



INDIVIDUAL SEWAGE SYSTEM DESIGN SUMMARY

Property Owner: Daniel Behrens Phone: _____
Address: 32553 – 420th Place Township: Farm Island
City: Aitkin Zip: 56431 County: Aitkin

DESIGN USAGE

Single Family Home 300 Other _____
Number of Potential Bedrooms 2
Garbage Disposal no
Sewage Lift Pump no

SITE CHARACTERISTICS

Soil type Fine Sandy Loam
Hydraulic Loading 1.0 GPD/Ft2
Depth to restrictive layer 20"

PUMP INFORMATION

Pump GPM & TDH 23gpd 13.2 TDH
Cycles per day 4
Gallons per cycle 75 gallons

CAPACITIES

Daily Water Use 300 Est _____ Calc X
Septic Tank Capacity 500 gallons
Pump Tank Capacity 500 gallons

Perforation size & spacing 1/4" every 3'
Number, spacing, & diameter of laterals 3 – 1.5" laterals every 3'
Forcemain Size 2"


MOUND SYSTEM

~~Dimension of Rock Base _____
Depth of Rock Below Pipe _____
Dimensions of Mound _____
% Slope of Soil Under Mound _____
Upslope Dike Width _____
Downslope Dike Width _____
Sideslope Dike Width _____~~

BED SYSTEM

Type of bed Pressure
Maximum Depth of bed 8"
Square Feet of bed Required 300ft2
Square Feet of bed Proposed 300ft2
Dimension of bed Proposed 10' by 30'

APPROVAL

By  _____ Date 4/11/16
Brian Koski License #2624

See additional information sheet if checked

Septic System Design Additional Information

Property Owner: Daniel Behrens (Possible buyer)

Description of Wastewater Treatment and Dispersal System

This design is for a type IV septic system at an existing property. The design requires multiple variances as the proposed system is located on an island with an existing land bridge for access. Advanced treatment technologies will need to be utilized to assure longevity of the drainfield and to assure maximum treatment of wastewater considering the location. An existing outhouse on the property will need to be properly abandon upon installation of the updated septic system.

A soil sample was completed onsite and verified by Becky Sovde, a soil scientist with Aitkin County. The soil sample showed Fine sandy loam soils with redox features at a depth of 20". The soils have an E horizon that is not to be confused with gleyed soils. Gleyed soils with faint concentrations were found at a depth of 20".

Final soils and elevations will be completed upon the approval of the variance.

A Delta Environmental ECO Pod E50 will be installed with a Salcor UV disinfection lamp. This unit is capable of treating up to 500 gallons per day. This system will need to be on an operating permit to assure proper maintenance and function. All services will need to be performed by a licensed service provider.

Sewage will flow out of the cabin into an Infiltrator TW-500 septic tank; effluent will then flow into an Infiltrator TW-1050 where it will then get treated by an ECO Pod E50 treatment unit. Once treated, the effluent will then flow by gravity through a Salcor UV disinfection lamp into the Infiltrator TW-500 pump tank. It will then dose a 10' by 30' pressure bed with EZ Flow distribution media with lateral cleanouts and inspection pipes to grade.

Keep all vehicles and construction equipment off septic area. Rutting and/or compacting the soil will change the percolation rates and may lead to system failure.

Homeowner to verify all property lines.

Elevations are referenced to Bench Mark on the survey stake on the south side of the property.

Installer to verify all elevations, dimensions, and ensure proper fall to pipes. Pitch pump chamber outlet to ensure complete drainback to pump chamber.

Establish turf to prevent erosion and freezing.

Each tank is to be pumped through the maintenance cover when serviced. Do not pump through inspection pipes.

Homeowner is responsible for all costs involved in servicing, monitoring, and mitigating the system.

All construction to be performed in accordance with MN Rule 7080.

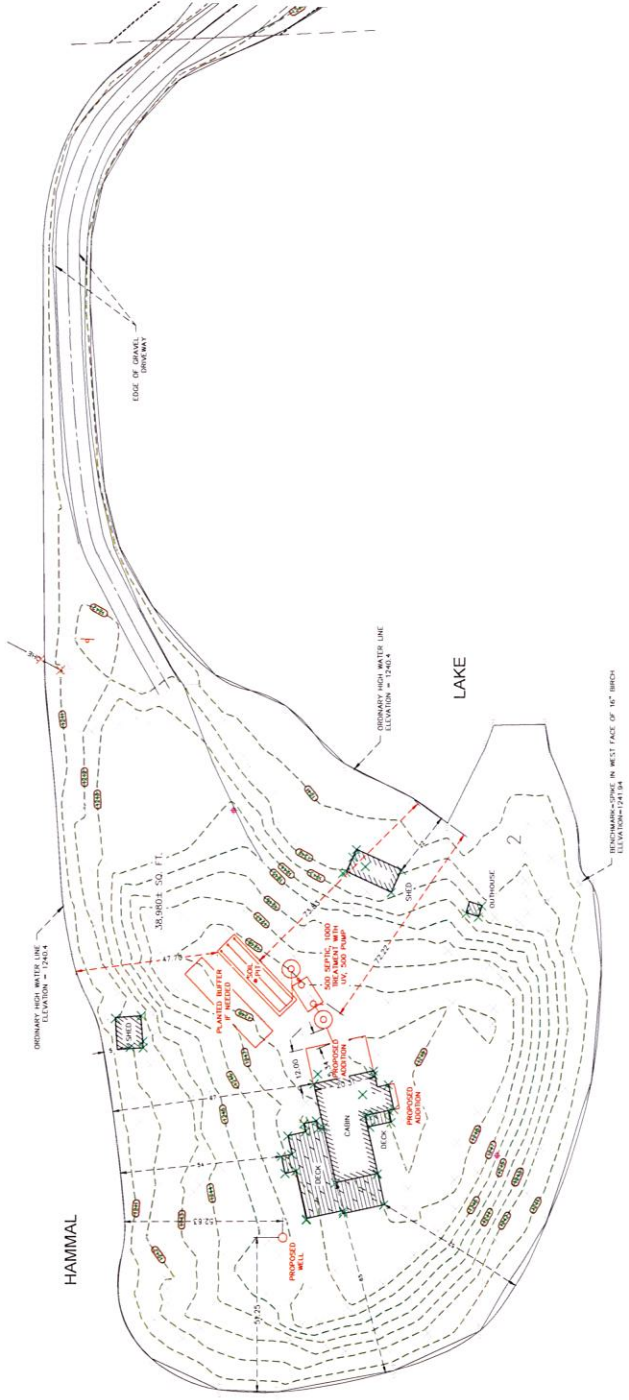
Maintenance Requirements

See attached operating permit or management plan for details

CERTIFICATE OF SURVEY
 PART OF GOVERNMENT LOT 2, SECTION 10,
 TOWNSHIP 46, RANGE 27, AITKIN COUNTY, MINNESOTA



OPERATION OF THIS SEWAGE SYSTEM IS BASED ON
 THE ASSUMPTIONS THAT THE SEWAGE TREATMENT
 PLANT WILL BE MAINTAINED AND OPERATED AS
 INDICATED ON THIS PLAN.
 • MANHOLE AND PUMP HOUSE
 ○ 4" DIA. 15' HIGH CHARACTER PIPE 18" I.D. 1/2" DIA.
 PIPE 18" I.D. 1/2" DIA. 15' HIGH MANHOLE



