SEPTIC CHECK

EXPERT SERVICE. LASTING VALUE. CLEAN WATER

# INDIVIDUAL SEWAGE SYSTEM DESIGN SUMMARY

Property Owner: Darlene Panushka
Phone: (218) 851-8838 Andrew – B-Dirt Construction
Address: 44477 238th Lane
PID: 11-1-111300
City: Aitkin Zip: 56431
County: Aitkin

## DESIGN USAGE

Single Family Home x Other
Number of Potential Bedrooms 4
Garbage Disposal No
Sewage Lift Pump Yes

## SITE CHARACTERISTICS

Soil type Silt Loam
Hydraulic Loading 0.50 gpd/ft2
Depth to restrictive layer 24"

## PUMP INFORMATION

Pump GPM & TDH 29.0 GPM & 15.7 TDH
Cycles per day 5 Cycles
Gallons per cycle 80 gallons
Perforation size & spacing ¼" perfs every 36"
Number, spacing, & diameter of laterals 3 – 1 ½" laterals every 36"
Forcemain Size 2"

## CAPACITIES

Daily Water Use ____ Est ____ Calc 450 gpd
Septic Tank Capacity 2250 Gal. Combo Tank
Pump Tank Capacity 1000 Gal. Single Tank

## MOUND SYSTEM

Dimension of Rock Base 10' x 38'
Depth of Rock Below Pipe 9"
Dimensions of Mound 26.5' x 54.5'
% Slope of Soil Under Mound 0% - A Dig Out is Required
Upslope Dike Width 8.3'
Downslope Dike Width 8.3'
Sideslope Dike Width 8.3'

## TRENCH SYSTEM

Type of trench
Maximum Depth of trench
Square Feet of bed Required
Square Feet of bed Proposed
Lineal Feet of bed Proposed

## APPROVAL

By _____ Date 10/17/19

Melissa Besser License #2624

See additional information sheet if checked ☒

# Septic System Design
# Additional Information

SEPTIC CHECK

Property Owner: Darlene Panushka – 44477 238th Lane Aitkin, MN 56431

**Description of Wastewater Treatment and Dispersal System**

This is a Type III design for construction of a new 5-bedroom, class I home. The proposed home will be built on much of the existing footprint and will not have a garbage disposal but **will** require a sewage ejector. There is not enough space on the lot to build a mound for a 5-bedroom system so time dosing will be incorporated. This allows the design to go from a 5-bedroom home at 750 gpd to that of a 3-bedroom home with a design flow of 450 gpd. The maximum time dosing is 315 gallons which is 70% of 450gpd.

The typical soil profile identified on the property consisted of 0" – 12" of loamy sand with 12" – 26" of silt loam soil below that. Redox features were found at about 24" in all the observations that were completed. For this design we will be using the soil loading rate of Silt Loam at 0.5 gpd/ft2.

The existing drainfield was not located which is said to be in the general area of our soil observations. If the existing drainfield is found during excavation, the dirty rock and pipes will need to be removed. There are two sheds on the property that will need to be removed prior to excavation, one of which is inside the 10'x 38' staked rockbed. Due to the soils being disturbed in this area, it is required that a 24" dig out be completed in the 24' x 38' rockbed and absorption area. The new grade is to be level with a 0% slope at an elevation of 93.30 throughout. It will then be scarified before adding the washed sand. The amount of new washed sand will need to equal three feet of separation from the periodically saturated soil in the rockbed area before adding the 1 ½" washed rock and placing the new laterals. The mound will be constructed with a 3:1 slope and a block or rock wall will need to be constructed on the north endslope of the mound along the driveway.

The existing tank will need to pumped, crushed and removed and the new tank will be set in its place. Sewage will be pumped from the home into a Brown Wilbert 2250 2-compartment septic tank. From there sewage will flow by gravity to a Brown Wilbert 1000-gallon pump tank. The pump must deliver at least 29.0 GPM and 15.7 TDH. To ensure proper timer settings and dose volumes a draw down will need to be performed to calibrate the pump.

All manholes will need to be installed to grade for ease of servicing. Effluent will then be time dosed to a 10' by 38' rockbed mound which will have lateral cleanouts and inspection pipes to grade. It is the installer's responsibility to make sure the septic system is seeded and mulched prior to final completion.

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 Benchmark on the top of the nail in tree near the north property line.

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.

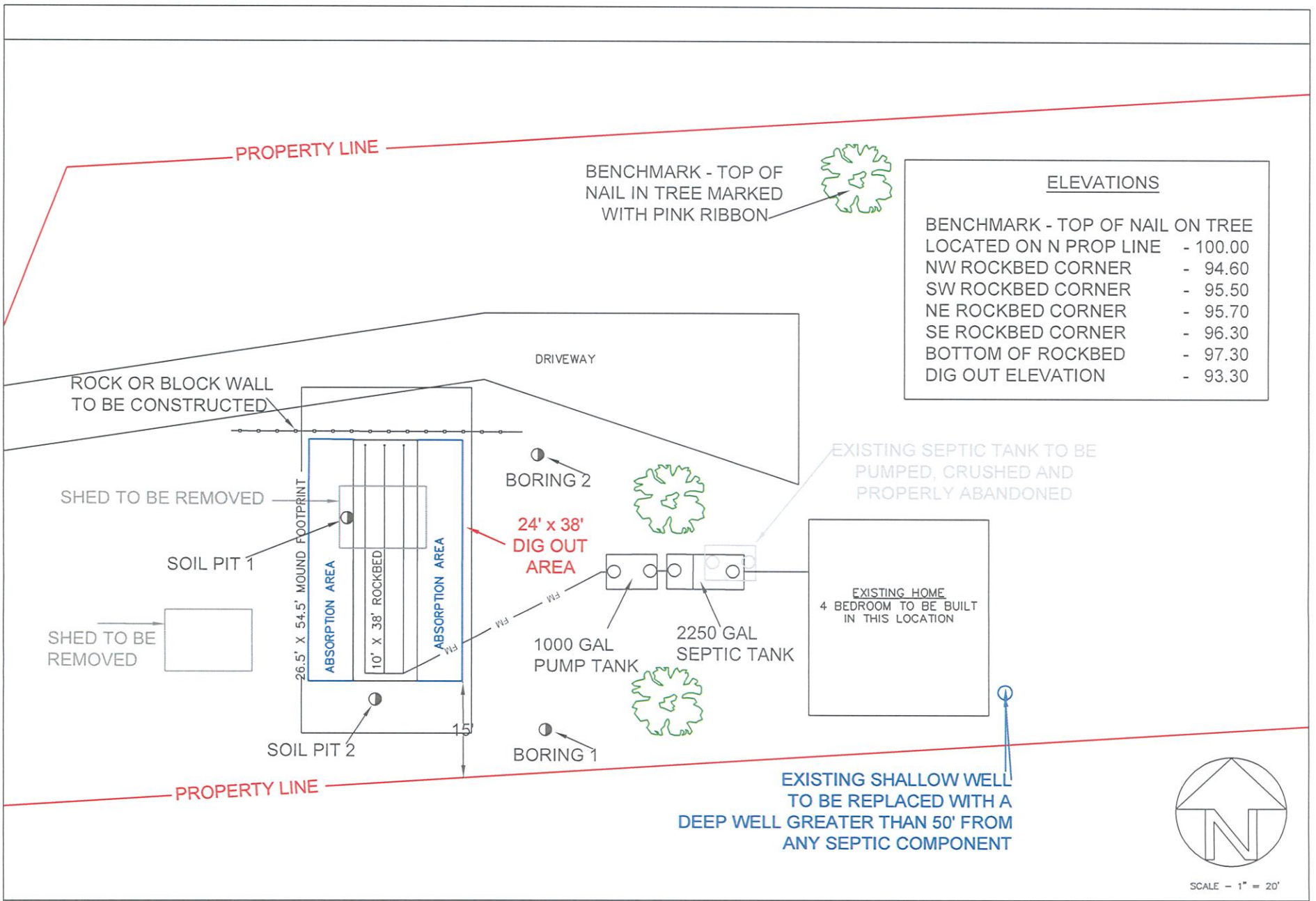
Each tank is to be pumped through the maintenance cover when serviced. Do not pump through inspection pipes.

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 and the Aikin County septic ordinance.

**Maintenance Requirements**

See attached operating permit or management plan for details




| PREPARED FOR: | PROPERTY LOCATION | LEGAL DESCRIPTION | SEPTIC CHECK | | PAGE TITLE | SHEET NUMBER |
|---|---|---|---|---|---|---|
| Darlene Panushka | 44477 238th Lane<br>Aitkin, MN 56431 | Aitkin County, Minnesota.<br>PID# 11-1-111300 | 6074 KEYSTONE RD MILACA, MN 56353<br>(320)-983-2447 (FAX) (320)-983-2151 | I hereby certify that this site plan was prepared by me or under my direct supervision.<br>MelissaBesser<br>Melissa Besser M. P. C. A. License # 2624<br>DATE 10/16/19 | SEPTIC DESIGN | 1 OF 1 |

SEPTIC CHECK

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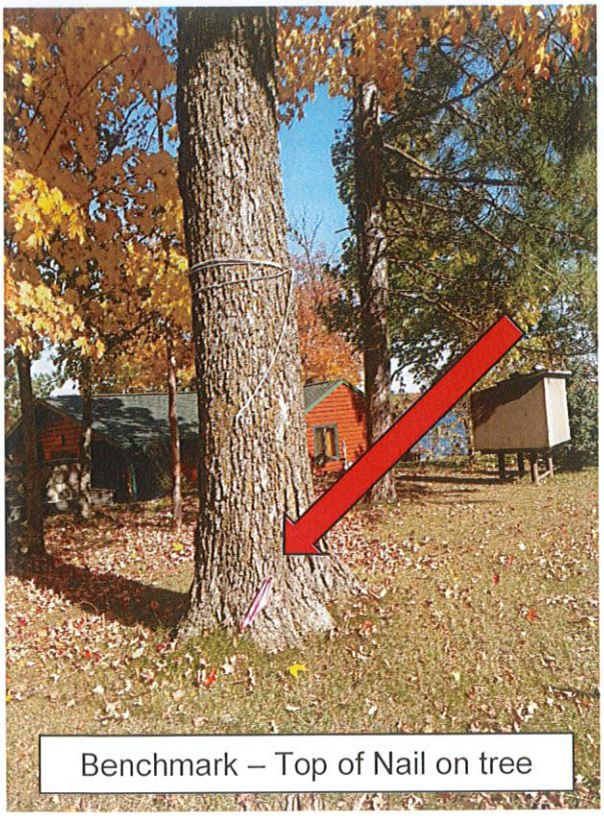
Darlene Panushka
44477 238th Lane Aitkin, MN 56431

Existing Home to be replaced with a new 4-bedroom home

Shallow well to be capped. New well to be dug 50' or greater from any septic component

