

# IMPROVEMENT PERMIT

Be it ordained by the Harnett County Board of Health as follows: Section III, Item B. "No Person shall begin construction of any building at which a septic tank system is to be used for disposal of sewage without first obtaining a written permit from the Harnett County Health Department."

Name: (owner) Mike Hamilton  New Installation  Septic Tank

Property Location: SR# 210 N  Repairs  Nitrification Line

Subdivision Northport Lot # 1

Tax ID # \_\_\_\_\_ Quadrant # \_\_\_\_\_

Number of Bedrooms Proposed: 3 Lot Size: \_\_\_\_\_

Basement with Plumbing:  Garage:

Water Supply:  Well  Public  Community

Distance From Well: 50 ft.

Following is the minimum specifications for sewage disposal system on above captioned property. Subject to final approval.

Type of system:  Conventional  Other low pressure p.p.e

Size of tank: Septic Tank: 1000 gallons <sup>1x105</sup> Pump Tank: 1000 gallons

Subsurface Drainage Field No. of ditches 5 exact length <sup>2x100</sup> of each ditch 1x92 ft. width of ditches 18 in depth of ditches 12 in.

French Drain Required: \_\_\_\_\_ Linear feet

Date: 12/5/2000

**This permit is subject to revocation if site plans or intended use change.**

Signed: Bryna McJannet P.S.  
Environmental Health Specialist

\* House location, system layout, and all system specifications are on attached paper work

HARNETT COUNTY HEALTH DEPARTMENT  
AUTHORIZATION TO CONSTRUCT

Authorization is hereby given to construct a wastewater system to the specifications described by Harnett County Health Department Improvement Permit # 16726. This authorization shall be valid for a period not to exceed five (5) years from the date of issuance. This authorization will be invalid if ownership, site plans, or intended use change.

Owner or Authorized Agent \_\_\_\_\_

Name: Mike Hamilton Telephone # 814-8400

Address: P.O. Box 3687 Brier Creek, N.C. 27506

Property Location: SR # 210 Road Name \_\_\_\_\_

New Installation  Repair  Septic Tank  Nitrification Lines

Subdivision Northport Lot # 1

Number of Bedrooms Proposed: 3 Lot size: 8/1Ac

Basement  With Plumbing  Without Plumbing

Water Supply: Well  Public  Minimum Well Setback: 50 ft.

Type of System: Conventional  Other Low Pressure Pipe

Tank Volume: Septic Tank 1000 gallons Pump Chamber 1000 gallons

**Nitrification Field Specifications**

Number of fields 1 Number of Lines per Field 5 Length of lines 1x105 1x82 2x100 1x92

Width of ditches 18 inches Depth of ditches 12 inches

French Drain: Linear feet required \_\_\_\_\_ Depth of gravel \_\_\_\_\_

No wastewater system shall be covered or placed into use by any person until an inspection by the Harnett County Health Department has determined that the system has been installed according to the conditions of the improvement permit and that a valid operations permit has been issued.

Authorized Agent for Harnett County Health Department

Name: Bryna McSwain R.S. Date: 12/5/2000

# Lot 1, Northport Subdivision

On-Site Wastewater Design Specifications

Prepared By: BCR  
 Bill Owen & Associates, Inc.  
 Civil & Environmental Scientists  
 P.O. Box 400, 266 Old Coats Rd.  
 Lillington, NC 27546-0400  
 Phone: (910) 893-8743

House Footprint: 30 x 50ft

Bedrooms: 3

Initial System: LPP

on contour at: 12in

LTAR: 0.15gpd/sqft

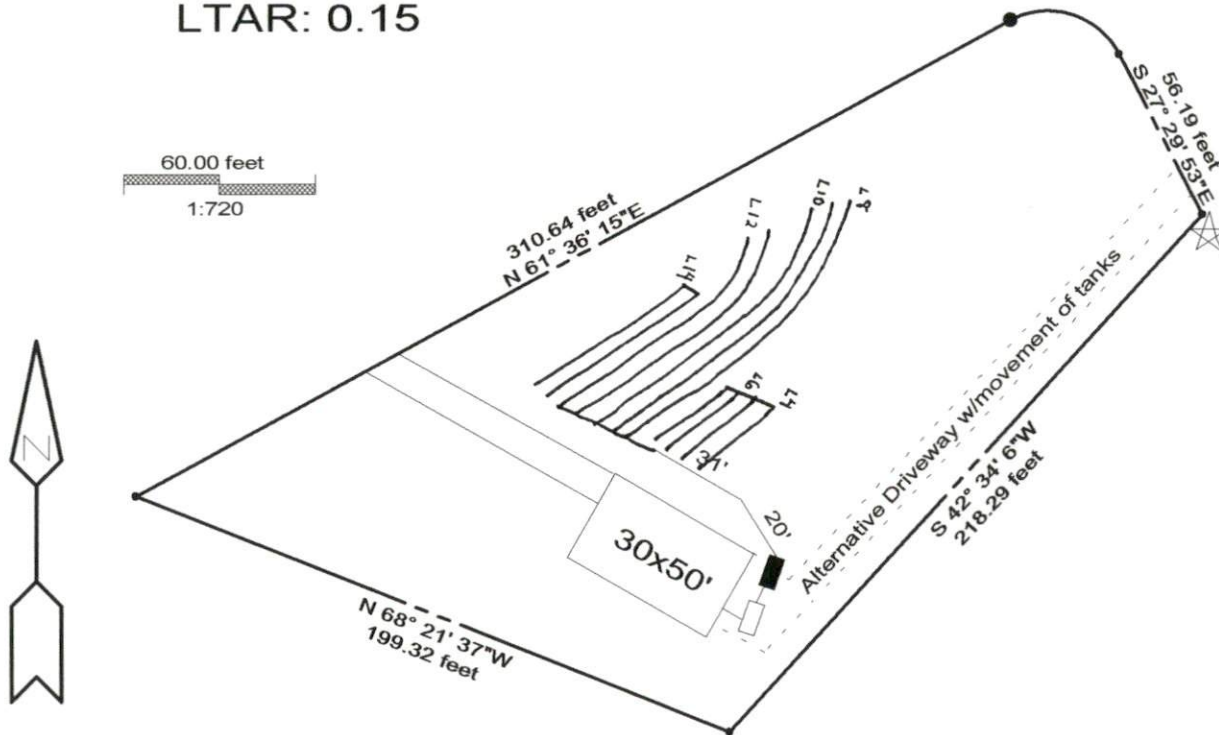
Repair System : LPP w/ pretreatment

on contour at: 12in

LTAR: 0.15

### LEGEND

☒ Pressure Manifold	□ Septic Tank
☆ EIP	■ Pump Tank
⊞ Step-down	○ D-Box



Lines flagged at site on 5-ft centers.

Initial/Repair	Line#	Line Color	Drainline Length(ft)	Measured Field Line Length(ft)	Relative Elevation(ft)
	L1	W	0	42	98.1
	L2	B	0	44	97.7
	L3	Y	0	45	97.5
Repair	L4	B	30	35	98.2
Repair	L5	Y	30	33	97.9
Repair	L6	R	30	43	97.7
Repair	L7	W	30	34	97.6
Initial	L8	B	105	108	97.3
Initial	L9	Y	100	101	97.1
Initial	L10	R	100	101	96.9
Initial	L11	W	92	92	96.8
Initial	L12	B	82	84	96.6
Repair	L13	Y	60	80	96.5
Repair	L14	W	60	60	96.3
Pump T					98.09
		<b>Total:</b>	<b>720</b>	<b>902</b>	☆ EIP = 100.00

\*\* The unsuitable soil area has been transferred from a hand-drawn map and is approximate.