DATE	4-1-18	BY	DANIEL BERNERS
SCALE	AS SHOWN	CHECKED BY	DANIEL BERNERS
PROJECT NO.	2018-005	DATE	4-1-18
FILE NUMBER	2018-005-000	PROJECT NO.	2018-005

WIDSETH SMITH NOLTING
 Engineering | Architecture | Surveying | Environmental

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Client/ Address:		32553 - 420th Place Aitkin MN 56431		Legal Description/ GPS:		07-0-021600	
Soil parent material(s): (Check all that apply)							
<input type="checkbox"/> Outwash		<input type="checkbox"/> Lacustrine		<input type="checkbox"/> Loess		<input type="checkbox"/> Till	
<input type="checkbox"/> Summit		<input type="checkbox"/> Shoulder		<input type="checkbox"/> Back/Side Slope		<input type="checkbox"/> Foot Slope	
<input checked="" type="checkbox"/> Grass		Soil survey map units		Slope %		Elevation: 1248.5	
Landscape Position: (check one)				Slope shape			
<input checked="" type="checkbox"/> Summit		<input type="checkbox"/> Shoulder		<input type="checkbox"/> Back/Side Slope		<input type="checkbox"/> Foot Slope	
Weather Conditions/Time of Day:		Cloudy 9:45am		Date		04/08/16	
Observation #/Location:				SB1 - Center of Bed Location			
Observation #/Location:		SB1 - Center of Bed Location		Observation Type:		Auger	
Depth (in)		Rock Frag. %		Matrix Color(s)		Mottle Color(s)	
0-7		<35%		10YR 3/3		Redox Kind(s)	
7-18		<35%		10YR 4/4		Indicator(s)	
18-22		<35%		10YR 5/4		Concentrations, depletions	
Texture		Sandy Loam		Sandy Loam		Sandy Clay Loam	
Shape		Granular		Granular		Blocky	
Grade		Strong		Strong		Strong	
Consistence		Friable		Friable		Friable	

Comments Redox Features at 20" (faint) Soils verified by Becky With Aitkin County, she recommended a pit upon installation to possibly go deeper.

I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.

Travis Johnson
(Designer/Inspector)

2624
(License #)

4/11/2016
(Date)



Property Owner/Client: Project ID: v 07.14.15
 Site Address: Date:

1. DESIGN FLOW AND TANKS

A. Design Flow: Gallons Per Day (GPD) *Note: The estimated design flow is considered a peak flow rate including a safety factor. For long term performance, the average daily flow is recommended to be < 60% of this value.*

B. Septic Tanks:
 Minimum Code Required Septic Tank Capacity: Gallons, in Tanks or Compartments
 Recommended Septic Tank Capacity: Gallons, in Tanks or Compartments
 Effluent Screen: Alarm:

C. Holding Tanks Only:
 Minimum Code Required Capacity: Gallons, in Tanks
 Designer Recommended Capacity: Gallons, in Tanks
 Type of High Level Alarm:

D. Pump Tank 1 Capacity (Code Minimum): Gallons Pump Tank 2 Capacity (Code Minimum): Gallons
 Pump Tank 1 Capacity (Designer Rec): Gallons Pump Tank 2 Capacity (Designer Rec): Gallons
 Pump 1 GPM Total Head ft Pump 2 GPM Total Head ft
 Supply Pipe Dia. in Dose Volume: gal Supply Pipe Dia. in Dose Volume: gal

2. SYSTEM TYPE

- Trench Bed Mound At-Grade Gravity Distribution Pressure Distribution-Level Pressure Distribution-Unlevel
 Drip Holding Tank Other * Selection Required

Benchmark Elevation: ft
 Benchmark Location:

System Type

Type I Type II Type III Type IV Type V

Type of Distribution Media:
 Drainfield Rock Registered Treatment Media:

3. SITE EVALUATION:

A. Depth to Limiting Layer: in ft B. Measured Land Slope %: %
 C. Elevation of Limiting Layer: D. Soil Texture:
 E. Loc. of Restrictive Elevation: F. Soil Hyd. Loading Rate: GPD/ft²
 G. Minimum Required Separation: in ft H. Perc Rate: MPI
 I. Code Maximum Depth of System: in Comments:

4. DESIGN SUMMARY

Trench Design Summary

Dispersal Area ft² Sidewall Depth in Trench Width ft
 Total Lineal Feet ft Number of Trenches Code Maximum Trench Depth in
 Contour Loading Rate ft Designer's Max Trench Depth in

Bed Design Summary

Absorption Area ft² Depth of sidewall in Code Maximum Bed Depth in
 Bed Width ft Bed Length ft Designer's Max Bed Depth in



Mound Design Summary

Absorption Bed Area ft² Bed Length ft Bed Width ft
 Absorption Width ft Clean Sand Lift ft Berm Width (0-1%) ft
 Upslope Berm Width ft Downslope Berm Width ft Endslope Berm Width ft
 Total System Length ft Total System Width ft Contour Loading Rate gal/ft

At-Grade Design Summary

Absorption Bed Width ft Absorption Bed Length ft System Height ft
 Contour Loading Rate gal/ft Upslope Berm Width ft Downslope Berm Width ft
 Endslope Berm Width ft System Length ft System Width ft

Level & Equal Pressure Distribution Summary

No. of Perforated Laterals Perforation Spacing ft Perforation Diameter in
 Lateral Diameter in Min. Delivered Volume gal Maximum Delivered Volume gal

Non-Level and Unequal Pressure Distribution Summary

	Elevation (ft)	Pipe Size (in)	Pipe Volume (gal/ft)	Pipe Length (ft)	Perforation Size (in)	Spacing (ft)	Spacing (in)	
Lateral 1								Minimum Delivered Volume <input type="text"/> gal
Lateral 2								
Lateral 3								Maximum Delivered Volume <input type="text"/> gal
Lateral 4								
Lateral 5								
Lateral 6								

5. Additional Info for Type IV/Pretreatment Design

A. Calculate the organic loading

1. Organic Loading to Pretreatment Unit = Design Flow X Estimated BOD in mg/L in the effluent X 8.35 ÷ 1,000,000

gpd X mg/L X 8.35 ÷ 1,000,000 = lbs BOD/day

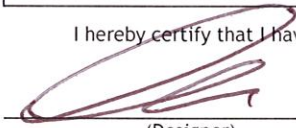
2. Type of Pretreatment Unit Being Installed:

3. Calculate Soil Treatment System Organic Loading: BOD concentration after pretreatment ÷ Bottom Area = lbs/day/ft²

mg/L X 8.35 ÷ 1,000,000 ÷ ft² = lbs/day/ft²

Comments/Special Design Considerations:

I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.



