

# Harnett County Department of Public Health

## Improvement Permit

A building permit cannot be issued with only an Improvement Permit

ISSUED TO: Davidson Homes, LLC

PROPERTY LOCATION: 16 Blue Monarch Ln. (Christian Light Rd. -  
SUBDIVISION Prince Place LOT # 22

NEW  REPAIR  EXPANSION

Site Improvements required prior to Construction Authorization Issuance:

Type of Structure: 4-Bedroom 50'x70.8' SFD

Proposed Wastewater System Type: 50% Reduction

Projected Daily Flow: 480 GPD

Number of bedrooms: 4 Number of Occupants: 8 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 NA feet

Permit valid for:  Five years  
 No expiration

Permit conditions:

Authorized State Agent: [Signature]

Date: 04/07/2022

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: Davidson Homes, LLC

PROPERTY LOCATION: 16 Blue Monarch Ln. (Christian Light Rd  
SUBDIVISION Prince Place LOT # 22

Facility Type: 4-Bedroom 50'x70.8' SFD  New  Expansion  Repair

Basement?  Yes  No Basement Fixtures?  Yes  No

Type of Wastewater System\*\* 50% Reduction Horizontal PPBPS Sys. (Initial) Wastewater Flow: 480 GPD

(See note below, if applicable )

50% Reduction Horizontal PPBP (Repair)

Installation Requirements/Conditions

Septic Tank Size 1000 gallons

Pump Tank Size 1200 gallons

Number of trenches 4

Exact length of each trench 70.50 feet

Trenches shall be installed on contour at a

Maximum Trench Depth of: 20 inches

(Trench bottoms shall be level to +/-1/4"

in all directions)

Trench Spacing: 9 Feet on Center

Soil Cover: 6 MIN inches

(Maximum soil cover shall not exceed

36" above the trench bottom)

Pump Requirements: \_\_\_\_\_ ft. TDH vs. \_\_\_\_\_ GPM

Aggregate Depth: NA inches below pipe

NA inches above pipe

NA inches total

Conditions: PROPOSAL BY MITCHELL ENVIRONMENTAL, P. A.

**WATER LINES (INCLUDING IRRIGATION) MUST BE 10FT. FROM ANY PART OF SEPTIC SYSTEM OR REPAIR AREA.  
NO UTILITIES ALLOWED IN INITIAL OR REPAIR DRAIN FIELD AREA.**

\*\*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: 04/07/2022

ANDREW CORBIN

Construction Authorization Expiration Date: 04/07/2027

Application # SFD2203-0101

## Harnett County Department of Public Health Site Sketch

Property Location: 16 Blue Monarch Ln. (Christian Light Rd. - SR 1412)

Issued To: Davidson Homes, LLC

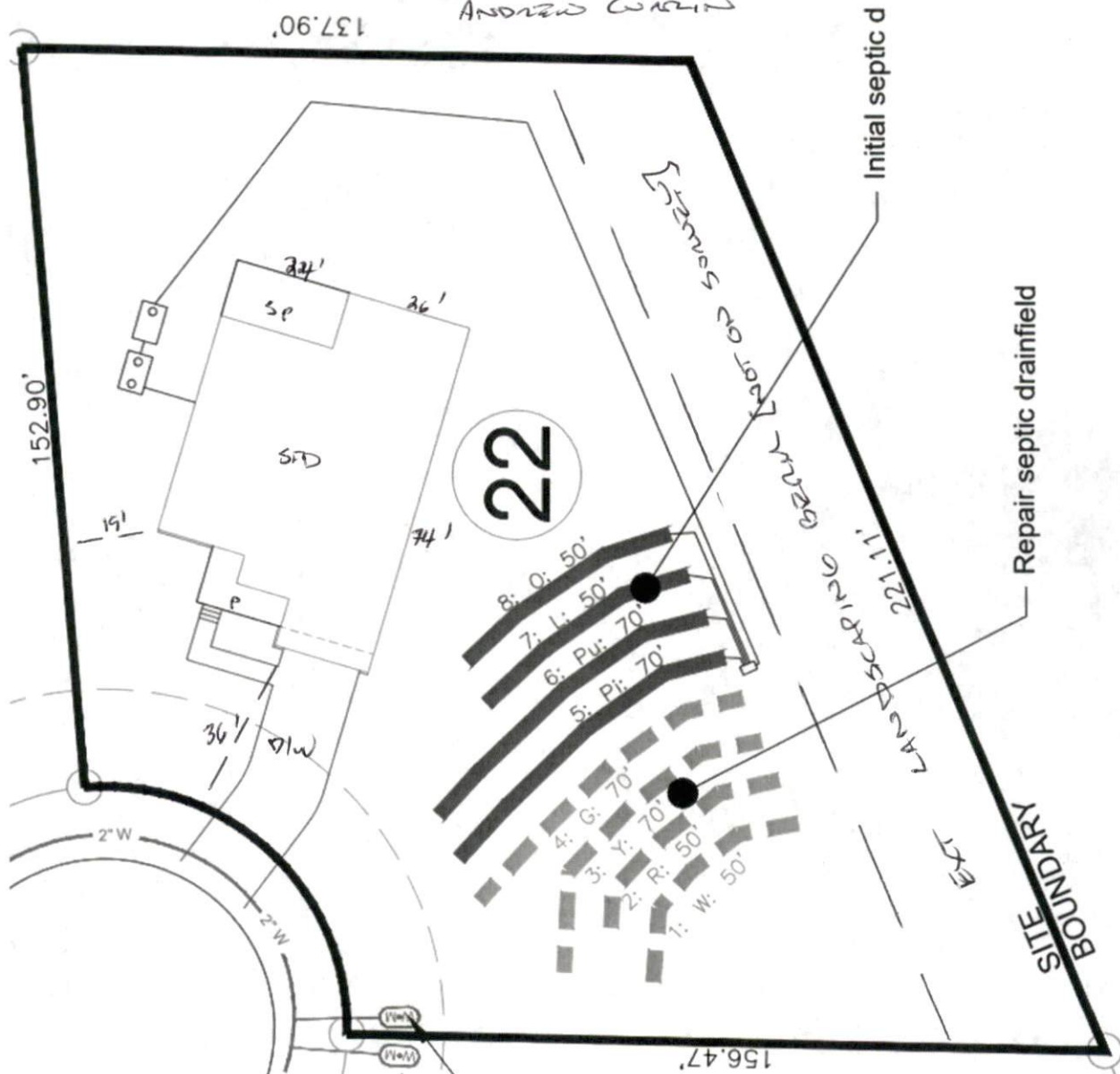
Subdivision Prince Place

Lot # 22

Authorized State Agent: \_\_\_\_\_

*Andrew Warren*  
ANDREW WARREN

Date: 04/07/2022



- \*PUMP TO PRESSURE MANIFOLD [SPECS ATTACHED]
- \*PROPOSAL BY MITCHELL ENVIRONMENTAL, P.A. [ATTACHED]
- \*50% REDUCTION HORIZONTAL PEBBLES SYSTEM

This drawing is for illustrative purposes only. System installation must meet all pertinent laws, rules, and regulations.

**Mitchell Environmental, P.A.**

**SEPTIC SYSTEM DESIGN**

**for**

**PRINCE PLACE SUBDIVISION- LOT 22**

**Fuquay-Varina, Harnett County, North Carolina**

**Submitted to:**

Harnett County Health Department  
307 Cornelius Harnett Blvd.  
Lillington, NC 27546

**Prepared for:**

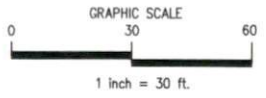
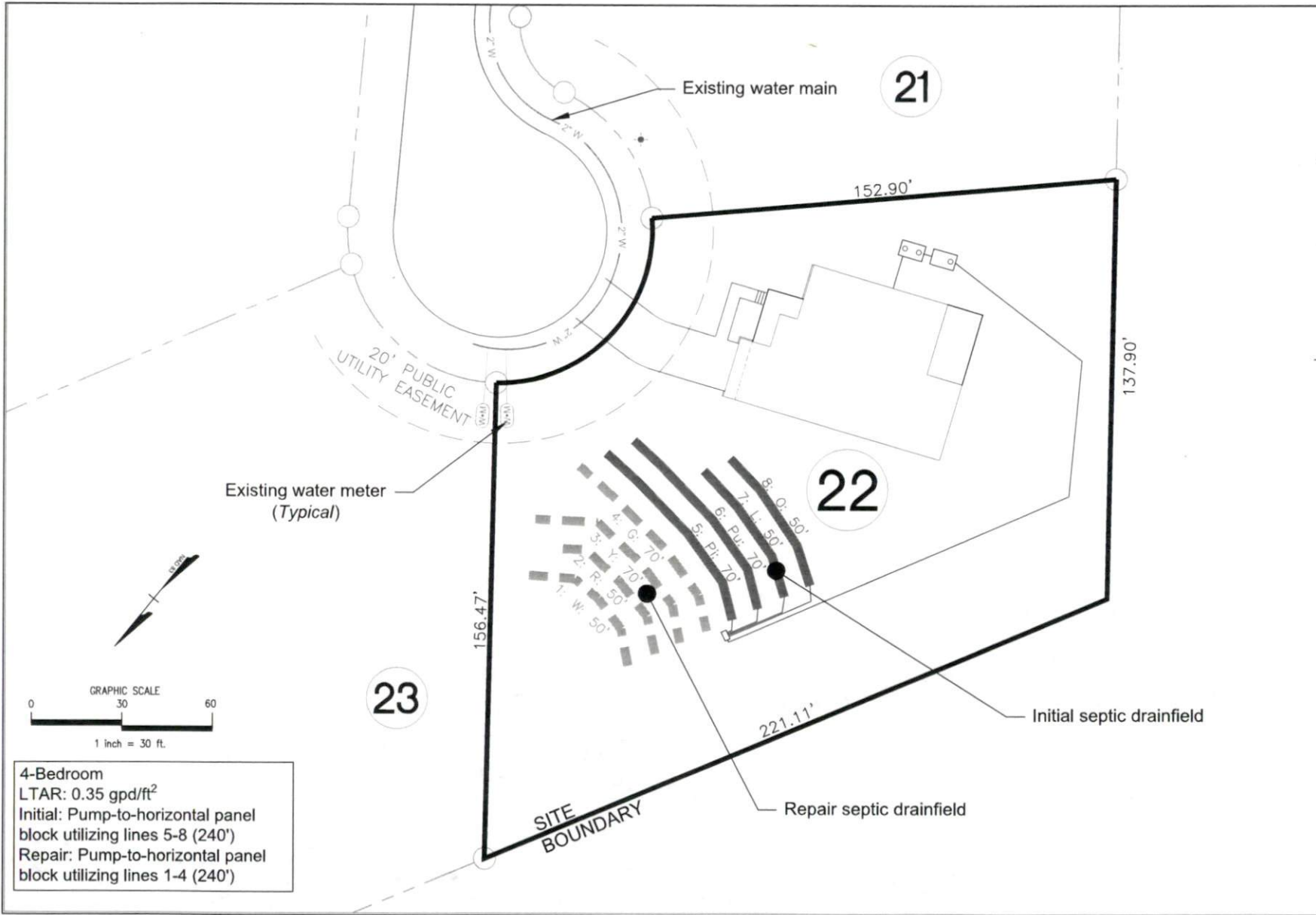
Davidson Homes, LLC  
336 James Record Road  
Huntsville, Alabama 35824

**Prepared by:**

Scott Mitchell, PE, LSS  
Adam Aycok, EI

**DATE: March 17, 2022**

**PROJECT NO.: 4321**



4-Bedroom  
 LTAR: 0.35 gpd/ft<sup>2</sup>  
 Initial: Pump-to-horizontal panel block utilizing lines 5-8 (240')  
 Repair: Pump-to-horizontal panel block utilizing lines 1-4 (240')

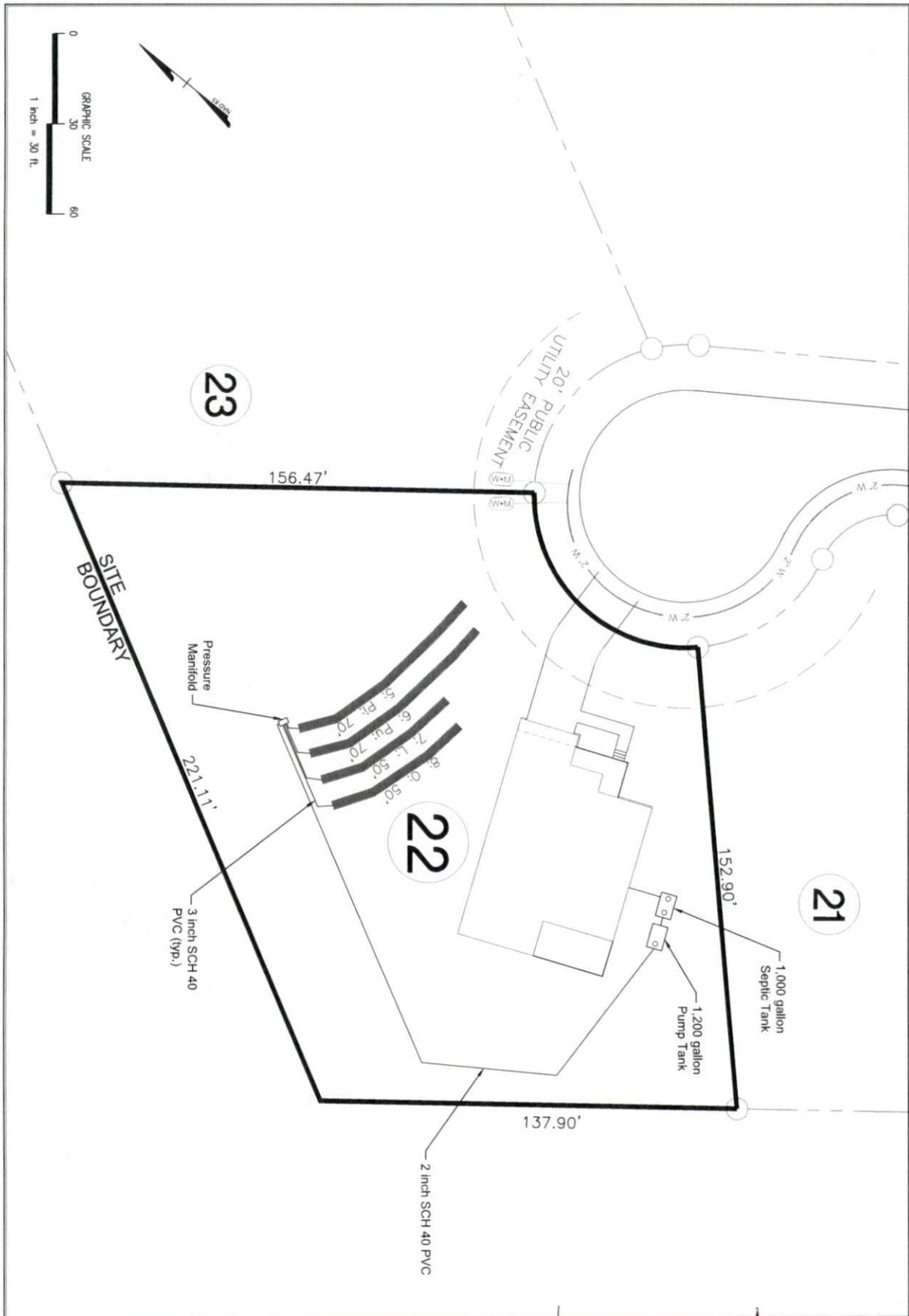
<b>MITCHELL ENVIRONMENTAL, PA</b> C-2911 1501 LAKESTONE VILLAGE LANE SUITE 205 FUQUAY VARINA, NC 27526	PREPARED FOR : Children Home and Good Samaritans, AL 35624	REVISION NO. Original Submittal	SHEET NUMBER 1 of 7
	DATE : March 17, 2022 ENGINEER AND SOIL SCIENTIST CONTACT: SCOTT MITCHELL, PE, LSS	REVISION 1 REVISION 2 REVISION 3	DATE March 17, 2022
	DRAWN BY: ADAM AYCOCK, D	MASTER SET	PROJECT Prince Place Lot 22 Overall Septic

