

HTE# 08-5-19182

Harnett County Department of Public Health

25172

Improvement Permit

A building permit cannot be issued with only an Improvement Permit

ISSUED TO: SIERRA DAY TREATMENT ACADEMY PROPERTY LOCATION: US421 SUBDIVISION _____ LOT # _____

NEW REPAIR EXPANSION Site Improvements required prior to Construction Authorization Issuance: _____

Type of Structure: EXISTING BUILDING

Proposed Wastewater System Type: _____

Projected Daily Flow: 560 GPD

Number of bedrooms: _____ Number of Occupants: 70 max

Basement Yes No

Pump Required: Yes No May be required based on final location and elevations of facilities

Type of Water Supply: Community Public Well Distance from well 50 feet

Permit conditions: _____ Permit valid for: Five years No expiration

Authorized State Agent: [Signature] Date: 2/6/09 SEE ATTACHED SITE SKETCH

The issuance of this permit by the Health Department in no way guarantees the issuance of other permits. The permit holder is responsible for checking with appropriate governing bodies in meeting their requirements. This site is subject to revocation if the site plan, plat, or the intended use changes. The Improvement Permit shall not be affected by a change in ownership of the site. This permit is subject to compliance with the provisions of the Laws and Rules for Sewage Treatment and Disposal and to conditions of this permit.

Construction Authorization

(Required for Building Permit)

The construction and installation requirements of Rules .1950, .1952, .1954, .1955, .1956, .1957, .1958, and .1959 are incorporated by references into this permit and shall be met. Systems shall be installed in accordance with the attached system layout.

ISSUED TO: SIERRA DAY TREATMENT ACADEMY PROPERTY LOCATION: US421 SUBDIVISION _____ LOT # _____

Facility Type: SCHOOL New Expansion Repair

Basement? Yes No Basement Fixtures? Yes No

Type of Wastewater System** _____ (Initial) Wastewater Flow: 560 GPD

(See note below, if applicable) _____ (Repair)

Installation Requirements/Conditions

Septic Tank Size EXISTING gallons Exact length of each trench _____ feet Trench Spacing: _____ Feet on Center

Pump Tank Size EXISTING gallons Trenches shall be installed on contour at a Soil Cover: _____ inches

Maximum Trench Depth of: _____ inches (Maximum soil cover shall not exceed 36" above the trench bottom)

(Trench bottoms shall be level to +/-1/4" in all directions)

Pump Requirements: _____ ft. TDH vs. _____ GPM _____ inches below pipe

Aggregate Depth: _____ inches above pipe

Conditions: SEE PROPOSAL FROM HALOWEN ASSOCIATES DATED 1/13/09 FOR ALL REQUIRED UPGRADES TO EXISTING SYSTEM. IN ADDITION A CONTRACT WITH A CERTIFIED OPERATOR MUST ALSO BE SUBMITTED TO THE HEALTH DEPARTMENT.

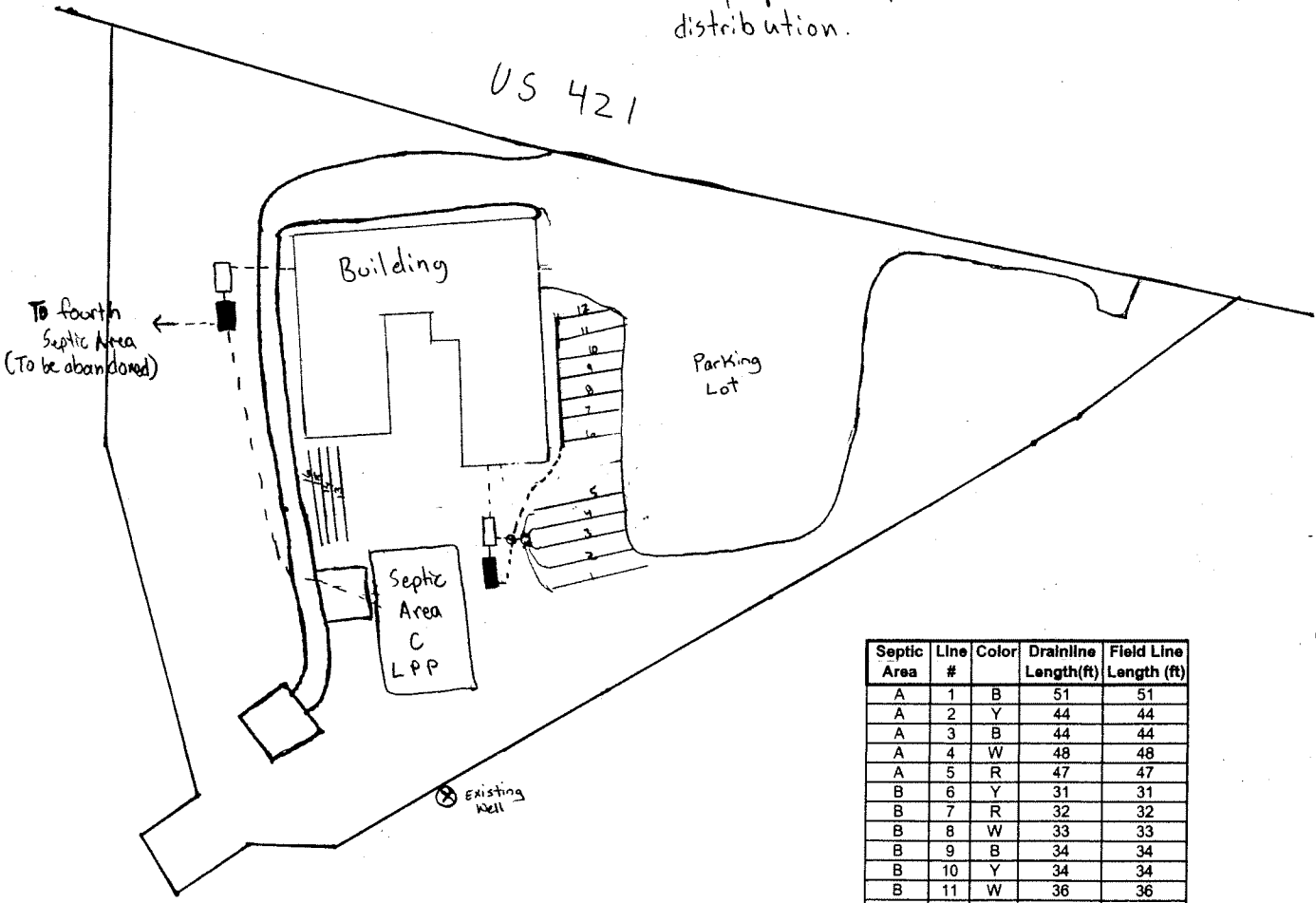
**If applicable: I understand the system type specified is different from the type specified on the application. I accept the specifications of this permit.

Owner/Legal Representative Signature: _____ Date: _____

This Construction Authorization is subject to revocation if the site plan, plat, or the intended use changes. The Construction Authorization shall not be transferred when there is a change in ownership of the site. This Construction Authorization is subject to compliance with the provisions of the Laws and Rules for Sewage Treatment and Disposal and to the conditions of this permit. SEE ATTACHED SITE SKETCH

Authorized State Agent: [Signature] Date: 2/6/09
Construction Authorization Expiration Date: 2/6/14

Sketch 1: Site plan illustrating all existing and proposed septic areas with current distribution.

