E-Z EXCAVATING LLC.

2358 HWY# 23
MORA MN. 55051
Ph. 320-679-4031
Cell 320-241-7036

BOX MOUND DESIGN

LOCATION: 17423 VIRGO RD. ONAMIA MN.

OWNER: MILLE LACS BAND OF OJIBWE

SYSTEM TYPE: TYPE III BOX MOUND

DESIGN FLOW: 3 BEDROOM DESIGNED @ 290 GPD

TREATMENT AREA: 720 SQ.FT.
MOUND SIZE: 18' X 40'
SLOPE: GRADED TO 0 %

SEPTIC TANK: EXISTING
FILTER: YES

PUMP TANK: 2000 GAL.

PUMP: GOULDS PE31

TIMED DOSING PANEL: SJE-RHOMBUS

KEVIN HERWIG M.P.C.A. 1472

BOX MOUND CONSTRUCTION NOTES

This is a TIMED DOSING TYPE III BOX MOUND.

The box mound area is to be graded too an elevation of 99.10

The existing septic tank needs to be inspected and certified to be reused. Should the existing septic tank fail certification a new 1600 gallon CEMSTONE two compartment tank is to be installed.

The existing pump tank is to be removed and a new 2000 gallon tank is to be installed in the same location.

The pump flow must be validated after installation. If flow rate differs from design the pump must be calibrated. The pump selected for this system is sized as close as possible to meet gpm.& head requirements.

If flow rates cannot be achieved a larger pump and control valve may be necessary.

The system is designed to have the laterals connected to the top of the chamber's not laying on the sand bed. Orifice shields must be used on the weep holes.

PRODUCT NOTES

PRODUCT BRAND & MODEL LISTED IN DESIGN MUST BE USED. (PUMP TANK 2000 GAL. CEMSTONE PRODUCT # 9552000, (PUMP – GOULDS PE31) PUMP SETTINGS AND FLOW WILL NOT BE CORRECT IF OTHER PRODUCTS ARE USED.

SJE RHOMBUS TIMED DOSING PANEL MODEL (TD1W124H8AC21E) FILTER (SIM/TECH STF-100A2)

INFILTRATOR QUICK 4 STANDARD CHAMBERS WITH TOP MOUNT LATERALS

IT IS THE DESIGNERS DISCRETION TO APPROVE OR DISAPPROVE SUBSTITUTIONS.THE INSTALLER WILL BE RESPONSIBLE FOR DESIGN CHANGE FEE.