**PRESSURE MANIFOLD DESIGN**

Name: Davidson Homes P.I.N. #: 0633-77-8619 D #: N/A  
 Address: 16 Blue Monarch Lane Subdiv: Prince Place Lot#: 22  
 # of BDR: 4 Daily Flow: 480 gal/day L.T.A.R.: 0.350 gal/day/sq.ft  
 Septic Tank: 1000 gals (min.) Pump Tank: 1200 gals (min.) Sq. Foot: 720 Stone Depth: N/A  
 Number of Taps: 4 Length of Trenches: Varies ft(See Tap Chart for Details) (Horizontal Panel Block)  
 Depth of Trenches: see Harnett County Permit Manifold Length: 42 in  
 Manifold Diameter: 4 in sch 80pvc (minimum) Tap Configuration: 6 in spacing 1 side(s) of manifold  
 Supply Line: length: 230 ft Diameter: 2 in sch 40pvc  
 Friction Loss + Fitting Loss: 4.53 ft(supply line length + 70' for fittings in pump tank)  
 Design Head: 2.0 ft Elevation Head: 9.74 ft  
 Vent Hole Size: 3/16 in Orifice Coefficient of Discharge: 0.60  
 Orifice Coefficient of Contraction: 0.62 Orifice Coefficient of Velocity: 0.97  
 Maximum Head Supplied by Selected Pump(s) at Total Design Flowrate: 22 ft  
 Orifice / Vent Hole Flowrate: 1.94 gpm Head Loss at Orifice / Vent Hole: 1.40 ft  
 Total Head: 17.67 ft Pump to Deliver: 27.12 gals/min at 17.67 ft head  
 Dosing Volume: 283.92 gals.  
 Drawdown: 283.92 gals divided by 19 gals/in = 14.94 inches  
 SJE Rhombus Installer Friendly Series simplex control panel, or equivalent, required  
 A septic tank filter, or equal is required.  
 Possible pumps: Hydromatic: Goulds: Myers:  
 Zoeller: 137 Other:

**TAP CHART**

Bench Mark	4.87	is = 100.00	set at	Top water meter lid			Design Head:	2.0		
Pump tank elev.		9.25	95.62	Pump elev.	90.62		Manifold elev.	100.36		
line	color	rod read	Elevation	length	hole size	flow/tap	gal/day	trench area	LINE	LTAR
5	Pink	5.01	99.86	70	1/2in SCH 40	7.11	135.54	210		0.6454
6	Purple	5.19	99.68	70	1/2in SCH 40	7.11	135.54	210		0.6454
7	Lime	5.38	99.49	50	1/2in SCH 80	5.48	104.46	150		0.6964
8	Orange	5.68	99.19	50	1/2in SCH 80	5.48	104.46	150		0.6964
		<b>total</b>	<b>feet =</b>	<b>240</b>	<b>gal/min =</b>	<b>25.2</b>		<b>LTAR =</b>		<b>0.3500</b>
<b>% of Pipe Vol.</b>		<b>182</b>		<b>Des. Flow</b>	480.00			<b>(Itar + 5%)</b>		0.3675
<b>Dose Volume</b>		283.92		<b>Pump Run=</b>	19.06			<b>(Itar W/ PB)</b>		0.7000
<b>Dose Pump Time</b>		11.28		<b>Tank Gal/IN</b>	19			<b>(Itar + 5%)</b>		0.7350
<b>Drawdown in Inches</b>		14.94		<b>Elev. Head</b>	9.74					
<b>Supply Line Length</b>		230								
<b>Comments:</b>										



 <p><b>MITCHELL ENVIRONMENTAL, PA</b> C-2911</p> <p>1501 LAKESTONE VILLAGE LANE SUITE 205 FUQUAY VARINA, NC 27526</p>	PREPARED FOR : Davidson Homes 336 James Record Road Huntsville, AL 35824	REVISION NO. Original Submittal Revision 1 Revision 2 Revision 3	DATE March 17, 2022 ----- ----- -----	<b>SHEET NUMBER</b>  2 of 7
	DATE : March 17, 2022	DRAWN BY : ADAM AYCOCK, EI	MASTER SET -----	
	ENGINEER AND SOIL SCIENTIST CONTACT: SCOTT MITCHELL, PE, LSS			

Repair System

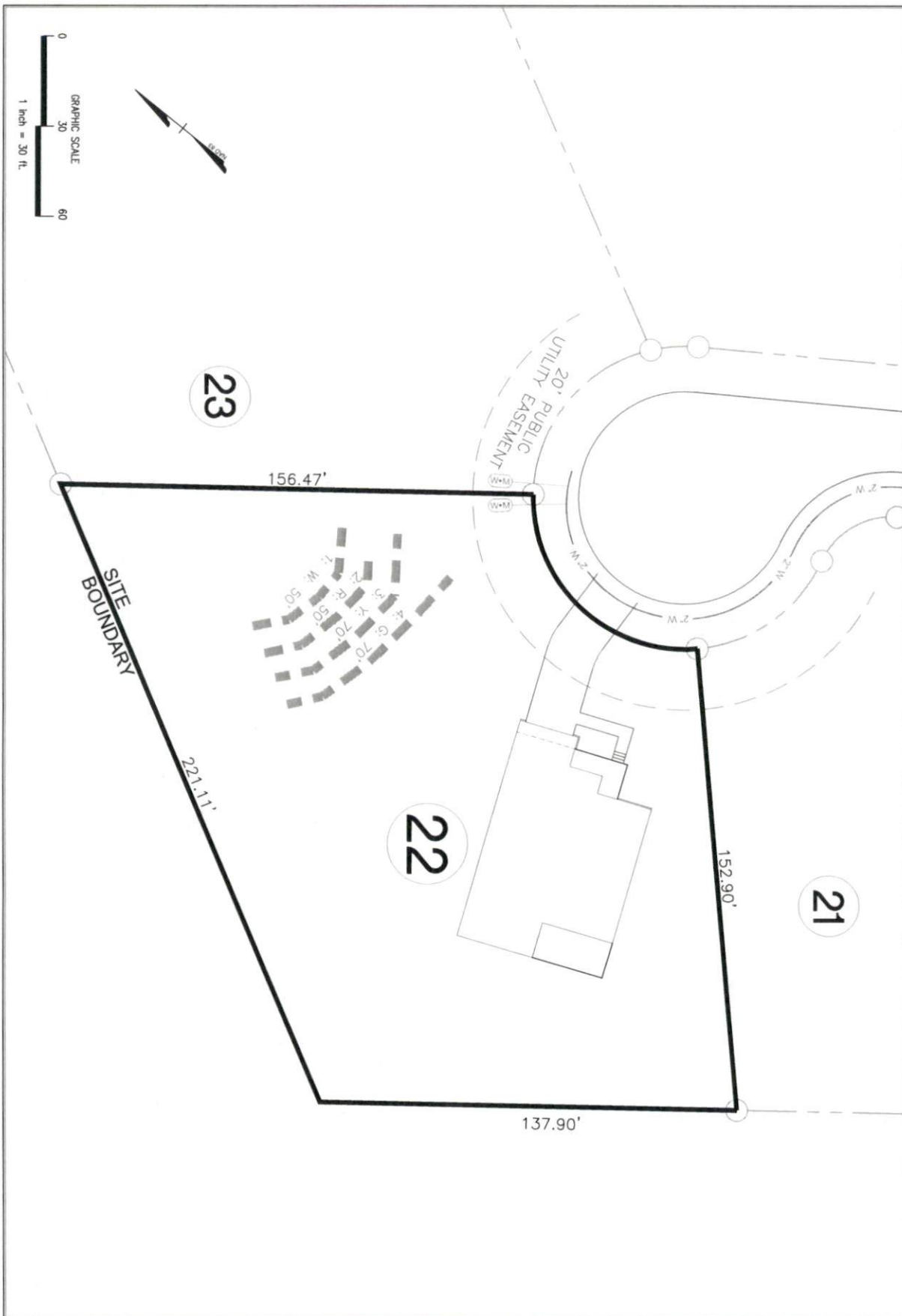
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 Depth of Trenches: see Harnett County Permit Manifold Length: 42 in  
 Manifold Diameter: 4 in sch 80pvc (minimum) Tap Configuration: 6 in spacing 1 side(s) of manifold  
 Supply Line: length: 265 ft Diameter: 2 in sch 40pvc  
 Friction Loss + Fitting Loss: 5.06 ft(supply line length + 70' for fittings in pump tank)  
 Design Head: 2.0 ft Elevation Head: 11.49 ft  
 Vent Hole Size: 3/16 in Orifice Coefficient of Discharge: 0.60  
 Orifice Coefficient of Contraction: 0.62 Orifice Coefficient of Velocity: 0.97  
 Maximum Head Supplied by Selected Pump(s) at Total Design Flowrate: 22 ft  
 Orifice / Vent Hole Flowrate: 1.94 gpm Head Loss at Orifice / Vent Hole: 1.40 ft  
 Total Head: 19.95 ft Pump to Deliver: 27.12 gals/min at 19.95 ft head  
 Dosing Volume: 283.92 gals.  
 Drawdown: 283.92 gals divided by 19 gals/in = 14.94 inches

SJE Rhombus Installer Friendly Series simplex control panel, or equivalent, required  
 A septic tank filter, or equal is required.  
 Possible pumps: Hydromatic: Goulds: Myers:  
 Zoeller: 137 Other:

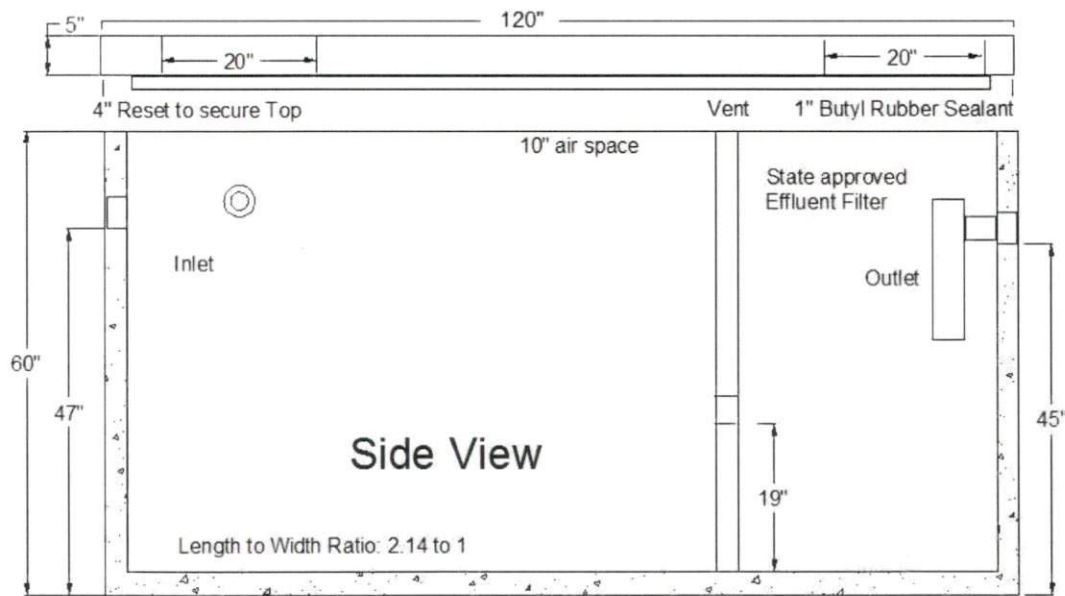
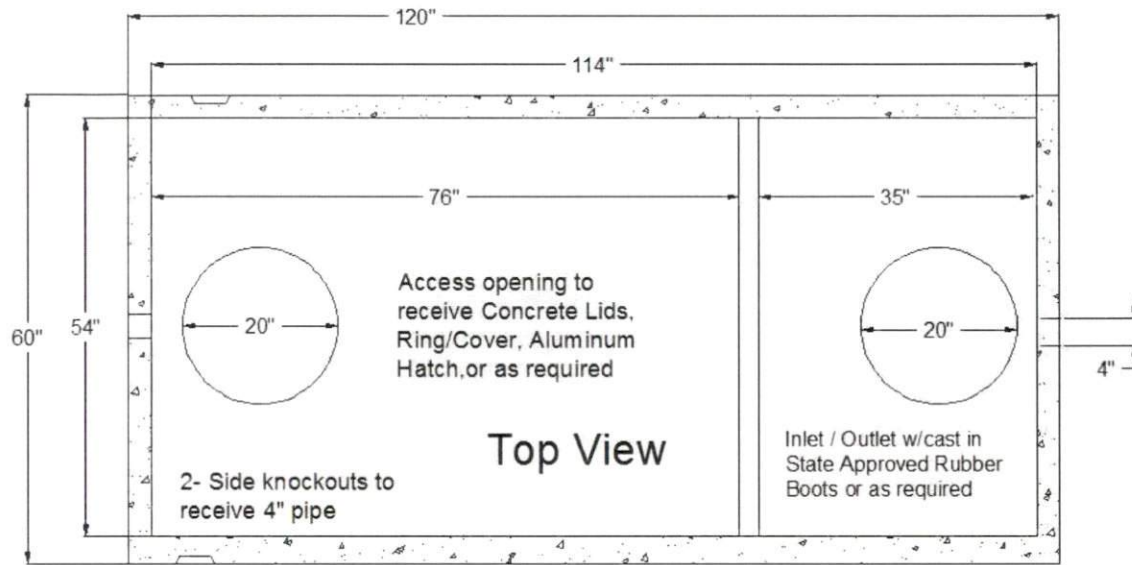
**TAP CHART**

Bench Mark	4.87	is = 100.00	set at	Top water meter lid			Design Head:	2.0	
Pump tank elev.	9.25	95.62	Pump elev.	90.62	Manifold elev.	102.11			
line	color	rod read	Elevation	length	hole size	flow/tap	gal/day	trench area	LINE LTAR
1	White	3.76	101.11	50	1/2in SCH 80	5.48	104.46	150	0.6964
2	Red	4.13	100.74	50	1/2in SCH 80	5.48	104.46	150	0.6964
3	Yellow	4.30	100.57	70	1/2in SCH 40	7.11	135.54	210	0.6454
4	Green	4.82	100.05	70	1/2in SCH 40	7.11	135.54	210	0.6454
<b>total</b>			<b>feet =</b>	<b>240</b>	<b>gal/min =</b>	<b>25.2</b>	<b>LTAR =</b>	<b>0.3500</b>	
% of Pipe Vol.	182		<b>Des. Flow</b>	480.00			<b>(Itar W/ PB)</b>	0.3675	
Dose Volume	283.92	3	<b>Pump Run=</b>	19.06			<b>(Itar W/ PB)</b>	0.7000	
Dose Pump Time	11.28		<b>Tank Gal/IN</b>	19			<b>(Itar + 5%)</b>	0.7350	
Drawdown in Inches	14.94		<b>Elev. Head</b>	11.49					
Supply Line Length	265								
Comments:									