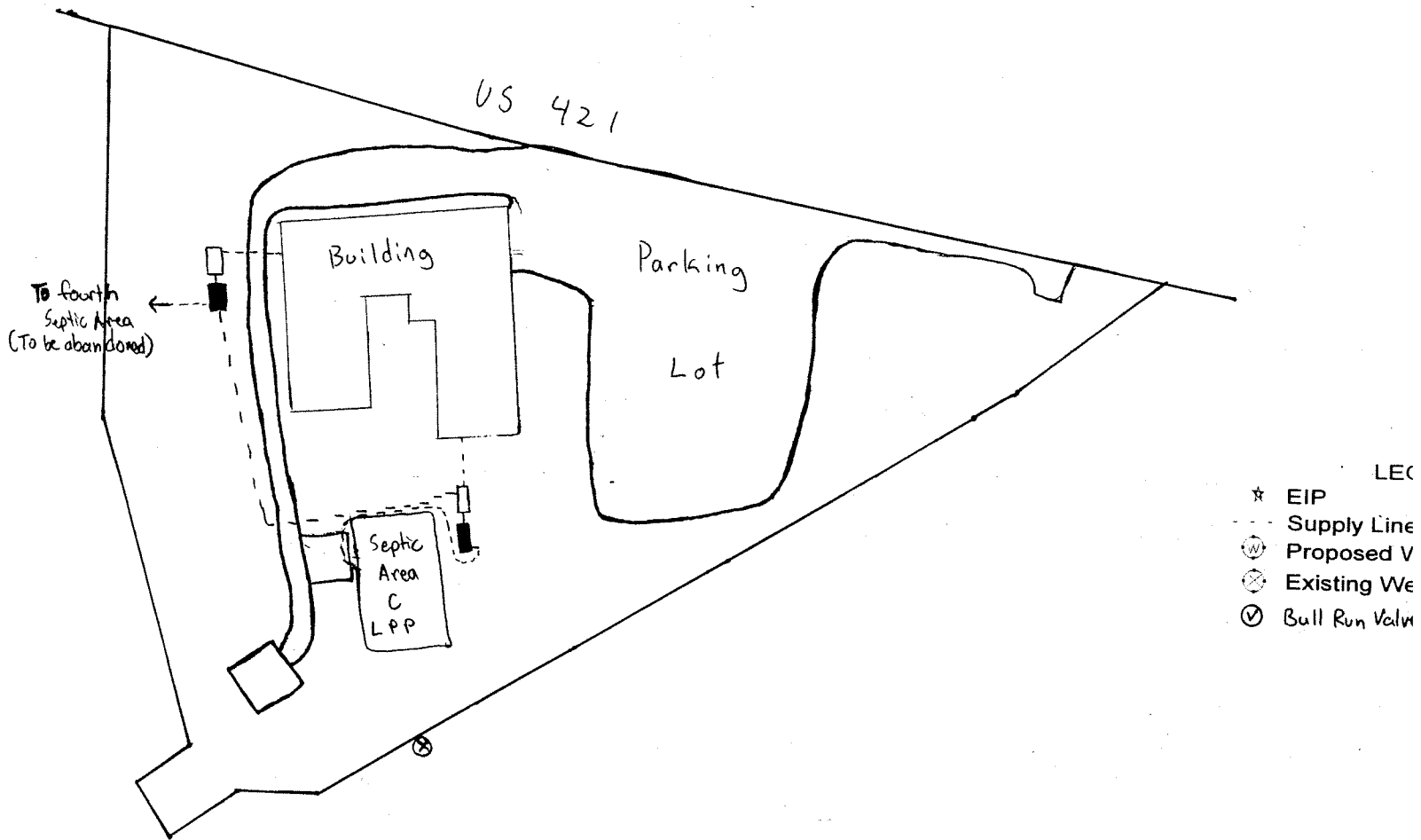


- LEG
- ★ EIP
 - Supply Line
 - ⊕ Proposed Well
 - ⊗ Existing Well
 - ⊙ Bull Run Valve

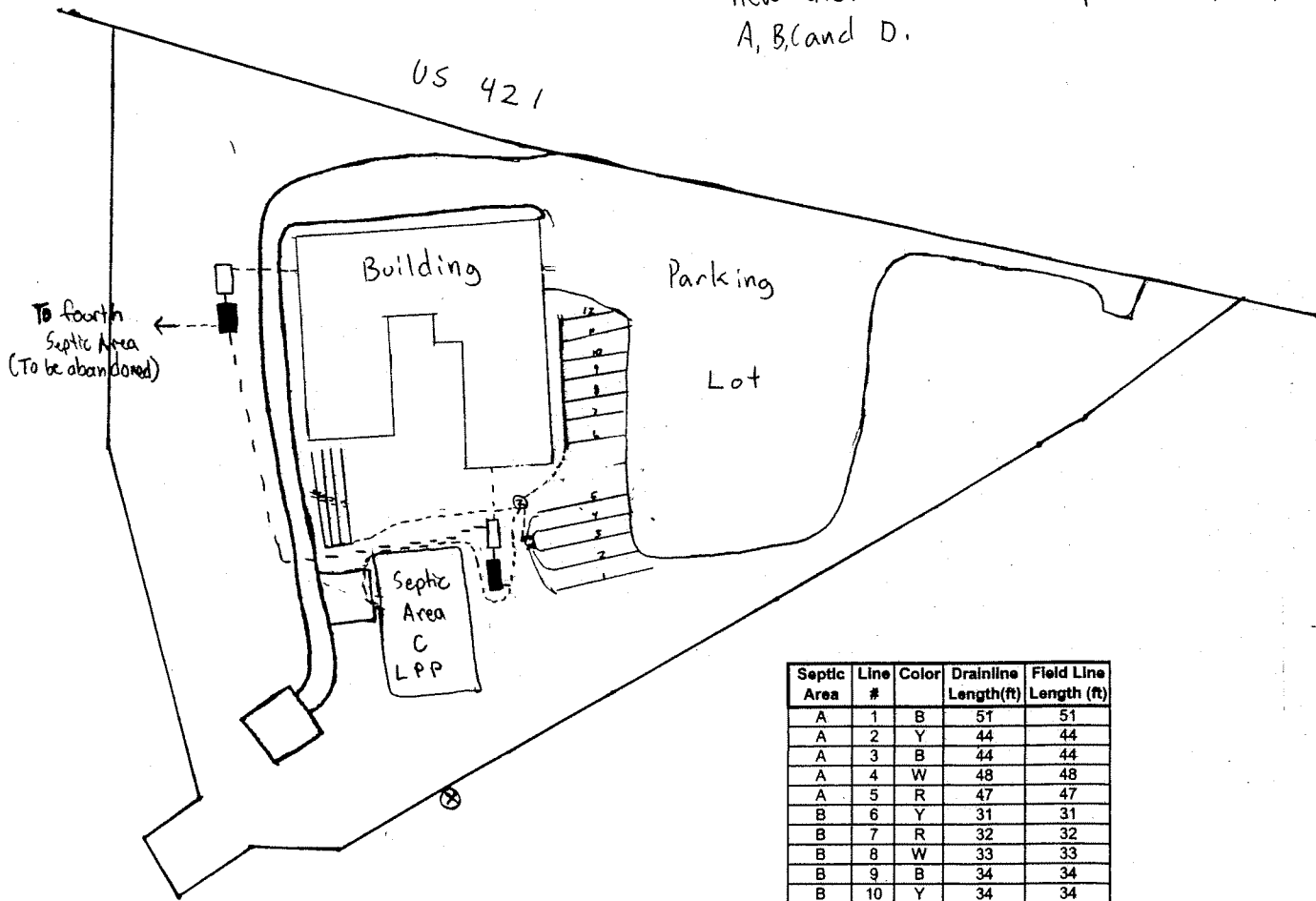
Septic Area	Line #	Color	Drainline Length(ft)	Field Line Length (ft)
A	1	B	51	51
A	2	Y	44	44
A	3	B	44	44
A	4	W	48	48
A	5	R	47	47
B	6	Y	31	31
B	7	R	32	32
B	8	W	33	33
B	9	B	34	34
B	10	Y	34	34
B	11	W	36	36
B*	12	B	n/a	24
D	13	B	47	50
D	14	W	47	50
D	15	Y	47	50
D	16	R	47	50

* Line 12 is to be detached from rest of system

Sketch 2: Site plan illustrating proposed new distribution to primary septic area C.



Sketch 3: Site plan illustrating proposed new distribution to repair area, septic areas A, B, C and D.



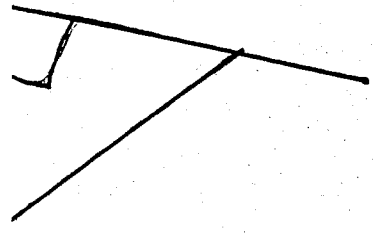
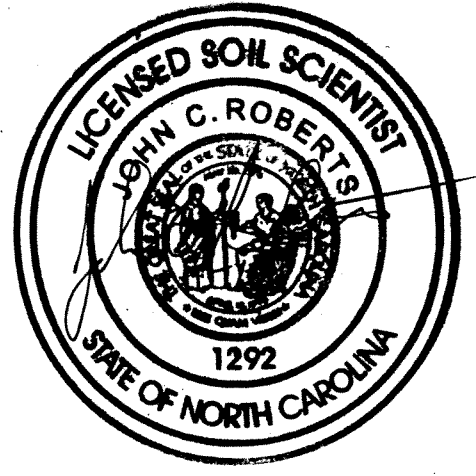
Septic Area	Line #	Color	Drainline Length(ft)	Field Line Length (ft)
A	1	B	51	51
A	2	Y	44	44
A	3	B	44	44
A	4	W	48	48
A	5	R	47	47
B	6	Y	31	31
B	7	R	32	32
B	8	W	33	33
B	9	B	34	34
B	10	Y	34	34
B	11	W	36	36
B*	12	B	n/a	24
D	13	B	47	50
D	14	W	47	50
D	15	Y	47	50
D	16	R	47	50

* Line 12 is to be detached from rest of system

- LEG
- ★ EIP
 - Supply Line
 - ⊕ Proposed W
 - ⊗ Existing Wel
 - ⊙ Bull Run Val

white out
suppl

g all existing
current



NE

LEGEND-

- ☆ EIP
- Supply Line
- ⊙ Proposed Well
- ⊗ Existing Well
- ⊖ Bull Run Valve
- Septic Tank
- Pump Tank
- ⊙ D-Box
- ⊗ Pressure Manifold
- ② Multizone Valve

Field Line Length (ft)
51
44
44
48
47
31
32
33
34
34
36
24
50
50
50
50

st of system

HAL OWEN & ASSOCIATES, INC.