 (Designer)



 (Signature)

 (License #)

 (Date)



OSTP Bed Design Worksheet

1. SYSTEM SIZING:	Project ID:	v 07.14.15
<p>A. Design Flow (Design Sum. 1A): <input type="text" value="300"/> GPD</p> <p>B. Code Maximum Depth*: <input type="text" value="8"/> inches Designers Maximum Depth: <input type="text" value="8"/> inches</p> <p>C. Soil Loading Rate: <input type="text" value="1.00"/> GPD/ft²</p> <p>D. Required Bottom Area: Design Flow (1.A) ÷ Loading Rate (1.C) = Initial Required Bottom Area <input type="text" value="300"/> GPD ÷ <input type="text" value="1.00"/> GPD/ft² = <input type="text" value="300"/> ft²</p> <p>E. Select Distribution Method: <input checked="" type="checkbox"/> Pressure <input type="checkbox"/> Gravity <input style="width: 150px; height: 20px;" type="text"/></p> <p>F. Select Dispersal Type: <input type="checkbox"/> Rock <input checked="" type="checkbox"/> Registered <input style="width: 150px; height: 20px; border: 1px solid black;" value="EZ Flow"/></p> <p>G. If distribution media is installed in contact with sandy or loamy sand or with a percolation rate of 0.1 to 5 mpi indicate distribution or treatment method: <input style="width: 150px; height: 20px; border: 1px solid black;" value="Pressure distribution"/></p>		
2. BED CONFIGURATION: (for sites with less than 6% slope)		
<p>A. Select size Multiplier: <input type="text" value="1.0"/> 1.0 = pressurized or 1.5 = gravity</p> <p>B. Req'd Bottom Area = Bottom Area (1.D) X Size Multiplier = <input type="text" value="300.0"/> ft² X <input type="text" value="1.0"/> ft = <input type="text" value="300"/> ft²</p> <p>C. Designed Bottom Area: <input type="text" value="300"/> ft <i>Optional upsizing of bed area</i></p> <p>D. Select Bed Width: <input type="text" value="10"/> ft</p> <p>E. Calculate Bed Length: Designed Bottom Area ÷ Bed Width = Bed Length <input type="text" value="300"/> ft² ÷ <input type="text" value="10.0"/> ft = <input type="text" value="30.0"/> ft</p>		
3. MATERIAL CALCULATION: ROCK		
<p>A. If drainfield rock is being used, select sidewall absorption <input style="width: 50px;" type="text"/> inches = <input style="width: 50px;" type="text"/> ft</p> <p>B. Media Volume: (Media Depth + depth to cover pipe) X Designed Bottom Area = ft³ (<input style="width: 50px;" type="text"/> ft + <input style="width: 50px;" type="text"/> ft) X <input style="width: 50px;" type="text"/> ft² = <input style="width: 50px;" type="text"/> ft³</p> <p>C. Calculate Volume in cubic yards: Media volume in cubic feet ÷ 27 = cubic yards <input style="width: 50px;" type="text"/> ft³ ÷ 27 = <input style="width: 50px;" type="text"/> yd³</p>		
4. MATERIAL CALCULATION: REGISTERED PRODUCTS - CHAMBERS AND EZFLOW		
<p>A. Registered Product: <input style="width: 150px; height: 20px; border: 1px solid black;" value="EZ Flo"/></p> <p>B. Component Length: <input style="width: 50px; height: 20px; border: 1px solid black;" value="10"/> ft 1</p> <p>C. Component Width: <input style="width: 50px; height: 20px; border: 1px solid black;" value="1"/> ft 0</p> <p>D. Component depth (louver or depth of sidewall loading) <input style="width: 50px; height: 20px; border: 1px solid black;" value="6"/> in</p> <p>D. Number of Components per Row = Bed Length divided by Component Length (Round up) <input type="text" value="30"/> ft ÷ <input type="text" value="10"/> ft = <input type="text" value="3"/> components</p> <p>E. Actual Bed Length = Number of Components X Component Length: <input type="text" value="3"/> components X <input type="text" value="10.0"/> ft = <input type="text" value="30.0"/> ft</p> <p>F. Number of Rows = Bed Width divided by Component Width <input type="text" value="10"/> ft ÷ <input type="text" value="1"/> ft = <input type="text" value="10.0"/> rows <i>Adjust width so this is an whole number.</i></p> <p>G. Total Number of Components = Number of Components per Row X Number of Rows <input type="text" value="3"/> X <input type="text" value="10"/> = <input type="text" value="30"/> components</p>		



OSTP Pressure Distribution Design Worksheet



Project ID:

v 07.14.15

1. Media Bed Width: ft

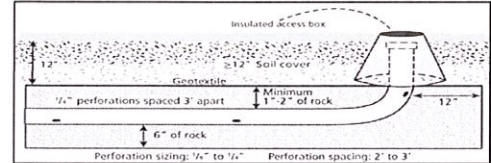
2. Minimum Number of Laterals in system/zone = Rounded up number of $[(\text{Media Bed Width} - 4) \div 3] + 1$.

$(\text{ } \boxed{10} \text{ } - 4) + 1 = \text{ } \boxed{3} \text{ } \text{laterals}$ *Does not apply to at-grades*

3. Designer Selected Number of Laterals: laterals
Cannot be less than line 2 (accept in at-grades)

4. Select Perforation Spacing: ft

5. Select Perforation Diameter Size: in



6. Length of Laterals = Media Bed Length - 2 Feet.

- 2ft = ft *Perforation can not be closer than 1 foot from edge.*

7. Determine the Number of Perforation Spaces. Divide the Length of Laterals by the Perforation Spacing and round down to the nearest whole number.

Number of Perforation Spaces = ft \div ft = Spaces

8. Number of Perforations per Lateral is equal to 1.0 plus the Number of Perforation Spaces. Check table below to verify the number of perforations per lateral guarantees less than a 10% discharge variation. The value is double with a center manifold.

Perforations Per Lateral = Spaces + 1 = Perfs. Per Lateral

Maximum Number of Perforations Per Lateral to Guarantee <10% Discharge Variation											
1/4 Inch Perforations						7/32 Inch Perforations					
Perforation Spacing (Feet)	Pipe Diameter (Inches)					Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1 1/4	1 1/2	2	3		1	1 1/4	1 1/2	2	3
2	10	13	18	30	60	2	11	16	21	34	68
2 1/2	8	12	16	28	54	2 1/2	10	14	20	32	64
3	8	12	16	25	52	3	9	14	19	30	60
3/16 Inch Perforations						1/8 Inch Perforations					
Perforation Spacing (Feet)	Pipe Diameter (Inches)					Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1 1/4	1 1/2	2	3		1	1 1/4	1 1/2	2	3
2	12	18	26	46	87	2	21	33	44	74	149
2 1/2	12	17	24	40	80	2 1/2	20	30	41	69	135
3	12	16	22	37	75	3	20	29	38	64	128

9. Total Number of Perforations equals the Number of Perforations per Lateral multiplied by the Number of Perforated Laterals.

Perf. Per Lat. X Number of Perf. Lat. = Total Number of Perf.