## Low Pressure Pipe Distribution Flow Sheet

Initial/Repair	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	Subfields	
Initial	L8	B	105	97.3	0	4	5/32	0.57	11.97	0.114	21	4.5	7.5	1	
Initial	L9	Y	100	97.1	0.2	4.2	5/32	0.58	11.02	0.1102	19	5	5	1	
Initial	L10	R	100	96.9	0.4	4.4	5/32	0.60	10.2	0.102	17	5	10	1	
Initial	L11	W	92	96.8	0	4	5/32	0.57	9.69	0.105	17	5	6	2	
Initial	L12	B	82	96.6	0.2	4.2	5/32	0.58	8.12	0.099	14	5.5	5.25	2	
Pump Tank =			98.09	% Decrease of gpm/ft from top line to bottom line=						<b>13.2%</b>					
Repair	L4	B	30	98.2	0	4	5/32	0.57	5.13	0.171	9	3	3	1	
Repair	L5	Y	30	97.9	0.3	4.3	5/32	0.59	4.72	0.157	8	3	3.5	1	
Repair	L6	R	30	97.7	0.5	4.5	5/32	0.61	4.27	0.142	7	3	6	1	
Repair	L7	W	30	97.6	0.6	4.6	5/32	0.617	3.70	0.123	6	3	7.5	1	
Repair	L13	Y	60	96.5	0	4	5/32	0.57	8.55	0.142	15	3	9	2	
Repair	L14	W	60	96.3	0.2	4.2	5/32	0.58	8.12	0.135	14	4	4	2	
Linear feet =			240	<b>**50% reduction in drainline for proposed pretreatment methods for the repair area.</b>				Ttl flow	34.49						

### Calculations:

Flow/Hole =  $11.79 d^2 h^{1/2}$

low/Lateral = (flow/hole) x #holes

gpm/ft = ((flow/hole) x #holes) / length

Vol. Dose= Sup Ln(d. vol) + 5(Lat Ln Vol)

Manifold Vol=(Manifold lengthxpip vol) /100

Sup.Ln(d)Vol= (Sup Ln. Length/100) x Pipe Size & Vol Table

Lat Ln Vol(1&1/4)=(Total linear footage/100)x Pipe Size & Vol Table

Prepared By:  
Hal Owen and Associates  
P.O Box 400  
266 Old Coats Road  
Lillington, NC 27546  
Phone: 910-893-8743  
Fax: 910893-3594

### Design Specifications

Sup.Line (d)Vol=	8.87
Lat. Line (d)Vol=	37.44
Manifold (d)Vol=	9.6
Vol.Dose Range	280.55 to 392.87
V. Dose=	280.55 @ 7x

Total Flow=	51
LTAR=	0.15 gpd/sqft
Run Time=	5.50min
Draw Down=	13.36in

Friction Hd(ft) =	2.3	Fitting Loss(ft)=	0.46
Elevation Head(ft)=	4.25		
Pipe(ft) Friction=	1.92	Pressure Head(ft)=	4
Flush Head(ft)=	2	TDH(ft)=	13.01

Run Time=Vol. Dose/Total Flow

Draw Down= (Vol. Dose/(Pump Tank Volume)) x 4ft x 12in

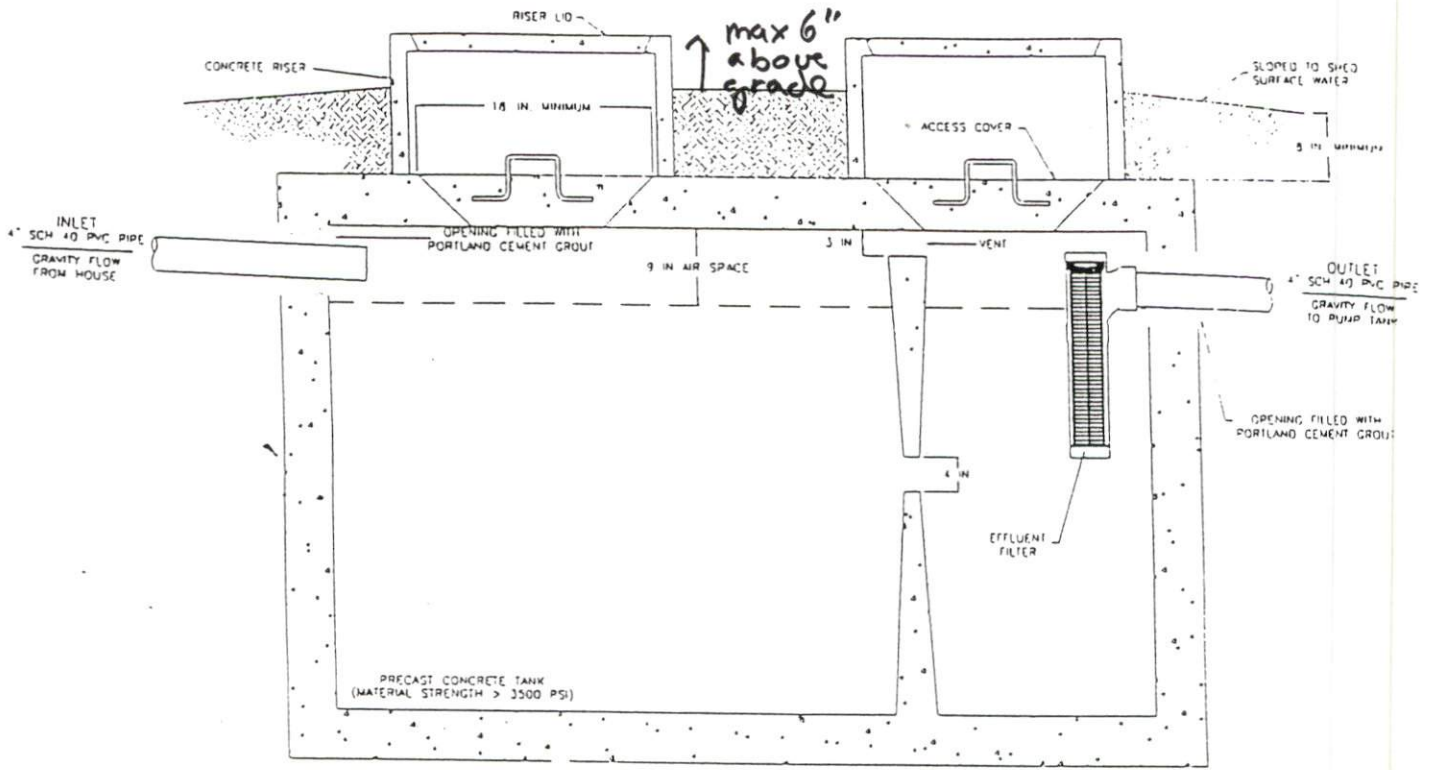
Pipe Friction= ((Sup Ln Length)/100) x Pipe Size and Vol Table