Existing Tank to be pumped and properly abandoned



Benchmark – Top of Nail on tree

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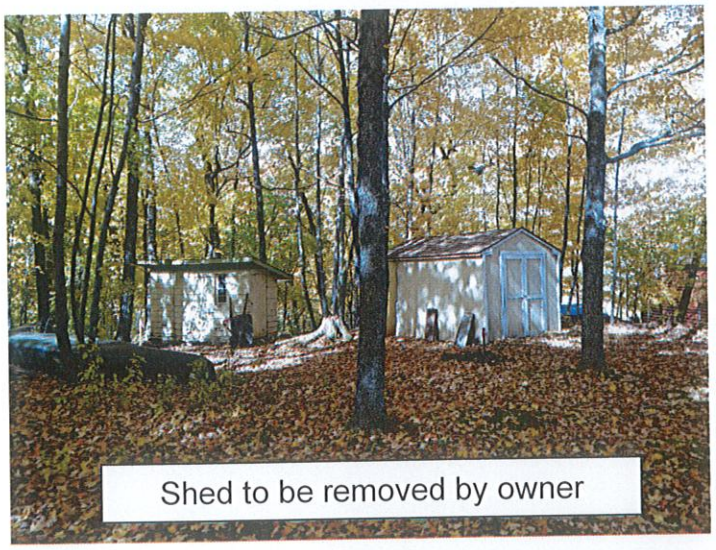
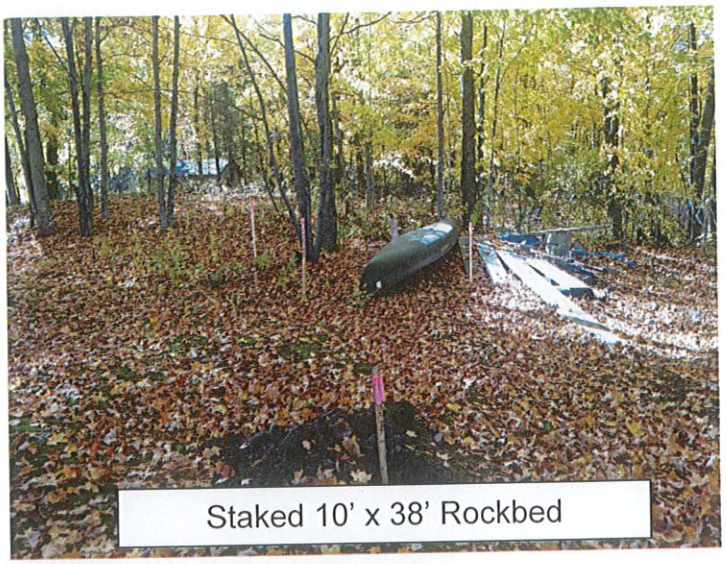
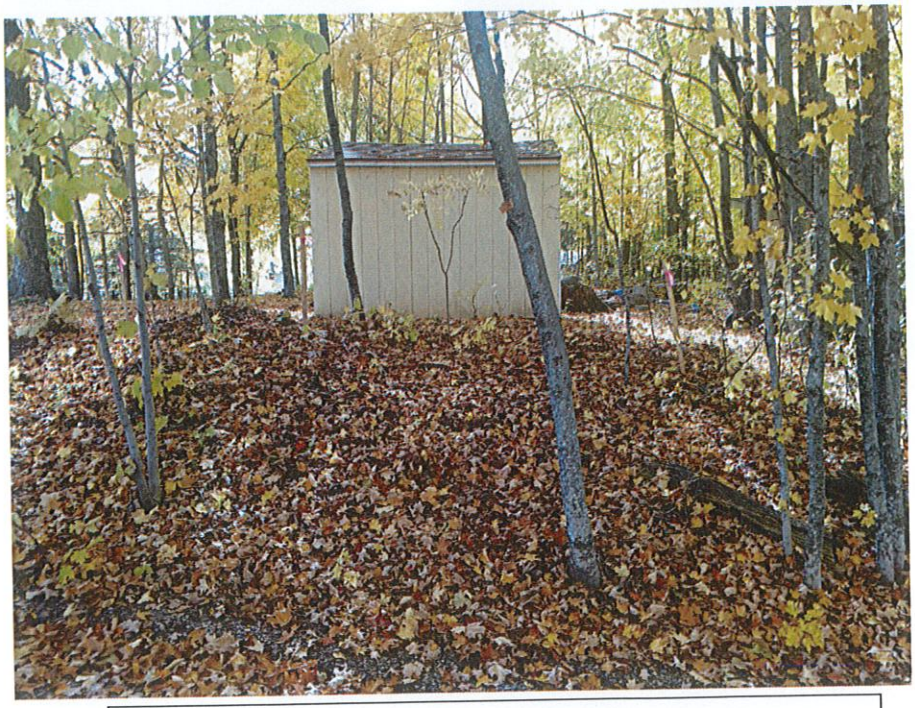


Shed to be removed by owner



Staked 10' x 38' Rockbed



North endslope that will require
a rock or block retaining wall along the driveway

320-983-2447 6074 KEYSTONE ROAD, MILACA, MN 56353 WWW.SEPTICCHECK.COM

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# OSTP Design Summary Worksheet

University of Minnesota

Property Owner/Client: Darlene Panushka | Project ID: | v 07.14.15

Site Address: 44477 238th Lane Aitkin, MN 56431 | Date: 10/16/19

## 1. DESIGN FLOW AND TANKS

A. *Design Flow:* 450 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: 2250 Gallons, in 1 Tanks or Compartments

Recommended Septic Tank Capacity: 2250 Gallons, in 2 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): 500 Gallons *Pump Tank 2* Capacity (Code Minimum): Gallons

*Pump Tank 1* Capacity (Designer Rec): 1000 Gallons *Pump Tank 2* Capacity (Designer Rec): Gallons

Pump 1 29.0 GPM Total Head 15.7 ft Pump 2 GPM Total Head ft

Supply Pipe Dia. 2.00 in Dose Volume: 80.0 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: 100.00 ft

Benchmark Location: Nail in Tree N. Prop. Line

| 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: 24 in 2.0 ft

B. Measured Land Slope %: 0.0 %

C. Elevation of Limiting Layer: 94.3

D. Soil Texture: Silt Loam

E. Loc. of Restricive Elevation: SE Rockbed Corner

F. Soil Hyd. Loading Rate: 0.50 GPD/ft$^2$

G. Minimum Required Separation: 36 in 3.0 ft

H. Perc Rate: MPI

I. Code Maximum Depth of System: Mound in

Comments:

## 4. DESIGN SUMMARY

### Trench Design Summary

Dispersal Area ft$^2$ 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 ft$^2$ Depth of sidewall in Code Maximum Bed Depth in

Bed Width ft Bed Length ft Designer's Max Bed Depth in

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# OSTP Design Summary Worksheet

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## Mound Design Summary

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Absorption Bed Area | 380.0 | $ft^2$ | Bed Length | 38.0 | ft | Bed Width | 10.0 | ft |
| Absorption Width | 24.0 | ft | Clean Sand Lift | 1.0 | ft | Berm Width (0-1%) | 8.3 | ft |
| Upslope Berm Width | 8.3 | ft | Downslope Berm Width | 8.3 | ft | Endslope Berm Width | 8.3 | ft |
| Total System Length | 54.5 | ft | Total System Width | 26.5 | ft | Contour Loading Rate | 12.0 | 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 | 3 | | Perforation Spacing | 3 | ft | Perforation Diameter | 1/4 | in |
| Lateral Diameter | 1.50 | in | Min. Delivered Volume | 48 | gal | Maximum Delivered Volume | 113 | 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 | | | | | | | |
| Lateral 2 | | | | | | | |
| Lateral 3 | | | | | | | |
| Lateral 4 | | | | | | | |
| Lateral 5 | | | | | | | |
| Lateral 6 | | | | | | | |

Minimum Delivered Volume _____ gal

Maximum Delivered Volume _____ gal

## 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/$ft^2$

_____ mg/L X 8.35 ÷ 1,000,000 ÷ _____ $ft^2$ = _____ lbs/day/$ft^2$

## Comments/Special Design Considerations:

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

| Melissa Besser | | 2624 | 10/16/19 |
|---|---|---|---|
| (Designer) | (Signature) | (License #) | (Date) |

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# OSTP Mound Design Worksheet <1% Slope

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## 1. SYSTEM SIZING:

Project ID:

v 07.14.15

| | | |
|---|---|---|
| A. Design Flow : | 450 | GPD |
| B. Soil Loading Rate: | 0.50 | GPD/ft$^2$ |
| C. Depth to Limiting Condition: | 2.0 | ft |
| D. Percent Land Slope: | 0.0 | % |
| E. Design Media Loading Rate: | 1.2 | GPD/ft$^2$ |
| F. Mound Absorption Ratio: | 2.40 | |

**Table I**
**MOUND CONTOUR LOADING RATES:**

| Measured Perc Rate | ← OR → | Texture - derived mound absorption ratio | | Contour Loading Rate: |
|---|---|---|---|---|
| ≤ 60mpi | | 1.0, 1.3, 2.0, 2.4, 2.6 | → | ≤12 |
| 61-120 mpi | ← OR → | 5.0 | → | ≤12 |
| ≥ 120 mpi* | | >5.0* | → | ≤6* |

**TABLE IXa**

LOADING RATES FOR DETERMINING BOTTOM ABSORPTION AREA AND ABSORPTION RATIOS USING PERCOLATION TESTS

| Percolation Rate (MPI) | Treatment Level C | | Treatment Level A, A-2, B, | |
|---|---|---|---|---|
| | Absorption Area Loading Rate (gpd/ft$^2$) | Mound Absorption Ratio | Absorption Area Loading Rate (gpd/ft$^2$) | Mound Absorption Ratio |
| <0.1 | - | 1 | - | 1 |
| 0.1 to 5 | 1.2 | 1 | 1.6 | 1 |
| 0.1 to 5 (fine sand and loamy fine sand) | 0.6 | 2 | 1 | 1.6 |
| 6 to 15 | 0.78 | 1.5 | 1 | 1.6 |
| 16 to 30 | 0.6 | 2 | 0.78 | 2 |
| 31 to 45 | 0.5 | 2.4 | 0.78 | 2 |
| 46 to 60 | 0.45 | 2.6 | 0.6 | 2.6 |
| 61 to 120 | - | 5 | 0.3 | 5.3 |
| >120 | - | - | - | - |

*Systems with these values are not Type I systems. Contour Loading Rate (linear loading rate) is a recommended value.

## 2. DISPERSAL MEDIA SIZING

A. Calculate Dispersal Bed Area: Design Flow (1.A) ÷ Design Media Loading Rate (1.E) = ft$^2$

450 GPD ÷ 1.2 GPD/ft$^2$ = 375 ft$^2$

If a larger dispersal media area is desired, enter size: 380 ft$^2$

B. Enter Dispersal Bed Width: 10 ft *Can not exceed 10 feet.*

C. Calculate Contour Loading Rate: Bed Width (2.B) X Design Media Loading Rate (1.E)

10 ft$^2$ X 1.2 GPD/ft$^2$ = 12.0 gal/ft *Can not exceed Table 1*

D. Calculate Minimum Dispersal Bed Length: Dispersal Bed Area (2.A) ÷ Bed Width (2.B) = Bed Length

380 ft$^2$ ÷ 10 ft = 38.0 ft

## 3. ABSORPTION AREA SIZING

A. Calculate Absorption Width: Bed Width (2.B) X Mound Absorption Ratio (1.F) = Absorption Width

10.0 ft X 2.4 = 24.0 ft

B. For slopes from 0 to 1%, the Absorption Width is measured from the bed equally in both directions.

Absorption Width Beyond the Bed: Absorption Width (3.A) - Bed Width (2.B) ÷ 2 = Width beyond Bed