SOIL & ENVIRONMENTAL SCIENTISTS

P.O. Box 400, 266 Old Coats Road
Lillington, NC 27546-0400
Phone (910) 893-8743 / Fax (910) 893-3594
E-mail: service@halowensoil.com

13 January, 2009

Mr. Oliver Tolksdorf
Harnett County Environmental Health Division
307 Cornelius Harnett Blvd
Lillington, NC 27546

Reference: Septic System Proposal for Sierra Day Treatment Academy

Dear Mr. Tolksdorf,

A site investigation was conducted for the above referenced property located on the southern side of US 421, Upper Little River Township, Harnett County, North Carolina. The purpose of the investigation was to determine the ability of this property to support a proposed private school operation utilizing the existing subsurface sewage waste disposal systems at the site. All sewage disposal ratings and determinations were made in accordance with "Laws and Rules for Sewage Treatment and Disposal Systems, 15A NCAC 18A .1900". This report represents our professional opinion as a Licensed Soil Scientists but does not guarantee the continued proper function of the systems at the site.

Change of Use for Existing Facility and Owner Proposals

The existing facility has previously been utilized as a retirement home for several residents. The current owners are proposing to change the use of the facility to a school with an enrollment of 50 students and 20 full-time teacher/staff positions for grades K - 12. Hours of operation for the school will follow a traditional format from 8:00 AM to 3:00 PM Monday through Friday. The facility has an existing cafeteria and shower components. The current owners wish to use the cafeteria facilities and abandon the showers.

Existing Septic Systems

Currently there are four separate existing subsurface wastewater systems associated with this facility. The original system, described in this report as septic area A, includes 5 conventional drainlines and is gravity fed from the existing septic tank located near the southeastern corner of the facility (see Sketch 1). Additional conventional drainlines were observed, shown as septic area B, which originally incorporated 7 x 140-ft conventional drainlines utilizing pressure manifold distribution located immediately east of the facility. The majority of the drainlines in areas A and B have since been paved over and are now under the school's parking lot. A third existing septic system, septic area C, was observed to the south of the facility and is composed of 631-ft of low-pressure pipe (LPP) drainline, as per Harnett County Health Department Improvement Permit 4767 and on site observations. A fourth septic area with an unknown amount of drainline appeared to be located just west of the facility and

extend across the western property line. Since this septic area does not conform to current NC subsurface sewage rules and regulations, it is not included as part of the proposed septic system design and will be detached from the existing systems. Two septic tanks and two pump tanks were observed on the property with a septic tank and pump tank serving the low-pressure pipe system in septic area C and the other septic tank and pump tank serving septic areas A and B. A bull-run valve is also incorporated with areas A and B and is not proposed to be used in this design.

Determination of Enrollment for Proposed School

The design daily flow rate used in determining the maximum enrollment for the school was taken from daily and monthly flow rate data analyzed from Jonathan's House School, a facility located in Harnett County and comparable to the proposed school (see attached copy of report). The daily flow rate per student determined at Jonathan's House was 6 gallons/day per student/teacher. Since the cafeteria facilities are to be utilized at the site for the proposed school, an additional 2 gallons/day was added, totaling 8 gallons/day per student/teacher.

Maximum enrollment for the proposed school was calculated based on the total gallons/day septic area C can accept at a long-term acceptance rate of 0.2 gal/day/sqft. By utilizing all 631-ft of LPP drainline corresponding to a daily total flow rate of 631 gallons, it was calculated septic area C can support occupancy of 78 students/teachers. However, a maximum occupancy of 70 students/teachers (equaling a daily flow of 560 gallons/day) is proposed for this facility.

Design Specifications for Initial and Repair Septic Systems

Primary

The LPP system is proposed to function as the school's primary subsurface wastewater septic system. The current supply line feeding septic area C will be rerouted to the primary septic tank associated with septic areas A and B (see Sketch 2). A new supply line will be installed to connect the primary septic tank to septic area C. A portion of these two supply lines are proposed to be clearly labeled and installed in the same trench, carefully avoiding the ends of the LPP drainlines by at least 5-ft. A Zabel A300 Commercial Filter will be installed in both septic tanks. It is required that gate valves and lateral-end turn-ups be retro-fitted to the primary LPP system for proper cleaning and maintenance. A new NEMA 4X enclosure with simplex controls panel will need to be installed at each pump tank. Specifications for the controls are included within the proposed design packet. These are the activities proposed to be conducted at this time. Modifications to or installation of any portion of the repair areas will be conducted at such time that the initial system fails and the repair system is needed to be put into use.

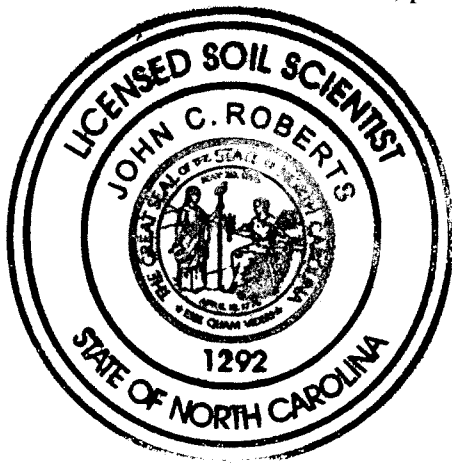
Repair

The unpaved portions of drainlines in areas A and B were visually inspected with the use of a backhoe to evaluate the current condition of the drainlines as well as to construct earthen dams to prevent wastewater from entering the covered portions of the drainlines. It was determined that each of the conventional drainlines appeared to be functioning properly on the day of the investigation and could support a long-term acceptance rate up to 0.4 gal/day/sqft. A surprising amount of small fibrous tree roots were observed in the existing drainlines in septic area B and it is recommended that a solution of copper-sulfate be used to burn-off the accumulated tree roots. Each drainline in septic areas A and B was also investigated to establish the linear footage of drainline not covered by the parking lot that could be allocated as part of the repair area. It was determined that septic areas A and B have 234-ft and 201-ft of usable conventional drainline that accounts for a total allowable wastewater flow of 280 and 241 gallons/day, respectively (see Sketch 3). As shown on the design proposal, drainline 12 will no longer be utilized and is to be capped off on along the manifold between drainlines 11 and 12. An area just south of the western wing of the facility, labeled as septic area D, was designed and appears adequate for placement of 188-ft of LPP drainline. For simplification purposes, septic areas A, B and D are designed to each receive a third of the total design daily flow ($560 / 3 = 187$ gallons/day). The effluent will be equally distributed between the three septic areas utilizing a Zoeller 4000 series (model 4403) automatic multizone diversion valve. Distribution of wastewater to drainlines associated with septic area A will be accomplished using the current distribution box. The existing pressure manifold will continue to distribute wastewater to drainlines in septic area B. The dose volume for septic areas A, B and D will be based on the amount of draw down in the primary pump tank to correspond to 187 gallons per dose. For a 1000-gallon pump tank the draw down value was determined to be 8.9 inches. The Zoeller 4000 series automatic multizone diversion valve would need to be placed at an elevation higher than the commonly shared pump tank, existing septic tank and the pressure manifolds for to allow for wastewater to drain away from the diversion valve. The multizone diversion valve assembly would require clear schedule 40 PVC inspection pipes for the first foot of distribution lines leaving the valve. In addition, an area in the eastern corner of the property appears adequate to support approximately 300 linear feet of LPP drainlines that could be installed as repair area but are not included in this proposal. However, it is strongly recommended that this area be designated for additional repair area and preserved for that purpose until public sewer becomes available.

All septic tanks and pump tanks were investigated for possible leaks. Tanks were observed over a weekend during which time there was no wastewater flow into the tanks. At no point during the weekend inspection did it appear that the wastewater level in any tank had dropped.

It appears that the existing LPP system and the proposed repair septic areas are adequate to support the proposed 50 students and 20 teachers/staff. Due to the past septic system issues, the scarcity of area for repair and the complexity of the proposed repair system it is recommended that total occupancy of the facility not exceed 70 students/teachers/staff as proposed in this report.

Attached is the septic system layout and supporting information for this facility. I trust that this report provides all the information that you require at this time. If you have any questions or need additional information, please contact me at your convenience.



Sincerely,

A handwritten signature in black ink that reads "John C. Roberts".

John C. Roberts
Licensed Soil Scientist

A handwritten signature in black ink that reads "Hal Owen".