Friction Head(FH)= 1.2 x Pipe Friction    Fitting Loss(FL)= Friction Headx.2

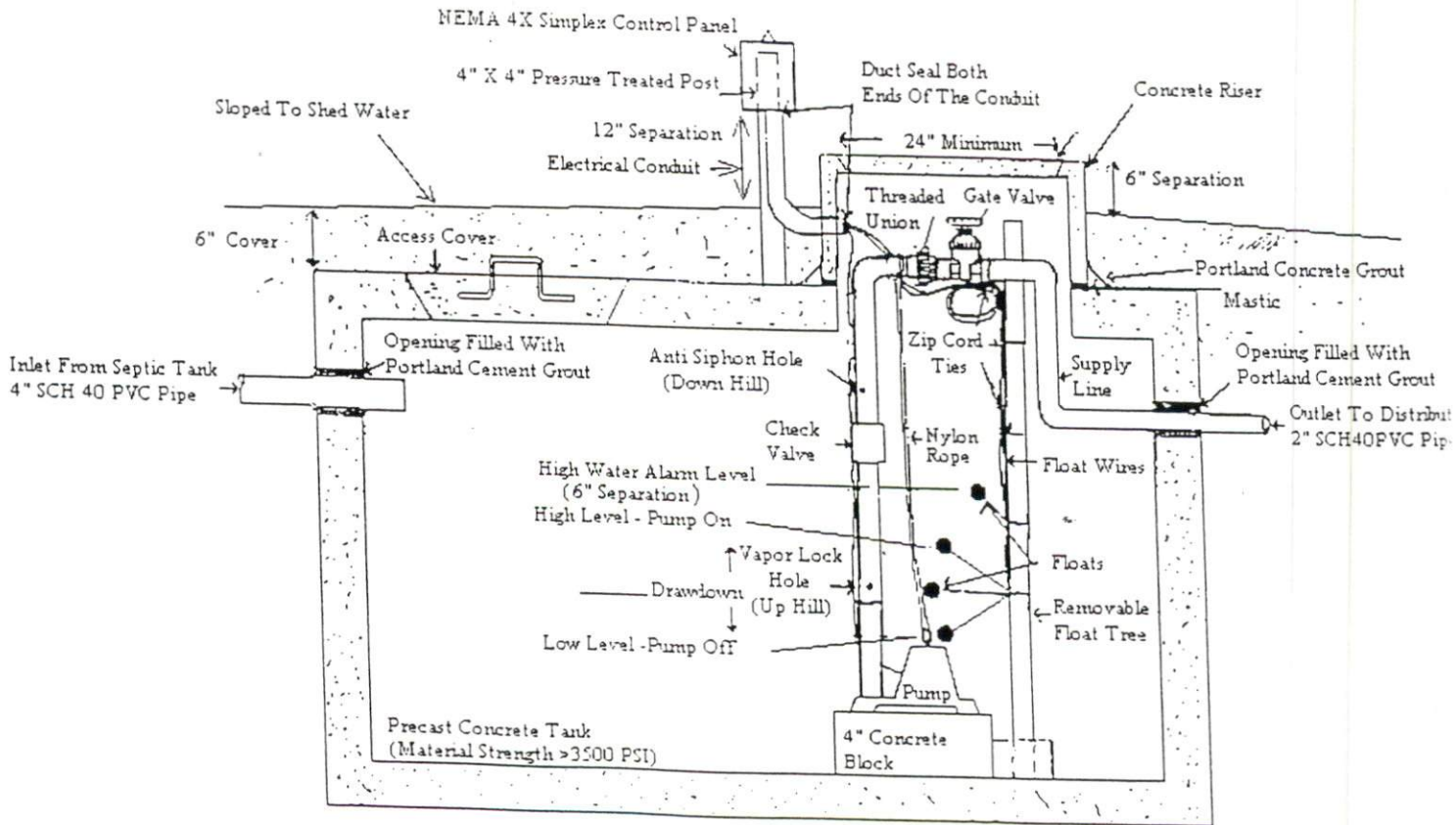
Elev Head(EH)=Manifold - (PTank - 5)    TDH=EH+FH+FL+P-Hd+Flush-Hd

# Septic Tank and Pump Tank Requirements

Lot 1 Northport Subdivision



1000 GALLON SEPTIC TANK



1000 GALLON PUMP TANK

112

MODEL 112

ALARMPACKAGE

- 0 = select options or no alarm package
- 1 = alarm package (includes test/normal/silence switch, fuse, red light, horn & float)

ENCLOSURERATING

- I = Indoor, NEMA 1 (metal)
- W = Weatherproof, NEMA 4X (engineered thermoplastic)

STARTINGDEVICE

- 1 = magnetic motor contactor 120/208/240V
- 9 = magnetic motor contactor 120V only

PUMP FULL LOAD AMPS

- 0 = 0-7 FLA
- 1 = 8-15 FLA
- 2 = 16-20 FLA
- 3 = 21-30 FLA

PUMP DISCONNECTS

- 0 = no pump disconnect
- 1 = pull-out with safety deadfront in a 10"x8" enclosure
- 4 = circuit breaker

FLOAT SWITCH APPLICATION

- H or L = pump down or pump up
- X = no floats

OPTIONS

Listed below

★ Options selected may increase enclosure size and change component layout.

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

CODE DESCRIPTION

- 1A Red beacon only / no audio  
*must select 1E if floats included*
- 1C Horn only / no visual  
*must select 1E if floats included*
- 1E Alarm float
- 3A Alarm flasher
- ★ 4A Low level cutout  
*select option 4D if floats included*
- ★ 4B Red low-level indicator & alarm  
*must select 4A also*
- 4D Low-level float
- 6A Auxiliary alarm contact, form C type
- ★ 8A Elapsed time meter
- ★ 8C Event (cycle) counter
- 10E Lockable latch - NEMA 4X
- 10E Lockable latch - NEMA 1
- ★ 10F Lightning arrester
- ★ 10K Anti-condensation heater

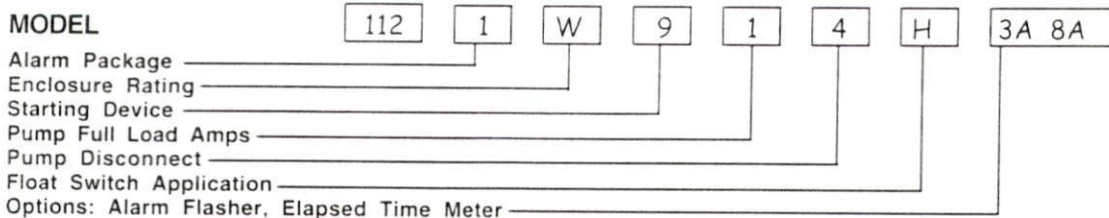
CODE DESCRIPTION

- 11C NEMA 1 alarm panel *must select option 6A*
- 11D NEMA 4X alarm panel *must select option 6A*
- 15A Control / alarm circuit breaker  
*Does not include the circuit board as in standard.*
- 16A 10' cord in lieu of 20'
- 16B 15' cord in lieu of 20'
- 16C 30' cord in lieu of 20'
- 16D 40' cord in lieu of 20'
- 17A SJE SignalMaster® / mounting strap ●
- 17B SJE SignalMaster® / externally weighted ●
- 17C Sensor Float® / internally weighted ▲
- 17D Sensor Float® / externally weighted ▲
- 17E Sensor Float® Mini / pipe clamp ▲
- 17F Sensor Float® Mini / externally weighted ▲
- 19X Door mounted pump run indicator
- 21A Pumpmaster® in lieu of on/off switches ●
- 21B PumpMaster® Plus in lieu of on/off switches ●
- 21C Super Single® in lieu of on/off switches ▲
- 21D Double Float™ in lieu of on/off switches ▲