KEVIN HERWIG LIC # 1472

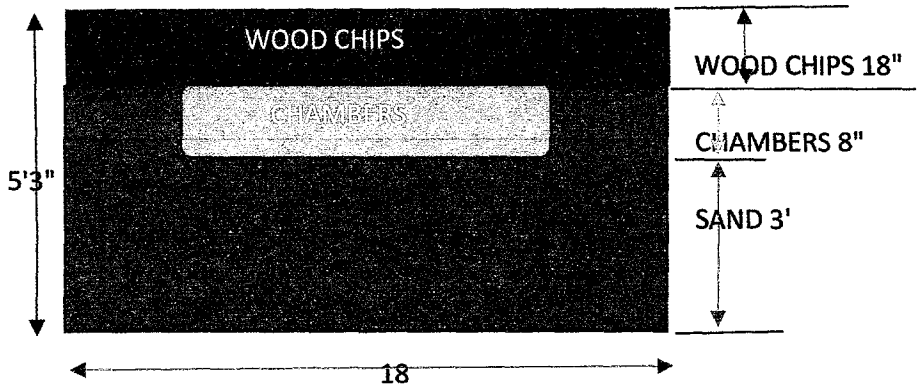
BOX MOUND

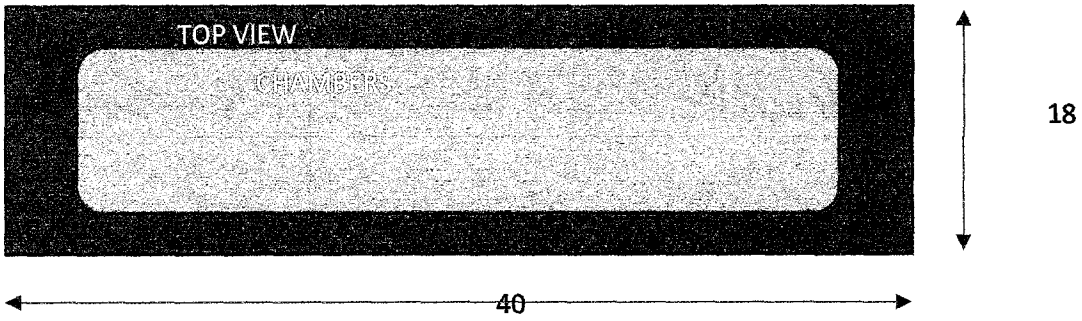
MATERIAL SPEC. LIST

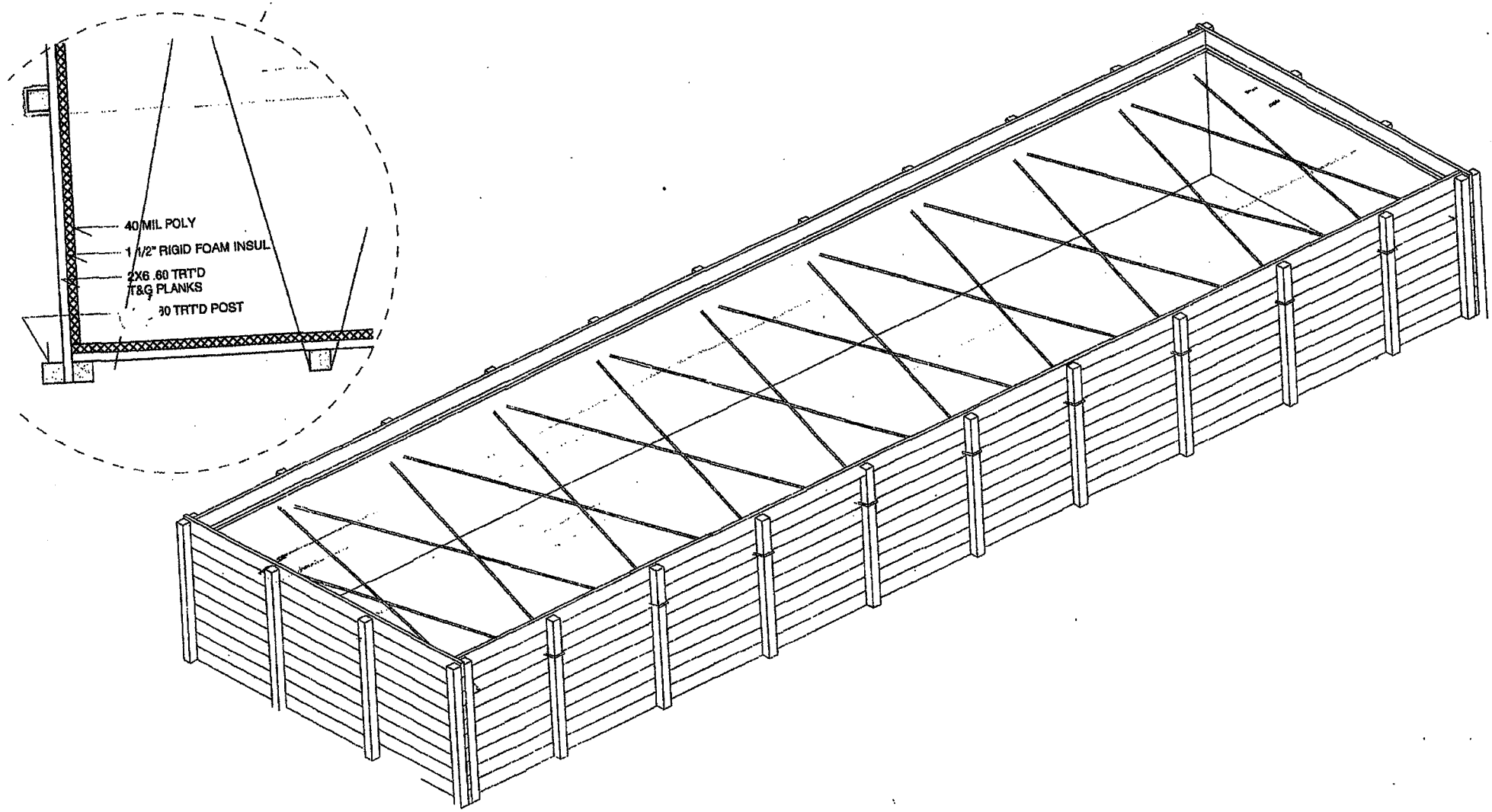
- POLY LINER- 40 MIL.
- INSULATION- 1 1/2" RIDID FOAM
- CABLE- 5/16" PLASTIC COATED STEEL
- TURN BUCKLES- 3/8"
- EYE BOLTS 3/8" W/ LARGE WASHERS
- PLANKS- 2"X6" T&G TREATED .40
- BASE ROW PLANK 2"X6" T&G TREATED .60
- POSTS- 5"X6" TREATED .60

