks/Low Pressure Dosing Systems
per 64E-6, Florida Administrative Code
Application: Marion Experimental Review by: E. Roder Dated October 29, 2013

Response to "missing" items

	Issue	Response
9	Head at holes specified	hn = 4 ft
10	flow per hole	(C&T p. 732)
		qn = 2.45 * C (D^2) sqrt(2*32.2*hn)
		qn = 2.45 * 0.63 *(0.25^2) sqrt (2*32.2*4)
		1.55 gpm = qn
11	total flow matches orifices flows	33 lateral length, ft
		3 orifice spacing, ft
		11 orifices/lateral
		4 # of laterals
		68.1 total flow, gpm
13	Equal distribution	7% difference first and last orifices
14	pump curve	70 flow, gpm
		18.2 TDH, ft
16	minimum dose volume (pipe network)	3.16 CF
	minimum dose volume (pipe network)	23.7 gal
	4 x pipe volume =	94.6 minimum dose, gal
17	dose per day	300 gpd code flow
		3.2 # doses/day
		1.4 dose duration, minutes

Effluent distribution system calculations

Qave	150	150	150	150	gpd
Qpeak	300	300	300	300	gpd
Dose per day	3	3	3	3	
Number of laterals	4	4	4	4	laterals
Number of orifices	11	11	11	11	orifices/lateral
Flow/dose	100	100	100	100	gal/dose
Flow/lateral	25	25	25	25	gal/lateral-dose
residual head at the orifice (h_n)	2	3	4	5	ft
Rate of orifice discharge (q_n)	1.09	1.34	1.55	1.73	gal/orifice-min
Flowrate/lateral	12.04	14.75	17.03	19.04	gal/min-lateral
QT	48.17	59.00	68.13	76.17	gal/min
Duration of dose	2.08	1.69	1.47	1.31	min
Headloss lateral pipe	1.25	1.25	1.25	1.25	diameter, inch
headloss in pipe w/o orifices = h_{fp}	1.00	1.45	1.90	2.33	ft
headloss in pipe w/orifices $h_{fdp} = \Delta h(_{1-n})$	0.33	0.48	0.63	0.78	ft
determine diff in discharge btwn first last orifice in each lateral					
head on first orifice, $h_1=h_n+\Delta h(1-n)$	2.33	3.48	4.63	5.78	
$m = sqrt(h_n/h_1)$	0.93	0.93	0.93	0.93	
difference 1st and last orifice	7%	7%	7%	7%	
Total dynamic head					
friction loss in pipe from septic tank	3.29	4.79	6.25	7.68	ft
fittings (estimated)	1	1	1	1	ft
friction loss in manifold	1.37	2.00	2.61	3.20	ft
friction loss in lateral	0.33	0.48	0.63	0.78	ft
residual head on orifices	2	3	4	5	ft
elev diff	2.6	2.6	2.6	2.6	ft
Total dynamic head	10.60	13.87	17.09	20.26	ft
QT	48.17	59.00	68.13	76.17	gpm

APPENDIX D

FLOWMETER

INTERMEDIATE MS MULTI-JET METERS

Maximize your revenue stream across a wide range of small commercial applications with our Intermediate MS Multi-Jets and capture low flow usage where turbine meters fall short.

Technical Specifications:

- **AWWA Standard** - Meets or exceeds all sections of Standard ANSI / AWWA C708, most recent revision for cold water multi-jet meters.
- **Design/Operation** - Velocity - type flow measurement. Water is evenly distributed by multiple converging inlet ports flows past an impeller in the measuring chamber, creating an impeller velocity directly proportional to water flow rate. The meter's register integrates that velocity into totalized flow.
- **Main Case** - Meets NSF/ ANSI 372 / NSF 61 Standards and is compliant with the Safe Drinking Water Act (SDWA). Lead free waterworks bronze case made of 86% minimum copper composition. Body design incorporates either compact externally threaded ends, or bolted, oval flanged connections. Top load bolted design.
- **Magnetic Drive** - A reliable, direct magnetic drive provides linkage between measurement element and register. No intermediate gearing is required; no gearing is exposed to water.