● Mechanically-activated ▲ Mercury-activated

SAMPLE

MODEL

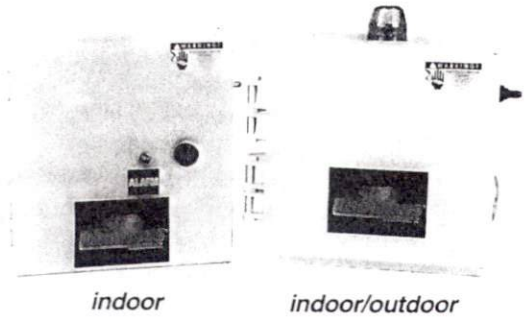


Lot 1 Northport

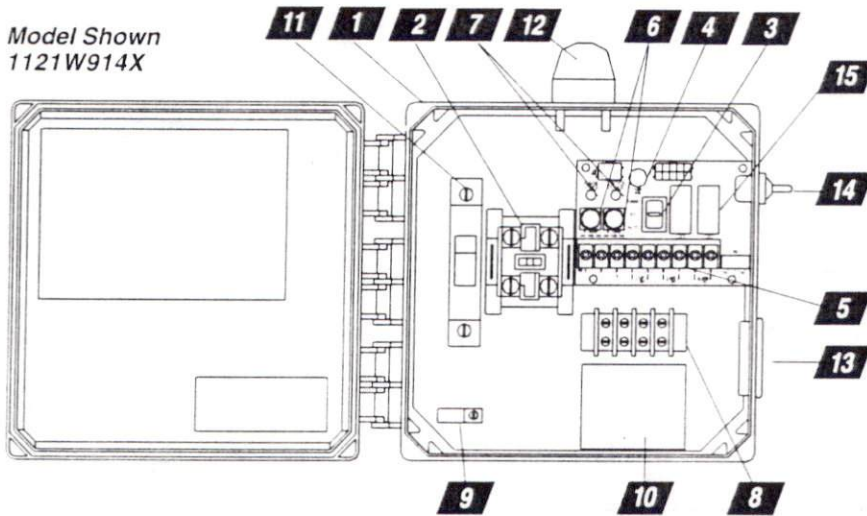
# MODEL 112 Control Panel

## 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.

### 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](http://www.sjerhombus.com)

# HYDROMATIC SPD50H/100H

Submersible Effluent Pump

- Septic Tank Effluent
- High-Capacity Sump
- High-Head Dewatering



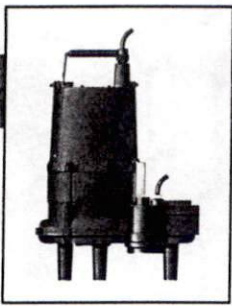
AURORA PUMP **GS**  
A UNIT OF GENERAL SIGNAL

© 1990 AURORA PUMP, NORTH AURORA, ILLINOIS

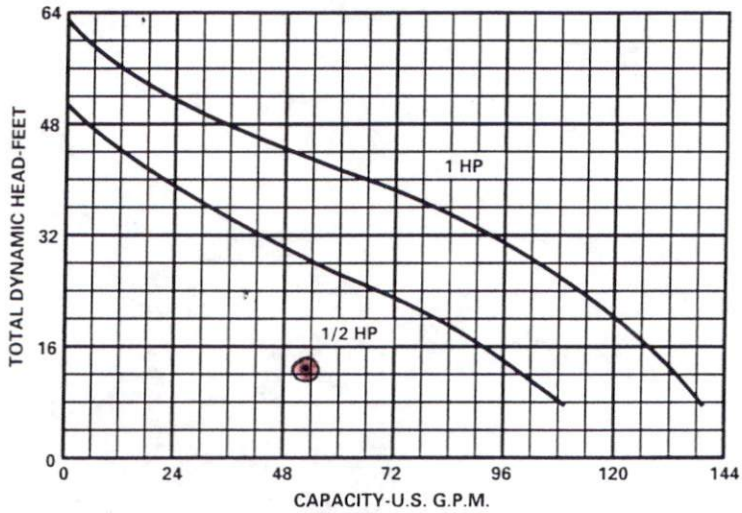


Lot 1 Northport

# ENGINEERING DETAILS - SPD50H/100H



## Performance Data



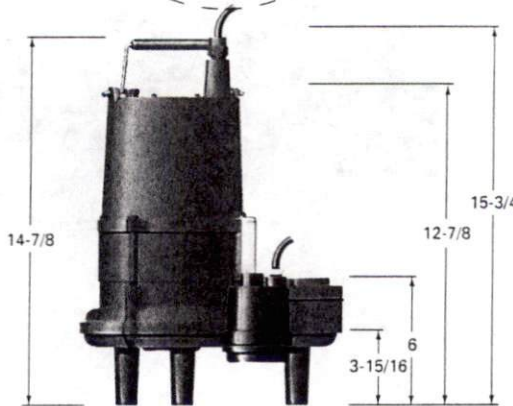
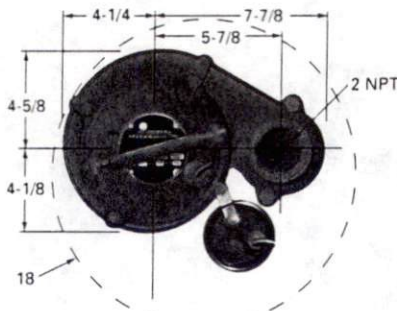
<b>Total Head (feet)</b>	<b>10</b>	<b>20</b>	<b>30</b>	<b>40</b>	<b>50</b>	<b>60</b>
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<b>GPM</b>	<b>1/2 HP</b>	<b>105</b>	<b>77</b>	<b>50</b>	<b>23</b>	<b>0</b>
	<b>1 HP</b>	<b>137</b>	<b>120</b>	<b>96</b>	<b>67</b>	<b>0</b>

## Pump Characteristics

Pump/Motor Unit	Submersible				
Manual Model (50)	MH1	MH2	MH6	MH4	MH5
Automatic Models	AH1	AH2	-	-	-
Horsepower	1/2				
Full Load Amps	15.0	7.5	4.0	1.8	1.5
Motor Type	Capacitor Start		Three-Phase		
R.P.M.	3450				
Phase Ø	1		3		
Voltage	115	230	200	460	575
Manual Model (100)	MH2	MH6	MH3	MH4	MH5
Automatic Models	AH2	-	-	-	-
Horsepower	1				
Full Load Amps	9.5	4.5	4.0	2.5	1.5
Motor Type	Cap.	Three-Phase			
R.P.M.	3450				
Phase Ø	1		3		
Voltage	230	200	230	460	575
Hertz	60				
Operation	Intermittent				
Temperature	140° F Ambient				
NEMA Design	B				
Insulation	Class B				
Discharge Size	2" NPT (3" opt.)				
Solids Handling	3/4"				
Unit Weight	73 lbs.				
Power Cord: SPD50H 14/3, SJTW-A, 1ø, 115V = 10' std. (20' opt.)-14/4, STW-A, 1ø, 115V = 10' std. (20' opt.)-16/3, STW-A, 1ø, 230V = 20' std.-16/4, STW-A, 1ø, 230V = 20' std. SPD100H 16/3, STW-A, 1ø, 230V = 20' std.-16/4, STW-A, 1ø, 230V = 20' std.-18/5, STW-A, 3ø, 200V, 230V, 460V or 575V = 20' std.					

## 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
- NOTE: Model SPD100AH2 utilizes wide-angle piggyback float switch for automatic operation.