10. Select Type of Manifold Connection (End or Center): End Center

11. Select Lateral Diameter (See Table): in



OSTP Pressure Distribution Design Worksheet



12. Calculate the *Square Feet per Perforation*. Recommended value is 4-11 ft² per perforation.

Does not apply to At-Grades

a. *Bed Area* = Bed Width (ft) X Bed Length (ft)

$$\boxed{10} \text{ ft} \times \boxed{30} \text{ ft} = \boxed{300} \text{ ft}^2$$

b. *Square Foot per Perforation* = *Bed Area* divided by the *Total Number of Perforations*.

$$\boxed{300} \text{ ft}^2 \div \boxed{30} \text{ perforations} = \boxed{10.0} \text{ ft}^2/\text{perforations}$$

13. Select *Minimum Average Head*: ft

14. Select *Perforation Discharge* (GPM) based on Table: GPM per Perforation

15. Determine required *Flow Rate* by multiplying the *Total Number of Perfs.* by the *Perforation Discharge*.

$$\boxed{30} \text{ Perfs} \times \boxed{0.74} \text{ GPM per Perforation} = \boxed{23} \text{ GPM}$$

16. *Volume of Liquid Per Foot of Distribution Piping* (Table II): Gallons/ft

17. *Volume of Distribution Piping* =

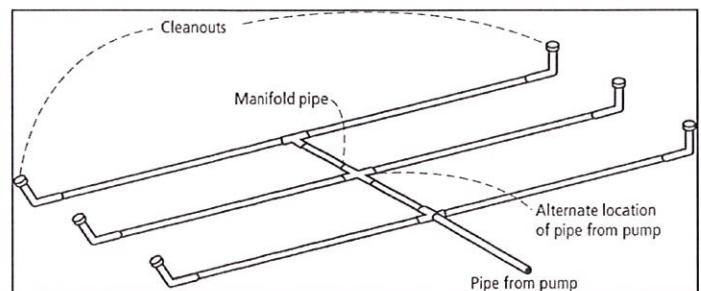
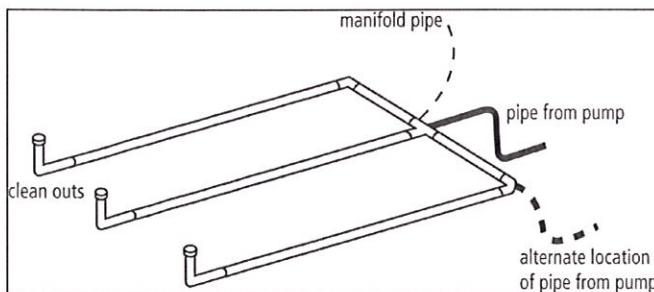
= [Number of Perforated Laterals X Length of Laterals X (Volume of Liquid Per Foot of Distribution Piping)]

$$\boxed{3} \times \boxed{28} \text{ ft} \times \boxed{0.110} \text{ gal/ft} = \boxed{9.2} \text{ Gallons}$$

18. Minimum Delivered Volume = Volume of Distribution Piping X 4

$$\boxed{9.2} \text{ gals} \times 4 = \boxed{37.0} \text{ Gallons}$$

Pipe Diameter (inches)	Liquid Per Foot (Gallons)
1	0.045
1.25	0.078
1.5	0.110
2	0.170
3	0.380
4	0.661



Comments/Special Design Considerations:



OSTP Basic Pump Selection Design Worksheet



1. PUMP CAPACITY Project ID: _____

Pumping to Gravity or Pressure Distribution: Gravity Pressure **Selection required**

1. If pumping to gravity enter the gallon per minute of the pump: GPM (10 - 45 gpm)

2. If pumping to a pressurized distribution system: GPM

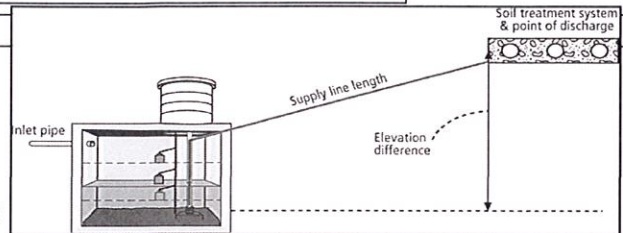
3. Enter pump description:

2. HEAD REQUIREMENTS

A. Elevation Difference ft
between pump and point of discharge:

B. Distribution Head Loss: ft

C. Additional Head Loss: ft (due to special equipment, etc.)



Distribution Head Loss	
Gravity Distribution = 0ft	
Pressure Distribution based on Minimum Average Head Value on Pressure Distribution Worksheet:	
Minimum Average Head	Distribution Head Loss
1ft	5ft
2ft	6ft
5ft	10ft

Table I. Friction Loss in Plastic Pipe per 100ft

Flow Rate (GPM)	Pipe Diameter (inches)			
	1	1.25	1.5	2
10	9.1	3.1	1.3	0.3
12	12.8	4.3	1.8	0.4
14	17.0	5.7	2.4	0.6
16	21.8	7.3	3.0	0.7
18		9.1	3.8	0.9
20		11.1	4.6	1.1
25		16.8	6.9	1.7
30		23.5	9.7	2.4
35			12.9	3.2
40			16.5	4.1
45			20.5	5.0
50				6.1
55				7.3
60				8.6
65				10.0
70				11.4
75				13.0
85				16.4
95				20.1

D. 1. Supply Pipe Diameter: in

2. Supply Pipe Length: ft

E. Friction Loss in Plastic Pipe per 100ft from Table I:

Friction Loss = ft per 100ft of pipe

F. Determine *Equivalent Pipe Length* from pump discharge to soil dispersal area discharge point. Estimate by adding 25% to supply pipe length for fitting loss. *Supply Pipe Length (D.2) X 1.25 = Equivalent Pipe Length*

ft X 1.25 = ft

G. Calculate *Supply Friction Loss* by multiplying *Friction Loss Per 100ft* (Line E) by the *Equivalent Pipe Length* (Line F) and divide by 100.

Supply Friction Loss =
 ft per 100ft X ft ÷ 100 = ft

H. *Total Head* requirement is the sum of the *Elevation Difference* (Line A), the *Distribution Head Loss* (Line B), *Additional Head Loss* (Line C), and the *Supply Friction Loss* (Line G)

ft + ft + ft + ft = ft

3. PUMP SELECTION

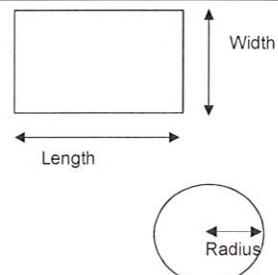
A pump must be selected to deliver at least **23.0** GPM (Line 1 or Line 2) with at least **13.2** feet of total head.