Hal Owen
Licensed Soil Scientist



4000 & 6000 Automatic Multizone Valves

SPECIFICATIONS	4000 SERIES	6000 SERIES
Flow Range: (Minimum flow of 10 gpm for the 4000 Series and 15 gpm for the 6000 Series must be maintained in order for the valve to index properly.)	4 Outlet Valve: 10 - 50 GPM 6 Outlet Valve: 10 - 40 GPM	4 Outlet Valve: 15 - 150 GPM 6 Outlet Valve: 15 - 150 GPM
Pressure Rating:	2½ - 75 PSI	2½ - 150 PSI
Pressure Loss - 4 Outlet Valve:	Flow (GPM): 10 20 30 40 50 PSI Loss: 2.0 3.0 4.5 6.4 10.0	Flow (GPM): 15 30 60 90 120 150 PSI Loss: 2.0 3.0 5.0 9.0 11.0 13.0
Pressure Loss - 6 Outlet Valve:	Flow (GPM): 10 20 30 40 PSI Loss: 2.5 4.5 7.5 11.5	Flow (GPM): 15 30 60 90 120 150 PSI Loss: 2.0 3.5 6.0 10.0 12.0 14.0
Inlet:	Slip and glue connections to 1¼" PVC pipe	Threaded 1½" NPT Connection.
Outlets:	Slip and glue connections. 4 Outlet Valve: To 1¼" PVC Pipe 6 Outlet Valve: To 1" PVC Pipe	Slip and glue connections to 1½" PVC Pipe.
Construction:	High strength noncorrosive ABS polymer.	Die Cast Metal Housing High strength noncorrosive ABS Polymer Outlets
Dimensions:	Height: 5¾" Width: 5¾"	Height: 7" Width: 8"

4000 SERIES:

4 Outlet Models

- P/N 170-0064 Model 4402 - For 2 Zone operation.
- P/N 170-0065 Model 4403 - For 3 Zone operation.
- P/N 170-0066 Model 4404 - For 4 Zone operation.

6 Outlet Models

- P/N 170-0067 Model 4605 - For 5 Zone operation.
- P/N 170-0068 Model 4606 - For 6 Zone operation.

6000 SERIES:

4 Outlet Models

- P/N 170-0069 Model 6402 - For 2 Zone operation.
- P/N 170-0070 Model 6403 - For 3 Zone operation.
- P/N 170-0071 Model 6404 - For 4 Zone operation.

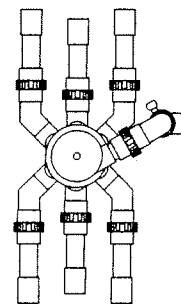
6 Outlet Models

- P/N 170-0072 Model 6605 - For 5 Zone operation.
- P/N 170-0073 Model 6606 - For 6 Zone operation.

New Automatic Multizone Valve Assemblies Featuring 6000 Series Automatic Multizone Valves

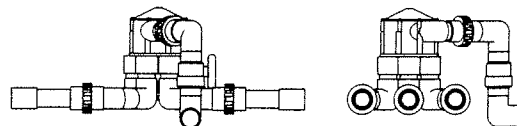
- Easy to install -
Slip ends are ready to glue.
- Easy to maintain -
*Unions allow for simple removal.
Shutoff ball valve included.*
- Convenient to test -
*Clear PVC "Windows" indicate
current flow path instantly.*
- Compact -
*Assemblies fit easily in a Zoeller
30" Deluxe Riser.*

- P/N 5053-0001 2 Outlet Multizone Assembly.
- P/N 5053-0002 3 Outlet Multizone Assembly.
- P/N 5053-0003 4 Outlet Multizone Assembly.
- P/N 5053-0004 5 Outlet Multizone Assembly.
- P/N 5053-0005 6 Outlet Multizone Assembly.



6 Outlet Multizone Valve
Assembly Shown

SK2469



6" Clear PVC Pipe

- P/N 170-0074 (4) 1¼" Dia. Pieces For 4400 2-4 Zone.
- P/N 170-0075 (6) 1" Dia. Pieces For 4600 5-6 Zone.

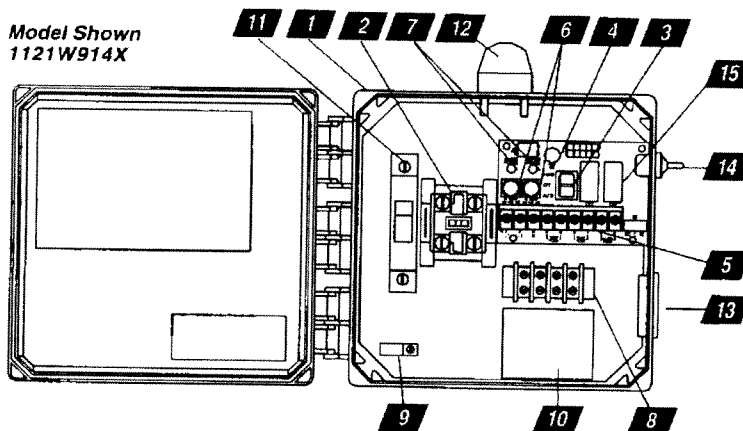
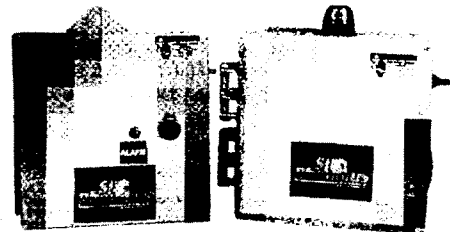
- P/N 170-0076 (4) 1½" Dia. Pieces For 6400 2-4 Zone.
- P/N 170-0077 (6) 1½" Dia. Pieces For 6600 5-6 Zone.

ALL ZOELLER ON-SITE WASTEWATER PRODUCTS MUST BE INSTALLED IN ACCORDANCE WITH LOCAL AND/OR STATE PLUMBING AND/OR HEALTH DEPARTMENT CODES.

MODEL 112 Control Panel

Single phase, simplex motor contactor control.

The Model 112 control panel provides a reliable means of controlling one 120, 208, or 240 VAC single-phase pump in pump chambers, sump pump basins, irrigation systems and lift stations. Two control switches activate a magnetic motor contactor to turn the pump on and off. If an alarm condition occurs, an additional alarm switch activates the audio/visual alarm system.



Model Shown
1121W914X

1. **Enclosure** measures 8 x 8 x 4 inches (20.32 X 20.32 X 10.16 cm). Choice of NEMA 1 (steel for indoor use), or NEMA 4X (ultraviolet stabilized thermoplastic with removable flanges for outdoor or indoor use).
* Options selected may increase enclosure size and change component layout.
2. **Magnetic Motor Contactor** controls pump by switching hot electrical lines.
3. **HOA Switch** for manual pump control (mounted on circuit board).
4. **Green Pump Run Indicator Light** (mounted on circuit board).
5. **Float Switch Terminal Block** (mounted on circuit board).
6. **Alarm and Control Fuses** (mounted on circuit board).
7. **Alarm and Control Power Indicators** (mounted on circuit board).
8. **Pump Input Power and Pump Connection Terminal Block**
9. **Ground Lug**
10. **Terminal Block Installation Label**
- ★ 11. **Circuit Breaker** (optional) provides pump disconnect and branch circuit protection. required (2X)

STANDARD ALARM PACKAGE (other options available)

12. **Red Alarm Beacon** provides 360° visual check of alarm condition.
Note: NEMA 1 style utilizes a door mounted indicator in lieu of a beacon.
13. **Alarm Horn** provides audio warning of alarm condition (83 to 85 decibel rating).
Note: NEMA 1 style utilizes an internally mounted buzzer (83 to 85 decibel) in lieu of horn.
14. **Exterior Horn Test/Normal/Silence Switch** allows alarm horn to be silenced and testing of horn and light to ensure proper operation of alarm system.
15. **Horn Silence Relay** automatically resets alarm after alarm condition has been resolved (mounted on circuit board).

FEATURES

- Entire control system (panel and switches) is UL Listed to meet and/or exceed industry safety standards
- Dual safety certification for the United States and Canada
- Standard package includes three 20' Sensor Float® control switches
- Complete with step-by-step installation instructions
- Three-year limited warranty



SJE-Rhombus
SJ ELECTRO SYSTEMS, INC.