 <p><b>MITCHELL ENVIRONMENTAL, PA</b> C-2911</p> <p>1501 LAKESTONE VILLAGE LANE SUITE 205 FUQUAY VARINA, NC 27526</p>	PREPARED FOR : Davidson Homes 336 James Record Road Huntville, AL 35824	REVISION NO. Original Submittal Revision 1 Revision 2 Revision 3 Master Set	DATE March 17, 2022 ----- ----- ----- -----	<b>SHEET NUMBER</b>  <p style="text-align: center;">3 of 7</p>
	DATE : March 17, 2022	ENGINEER AND SOIL SCIENTIST CONTACT: SCOTT MITCHELL, PE, LSS	DRAWN BY: ADAM AYOOK, EI	Prince Place Lot 22 Repair Nitrification Field





## STB - 345 - Top Seam

Approval Date: 12 - 09 - 99

Liquid Capacity 1007 Gallons

Non Traffic Rated

Reinforcing Schedule: # 3 Grade 60 Rebar

4500 PSI Concrete w/ State Approved Structural Fiber

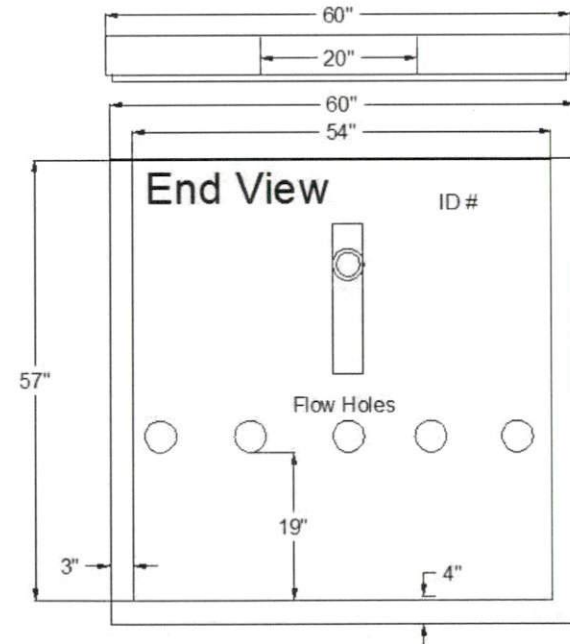
Est. Weight: 8,200 lbs.

Manufactured By:

**GARNERS**  
Septic Tanks, Inc.

Eddie Garner, President  
919-718-5181

121 Stanton Hill Road  
Carthage, NC 28327 Fax 919-775-2229  
Eddie@garnersseptic tanks.com





**PL-68 Filter and Tee**

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

**Features:**

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

**PL-68 Installation:**

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

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

**PL-68 Maintenance:**

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

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

**Related Products:**

PL-68 Filter Concrete Baffle  
 Extend & Lok<sup>TM</sup>



Extend & Lok<sup>TM</sup>  
 Easily installs into existing tanks.



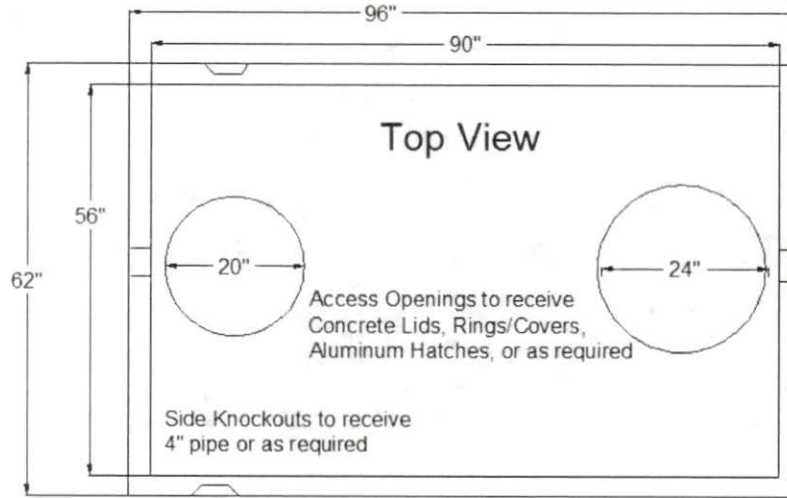
Spacer Bushing  
 4" SCHD 40 to SDR 35



Spacer Bushing  
 4" SCHD 40 to 110mm Pipe



2" Extender



## PT - 213 Top seam

Date: 08-18-93

Non Traffic Rated

Liquid Capacity **1,211 Gallons**

Reinforcing Schedule: # 3 Grade 60 Rebar

4500 PSI Concrete w/ State Approved Structural Fiber

2.5 yds. Est. Weight 8,900 lbs. 19 gals. per in.

Manufactured By:

**GARNERS**  
Septic Tanks, Inc.

Eddie Garner, President

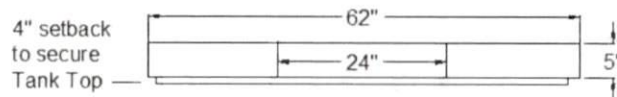
919-718-5181

121 Stanton Hill Road

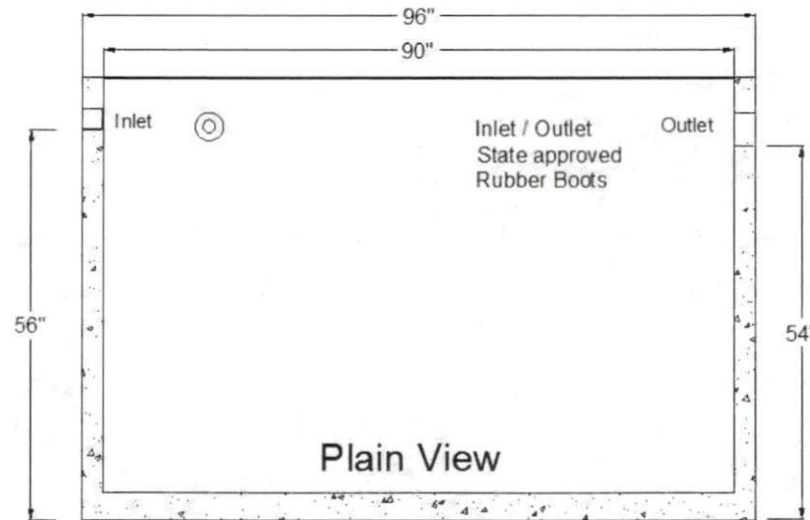
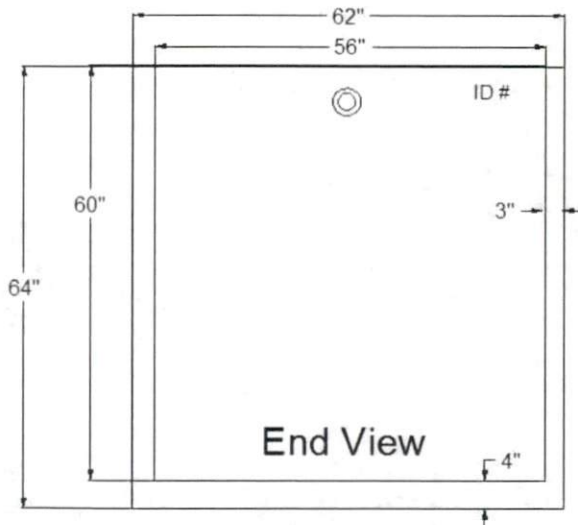
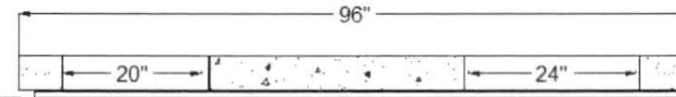
Carthage, NC 28327

Fax 919-775-2229

Eddie@garnersseptic tanks.com



1" Butyl Rubber Sealant in Jt.



# INSTALLER FRIENDLY SERIES® - IFS Single Phase Simplex (Demand/TD)

Single phase, simplex demand dose or timed dose, float controlled system for pump control and system monitoring.

The IFS simplex control panel is designed to control one 120, 208, 240 VAC single phase pump in water and sewage installations.

The IFS control panel features an easy-to-use touch pad with display on the inner door for programming and system monitoring.

The panel configuration can be easily converted in the field to either a timed dose or demand dose.

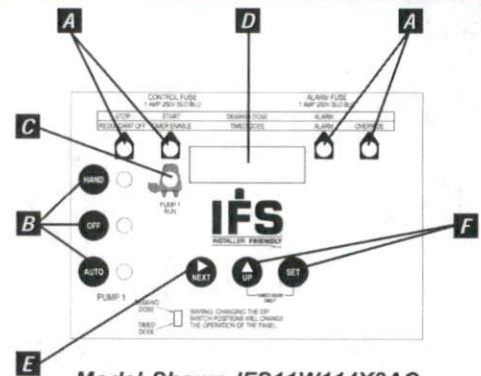
## TOUCH PAD FEATURES

- A. **Float Indicators** illuminate when floats are activated. Alarm will activate if a float operates out of sequence.
- B. **HOA (Hand-Off-Automatic) Buttons** control pump mode with indication. Hand mode defaults to Automatic when stop level or redundant off level is reached.
- C. **Pump Run Indicator** illuminates when pump is called to run.
- D. **LED Display** shows system information including: mode, pump elapsed time (hh:mm), events (cycles), alarm counter, float error count, timed dose override counter (timed dose only), and ON/OFF times (timed dose only).
- E. **NEXT Push Button** toggles display.
- F. **UP and SET Push Buttons** set pump ON/OFF times (timed dose only).

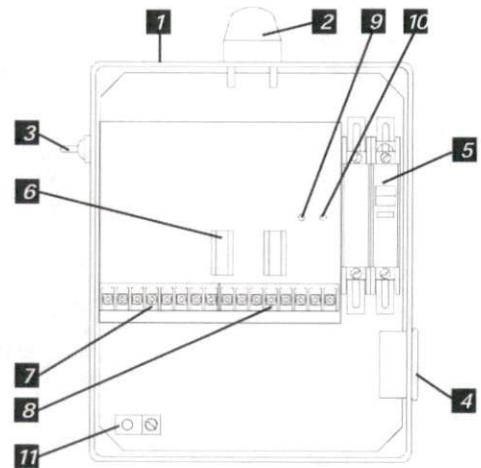
## PANEL COMPONENTS

1. **Enclosure base** measures 10 X 8 X 4 inches (25.4 X 20.32 X 10.16 cm). NEMA 4X (ultraviolet stabilized thermoplastic with removable mounting feet for outdoor or indoor use). **Note:** Options, voltage, and amp range selected may change enclosure size and component layout.
2. **Red Alarm Beacon** provides 360° visual check of alarm condition.
3. **Exterior Alarm Test/Normal/Silence Switch** allows horn and light to be tested and horn to be silenced in an alarm condition. Alarm automatically resets once alarm condition is cleared.
4. **Alarm Horn** provides audio warning of alarm condition (83 to 85 decibel rating).
5. **Circuit Breaker** (optional) provides pump disconnect and branch circuit protection.
6. **Power Relay** controls pump by switching electrical lines. Definite purpose contactor used when pump full load amps are above 15.
7. **Float Connection Terminal Block**
8. **Incoming Control/Alarm Power & Pump Terminal Block**
9. **Control Power Indicator/Fuse** indicator light illuminates if control power is present in panel. Alarm will activate if control fuse is blown.
10. **Alarm Power Indicator/Fuse** indicator light illuminates if alarm power is present in panel.
11. **Ground Lug**

**NOTE:** Schematic/Wiring Diagram and Pump Specification Label are located inside the panel on enclosure cover



Model Shown IFS11W114X8AC (Inner door view)



Model Shown IFS11W114X8AC (Inside view)

Reg. Cdn Pat. & TM Off

## 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:
  - Demand Dose** - three 20' SJE MilliAmpMaster™ control switches
  - Timed Dose** - two 20' SJE MilliAmpMaster™ control switches
- Complete with step-by-step installation instructions
- Three-year limited warranty



# SJE Rhombus

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)

SEE BACKSIDE FOR COMPLETE LISTING OF AVAILABLE OPTIONS.

IFS 2 1 W Note Note 4 H 8AC, 10E, 10F 15A

**MODEL IFS**

**MODEL TYPE**

- 1 = SPLX TIMED DOSE (includes option 8AC standard)
- 2 = SPLX DEMAND DOSE (includes option 8AC standard)

**ALARM PACKAGE**

- 1 = alarm package (includes test/normal/silence switch, fuse, red light & horn)

**ENCLOSURE RATING**

- W = NEMA 4X

**STARTING DEVICE**

- 1 = 120/208/240 VAC
- 9 = 120 VAC

**PUMP FULL LOAD AMPS**

- 0 = 0-7 FLA
- 1 = 7-15 FLA
- 2 = 15-20 FLA

**PUMP DISCONNECTS**

- 0 = no pump disconnect
- 4 = circuit breaker
  - 120 VAC (must select starting device option 9)
  - 120/208/240 VAC (must select starting device option 1)

**SWITCH APPLICATIONS**

- H = floats (Timed dose = low level and alarm / Demand dose = stop, start, and alarm) (select 17 option)
- X = no float
  - timed dose
  - demand Dose

**Note:** Pump down applications only.

**OPTIONS** *Listed below*

**Note:** Starting device, pump full load amps, cord length, and float type to be selected by installer and their electrician upon selection of pump.

*If additional features are required, call the factory for a quote on an Engineered Custom control panel.*

**CODE DESCRIPTION**

- 1J Duo alarm inputs
- 3A Alarm flasher
- 3B Manual reset alarm
- 4A Redundant off (select option 4D if floats are required) Demand Dose Timed Dose
- 4D Redundant off float
- 6A Auxiliary alarm contacts, form C
- 8AC Display board includes: ETM counter, events (cycles) counter, alarm counter, and override counter (timed dose only). **(Included as standard.)**
- 10E Lockable latch - NEMA 4X
- 10F Lightning arrestor (must select pump circuit breaker, control and alarm power combined)
- 10K Anti-condensation heater
- 11C NEMA 1 remote alarm panel (must select option 6A)

**CODE DESCRIPTION**

- 11D NEMA 4X remote alarm panel (must select option 6A)
- 15A Control / Alarm circuit breaker
- 16A 10' cord in lieu of 20' (per float)
- 16B 15' cord in lieu of 20' (per float)
- 16C 30' cord in lieu of 20' (per float)
- 16D 40' cord in lieu of 20' (per float)
- 17C Sensor Float® / internally weighted ▲ (per float)
- 17D Sensor Float® / externally weighted ▲ (per float)
- 17G MilliAmpMaster™ / pipe clamp ● (per float)
- 17H MilliAmpMaster™ / externally weighted ● (per float)
- 17J Sensor Float® / pipe clamp ▲ (per float)
- 18A Timer override option with float (timed dose only)

● Mechanically-activated ▲ Mercury-activated

**SAMPLE**

MODEL IFS 1 1 W 9 1 4 H 8AC 10E 17G

- Model Type
- Alarm Package
- Enclosure Rating
- Starting Device
- Pump Full Load Amps
- Pump Disconnects
- Switch Application
- Options: Display, Lockable Latch, SJE MilliAmpMaster™/pipe clamp

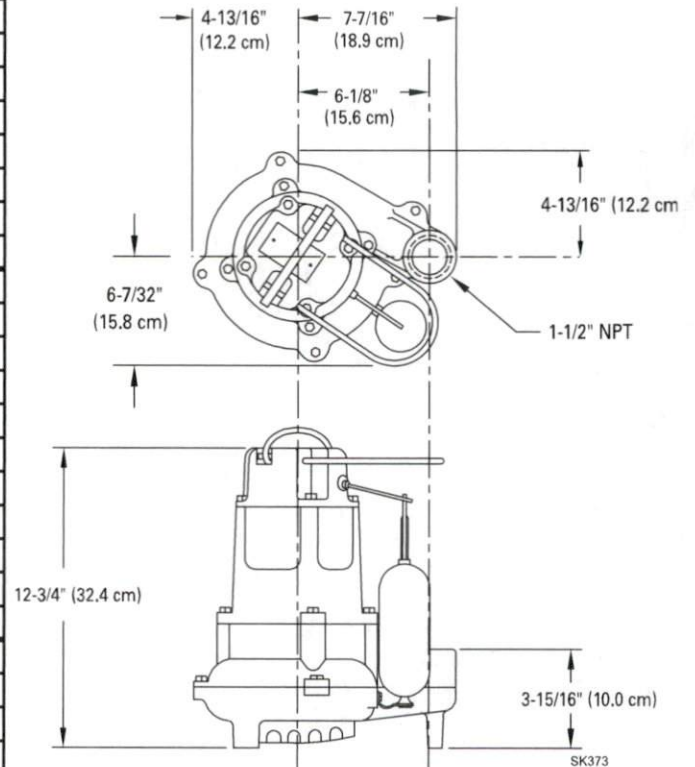
Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.