Comments:

DETERMINE TANK CAPACITY AND DIMENSIONS Project ID: v 07.14.15

1. A. Design Flow (Design Sum. 1A): 300 GPD
- B. Min. required pump tank capacity: 500 Gal C. Recommended pump tank capacity: 500 Gal
- D. Pump tank description: Time to Pressure

MEASURED TANK CAPACITY (existing tanks):

2. A. Rectangle area = Length (L) X Width (W)
 ft X ft = ft²
- B. Circle area = 3.14r² (3.14 X radius X radius)
 3.14 X ² ft = ft²
- C. Calculate Gallons Per Inch. Multiply the area from 1.A or 1.B, by 7.5 to determine the gallons per foot the tank holds and divide by 12 to calculate the gallons per inch.
 ft² X 7.5 gal/ft³ ÷ 12 in/ft = Gallons per inch
- D. Calculate Total Tank Volume
 Depth from bottom of inlet pipe to tank bottom: in
 Total Tank Volume = Depth from bottom of inlet pipe (Line 4.A) X Gallons/Inch (Line 2)
 in X 10.9 Gallons Per Inch = Gallons
- 

MANUFACTURER'S SPECIFIED TANK CAPACITY (when available):

3. A. Tank Manufacturer: Infiltrator
- B. Tank Model: TW-500
- C. Capacity from manufacturer: 504 Gallons
- D. Gallons per inch from manufacturer: 10.9 Gallons per inch
- E. Liquid depth of tank from manufacturer: 46.0 inches

Note: Design calculations are based on this specific tank. Substituting a different tank model will change the pump float or timer settings. Contact designer if changes are necessary.

DETERMINE DOSING VOLUME

4. Calculate Volume to Cover Pump (The inlet of the pump must be at least 4-inches from the bottom of the pump tank & 2 inches of water covering the pump is recommended)
 (Pump and block height + 2 inches) X Gallons Per Inch (2C or 3E)
 (12 in + 2 inches) X 10.9 Gallons Per Inch = 152 Gallons
5. Minimum Delivered Volume = 4 X Volume of Distribution Piping:
 - Line 17 of the Pressure Distribution or Line 11 of Non-level 37 Gallons (minimum dose)
6. Calculate Maximum Pumpout Volume (25% of Design Flow)
 Design Flow: 300 GPD X 0.25 = 75 Gallons (maximum dose)

7. Select a pumpout volume that meets both Minimum and Maximum: 75 Gallons

8. Calculate Doses Per Day = Design Flow ÷ Delivered Volume
300 gpd ÷ 75 gal = 4 Doses

9. Calculate Drainback:
- A. Diameter of Supply Pipe = 2 inches
- B. Length of Supply Pipe = 12 feet
- C. Volume of Liquid Per Lineal Foot of Pipe = 0.170 Gallons/ft
- D. Drainback = Length of Supply Pipe X Volume of Liquid Per Lineal Foot of Pipe
12 ft X 0.170 gal/ft = 2.0 Gallons

10. Total Dosing Volume = Delivered Volume plus Drainback
75 gal + 2.0 gal = 77 Gallons

11. Minimum Alarm Volume = Depth of alarm (2 or 3 inches) X gallons per inch of tank
3 in X 10.9 gal/in = 32.6 Gallons

Volume of Liquid in Pipe	
Pipe Diameter (inches)	Liquid Per Foot (Gallons)
1	0.045
1.25	0.078
1.5	0.110
2	0.170
3	0.380
4	0.661

TIMER or DEMAND FLOAT SETTINGS

Select Timer or Demand Dosing: Timer Demand Dose

A. Timer Settings

12. Required Flow Rate :

A. From Design (Line 12 of Pressure, Line 10 of Non-Level or Line 6 of Pump*): GPM

B. Or calculated: GPM = Change in Depth (in) x Gallons Per Inch / Time Interval in Minutes
 in X gal/in ÷ min = GPM

**Note: This value must be adjusted after installation based on pump calibration.*

13. Flow Rate from Line 12.A or 12.B above. GPM

14. Calculate **TIMER ON** setting:

Total Dosing Volume/GPM
 gal ÷ gpm = Minutes ON

15. Calculate **TIMER OFF** setting:

Minutes Per Day (1440) / Doses Per Day - Minutes On
 1440 min ÷ doses/day - min = Minutes OFF

16. Pump Off Float - Measuring from bottom of tank:

Distance to set Pump Off Float = Gallons to Cover Pump / Gallons Per Inch:
 gal ÷ gal/in = Inches

17. Alarm Float - Measuring from bottom of tank:

Distance to set Alarm Float = Tank Depth(4A) X 90% of Tank Depth
 in X 0.90 = in

B. DEMAND DOSE FLOAT SETTINGS

18. Calculate *Float Separation Distance* using *Dosing Volume* .

Total Dosing Volume /Gallons Per Inch
 gal ÷ gal/in = Inches

19. Measuring from bottom of tank:

A. *Distance to set Pump Off Float* = Pump + block height + 2 inches

in + in = Inches

B. *Distance to set Pump On Float* = *Distance to Set Pump-Off Float* + *Float Separation Distance*

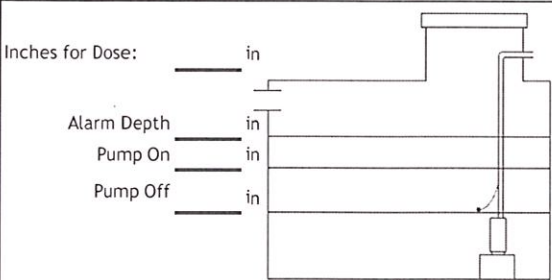
in + in = Inches

C. *Distance to set Alarm Float* = *Distance to set Pump-On Float* + *Alarm Depth* (2-3 inches)

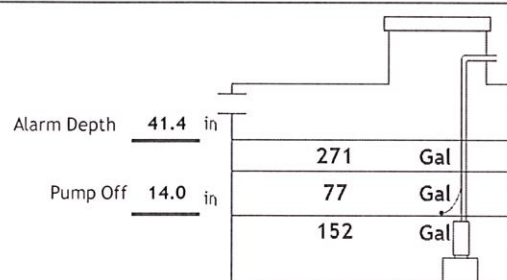
in + in = Inches

FLOAT SETTINGS

DEMAND DOSING



TIMED DOSING





This Management Plan identifies some basic requirements for proper operation and maintenance of the ECOPOD wastewater treatment device for residential use. Refer to the manufacturer's Operation and Maintenance Manual for ECOPOD wastewater treatment products for detailed instructions on proper system operation and maintenance. Refer to your soil treatment system management plan (below or above-grade) for additional management requirements.

The ECOPOD Manual, submitted by the manufacturer (Delta Environmental Products) as part of the registration of this product in Minnesota, can be found at the Minnesota Pollution Control Agency's website <http://www.pca.state.mn.us/programs/ists/productregistration.html>.

SYSTEM COMPONENT	TASK	FREQUENCY	RESPONSIBLE PARTY
ECOPOD Wastewater Treatment Device	Monitor alarm	On-going	Homeowner
	Keep vents on blower housing clear of obstruction	On-going	Homeowner
	Check and clean air filter on the air pump	Every three months	Homeowner or Service Provider
	Monitor flow	Every six months	Service Provider
	Check mechanical and electrical components	Every six months	Service Provider
	Perform operational field tests on influent/effluent quality including odor, color, turbidity, temperature, dissolved oxygen and pH as appropriate	Every six months	Service Provider
	Sample effluent as required in the local Operating Permit	See Operating Permit*	Service Provider
	Check sludge level in all sewage tanks; follow manufacturers recommendations for solids removal	Every six months	Service Provider & Maintainer
	For seasonal use, follow manufacturers guidelines	As required based on seasonal usage	Service Provider

* Systems designed to meet treatment level A or B with UV disinfection must collect effluent sample for fecal coliform annually at a minimum.