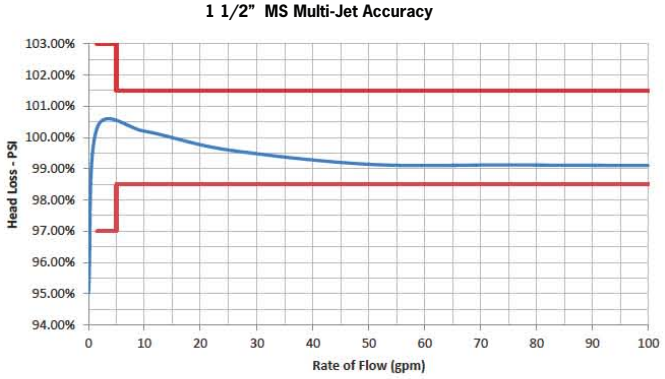
Features & Benefits:

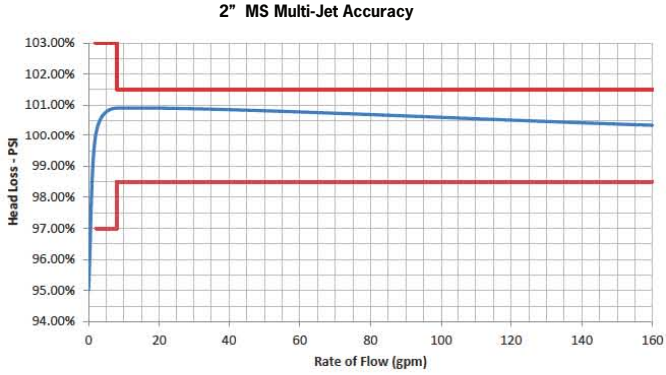
- All new 'MS' design with enhanced basket strainer and top load body provides exceptionally low head loss and improved reliabity over the life of the meter.
- Extended Low Flow Accuracy (.5 GPM on 1½" MS /.75 GPM on 2" MS) enhances water accountability efforts.
- Flexible application-specific vacuum sealed registers including Direct Read, AccuLinx Encoder, 3G AMR/ AMI, Interpreter and IP68+ Pulse Output are available on MS Multi-Jet meters.
- Meter performance exceeds the AWWA C-708 Standards in the critical areas of head loss and accuracy.
- Provides exceptional capabilities for passing entrained solids and operating in environments with high mineral content.
- Precision Engineered Flow Components and a Computational Fluid Dynamic (CFD) optimized design produces a smooth, balanced flow profile for improved, sustained accuracy and optimized revenue under the toughest conditions.

Technical Specs (Cont'd):

- **Register** - All Direct Read, AccuLinx Encoder, 3G AMR/AMI, Interpreter and IP68+ Pulse Output are vacuum sealed with a scratch resistant, tempered glass lens, stainless steel base and wrap-around gasket to prevent intrusion of dirt or moisture. The register assembly is removable under line pressure permitting seamless, simplified upgrades in reading technology. Available in USG, CF or M^3. Direct Read registers come equipped with center mounted low flow leak indicator with high sensitivity resulting from direct one to one linkage to measuring element and large center sweep hand with one hundred (100) clearly marked gradations on the periphery of the dial face.
- **Measuring Chamber** - The measuring chamber housing and measurement element are built with an advanced synthetic polymer. Measurement surfaces are not wear surfaces, providing sustained accuracy despite the presence of entrained solids in the water. A long-life, synthetic sapphire bearing serves as a wear surface. The chamber housing is constructed in two parts to allow access to the impeller.
- **Strainer** - A rugged, 360° basket strainer built from advanced polymer materials for superior wear mitigation protecting critical measuring element from damage. The unique strainer design smoothes the flow of water entering into the meter creating a balanced flow that is gentle on the meter's internal components.
- **Tamper Detection** - The Master Meter Multi-jet adjusting port and register are concealed to prevent tampering and removal of the register. This design also provides a visual indication of tampering attempts.

Accuracy Charts





* For expanded head loss and accuracy charts please see Engineering Charts, Version 6.13.