## Materials of Construction

Handle	Steel
Lubricating Oil	Dielectric Oil
Motor Housing	Cast Iron
Seal 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	Cast Iron
Upper Bearing	Single Row Ball Bearing
Lower Bearing	Single Row Ball Bearing
Base	Cast Iron
Fasteners	Stainless Steel

**AURORA/HYDROMATIC Pumps, Inc.**  
 1840 Baney Road, Ashland, Ohio 44805  
 (419) 289-3042

"QUALITY PUMPS SINCE 1939"



# ZOELLER

## PUMP CO.



SECTION: 2.30.020

FM0390

1099

Supersedes

1097

Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

MAIL TO: P.O. BOX 16347 • Louisville, KY 40256-0347  
 SHIP TO: 3649 Cane Run Road • Louisville, KY 40211-1961  
 (502) 778-2731 • 1 (800) 928-PUMP • FAX (502) 774-3624

visit our web site:  
<http://www.zoeller.com>

### COMPARE THESE FEATURES

- Float operated, submersible (NEMA 6) 2-pole mechanical switch.
- Durable cast construction. ASTM Class 25 Cast iron, switch case, and pump housing
- Cast iron base on 267, 268, & 4270.
- Engineered Plastic base on 266 & 270.
- Non-Clogging Vortex Impeller Design. Engineered plastic impeller with metal inserts on models 266, 267 & 268 (1 Ph). Model 267 available with cast iron impeller option. (Cast iron impeller standard on 3 Ph models.) (Model 270/4270, Non-Clogging Bronze Vortex Impeller.)
- Not effected by materials normally found in drainage and sewage sumps.
- Stainless steel screws, bolts, handle, guard, and arm and seal assembly.
- UL Listed 3-wire neoprene cord and plug.  
 10 ft. cord standard for automatic.  
 15 ft. cord standard for Nonautomatic.
- Thermal overload protected on single phase pumps.
- Oil filled motor - hermetically sealed.
- Square Ring & Gasket - Neoprene.
- 266/267/268 Series - ½ HP 60 cycle, 1725 RPM.  
 270 Series - 1 HP 60 cycle, 3450 RPM.
- Carbon and ceramic shaft seal.
- Double seal pump available - 4270 Series.
- Oil lubricated bearings.
- Passes 2-inch sphere solids.
- 2" NPT Discharge.
- On point - 12". Off point - 4" (Automatic units).
- Engineered plastic base on all 266 and 270 models.
- Model 268 (shown below). Combination 2" and 3" discharge.  
 2" N.P.T. Female discharge / 3" N.P.T. Male discharge.
- Corrosion resistant powder coated epoxy finish.

SIMPLEX AND DUPLEX SYSTEMS AVAILABLE  
 PACKAGED SYSTEMS AVAILABLE

## 266 - 267 - 268 - 270 - 4270 Series

(For Pump Prefix Identification see News & Views 0052)

# "WASTE-MATE"

## SUBMERSIBLE SEWAGE/\*EFFLUENT PUMP

OR DEWATERING PUMP  
 2" NPT DISCHARGE



Automatic  
267

POWDER  
 COATED  
**TOUGH™**



Nonautomatic  
4270  
double seal pump

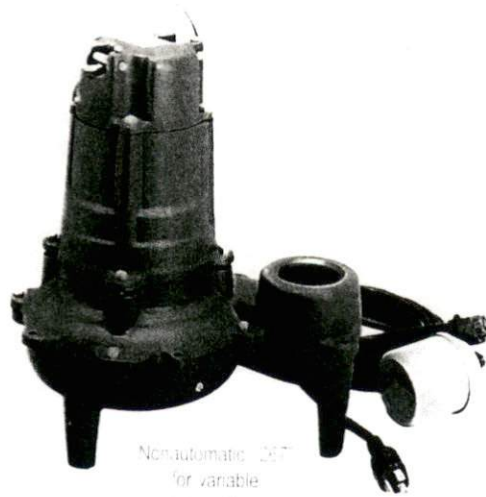


### FEATURES AVAILABLE

- Automatic (Not available in 270/4270)
- Nonautomatic (for variable level systems)
- Double Seal Pump in 4270, 115 or 230V, 1Ph, 1HP
- 2" NPT Discharge (2" & 3" Model 268)
- ½ H.P., 1 Ph, 115V, 200-208V, or 230V
- Passes 2" Solids
- BN and BE267 pumps available packaged with a Piggyback Variable Level Float Switch
- ½ H.P., 3 Ph, 200-208V, 230V, or 460V
- 1 HP, 1Ph, 115V & 230V 270/4270 models



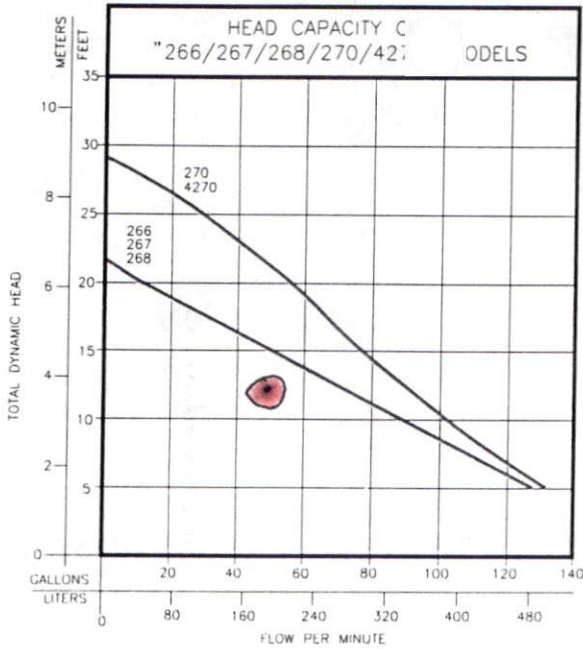
Automatic  
268



Nonautomatic 267  
for variable  
level systems

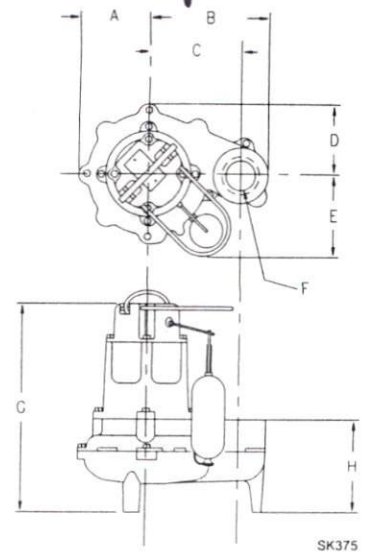
\* May be used in those states where codes do not restrict solids size in effluent systems.  
 \*\* See back page for UL & CSA listings

Lot 1 Northport



TOTAL DYNAMIC HEAD/CAI PER MINUTE SEWAGE AND DEWATER

MODELS 266/267/268				MODELS 270/4270	
Ft.	Meters	Gal.	Ltrs.	Gal.	Ltrs.
5	1.5	128	484	132	500
10	3.1	89	337	101	382
15	4.6	50	189	77	291
20	6.1	10	38	56	212
25	7.6	-	-	29	110
Lock Valve:			21.5'	29'	



MODEL	A	B	C	D	E	F	G	H
266	4-3/4	8-5/16	6-13/32	4-3/4	6-15/32	2"IPS	14-7/32	6-11/32
267	4-3/4	8-5/16	6-13/32	4-3/4	6-15/32	2"IPS	14-1/4	6-3/8
268	4-3/4	8-13/32	6-13/32	4-3/4	6-15/32	2"3/4IPS	14-1/4	8-11/16
270	4 3/4	8 5/16	6 13/32	4 3/4	N/A	2" IPS	15	6 1/4
4270	4 3/4	8 5/16	6 13/32	4 3/4	N/A	2" IPS	18 25/32	6 1/4

CONSULT FACTORY FOR SPECIAL APPLICATIONS

266 MODELS				Control Selection		Listings	
Model	Volts-Ph	Mode	Amps	Simplex	Duplex	CSA	UL
M266	115	1	10.4	1 or 1 & 8	---	Y	Y
N266	115	1	10.4	2 or 2 & 7	3 or 5 & 6	Y	Y
D266	230	1	5.5	1 or 1 & 8	---	Y	Y
E266	230	1	5.5	2 or 2 & 7	3 or 5 & 6	Y	Y
* H266	200-208	1	6.2	1 & 8	---	N	N
* I266	200-208	1	6.2	2 & 7	3 or 5 & 6	N	N
* J266	200-208	3	2.6	4 & 6	3 & 4 or 5 & 6	N	Y
* F266	230	3	2.6	4 & 6	3 & 4 or 5 & 6	N	Y
* G266	460	3	1.5	4 & 6	3 & 4 or 5 & 6	N	N

- Electrical alternators for duplex systems available with variable level control switches.
- Minimum recommended basin size (Small load applications)  
Simplex - 18" x 30"  
Duplex - 30" x 30".
- For Over 130° F. (54° C.) special quotation required.