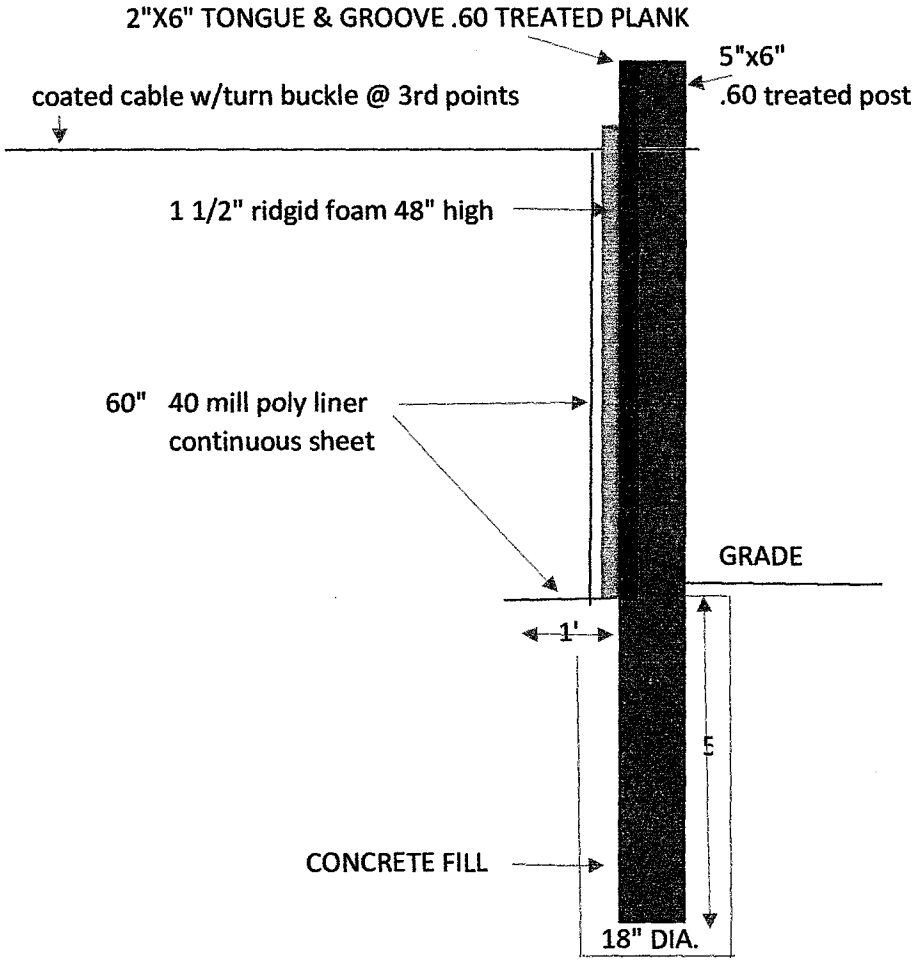
BOX MOUND

CROSS SECTION END VIEW






40 MIL POLY
1 1/2" RIGID FOAM INSUL
2X6 .60 TRT'D
T&G PLANKS
60 TRT'D POST


2"X6" TONGUE & GROOVE .60 TREATED PLANK
5"x6"
.60 treated post
coated cable w/turn buckle @ 3rd points
1 1/2" ridgid foam 48" high
60" 40 mill poly liner
continuous sheet
GRADE
1'
5'
CONCRETE FILL
18" DIA.

Soil Observation Log

www.SepticResource.com vers 12.4

Owner Information

Property Owner / project: _____ Date 8/8/2019

Property Address / PID: 17423 VIRGO RD ONAMIA MN

Soil Survey Information

☐ refer to attached soil survey

Parent matl's: ☑ Till ☐ Outwash ☐ Lacustrine ☐ Alluvium ☐ Organic ☐ Bedrock

landscape position: ☐ Summit ☑ Shoulder ☐ Side slope ☐ Toe slope

slope 2 % direction- downhill

Soil Log #1

☐ Boring ☑ Pit Elevation 99.27 Depth to SHWT 97.85

Depth (in)	Texture	fragment %	matrix color	redox color	consistence	grade	shape
0-10	Silt Loam	<35	10YR 3/4		Friable	Weak	Granular
10-18	Silt Loam	<35	7.5YR 4/3	7.5YR 5/6	Friable	Weak	Blocky
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive

Comments:

17423 VIRGO RD ONAMIA MN **Soil Log #2**

☐ Boring ☑ Pit Elevation 99.28 Depth to SHWT 97.9

Depth (in)	Texture	fragment %	matrix color	redox color	consistence	grade	shape
0-10	Silt Loam	<35	10YR 3/4		Friable	Weak	Granular
10-15	Silt Loam	<35	7.5YR 4/3	7.5YR5/6	Friable	Weak	Blocky
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive

17423 VIRGO RD ONAMIA MN **Soil Log #3**

☐ Boring ☐ Pit Elevation 99.33 Depth to SHWT 98.5

Depth (in)	Texture	fragment %	matrix color	redox color	consistence	grade	shape
0-8	Silt Loam	<35	10YR3/4		Friable	Weak	Granular
8-11	Silt Loam	<35	7.5YR3/3	5YR5/6	Friable	Weak	Blocky
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive

I hereby certify this work was completed in accordance with MN 7080 and any local req's.

