Design, Installation and Maintenance

of the

T & J Panel
Wastewater Treatment System

A Better Quality Effluent

Environmental Health Specialists
Septic Tank Installers

Updated 2020

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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 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 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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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 total 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 12 of this manual.

Conversion For 50% Reduction

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 16inch 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.

37.5 / 37.5 Additional Reduction

As a modified conventional system, PPBPS can be installed utilizing the 75/75 rule to overcome site limitations. This rule, when applied, gives the panel system an additional reduction. This equates to a 62.5% reduction of total area needed when initial and repair are installed simultaneously to be used as dual alternating drain fields.
For example: A proposed 3-bedroom home with a .4 application rate would require 300 LF for both initial and repair for a total of 600 LF. Utilizing a conventional rock and pipe system the 75/75 or dual alternating fields would now require two drain fields at 225LF for a total of 450LF.
When applying this rule to Panel Systems you would then multiply 450LF by 0.5 for total of 225 LF of Panels; a 112.5 LF drain field alternating to another 112.5 LF drain field.

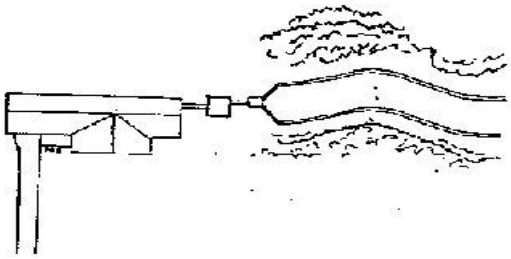
THIS PROVIDES A TOTAL **62.5%** REDUCTION

This can be achieved in most gravity flow scenarios with a standard flow diversion valve and two D-boxes.

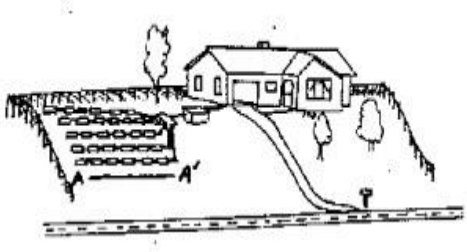
When pressure manifolds are used the safest practice for long term success and maintenance is a flow diversion valve controlling the flow to **two separate manifolds**.

Window Effect

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



MOST DESIRABLE

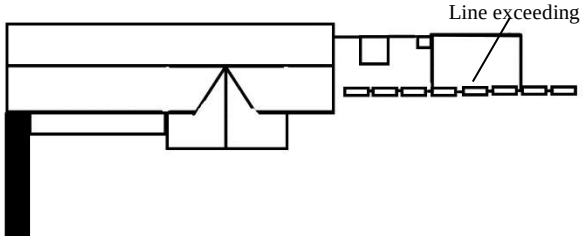


LESS DESIRABLE

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 distribution. 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 ¼ inch of drain line fall in 10 feet of run), they feed both ways equally. T&J Panel recommends that gravity fed lines not exceed 50 feet from point of introduction (an example of how to utilize longer line lengths with gravity distribution would be center-feeding a 100 ft line; this would give you 50 feet from the point of introduction). T&J Panel recommends that line lengths fed solely from one end that are between 50 and 75 feet utilize a pressure manifold to gravity, and that lines exceeding 75 feet utilize low-pressure distribution. These are recommendations of best practices, however we realize that particular sites and situations may call for a different approach.



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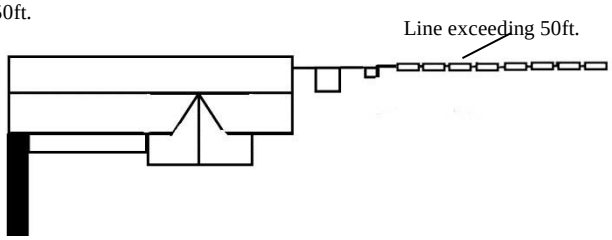


(Incorrect)