Standard All Models -

- 266 - Weight 41 lbs. 1/2 H.P.
- 267 - Weight 50 lbs. 1/2 H.P.
- 268 - Weight 51 lbs. 1/2 H.P.
- 270 - Weight 49 lbs. 1 H.P.
- 4270 - Weight 73 lbs. 1 H.P.

- High water alarms available.
- Mechanical alternators available for duplex systems.
- Caution:** Maximum temperature of sewage or dewatering must be limited to 130° F. (54° C.)

267 MODELS				Control Selection		Listings	
Model	Volts-Ph	Mode	Amps	Simplex	Duplex	CSA	UL
M267	115	1	10.4	1 or 1 & 8	---	Y	Y
** BN267	115	1	10.4	2	---	Y	Y
N267	115	1	10.4	2 or 2 & 7	3 or 5 & 6	Y	Y
D267	230	1	5.5	1 or 1 & 8	---	Y	Y
E267	230	1	5.5	2 or 2 & 7	3 or 5 & 6	Y	Y
** BE267	230	1	5.5	2	---	Y	Y
* H267	200-208	1	6.2	1 & 8	---	N	N
* I267	200-208	1	6.2	2 & 7	3 or 5 & 6	N	N
* J267	200-208	3	2.6	4 & 6	3 & 4 or 5 & 6	N	Y
* F267	230	3	2.6	4 & 6	3 & 4 or 5 & 6	N	Y
* G267	460	3	1.5	4 & 6	3 & 4 or 5 & 6	N	N

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.
4. Simplex Control Panel. Refer to FM1596.
5. See FM0712, for correct model of Electrical Alternator, E-Pak.
6. Variable level control switch 10-0225 used as a control activator, specify simplex or duplex (3) or (4) float system.

268 MODELS				Control Selection		Listings	
Model	Volts-Ph	Mode	Amps	Simplex	Duplex	CSA	UL
M268	115	1	10.4	1 or 1 & 8	---	Y	Y
N268	115	1	10.4	2 or 2 & 7	3 or 5 & 6	Y	Y
D268	230	1	5.5	1 or 1 & C	---	Y	Y
E268	230	1	5.5	2 or 2 & 7	3 or 5 & 6	Y	Y
* H268	200-208	1	6.2	1 & 8	---	Y	N
* I268	200-208	1	6.2	2 & 7	3 or 5 & 6	Y	N
* J268	200-208	3	2.6	4 & 6	3 & 4 or 5 & 6	Y	Y
* F268	230	3	2.6	4 & 6	3 & 4 or 5 & 6	Y	Y
* G268	460	3	1.5	4 & 6	3 & 4 or 5 & 6	N	N

\*No molded plug \*\*Single piggyback switch included

270/4270* MODELS				Control Selection		Listings		
Model	Model	Volts-Ph	Mode	Amps	Simplex	Duplex	CSA	UL
N270	N4270	115	1	15.0	2 or 2 & 7	3 or 5 & 6	N	N
E270	E4270	230	1	7.5	2 or 2 & 7	3 or 5 & 6	N	N

For information on additional Zoeller products refer to catalog on Simplex Panels, FM1596; Piggyback Variable Level Switches, FM0477; Electrical Alternator, FM0486; Mechanical Alternator, FM0495; Sump/Sewage Basins, FM0487; Single Phase Alarm Systems, FM0732; Watertight Junctions Boxes, FM1597; and Disconnect & Rail Systems, FM0787.

**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.

## PIPELINE SIZE AND VOLUME

### A. Actual Inside Diameter (Inches)

Nominal Pipe Size (inches)	Outside Pipe Diameter (inches)	PVC Flexible Pressure Pipe				PVC Rigid Pipe		Corrugated Drainage Tile
		SDR32.5	SDR26	SDR21	SDR17	Sch.40	Sch.80	
1	1.315		1.195	1.189	1.161	1.049	.957	
1 ¼	1.660	1.54	1.532	1.502	1.464	1.380	1.278	
1 ½	1.90	1.78	1.754	1.72	1.676	1.610	1.50	
2	2.375	2.229	2.193	2.149	2.095	2.067	1.939	
2 ½	2.875	2.699	2.655	2.601	2.537	2.469	2.323	
3	3.50	3.284	3.23	3.166	3.088	3.068	2.90	
3 ½	4.0	3.754	3.692	3.62	3.53	3.548	3.364	
4	4.50	4.224	4.154	4.072	3.97	4.026	3.826	4.00
5	5.563	5.221	5.135	5.033	4.909	5.047	4.813	5.00
6	6.625	6.217	6.115	5.993	5.845	6.065	5.761	6.00
8	8.625	8.095	7.961	7.805	7.609	7.981	7.625	

### B. Volume Per 100 Feet (Gallons)

Nominal Pipe Size (inches)	PVC Flexible Pressure Pipe				PVC Rigid		
	SDR32.5	SDR26	SDR21	SDR17	Sch. 40	SCH.80	
1		5.8	5.8	5.5	4.5	3.7	
1 ¼	9.7	9.6	9.2	8.7	7.8	6.7	
1 ½	12.9	12.6	12.1	11.5	10.6	9.2	
2	20.3	19.6	18.8	17.9	17.4	15.3	
2 ½	29.7	28.8	27.6	26.3	24.9	22.0	
3	44.0	42.6	40.9	38.9	38.4	34.3	
3 ½	57.5	55.6	53.5	50.8	51.4	46.2	
4	72.8	70.4	67.7	64.3	66.1	59.7	65.3
5	111	108	103	98.3	104	94.5	102
6	158	153	147	139	150	135	147
8	267	259	249	236	260	237	

**NOTES:**

“SDR” means standard dimension ratio and is the ratio of outside pipe diameter to wall thickness.