( 24.0 ft - 10.0 ft) ÷ 2 = 7.0 ft

## 4. DISTRIBUTION MEDIA: ROCK

A. Media Volume: Media Depth below and above pipe X Length X Width

0.75 ft X 38.0 ft X 10.0 ft = 285 $ft^3$ ÷ 27 = 10.6 $yd^3$

## 5. DISTRIBUTION MEDIA: REGISTERED TREATMENT PRODUCTS: CHAMBERS AND EZFLOW

A. Enter Dispersal Media:

B. Enter the Component: Length: ft Width: ft Depth: ft

C. Number of Components per Row = Bed Length divided by Component Length (Round up)

ft ÷ ft = components/row

D. Actual Bed Length = Number of Components/row X Component Length:

components X ft = ft

E. Number of Rows = Bed Width divided by Component Width

ft ÷ ft = rows *Adjust width so this is an whole number.*

F. Total Number of Components = Number of Components per Row X Number of Rows

X = components

## 6. MOUND SIZING

A. Calculate Clean Sand Lift: 3 feet minus Depth to Limiting Condition = Clean Sand Lift (1 ft minimum)

3.0 ft - 2.0 ft = 1.0 ft Design Sand Lift (optional): ft

B. Upslope Mound Height = Clean Sand Lift + Depth of Media + Depth of Cover (1 ft)

1.0 ft + 0.75 ft + 1.0 ft = 2.8 ft

C. Berm Width = Upslope Mound Height (4.B) X 4 (4 is recommended, but could be 3-12)

2.8 ft X 3.0 ft = 8.3 ft

D. Total Landscape Width = Berm Width + Dispersal Bed Width + Berm Width

8.3 ft + 10.0 ft + 8.3 ft = 26.5 ft

E. Additional Berm Width necessary for absorption - Absorption Width - Total Landscape Width

24.0 ft - 26.5 ft = 0 ft if number is negative (<0), value is **ZERO**

F. Final Berm Width = Additional Berm Width + Berm Width

0 ft + 8.3 ft = 8.3 ft

G. Total Mound Width = Final Berm Width + Dispersal Bed Width + Final Berm Width

8.3 ft + 10.0 ft + 8.3 ft = 26.5 ft

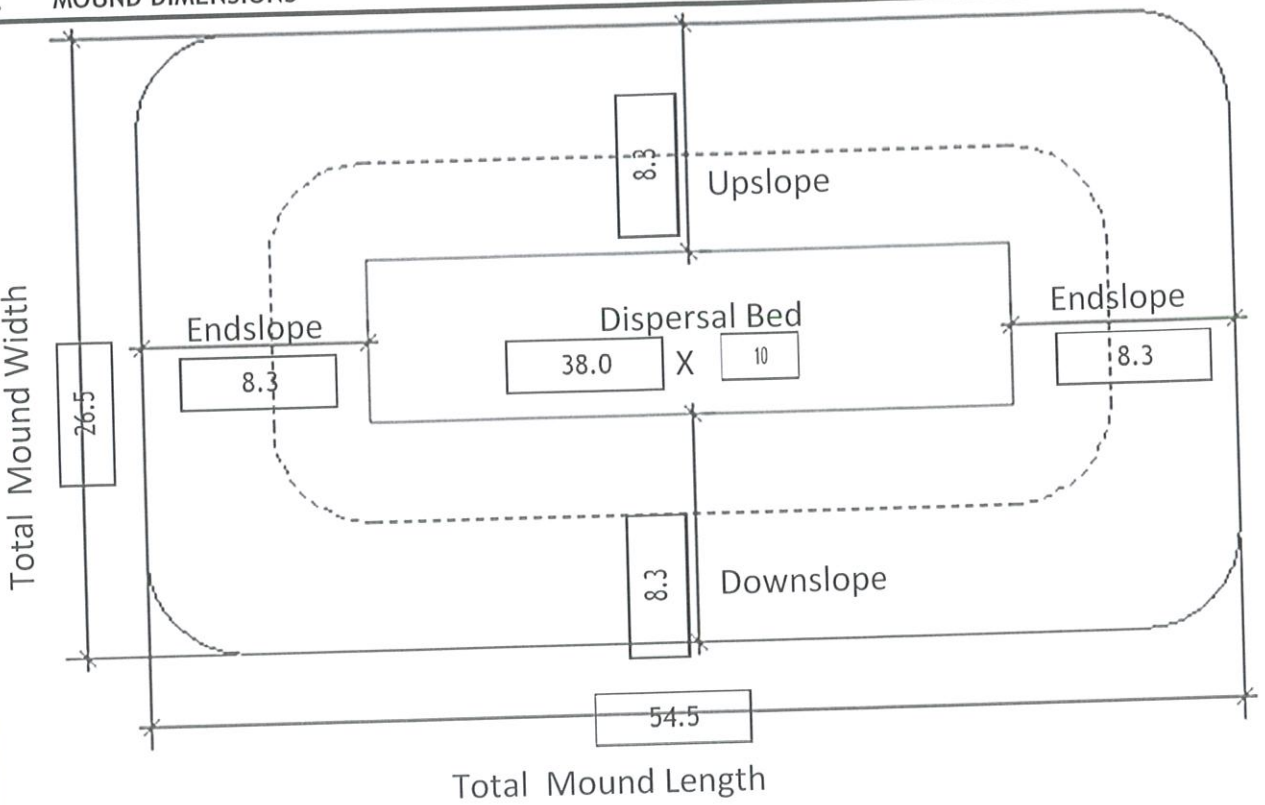
H. Total Mound Length = Final Berm Width + Dispersal Bed Length + Final Berm Width

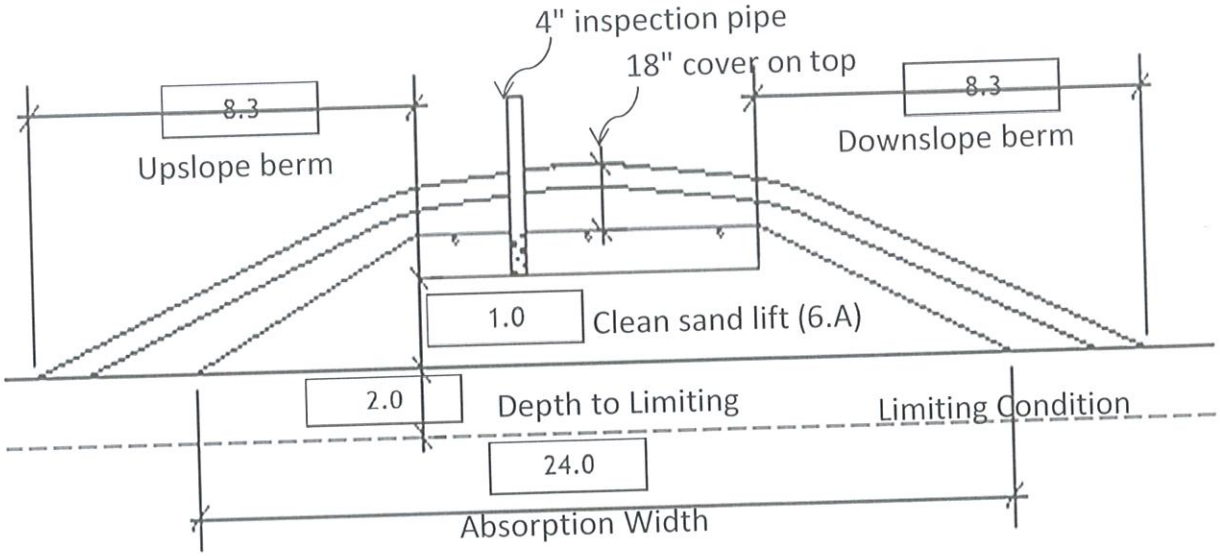
8.3 ft + 38.0 ft + 8.3 ft = 54.5 ft

I. Setbacks from the Bed: Absorption Width - Dispersal Bed Width divided by 2

( 24.0 ft - 10.0 ) / 2 = 7.0 ft

## 7. MOUND DIMENSIONS




Comments:

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# OSTP Pressure Distribution Design Worksheet

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Project ID: v 07.14.15

1. Media Bed Width: 10 ft

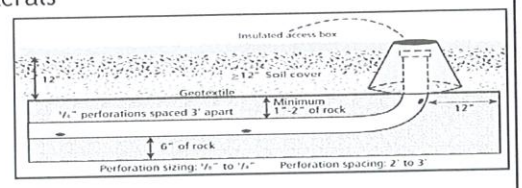
2. Minimum Number of Laterals in system/zone = Rounded up number of [(Media Bed Width - 4) ÷ 3] + 1.

( 10 - 4 ) + 1 = 3 laterals *Does not apply to at-grades*

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

4. Select *Perforation Spacing*: 3.0 ft

5. Select *Perforation Diameter Size:* 1/4 in




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

38 - 2ft = 36 ft *Perforation can not be closer then 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* = 36 ft ÷ 3 ft = 12 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* = 12 Spaces + 1 = 13 Perfs. Per Lateral

**Maximum Number of Perforations Per Lateral to Guarantee <10% Discharge Variation**

**¼ Inch Perforations**

| Perforation Spacing (Feet) | Pipe Diameter (Inches) | | | | |
|---|---|---|---|---|---|
| | 1 | 1¼ | 1½ | 2 | 3 |
| 2 | 10 | 13 | 18 | 30 | 60 |
| 2½ | 8 | 12 | 16 | 28 | 54 |
| 3 | 8 | 12 | 16 | 25 | 52 |

**7/32 Inch Perforations**

| Perforation Spacing (Feet) | Pipe Diameter (Inches) | | | | |
|---|---|---|---|---|---|
| | 1 | 1¼ | 1½ | 2 | 3 |
| 2 | 11 | 16 | 21 | 34 | 68 |
| 2½ | 10 | 14 | 20 | 32 | 64 |
| 3 | 9 | 14 | 19 | 30 | 60 |

**3/16 Inch Perforations**

| Perforation Spacing (Feet) | Pipe Diameter (Inches) | | | | |
|---|---|---|---|---|---|
| | 1 | 1¼ | 1½ | 2 | 3 |
| 2 | 12 | 18 | 26 | 46 | 87 |
| 2½ | 12 | 17 | 24 | 40 | 80 |
| 3 | 12 | 16 | 22 | 37 | 75 |

**1/8 Inch Perforations**

| Perforation Spacing (Feet) | Pipe Diameter (Inches) | | | | |
|---|---|---|---|---|---|
| | 1 | 1¼ | 1½ | 2 | 3 |
| 2 | 21 | 33 | 44 | 74 | 149 |
| 2½ | 20 | 30 | 41 | 69 | 135 |
| 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.*

13 Perf. Per Lat. X 3 Number of Perf. Lat. = 39 Total Number of Perf.

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

11. *Select Lateral Diameter (See Table)*: 1.50 in

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# OSTP Pressure Distribution Design Worksheet

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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)

| | | | | | | |
|---|---|---|---|---|---|---|
| 10 | ft | X | 38 | ft | = | 380 ft² |

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

| | | | | | | |
|---|---|---|---|---|---|---|
| 380 | ft² | ÷ | 39 | perforations | = | 9.7 ft²/perforations |

13. Select *Minimum Average Head*: 1.0 ft

14. Select *Perforation Discharge* (GPM) based on Table: 0.74 GPM per Perforation

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

| | | | | | | |
|---|---|---|---|---|---|---|
| 39 | Perfs | X | 0.74 | GPM per Perforation = | | 29 GPM |

16. *Volume of Liquid Per Foot of Distribution Piping (Table II)*: 0.110 Gallons/ft

17. *Volume of Distribution Piping* =

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

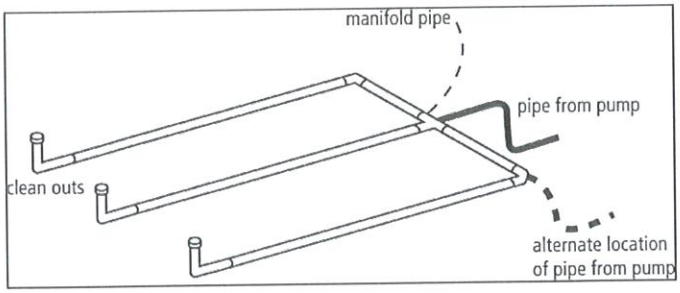
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 3 | X | 36 | ft | X | 0.110 | gal/ft | = | 11.9 Gallons |