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

Calculating Panels per Trench

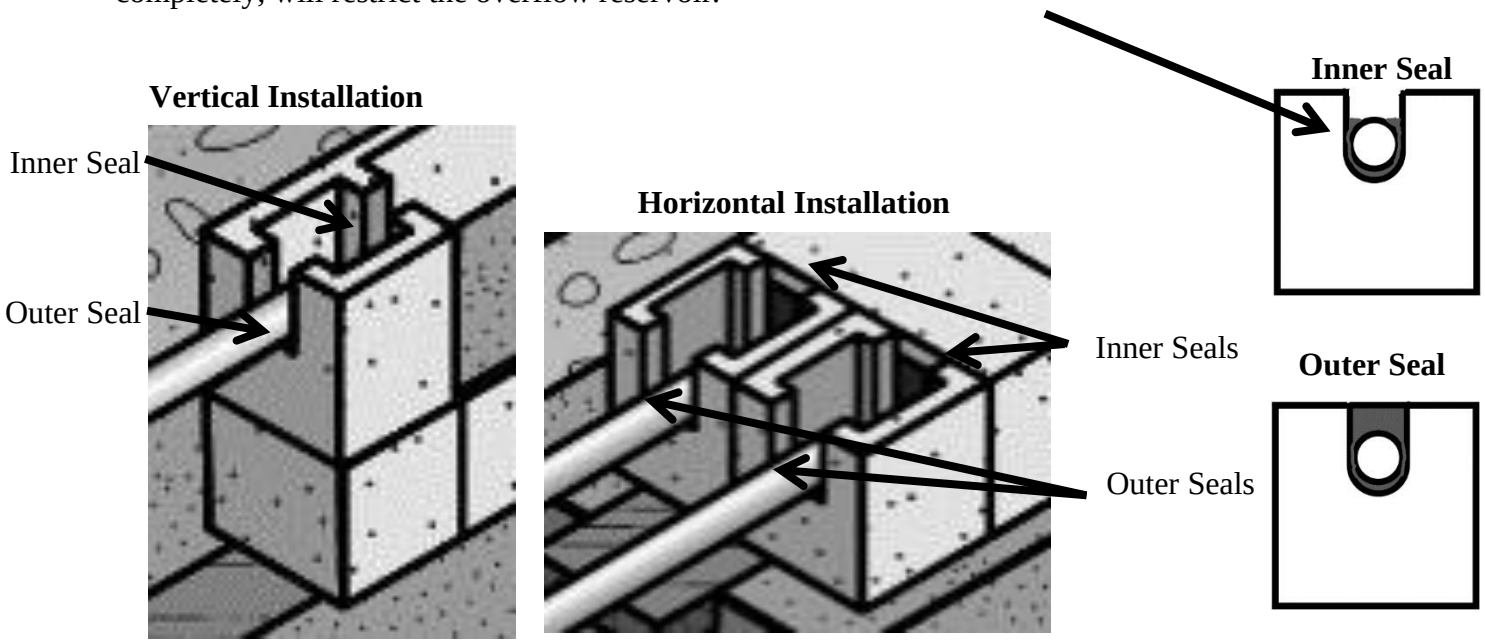
To calculate the number of panels needed for a 150-foot line, multiply 150' X 12" = 1800", then divide by 52" which is 46 inches for the panel and 6 inches for the space between the panels in the trench. 1800" / 52" = 34.6 panels; therefore, you would call for 35 panels (If .5 or greater round up to the nearest number). 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 16 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 5 to 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

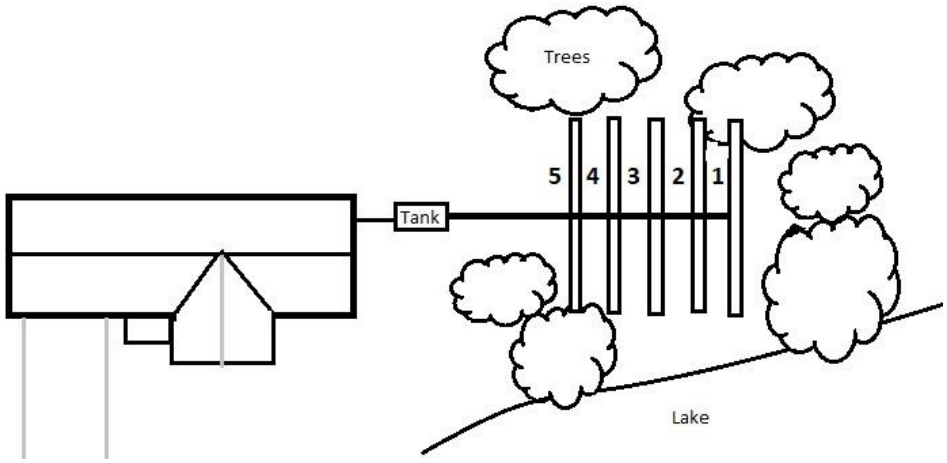
Generally, on level open land, a panel block system can be installed in about the same amount of time as a conventional system; however, traditionally, panel block systems have been installed where space and topography have restricted the use of a conventional system. For this reason, panel block system 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.