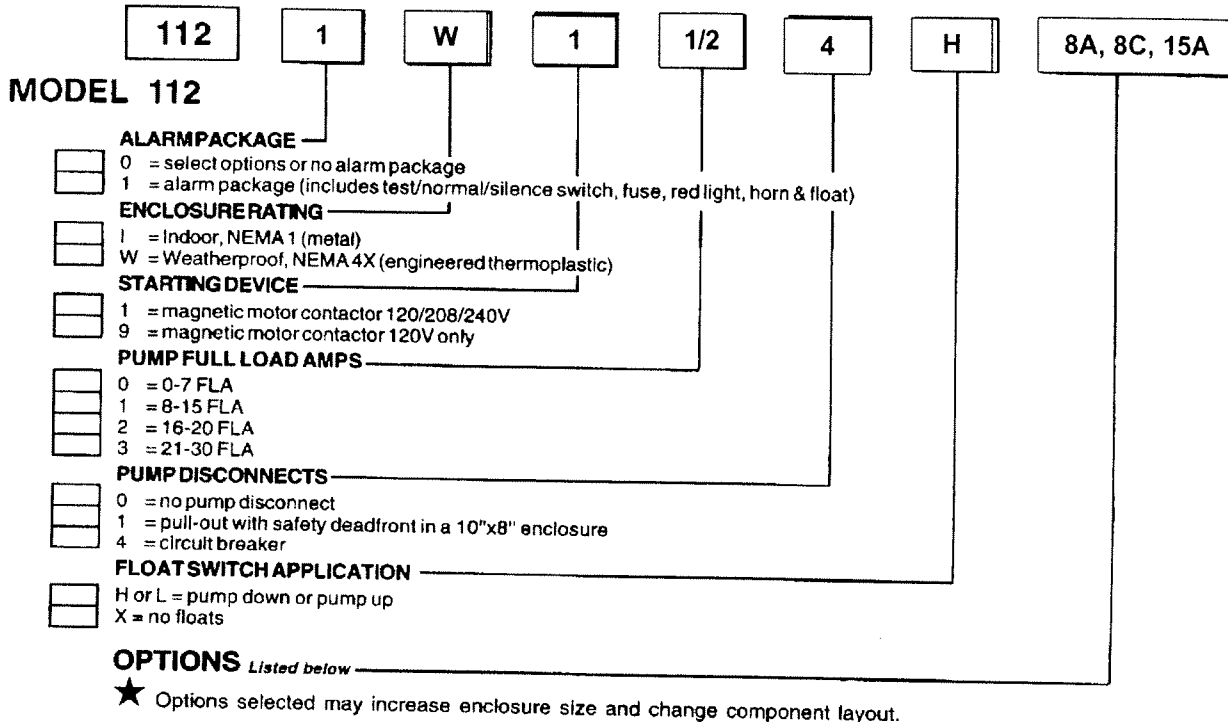
PO Box 1708, Detroit Lakes, MN 56502

1-888-DIAL-SJE • 1-218-847-1317

1-218-847-4617 Fax

email: sje@sjerhombus.com

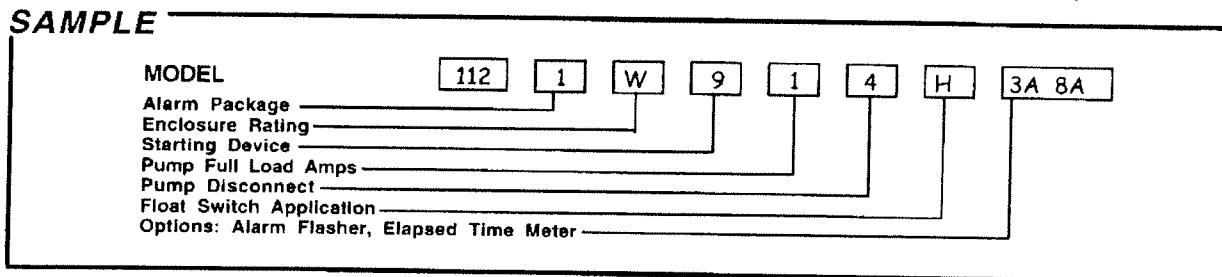
www.sjerhombus.com

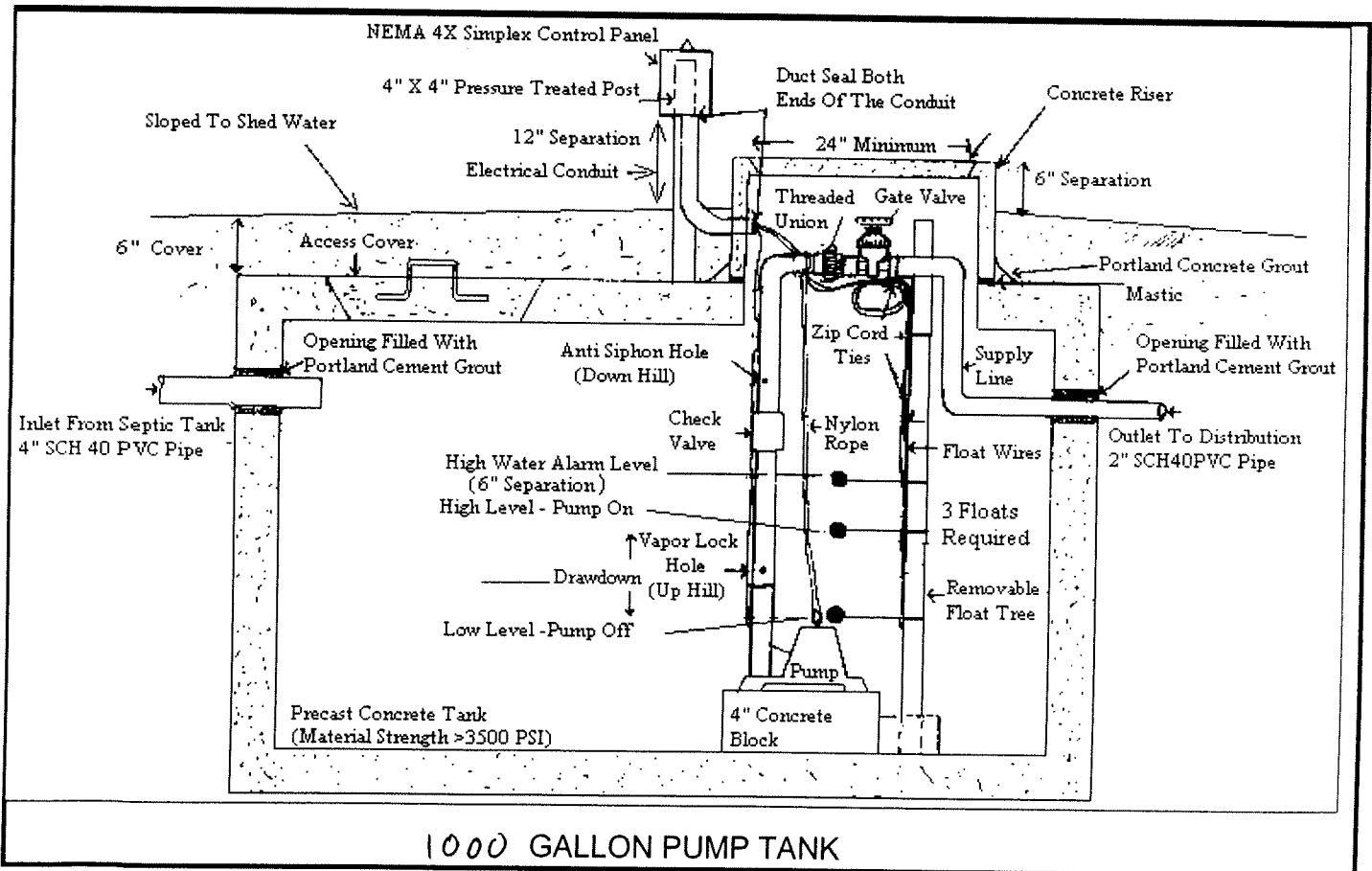
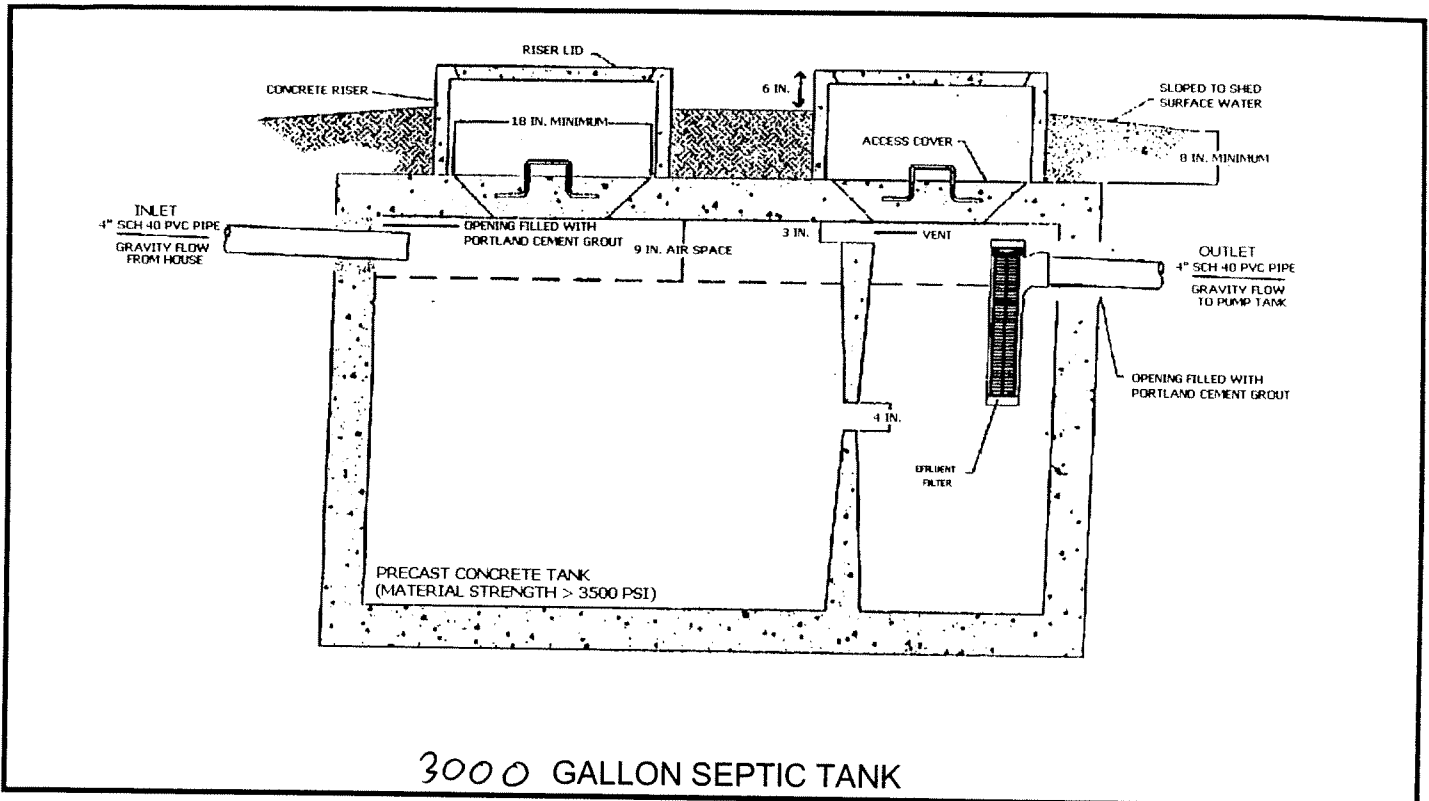