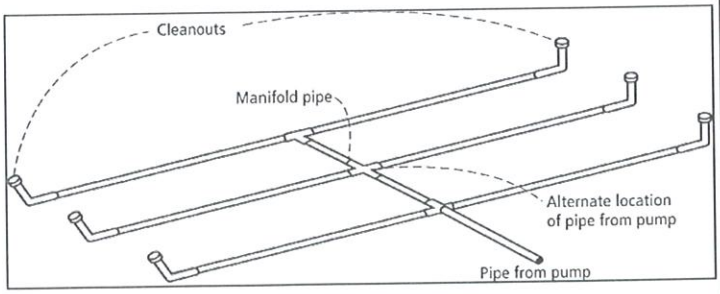
18. Minimum Delivered Volume = Volume of Distribution Piping X 4

| | | | | |
|---|---|---|---|---|
| 11.9 | gals | X | 4 | = 47.5 Gallons |

**Table II**
**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 |




Comments/Special Design Considerations:

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# OSTP Basic Pump Selection Design Worksheet

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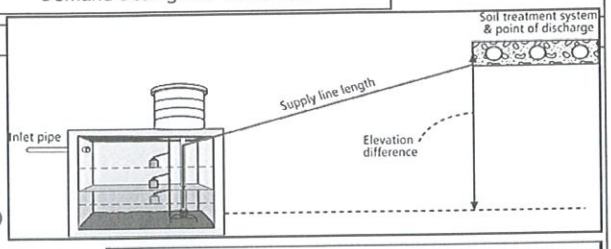
## 1. PUMP CAPACITY

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: 29.0 GPM
3. Enter pump description: Demand Dosing Soil Treatment

## 2. HEAD REQUIREMENTS




A. Elevation Difference between pump and point of discharge: 10 ft

B. Distribution Head Loss: 5 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 |

D. 1. Supply Pipe Diameter: 2.0 in

2. Supply Pipe Length: 25 ft

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

Friction Loss = 2.23 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*

25 ft X 1.25 = 31.3 ft

**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 |

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 = 2.23 ft per 100ft X 31.3 ft ÷ 100 = 0.7 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 )

10.0 ft + 5.0 ft + _____ ft + 0.7 ft = 15.7 ft

## 3. PUMP SELECTION

A pump must be selected to deliver at least **29.0** GPM (Line 1 or Line 2) with at least **15.7** feet of total head.

Comments:

Minnesota Pollution Control Agency

# OSTP Pump Tank Design Worksheet

University of Minnesota

## DETERMINE TANK CAPACITY AND DIMENSIONS

Project ID: | v 07.14.15

1. A. *Design Flow (Design Sum.1A)*: 450 GPD

   B. Min. required pump tank capacity: 500 Gal  C. Recommended pump tank capacity: 1000 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 = ____ $ft^2$

   B. Circle area = $3.14r^2$ (3.14 X radius X radius)

   3.14 X ____ $^2$ ft = ____ $ft^2$

   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.

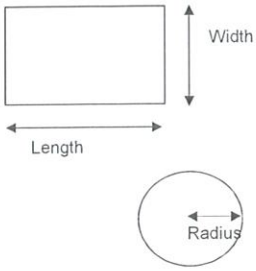
   ____ $ft^2$ X 7.5 $gal/ft^3$ ÷ 12 in/ft = ____ Gallons per inch

   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 23.1 Gallons Per Inch = ____ Gallons




## MANUFACTURER'S SPECIFIED TANK CAPACITY (when available):

3. A. Tank Manufacturer: Brown Wilbert

   B. Tank Model: 1000 gallon single compartment

   C. Capacity from manufacturer: 1001 Gallons

   D. Gallons per inch from manufacturer: 23.1 Gallons per inch

   E. Liquid depth of tank from manufacturer: 43.3 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 23.1 Gallons Per Inch = 323 Gallons

5. *Minimum Delivered Volume* = 4 X Volume of Distribution Piping:

   *- Line 17 of the Pressure Distribution or Line 11 of Non-level* 48 Gallons (minimum dose)

6. Calculate *Maximum Pumpout Volume* (25% of Design Flow)

   Design Flow: 315 GPD X 0.25 = 79 Gallons (maximum dose)

7. *Select a pumpout volume that meets both Minimum and Maximum:* 50 Gallons

8. Calculate *Doses Per Day* = Design Flow ÷ *Delivered Volume*

   315 gpd ÷ 50 gal = 6 *Doses*

9. Calculate Drainback:

   A. *Diameter of Supply Pipe* = 2 inches

   B. Length of Supply Pipe = 25 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*

   25 ft X 0.170 gal/ft = 4.3 Gallons

10. *Total Dosing Volume = Delivered Volume* plus *Drainback*

    50 gal + 4.3 gal = 54 Gallons

11. Minimum Alarm Volume = Depth of alarm (2 or 3 inches) X gallons per inch of tank

    3 in X 23.1 gal/in = 69.3 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 |

Minnesota Pollution Control Agency

# OSTP Pump Tank Design Worksheet

University of Minnesota

## 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*): 29 GPM

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

[ ] in X [23.1] 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. 29 GPM

14. Calculate **TIMER ON** setting:

*Total Dosing Volume/GPM*

[54] gal ÷ [29.0] gpm = [1.9] Minutes ON

15. Calculate **TIMER OFF** setting:

Minutes Per Day (1440)/*Doses Per Day* - Minutes On

1440 min ÷ [6] doses/day - [1.9] min = [238.1] Minutes OFF

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

*Distance to set Pump Off Float=Gallons to Cover Pump / Gallons Per Inch*:

[323.4] gal ÷ [23.1] gal/in = [14.0] Inches

17. Alarm Float - Measuring from bottom of tank:

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

[43.25] in X 0.90 = [38.925] 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*

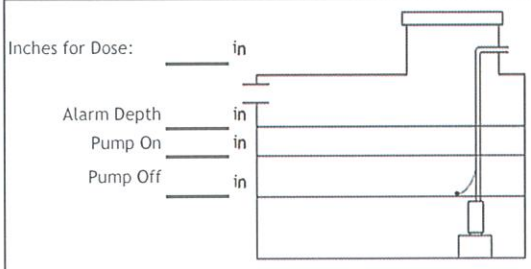
[ ] in + [ ] in = [ ] Inches

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

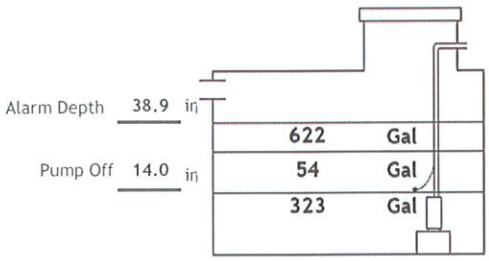
[ ] in + [ ] in = [ ] Inches

## FLOAT SETTINGS

### DEMAND DOSING




### TIMED DOSING



# Soil Profile Description

| | | | |
|---|---|---|---|
| **Date Completed :** | 10/9/2019 | **Observation # :** | 2 Soil Pits & 2 Soil Borings |
| **Completed By :** | Melissa Besser | **Equipment :** | Hand Auger & Shovel |
| **Client / Project :** | Darlene Panushka | **Limiting Layer :** | 24" |
| **Landscape position :** | Side Slope | **Vegitation :** | Wooded |
| **Mapped soil type :** | 504B | **Weather :** | Sunny |

***Observation # : 1 Pit*** ***Primary Site***

| Horizon Depth | Soil Texture | Matrix Color | Redox features | Shape | Grade | Consistence |
|---|---|---|---|---|---|---|
| 0" - 8" | Loamy Sand | 10YR 3/2 | | Granular | Strong | Friable |
| 8" - 24" | Silt Loam | 10YR 3/3 | | Blocky | Strong | Friable |
| Rock Restriction at 24" - Redox was not present | | | | | | |

***Observation # : 2*** ***Primary Site***

| Horizon Depth | Soil Texture | Matrix Color | Redox features | Shape | Grade | Consistence |
|---|---|---|---|---|---|---|
| 0" - 11" | Loamy Sand | 10YR 3/2 | | Granular | Strong | Friable |
| 11" - 24" | Silt Loam | 10YR 3/3 | | Blocky | Strong | Friable |
| Rock Restriction at 24" - Redox was not present | | | | | | |

***Observation # : 3*** ***Primary Site***

| Horizon Depth | Soil Texture | Matrix Color | Redox features | Shape | Grade | Consistence |
|---|---|---|---|---|---|---|
| 0" - 10" | Loamy Sand | 10YR 3/2 | | Granular | Strong | Friable |
| 10" - 24" | Silt Loam | 10YR 3/3 | Redox at 24" | Blocky | Strong | Friable |
| 24" - 26" | Silt Loam | 7.5YR 4/4 | Redox = 7.5YR 5/8 | Blocky | Strong | Friable |

***Observation # : 4*** ***Primary Site***

| Horizon Depth | Soil Texture | Matrix Color | Redox features | Shape | Grade | Consistence |
|---|---|---|---|---|---|---|
| 0" - 12" | Loamy Sand | 10YR 3/2 | | Granular | Strong | Friable |
| 12" - 26" | Silt Loam | 10YR 3/3 | Redox at 26" | Blocky | Strong | Friable |
| 26" - 30" | Silt Loam | 7.5YR 4/4 | Redox = 7.5YR 5/8 | Blocky | Strong | Friable |

SEPTIC CHECK

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Phone: (320)-983-2447 Fax: (320)-983-2151 info@septiccheck.com www.SepticCheck.com

# Aitkin County, Minnesota

## 504B—Duluth fine sandy loam, 1 to 6 percent slopes

### Map Unit Setting

*National map unit symbol:* gjh7
*Elevation:* 980 to 1,640 feet
*Mean annual precipitation:* 25 to 30 inches
*Mean annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 120 to 140 days
*Farmland classification:* All areas are prime farmland

### Map Unit Composition

*Duluth and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Duluth

#### Setting

*Landform:* Moraines
*Landform position (two-dimensional):* Backslope, summit
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Loamy till

#### Typical profile

*A - 0 to 3 inches:* fine sandy loam
*E,Bw,2BE,2Bt - 3 to 41 inches:* clay loam
*2C - 41 to 60 inches:* loam

#### Properties and qualities

*Slope:* 1 to 6 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.06 to 0.60 in/hr)
*Depth to water table:* About 13 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 5 percent
*Available water storage in profile:* High (about 10.2 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2e
*Hydrologic Soil Group:* C/D
*Forage suitability group:* Sloping Upland, Acid (G090AN006MN)
*Hydric soil rating:* No

**Minor Components**

**Mahtowa and similar soils**
*Percent of map unit:* 3 percent
*Landform:* Depressions
*Hydric soil rating:* Yes

**Blackhoof and similar soils**
*Percent of map unit:* 3 percent
*Landform:* Depressions
*Hydric soil rating:* Yes

**Rifle and similar soils**
*Percent of map unit:* 3 percent
*Landform:* Bogs
*Hydric soil rating:* Yes

**Cromwell and similar soils**
*Percent of map unit:* 2 percent
*Hydric soil rating:* No

**Dusler and similar soils**
*Percent of map unit:* 2 percent
*Hydric soil rating:* No

**Cutaway and similar soils**
*Percent of map unit:* 2 percent
*Hydric soil rating:* No

## Data Source Information

Soil Survey Area: Aitkin County, Minnesota
Survey Area Data: Version 20, Sep 16, 2019

# Aitkin County, Minnesota

## 928D—Cushing-Mahtomedi complex, 10 to 25 percent slopes

### Map Unit Setting

*National map unit symbol:* gjk5
*Elevation:* 980 to 1,640 feet
*Mean annual precipitation:* 25 to 30 inches
*Mean annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 120 to 140 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Cushing and similar soils:* 45 percent
*Mahtomedi and similar soils:* 40 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Cushing

#### Setting

*Landform:* Moraines
*Landform position (two-dimensional):* Shoulder, backslope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Loamy till