Designer Signature

E-Z EXCAVATING
Company

1472
License #

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

1. PROJECT INFORMATION

v 04.02.2019

Property Owner/Client:	MILLE LACS BAND OF OJIBWE	Project ID:	
Site Address:	17423 VIRGO RD. OMAMIA MN.	Date:	08/08/19
Email Address:		Phone:	

2. DESIGN FLOW & WASTE STRENGTH

Attach data / estimate basis for Other Establishments

Design Flow: 450 GPD Anticipated Waste Type: Residential

BOD: mg/L TSS: mg/L Oil & Grease: mg/L

Treatment Level: C *Select Treatment Level C for residential septic tank effluent*

3. HOLDING TANK SIZING

Minimum Capacity: Residential =400 gal/bedroom, Other Establishment = Design Flow x 5.0, Minimum size 1000 gallons

Code Minimum **Holding Tank** Capacity: Gallons in Tanks or Compartments

Recommended **Holding Tank** Capacity: Gallons in Tanks or Compartments

Type of High Level Alarm: (Set @ 75% tank capacity)

Comments:

4. SEPTIC TANK SIZING

A. Residential dwellings:

Number of Bedrooms (Residential): 3

Code Minimum **Septic Tank** Capacity: 1000 Gallons in 1 Tanks or Compartments

Recommended **Septic Tank** Capacity: 1600 Gallons in 2 Tanks or Compartments

Effluent Screen & Alarm (Y/N): Yes Model/Type: SIM/TECH STF-100A2

B. Other Establishments:

Waste received by: GPD x Days Hyd. Retention Time

Code Minimum **Septic Tank** Capacity: Gallons In Tanks or Compartments

Recommended **Septic Tank** Capacity: Gallons In Tanks or Compartments

Effluent Screen & Alarm (Y/N): Model/Type:

5. PUMP TANK SIZING

Pump Tank 1 Capacity (Minimum):	2000 Gal	Pump Tank 2 Capacity (Minimum):	Gal
Pump Tank 1 Capacity (Recommended):	0 Gal	Pump Tank 2 Capacity (Recommended):	Gal
Pump 1	27.0 GPM Total Head 16.6 ft	Pump 2	GPM Total Head ft
Supply Pipe Dia.	2.00 in Dose Vol: 73.0 gal	Supply Pipe Dia.	Dose Vol: Gal

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

6. SYSTEM AND DISTRIBUTION TYPE

Project ID:

Soil Treatment Type:	Mound	Distribution Type:	Pressure Distribution-Level
Elevation Benchmark:	100 ft	Benchmark Location:	TOP OF FOOTING
MPCA System Type:	Type III	Distribution Media:	Registered Product:
Type III/IV Details:			INFILTRATOR STANDARD

7. SITE EVALUATION SUMMARY:

Describe Limiting Condition: Redoximorphic Features/Saturated Soils

Layers with >35% Rock Fragments? (yes/no) No If yes, describe below: % rock and layer thickness, amount of soil credit and any additional information for addressing the rock fragments in this design.

Note:

	Depth		Depth		Elevation	
Limiting Condition:	0	inches	0.0	ft	99.1	ft
Minimum Req'd Separation:	36	inches	3.0	ft		
					Elevation	
Code Max System Depth:	Mound	inches	-3.0	ft	102.1	ft

Critical for system compliance

This is the maximimum depth to the bottom of the distribution media. Negative Depth (ft) means it must be a mound.

Soil Texture:	Silt Loam		
Soil Hyd. Loading Rate:	0.50 GPD/ft^2	Percolation Rate:	MPI
Contour Loading Rate:	11	Note:	
Measured Land Slope:	0.0 %	Note:	
Comments:			

8. SOIL TREATMENT AREA DESIGN SUMMARY

Trench:

Dispersal Area	ft^2	Sidewall Depth	in	Trench Width	ft
Total Lineal Feet	ft	No. of Trenches		Code Max. Trench Depth	in
Contour Loading Rate	ft	Min. Length	ft	Designed Trench Depth	in

Bed:

Dispersal Area	ft^2	Sidewall Depth	in	Maximum Bed Depth	in
Bed Width	ft	Bed Length	ft	Designed Bed Depth	in

Mound:

Dispersal Area	375.0	ft^2	Bed Length	37.5	ft	Bed Width	10.0 ft
Absorption Width	18.0	ft	Clean Sand Lift	3.0	ft	Berm Width (0-1%)	18.0 ft
Upslope Berm Width	5.0	ft	Downslope Berm	5.0	ft	Endslope Berm Width	2.0 ft
Total System Length	40.0	ft	System Width	18.0	ft	Contour Loading Rate	12.0 gal/ft

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

Project ID: #REF!