## TECHNICAL DATA SHEET FLOW-MATE SERIES Models 137, 139 Effluent / Dewatering Pumps

### PRODUCT SPECIFICATIONS

<b>MOTOR</b>	Horse Power	1/2
	Voltage	115 - 460
	Phase	1 or 3 Ph
	Hertz	60 Hz
	RPM	1750
	Type	Split phase or 3 phase
	Insulation	Class B
	Amps	1.4 - 10.7
<b>PUMP</b>	Operation	Automatic or nonautomatic
	Auto On/Off Points	10" (25.4 cm) / 2-3/4" (7 cm)
	Discharge Size	1-1/2" NPT
	Solids Handling	5/8" (15 mm) spherical solids
	Cord Length	10' (3 m) automatic, 15' (5 m) nonautomatic
	Cord Type	UL listed, neoprene cord
	Max. Head	26' (8 m)
	Max. Flow Rate	93 GPM (352 LPM)
	Max. Operating Temp.	130° F (54° C) [extra duty 140° F (60° C)]
	Cooling	Oil filled
<b>MATERIALS</b>	Motor Protection	Auto reset thermal overload (1 Ph)
	Motor Housing	Cast iron (137) or bronze (139)
	Pump Housing	Cast iron (137) or bronze (139)
	Base	Cast iron (137) or bronze (139)
	Upper Bearing	Sleeve bearing
	Lower Bearing	Sleeve bearing
	Mechanical Seals	Carbon and ceramic
	Impeller Type	Non-clogging vortex
	Impeller	Cast iron or bronze
	Hardware	Stainless steel
	Motor Shaft	AISI 1215 cold rolled steel
	Gasket	Neoprene

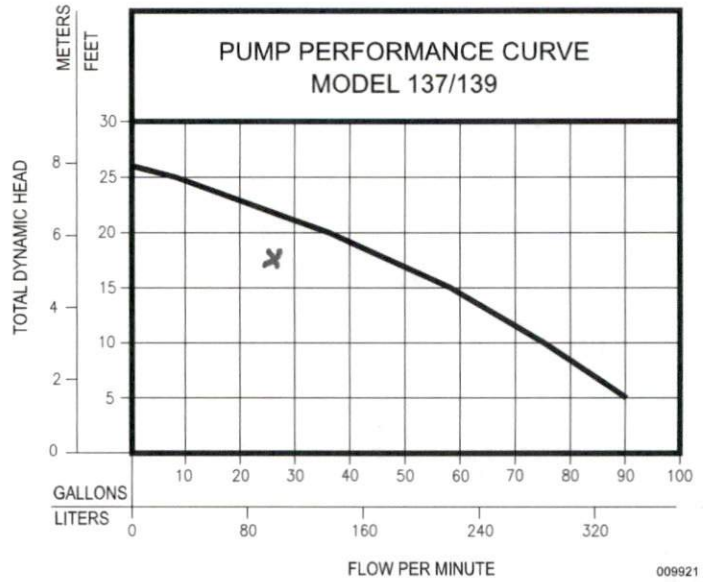


NOTE: See model comparison chart for specific details.



**TOTAL DYNAMIC HEAD  
FLOW PER MINUTE**

MODEL		137/139	
Feet	Meters	Gal.	Liters
5	1.5	90	340
10	3.0	75	284
15	4.6	58	220
20	6.1	36	136
25	7.6	8	30
Shut-off Head:		26 ft.(8.0m)	



Model	MODEL COMPARISON											CERTIFICATIONS	
	Seal	Mode	Volts	Ph	Amps	HP	Hz	Lbs	Kg	Simplex	Duplex	CSA	UL
M137	Single	Auto	115	1	10.7	1/2	60	47	21	1	4	Y	Y
N137	Single	Non	115	1	10.7	1/2	60	46	21	2 or 3	2 or 4	Y	Y
BN137	Single	Auto	115	1	10.7	1/2	60	48	22	**	4	Y	Y
D137	Single	Auto	230	1	5.8	1/2	60	47	21	1	4	Y	Y
E137	Single	Non	230	1	5.8	1/2	60	48	22	2 or 3	4	Y	Y
* H137	Single	Auto	200	1	6.2	1/2	60	48	22	1	4	Y	N
* I137	Single	Non	200	1	6.2	1/2	60	48	22	3	4	Y	N
* J137	Single	Non	200	3	2.6	1/2	60	46	21	3	4	Y	Y
* F137	Single	Non	230	3	2.6	1/2	60	48	22	3	4	Y	Y
* G137	Single	Non	460	3	1.4	1/2	60	48	22	3	4	N	N
BE137	Single	Auto	230	1	5.8	1/2	60	48	22	**	---	Y	Y
M139	Single	Auto	115	1	10.7	1/2	60	51	23	1	4	Y	Y
N139	Single	Non	115	1	10.7	1/2	60	51	23	2 or 3	2 or 4	Y	Y
D139	Single	Auto	230	1	5.8	1/2	60	47	21	1	4	Y	Y
E139	Single	Non	230	1	5.8	1/2	60	48	22	2 or 3	4	Y	Y
*H139	Single	Auto	200	1	6.2	1/2	60	48	22	1	4	Y	N
*I139	Single	Non	200	1	6.2	1/2	60	48	22	3	4	Y	N
*J139	Single	Non	200	3	2.6	1/2	60	50	23	3	4	Y	Y
*F139	Single	Non	230	3	2.6	1/2	60	48	22	3	4	Y	Y
*G139	Single	Non	460	3	1.4	1/2	60	48	22	3	4	N	N

\* No molded plug      \*\* Single piggyback switch included      BE and BN models include a piggyback variable level pump switch.

**SELECTION GUIDE**

1. Integral float-operated mechanical switch, no external control required.
2. For automatic, use single piggyback variable level float switch or double piggyback variable level float switch. Refer to FM0477.
3. See FM1228 for correct model of simplex control panel.
4. See FM0712 for correct model of duplex control panel or FM1663 for a residential alternator 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 Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).

**Design, Installation  
and Maintenance**

**of the**

**T & J Panel**

**Wastewater Treatment System**



**A Better Quality Effluent**

**Environmental Health Specialists**  
**Septic Tank Installers**

*Updated 2018*



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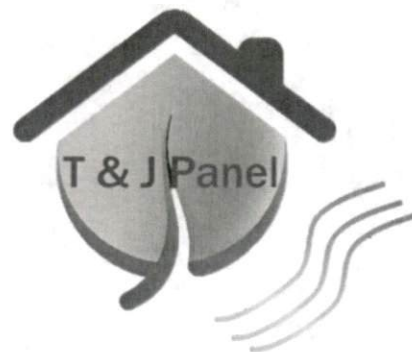
**Resources – pg. 12- pg. 18 (Installation/Design Resources & Illustrations)**

### **Introduction**

Although this manual is sectioned for specific user groups, we at T&J Panel suggest you familiarize yourself with the complete manual. Please visit our website at [www.TJPanel.com](http://www.TJPanel.com) for more resources regarding design, installation and maintenance of T&J Panel Systems. All of the resources provided in this manual are available online to print. The most current and up-to-date version of this manual is posted on our website at [www.TJPanel.com](http://www.TJPanel.com) and supersedes all printed editions. For further discussion of this manual, please reach out to our office at 704-924-8600.

### **Company Information**

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[Brad@tjpanel.com](mailto:Brad@tjpanel.com)



Feel free to contact us with any questions regarding ordering, installation, design, maintenance or any other matter regarding the T&J Panel System.

### **Installer Training**

While T&J Panels does not require a product specific installer certification, it is our goal to train installers to correctly install a panel block system. If it is your first time installing, inspecting, or designing a system, please do not hesitate to reach out to us, or to ask us to include the installer training for your job. Installation training will send a company representative to your jobsite to discuss the panel block system and how to properly install them. T&J Panels recommends an installation training for each orientation of the panel block system (both horizontal and vertical). Contact our offices to schedule your install training at 704-924-8600.

## ENVIRONMENTAL HEALTH SPECIALISTS

### System Design

The primary reason for permitting the panel block system is because of insufficient space for a conventional system. Panel block systems are included in the North Carolina Sewage Regulations [10NCAC 10A.1956 (3) (a) (ii)] [15ANCAC 18E .0905] as a modified conventional system. The panel block system should be considered when: a quality effluent may be needed, space is limited, usable soil is limited, or there are indications that at some future time space may be needed for other development. When there is a trend for added development such as additions to homes, pools or other special landscaping development, a T&J Panel System may prevent insufficient space later. As the Environmental Health Specialist who is designing a system, you can foresee such a trend of continued development, the panel block system may be an option the property owner would like to utilize.

As noted in the regulations, a PPBPS (Prefabricated, Permeable, Block Panel System) is permitted where soils are suitable, provisionally suitable, or reclassified provisionally suitable; however, only one half of the area needed for a conventional system is required. This is one reason the panel block system can help you utilize the best soils available on the lot. The minimum soil depth required for horizontally installed Panel Systems is 26-inches, whereas the minimum soil depth required for vertically installed Panel Systems is 34-inches (minimum depths require 6" of suitable soil cover). The system can be gravity fed, pumped to a pressure manifold and gravity fed into the lines, or pumped to low-pressure panel lines. Most of the concepts for a panel block system layout are the same as for a conventional system; the biggest difference being the aerial area needed and the quality of effluent being introduced into the ground.

T&J panels can be installed as either gravity, pump to gravity, pump to pressure manifold, or low-pressure pipe distribution system. When designing a pressure system, the principles of low-pressure distribution are as described in the LPP manual. There is further discussion on pressure systems on page 11 of this manual.

### Conversion

A three-bedroom house with a 0.4 gpd application rate. (The first three steps are the same as for the conventional system.)

- 1) 120 gallons per bedroom X 3 bedrooms = 360 gallons per day design flow rate.
- 2) 360 gallons' flow rate / 0.4 application rate = 900 sq. ft. of conventional trench bottom.
- 3) 900 sq. ft. / 3 ft. wide trench = 300 linear feet of conventional system.

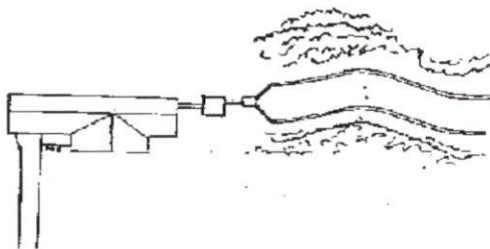
This conventional layout requires 2700 sq. ft. of area on the lot with another equal area of repair space for a total of 5400 sq. ft. of suitable usable area. To calculate the size of the T&J Panel system, the above calculations must be made with an additional fourth step as described in [10NCAC 10A .1956 (3) (a) (ii) (B)] for a PPBPS, (T&J Panel System).

- 4) 300 linear feet of conventional system X 0.5 for a horizontally or vertically installed 16-inch panel block system = 150 linear feet of T&J Panel System.

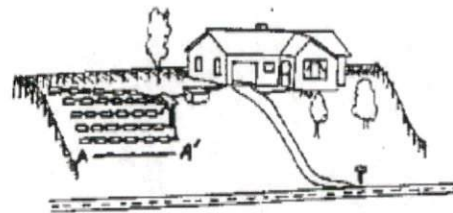
A panel block system requires only a 1200 sq. ft. area on the lot for the system with an equal area for repair, a total of 2400 sq. ft. With the panel block system, the installation and repair can go into the same area as the initial area required for a conventional gravel trench system.

### Window Effect

To prevent hydraulic overload in the soil, aerial space should always be a consideration for any system. However, it is especially notable with panel block systems, as with any system, that reduces the size of the aerial area drain field. The following is a simplistic example of this concept:



MOST DESIRABLE

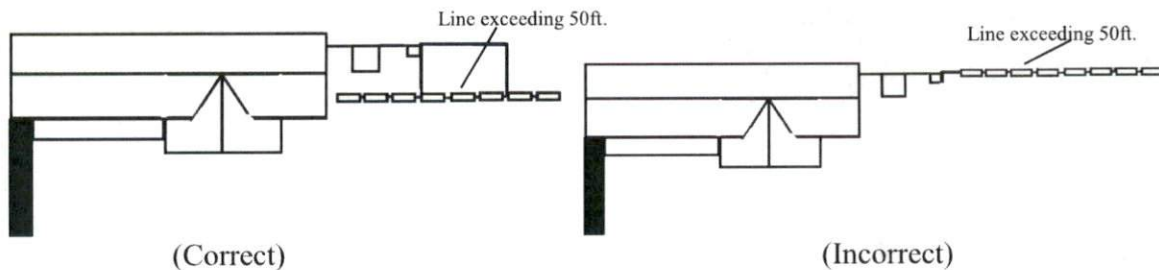


LESS DESIRABLE

While both systems have the same linear footage of trench, the second diagram is a less desirable design. The effluent must pass through the area A-A' which can cause a strain on that area and even a failure because of hydraulic overloading.

### Distribution

In the incorrect example below, the aerial space is good and the chance of hydraulic overloading is greatly reduced. However, downline distribution in a long single trench fed from only one end, will not give optimum treatment. In the correct example we see that the trench has been fed from multiple points. Because the panel lines are put in as level as possible (never exceeding 1/4 inch of drain line fall in 10 feet of run), they feed both ways equally. T&J Panel recommends that no gravity line exceed 50 feet unless it is fed from multiple points. T&J Panel recommends that line lengths between 50 and 70 feet utilize a pressure manifold to gravity, and that lines exceeding 70 feet utilize low-pressure distribution.



Any questions regarding the optimal distribution method for your system design, please contact our office.