At the time of each service visit, Form 7-2: Aerobic Treatment Unit should be completed. See <http://www.onsiteconsortium.org/omspchecklists.html>

Items not permitted in the ECOPOD wastewater systems are specified in the ECOPOD Manual for Minnesota.

Sampling requirements may be specified in local operating permits. The protocol for collection of wastewater samples is specified in the ECOPOD Manual for Minnesota.



Minnesota Pollution Control Agency

Duluth Office | 525 Lake Avenue South | Suite 400 | Duluth, MN 55802 | 218-723-4660

800-657-3864 | 651-282-5332 TTY | www.pca.state.mn.us | Equal Opportunity Employer

January 21, 2015

Mr. Mike Catanzaro
Delta Environmental Products
8275 Florida Blvd.
Denham Springs, LA 70726

RE: Product Registration Renewal #2 – Notice of Proprietary Treatment Product Listing

Description:	Sewage Treatment System, Attached Growth
Manufacturer:	Delta Environmental Products
Product Name:	ECOPOD® Series (With and Without Disinfection)
Model Number:	E50 and E60 (Design Flow 500 GPD for E50; 600 GDP for E60)
Product Listing:	Category A (Residential Sewage)
Product File No:	2015-006

Dear Mr. Catanzaro:

Thank you for your application for product renewal for the ECOPOD Series, which includes the following models: E50 and E60 (with and without Ultraviolet Light Disinfection).

In accordance with Minnesota Rules Chapter 7080 through 7083, the Minnesota Pollution Control Agency (MPCA) has reviewed Delta Environmental Product's submitted materials requesting registration for Category A (residential) treatment product listing of the ECOPOD E50 and E60. Based on the submitted documentation, the MPCA finds that the ECOPOD Series is eligible to be registered per Minnesota Rules 7083.4030 as meeting the following treatment levels:

- **Treatment Level A** (cBOD₅ of 15 mg/L, TSS of 15 mg/L, and fecal coliform of 1000 colonies per 100 ml with disinfection)
- **Treatment Level B** (cBOD₅ of 25 mg/L, TSS of 30 mg/L, and fecal coliform of 10,000 colonies per 100 ml) with disinfection
- **Treatment Level A2** (cBOD₅ of 15 mg/L, TSS of 15 mg/L) without disinfection
- **Treatment Level B2** (cBOD₅ of 25 mg/L, TSS of 30 mg/L) without disinfection
- **Treatment Level C** (cBOD₅ of 125 mg/L, TSS of 60 mg/L, Oil & Grease of 25 mg/L) without disinfection
- **Total Nitrogen** (TN of less than or equal to 20 mg/L)

The ECOPOD Model Series, E50 and E60, is registered with a design rated capacity of 500 and 600 gallons per day per unit, as shown in Table 1 and Table 2.

Subject to this determination, the ECOPOD Series Models E50 and E60 will be placed on the List of Registered Subsurface Sewage Treatment System (SSTS) Products. The product information listed in this Notice of Proprietary Product Listing will be maintained on the MPCA website and may not be altered by the manufacturer without permission from the MPCA.

Table 1. ECOPOD E50 and E60 Model Series with Salcor Ultraviolet (UV) Disinfection.

Product Name Model	Treatment Process	Design Flow (gpd)	BOD ₅ Removed (lbs/day)	Highest Treatment Level	Nutrient removal*	Important Product Use Information
ECOPOD Fixed Film Wastewater Treatment System with one (1) Salcor 3G UV Disinfection Unit E50	Attached Growth	500	1.25	A	TN	<ul style="list-style-type: none"> • Notice of Product Listing <ul style="list-style-type: none"> ○ MPCA Letter ○ Conditions of Registration ○ Expiration Date • ECOPOD Manual <ul style="list-style-type: none"> ○ Submitted Drawings ○ Known Limitations ○ Installation ○ Operation & Maintenance ○ Owners Information ○ Regulators Checklist ○ Service Contract • Management Plan • Operating Permit Template
ECOPOD Fixed Film Wastewater Treatment System with one (1) Salcor 3G UV Disinfection Unit E60	Attached Growth	600	1.50	A	TN	

Table 2. ECOPOD E50 and E60 Model Series.

Product Name Model	Treatment Process	Design Flow (gpd)	BOD ₅ Removed (lbs/day)	Highest Treatment Level	Nutrient Removal*	Important Product Use Information
ECOPOD Fixed Film Wastewater Treatment System E50	Attached Growth	500	1.25	A2	TN	<ul style="list-style-type: none"> • Notice of Product Listing <ul style="list-style-type: none"> ○ MPCA Letter ○ Conditions of Registration ○ Expiration Date • ECOPOD Manual <ul style="list-style-type: none"> ○ Submitted Drawings ○ Known Limitations ○ Installation ○ Operation & Maintenance ○ Owners Information ○ Regulators Checklist ○ Service Contract • Management Plan • Operating Permit Template
ECOPOD Fixed Film Wastewater Treatment System E60	Attached Growth	600	1.50	A2	TN	

* Third-party testing showed ECOPOD effluent achieved the Total Nitrogen (TN) level of 20 mg/L [mean TN=20 mg/L with 53% removed]; CBOD₅ was 5 mg/L; TSS was 8 mg/L. Total nitrogen removal is highly dependent upon BOD and TKN loading, adequate alkalinity, temperature and toxicity; site specific alkalinity levels in the source water should be evaluated and homeowners should be well educated in order to achieve optimal total nitrogen reduction.

The registration of products in Minnesota is contingent upon compliance with the following conditions:

1. Products must be used in compliance with the MPCA rules and the plans and design specifications provided. Any deviation from the plans and specifications shall not be permitted unless authorized by National Sanitation Foundation (NSF) and, in writing, by the MPCA for registered use.
2. The manufacturer shall have readily accessible information, specific to a product's registered use in Minnesota, for designers, installers, regulators, systems owners, and service providers for the following items: a) product manual, b) design instructions, c) installation instructions, d) information regarding operation and maintenance, e) homeowner instructions, and f) list of manufacturer-certified service providers, if any, as required by Minnesota Rules Chapter 7083.4040 (H).
3. The design flows for the registered products are 500 gallons per day for model E50 and 600 gallons per day for model E60.
4. Septic/trash tank capacity for dwellings shall meet the manufacturer's minimum and maximum size requirements as specified in the initial Application for Product Registration. The tank(s) shall be designed to withstand the pressures to which it will be subject to. The tank(s) and all pipe penetrations, risers, and other connections to the tank shall be watertight.
5. Each system must be delivered with an installation manual and owner's manual for both the ECOPOD unit and the Salcor 3G UV disinfection unit. Each unit must be installed in accordance with the manufacturer's installation manual.
6. All systems shall be designed and operated with (a) suitable alarm(s) should either, or both, the treatment device or its components malfunction.
7. For both the E50 and E60 models, each unit shall be equipped with its own Salcor 3G UV disinfection unit to achieve Treatment Level A and Treatment Level B. No UV disinfection unit is required to achieve Treatment Level A2, Treatment Level B2, or Treatment level C. Each UV disinfection device shall have an alarm in the event that the UV unit malfunctions.
8. This treatment product is a Minnesota-registered product for Type IV systems. Effluent loading rates to the soil, method of distribution, and vertical separation requirements shall meet the minimum requirements contained in Minnesota Rules Chapter 7080.2150 thru 7080.2350. The effluent, following treatment in the ECOPOD Model Series, is required to be uniformly distributed to the soil for final treatment and dispersal.
9. Systems may only be designated as Type IV systems when designed and installed per the drawings submitted as part of the initial Application for Product Registration, dated December 17, 2008.
10. As a Type IV system, the system must be constructed and operated under the required local permits.