At-Grade:

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

Level & Equal Pressure Distribution

No. of Laterals	3		Perforation Spacing	3	ft	Perforation Diameter	1/4	in
Lateral Diameter	2.00	in	Min Dose Volume	69	gal	Max Dose Volume	113	gal

Non-Level and Unequal Pressure Distribution

	Elevation (ft)	Pipe Size (in)	Pipe Volume (gal/ft)	Pipe Length (ft)	Perf Size (in)	Spacing (ft)	Spacing (in)
Lateral 1							
Lateral 2							
Lateral 3							
Lateral 4							
Lateral 5							
Lateral 6							

Minimum Dose Volume: _____ gal

Maximum Dose Volume: _____ gal

9. Additional Info for At-Risk, HSW or Type IV Design

A. Starting BOD Concentration = Design Flow X Starting BOD (mg/L) X 8.35 ÷ 1,000,000

_____ gpd X _____ mg/L X 8.35 ÷ 1,000,00 = _____ lbs. BOD/day

B. Target BOD Concentration = Design Flow X Target BOD (mg/L) X 8.35 ÷ 1,000,000

_____ gpd X _____ mg/L X 8.35 ÷ 1,000,00 = _____ lbs. BOD/day

Lbs. BOD To Be Removed: _____

PreTreatment Technology: _____ *Must Meet or Exceed Target

Disinfection Technology: _____ *Required for Levels A & B

C. Organic Loading to Soil Treatment Area:

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

10. Comments/Special Design Considerations:

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

KEVIN HERWIG		1472	8/8/2019
(Designer)	(Signature)	(License #)	(Date)

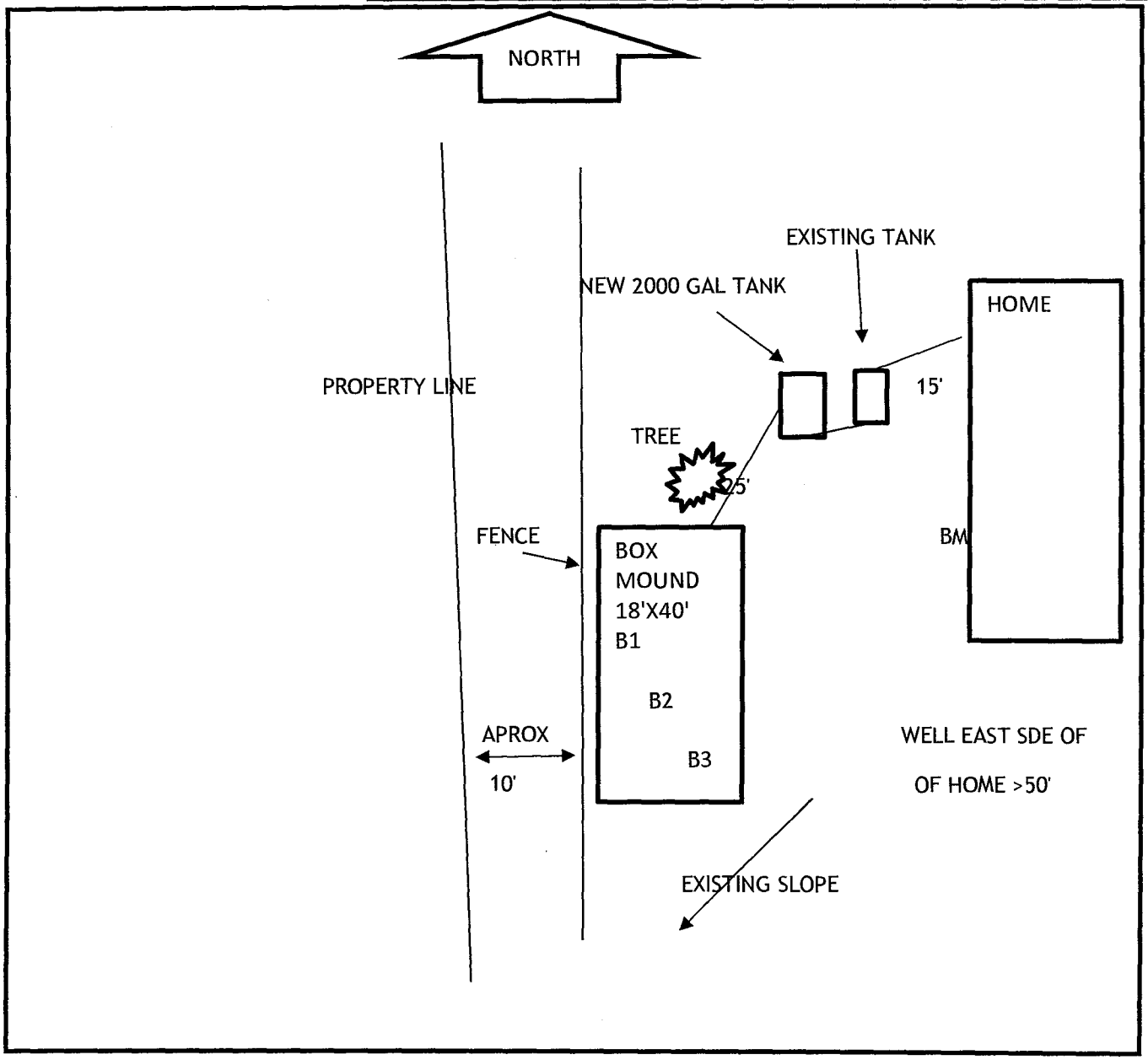
University of Minnesota Onsite Sewage Treatment Program