#### Typical profile

*E - 0 to 7 inches:* loam
*B/E - 7 to 17 inches:* loam
*Bt - 17 to 30 inches:* loam
*C - 30 to 60 inches:* loam

#### Properties and qualities

*Slope:* 10 to 25 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high (0.20 to 0.60 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 10 percent
*Available water storage in profile:* High (about 9.1 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4e
*Hydrologic Soil Group:* C
*Forage suitability group:* Sloping; Fine Texture (G090AN023MN)
*Hydric soil rating:* No

### Description of Mahtomedi

#### Setting

*Landform:* Moraines
*Landform position (two-dimensional):* Shoulder, backslope
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Sandy and gravelly outwash

#### Typical profile

*A - 0 to 3 inches:* loamy coarse sand
*E - 3 to 13 inches:* coarse sand
*Bw - 13 to 25 inches:* gravelly coarse sand
*C - 25 to 60 inches:* gravelly sand

#### Properties and qualities

*Slope:* 10 to 25 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Excessively drained
*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (6.00 to 20.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Calcium carbonate, maximum in profile:* 15 percent
*Available water storage in profile:* Low (about 4.2 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 6s
*Hydrologic Soil Group:* A
*Forage suitability group:* Sandy (G090AN022MN)
*Hydric soil rating:* No

### Minor Components

#### Alstad and similar soils

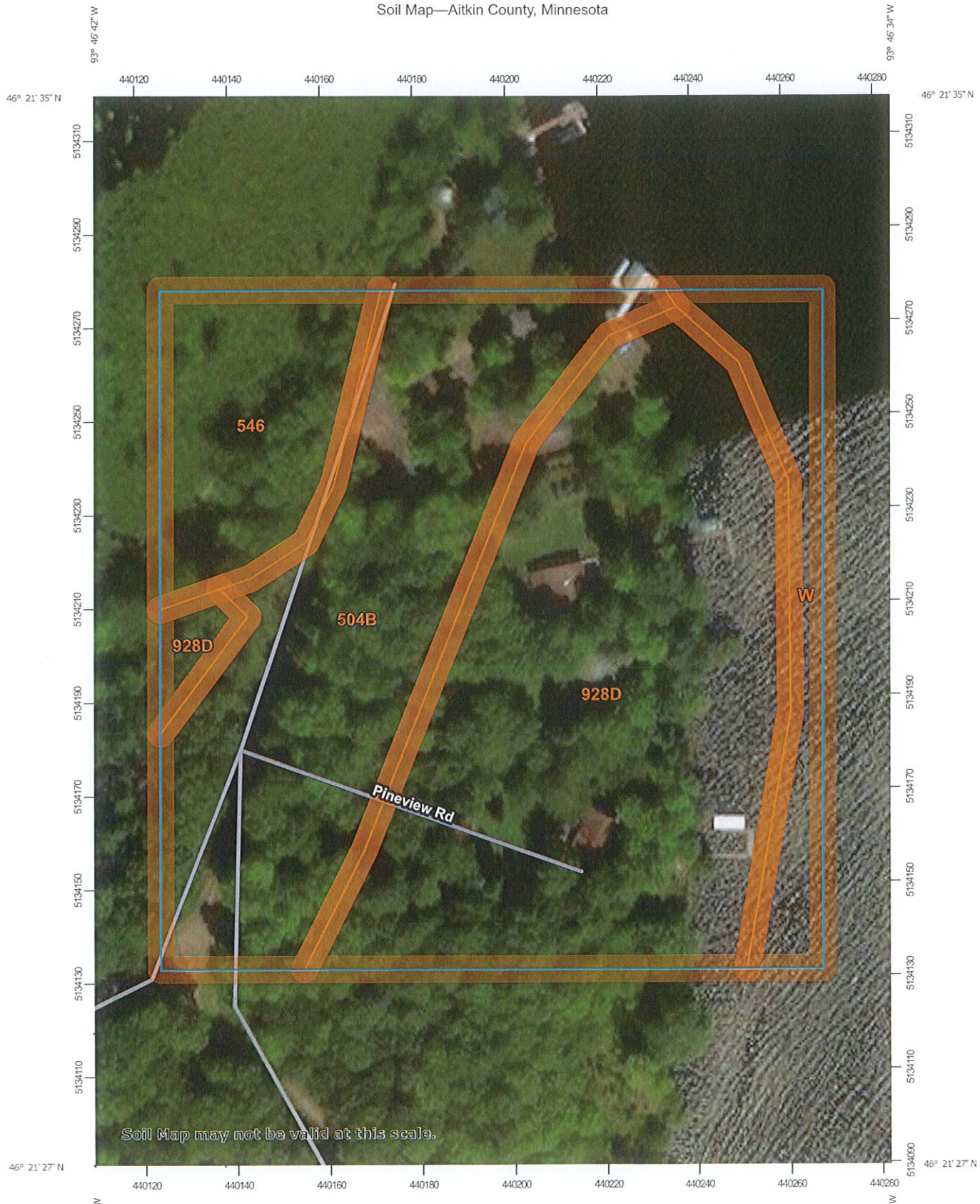
*Percent of map unit:* 8 percent
*Hydric soil rating:* No

#### Cathro and similar soils

*Percent of map unit:* 7 percent
*Landform:* Bogs
*Hydric soil rating:* Yes

## Data Source Information

Soil Survey Area: Aitkin County, Minnesota
Survey Area Data: Version 20, Sep 16, 2019




Map Scale: 1:1,110 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

**Water Features**
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**
- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Aitkin County, Minnesota
Survey Area Data: Version 20, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 19, 2014—Sep 23, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| 504B | Duluth fine sandy loam, 1 to 6 percent slopes | 1.6 | 31.7% |
| 546 | Lupton muck | 0.6 | 11.8% |
| 928D | Cushing-Mahtomedi complex, 10 to 25 percent slopes | 2.5 | 48.1% |
| W | Water | 0.4 | 8.4% |
| **Totals for Area of Interest** | | **5.2** | **100.0%** |

**TECHNICAL BROCHURE**
BPE R1


## FEATURES

- Corrosion resistant construction
- Cast iron body
- Thermoplastic impeller and cover.
- Upper sleeve and lower heavy duty ball bearing construction.
- Motor is permanently lubricated for extended service life.
- Powered for continuous operation.
- All ratings are within the working limits of the motor.
- Quick disconnect power cord, 20' standard length, heavy duty 16/3 SJTW with 115 or 230 volt grounding plug.
- Complete unit is heavy duty, portable and compact.
- Mechanical seal is carbon, ceramic, BUNA and stainless steel.
- Stainless steel fasteners

# PE

SUBMERSIBLE EFFLUENT PUMP

BUILT IN THE USA
ENGINEERED, ASSEMBLED & TESTED

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## APPLICATIONS

Specially designed for the following uses:

- Mound Systems
- Effluent/Dosing Systems
- Low Pressure Pipe Systems
- Basement Draining
- Heavy Duty Sump/Dewatering

## SPECIFICATIONS

**Pump - General:**

- Discharge: 1½" NPT
- Temperature: 104°F (40°C) maximum, continuous when fully submerged.
- Solids handling: ½" maximum sphere.
- Automatic models include a float switch.
- Manual models available.
- Pumping range: see performance chart or curve.

PE31 Pump:

- Maximum capacity: 53 GPM
- Maximum head: 25' TDH

PE41 Pump:

- Maximum capacity: 61 GPM
- Maximum head: 29' TDH

PE51 Pump:

- Maximum capacity: 70 GPM
- Maximum head: 37' TDH

## MOTOR

**General:**

- Single phase
- 60 Hertz
- 115 and 230 volts
- Built-in thermal overload protection with automatic reset.
- Class B insulation
- Oil-filled design
- High strength carbon steel shaft

PE31 Motor:

- .33 HP, 3000 RPM
- 115 volts
- Shaded pole design

PE41 Motor:

- .40 HP, 3400 RPM
- 115 and 230 volts
- PSC design

PE51 Motor:

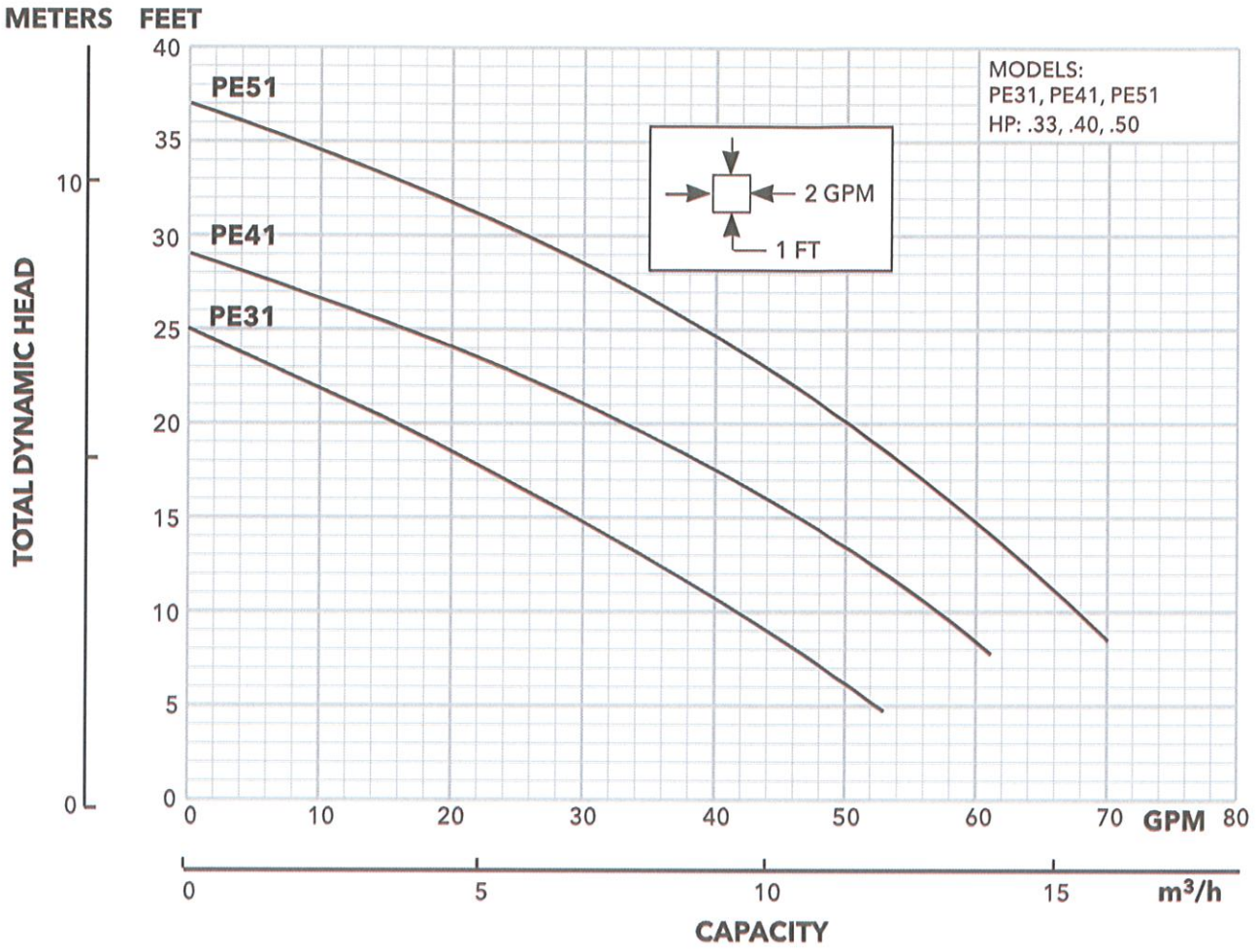
- .50 HP, 3400 RPM
- 115 and 230 volts
- PSC design

## AGENCY LISTINGS

Tested to UL 778 and CSA 22.2 108 Standards
By Canadian Standards Association
File #LR38549