CORRECT INCORRECT

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 2inch PVC pipe (for gravity distribution, see page 12 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. Trenches should be either 8 or 9 foot on center (9 foot on center recommended where space allows). 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 7.5 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 (15 pounds total of sand per panel). 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, two 24-inch sections of 1 ½ inch PVC pipe (for gravity distribution, see page 12 for pressure distribution instructions) are 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.

- particle sand (medium sand blasting sand) 15lbs. 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 between 5 gal to 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 15 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 of a horizontal panel system consists of two pipes tied in at both the beginning and end of each trench, creating a consecutive distribution loop. This also allows for one supply line and one stand-up pipe at the distal end of the trench. 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" .094"	1/8" .125"	**5/32" .156"**	**3/16" .188"**	7/32" .219"	1/4" .250"	9/32" .281"	5/16" .313"	11/32" .344"	3/8" .375"
2.0	.15	.26	**.41**	**.59**	.80	1.04	1.32	1.63	1.97	2.34
2.1	.15	.27	**.42**	**.60**	.82	1.07	1.35	1.67	2.02	2.40
2.2	.15	.27	**.43**	**.61**	.84	1.09	1.38	1.71	2.07	2.46
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

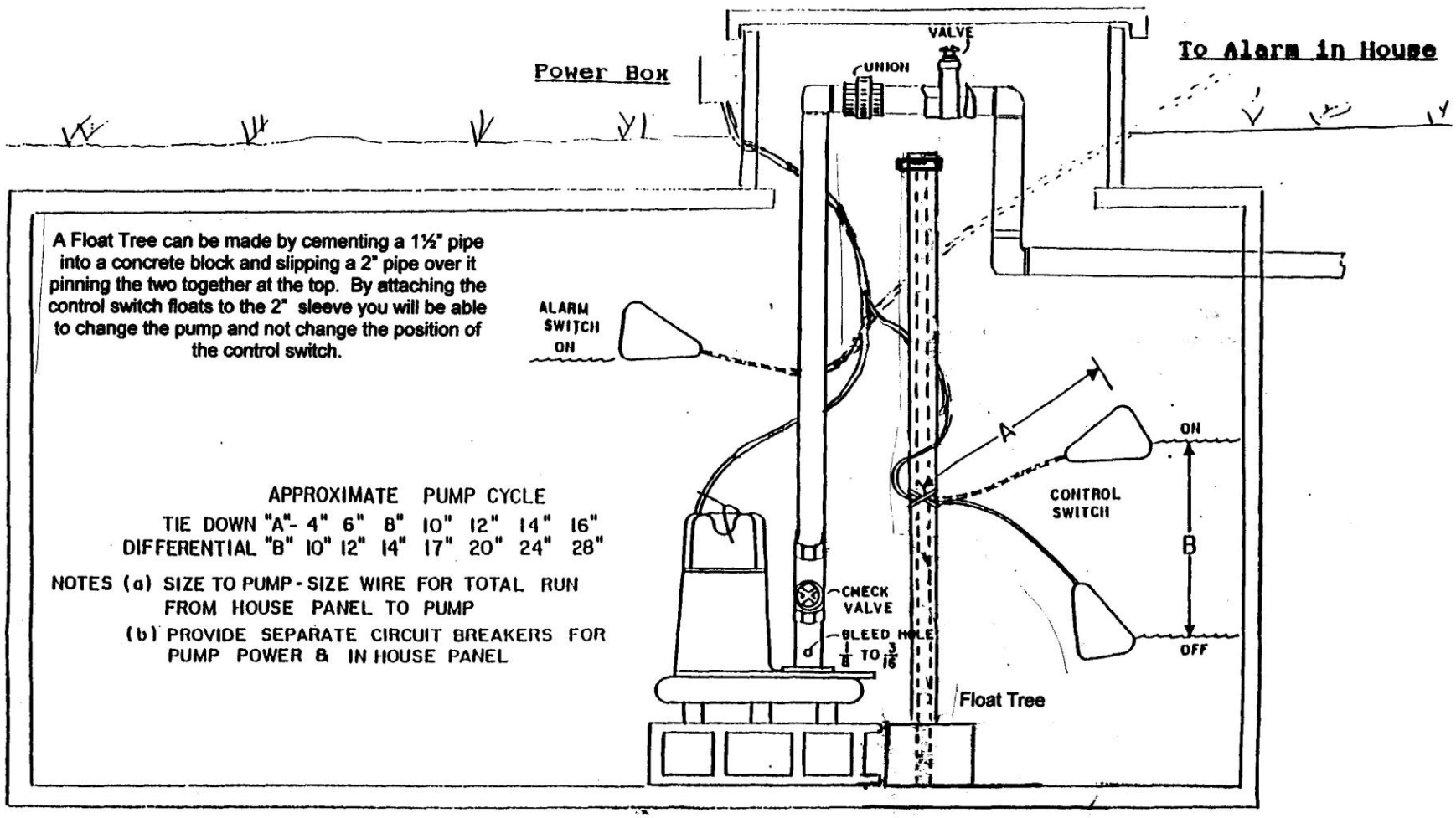
Head Pressure ft.	**SCH 40 1/2" 0.622**	**3/4" 0.824**	**Tap Diameter**	**SCH 80 1/2" 0.546**	**3/4" 0.742**