Proposed Design Map

Minnesota Pollution Control Agency

Contact Information | Project ID: | v 04.02.2019

Property Owner/Client: MILLE LACS BAND OF OJIBWE



Map scale: NONE ☑ Indicated north ☐ Show slope/contours

Elevations in feet

System Corners:

NW:	99.43	ft
NE:	99.47	ft
SW:	99.12	ft
SE:	99.26	ft

Soil Borings:

#1:	99.27	ft
#2:	99.28	ft
#3:	99.33	ft

Tank Outlet: 96.96 ft

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Mound Design Worksheet
<1% Slope

MINNESOTA POLLUTION CONTROL AGENCY

1. SYSTEM SIZING: Project ID: v 04.02.2019

A. Design Flow :	450	GPD
B. Soil Loading Rate:	0.50	GPD/ft^2
C. Depth to Limiting Condition:	0.0	ft
D. Percent Land Slope:	0.0	%
E. Design Media Loading Rate:	1.2	GPD/ft^2
F. Mound Absorption Ratio:	2.50	

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: Absorption Area Loading Rate (gpd/ft^2)	Treatment Level C: Mound Absorption Ratio	Treatment Level A, A-2, B: Absorption Area Loading Rate (gpd/ft^2)	Treatment Level A, A-2, B: 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	1.6	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 = 290 ft^2 REDUCED SIZE TYPE III

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

B. Enter Dispersal Bed Width: _____ REDUCED SIZE BOX MOUND

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

_____ ft^2 X _____ GPD/ft^2 = _____ gal/ft *Can not exceed Table 1*

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

_____ ft^2 ÷ _____ ft = 18.0 ft

3. ABSORPTION AREA SIZING

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

_____ ft X _____ = 18.0 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

(18.0 ft - 8.0 ft) ÷ 2 = 5.0 ft

4. DISTRIBUTION MEDIA: ROCK

Project ID: #REF!

A. Rock Depth Below Distribution Pipe

[ ] in [ ] ft

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

A. Enter Dispersal Media: QUICK 4 STANDARD

B. Enter the Component: Length: 4 ft Width: 2.75 ft Depth: 0.66 ft

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

36 ft ÷ 4 ft = 9 components/row

Check registered product information for specific application and design

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

9 components X 4.0 ft = 36.0

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

8 ft ÷ 3 ft = 3.0 rows *Adjust width so this is a whole number.*

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

9 X 3 = 27 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 - [ ] ft = 3.0 ft Design Sand Lift (optional): [ ] ft

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

3.0 ft + 0.66 ft + 1.50 ft = 5.2 ft

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

5.2 ft X 1.0 ft = 5.2 ft

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

5.0 ft + 8.0 ft + 5.0 ft = 18.0 ft

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

18.0 ft - 18.0 ft = 0.00 ft if number is negative (<0), value is **ZERO**

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

0.00 ft + 18.0 ft = 18.0 ft

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

18.0 ft + [ ] ft + 18.0 ft = 18.0 ft

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

2.0 ft + 36.0 ft + 2.0 ft = 40.0 ft

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

([ ] ft - [ ]) / 2 = [ ] ft

University of Minnesota Onsite Sewage Treatment Program

Pressure Distribution Design Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

Project ID: v 04.02.2019

1. Media Bed Width: 8 ft

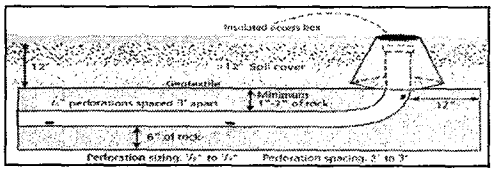
2. Minimum Number of Laterals in system/zone = Rounded up number of [(Media Bed Width - 4) ÷ 3] + 1.

[(8 - 4) ÷ 3] + 1 = 3 laterals *Does not apply to at-grades*

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

4. Select *Perforation Spacing*: 3.00 ft

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



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

36.0 - 2ft = 34.0 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 = 34.0 ft ÷ 3.0 ft = 11 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 = 11 Spaces + 1 = 12 Perfs. Per Lateral

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

1/4 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.*

12 Perf. Per Lat. X 3 Number of Perf. Lat. = 36 Total Number of Perf.

10. Spacing of laterals; Must be greater than 1 foot and no more than 3 feet: 3.0 ft

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

11. *Select Lateral Diameter (See Table)*: 2.00 in

University of Minnesota Onsite Sewage Treatment Program

Pressure Distribution Design Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

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)

8	ft	X	36	ft	=	288	ft²

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

288	ft²	÷	36	perforations	=	8.0	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.*

36	Perfs	X	0.74	GPM per Perforation =	27	GPM

16. *Volume of Liquid Per Foot of Distribution Piping (Table II)*: 0.170 Gallons/ft