## PUMP INFORMATION

| Order No. | HP | Volts | Amps | Minimum Circuit Breaker | Phase | Float Switch Style | Cord Length | Discharge Connection | Minimum Basin Diameter | Maximum Solids Size | Shipping Weight lbs/kg |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PE31M | 0.33 | 115 | 12 | 20 | 1 | Manual / No Switch | 20' | 1.5" | 18" | .5" | 31 / 14.1 |
| PE31P1 | | | | | | Piggyback Float Switch | | | | | |
| PE41M | 0.4 | | 7.5 | 15 | | Manual / No Switch | | | | | |
| PE41P1 | | | | | | Piggyback Float Switch | | | | | |
| PE42M | | 230 | 3.7 | 10 | | Manual / No Switch | | | | | |
| PE42P1 | | | | | | Piggyback Float Switch | | | | | |
| PE51M | 0.5 | 115 | 9.5 | 20 | | Manual / No Switch | | | | | |
| PE51P1 | | | | | | Piggyback Float Switch | | | | | |
| PE52M | | 230 | 4.7 | 10 | | Manual / No Switch | | | | | |
| PE52P1 | | | | | | Piggyback Float Switch | | | | | |




## PERFORMANCE RATINGS

**PE31**

| Total Head (feet of water) | GPM |
|---|---|
| 5 | 52 |
| 10 | 42 |
| 15 | 29 |
| 20 | 16 |
| 25 | 0 |

**PE41**

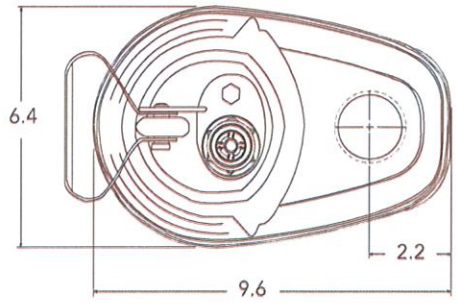
| Total Head (feet of water) | GPM |
|---|---|
| 8 | 61 |
| 10 | 57 |
| 15 | 46 |
| 20 | 33 |
| 25 | 16 |

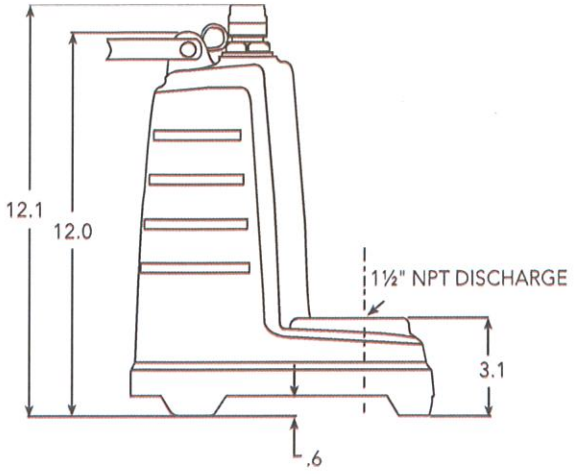
**PE51**

| Total Head (feet of water) | GPM |
|---|---|
| 10 | 67 |
| 15 | 59 |
| 20 | 50 |
| 25 | 39 |
| 30 | 26 |
| 35 | 8 |

## DIMENSIONS

(All dimensions are in inches. Do not use for construction purposes.)

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# INSTALLER FRIENDLY SERIES® - IFS Single Phase Simplex

**Single phase, simplex demand dose or timed dose, float or C-Level™ 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 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.

The optional C-Level™ sensor is a pressure transducer that senses the liquid level in the tank and sends a signal to the IFS panel. Pump activation levels can be adjusted by using the panel touch pad. C-Level™ CL40 sensor operating range is 3-39.9 inches (7.6-101.3 cm). C-Level™ CL100 operating range is 3-99.5 inches (7.6-252.7 cm).

## TOUCH PAD FEATURES

A. **Level Status Indicators** illuminate when floats or set points 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: level in inches or centimeters (C-Level™ only), 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).

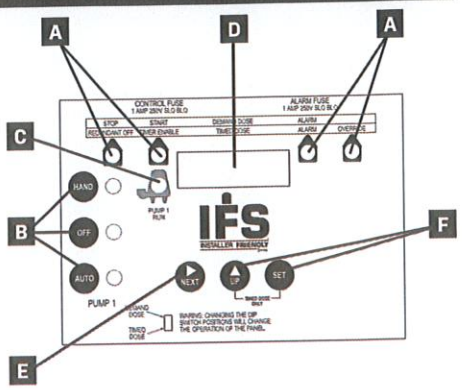
E. **NEXT Push Button** toggles display.

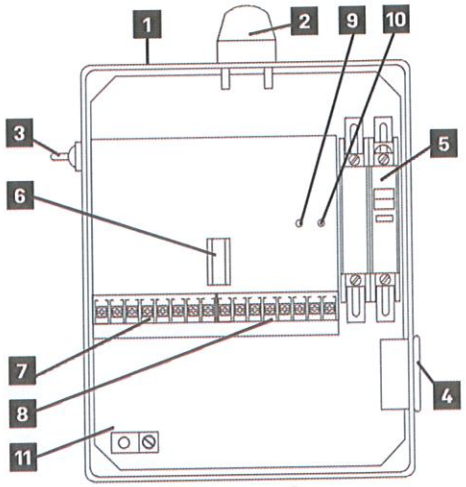
F. **UP and SET Push Buttons** set pump ON/OFF times (timed dose only) or activation levels (C-Level™ only).

## PANEL COMPONENTS

1. **Enclosure** measures 12x10x6 inches (30.48x24.4x15.24) NEMA 4X (ultraviolet stabilized thermoplastic, padlockable with integral mounting flanges, drip shield, (2) heavy duty cover latches, and stainless steel ¼ turn set screw; for outdoor or indoor use). Note: added options, voltage, and amp range selected may change enclosure size and enclosure features, 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***

Reg. Cdn Pat. & TM Off
C-Level™ Sensor US Patent No. 8,336,385; 8,567,242; 8,650,949

## FEATURES

- Entire control system 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' control switches
  **Timed Dose** - two 20' control switches
- Available with EZconnex® float system
- Complete with step-by-step installation instructions
- Five-year limited warranty

c UL us LISTED

California Prop 65 requires the following: ⚠ WARNING Cancer and Reproductive Harm - www.P65Warnings.ca.gov

**SEE REVERSE SIDE FOR ORDERING INFORMATION.**
**SEE PRICE BOOK FOR LIST PRICE.**


SJE RHOMBUS.

1-888-DIAL-SJE • 1-218-847-1317
1-218-847-4617 Fax
email: customer.service@sjeinc.com
**www.sjerhombus.com**

| IFS | | 1 | W | | | | | 8AC |
|---|---|---|---|---|---|---|---|---|

## 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 = timer enable and alarm / Demand dose = stop, start, and alarm) (select 17 option)
E = EZconnex® float switch system (select 33, 35 or 36 option)
timed dose
demand dose
X = no floats
timed dose
demand dose
C = C-Level™ sensor (must select 24 or 29 option)
(select option 3E and/or 4A & 4D for high water alarm and/or redundant off floats)
timed dose
demand dose

**Note:** Pump down applications only.
***Industry practices suggest that a secondary device, such as a float switch, be used for redundant activation of the high level alarm and pump shut off.***

**OPTIONS** ***Listed below***

| CODE | DESCRIPTION |
|---|---|
| 1J | Duo alarm inputs |
| 3A | Alarm flasher |
| 3B | Manual alarm reset |
| 3E | High water alarm float *(must select 17 option)* ***(Available only when Switch Applications = C)*** |
| 4A | Redundant off *(select option 4D if floats are required)* Demand Dose Timed Dose |
| 4D | Redundant off float *(must select 4A option) (must select 17 option)* |
| 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 alarm panel *(must select option 6A)* |
| 11D | NEMA 4X 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)* |

| CODE | DESCRIPTION |
|---|---|
| 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 float (timed dose float panel only) |
| 24E | C-Level™ CL40 sensor with 4' vent tube & 20' cord |
| 24F | C-Level™ CL40 sensor with 4' vent tube & 40' cord |
| 24G | C-Level™ CL40 sensor with 8' vent tube & 20' cord |
| 24H | C-Level™ CL40 sensor with 8' vent tube & 40' cord |
| 24X | No C-Level™ CL40 sensor |
| 29A | C-Level™ CL100 sensor w/10' vent tube & 20' cord |
| 29B | C-Level™ CL100 sensor w/10' vent tube & 40' cord |
| 29X | No C-Level™ CL100 sensor |
| 33D | EZconnex® 3-Port, 25', w/10' floats (3) /pipe clamp ✱ |
| 33E | EZconnex® 3-Port, 50', w/10' floats (3) /pipe clamp ✱ |
| 33G | EZconnex® 3-Port, 25', w/20' floats (3) /pipe clamp ✱ |
| 33H | EZconnex® 3-Port, 50', w/20' floats (3) /pipe clamp ✱ |
| 35D | EZconnex® 4-Port, 25', w/10' floats (4) /pipe clamp ✱ |
| 35E | EZconnex® 4-Port, 50', w/10' floats (4) /pipe clamp ✱ |
| 35G | EZconnex® 4-Port, 25', w/20' floats (4) /pipe clamp ✱ |
| 35H | EZconnex® 4-Port, 50', w/20' floats (4) /pipe clamp ✱ |
| 36D | EZconnex® 3-Port, 25' w/10' floats (2) /pipe clamp, sealing plug ✱ |
| 36E | EZconnex® 3-Port, 50' w/10' floats (2) /pipe clamp, sealing plug ✱ |
| 36G | EZconnex® 3-Port, 25' w/20' floats (2) /pipe clamp, sealing plug ✱ |
| 36H | EZconnex® 3-Port, 50' w/20' floats (2) /pipe clamp, sealing plug ✱ |

● Mechanically-activated ▲ Mercury-activated

✱ EZconnex® mechanically-activated, narrow angle float switches with quick release connections.