2.0	7.11	12.50		5.48	10.10
2.1	7.29	12.80		5.62	10.40
2.2	7.46	13.10		5.75	10.60
2.3	7.63	13.40		5.88	10.90
2.4	7.79	13.70		6.00	11.10
2.5	7.95	14.00		6.13	11.30
2.6	8.11	14.20		6.25	11.50
2.7	8.26	14.50		6.37	11.80
2.8	8.62	14.80	**Gallons**	6.48	12.00
2.9	8.36	15.00	**per minute**	6.60	12.20
3.0	8.71	15.30		6.71	12.40
3.1	8.86	15.50		6.82	12.60
3.2	9.00	15.80		6.93	12.80
3.3	9.14	16.00		7.04	13.00
3.4	9.27	16.30		7.15	13.20
3.5	9.41	16.50		7.25	13.40
3.6	9.54	16.70		7.35	13.60
3.7	9.67	17.00		7.45	13.80
3.8	9.80	17.20		7.55	14.00
3.9	9.93	17.40		7.65	14.10
4.0	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"
		Friction Loss (100ft)				
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


Power Box
VALVE
UNION
To Alarm in House
A Float Tree can be made by cementing a 1½" pipe into a concrete block and slipping a 2" pipe over it pinning the two together at the top. By attaching the control switch floats to the 2" sleeve you will be able to change the pump and not change the position of the control switch.
ALARM SWITCH ON
A
ON
CONTROL SWITCH
B
OFF
CHECK VALVE
BLEED HOLE
1/8 TO 3/16
Float Tree
APPROXIMATE PUMP CYCLE
TIE DOWN "A"- 4" 6" 8" 10" 12" 14" 16"
DIFFERENTIAL "B" 10" 12" 14" 17" 20" 24" 28"
NOTES (a) SIZE TO PUMP - SIZE WIRE FOR TOTAL RUN FROM HOUSE PANEL TO PUMP
(b) PROVIDE SEPARATE CIRCUIT BREAKERS FOR PUMP POWER & IN HOUSE PANEL

T&J Panels Jobsite Worksheet

Homeowner/Job Name: _____ County:

_____ Address:

_____

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

_____

_____ 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.

_____

MATERIALS CHECKLIST:

_____ 2" Pipe

_____ 1 ½" Pipe

_____ 1 ¼" 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 COMPLETITION:

_____ Septic Tank _____ Gallon

_____ Pump Tank _____ Gallon

_____ 4" Pipe

_____ Distribution Box

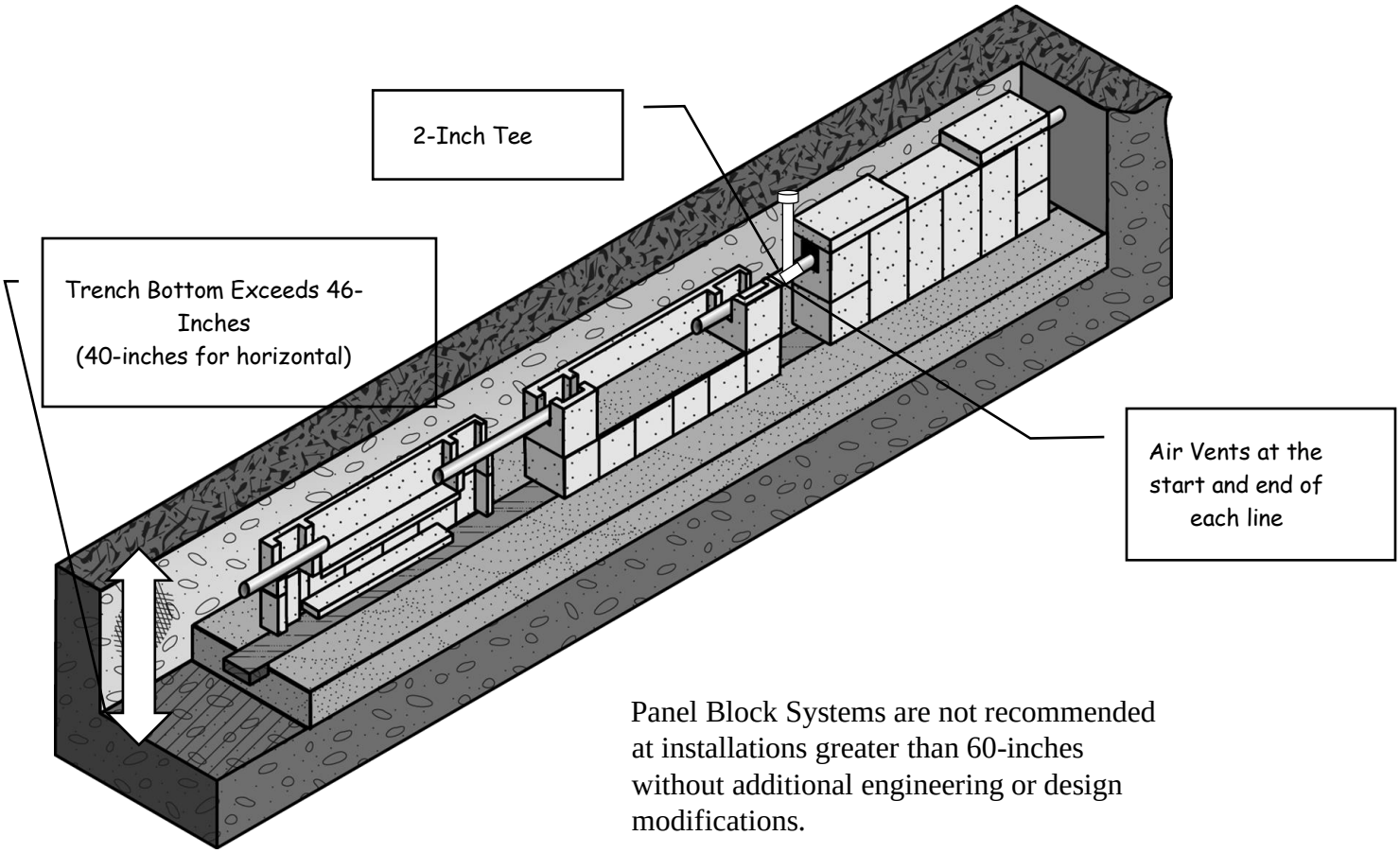
_____ Manifold _____ Taps _____ Size

_____ Install Training

_____ Tar Seal Rope (5ft. per panel)

Deep Installation of Panel Block Systems

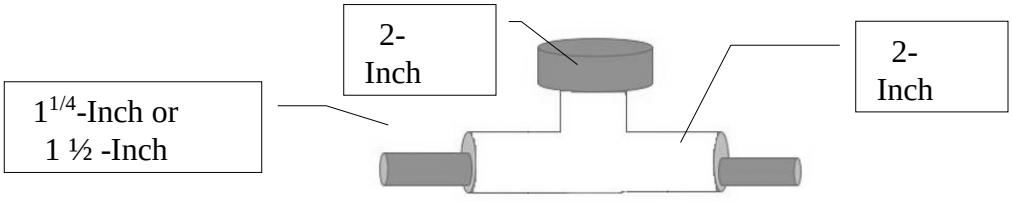
Utilize these specifications for ventilation when Trench Bottom *exceeds* 46-inches for vertical installation and 40-inches for horizontal installation.
In certain situations, there are more desirable soil conditions deeper in the soil profile. On these sites, Panel Systems can still be utilized, with 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.



Panel Block Systems are not recommended at installations greater than 60-inches without additional engineering or design modifications.

Gravity Flow Installation: Cut the 24-inch long, 2-inch PVC pipe in half, then reconnect with a 2-inch 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. These can be covered with a standard irrigation valve box for landscape purposes if lids allow for air flow (recommend drilling additional holes)

LP Panel Installation (Low Pressure Pipe): Insert your $1^{1/4}$-inch or 1 ½-inch into a 2-inch PVC "sleeve" that spans from one chamber of a panel to the next. Connect a 2-inch 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.



MAINTENANCE

The maintenance that pertains to a T&J Panel system is dependent upon the functionality of the components used to distribute effluent. Routine servicing of the septic tank and filter is key to maintaining a healthy, functioning system. The drain field site should be maintained with low lying vegetative growth free from saplings and other tree species that have infiltrative tendencies. A list of trees that should not be in close proximity to the septage area include elms, gum trees, cypress trees, maples, birches, walnut trees, poplars, and willows.

Gravity-Flow

- Pump septic tank every 3-5 years
- Clean effluent filter as needed
- Check for proper distribution if possible (ex: D-box, speed levelers)
- In a gravity-flow system, there is no maintenance needed in the drain field itself

Pressure Manifold to Gravity

- Pump septic tank every 3-5 years
- Clean effluent filter as needed