Mr. Mike Catanzaro

Page 4

January 21, 2015

11. The level of maintenance required for ECOPOD systems and Salcor 3G UV disinfection units shall be as specified in the products Operation and Maintenance Manual. This includes, but is not limited to, maintenance every 6 months.
12. For systems registered as meeting the requirements for Treatment Level A and Treatment Level B, testing for fecal coliform bacteria is required per the local operating permit when reduced vertical separation is employed.
13. As specified in the known limitations of the product contained in the Items not Permitted in Systems in the ECOPOD Manual for Minnesota, backwash from water softeners and other unsuitable wastes must not be discharged to the ECOPOD units. The manufacturer is responsible to provide a listing of other known limitations, made available on the company's website or other means.
14. Training shall be provided to MPCA-licensed Subsurface Sewage Treatment System practitioners before designing, installing, or providing service to the ECOPOD Series Models E50 and E60 treatment systems and to Salcor 3G UV disinfection devices registered for use in Minnesota.
15. During the period of product registration and as part of the renewal process, systems using registered treatment products are subject to an audit by the MPCA

Please be advised that this registration expires December 31, 2017. Manufacturers desiring to continue product registration beyond this date must obtain MPCA renewal according to the requirements in Minnesota Rules Chapter 7083.4080 (E). If the product has changed or is retested according to the protocol required for registration, renewal shall be based on the most recent test results. If the MPCA finds the product has changed in any way that affects performance, it may not be renewed and must meet the requirements for initial registration.

The MPCA is in no way endorsing these products or any advertising, and is not responsible for any situation which may result from its use or misuse. The MPCA is not liable for any product failure and these statements are not intended and cannot be relied upon to establish any substantive or procedural rights with the state of Minnesota or the MPCA either express or implied that can be enforced in litigation or any administrative proceeding.

If you have any questions, please contact Barbara McCarthy at 218-302-6647 or by email at barbara.mccarthy@state.mn.us.

Sincerely,

Barbara McCarthy, P.S.S.
Environmental Specialist 4
SSTS Section
Municipal Division

BM:kmk

cc: File

TW-SERIES SEPTIC TANKS BY INFILTRATOR®

*The Only Plastic Tank
with Triple-wall Strength*



Infiltrator TW-Series Septic Tanks are not only hard to miss, they represent a revolutionary improvement in plastic septic tank design, offering exceptional strength comparable to concrete tanks. The superior strength provided by these tanks offer long-term, water tight performance. Innovative features not found in any other plastic tank include: a consistent, thick triple wall design manufactured with proprietary state-of-the-art rotomolding technology; permanent, factory-installed structural bulkheads; welded, reinforced access ports.



FEATURES AND BENEFITS

Ease of Installation. TW-Series tanks offer a lightweight design for easy installation. They can be installed without special water filling procedures and can be pumped dry during pump-outs. They are also resistant to flotation in high water conditions.

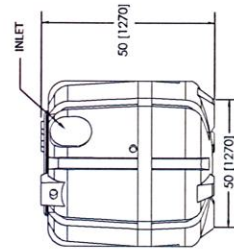
Superior Strength. A triple-wall provides a thick, composite wall structure that acts like a structural I-beam. Factory installed bulkheads offer superior structural stability under heavy loads. Reinforced, welded access ports do not distort upon backfilling or during pump-outs.

Flexibility. These tanks are suitable for use as septic and pump tanks, come in single and dual compartments, and have flat bottoms allowing for easy storage.

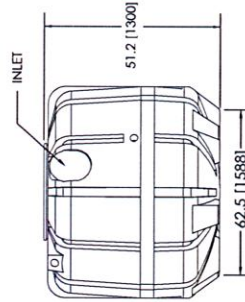
Innovative Technology. TW-Series septic tanks are the only plastic tank on the market manufactured with a proprietary state-of-the-art rotomolding process making these tough tanks comparable to concrete.

PRODUCT SIZES AND ACCESSORIES

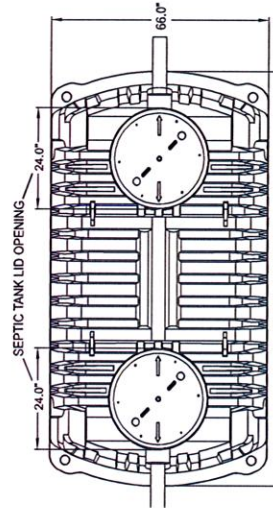
The TW-Series Septic Tanks by Infiltrator come in six different sizes: TW-300, TW-500, TW-900, TW-1050, TW-1250, and TW-1500 gallon. Tanks may be used as septic or pump tanks and come in single or dual compartments (except TW-300 and TW-500). Infiltrator's TW-Risers are compatible with any TW-Series Septic Tank.