### Calculating Panels per Trench

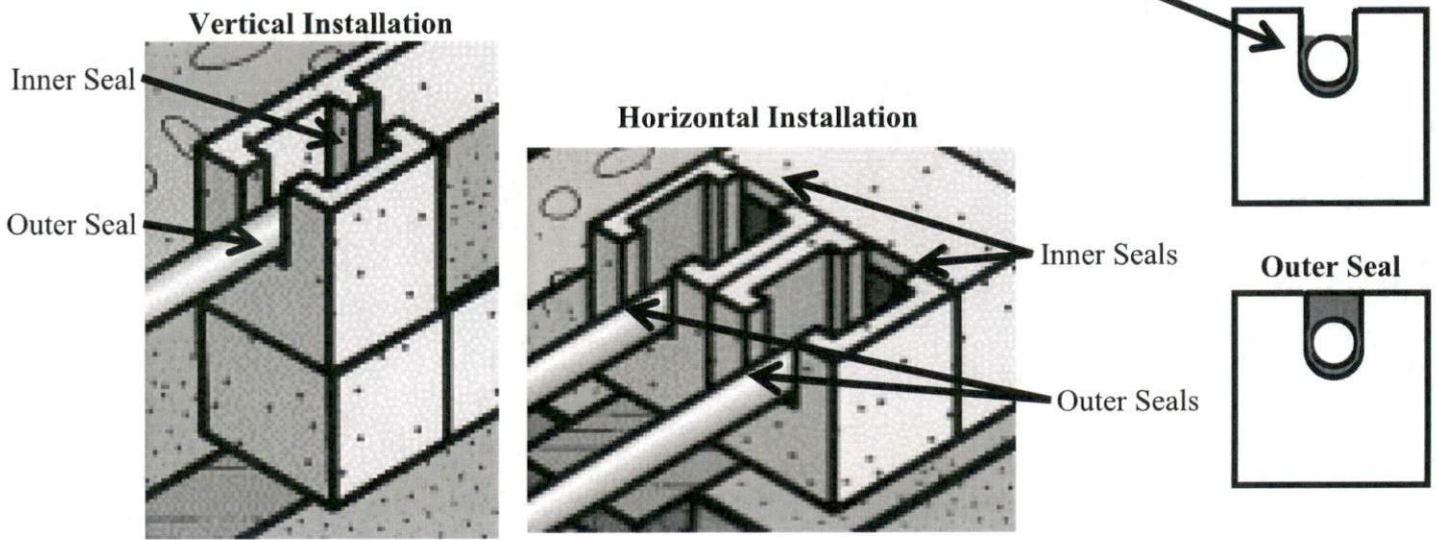
To calculate the number of panels needed for a 150-foot line, multiply  $150' \times 12'' = 1800''$ , then divide by  $52''$  which is 46 inches for the panel and 6 inches for the space between the panels in the trench.  $1800'' / 52'' = 34.6$  panels; therefore, you would call for 35 panels. If there is to be more than one trench, the sizing of the lines should be as equal as possible with as close to the same number of panels in each trench as is practical. A material order chart is available on page 15 of this manual.

### Backfill

Backfill sand shall be a clean, screened, medium-grade sand that is naturally-occurring. Acceptable sands are sands that are suitable for the production of ready-mix concrete and clean of organic debris and stone. Sands dredged from rivers and creeks can be used, if gradation is sufficient to be blended into ready-mix concrete production. Product description includes, but is not limited to: Concrete Sand, NC-2S Sand, ASTM C-33 Sand, FA-10 Sand and Grade "A" Sand. Product suitability is important and T&J Panel, Inc. will help answer any questions. The other type of sand utilized within panel block systems is a clean particle sand, used to coat the bottom of each panel's dosing chamber with a bed of sand one-inch-deep (see pages 6-12 for installation instructions). This sand is a medium grade of sand blasting sand; and is provided by your panel supplier.

### Foam Sealant / Tar Seals

The drawings below illustrate the outer and inner seal. Note that while the outer seal is a complete seal, the inner seal is only up to the top of the connecting pipe. This is to allow for over flow of the effluent into the sand at peak use. These seals can be inspected by lifting the caps at the ends of the panels while inspecting the system installation. GE Foam Sealer is an approved alternative to tar for these seals. Care should be used not to glue the caps down with the use of GE Foam Sealer. When using GE Foam Sealer, special care should be used on the inner seals of the panel not to over fill or under fill this seal. The **inner** seal, if sealed off completely, will restrict the overflow reservoir.



## **Trench Preparation**

Trench grade should be established so that backfill cover will be four to six inches over the tops of the panels. (Note, on severe slopes, system depth should be adjusted to protect against breakout of effluent.) In soils containing clay, the trench side walls should be raked to bring slicked over areas back as near to original structure as possible. A light dusting of lime on the sidewalls will help restore the soils back to their original structure. (At grade installation systems are required to bring in 6" of topsoil suited for vegetative growth)

## **Final Inspection**

The following list of key points are things that an inspector should look for when issuing a completion permit:

- 1) Were panels installed horizontally or vertically, according to the permit?
- 2) Is the depth of the panels within guidelines?
- 3) Are drain lines level or less than ¼ inch fall in ten feet?
- 4) Have seals been properly constructed?
- 5) Was the proper sand used in the trench backfill?  
Is the sand clean? (i.e. free of debris, large organics, leaves, etc.)  
Has the sand been screened? (to a medium-grade, not too fine, free of large rocks)  
Is the sand naturally-occurring? (i.e. from a river, creek, sand pit, etc., not manufactured)
- 6) If in soils where clay is present, were the sidewalls raked and limed?

### **For Pumped Systems**

- 7) Have pump size, head pressure and dose cycle been properly sized and set?  
Set dose cycle for 3.6 gallons per panel with pressure distribution  
Set dose cycle at 3.6 gallons per vertical panel and 7.2 gallons per horizontal panel when pumping to pressure manifold and gravity feeding.
- 8) Record field data on operations permit.

# INSTALLER

## The Panel Block System

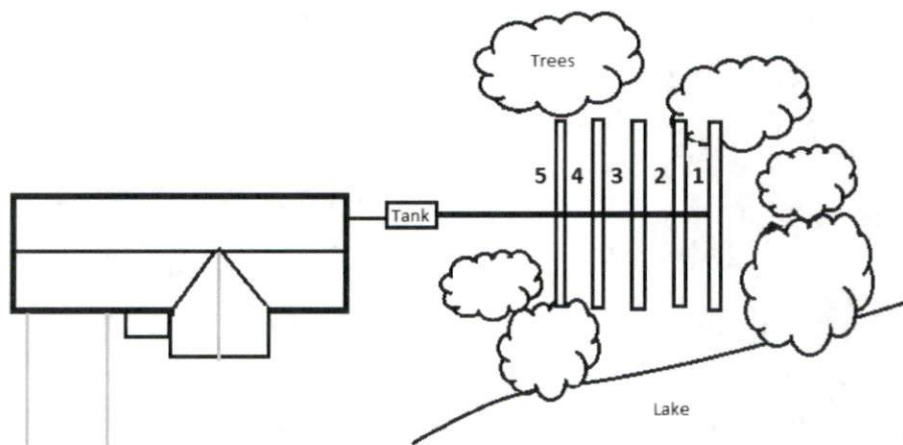
Generally, on level open land, a panel block system can be installed in about the same amount of time as a conventional system; however, traditionally, panel block systems have been installed where space and topography have restricted the use of a conventional system. For this reason, panel block system installations require more time. Many installers enjoy the change of working with panels, not handling gravel, and the satisfaction of knowing a better quality, long-lasting system has been installed.

## Ordering Materials

T&J Panel partners with suppliers to ensure panel block systems are available statewide. Please be sure to let your supplier know what installation method you are utilizing, as this will affect the amount of materials needed for the system. For information on the distributor located closest to you, call **704-924-8600** or email **info@tjpanel.com**.

## Installation Tips

Installation for multiple line systems should begin in the most confining area and be worked to the more open areas.



Above is an example of a multiple line installation. As you can see, the installation should begin with the line marked 1 and proceed to 2, 3 then 4. This procedure will greatly ease material handling and backfilling. (Note, sections of the drain lines should be left uncovered to allow for inspection of lines when area is confined and return access to lines is limited.)

**Most Panel Systems are currently used due to space considerations and caution should be taken to preserve suitable soil structure and site conditions.**

Below are two examples of drain lines on sloping lots. The second drawing shows the drain line going through a slope making the center of the line deeper in the ground, resulting in an undesirable situation. The first drawing shows the drain line going around the slope (on contour) keeping the trench depth and cover uniform for the entire length of the line. On slopes, care should be given to avoid cutting away valuable topsoil in an effort to make straight lines. The panel line should be installed on grade with the contour of the natural slope. Panel lines can be curved to almost any degree.



### **Digging the Trench for Vertical Installation**

Start by shooting the grade and marking the contour. For a 16-inch, vertically installed panel, add 28 inches to the shallowest or lowest grade (22 inches for at grade installations with area soil cap) that the trench must cross to obtain the trench bottom grade. Dig the trench at the elevation derived, checking the grade frequently. The trench should be a minimum of 2 feet wide. With the trench open, all sidewalls should be raked to bring smeared areas back to their original structure before a light dusting of lime is applied. Place a 6-inch layer of appropriate backfill sand (clean, screened, naturally-occurring sand) in the trench and level to grade. Place a 1x4 or 1x6 board (does not have to be treated) flat on the top of the 6-inch layer of sand. Once more, check the grade of the trench by shooting the top of the board. Once the grade boards have been set, the panels may be set into the trench by hand or by using the backhoe. Each panel weighs about 155 pounds and placement by hand goes quickly. The panels should be placed about 6 inches apart in the trench to obtain equal spacing. Place 10 pounds of clean particle sand (medium sand blasting sand) in the top chamber of each panel to form a bed of sand about one-inch-thick. Place half the sand in one end of the panel and the other half of sand in the other end of the panel. The effluent entering the panel will level the sand for you. GE Foam Sealer or tar seal rope should be placed in the bottom of the U outs to form seals around the pipe as shown in earlier drawings. Once the GE Foam Sealer or tar seal rope is in place, a 24-inch section of 2-inch PVC pipe (for gravity distribution, see page 11 for pressure distribution instructions) is cut to span from the middle top chamber of the first panel to the middle top chamber of the next panel. Any tar seal rope that is used should be of tar or butyl that is soft and pliable to obtain a watertight seal. Now that the connection and sealing is complete, a cap block is placed on each end of the panel, covering all openings (these will be delivered with the panels). The cap block may well serve as an inspection port at some future date. The trench is ready to be backfilled to the top of the panel with the same backfill sand used in the trench bottom. With the sand to the top of the panel, trenches should be left for the sanitarian to inspect. Soil cover should be added after the final inspection. (At grade installation systems are required to bring in 6" of topsoil suited for vegetative growth)

## Materials Chart for Vertical Installation

- Materials needed:
- One can of GE Foam Sealer per five panels  
or
  - Three feet of half inch tar seal rope per panel
  
  - Two feet of 2-inch SCH40 pipe per panel (for gravity distribution), or same linear feet as line layout of pressure system of 1 ¼ inch or 1 ½ inch pipe. Add pipe for tie in of lines to tank and house.
  
  - 50 pounds of particle sand (medium sand blasting sand) per five panels (10 lbs. per panel)
  
  - Same linear feet of 1x4 or 1x6 as line length
  
  - Bag of powder lime when in clay soil

### Vertical Installation

Panel and Backfill Sand totals for a Vertical Installation trench.  
(Add 50% more for a 3-foot-wide trench with vertical installation)

50 LF – 12 panels 8¼ tons sand	130 LF – 30 panels 21½ tons sand
60 LF – 14 panels 10 tons sand	140 LF – 32 panels 23 tons sand
70 LF – 16 panels 11½ tons sand	150 LF – 35 panels 25 tons sand
80 LF – 18 panels 13¼ tons sand	160 LF – 37 panels 26½ tons sand
90 LF – 21 panels 15 tons sand	170 LF – 39 panels 28 tons sand
100 LF – 23 panels 16½ tons sand	180 LF – 42 panels 30 tons sand
110 LF – 25 panels 18¼ tons sand	190 LF – 44 panels 31½ tons sand
120 LF – 28 panels 20 tons sand	200 LF – 46 panels 33 tons sand



## **Shallow Soils Solution**

**\*\*\* Please Let Your Distributor Know If You Plan To Use Horizontal Installation\*\*\***  
(This will change the amount of materials needed to complete your job)

### **Digging the Trench for Horizontal Installation**

Start by shooting the grade and marking the contour. For a 16-inch panel, horizontal installation, add 20 inches to the shallowest or lowest grade (14 inches for at-grade installations with area soil cap) that the trench must cross to obtain the trench bottom grade. Dig the trench at the elevation derived, checking the grade frequently. The trench should be a minimum of 3-foot-wide (9 feet on center). With the trench open, all sidewalls should be raked to bring smeared areas back to their original structure before a light dusting of lime is applied. Place a 6-inch layer of appropriate backfill sand (clean, screened, naturally-occurring sand) in the trench and level to grade, then place a 1x6 inch board flat on the top of the 6-inch layer of sand. Once more check the grade of the trench by shooting the top of the board. Once the grade boards have been set, the panels may be set into the trench by hand or by using the backhoe. Each panel weighs about 155 pounds and placement by hand goes quickly. The panels should be placed about 6 inches apart in the trench to obtain equal spacing. At the beginning of each line, install an Entry T (for gravity distribution) to divide the gravity flow, as close to the beginning of the first panel as possible. Place 10 pounds of clean particle sand (medium sand blasting sand) in each chamber of each panel to form a bed of sand about one-inch thick. Place half the sand in one end of the panel and the other half of sand in the other end of the panel. The effluent entering the panel will level the sand for you. GE Foam Sealer or tar seal rope should be placed in the bottom of the U outs to form seals around the pipe as shown in earlier drawings. Once the GE Foam Sealer or tar seal rope is in place, a 24-inch section of 1 ½ inch PVC pipe (for gravity distribution, see page 11 for pressure distribution instructions) is cut to span from the inside of the two chambers to the inside of the two chambers in the following panel. Any tar seal rope that is used, should be of tar or butyl that is soft and pliable to obtain a watertight seal. Once the connection and sealing are complete, a cap block (delivered with all panels) is placed on each end of the panel covering all openings. The cap block may well serve as an inspection port at some future date. The trench is then ready to be backfilled to the top of the panel with the same backfill sand used in the trench bottom. With the sand to the top of the panel, trenches should be left for the sanitarian to inspect. Soil cover should be added after the final inspection. (At grade installation systems are required to bring in 6" of topsoil; suited for vegetative growth)

**Most Panel Systems are currently used due to space considerations and caution should be taken to preserve suitable soil structure and site conditions.**

**\*\*\* Please Let Your Distributor Know If You Plan To Use Horizontal Installation\*\*\***  
(This can change the amount of materials needed to complete your job)

**Materials Chart for Horizontal Installation**

- Materials needed:
- Five feet of half inch tar seal rope per panel  
or
  - Two cans of GE Foam Sealer per five panels
  
  - Two pieces of two feet long 1 ½ inch SCH40 pipe per panel (for gravity distribution), or two times the linear feet of line layout of pressure system of 1 ¼ inch or 1 ½ inch pipe. Add pipe for tie in of lines to tank and house.
  
  - 100 pounds of particle sand (medium sand blasting sand) per five panels (20 lbs. per panel)
  
  - Same linear feet of 1x6 as line length
  
  - Bag of powder lime when in clay soil

**Horizontal Installation**

Panel and Backfill Sand totals for a Horizontal Installation trench.