- Check functionality and condition of pump, floats, control panel, and alarms
- Check pressure manifold for proper head pressure and distribution
- Because it is gravity-flow once it leaves the manifold there is no maintenance needed in the drain field itself

Low Pressure Distribution

- Pump septic tank every 3-5 years
- Clean effluent filter as needed
- Check functionality and condition of pump, floats, control panel, and alarms
- Blow or cleanout distribution lines
- Reset head pressures and check for proper distribution

FAQ

Q: Can I use Vertical and Horizontal Panels in the same system to overcome certain site or soil conditions?
A: YES. Both styles are interchangeable and are often used in combination.

Q: How do I calculate the amount of backfill sand for my drain field?
A: To calculate the amount of backfill needed the simple equation is **LF** x **.17** = **Tons Needed**

Q: Does the Horizontal Panel System use more sand due to its 3-foot trench?
A: No, the cubic volume remains the same as Vertical Panel system even thought it is a 2-foot trench due to the lower trench profile.

Q: Should I consider a wider trench when installing a Vertical Panel System?
A: No, a 2-foot trench is vital in the distribution of effluent to the side walls and is key to keeping the aerobic treatment needed for breakdown.

Q: Why do Panel Block Systems have the longest lifespan on average of any system on the market?
A: This is primarily due to the fact that the storage capacity is **3X** that of a conventional system all while pretreating the effluent and preserving the soil itself. This hydraulically allows the soil to accept effluent longer and in a much smaller footprint.

Q: What is the difference between the sand inside the Panel Block chambers and the backfill sand used around the panels during install?
A: These two sands are very different and are used with opposite effects. The 50lb bags that come with the panels (typically a medium grade sand blasting sand) is angular in nature and is used to move effluent across the surface for both downline distribution and horizontal distribution to the trench side walls. The Naturally occurring backfill sand (typically a C-33 or 2-S sand) is round or cubical in nature to create voids that can not be stopped up and allow filtration and movement of effluent to trench sidewalls.