Source: derived from ASTM Standards D-1785, D-2241, D-2729, and F-405

**FRICITION LOSS, IN FEET, THROUGH 100 FEET OF PLASTIC PIPE**  
Pipe Diameter (inches)

FLOW (GPM)	1"		1 1/4"		1-1/2"		2"		3"		4"		6"	
	160 PSI	SCH 40	160 PSI	SCH 40	160 PSI	SCH 40	160 PSI	SCH 40	160 PSI	SCH 40	160 PSI	SCH 40	160 PSI	SCH 40
1	.05	.09												
2	.17	.32	.05	.09										
3	.36	.68	.11	.18	.06	.08								
4	.62	1.17	.18	.31	.10	.14								
5	.93	1.76	.28	.46	.14	.22	.05	.06						
6	1.31	2.47	.39	.65	.20	.31	.07	.09						
7	1.74	3.28	.52	.86	.27	.41	.09	.12						
8	2.23	4.20	.66	1.10	.34	.52	.12	.15						
9	2.77	5.22	.83	1.37	.43	.65	.14	.19						
10	3.37	6.35	1.00	1.67	.52	.79	.17	.23						
11	4.01	7.57	1.20	1.99	.62	.94	.21	.28						
12	4.72		1.41	2.34	.73	1.10	.25	.33						
13	5.47		1.63	2.71	.84	1.28	.28	.38						
14	6.27		1.87	3.11	.97	1.47	.33	.43	.05	.06				
15	7.13		2.13	3.54	1.10	1.67	.37	.49	.06	.07				
16			2.39	3.98	1.24	1.88	.42	.56	.06	.08				
17			2.68	4.46	1.39	2.10	.47	.62	.07	.09				
18			2.98	4.95	1.54	2.34	.52	.69	.08	.10				
19			3.29	5.47	1.70	2.58	.57	.77	.09	.11				
20			3.62	6.02	1.87	2.84	.63	.84	.10	.12				
25			5.47		2.83	4.29	.95	1.27	.14	.19				
30			7.67		3.96	6.02	1.34	1.78	.20	.26	.06	.07		
35					5.27		1.78	2.37	.27	.35	.08	.09		
40					6.75		2.27	3.03	.35	.44	.10	.12		
45							2.83	3.77	.43	.55	.13	.15		
50							3.44	4.58	.52	.67	.15	.18		
60							4.81	6.42	.73	.94	.21	.25		
70							6.40		.97	1.25	.29	.33		
80									1.24	1.60	.37	.43	.06	.06
90									1.55	1.99	.45	.53	.07	.07
100									1.88	2.41	.55	.64	.08	.09
125									2.84	3.65	.83	.97	.13	.13
150									3.98	5.11	1.17	1.36	.18	.19
175									5.29	6.80	1.55	1.81	.24	.25
200									6.78		1.99	2.32	.30	.32
225											2.47	2.88	.38	.39
250											3.01	3.50	.46	.48
275											3.59	4.18	.55	.57
300											4.21	4.91	.64	.67
325											4.89	5.69	.74	.77
350											5.60	6.53	.85	.89
375											6.37	7.41	.97	1.01
400											7.17		1.09	1.14
425													1.22	1.27
450													1.36	1.41
475													1.50	1.56
500													1.65	1.72
550													1.97	2.05
600													2.31	2.40
650													2.68	2.79
700													3.07	3.20
750													3.49	3.63
800													3.93	4.09
850													4.40	4.58
900													4.89	5.09
950													5.41	5.63

NOTES:

160 PSI pipe assumed to be SDR 26

Computed by the Hazen Williams Formula, assuming C = 140:

$$h_f = \frac{0.00113 L Q^{1.85}}{D^{4.87}}$$

- $h_f$  = head loss (feet)
- $L$  = pipe length (feet)
- $Q$  = flow (GPM)
- $D$  = pipe inside diameter (inches)

ALLOWANCE IN EQUIVALENT LENGTH OF PIPE FOR FRICTION LOSS  
IN VALVES AND THREADED FITTINGS (ASA A40.8-1955)

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DIAMETER OF FITTING	90 DEG. STANDARD ELL	45 DEG. STANDARD ELL	90 DEG. STANDARD TEE	COUPLING OR STR. RUN OF TEE	GATE VALVE	GLOVE VALVE	ANGLE VALVE	CHECK VALVE
Inches	Feet	Feet	Feet	Feet	Feet	Feet	Feet	Feet
3/8	1	0.6	1.5	0.3	0.2	8	4	3
1/2	2	1.2	3	0.6	0.4	15	8	5
3/4	2.5	1.5	4	0.8	0.5	20	12	7
1	3	1.8	5	0.9	0.6	25	15	8
1 1/4	4	2.4	6	1.2	0.8	35	18	11
1 1/2	5	3	7	1.5	1.0	45	22	14
2	7	4	10	2	1.3	55	28	19
2 1/2	8	5	12	2.5	1.6	65	34	22
3	10	6	15	3	2	80	40	27
3 1/2	12	7	18	3.6	2.4	100	50	32
4	14	8	21	4.0	2.7	125	55	38
5	17	10	25	5	3.3	140	70	46
6	20	12	30	6	4	165	80	54

---

# FLOW RATE AS A FUNCTION OF PRESSURE HEAD AND HOLE DIAMETER IN DRILLED PVC PIPE

Pressure Head (feet)    (PSI)		Drilled Hole Diameter (inches)					
		3/32*	1/8**	5/32	3/16	7/32	1/4
		Flow Rate (gallons per minute)					
1	0.43	0.10	0.18	0.29	0.42	0.56	0.74
2	0.87	0.15	0.26	0.41	0.59	0.80	1.04
3	1.30	0.18	0.32	0.50	0.72	0.98	1.28
4	1.73	0.21	0.37	0.58	0.83	1.13	1.48
5	2.16	0.23	0.41	0.64	0.93	1.26	1.65
6	2.60	0.25	0.45	0.70	1.02	1.38	1.81

\* This size is not recommended

\*\*Not recommended for entire system, and only for relatively clear effluents

$$Q = 449 CA (2gh)^{1/2}$$

Where: Q = flow per orifice (gpm)  
 C = 0.6 for sharp-edged orifices  
 A = cross-sectional area of orifice (ft<sup>2</sup>)  
 g = gravitational constant = 32.2 ft/sec<sup>2</sup>  
 h = pressure head (ft)

$$Q = Q_1 + Q_2 + Q_3 + \dots + Q_n$$

$$TDH = E_H + F_H + P_H$$

$\begin{matrix} \text{elev.} & + & \text{friction} & + & \text{pressure} \\ \text{diff} & & \text{loss} & & \text{head} \end{matrix}$

$$Q = 1697.97 d^2 h^{1/2}$$

Where: Q = flow per orifice (gpm)  
 d = diameter of orifice (ft<sup>2</sup>)  
 h = pressure head (ft)

$$Q = 11.79 d^2 h^{1/2} \quad LPP$$

Where: Q = flow per orifice (gpm)  
 d = diameter of orifice (inches)  
 h = pressure head (ft)

$$Q = 13 d^2 h^{1/2} \quad PM$$

PIPE MANIFOLD TAP FLOW FOR SCHEDULE 40 PVC PIPE

TAP DIAMETER IN INCHES

HEAD (ft.)	TAP DIAMETER IN INCHES						
	3/4	1	1 1/4	1 1/2	2	2 1/2	3
1.5	0.622	1.049	1.380	1.610	2.067	2.469	3.068
1.6	6.16	17.5	30.3	41.3	68.0	97.1	150
1.7	6.36	18.1	31.3	42.6	70.3	100	155
1.8	6.56	18.7	32.3	43.9	72.4	103	160
1.9	6.75	19.2	33.2	45.2	74.5	106	164
2.0	6.93	19.7	34.1	46.4	76.6	109	169
2.1	7.11	20.2	35.0	47.7	78.5	112	173
2.2	7.29	20.7	35.9	48.8	80.5	115	177
2.3	7.46	21.2	36.7	50.0	82.4	118	181
2.4	7.63	21.7	37.5	51.1	84.2	120	186
2.5	7.79	22.2	38.4	52.2	86.0	123	190
2.6	7.95	22.6	39.1	53.3	87.8	125	193
2.7	8.11	23.1	39.9	54.3	89.6	128	197
2.8	8.26	23.5	40.7	55.4	91.3	130	201
2.9	8.42	23.9	41.4	56.4	92.9	133	205
3.0	8.56	24.4	42.2	57.4	94.6	135	208
3.1	8.71	24.8	42.9	58.4	96.2	137	212
3.2	8.86	25.2	43.6	59.3	97.8	140	215
3.3	9.00	25.6	44.3	60.3	99.4	142	219
3.4	9.14	26.0	45.0	61.2	101	144	222
3.5	9.27	26.4	45.7	62.1	102	146	226
3.6	9.41	26.8	46.3	63.0	104	148	229
3.7	9.54	27.1	47.0	63.9	105	150	232
3.8	9.67	27.5	47.6	64.8	107	152	235
3.9	9.80	27.9	48.3	65.7	108	154	239
4.0	9.93	28.3	48.9	66.5	110	157	242
4.1	10.1	28.6	49.5	67.4	111	158	245
4.2	10.2	29.0	50.1	68.2	112	160	248
4.3	10.3	29.3	50.7	69.1	114	162	251
4.4	10.4	29.7	51.3	69.9	115	164	254
4.5	10.5	30.0	51.9	70.7	117	166	257
4.6	10.7	30.3	52.5	71.5	118	168	260
4.7	10.8	30.7	53.1	72.3	119	170	262
4.8	10.9	31.0	53.7	73.1	120	172	265
4.9	11.0	31.3	54.2	73.8	122	174	268
5.0	11.1	31.7	54.8	74.6	123	175	271
5.1	11.2	32.0	55.4	75.3	124	177	274
5.2	11.4	32.3	55.9	76.1	125	179	276
5.3	11.5	32.6	56.5	76.8	127	181	279
5.4	11.6	32.9	57.0	77.6	128	182	282
5.5	11.7	33.2	57.5	78.3	129	184	284
5.6	11.8	33.5	58.1	79.0	130	186	287
5.7	11.9	33.9	58.6	79.7	131	188	290
5.8	12.0	34.2	59.1	80.5	133	189	292
5.9	12.1	34.5	59.6	81.2	134	191	295
6.0	12.2	34.7	60.1	81.9	135	192	297
	12.3	35.0	60.6	82.5	136	194	300