If additional features are required, call the factory for a quote on either a Pro-Line or Engineered Custom control panel system.

CODE DESCRIPTION	CODE DESCRIPTION
<input type="checkbox"/> 1A Red beacon only / no audio <i>must select 1E if floats included</i>	<input type="checkbox"/> 11C NEMA 1 alarm panel <i>must select option 6A</i>
<input type="checkbox"/> 1C Horn only / no visual <i>must select 1E if floats included</i>	<input type="checkbox"/> 11D NEMA 4X alarm panel <i>must select option 6A</i>
<input type="checkbox"/> 1E Alarm float	<input type="checkbox"/> 15A Control / alarm circuit breaker <i>Does not include the circuit board as in standard.</i>
<input type="checkbox"/> 3A Alarm flasher	<input type="checkbox"/> 16A 10' cord in lieu of 20'
<input type="checkbox"/> ★ 4A Low level cutout <i>select option 4D if floats included</i>	<input type="checkbox"/> 16B 15' cord in lieu of 20'
<input type="checkbox"/> ★ 4B Red low-level indicator & alarm <i>must select 4A also</i>	<input type="checkbox"/> 16C 30' cord in lieu of 20'
<input type="checkbox"/> 4D Low-level float	<input type="checkbox"/> 16D 40' cord in lieu of 20'
<input type="checkbox"/> 6A Auxiliary alarm contact, form C type	<input type="checkbox"/> 17A SJE SignalMaster® / mounting strap ●
<input type="checkbox"/> ★ 8A Elapsed time meter	<input type="checkbox"/> 17B SJE SignalMaster® / externally weighted ●
<input type="checkbox"/> ★ 8C Event (cycle) counter	<input type="checkbox"/> 17C Sensor Float® / Internally weighted ▲
<input type="checkbox"/> 10E Lockable latch - NEMA 4X	<input type="checkbox"/> 17D Sensor Float® / externally weighted ▲
<input type="checkbox"/> 10E Lockable latch - NEMA 1	<input type="checkbox"/> 17E Sensor Float® Mini / pipe clamp ▲
<input type="checkbox"/> ★ 10F Lightning arrester	<input type="checkbox"/> 17F Sensor Float® Mini / externally weighted ▲
<input type="checkbox"/> ★ 10K Anti-condensation heater	<input type="checkbox"/> 19X Door mounted pump run indicator
	<input type="checkbox"/> 21A Pumpmaster® in lieu of on/off switches ●
	<input type="checkbox"/> 21B PumpMaster® Plus in lieu of on/off switches ●
	<input type="checkbox"/> 21C Super Single® in lieu of on/off switches ▲
	<input type="checkbox"/> 21D Double Float™ in lieu of on/off switches ▲

● Mechanically-activated ▲ Mercury-activated





Low Pressure Pipe Design Summary for Septic Area D

Applicant: Scotty VanHook Phone #: _____

Mailing Address: P.O. Box 655 Lillington, NC 27546

D# : #NAME? PIN: 0640-42-4596.000 S/D: _____ Lot#: _____

Site Address: _____

No. of Bedrooms: 0 Daily Flow: 187 gallons LTAR: 0.2 gpd/sqft

Septic Tank: 3000 gallons Pump Tank: 1000 gallons

Amt. Of Drainline: 1000 sqft, or 187 linear ft Lateral Pipe Size: 1 1/2" sch 40 pvc

(Sleeve with equal lengths of 4 inch diameter perforated corrugated pipe)

TRENCHES width (in.): 18 depth (in.): 12 Stone Depth (# 5 ASTM-D448): 9 in.

SUPPLY LINE Diameter: 2" sch 40 pvc Length: 120 feet

MANIFOLD Diameter: 3" sch 40 pvc Length: 20 feet Elevation: 100

No. of Subfields: 1 No. of Gatevalves: 1 No. of Checkvalves: 2

CALCULATIONS:

Dose Volume Range: 128.2- 227.84 gallons Dose Volume (gal): 188 @ x 8

Dose Pump Run Time (min): 7.10

Drawdown: 187.984 gallons divided by 21 gal/inch = 9 inches

Pump Tank Elevation (ft): 98.00 Pump Elevation (ft): 93

Elevation Head (ft): 7 Design Head (ft): 4

Friction Head (ft): 11.34 Total Head (ft): 22.34

Pump to Deliver: 26.5 gpm @ 22.3 ft head

Simplex Control Panel (SJE Rhombus 112 or equal) with elapsed time meter, cycle counter, alarm, and pump on separate circuits is required. Floats to be determined by type of pump tank used. A septic filter (Zabel A300 Commercial Filter or equal) is required.

Possible Pumps Include:

Hydromatic: SHEF 50 1/2 HP

Zoeller: 161 1/2HP

Low Pressure Pipe Distribution Flow Sheet

Septic Area	Line #	Line Color	Line Length	Relative Elev(ft)	Elevation Change	Pressure Head(ft)	Hole Size	Flow/Hole	Flow/Lateral	gpm/ft	# Holes	Hole Spacing	First/Last Holes
C	13	B	47	100.0	0.0	4.0	5/32	0.5757	7.48	0.1592	13	3	5.50
C	14	W	47	100.0	0.0	4.0	5/32	0.5757	6.33	0.1347	11	3	8.50
C	15	Y	47	100.0	0.0	4.0	5/32	0.5757	6.33	0.1347	11	3.75	4.75
C	16	R	47	100.0	0.0	4.0	5/32	0.5757	6.33	0.1347	11	4	3.50
Total line length=									Total Flow=				
Pump Tank =										15.38945			
% Decrease of gpm/ft from top to bottom line=													

Calculations:

Flow/Hole = $11.79 d^2 h^{1/2}$ Flow/Lateral = (flow/hole) x #holes
 gpm/ft = (flow /hole) x # Holes / Line Length
 Supply Ln Volume = Supply Line Length /100 x Pipe Size & Volume Table
 Lateral Ln Vol (1&1/2) = Total linear footage /100 x Pipe Size & Volume Table
 Manifold Vol. = Manifold Length x Pipe Volume /100
 Dose Vol = Supply Line Vol. + Manifold Vol. + (5 to 10)(Lateral Line Vol.)
 Run Time = Dose Volume /Total Flow
 Draw Down = Dose Vol /Pump Tank Vol x liquid depth of tank(inches)
 Elev Head = Manifold Elevation - (Pump Tank Elevation - 5ft)
 Friction Head = $[0.00113 \times (\text{Supply Line Length(ft)} + 70\text{ft for fittings in pump tank}) \times \text{Flow(gpm)}^{1.85}] / \text{Pipe Inside Diameter(in)}^{4.87}$ Computed by the Hazen Williams Formula
 TDH = Pressure Head + Elevation Head + Friction Head