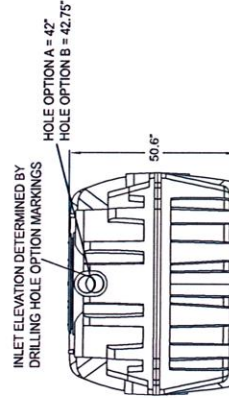
TW-300
PROFILE VIEW



TW-500
PROFILE VIEW



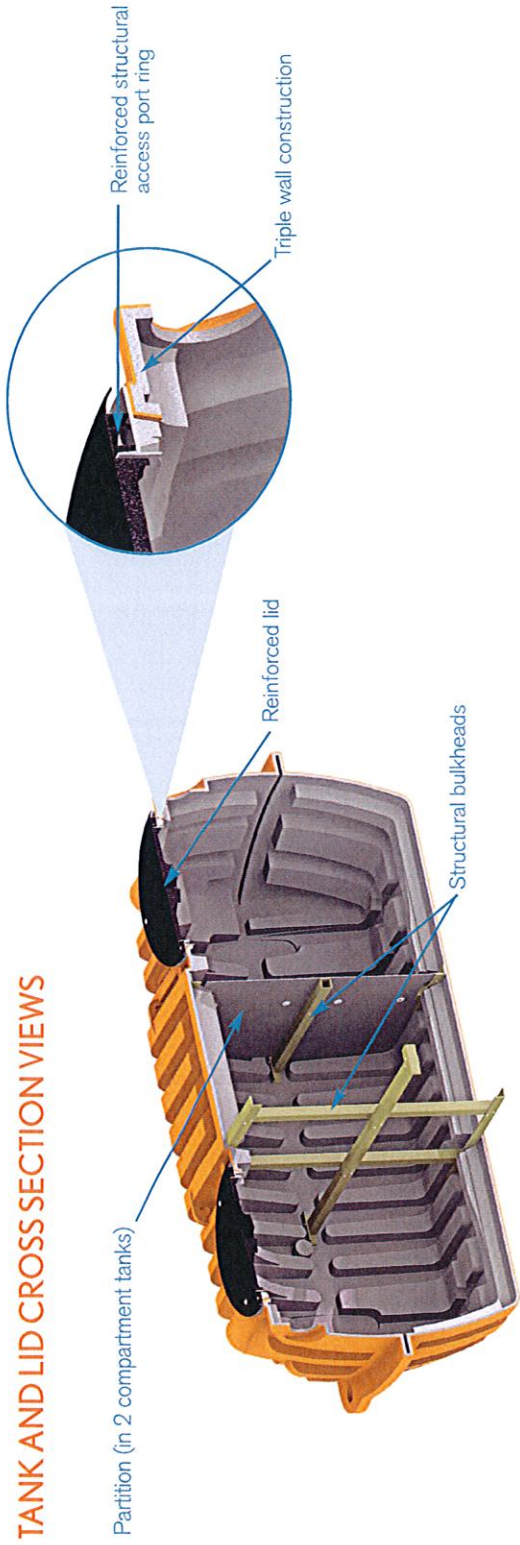
TW-900, TW-1050, TW-1250, AND TW-1500
PLAN VIEW



TW-900, TW-1050,
TW-1250, AND TW-1500
INLET END VIEW

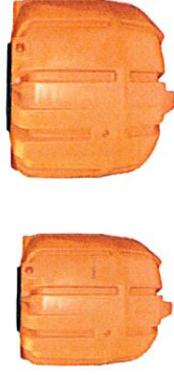
For more information, call Infiltrator Systems at 800.221.4436 or visit www.infiltratorsystems.com

TANK AND LID CROSS SECTION VIEWS



TW-SERIES PUMP TANK NOMINAL SPECIFICATIONS

Tank Model	Total Volume	Diameter	Height
TW-300	313 gal. [1,185 L]	50 in. [1,270 mm]	50 in. [1,270 mm]
TW-500	504 gal. [1,908 L]	62.5 in. [1,588 mm]	51 in. [1,295 mm]



TW-SERIES SEPTIC TANK NOMINAL SPECIFICATIONS

Tank Model	Total Volume	Length	Width	Height
TW-900	1,055 gal. [3,994 L]	110.4 in. [2,804 mm]	66.0 in. [1,676 mm]	50.6 in. [1,285 mm]
TW-1050	1,212 gal. [4,588 L]	123.7 in. [3,142 mm]	66.0 in. [1,676 mm]	50.6 in. [1,285 mm]
TW-1250	1,448 gal. [5,481 L]	143.7 in. [3,650 mm]	66.0 in. [1,676 mm]	50.6 in. [1,285 mm]
TW-1500	1,762 gal. [6,669 L]	170.4 in. [4,328 mm]	66.0 in. [1,676 mm]	50.6 in. [1,285 mm]



**INFILTRATOR SYSTEMS, INC. ("Infiltrator")
INFILTRATOR® TW™-SEPTIC TANK LIMITED WARRANTY
FIVE (5) YEAR MATERIALS AND WORKMANSHIP LIMITED WARRANTY**

(a) This limited warranty is extended to the end user of an Infiltrator TW™ Septic Tank. A Septic Tank manufactured by Infiltrator, when installed and operated in accordance with Infiltrator's installation instructions and local regulation by a licensed installer, is warranted to you; (i) against defective materials and workmanship for five (5) years after installation. Infiltrator will, at its option, (i) repair the defective product or (ii) replace the defective materials. Infiltrator's liability specifically excludes the cost of removal and/or installation of the Septic Tank.

(b) In order to exercise its warranty rights, you must notify Infiltrator in writing at its corporate headquarters in Old Saybrook, Connecticut within fifteen (15) days of the alleged defect.

(c) YOUR EXCLUSIVE REMEDY WITH RESPECT TO ANY AND ALL LOSSES OR DAMAGES RESULTING FROM ANY CAUSE WHATSOEVER SHALL BE SPECIFIED IN SUBPARAGRAPH (a) ABOVE. INFILTRATOR SHALL IN NO EVENT BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY KIND, HOWEVER OCCASIONED, WHETHER BY NEGLIGENCE OR OTHERWISE. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THIS LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

(d) THIS LIMITED WARRANTY IS THE EXCLUSIVE WARRANTY GIVEN BY INFILTRATOR AND SUPERSEDES ANY PRIOR, CONTRARY, ADDITIONAL, OR SUBSEQUENT REPRESENTATIONS, WHETHER ORAL OR WRITTEN. INFILTRATOR DISCLAIMS AND EXCLUDES TO THE GREATEST EXTENT ALLOWED BY LAW ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND ANY IMPLIED WARRANTIES OTHERWISE ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE. NO PERSON (INCLUDING ANY EMPLOYEE, AGENT, DEALER, OR REPRESENTATIVE) IS AUTHORIZED TO MAKE ANY REPRESENTATION OR WARRANTY CONCERNING THIS PRODUCT, EXCEPT TO REFER YOU TO THIS LIMITED WARRANTY. EXCEPT AS EXPRESSLY SET FORTH HEREIN, THIS WARRANTY IS NOT A WARRANTY OF FUTURE PERFORMANCE, BUT ONLY A WARRANTY TO REPAIR OR REPLACE.

(e) YOU MAY ASSIGN THIS LIMITED WARRANTY TO A SUBSEQUENT PURCHASER OF YOUR HOME.

(f) NO REPRESENTATIVE OF INFILTRATOR HAS THE AUTHORITY TO CHANGE THIS LIMITED WARRANTY IN ANY MANNER WHATSOEVER, OR TO EXTEND THIS LIMITED WARRANTY.

CONDITIONS AND EXCLUSIONS

There are certain conditions or applications over which Infiltrator has no control. Defects or problems as a result of such conditions or applications are not the responsibility of Infiltrator and are NOT covered under this warranty. They include failure to install the Septic Tank in accordance with instructions or applicable regulatory requirements or guidance, altering the Septic Tank contrary to the installation instructions and disposing of chemicals or other materials contrary to normal septic tank usage.

The above represents the Standard Limited Warranty offered by Infiltrator. A limited number of states and counties have different warranty requirements. Any purchaser of a Septic Tank should contact Infiltrator's corporate headquarters in Old Saybrook, Connecticut, prior to such purchase to obtain a copy of the applicable warranty, and should carefully read that warranty prior to the purchase of a Septic Tank.



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