EQUATION :  $Q = 13.0d^2 h$

EXAMPLE : 1" SCHEDULE 40 TAP WITH 3.0 FEET OF HEAD

FLOW = 24.8 GPM



-----  
 PRESSURE MANIFOLD TAP FLOW FOR SCHEDULE 80 PIPE  
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HEAD (ft.)	TAP DIAMETER IN INCHES							
	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
1.5	4.75	8.77	14.6	26.0	35.8	59.9	85.9	134
1.6	4.90	9.05	15.1	26.9	37.0	61.8	88.7	138
1.7	5.05	9.33	15.5	27.7	38.1	63.7	91.5	143
1.8	5.20	9.60	16.0	28.5	39.2	65.6	94.1	147
1.9	5.34	9.87	16.4	29.3	40.3	67.4	96.7	151
2.0	5.48	10.1	16.8	30.0	41.4	69.1	99.2	155
2.1	5.62	10.4	17.3	30.8	42.4	70.8	102	158
2.2	5.75	10.6	17.7	31.5	43.4	72.5	104	162
2.3	5.88	10.9	18.1	32.2	44.4	74.1	106	166
2.4	6.00	11.1	18.4	32.9	45.3	75.7	109	169
2.5	6.13	11.3	18.8	33.6	46.2	77.3	111	173
2.6	6.25	11.5	19.2	34.2	47.2	78.8	113	176
2.7	6.37	11.8	19.6	34.9	48.1	80.3	115	180
2.8	6.48	12.0	19.9	35.5	48.9	81.8	117	183
2.9	6.60	12.2	20.3	36.2	49.8	83.2	119	186
3.0	6.71	12.4	20.6	36.8	50.7	84.7	122	189
3.1	6.82	12.6	21.0	37.4	51.5	86.1	124	192
3.2	6.93	12.8	21.3	38.0	52.3	87.4	125	196
3.3	7.04	13.0	21.6	38.6	53.1	88.8	127	199
3.4	7.15	13.2	22.0	39.2	53.9	90.1	129	202
3.5	7.25	13.4	22.3	39.7	54.7	91.4	131	205
3.6	7.35	13.6	22.6	40.3	55.5	92.7	133	207
3.7	7.45	13.8	22.9	40.8	56.3	94.0	135	210
3.8	7.55	14.0	23.2	41.4	57.0	95.3	137	213
3.9	7.65	14.1	23.5	41.9	57.8	96.5	139	216
4.0	7.75	14.3	23.8	42.5	58.5	97.8	140	219
4.1	7.85	14.5	24.1	43.0	59.2	99.0	142	221
4.2	7.94	14.7	24.4	43.5	59.9	100	144	224
4.3	8.04	14.8	24.7	44.0	60.7	101	145	227
4.4	8.13	15.0	25.0	44.5	61.4	103	147	229
4.5	8.22	15.2	25.3	45.0	62.0	104	149	232
4.6	8.31	15.4	25.5	45.5	62.7	105	150	234
4.7	8.40	15.5	25.8	46.0	63.4	106	152	237
4.8	8.49	15.7	26.1	46.5	64.1	107	154	240
4.9	8.58	15.8	26.4	47.0	64.7	108	155	242
5.0	8.67	16.0	26.6	47.5	65.4	109	157	244
5.1	8.75	16.2	26.9	48.0	66.1	110	158	247
5.2	8.84	16.3	27.1	48.4	66.7	111	160	249
5.3	8.92	16.5	27.4	48.9	67.3	113	162	252
5.4	9.01	16.6	27.7	49.3	68.0	114	163	254
5.5	9.09	16.8	27.9	49.8	68.6	115	165	256
5.6	9.17	16.9	28.2	50.2	69.2	116	166	259
5.7	9.25	17.1	28.4	50.7	69.8	117	167	261
5.8	9.33	17.2	28.7	51.1	70.4	118	169	263
5.9	9.41	17.4	28.9	51.6	71.0	119	170	266
6.0	9.49	17.5	29.2	52.0	71.6	120	172	268

EQUATION :  $q = 13.0d^{2.05}h$

EXAMPLE : 1" SCHEDULE 80 TAP WITH 3.0 FEET OF HEAD  
 FLOW = 20.6 GPM

## CONVERSION FACTORS

MULTIPLY	BY	TO OBTAIN
Acres	43,560	Square feet
Atmospheres	33.90	Feet of water
Centimeters	0.3937	Inches
Cubic feet	7.48052	Gallons
Cubic feet	28.32	Liters
Cubic feet/sec.	449	Gallons/Min.
Cubic meters	35.31	Cubic feet
Cubic meters	264.2	Gallons
Cubic meters	$10^3$	Liters
Cubic yards	27	Cubic feet
Cubic yards	202.0	Gallons
Feet	30.48	Centimeters
Feet	0.3048	Meters
Feet of water	62.43	Lbs/sq. ft.
Feet of water	0.434	PSI (lbs./sq. in.)
Gallons	3785	Cubic centimeters
Gallons	0.1337	Cubic feet
Gallons	3.785	Liters
Gallons water	8.3453	Pounds of water
Gallons/min.	$2.228 \times 10^{-3}$	Cubic feet/sec.
Gallons/min.	1440	Gallons/day
Gallons/min.	0.06308	Liters/sec.

Gallons/day	$6.944 \times 10^{-4}$	Gallons/min.
Gallons/day/sq.ft.	1.604	Inches/day
Grams	$2.205 \times 10^{-3}$	Pounds
Grams/liter	1000	Parts/million
Hectares	2.471	Acres
Horsepower	33,000	Foot-Lbs min.
Horsepower	0.7457	Kilowatts
Inches	2.540	Centimeters
Inches/day	0.6234	Gallons/day/sq.ft.
Kilograms	2.205	Lbs.
Kilowatts	1.341	Horsepower
Kilowatt-hours	$2.655 \times 10^6$	Foot-lbs.
Liters	$10^3$	Cubic centimeters
Liters	0.03531	Cubic feet
Liters	0.2642	Gallons
Meters	3.281	Feet
Milligrams/liter	1	Parts/million
Million gals./day	1.54723	Cubic ft sec.
Parts/million	8.345	Lbs/million gal.
Pounds	453.5024	Grams
Pounds of water	0.1198	Gallons
psi (lbs/sq.in.)	2.31	Feet of water
Square feet	$2.296 \times 10^{-5}$	Acres
Temp. ( $^{\circ}\text{C}$ ) + 17.78	1.8	Temp. ( $^{\circ}\text{F}$ )
Temp. ( $^{\circ}\text{F}$ ) - 32	5/9	Temp. ( $^{\circ}\text{C}$ )