Design Specifications

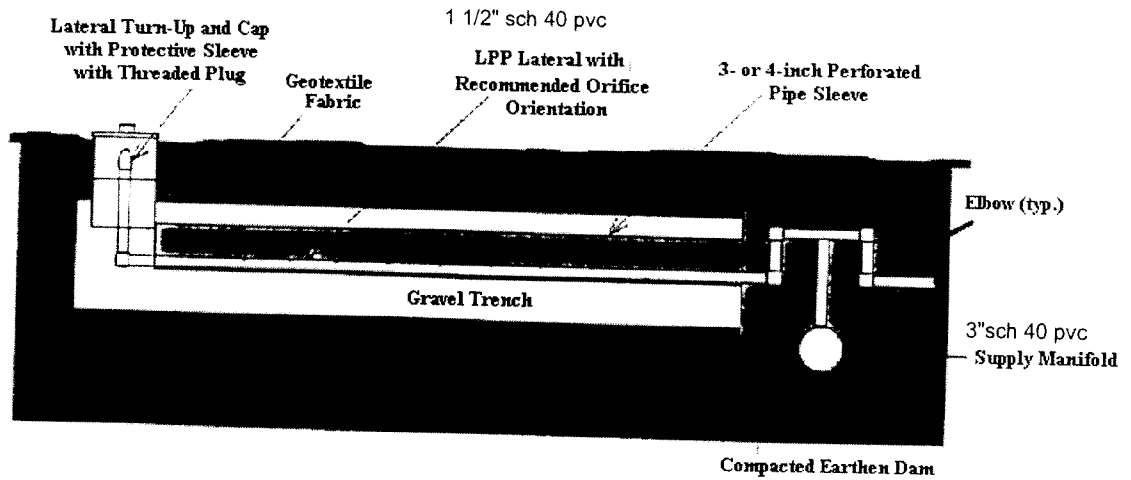
Supply Line Volume=	20.9
Lateral Line Volume=	19.9
Manifold Volume=	7.7
Dose Vol Range=	128.2-227.8
Dose Vol=	188.0 @ x 8

Total Flow =	26.5
LTAR=	0.20
Run Time =	7.10
Draw Down=	8.95

Pressure Head (ft)=	4.00
Elevation Head (ft)=	7.00
Friction Head (ft)=	11.34
TDH (ft)=	22.34

Typical LPP Trench and Manifold Details

Figure 1: Manifold, Lateral, and Trench



** Hole orientation should be upward except for a hole 1/3 and 2/3 the distance from the manifold which should face down for drainage of pipe between pump cycles.

Figure 2: Cross Section of Trench

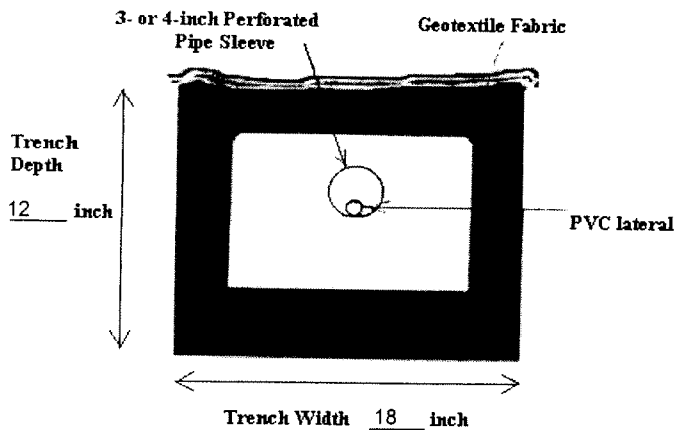
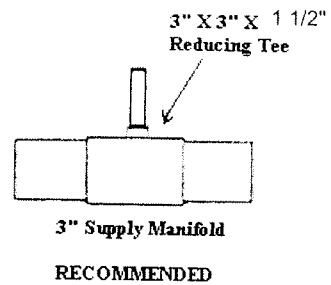
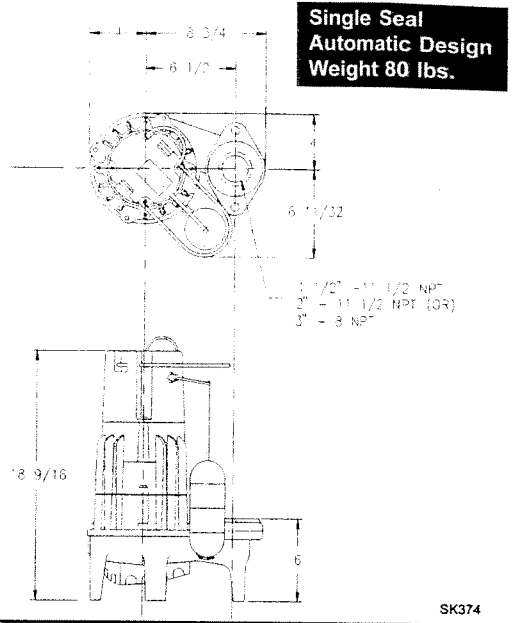
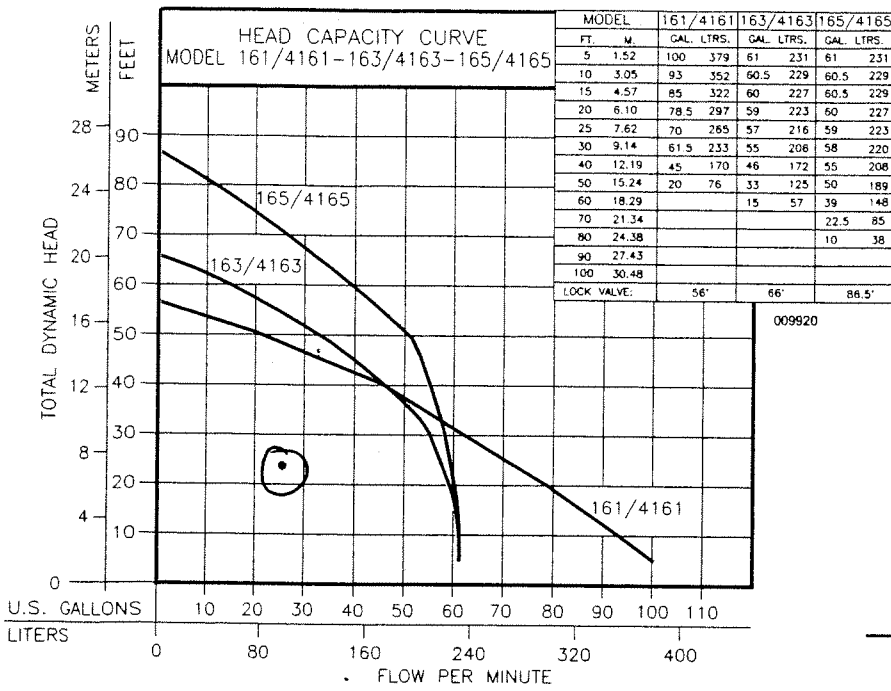


Figure 3: Manifold Side Profile



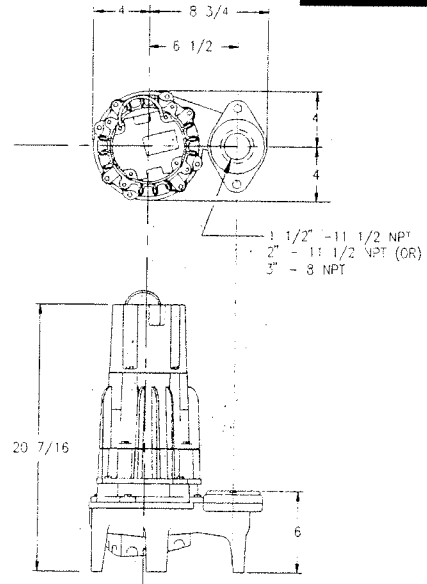


SK374

Standard all models - 20 ft. cord - 1/2 H.P.

161 MODELS		4161 MODELS		Control Selection				Listings	
Single Seal	Double Seal	Volts - Ph	Mode	Amps	Simplex	Duplex	CSA	UL	
M161	—	115	1	Auto	15.5	—	Y	Y	
N161	N4161	115	1	Non	15.5	3 or 5 & 6	Y	Y ⁽¹⁾	
D161	—	230	1	Auto	7.5	—	Y	Y	
E161	E4161	230	1	Non	7.5	3 or 5 & 6	Y	Y	
* H161	—	200-208	1	Auto	8.8	—	Y	N	
* I161	* I4161	200-208	1	Non	8.8	3 or 5 & 6	Y	N	
* J161	* J4161	200-208	3	Non	6.4	4 & 6	Y	Y	
* F161	* F4161	230	3	Non	5.2	4 & 6	Y	Y	
* G161	* G4161	460	3	Non	2.9	4 & 6	Y	Y	

Double Seal Design Weight 87 lbs.