Q: What type of boards do I use for installation and what are their purpose?
A: Any 1x4 or 1x6 board will work it does not have to be a treated board because it will fossilize in the trench over time. The purpose of this board is for maintaining level at time of installation.

Q: Do I need a certification from T & J Panels to be able to install the system?
A: No, you do not need a certification from T & J Panel to be able to install the system, but we recommend an install training from one of our company reps for your first experience.

Q: Why would I consider a Panel System?
A: You may consider using a panel system if you want a system with longevity, if you have future site needs (i.e.: pools, additional bedrooms, landscaping needs), maximize your development potential, or if you just want a more environmentally friendly option.

NOTES:

T & J Panel Wastewater Treatment System

269 Marble Road
Statesville, NC 28625

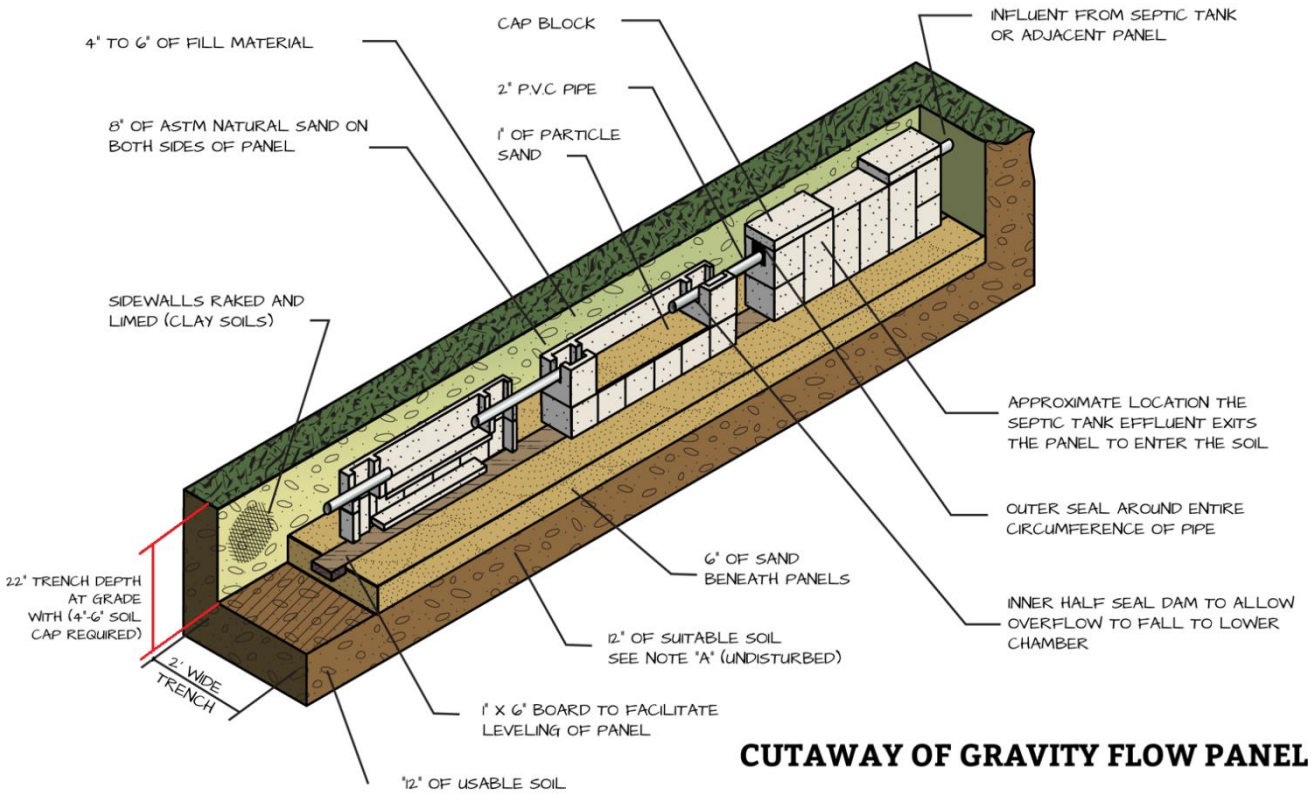
Office: **704-924-8600**
Fax: **704-924-8681**