50 LF – 12 panels 8¼ tons sand	130 LF – 30 panels 21½ tons sand
60 LF – 14 panels 10 tons sand	140 LF – 32 panels 23 tons sand
70 LF – 16 panels 11½ tons sand	150 LF – 35 panels 25 tons sand
80 LF – 18 panels 13¼ tons sand	160 LF – 37 panels 26½ tons sand
90 LF – 21 panels 15 tons sand	170 LF – 39 panels 28 tons sand
100 LF – 23 panels 16½ tons sand	180 LF – 42 panels 30 tons sand
110 LF – 25 panels 18¼ tons sand	190 LF – 44 panels 31½ tons sand
120 LF – 28 panels 20 tons sand	200 LF – 46 panels 33 tons sand

### **Pump to Pressure Manifold Gravity Feed**

When pumping to gravity feed, the vertical panel should be dosed at 3.6 gal per panel and the horizontal panel should be dosed at 7.2 gal per panel. The outer and inner seal on the first panel in each line should be a full seal. The maximum flow per tap on a vertical panel should be 12.5 gpm and 17.7 gpm on horizontal panels.

### **Low-Pressure Distribution**

The LP Panel uses technology similar to that of Low Pressure Pipe (LPP) Systems. The tables and distribution design described in the LPP manual, in most regards, is applicable to the pressure Panel System. The system should be used with two to four feet of head. In many respects, a LP Panel is similar to an LPP with the holes discharging into the panels.

In *both* horizontally and vertically installed pressure dosed panel systems, valves should be banked in a valve box and turn-ups should be neatly capped, covered and labeled for future service. Pump tanks should be constructed as shown in the drawing on page 14 to allow for service and repairs.

### **Vertical Panels with Pressure Distribution**

The dosing cycle for the vertical Panel System is designed to pump enough effluent to fill the top chambers of all the panels in the system. The top chamber of a 16-inch panel holds 3.6 gallons, before promoting downline distribution to the next panel. When the system has 34 panels and all holes are the same size, you would multiply 34 X 3.6 to get 122 gallons per dose cycle. The holes are drilled in the distribution pipe, one hole per panel. These holes are drilled, alternating between the 10 o'clock and 2 o'clock positions on the pipe in each panel. Special care should be taken to ensure that only one hole is drilled per panel. These holes are alternating between 10 o'clock and 2 o'clock every panel to prevent hydraulic overload of one side of the trench. These pipes are then placed so that the effluent is pumped into the top chamber of the panel. If the hole sizing changes in the system, the pump cycle is set by the hole that is discharging the fastest.

### **Horizontal Panels with Pressure Distribution**

The dosing cycle for the horizontal Panel System is designed to pump enough effluent to fill an inner chamber in all the panels in the system. Each chamber of a 16-inch panel holds 3.6 gallons. When the system has 34 panels and all holes are the same size, you would multiply 34 X 3.6 to get 122 gallons per dose cycle. The holes are drilled in the distribution pipe, one hole per panel. These holes are drilled, alternating between the 10 o'clock and 2 o'clock positions on the pipe in each panel, while also alternating between the left and right chambers within the panel. Special care should be taken to ensure that only one hole is drilled per panel. These holes are alternating between 10 o'clock and 2 o'clock every panel, as well as alternating between the left and right chambers to prevent hydraulic overload of one side of the trench. These pipes are then placed so that the effluent is pumped into the inner chambers of the panel. If the hole sizing changes in the system, the pump cycle is set by the hole that is discharging the fastest.

**Please feel free to contact a member of T&J Panel with any design, installation or maintenance questions related to an LP Panel or Pressure Manifold system**

## Flow Chart of Various Orifices and Pressure Heads

FLOW CHART OF VARIOUS ORIFICES AND HEAD PRESSURES

Head Pressure ft.	Orifice Size									
	3/32"	1/8"	5/32"	3/16"	7/32"	1/4"	9/32"	5/16"	11/32"	3/8"
2.0	.094"	.125"	.156"	.188"	.219"	.250"	.281"	.313"	.344"	.375"
2.1	.15	.26	.41	.59	.80	1.04	1.32	1.63	1.97	2.34
2.2	.15	.27	.42	.60	.82	1.07	1.35	1.67	2.02	2.40
2.3	.16	.28	.44	.63	.86	1.12	1.41	1.75	2.11	2.51
2.4	.16	.29	.46	.64	.87	1.14	1.44	1.78	2.16	2.57
2.5	.16	.29	.46	.66	.89	1.17	1.47	1.82	2.20	2.62
2.6	.17	.30	.46	.67	.91	1.19	1.5	1.86	2.25	2.67
2.7	.17	.30	.47	.68	.93	1.21	1.53	1.89	2.29	2.72
2.8	.17	.31	.48	.69	.94	1.23	1.56	1.93	2.33	2.77
2.9	.18	.31	.49	.71	.96	1.25	1.59	1.96	2.37	2.82
3.0	.18	.32	.50	.72	.98	1.28	1.62	1.99	2.41	2.87
3.1	.18	.32	.51	.73	.99	1.3	1.64	2.03	2.45	2.92
3.2	.19	.33	.51	.74	1.01	1.32	1.67	2.06	2.49	2.97
3.3	.19	.33	.52	.75	1.02	1.34	1.69	2.09	2.53	3.01
3.4	.19	.34	.53	.76	1.04	1.36	1.72	2.12	2.57	3.06
3.5	.19	.34	.54	.78	1.06	1.38	1.74	2.15	2.61	3.10
3.6	.20	.35	.55	.79	1.07	1.40	1.77	2.18	2.64	3.15
3.7	.20	.35	.55	.80	1.09	1.42	1.79	2.21	2.68	3.19
3.8	.20	.36	.56	.81	1.10	1.44	1.82	2.24	2.72	3.23
3.9	.20	.36	.57	.82	1.11	1.46	1.84	2.27	2.75	3.27
4.0	.21	.37	.58	.83	1.13	1.47	1.87	2.30	2.79	3.32

GPM

Here you will find a pressure head table to help in flow design of your LP Panel system. These numbers are a guide to help you in selecting the right flow for your system. We have found that in most systems the 5/32" and 3/16" hole at 2 to 4 feet of head pressure works the best in giving a pump cycle of more than 5 minutes and keeps the same maximum top chamber flow load as sited on the previous page.

PRESSURE MANIFOLD TAP FLOW

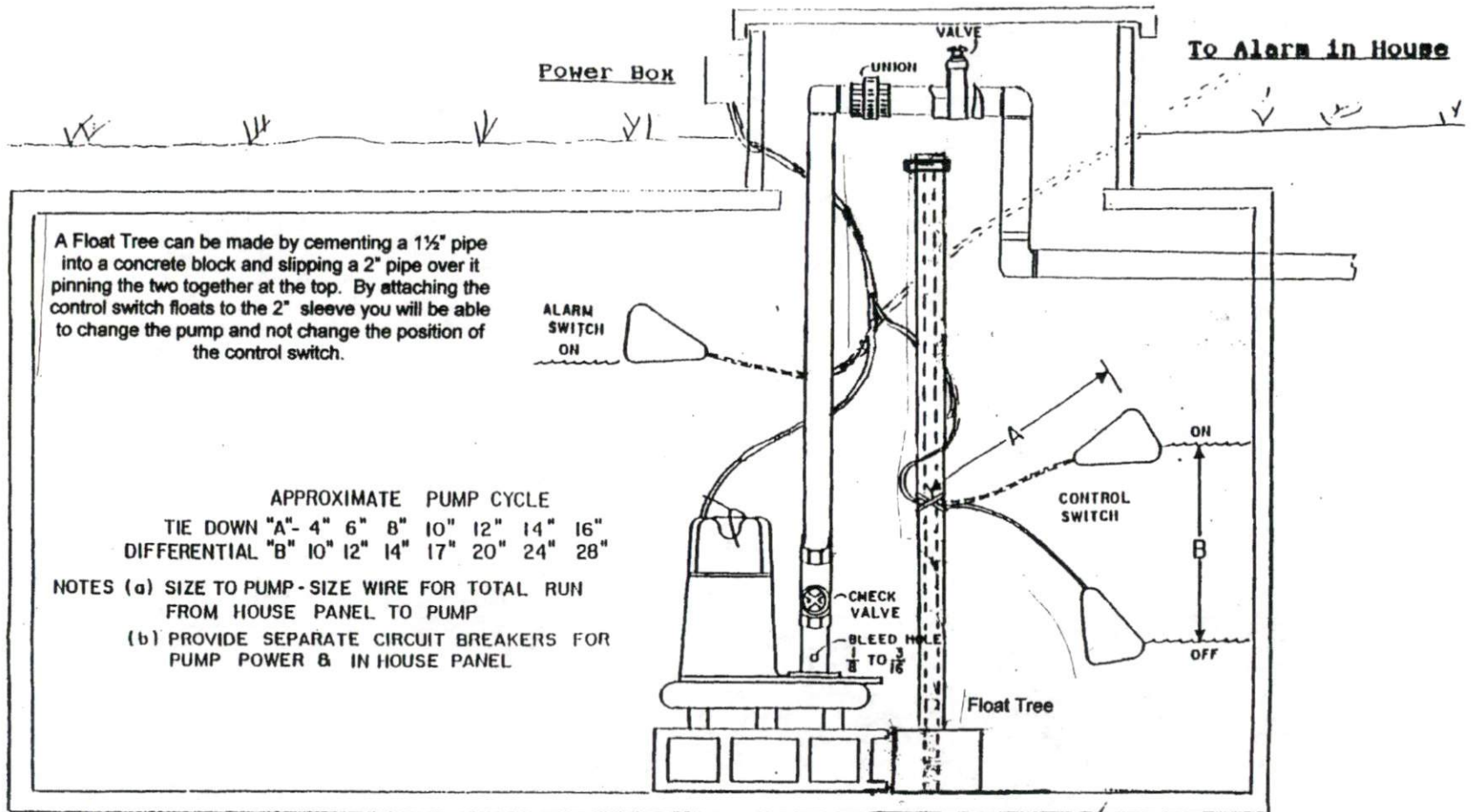
Head Pressure ft.	SCH 40		Tap Diameter	SCH 80	
	1/2"	3/4"		1/2"	3/4"
2.0	0.622	0.824		0.546	0.742
2.1	7.11	12.50		5.48	10.10
2.2	7.29	12.80		5.62	10.40
2.3	7.46	13.10		5.75	10.60
2.4	7.63	13.40		5.88	10.90
2.5	7.79	13.70		6.00	11.10
2.6	7.95	14.00		6.13	11.30
2.7	8.11	14.20		6.25	11.50
2.8	8.26	14.50		6.37	11.80
2.9	8.62	14.80	Gallons	6.48	12.00
3.0	8.36	15.00	per minute	6.60	12.20
3.1	8.71	15.30		6.71	12.40
3.2	8.86	15.50		6.82	12.60
3.3	9.00	15.80		6.93	12.80
3.4	9.14	16.00		7.04	13.00
3.5	9.27	16.30		7.15	13.20
3.6	9.41	16.50		7.25	13.40
3.7	9.54	16.70		7.35	13.60
3.8	9.67	17.00		7.45	13.80
3.9	9.80	17.20		7.55	14.00
4.0	9.93	17.40		7.65	14.10
	10.10	17.70		7.75	14.30

This chart will assist you in determining the proper tap sizes when you have to pump to a pressure manifold in a gravity system.

### Pump Sizing

Below is a chart to aid in head selection due to friction loss in PVC pipe. In calculating friction, be sure to add 20% for loss in fittings. In the chart below, friction loss is per 100 feet of pipe. The head created by friction loss is added to the elevation head of lift from the bottom of the pump tank to the top of the highest turn-up.

Flow GPM	Pipe Diameter					
	1"	1 1/4"	1 1/2"	2"	3"	4"
1	.07					
2	.28	.07				
3	.60	.16	.07			
4	1.01	.25	.12			
5	1.52	.39	.18			
6	2.14	.55	.25	.07		
7	2.89	.76	.36	.10		
8	3.63	.97	.46	.14		
9	4.57	1.21	.58	.17		
10	5.5	1.46	.70	.21		
11		1.77	.84	.25		
12		2.09	1.01	.30	.07	
13		2.42	1.17	.35	.08	
14		2.74	1.33	.39	.09	
15		3.06	1.45	.44	.10	
16		3.49	1.65	.50	.11	
17		3.93	1.86	.56	.12	
18		4.37	2.07	.62	.16	
19		4.81	2.28	.68	.23	
20		5.23	2.46	.74	.30	
25			3.75	1.10	.39	
30			5.22	1.54	.48	
35				2.05	.58	.07
40				2.62	.81	.09
45				3.27	1.08	.12
50				3.98	1.38	.16
60					1.73	.21
70					2.09	.28
80						.37
90						.46
100						.55





## T&J Panels Jobsite Worksheet

Homeowner/Job Name: \_\_\_\_\_ County: \_\_\_\_\_

Address: \_\_\_\_\_

System Description (Distribution type, total lines, line lengths, etc.):

\_\_\_\_\_  
\_\_\_\_\_

### **MATERIALS CHECKLIST:**

- \_\_\_\_\_ Vertical T&J Panels (Caps included)
- \_\_\_\_\_ Horizontal T&J Panels (Caps included)
- \_\_\_\_\_ GE Foam Sealer (amount varies based on installation method)
- \_\_\_\_\_ Medium Sand Blasting Sand (amount varies based on installation method)
- \_\_\_\_\_ Powdered Lime
- \_\_\_\_\_ Entry T (per line, Horizontal Installation ONLY)

AVAILABLE FOR  
PURCHASE FROM T&J  
PANEL.

\_\_\_\_\_ 2" Pipe

\_\_\_\_\_ 1 1/2" Pipe

\_\_\_\_\_ 1 1/4" Pipe

\_\_\_\_\_ Fittings for Pipe

\_\_\_\_\_ Backfill Sand (Clean, Screened, Naturally-Occurring, Concrete Sand, or ASTM-C33, NC-2S, FA-10 and Grade "A" Sands)

↳ Be sure to use the correct backfill sand material. Contact our offices for backfill sand sources or with any questions regarding backfill sand material.