17. *Volume of Distribution Piping* =

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

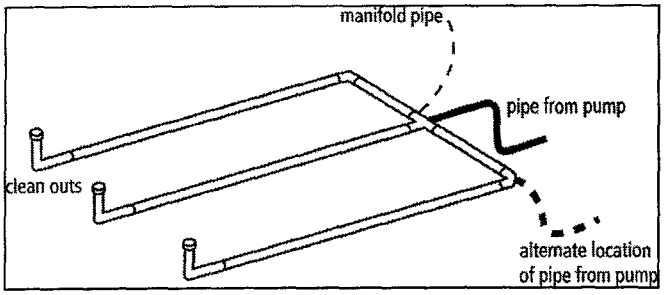
3	X	34	ft	X	0.170	gal/ft	=	17.3	Gallons

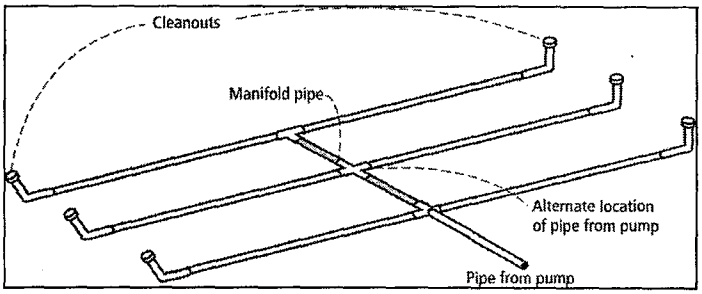
18. Minimum Delivered Volume = Volume of Distribution Piping X 4

17.3	gals	X	4	=	69.4	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:

Basic Pump Selection Design Worksheet

Onsite Sewage Treatment Program

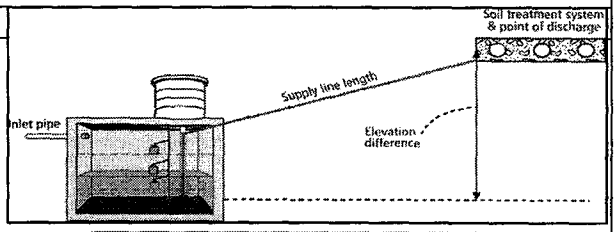
Minnesota Pollution Control Agency

1. PUMP CAPACITY Project ID: v 04.02.2019

Pumping to Gravity or Pressure Distribution: Pressure

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: 27.0 GPM
3. Enter pump description: Demand Dosing

2. HEAD REQUIREMENTS



A. Elevation Difference between pump and point of discharge: 11 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

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: 2.0 in

2. Supply Pipe Length: 25 ft

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

Friction Loss = 1.95 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

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 =

1.95 ft per 100ft X 31.3 ft ÷ 100 = 0.6 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)

11.0 ft + 5.0 ft + ____ ft + 0.6 ft = 16.6 ft

3. PUMP SELECTION

A pump must be selected to deliver at least **27.0** GPM (Line 1 or Line 2) with at least **16.6** feet of total head.

Comments:

Onsite Sewage Treatment Program

Pump Tank Design Worksheet (Time Dose)

MINNESOTA POLLUTION CONTROL AGENCY

DETERMINE TANK CAPACITY AND DIMENSIONS | Project ID: | v 04.02.2019

1. A. *Design Flow (Design Sum. 1A)*: 450 GPD B. Tank Use: Dosing
   C. 70% of Design Flow: 315 Gal
   D. Min. required pump tank capacity: 2000 Gal E. Recommended capacity: _____ Gal

2. A. Tank Manufacturer: CEMSTONE B. Tank Model: 9552000
   C. Capacity from manufacturer: 2000 Gallons
   D. Gallons per inch: 48.0 Gallons per inch
   E. Liquid depth of tank from manufacturer: 46.0 inches

Note: Design calculations are based an 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

3 Calculate *Volume to Cover Pump* (The inlet of pump should be 4 in from the bottom of the tank & 2 inches of water covering the pump is recommended)

(Pump and block height + 2 inches) X *Gallons Per Inch* (2D)

(12 in + 2 inches) X 48.1 Gallons Per Inch = 674 Gallons

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

-Item 18 of the Pressure Distribution or Item 11 of Non-level 69 Gallons (minimum dose) 1.4 inches/dose

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

Design Flow: 450 GPD X 0.25 = 113 Gallons (maximum dose) 2.3 inches/dose

6 *Select a pumpout volume that meets both Minimum and Maximum:* 73 Gallons

7 Calculate *Doses Per Day* = Design Flow X 70% ÷ *Delivered Volume*

315 gpd ÷ 73 gal = 3.0 *Doses*

8 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

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

73 gal + 4.3 gal = 77 Gallons

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

3 in X 48.1 gal/in = 144.4 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 FLOAT SETTINGS*