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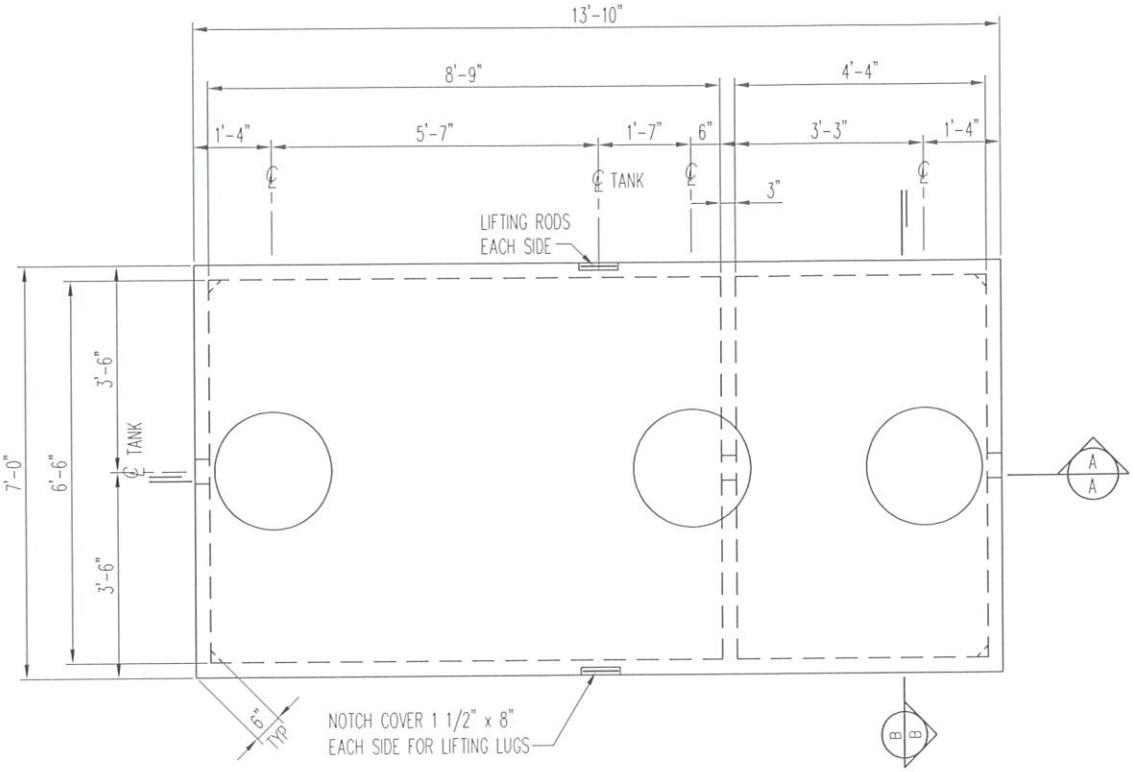
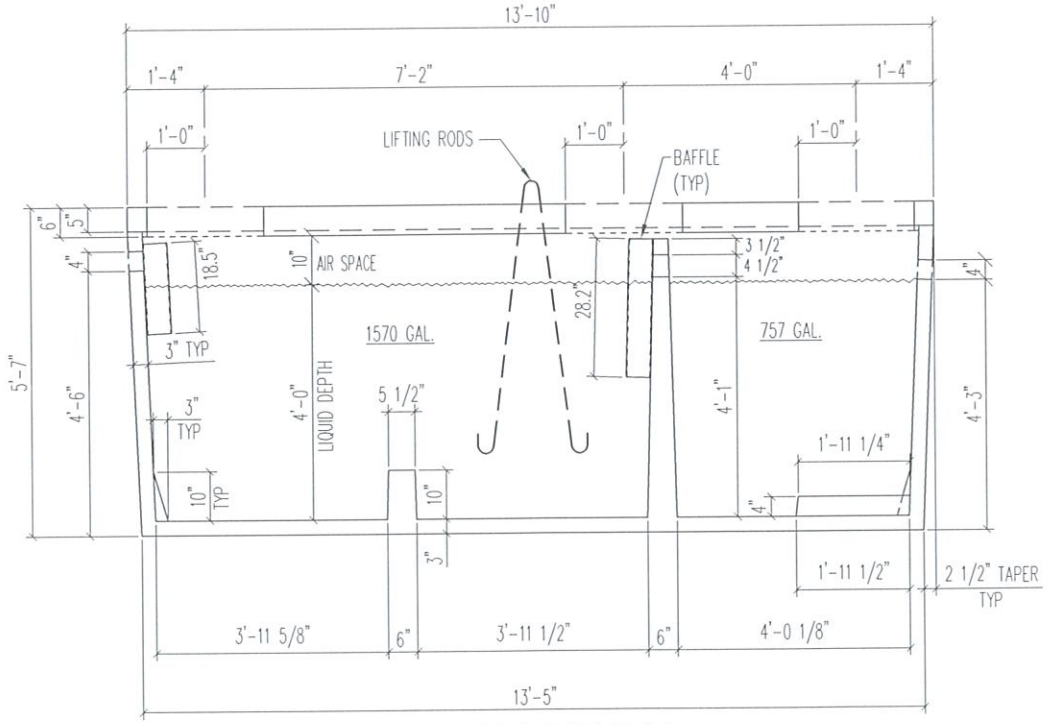



## 2250 GALLON 2 COMP. TANK

1/2" = 1'-0"



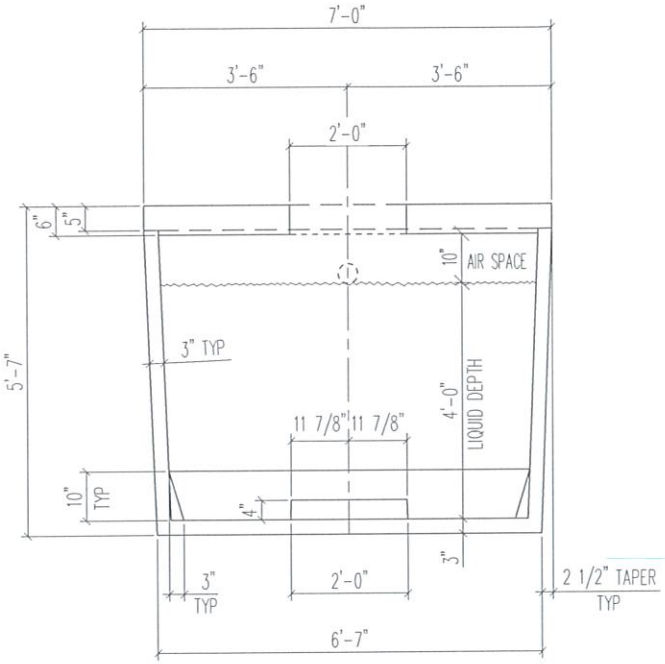

## A/A SECTION

1/2" = 1'-0"

NOTE:

1. PROVIDE MINIMUM 1" CLEAR BETWEEN TOP OF BAFFLE AND UNDERSIDE OF LID.

| | | |
|---|---|---|
| 2250 GALLON 2 COMP.<br>SEPTIC TANK<br>(2250 2C PT) | Brown Wilbert | WEIGHT= 20,380#<br>MAX. SOIL COVER= 8'-0"<br>TOTAL LIQUID VOLUME= 2327 GAL. |



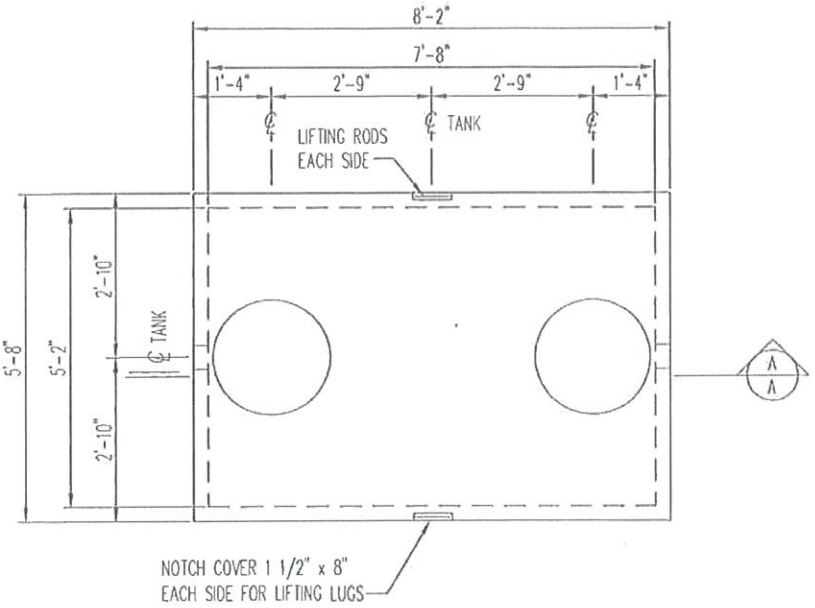

B/B SECTION

1/2" = 1'-0"

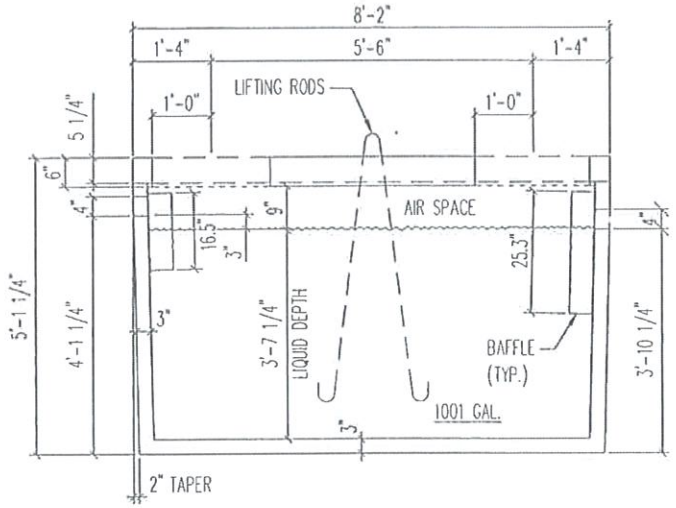
NOTE:

1. PROVIDE MINIMUM 1" CLEAR BETWEEN TOP OF BAFFLE AND UNDERSIDE OF LID.

| | | |
|---|---|---|
| 2250 GALLON 2 COMP.<br>SEPTIC TANK<br>(2250 2C PT) | Brown Wilbert | WEIGHT= 20,380#<br>MAX. SOIL COVER= 8'-0"<br>TOTAL LIQUID VOLUME= 2327 GAL. |




1000 GALLON TANK
1/2" = 1'-0"




A
A
SECTION
1/2" = 1'-0"

NOTE:
1. PROVIDE MINIMUM 1" CLEAR BETWEEN TOP OF BAFFLE AND UNDERSIDE OF LID.
2. PUMP TANK (PT) HAS NO OUTLET BAFFLE.

| | | |
|---|---|---|
| 1000 GALLON SEPTIC OR PUMP TANK<br>(1000 ST OR 1000 PT) | Brown Wilbert | WEIGHT=8650#<br>MAX. SOIL COVER= 8'-0" |

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# Septic System Management Plan for Above Grade Systems

The goal of a septic system is to protect human health and the environment by properly treating wastewater before returning it to the environment. Your septic system is designed to kill harmful organisms and remove pollutants before the water is recycled back into our lakes, streams and groundwater.

This **management plan** will identify the operation and maintenance activities necessary to ensure long-term performance of your septic system. Some of these activities must be performed by you, the homeowner. Other tasks must be performed by a licensed septic maintainer or service provider. However, it is **YOUR** responsibility to make sure all tasks get accomplished in a timely manner.

The University of Minnesota's *Septic System Owner's Guide* contains additional tips and recommendations designed to extend the effective life of your system and save you money over time.

***Proper septic system design, installation, operation and maintenance means safe and clean water!***

| | | | |
|---|---|---|---|
| Property Owner | Darlene Panushka | Email | |
| Property Address | 44477 238th Lane Aitkin | Property ID | 11-1-111300 |
| System Designer | Septic Check | Contact Info | 320-983-2447 |
| System Installer | Septic Check | Contact Info | 320-983-2447 |
| Service Provider/Maintainer | Septic Check | Contact Info | 320-983-2447 |
| Permitting Authority | Aitkin County | Contact Info | 218-927-7342 |
| Permit # | | Date Inspected | |

Keep this Management Plan with your Septic System Owner's Guide. The Septic System Owner's Guide includes a folder to hold maintenance records including pumping, inspection and evaluation reports. Ask your septic professional to also:

- Attach permit information, designer drawings and as-built of your system, if they are available.
- Keep copies of all pumping records and other maintenance and repair invoices with this document.
- Review this document with your maintenance professional at each visit; discuss any changes in product use, activities, or water-use appliances.

For a copy of the *Septic System Owner's Guide*, visit www.bookstores.umn.edu and search for the word "septic" or call 800-322-8642.