\_\_\_\_\_ 1x6 Board (Does not need to be treated)

### **ADDITIONAL PRODUCTS THAT MAY BE NEEDED FOR COMPLETION:**

\_\_\_\_\_ Septic Tank \_\_\_\_\_ Gallon

\_\_\_\_\_ Pump Tank \_\_\_\_\_ Gallon

\_\_\_\_\_ 4" Pipe

\_\_\_\_\_ Distribution Box

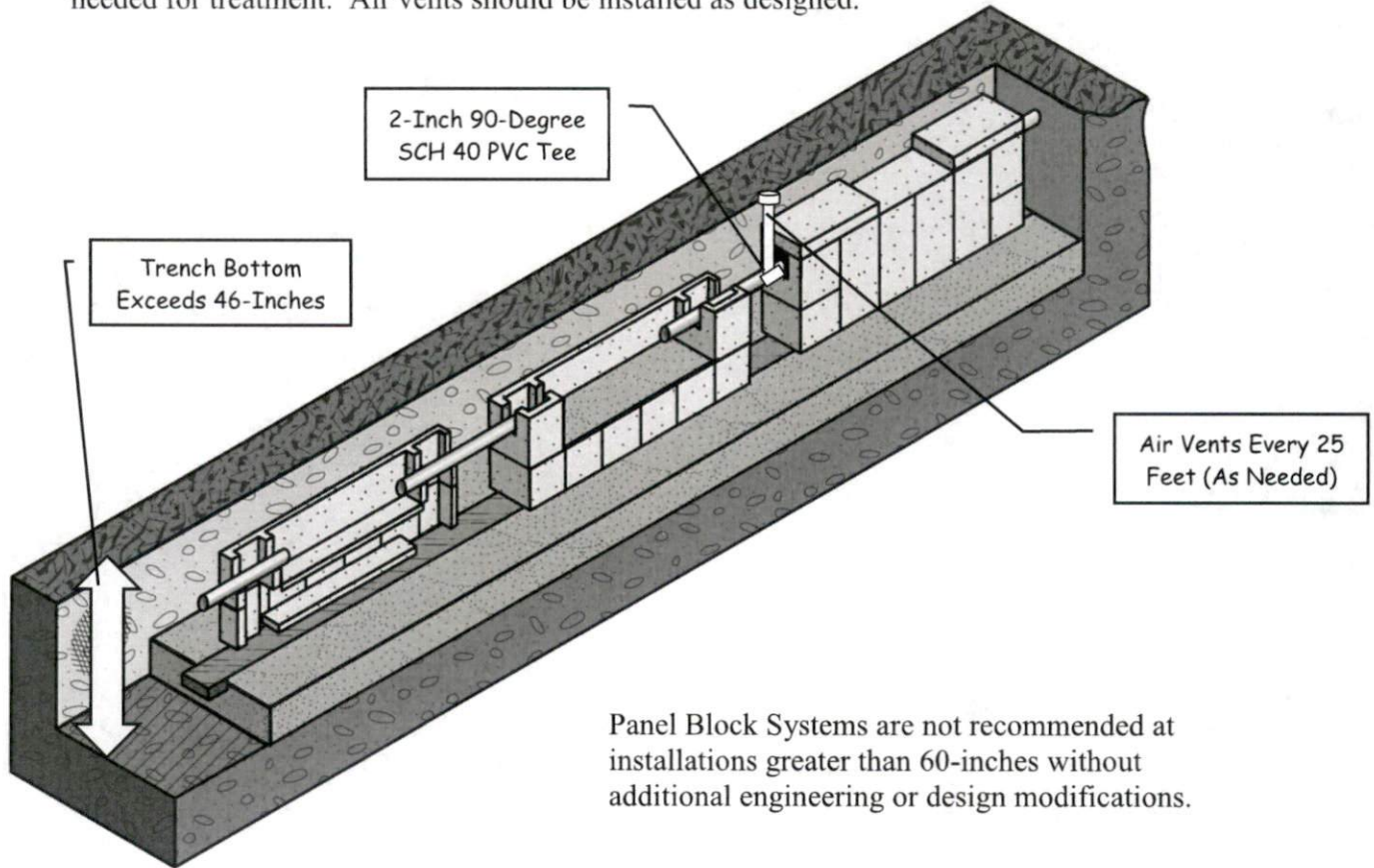
\_\_\_\_\_ Manifold \_\_\_\_\_ Taps \_\_\_\_\_ Size

\_\_\_\_\_ Install Training

\_\_\_\_\_ Tar Seal Rope (5ft. per panel)

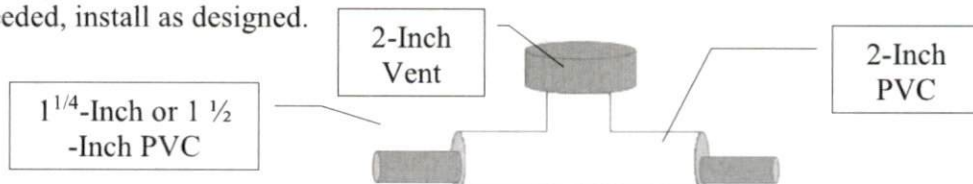
## Deep Installation of Panel Block Systems

Utilize these specifications for ventilation when Trench Bottom *exceeds* 46-inches for vertical installation. In certain situations, there are more desirable soil conditions deeper in the soil profile. On these sites, Panel Systems can still be utilized, with proper ventilation to the system. Air vents are used with Panel Systems to allow the chambers within the Panel to receive the air needed for treatment. Air vents should be installed as designed.



**Gravity Flow Installation:** Cut the 24-inch long, 2-inch PVC pipe in half, then reconnect with a 2-inch 90-Degree SCH 40 Tee. Extend the 2-inch Tee up to ground surface to allow ventilation. Recommend utilizing vent caps, studor vents, or turndowns if needed, install as designed.

**LP Panel Installation (Low Pressure Pipe):** Insert your 1<sup>1/4</sup>-inch or 1<sup>1/2</sup>-inch into a 2-inch PVC "sleeve" that spans from one chamber of a panel to the next. Connect a 2-inch 90-Degree SCH 40 Tee to this "sleeve" halfway between one panel and the next. Extend the 2-inch Tee up to ground surface to allow ventilation. Recommend utilizing vent caps, studor vents, or turndowns if needed, install as designed.





# **T & J Panel Wastewater Treatment System**

**269 Marble Road  
Statesville, NC 28625**

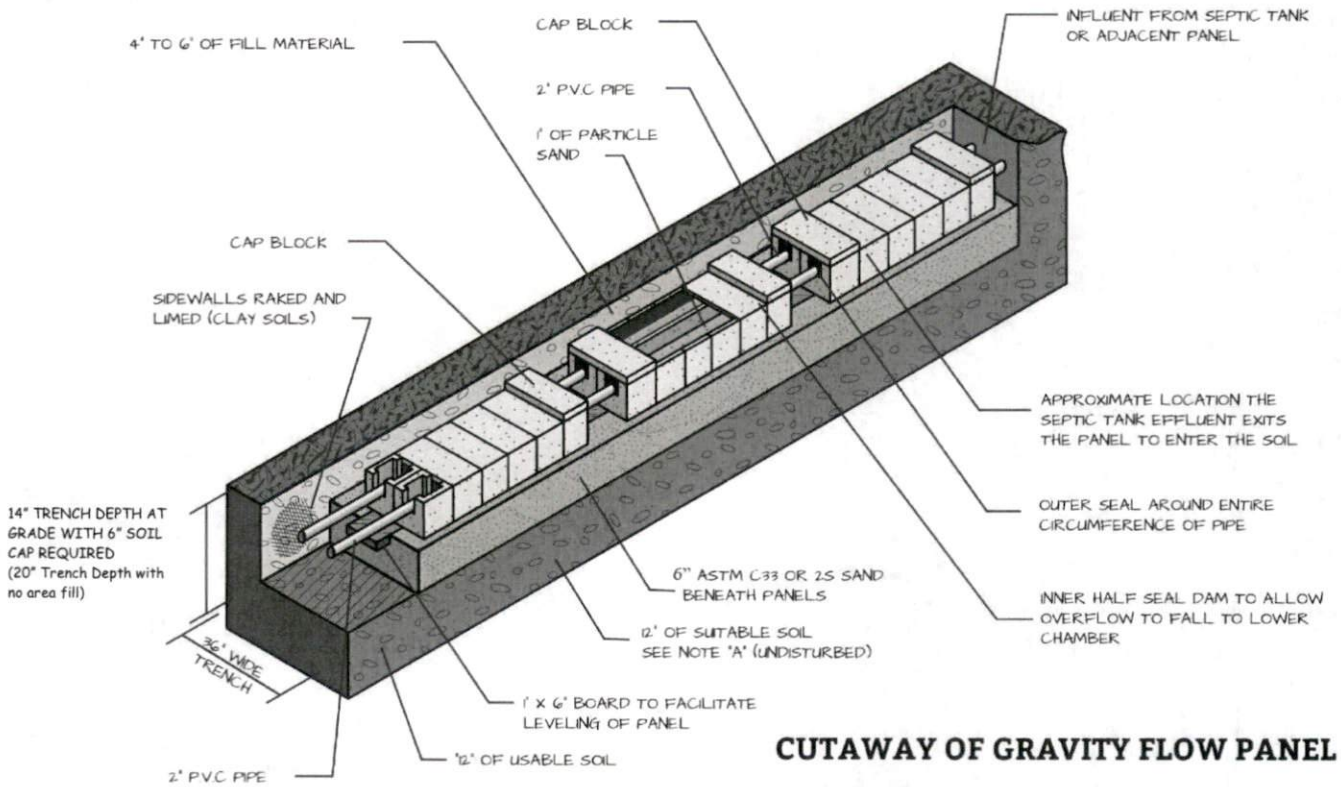
**Office: 704-924-8600  
Fax: 704-924-8681**

**Website: [www.tjpanel.com](http://www.tjpanel.com)  
Email: [info@tjpanel.com](mailto:info@tjpanel.com)**

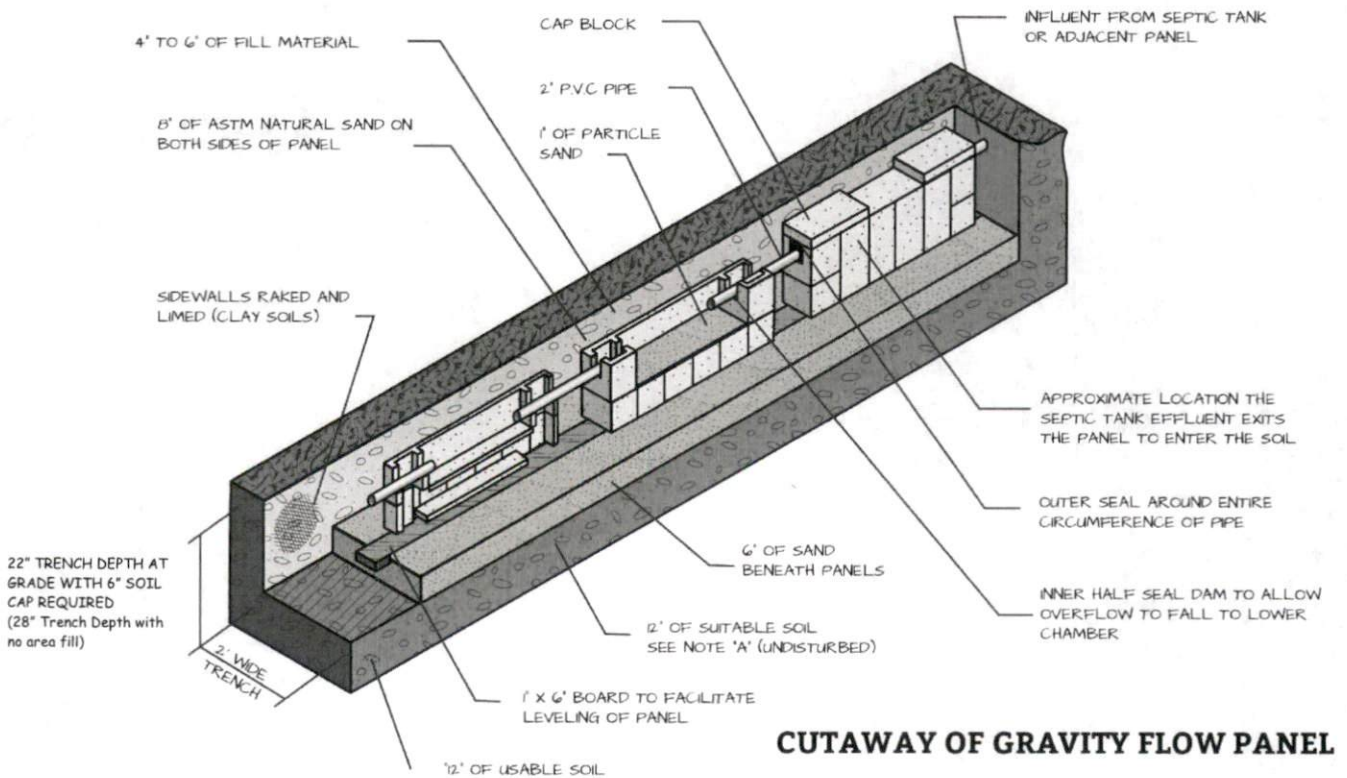
## **Limited Warranty:**

The structural integrity of each T&J Panel, when installed in accordance with manufacturer's instructions, is warranted against defective materials and workmanship for one year from date of manufacture. Should a defect appear within the warranty period, purchaser must inform T&J Panel System of the defect before the warranty expires. T&J Panel System will supply a replacement unit. T&J Panel System's liability specifically excludes the cost of removal and/or installation of the panels. There are no other warranties with respect to the units, including no warranties of merchantability or of fitness for a particular purpose. The warranty does not extend to incidental, consequential, special or indirect damages. The company shall not be liable for penalties or liquidated damages, including loss of production and profits, labor and materials, overhead costs, or other loss or expense incurred by buyer. Specifically excluded from warranty coverage are: Damage to the panels due to ordinary wear and tear; alteration, accident, misuse, abuse or neglect of the panels; the panels being subjected to stresses greater than those prescribed in the installation instructions; the placement by buyer of improper materials into buyer's system; or any other event, not caused by the company. Furthermore, in no event shall the company be responsible for any loss or damage to the buyer, the panels or any third party resulting from its installation or shipment. Buyer shall be solely responsible for ensuring that installation of the system is completed in accordance with all applicable laws, codes, rules and regulations. Any alteration of this warranty must be noted as "Warranty" in writing by the company.