11. Required *Flow Rate*:

A. From Pump Curve - Must be Validated after Installation: 27 GPM

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

0.56 in X 48.0 gal/in ÷ 1 min = 26.9 GPM

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

12. Select Flow Rate from Line 11.A or 11.B above: 27.0 GPM*

13. Calculate **TIMER ON** setting:

Total Dosing Volume x GPM

77 gal x 27.0 gpm = 2.9 Minutes ON*

14. Calculate **TIMER OFF** setting:

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

1440 min ÷ 3 doses/day - 2.9 min = 473.9 Minutes OFF*

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

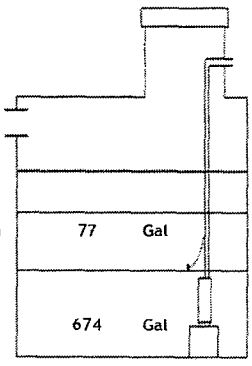
Distance to set Pump Off Float=Gallons to Cover Pump / Gallons Per Inch:

674 gal ÷ 48.0 gal/in = 14.0 Inches

16. Alarm Float - Measuring from bottom of tank (90% recommended):

Distance to set Alarm Float = Tank Depth X % of Tank Depth (0.9 recommended)

46.0 in X 0.9 = 41.4 in



TYPE III SEPTIC SYSTEM

THIS SEPTIC SYSTEM IS CLASSIFIED TYPE III DUE TO SOIL TYPE, CONDITION, AND REDUCED SIZING

TYPE III SYSTEMS ARE NOT WARRANTED BY THE DESIGNER, INSTALLER, OR THE LOCAL UNIT OF GOVERNMENT.

IF THE SYSTEM FAILS IT IS THE PROPERTY OWNERS RESPONSIBILTY TO HAVE THE SYSTEM REPAIRED AT THEIR EXPENSE.

A MANAGEMENT PLAN WILL BE PROVIDED WITH THE DESIGN

THE MANAGEMENT PLAN MUST BE FOLLOWED OR YOUR SYSTEM WILL BE IN NONCOMPLIANCE .

KEVIN HERWIG M.P.C.A. LIC# 1472

PROPERTY
OWNER_____DATE_____

MONITORING AND MITIGATION

SEPTIC SYSTEM CLASSIFIED AS TYPE III

Should the system failed a new site for the septic system may be considered or the owner agrees to repair the septic system if it is possible If the septic system is not repairable the homeowner agrees to disconnect the septic tanks from the septic system and use and maintain the septic tanks as holding tanks.

MILLE LACS BAND OF OJIBWE DNR and Kevin Herwig are to be notified as soon as possible about any operational problems. If a failure occurs the septic pump must be disconnected immediately and remain disconnected until any and all repairs are completed. A pumping contract will need to be set up with a septic maintenance contractor. A copy of all documents must be submitted to the county.

The system must be monitored for a minimum of three years. The mound system is to be inspected by the homeowner for leaks or saturated areas. Inspections are to be done every month for 36 months. Any leaks or failures in system must be reported to the county within 24 hours.

Any and all expenses are inspections, maintenance, or repair is the homeowner's responsibility.

I _____, property owner of 17423 VIRGO RD. ONAMIA Mn.

Hereby agree that as long as I am the owner of the property, to accept all legal and financial responsibility for future system repair and/or replacement expense in the event that failure of the system on the above referenced property occurs.

_____

Owner

_____

Date

Owners Septic System Management Plan

Date: _____

Property Address: 17423 VIRGO RD. ONAMIA MN.

Septic Systems can be an expensive investment, good maintenance will ensure they last a lifetime. The purpose of a septic system is to properly "decompose" the pollutants before the water is recycled back into the groundwater. If you're not taking this seriously, ask yourself where your well water comes from.

Your septic design lists all the components of your system and their location. Keep the design, this management plan and the UofM "Septic System Owners Guide" in a safe place for future reference. For a copy of the Owners guide call the University of MN at 1-800-876-8636.

Some of the following tasks you can do yourself, some require a professional, but is it YOUR responsibility to see that it gets done.

Homeowner Tasks

- Do your best to conserve water. Don't overload your septic with multiple large water uses at the same time or on the same day.
- Fix household leaks promptly (leaky toilet, dripping faucets).
- Limit bleach and anti-bacterial products. Use Biodegradable dishwasher detergent.
- Consider a lint filter on your clothes washer.
- Regularly check for wet or spongy soil around your drainfield.
- Have a septic professional check your tanks every 3 years to determine if they need pumping.
- If you have a septic tank filter (effluent filter) clean it on a regular basis (or have a professional do it).
- If a septic alarm goes off, call your septic professional to diagnose the problem.
- Notify the County/City/Township when this management plan is not being met.
- Be aware of and protect your secondary drainfield site.

Professional Tasks

- Disclose the location of the secondary drainfield (if applicable).
- Respond to alarms and diagnose problems as needed.
- Review water use with the owner, check for a "soggy" drainfield.
- Pump the septic tanks as needed and ensure they are in proper working order.
- Verify the pump, dose amount, HI Level Alarm & drainback are all working properly.

"As the owner, I understand it is my responsibility to properly operate and maintain this septic system".

Property Owner Signature: _____ **Date** _____