## For more information see http://septic.umn.edu

Version: August 2015

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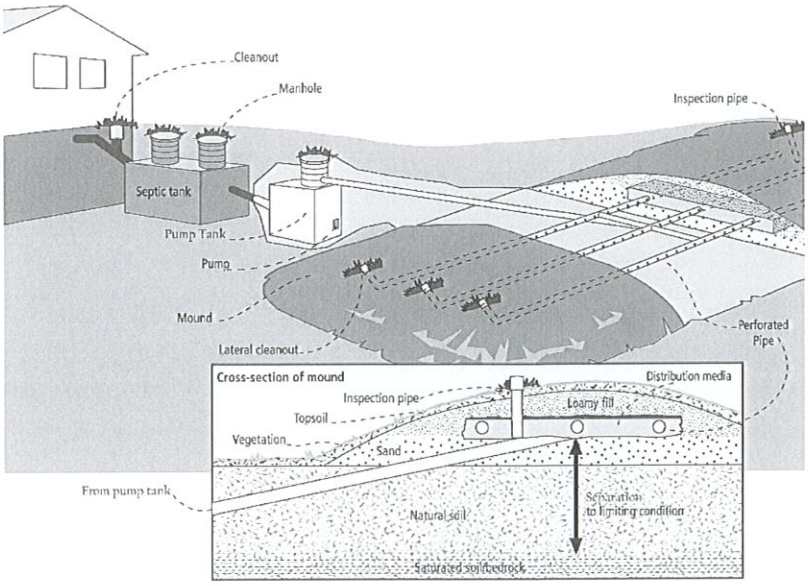
*Septic System Management Plan for Above Grade Systems*

## Your Septic System




### Septic System Specifics

System Type: ◯ I ◯ II ◉ III ◯ IV* ◯ V*

*(Based on MN Rules Chapter 7080.2200 – 2400)*

**Additional Management Plan required*

☑ System is subject to operating permit*

☐ System uses UV disinfection unit*

Type of advanced treatment unit _____

### Dwelling Type

Number of bedrooms: 4

System capacity/ design flow (gpd): 450

Anticipated average daily flow (gpd): _____

Comments _____

Business? : ◯ Y ◉ N What type? _____

### Well Construction

Well depth (ft): _____

☒ Cased well Casing depth: _____

☐ Other (specify): _____

Distance from septic (ft): >50'

Is the well on the design drawing? ◉ Y ◯ N

### Septic Tank

☐ First tank *Tank volume:* 2250 *gallons*

Does tank have two compartments? ◉ Y ◯ N

☐ Second tank *Tank volume:* _____ *gallons*

☐ Tank is constructed of Concrete

☐ Effluent screen: ◯ Y ◉ N Alarm ◉ Y ◯ N

☐ Pump Tank 1000 *gallons*

☐ Effluent Pump *make/model:* Goulds PE 41

Pump capacity 29.0 GPM

TDH 15.7 Feet of head

☐ Alarm location Outdoor Powerpost

### Soil Treatment Area (STA)

Mound/At-Grade area (width x length): 26.5 ft x 54.5 ft

Rock bed size (width x length): 10 ft x 38 ft

Location of additional STA: _____

Type of distribution media: 1 1/2" Washed Rock

☑ Inspection ports ☑ Cleanouts

☐ Surface water diversions

☐ Additional STA not available

# Homeowner Management Tasks

These op*eration and maintenance ac*tivities are your responsibility. *Chart on page 6 can help track your activities.*

**Your toilet is not a garbage can. Do not flush anything besides human waste and toilet paper. No wet wipes, cigarette butts, disposal diapers, used medicine, feminine products or other trash!**

The system and septic tanks needs to be checked every 36 months

Your service provider or pumper/maintainer should evaluate if your tank needs to be pumped more or less often.

**Seasonally or several times per year**

- *Leaks.* Check (listen, look) for leaks in toilets and dripping faucets. Repair leaks promptly.
- *Soil treatment area.* Regularly check for wet or spongy soil around your soil treatment area. If surfaced sewage or strong odors are not corrected by pumping the tank or fixing broken caps and leaks, call your service professional. *Untreated sewage may make humans and animals sick.* Keep bikes, snowmobiles and other traffic off and control borrowing animals.
- *Alarms.* Alarms signal when there is a problem; contact your service professional any time the alarm signals.
- *Lint filter.* If you have a lint filter, check for lint buildup and clean when necessary. If you do not have one, consider adding one after washing machine.
- *Effluent screen.* If you do not have one, consider having one installed the next time the tank is cleaned along with an alarm.

**Annually**

- *Water usage rate.* A water meter or another device can be used to monitor your average daily water use. Compare your water usage rate to the design flow of your system (listed on the next page). Contact your septic professional if your average daily flow over the course of a month exceeds 70% of the design flow for your system.
- *Caps.* Make sure that all caps and lids are intact and in place. Inspect for damaged caps at least every fall. Fix or replace damaged caps before winter to help prevent freezing issues.
- *Water conditioning devices.* See Page 5 for a list of devices. When possible, program the recharge frequency based on *water demand (gallons)* rather than *time (days)*. Recharging too frequently may negatively impact your septic system. Consider updating to demand operation if your system currently uses time,
- *Review your water usage rate.* Review the Water Use Appliance chart on Page 5. Discuss any major changes with your service provider or pumper/maintainer.

**During each visit by a service provider or pumper/maintainer**

- Make sure that your service professional services the tank through the manhole. (NOT though a 4" or 6" diameter inspection port.)
- Ask how full your tank was with sludge and scum to determine if your service interval is appropriate.
- Ask your pumper/maintainer to accomplish the tasks listed on the Professional Tasks on Page 4.

# Professional Management Tasks

*These are the operation and maintenance activities that a pumper/maintainer performs to help ensure long-term performance of your system.* At each visit a written report/record must be provided to homeowner.

**Plumbing/Source of Wastewater**

- Review the Water Use Appliance Chart on Page 5 with homeowner.
  Discuss any changes in water use and the impact those changes may have on the septic system.
- Review water usage rates (if available) with homeowner.

**Septic Tank/Pump Tanks**

- *Manhole lid.* A riser is recommended if the lid is not accessible from the ground surface. Insulate the riser cover for frost protection.
- *Liquid level.* Check to make sure the tank is not leaking. The liquid level should be level with the bottom of the outlet pipe. (If the water level is below the bottom of the outlet pipe, the tank may not be watertight. If the water level is higher than the bottom of the outlet pipe of the tank, the effluent screen may need cleaning, or there may be ponding in the soil treatment area.)
- *Inspection pipes.* Replace damaged or missing pipes and caps.
- *Baffles.* Check to make sure they are in place and attached, and that inlet/outlet baffles are clear of buildup or obstructions.
- *Effluent screen.* Check to make sure it is in place; clean per manufacturer recommendation. Recommend retrofitted installation if one is not present.
- *Alarm.* Verify that the alarm works.
- *Scum and sludge.* Measure scum and sludge in each compartment of each septic and pump tank, pump if needed.

**Pump**

- *Pump and controls.* Check to make sure the pump and controls are operating correctly.
- *Pump vault.* Check to make sure it is in place; clean per manufacturer recommendations.
- *Alarm.* Verify that the alarm works.
- *Drainback.* Check to make sure it is draining properly.
- *Event counter or elapsed time meter.* Check to see if there is an event counter or elapsed time meter for the pump. If there is one or both, calculate the water usage rate and compare to the anticipated use listed on Design and Page 2. Dose Volume: _____ gallons: Pump run time: _____ Minutes

**Soil Treatment Area**

- *Inspection pipes.* Check to make sure they are properly capped. Replace caps and pipes that are damaged.
- *Surfacing of effluent.* Check for surfacing effluent or other signs of problems.
- *Lateral flushing.* Check lateral distribution; if cleanouts exist, flush and clean at recommended frequency.
- *Vegetation* - Check to see that a good growth of vegetation is covering the system.

**All other components – evaluate as listed here:** _____

_____

## Water-Use Appliances and Equipment in the Home

| Appliance | Impacts on System | Management Tips |
|---|---|---|
| Garbage disposal | • Uses additional water.<br>• Adds solids to the tank.<br>• Finely-ground solids may not settle. Unsettled solids can exit the tank and enter the soil treatment area. | • Use of a garbage disposal is not recommended.<br>• Minimize garbage disposal use. Compost instead.<br>• To prevent solids from exiting the tank, have your tank pumped more frequently.<br>• Add an effluent screen to your tank. |
| Washing machine | • Washing several loads on one day uses a lot of water and may overload your system.<br>• Overloading your system may prevent solids from settling out in the tank. Unsettled solids can exit the tank and enter the soil treatment area. | • Choose a front-loader or water-saving top-loader, these units use less water than older models.<br>• Limit the addition of extra solids to your tank by using liquid or easily biodegradable detergents. Limit use of bleach-based detergents and fabric softeners.<br>• Install a lint filter after the washer and an effluent screen to your tank<br>• Wash only full loads and think even – spread your laundry loads throughout the week. |
| Dishwasher | • Powdered and/or high-phosphorus detergents can negatively impact the performance of your tank and soil treatment area.<br>• New models promote "no scraping". They have a garbage disposal inside. | • Use gel detergents. Powdered detergents may add solids to the tank.<br>• Use detergents that are low or no-phosphorus.<br>• Wash only full loads.<br>• Scrape your dishes anyways to keep undigested solids out of your septic system. |
| Grinder pump (in home) | • Finely-ground solids may not settle. Unsettled solids can exit the tank and enter the soil treatment area. | • Expand septic tank capacity by a factor of 1.5.<br>• Include pump monitoring in your maintenance schedule to ensure that it is working properly.<br>• Add an effluent screen. |
| Large bathtub (whirlpool) | • Large volume of water may overload your system.<br>• Heavy use of bath oils and soaps can impact biological activity in your tank and soil treatment area. | • Avoid using other water-use appliances at the same time. For example, don't wash clothes and take a bath at the same time.<br>• Use oils, soaps, and cleaners in the bath or shower sparingly. |
| **Clean Water Uses** | **Impacts on System** | **Management Tips** |
| High-efficiency furnace | • Drip may result in frozen pipes during cold weather. | • Re-route water directly out of the house. Do not route furnace discharge to your septic system. |
| Water softener<br>Iron filter<br>Reverse osmosis | • Salt in recharge water may affect system performance.<br>• Recharge water may hydraulically overload the system. | • These sources produce water that is not sewage and should not go into your septic system.<br>• Reroute water from these sources to another outlet, such as a dry well, draintile or old drainfield.<br>• When replacing, consider using a demand-based recharge vs. a time-based recharge.<br>• Check valves to ensure proper operation; have unit serviced per manufacturer directions |
| Surface drainage<br>Footing drains | • Water from these sources will overload the system and is prohibited from entering septic system. | |

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*Septic System Management Plan for Above Grade Systems*

## Homeowner Maintenance Log

*Track maintenance activities here for easy reference. See list of management tasks on pages 3 and 4.*

| Activity | Date accomplished | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Check frequently:*** | | | | | | | | | | |
| Leaks: check for plumbing leaks* | | | | | | | | | | |
| Soil treatment area check for surfacing** | | | | | | | | | | |
| Lint filter: check, clean if needed* | | | | | | | | | | |
| Effluent screen (if owner-maintained)*** | | | | | | | | | | |
| Alarm** | | | | | | | | | | |
| ***Check annually:*** | | | | | | | | | | |
| Water usage rate (maximum gpd _____) | | | | | | | | | | |
| Caps: inspect, replace if needed | | | | | | | | | | |
| Water use appliances – review use | | | | | | | | | | |
| Other: | | | | | | | | | | |

*Monthly

**Quarterly

***Bi-Annually

Notes: If flow exceeds system capacity, check for and repair any leaks into the system, including household plumbing fixtures. If system ponds or otherwise cannot handle flow, repair options include; add time dosing, adding pre-treatment, or expanding the system.

*"As the owner of this SSTS, I understand it is my responsibility to properly operate and maintain the sewage treatment system on this property, utilizing the Management Plan. If requirements in this Management Plan are not met, I will promptly notify the permitting authority and take necessary corrective actions. If I have a new system, I agree to adequately protect the reserve area for future use as a soil treatment system."*

Property Owner Signature: _____ Date _____

Management Plan Prepared By: Melissa Besser Certification # 691

Permitting Authority: Aitkin County