## Isometric Drawing of a Segment of T & J Panel Horizontal Installation



## Isometric Drawing of a Segment of T & J Panel Vertical Installation



# When Your Problem In On-site Is:



Topography and Vegetation



Special Landscaping Needs



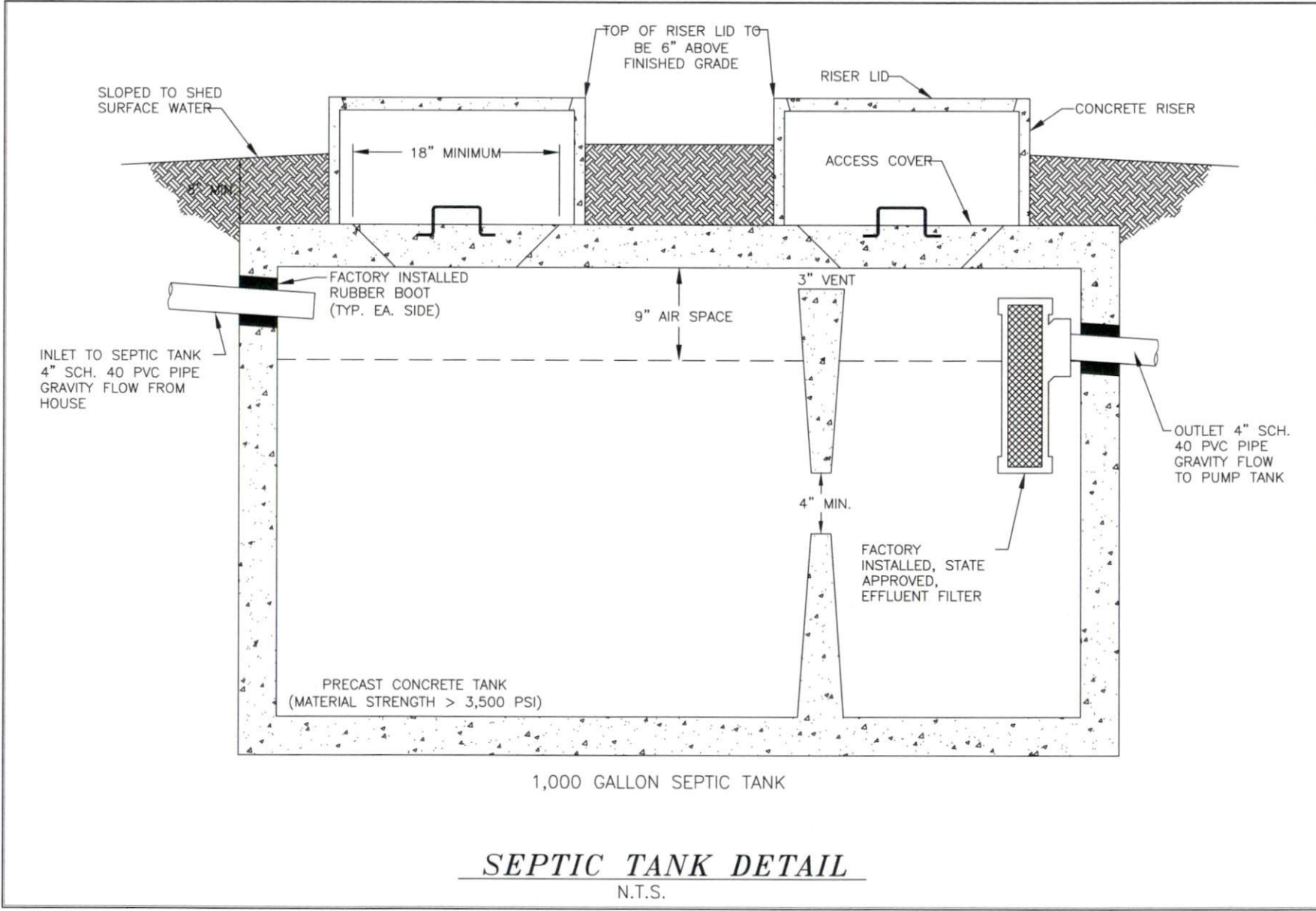
Future Site Needs



Limited Suitable Area

Then consider a better quality effluent with T & J Panel

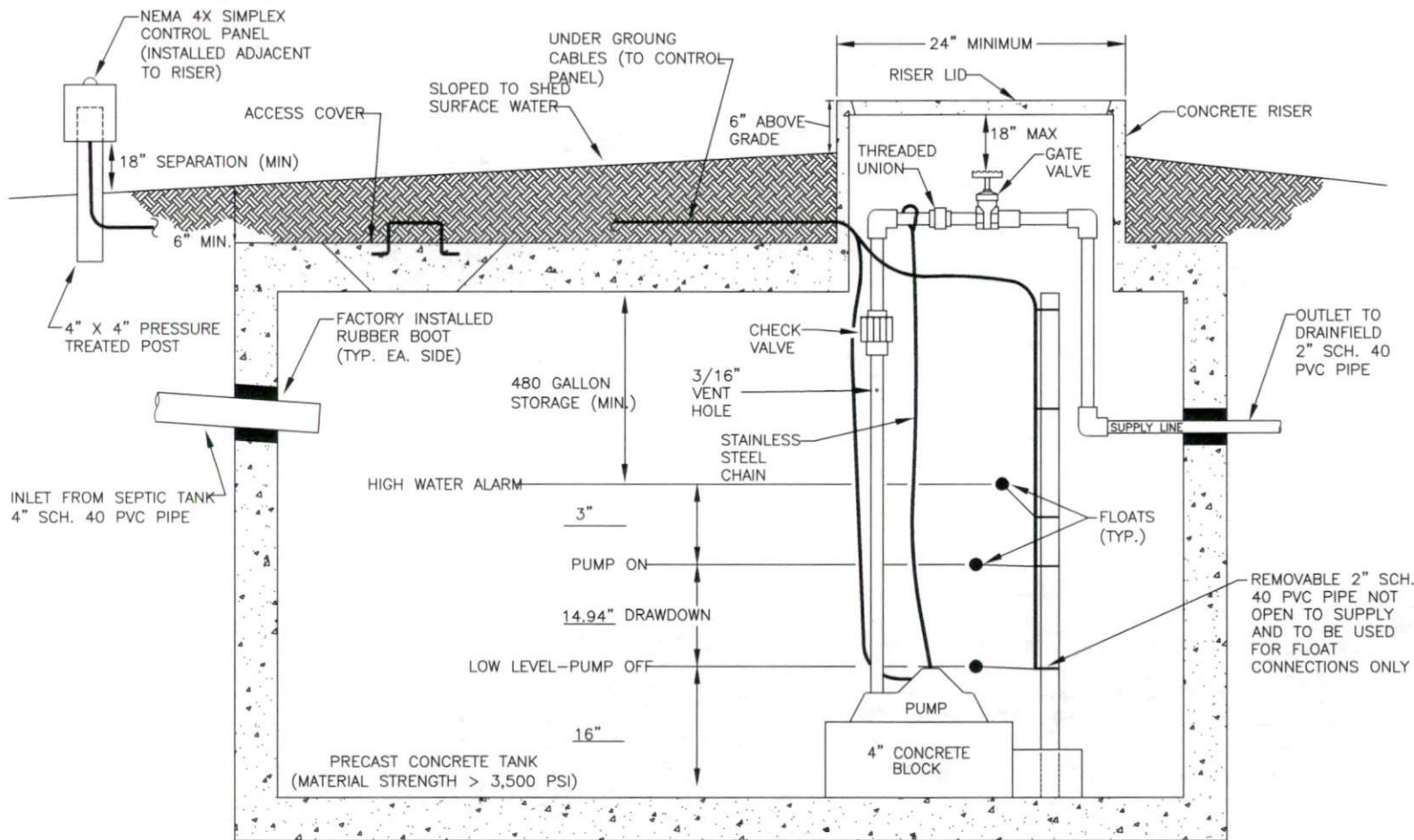




<b>SHEET NUMBER</b> <p style="font-size: 2em; text-align: center;">4 of 7</p>	
DATE March 17, 2022	REVISION NO. Original Submitted Revision 1 Revision 2 Revision 3 Master Set
PREPARED FOR : Division Home 10000 Highway, AL 35024	DATE : March 17, 2022 ENGINEER AND SEAL SCIENTIST CONTACT: SCOTT MITCHELL, PE, LSS DRAWN BY: ADAM WOOD, B
<b>MITCHELL ENVIRONMENTAL, PA</b> C-2911 1501 LAKESTONE VILLAGE LANE SUITE 205 FUQUAY VARINA, NC 27526	

Prince Place  
 Lot 22  
 Septic Tank Detail


\* DRAWDOWN SPECIFIED 19.0 GALLONS PER INCH



1,200 GALLON PUMP TANK

**PUMP TANK DETAIL**

N.T.S.

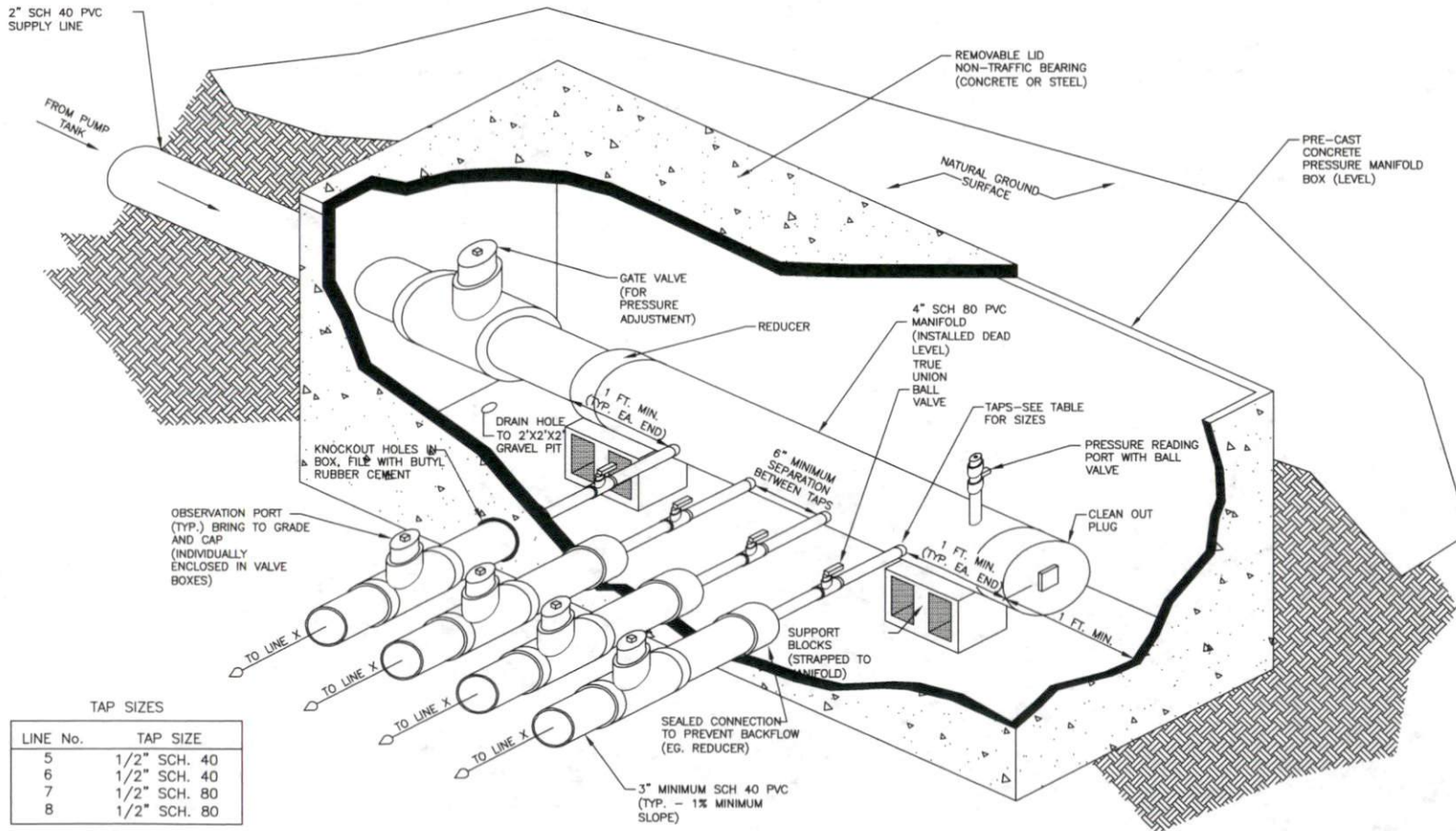
<b>SHEET NUMBER</b>		<b>5 of 7</b>	
DATE		March 17, 2022	
REVISION NO.		Original Submittal	
		Revision 1	
		Revision 2	
		Revision 3	
		Master Set	
PREPARED FOR :		Division Home Road Huntsville, AL 35824	
DATE :		March 17, 2022	
ENGINEER AND SEAL SCIENTIST CONTACT:		SCOTT MITCHELL, PE, LSS	
DRAWN BY:		ADAM WYCKO, B	
<b>MITCHELL ENVIRONMENTAL, PA</b>		<b>C-2911</b>	
1501 LAKESTONE VILLAGE LANE		SUITE 205	
FUQUAY VARINA, NC 27526			
		Prince Place Lot 22 Pump Tank Detail	

## PRESSURE MANIFOLD DETAIL FOR PRINCE PLACE LOT 22 INITIAL SEPTIC SYSTEM

N.T.S.

NOTE: MANIFOLD MAY NEED TO BE FLIPPED SO THAT  
SUPPLY LINE ENTRANCE AND CLEANOUTS ARE  
REVERSED. SEE SITE PLAN.

NOTE: THE NUMBER OF TAPS MAY VARY FROM LOT  
TO LOT. SEE DESIGN SHEET FOR NUMBER OF TAPS.

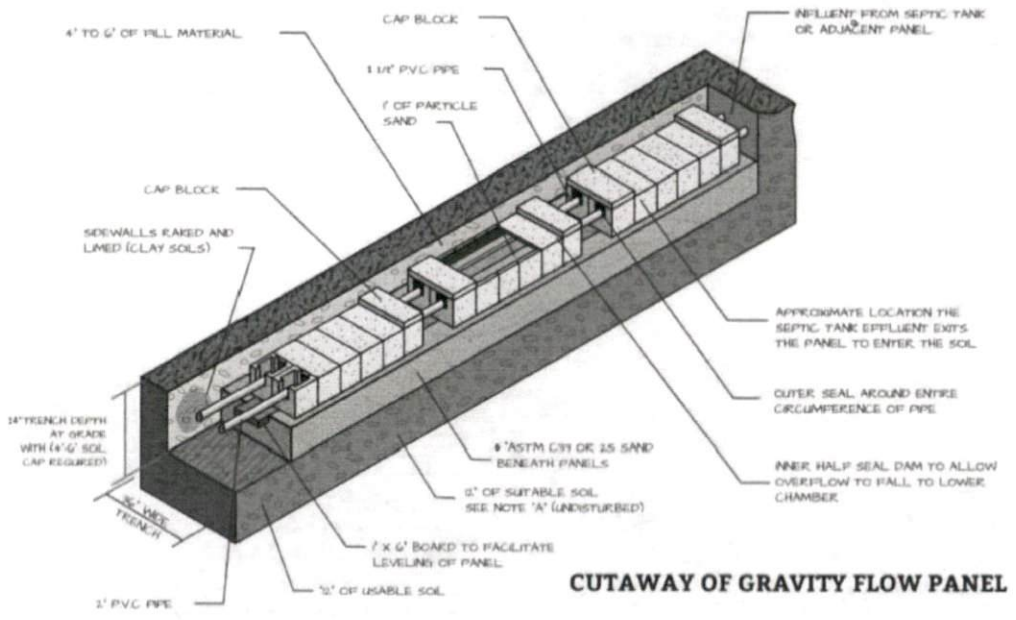


TAP SIZES

LINE No.	TAP SIZE
5	1/2" SCH. 40
6	1/2" SCH. 40
7	1/2" SCH. 80
8	1/2" SCH. 80

<p>Division Home Prepared for: 330 James Record Road Huntersville, NC 28024</p> <p>DATE: March 17, 2022</p> <p>ENGINEER AND SEAL DESIGNER CONTACT: SCOTT MITCHELL, P.E., L.S.</p> <p>DRAWN BY: ADAM AYCOCK, D</p>	<p>REVISION NO. Original Submitted</p> <p>Revision 1</p> <p>Revision 2</p> <p>Revision 3</p> <p>Master Set</p>	<p>DATE March 17, 2022</p>
<p><b>MITCHELL ENVIRONMENTAL, PA</b> C-2911</p> <p>1501 LAKESTONE VILLAGE LANE SUITE 205 FUQUAY VARINA, NC 27526</p>		
<p>6 of 7</p> <p>Prince Place Lot 22 Pressure Manifold Detail</p>		

**Isometric Drawing of a Segment of  
T & J Panel Horizontal Installation**



**CUTAWAY OF GRAVITY FLOW PANEL**

**SHEET NUMBER**  
7 of 7

Prince Place  
Lot 22  
Trench Detail

REVISION NO.	DATE
Original Submitted	March 17, 2022
Revision 1	
Revision 2	
Revision 3	
Master Set	

Division Home  
PREPARED FOR : 330 Jenna Record Road  
Northlake, AL 35894

DATE : March 17, 2022

DESIGNER CONTACT:  
T & J PANEL

DRAWN BY:  
T & J PANEL

**MITCHELL ENVIRONMENTAL, PA**  
C-2911

1501 LAKESTONE VILLAGE LANE  
SUITE 205  
FUQUAY VARINA, NC 27526