Website**: www.tjpanel.com**
Email: **info@tjpanel.com**

Limited Warranty:

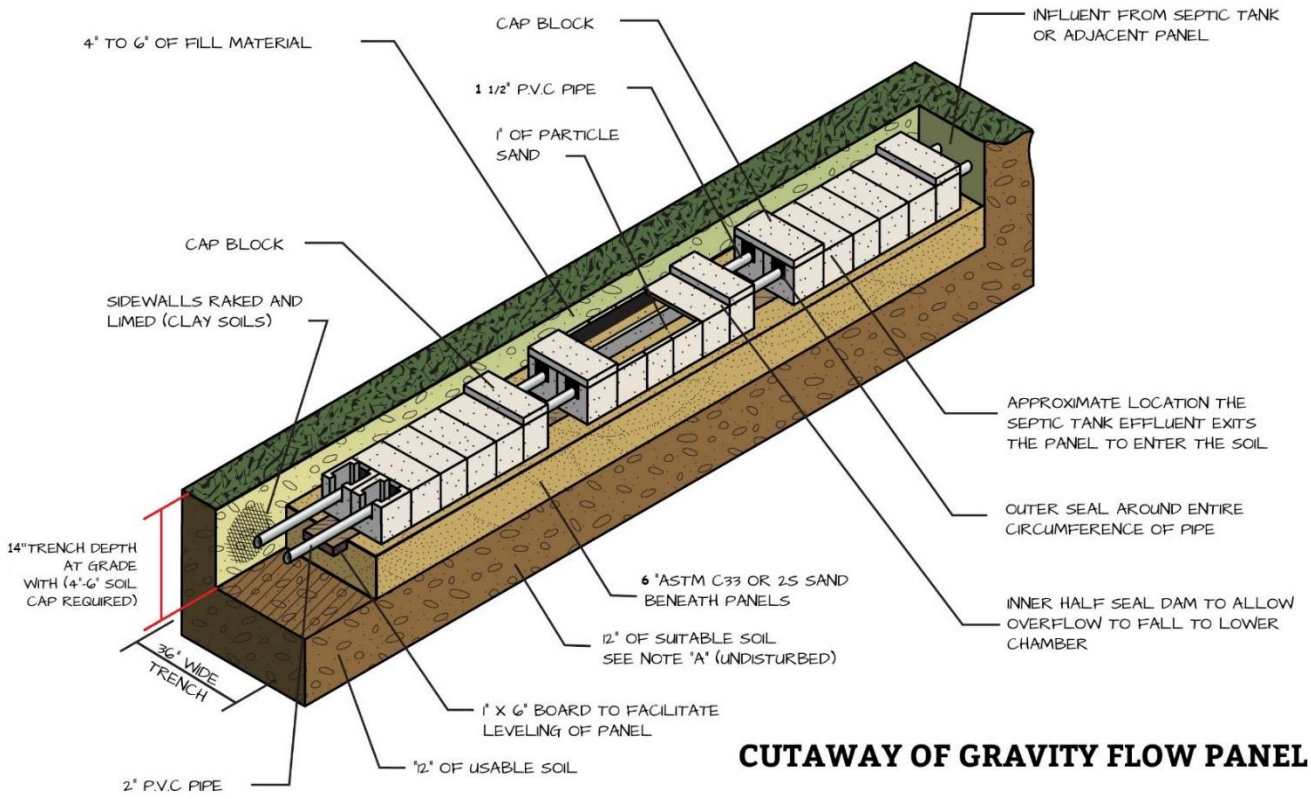
The structural integrity of each T&J Panel, when installed in accordance with manufacturer's instructions, is warranted against defective materials and workmanship for one year from date of manufacture. Should a defect appear within the warranty period, purchaser must inform T&J Panel System of the defect 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 Vertical Installation



CUTAWAY OF GRAVITY FLOW PANEL

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



CUTAWAY OF GRAVITY FLOW PANEL

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