SK1413

Standard all models - 20 ft. cord - 1/2 H.P.

163 MODELS		4163 MODELS		Control Selection				Listings	
Single Seal	Double Seal	Volts - Ph	Mode	Amps	Simplex	Duplex	CSA	UL	
M163	—	115	1	Auto	15.0	—	Y	Y	
N163	N4163	115	1	Non	15.0	3 or 5 & 6	Y	Y ⁽¹⁾	
D163	—	230	1	Auto	7.5	—	Y	Y	
E163	E4163	230	1	Non	7.5	3 or 5 & 6	Y	Y	
* H163	—	200-208	1	Auto	8.5	—	Y	N	
* I163	* I4163	200-208	1	Non	8.5	3 or 5 & 6	Y	N	
* J163	* J4163	200-208	3	Non	6.0	4 & 6	Y	Y	
* F163	* F4163	230	3	Non	4.8	4 & 6	Y	Y	
* G163	* G4163	460	3	Non	2.9	4 & 6	Y	Y	

Standard all models - 20 ft. cord - 1 H.P.

165 MODELS		4165 MODELS		Control Selection				Listings	
Single Seal	Double Seal	Volts - Ph	Mode	Amps	Simplex	Duplex	CSA	UL	
D165	—	230	1	Auto	10.2	—	Y	Y	
E165	E4165	230	1	Non	10.2	3 or 5 & 6	Y	Y	
* H165	—	200-208	1	Auto	12.6	—	Y	N	
* I165	* I4165	200-208	1	Non	12.6	3 or 5 & 6	Y	N	
* J165	* J4165	200-208	3	Non	7.5	4 & 6	Y	Y	
* F165	* F4165	230	3	Non	7.4	4 & 6	Y	Y	
* G165	* G4165	460	3	Non	3.7	4 & 6	Y	Y	
* BA165	* BA4165	575	3	Non	3.0	4 & 6	N	N	

* No Moulded Plug

⁽¹⁾ UL listed unit available with 20 Amp plug.

SELECTION GUIDE

1. Integral float operated 2-pole mechanical switch, no external control required.
2. Single piggyback variable level float switch or double piggyback variable level float switch. Refer to FM0477.
3. Mechanical alternator M-Pak 10-0072 or 10-0075. Refer to FM0495
4. Simplex three phase control panel. Refer to FM1228.
5. See FM0712 for correct model of Electrical Alternator.
6. Variable level control switch 10-0225 used as control activator, specify simplex (3) float or duplex (3) or (4) float system.

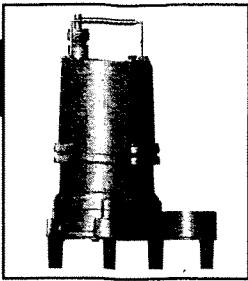
CAUTION

All installation of controls, protection devices and wiring should be done by a qualified licensed electrician. All electrical and safety codes should be followed including the most recent National Electric Code (NEC) and the Occupational Safety and Health Act (OSHA).

RESERVE POWERED DESIGN

For unusual conditions a reserve safety factor is engineered into the design of every Zoeller pump.

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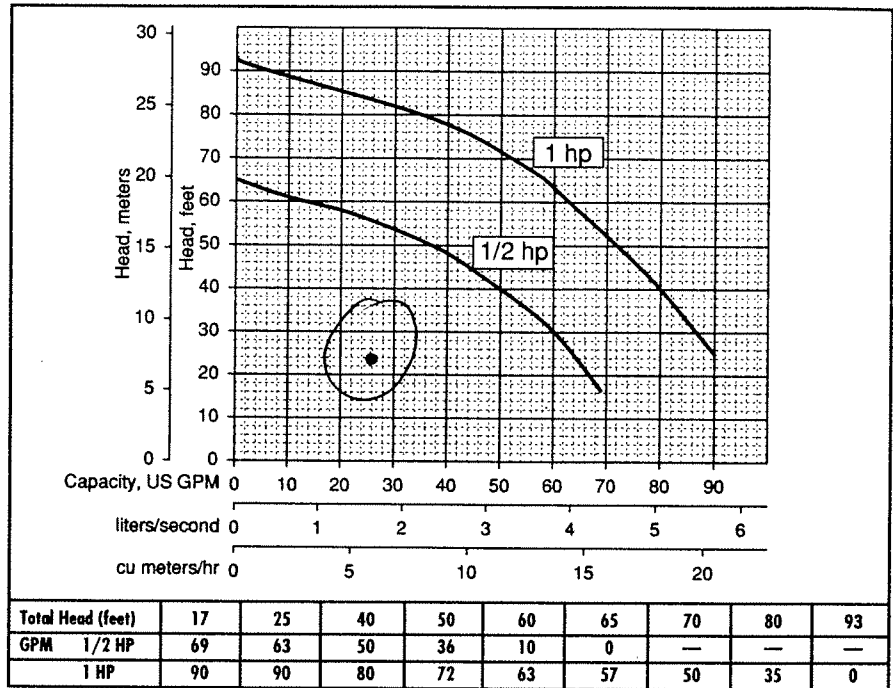


ENGINEERING DETAILS - SHEF50/100

Pump Characteristics

Pump/Motor Unit	Submersible				
Manual Models (50)	M1	M2	M3	M4	M5
Automatic Models	A1	A2	-	-	-
Horsepower	1/2				
Full Load Amps	15.0	7.6/7.1	3.2/3.1	1.6	1.2
Motor Type	Capacitor Start				
R.P.M.	3450				
Phase	1 Ø		3 Ø		
Voltage	115	208-230	208-230	460	575
Manual Model (100)		M2	M3	M4	M5
Automatic Models		A2	-	-	-
Horsepower	1				
Full Load Amps		13.6/12.1	6.0/5.8	2.8	1.9
Motor Type	Capacitor Start				
RPM	3450				
Phase	1 Ø		3 Ø		
Voltage		208-230	208-230	460	575
Hertz	60				
Temperature	140° F Max Fluid Temp.				
NEMA Design	L		B		
Insulation	Class B				
Discharge Size	2" NPT Std.				
Solids Handling	3/4"				
Unit Weight	58 lbs. (50)		65 lbs. (100)		
Power Cord	115V, 14/3, SJTW-A; 230V, 1ø, 16/3 STW-A; 3ø, 16/4, STW-A, All cords 20' std. with 30' opt.				

Performance Data

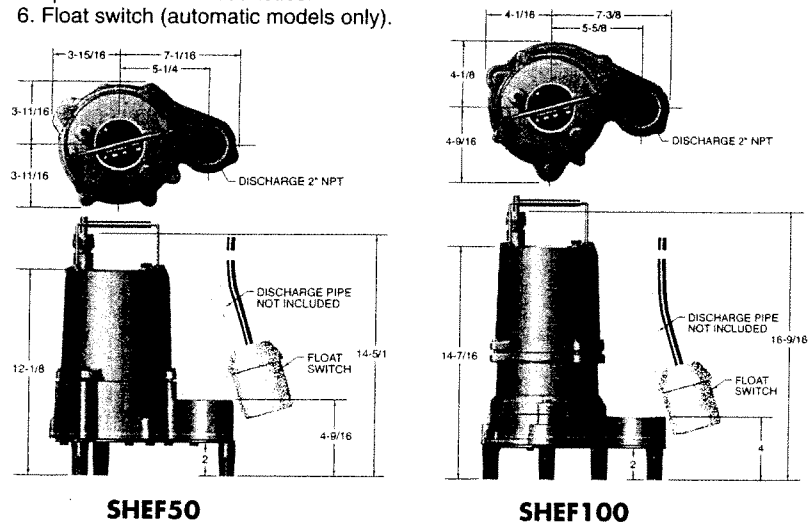


Materials of Construction

Handle	Stainless Steel
Lubricating Oil	Dielectric Oil
Motor Housing	Cast Iron
Pump Casing	Cast Iron
Shaft	Stainless Steel
Mechanical Shaft Seal	Seal Faces: Carbon/Ceramic Seal Body: Brass Spring: Stainless Steel Bellows: Buna-N
Impeller	Engineered Thermoplastic
Upper Bearing	Single Row Ball Bearing
Lower Bearing	Single Row Ball Bearing
Bottom Plate	Polyester Coated Steel
Fasteners	Stainless Steel
Legs	Engineered Thermoplastic

Dimensional Data

- All dimensions in inches.
- Component dimensions may vary +/- 1/8 inch.
- Not for construction purposes unless certified.
- Dimensions and weights are approximate.
- We reserve the right to make revisions to our products and their specifications without notice.
- Float switch (automatic models only).



AURORA/HYDROMATIC Pumps, Inc.

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