Performance Data

METER OPERATING CHARACTERISTIC/DIMENSION	*1 ½" Threaded*	*1 ½" Flanged*	*2" Threaded*	*2" Flanged*
Flow Rating (gpm)	100	100	160	160
Continuous Flow (gpm)	75	75	120	120
Normal Flow Range (gpm)	5-100	5-100	8-160	8-160
Low Flow (gpm)	1.5	1.5	2	2
Extended Low Flow (gpm)	1/2	1/2	3/4	3/4
Maximum Working Pressure (psi)	150	150	150	150
Maximum Working Temperature (°F)	120	120	120	120
Length	12 ⅝"	13"	15 ¼"	17"
Width	5 ⅜"	5 ⅜"	5 ¾"	5 ¾"
Height, standard register with lid	6 ¾"	6 ¾"	7 ⅝"	7 ⅝"
Height with DIALOG register	7 ½"	7 ½"	8 ⅜"	8 ⅜"
Height, bottom to center line	1 ¾"	1 ½"	2 ¾"	2 ¾"
Meter Casing Spuds, Nominal Threadsize	2"	N/A	2 ½"	N/A
Weight (lbs)	11	12	20	24
Packed To Carton	1	1	1	1
Carton Weight (lbs)	12	14	22	26

Master Meter, Inc.
Tel: 817-842-8000
Fax: 817-842-8100
innovate@mastermeter.com

APPENDIX E

MEDIA

SOURCES OF MEDIA

STAGE 2 BIOFILTER (WOOD)

Wood Resource Recovery
8510 Northwest Gainesville Road
Ocala, FL 34475
Phone 352-671-7845

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

INGREDIENT	PERCENT	CAS NUMBER	LD_{50} Oral-Rat	LC_{50} Inhal-Rat	ACGIH-TLV

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

SYNERGISTIC PRODUCTS:	Not applicable

SECTION IV: FIRST AID MEASURES

SKIN CONTACT:	Wash with soap and water. If irritation develops, obtain medical attention.
EYE CONTACT:	Flush eye to remove debris. If irritation persists, obtain medical attention.
INGESTION:	If a large amount is ingested, consult a physician.
INHALATION:	Move patient from dusty environment. Apply oxygen or artificial respiration if required. If breathing difficulties or distress continues obtain medical attention.

SECTION V: PHYSICAL DATA

APPEARANCE AND ODOUR:	Yellow granular flake; woody odour
SPECIFIC GRAVITY:	Variable
BOILING POINT (C):	Not applicable
MELTING POINT (C):	Not applicable
SOLUBILITY IN WATER:	Insoluble pH: No data
PERCENT VOLATILE BY VOLUME:	Not applicable
EVAPORATION RATE:	Not applicable
VAPOUR PRESSURE (mmHg):	Not applicable
VAPOUR DENSITY (air = 1)	Not applicable
BULK DENSITY:	Not applicable

SECTION VI: FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:	Not applicable
FLAMMABLE LIMITS:	LEL: 40 gm/m^3 UEL: Variable
EXTINGUISHING MEDIA:	Dry chemical, carbon dioxide, water spray or foam. Suggest water spray for large fires.
SPECIAL FIRE FIGHTING PRODCEDURES:	Self-contained breathing apparatus required for fire fighting personnel. Move containers from fire area, or cool with water spray, if possible.
UNUSUAL FIRE AND EXPLOSION HAZARDS:	Material will burn under fire conditions. Autoignition temperature = 400-500F.

SECTION VII: REACTIVITY DATA

STABILITY:	STABLE [XX]	UNSTABLE [ ]

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, formaic 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 Point .....Not 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 H_2O (% 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/m^3 (LEL)
Extinguishing Media.....Water, CO_2, 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/m^3;
STEL$_{(15\ min.)}$ - 10 mg/m^3 (softwood)
TWA - 1.0 mg/m^3;
(certain hardwoods such as beech and oak)
OSHA PEL: TWA (see Footnote 1) -
(total dust) - 15.0 mg/m^3

(respirable factor) - 5.0 mg/m^3
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/m^3; STEL (15 MIN.) - 10.0 mg/m^3 (ALL SOFT AND HARD WOODS, EXCEPT WESTERN RED CEDAR); WESTERN RED CEDAR: TWA - 2.5 mg/m^3. 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

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 lend 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

PIONEER SAWDUST®

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

Preparer: Duncan H. Brockbank
Original Date: 12/04/85 (by Norman L. Brockbank)
Revision Date:
Supersedes: