Septic System Management Plan Agreement

Property Owner: Cory Wensmann Phone: 3202327608 Date: 6-03-22

Site Address: _____ Parcel # 310451000

System Designer: Darrell Bacon Company Name: Big Stone Excavating License # 4018

Management Tasks—Listed below are the operating and management activities necessary to ensure the long-term performance of your septic system. The list includes responsibilities of the system owner and those of the system designer and or other septic system professionals. Certain management activities will require a licensed septic system professional.

Service Intervals—The system designer and Morrison County are providing recommended Service Intervals for your septic system.

- State Code requires "septic tank assessment" every 36 months
- Morrison County code requires "septic tank assessment" every 36 months
- System Designer recommends "septic tank assessment" every **24** months

  - If the assessment identifies a need for pumping and cleaning of your tanks it must be done by a licensed professional.

Seasonal Tasks—or several times per year:

- ✓ **Leaks.** Check (listen, look) for leaks in toilets and dripping faucets. Repair leaks promptly.
- ✓ **Surfacing sewage.** Regularly check for wet or spongy soil around your treatment area. If surfacing sewage or strong odors are not corrected by pumping the tank or fixing broken caps, call your service professional.
  - **Untreated sewage may make humans and animals sick.**
- ✓ **Alarms.** If there is an Alarm, the signal indicates there is a problem; contact your maintainer or a licensed septic system professional any time the alarm signals.
- ✓ **Lint filters.** If there is a lint filter, check for buildup and clean when necessary.
- ✓ **Effluent screen.** If there is an effluent screen, inspect and clean it twice a year or per manufacturer recommendations

Annual Tasks—or scheduled maintenance tasks:

- ✓ **Inspection Caps**. Check to make sure they are properly capped. Replace caps that are damaged.
- ✓ **Pumps and controls.** Check to make sure the pump and controls are operating correctly and inspect wiring for corrosion and function.
- ✓ **Event counter or water meter**. Monitor the average daily water use (if applicable).
- ✓ **Septic tank integrity.** Scheduling of pumping and cleaning of tanks at the recommended interval is very important.
  - This maintenance must be conducted through the manhole openings and include verification that tank and tank components are watertight and in good operating condition.

"*I understand it is task manager's responsibility* (property owner or contracted licensed maintainer) *to properly operate and maintain the sewage treatment system on this property, utilizing this Management Plan. If requirements of this Management Plan are not met, I (*a management professional*) will promptly notify Morrison County Planning & Zoning and take necessary corrective actions. If I* (property owner) *have a new system, I agree to adequately protect the reserve area for future use as a soil treatment system."*

Property Owner Signature: _____ Date: _____

Designer Signature: _____ Date: 6-03-22

Big Stone Excavating/Mark & Kody Throener/License # L4018

Morrison County P&Z Signature: Jeremy Bartkowicz Date: 13 June 2022

1500 gal 2 comp tank w/a 375 sq ft mound.

University of Minnesota Onsite Sewage Treatment Program

Preliminary Evaluation Worksheet

Minnesota Pollution Control Agency

1. Contact Information

v 04.01.2020

Property Owner/Client:	Cory Wensmann	Date Completed:	6/3/2022
Site Address:		Project ID:	
Email:		Phone:	3202327608
Mailing Address:	9281 hwy238 Bowlus MN 56314		
Legal Description:			

Parcel ID:	310451000	SEC:	36	TWP:	128	RNG:	031

2. Flow and General System Information

A. Client-Provided Information

Project Type: ☑ New Construction ☐ Replacement ☐ Expansion ☐ Repair

Project Use: ☑ Residential ☐ Other Establishment:

Residential use: # Bedrooms:	3	Dwelling Sq.ft.:		Unfinished Sq. Ft.:	
# Adults:	1	# Children:		# Teenagers:	
In-home business (Y/N):	No	If yes, describe:			

Water-using devices: *(check all that apply)*

☐ Garbage Disposal/Grinder	☑ Dishwasher	☐ Hot Tub*
☐ Sewage pump in basement	☑ Water Softener*	☐ Sump Pump*
☐ Large Bathtub >40 gallons	☐ Iron Filter*	☐ Self-Cleaning Humidifier*
☑ Clothes Washing Machine	☐ High Eff. Furnace*	☐ Other:

* Clear water source - should not go into system

Additional current or future uses:

Anticipated non-domestic waste:

The above is complete & accurate: ***Client signature & date***

B. Designer-determined flow Information

Attach additional information as necessary.

Design Flow:	GPD			Anticipated Waste Type:	
BOD:	mg/L	TSS	mg/L	Oil & Grease	mg/L

3. Preliminary Site Information

A. Water Supply Wells

#	Description	Mn. ID#	Well Depth (ft.)	Casing Depth (ft.)	Confining Layer	STA Setback	Source
1	no well yet						
2							
3							
4							

Additional Well Information:

University of Minnesota Onsite Sewage Treatment Program

Preliminary Evaluation Worksheet

Minnesota Pollution Control Agency

Site within 200' of noncommunity transient well (Y/N)	No	Yes, source:	
Site within a drinking water supply management area (Y/N)	No	Yes, source:	
Site in Well Head Protection inner wellhead management zone (Y/N)	No	Yes, source:	
Buried water supply pipes within 50 ft of proposed system (Y/N)	No		
B. Site located in a shoreland district/area?	No	Yes, name:	
Elevation of ordinary high water level:	ft	Source:	
Classification:	Tank Setback: ft.	STA Setbk: ft.	
C. Site located in a floodplain?		Yes, Type(s):	
Floodplain designation/elevation (10 Year):	ft	Source:	
Floodplain designation/elevation (100 Year):	ft	Source:	

D. Property Line Id / Source: ☑ Owner ☐ Survey ☑ County GIS ☐ Plat Map ☐ Other:

E. ID distance of relevant setbacks on map: ☐ Water ☐ Easements ☐ Well(s) ☐ Building(s) ☑ Property Lines ☐ OHWL ☐ Other:

4. Preliminary Soil Profile Information From Web Soil Survey (attach map & description)

Map Units: 200c Slope Range: 8 to 15 %

List landforms: hillslopes and moraines

Landform position(s): Shoulder

Parent materials: Till

Depth to Bedrock/Restrictive Feature: 24 in Depth to Watertable: in

Map Unit Ratings

Septic Tank Absorption Field- At-grade:	Slightly Limited
Septic Tank Absorption Field- Mound:	Extremely Limited
Septic Tank Absorption Field- Trench:	Slightly Limited

5. Local Government Unit Information

Name of LGU: morrison county

LGU Contact:

LGU-specific setbacks:

LGU-specific design requirements:

LGU-specific installation requirements:

Notes:

University of Minnesota Onsite Sewage Treatment Program

Field Evaluation Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

1. Project Information

v 04.01.2020

Property Owner/Client: Cory Wensmann | Project ID:

Site Address: | Date Completed: 6/3/2022

2. Utility and Structure Information

Utility Locations Identified ☐ Gopher State One Call # | ☐ Any Private Utilities:

Locate and Verify (*see Site Evaluation map*) ☐ Existing Buildings ☐ Improvements ☐ Easements ☐ Setbacks

3. Site Information

Vegetation type(s): Ag. Land | Landscape position: Shoulder

Percent slope: 2 % | Slope shape: Linear, Linear | Slope direction: north

Describe the flooding or run-on potential of site:

Describe the need for Type III or Type IV system:

Note:

Proposed soil treatment area protected? (Y/N): Yes | If yes, describe: flags

4. General Soils Information

Filled, Compacted, Disturbed areas (Y/N): No

If yes, describe:

Soil observations were conducted in the proposed system location (Y/N): Yes

A soil observation in the most limiting area of the proposed system (Y/N): Yes

Number of soil observations: 4 | Soil observation logs attached (Y/N): Yes

Percolation tests performed & attached (Y/N): No

5. Phase I. Reporting Information

	Depth		Elevation		
Limiting Condition*:	24	in	**95.0**	ft	**Most Restrictive Depth Identified from List Below*
Periodically saturated soil:		in		ft	Soil Texture: medium sandy loam
Standing water:		in		ft	Percolation Rate: min/inch
Bedrock:		in		ft	Soil Hyd Loading Rate: 0.68 gpd/ft^2
Benchmark Elevation:	100.0	ft			Elevations and Benchmark on map? (Y/N): Yes

Benchmark Elevation Location: site pad

Differences between soil survey and field evaluation:

Site evaluation issues / comments:

Anticipated construction issues:

University of Minnesota Onsite Sewage Treatment Program

Field Evaluation Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

1. Project Information

v 04.01.2020

Property Owner/Client: Cory Wensmann | Project ID:

Site Address: | Date Completed: 6/3/2022

2. Utility and Structure Information

Utility Locations Identified ☐ Gopher State One Call # | ☐ Any Private Utilities:

Locate and Verify (*see Site Evaluation map*) ☐ Existing Buildings ☐ Improvements ☐ Easements ☐ Setbacks

3. Site Information

Vegetation type(s): Ag. Land | Landscape position: Shoulder

Percent slope: 2 % | Slope shape: Linear, Linear | Slope direction: north

Describe the flooding or run-on potential of site:

Describe the need for Type III or Type IV system:

Note:

Proposed soil treatment area protected? (Y/N): Yes | If yes, describe: flags

4. General Soils Information

Filled, Compacted, Disturbed areas (Y/N): No

If yes, describe:

Soil observations were conducted in the proposed system location (Y/N): Yes

A soil observation in the most limiting area of the proposed system (Y/N): Yes

Number of soil observations: 4 | Soil observation logs attached (Y/N): Yes

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Standing water:		in		ft	Percolation Rate: min/inch
Bedrock:		in		ft	Soil Hyd Loading Rate: 0.68 gpd/ft^2
Benchmark Elevation:	100.0	ft			Elevations and Benchmark on map? (Y/N): Yes

Benchmark Elevation Location: site pad

Differences between soil survey and field evaluation:

Site evaluation issues / comments:

Anticipated construction issues:

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

Minnesota Pollution Control Agency

1. PROJECT INFORMATION

v 04.01.2020

Property Owner/Client:	Cory Wensmann	Project ID:	
Site Address:		Date:	06/03/22
Email Address:		Phone:	3202327608

2. DESIGN FLOW & WASTE STRENGTH

Attach data / estimate basis for Other Establishments

Design Flow: 450 GPD Anticipated Waste Type:

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 Tanks or Compartments

Recommended **Septic Tank** Capacity: 1000 Gallons in Tanks or Compartments

Effluent Screen & Alarm (Y/N): No Model/Type:

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):	Gal	Pump Tank 2 Capacity (Minimum):	Gal
Pump Tank 1 Capacity (Recommended):	Gal	Pump Tank 2 Capacity (Recommended):	Gal
Pump 1 GPM Total Head	ft	Pump 2 GPM Total Head	ft
Supply Pipe Dia. in Dose Vol:	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:	site pad
MPCA System Type:	Type I	Distribution Media:	Rock
Type III/IV Details:			

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 of Limiting Condition	
Limiting Condition:	24	inches	2.0	ft		ft
Minimum Req'd Separation:	36	inches	3.0	ft		
Code Max System Depth:	Mound	inches	-1.0	ft	Elevation 3.00	ft

Critical for system compliance

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

Soil Texture:	Loam		
Soil Hyd. Loading Rate:	0.60 GPD/ft^2	Percolation Rate:	MPI
Contour Loading Rate:	6	Note:	
Measured Land Slope:	2.0 %	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	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	20.0 ft	Clean Sand Lift	1.0 ft	Berm Width (0-1%)	10.0 ft
Upslope Berm Width	10.4 ft	Downslope Berm	14.0 ft	Endslope Berm Width	12.0 ft
Total System Length	61.5 ft	System Width	34.4 ft	Contour Loading Rate	12.0 gal/ft

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

Minnesota Pollution Control Agency

Project ID:

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	0		Perforation Spacing	0	ft	Perforation Diameter	0	in
Lateral Diameter	0.00	in	Min Dose Volume	0	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 ÷ 1,000,000 = _____ 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 ÷ 1,000,000 = _____ 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.

Kody Thrasher		4018	6-3-22
(Designer)	(Signature)	(License #)	(Date)

Mound Design Worksheet
≥1% Slope

University of Minnesota Onsite Sewage Treatment Program

Minnesota Pollution Control Agency

1. SYSTEM SIZING: Project ID: v 04.01.2020

A. Design Flow: 450 GPD

B. Soil Loading Rate: 0.60 GPD/ft^2

C. Depth to Limiting Condition 2.0 ft

D. Percent Land Slope: 2.0 %

E. Design Media Loading Rate: 1.2 GPD/ft^2

F. Mound Absorption Ratio: 2.00

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 ÷ Design Media Loading Rate

450 GPD ÷ 1.2 GPD/ft^2 = 375 ft^2

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

B. Enter Dispersal Bed Width: 10.0 ft *Can not exceed 10 feet*

C. Calculate Contour Loading Rate: Bed Width X Design Media Loading Rate

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 ÷ Bed Width

375 ft^2 ÷ 10.0 ft = 37.5 ft

3. ABSORPTION AREA SIZING

A. Calculate Absorption Width: Bed Width X Mound Absorption Ratio

10.0 ft X 2.0 = 20.0 ft

B. For slopes >1%, the Absorption Width is measured downhill from the upslope edge of the Bed.

Calculate Downslope Absorption Width: Absorption Width - Bed Width

20.0 ft - 10.0 ft = 10.0 ft

4. DISTRIBUTION MEDIA: ROCK Project ID:

A. Rock Depth Below Distribution Pipe

6 in 0.50 ft

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

Check registered product information for specific application details and design

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

[ ] components **X** [ ] ft = [ ]

E. Number of Rows = Bed Width divided by Component Width (Round up)

[ ] ft ÷ [ ] ft = [ ] rows *Adjust width so this is a whole number.*

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

[ ] X [ ] = [ ] components

6. MOUND SIZING

A. Clean Sand Lift: Required Separation - 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 Height: Clean Sand Lift + Depth of Media +Depth to Cover Pipe+ Depth of Cover (1 ft)

1.0 ft + 0.50 ft + 0.3 ft + 1.0 ft = 2.8 ft

Land Slope %		0	1	2	3	4	5	6	7	8	9	10	11	12
Upslope Berm Ratio	3:1	3.00	2.91	2.83	2.75	2.68	2.61	2.54	2.48	2.42	2.36	2.31	2.26	2.21
	4:1	4.00	3.85	3.70	3.57	3.45	3.33	3.23	3.12	3.03	2.94	2.86	2.78	2.70

C. Select Upslope Berm Multiplier (based on land slope): 3.70

D. Calculate Upslope Berm Width: Multiplier X Upslope Mound Height

3.70 ft X 2.8 ft = 10.4 ft

E. Calculate Drop in Elevation Under Bed: Bed Width X Land Slope ÷ 100 = Drop (ft)

10.0 ft X 2.0 % ÷ 100 = 0.20 ft

F. Calculate Downslope Mound Height: Upslope Height + Drop in Elevation

2.8 ft + 0.20 ft = 3.0 ft

Land Slope %		0	1	2	3	4	5	6	7	8	9	10	11	12
Downslope Berm Ratio	3:1	3.00	3.09	3.19	3.30	3.41	3.53	3.66	3.80	3.95	4.11	4.29	4.48	4.69
	4:1	4.00	4.17	4.35	4.54	4.76	5.00	5.26	5.56	5.88	6.25	6.67	7.14	7.69

G. Select Downslope Berm Multiplier (based on land slope): 4.35

H. Calculate Downslope Berm Width: Downslope Multiplier X Downslope Height

4.35 x 3.0 ft = 13.1 ft

I. Calculate Minimum Berm to Cover Absorption Area: Downslope Absorption Width + 4 feet

10.0 ft + 4 ft = 14.0 ft

J. Design Downslope Berm = greater of 4H and 4I: 14.0 ft

K. Select Endslope Berm Multiplier: 4.00 *(usually 3.0 or 4.0)*

L. Calculate Endslope Berm X Downslope Mound Height = Endslope Berm Width

4.00 ft X 3.0 ft = 12.0 ft

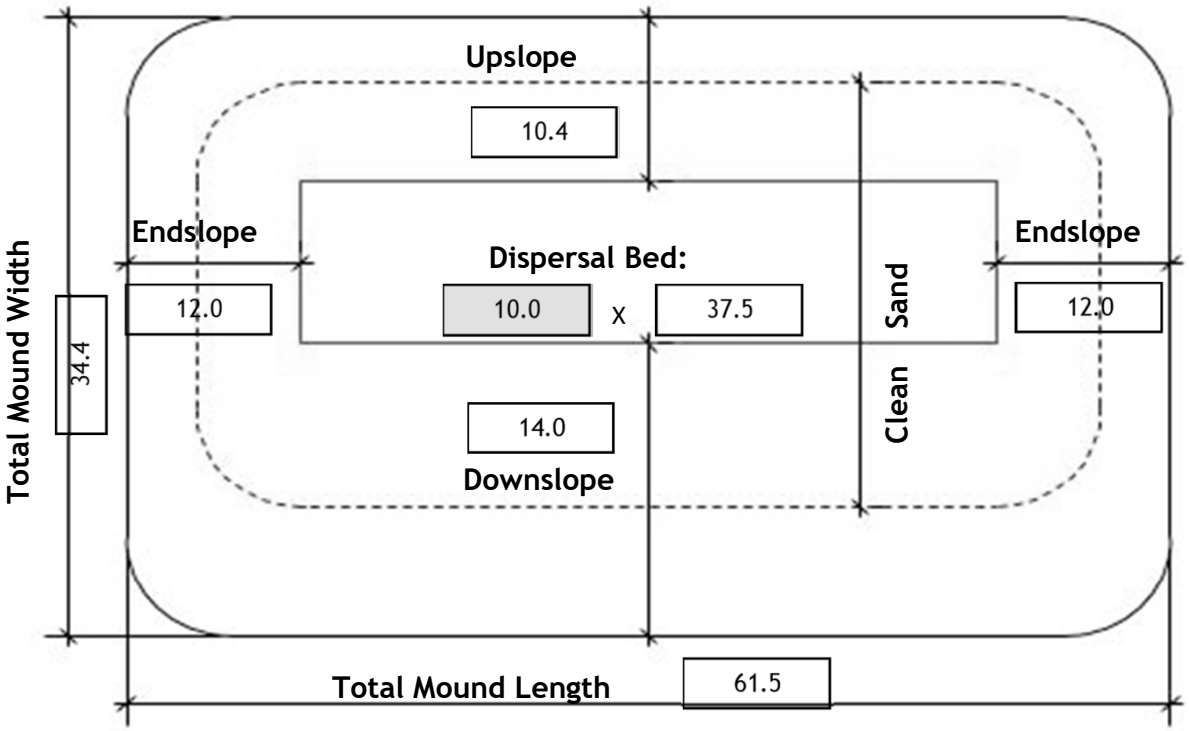
M. Calculate Mound Width: Upslope Berm Width + Bed Width + Downslope Berm Width

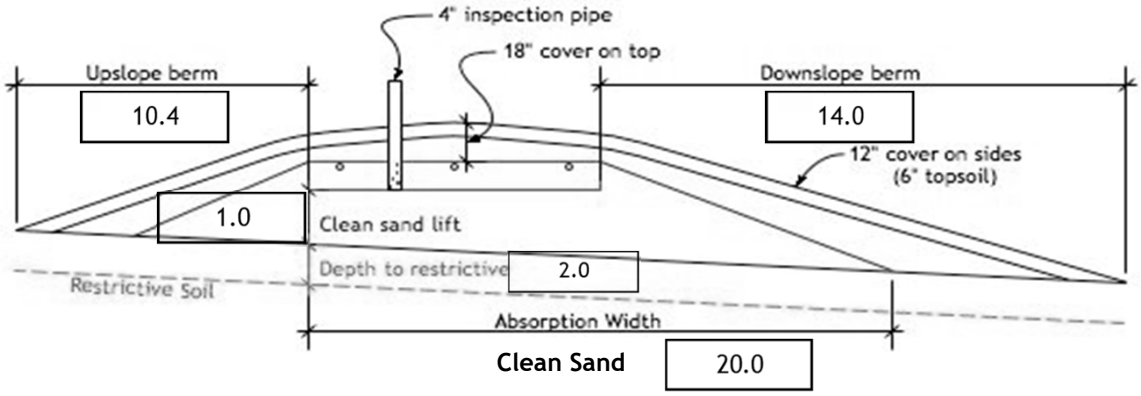
10.4 ft + 10.0 ft + 14.0 ft = 34.4 ft

N. Calculate Mound Length: Endslope Berm Width + Bed Length + Endslope Berm Width

12.0 ft + 37.5 ft + 12.0 ft = 61.5 ft

7. MOUND DIMENSIONS Project ID:





Comments:

University of Minnesota Onsite Sewage Treatment Program

Mound Materials Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

Project ID:

v 04.01.2020

A. Rock *Volume* : (Rock Below Pipe + Rock to cover pipe (*pipe outside dia + ~2 inch)*) X *Bed Length* X *Bed Width* = *Volume*

(6 in + 4.0 in) ÷ 12 X 37.5 ft X 10.0 ft = 312.5 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 312.5 ft^3 ÷ 27 = 11.6 yd^3

Add 30% for constructability: 11.6 yd^3 X 1.3 = 15.0 yd^3

B. Calculate *Clean Sand Volume:*

Volume Under Rock bed : *Average Sand Depth* x *Media Width* x *Media Length* = cubic feet

1.0 ft X 10.0 ft X 37.5 ft = 375.0 ft^3

For a Mound on a slope from 0-1%

Volume from Length = ((Upslope Mound Height - 1) X Absorption Width Beyond Bed X Media Bed Length)

2.00 ft - 1) X 5.00 X 37.5 ft = 187.50

Volume from Width = ((Upslope Mound Height - 1) X Absorption Width Beyond Bed X Media Bed Width)

2.00 ft - 1) X 5.00 X 10 ft = 50.00

Total Clean Sand Volume : *Volume from Length + Volume from Width + Volume Under Media*

187.5 ft^3 + 50.0 ft^3 + 375 ft^3 = 612.5 ft^3

For a Mound on a slope greater than 1%

Upslope Volume : ((*Upslope Mound Height - 1*) x 3 x *Bed Length*) ÷ 2 = cubic feet

((2.8 ft - 1) X 3.0 ft X 37.5) ÷ 2 = 101.3 ft^3

Downslope Volume : ((*Downslope Height - 1)* x Downslope Absorption Width x *Media Length*) ÷ 2 = cubic feet

((3.0 ft - 1) X 10.0 ft X 37.5) ÷ 2 = 375.0 ft^3

Endslope Volume : (*Downslope Mound Height - 1)* x 3 x *Media Width* = cubic feet

(3.0 ft - 1) X 3.0 ft X 10.0 ft = 60.0 ft^3

Total Clean Sand Volume : *Upslope Volume* + *Downslope Volume* + *Endslope Volume* + *Volume Under Media*

101.3 ft^3 + 375.0 ft^3 + 60.0 ft^3 + 375.0 ft^3 = 911.3 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 911.3 ft^3 ÷ 27 = 33.8 yd^3

Add 30% for constructability: 33.8 yd^3 X 1.3 = 43.9 yd^3

C. Calculate *Sandy Berm Volume:*

Total Berm Volume (approx) : ((Avg. Mound Height - 0.5 ft topsoil) x Mound Width x Mound Length) ÷ 2

(2.9 - 0.5)ft X 34.4 ft X 61.5) ÷ 2 = 2535.8 ft^3

Total Mound Volume - Clean Sand volume -Rock Volume = cubic feet

2535.8 ft^3 - 911.3 ft^3 - 312.5 ft^3 = 1312.0 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 1312.0 ft^3 ÷ 27 = 48.6 yd^3

Add 30% for constructability: 48.6 yd^3 x 1.3 = 63.2 yd^3

D. Calculate *Topsoil Material Volume: Total Mound Width X Total Mound Length X .5 ft*

34.4 ft X 61.5 ft X 0.5 ft = 1056.6 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 1056.6 ft^3 ÷ 27 = 39.1 yd^3

Add 30% for constructability: 39.1 yd^3 x 1.3 = 50.9 yd^3

University of Minnesota Onsite Sewage Treatment Program

Pressure Distribution Design Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

Project ID: v 04.01.2020

1. Media Bed Width: 10 ft

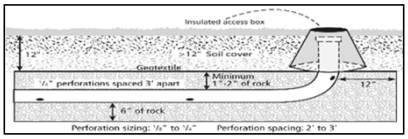
2. Minimum Number of Laterals in system/zone = Rounded up number of [(Media Bed Width - 4) ÷ 3] + 1.

[(10 - 4) ÷ 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.

37.5 - 2ft = 35.5 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 = 35.5 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

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

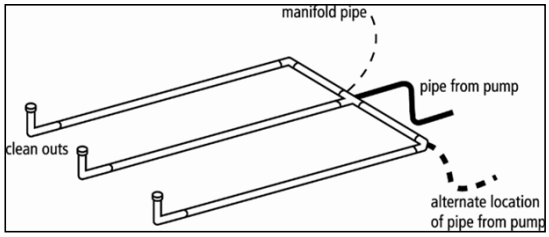
Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3
2	11	16	21	34	68
2½	10	14	20	32	64
3	9	14	19	30	60

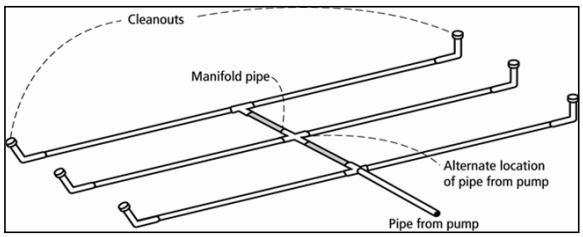
3/16 Inch Perforations

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.*

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: 2.0 ft

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

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

Pressure Distribution Design Worksheet

13. 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 =	375	ft^2

b. *Square Foot per Perforation* = *Bed Area* ÷ by the *Total Number of Perfs*

375	ft^2 ÷		36	perf =	10.4	ft^2/perf

14. Select *Minimum Average Head* : 1.0 ft

15. Select *Perforation Discharge* based on Table: 0.74 GPM per Perf

16. *Flow Rate* = *Total Number of Perfs X Perforation Discharge.*

36	Perfs	X	0.74	GPM per Perforation =	27 GPM

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

18. *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	0.170	gal/ft =	18.1 Gallons

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

18.1	gals	X	4	= 72.4 Gallons

Perforation Discharge (GPM)

Head (ft)	Perforation Diameter 1/8	3/16	7/32	1/4
1.0[a]	0.18	0.41	0.56	0.74
1.5	0.22	0.51	0.69	0.9
2.0[b]	0.26	0.59	0.80	1.04
2.5	0.29	0.65	0.89	1.17
3.0	0.32	0.72	0.98	1.28
4.0	0.37	0.83	1.13	1.47
5.0[c]	0.41	0.93	1.26	1.65

1 foot	Dwellings with 3/16 inch to 1/4 inch perforations
2 feet	Dwellings with 1/8 inch perforations
	Other establishments and MSTS with 3/16 inch to 1/4 inch perforations
5 feet	Other establishments and MSTS with 1/8 inch perforations

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

University of Minnesota Onsite Sewage Treatment Program

Minnesota Pollution Control Agency

1. PUMP CAPACITY Project ID: v 04.01.2020

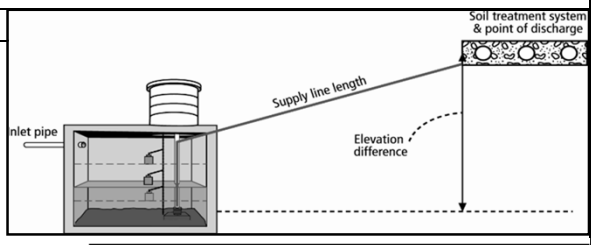
Pumping to Gravity or Pressure Distribution: Pressure

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

B. If pumping to a pressurized distribution system: 27.0 GPM

C. Enter pump description: Demand Dosing

2. HEAD REQUIREMENTS



A. Elevation Difference between pump and point of discharge: 7 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: 20 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* X 1.25 = *Equivalent Pipe Length*

20 ft X 1.25 = 25.0 ft

G. Calculate *Supply Friction Loss* by multiplying *Friction Loss Per 100ft* by the *Equivalent Pipe Length* and divide by 100.

Supply Friction Loss =

1.95 ft per 100ft X 25.0 ft ÷ 100 = 0.5 ft

H. *Total Head* requirement is the sum of the *Elevation Difference* + Distribution Head Loss, + Additional Head Loss + Supply Friction Loss

7.0 ft + 5.0 ft + _____ ft + 0.5 ft = 12.5 ft

3. PUMP SELECTION

A pump must be selected to deliver at least **27.0** GPM with at least **12.5** feet of total head.

Comments:

Pump Tank Design Worksheet (Demand Dose)

DETERMINE TANK CAPACITY AND DIMENSIONS — Project ID: — v 04.01.2020

1. A. *Design Flow (Design Sum.1A)*: 450 GPD — C. Tank Use:
   B. Min. required pump tank capacity: 500 Gal — D. Recommended pump tank capacity: Gal

2. A. Tank Manufacturer: bw — B. Tank Model:
   C. Capacity from manufacturer: 504 Gallons
   D. Gallons per inch from manufacturer: 11.0 Gallons per inch
   E. Liquid depth of tank from manufacturer: 46.0 inches

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

DETERMINE DOSING VOLUME

3 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*

(4 in + 2 inches) X 11.0 Gallons Per Inch = 66 Gallons

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

-Item 18 of the Pressure Distribution or Item 11 of Non-level 72 **Gallons (Minimum dose)** 6.6 inches/dose

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

Design Flow: 450 GPD X 0.25 = 113 **Gallons (Maximum dose)** 10.2 inches/dose

6 *Select a pumpout volume that meets both Minimum and Maximum:* 90 Gallons

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

450 gpd ÷ 90 gal = 5.00 *Doses*

8 Calculate Drainback:

A. *Diameter of Supply Pipe* = 2 inches

B. Length of Supply Pipe = 20 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*

20 ft X 0.170 gal/ft = 3.4 Gallons

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

90 gal + 3.4 gal = 93 Gallons

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

2 in X 11.0 gal/in = 22.0 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

DEMAND DOSE FLOAT SETTINGS

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

Total Dosing Volume /Gallons Per Inch

93 gal ÷ 11.0 gal/in = 8.5 Inches

12. Measuring from bottom of tank:

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

4 in + 2 in = 6 Inches

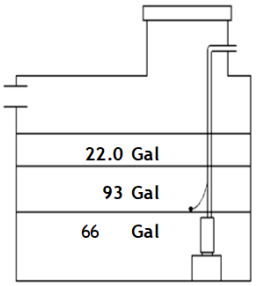
B. *Distance to set Pump On Float=Distance to Set Pump-Off Float* + *Float Separation Distance*

6 in + 8.5 in = 14 Inches

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

14 in + 2.0 in = 16 Inches

Inches for Dose:	8.5	in
Alarm Depth	16.5	in
Pump On	14.5	in
Pump Off	6.0	in



University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.01.2020

Client:	Cory Wensmann			Location / Address:	

Soil parent material(s): (Check all that apply) ☐ Outwash ☐ Lacustrine ☐ Loess ☑ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter

Landscape Position: (select one)	Shoulder	Slope %:	2.0	Slope shape	Linear, Linear	Elevation-relative to benchmark:	100.0
Vegetation:	Ag. Land	Soil survey map units:	200c			Limiting Layer Elevation:	95
Weather Conditions/Time of Day:	sunny 65	1:00		Date	06/03/22		
Observation #/Location:	1			Observation Type:	Pit		

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0"to8"	Sandy Loam	<35%	10YR 2/2				Granular	Weak	Friable
8"to24"	Sandy Loam	<35%	10YR 4/4				Platy	Weak	Friable
24"	Sandy Loam	<35%	10YR 4/4	7.5YR 5/4	Concentrations	S1	Platy	Moderate	Friable

Comments

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

Kody Throener	Kody Throener	4018	6/3/2022
(Designer/Inspector)	(Signature)	(License #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.01.2020

Client:	Cory Wensmann			Location / Address:	

Soil parent material(s): (Check all that apply) ☐ Outwash ☐ Lacustrine ☐ Loess ☑ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter

Landscape Position: (select one)	Shoulder	Slope %:	2.0	Slope shape	Linear, Linear	Elevation-relative to benchmark:	100.0
Vegetation:	Ag. Land	Soil survey map units:	200c			Limiting Layer Elevation:	95
Weather Conditions/Time of Day:	sunnny 65	1:00		Date	06/03/22		
Observation #/Location:	2			Observation Type:	Pit		

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0"to9"	Sandy Loam	<35%	10YR 2/2				Granular	Weak	Friable
9"to 25"	Sandy Loam	<35%	10YR 4/4				Platy	Weak	Friable
25"	Sandy Loam	<35%	10YR 4/4	7.5YR 5/4	Concentrations	S1	Platy	Moderate	Friable

Comments	

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Kody Throener		4018	6/3/2022
(Designer/Inspector)	(Signature)	(License #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.01.2020

Client:	Cory Wensmann			Location / Address:	

Soil parent material(s): (Check all that apply) ☐ Outwash ☐ Lacustrine ☐ Loess ☑ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter

Landscape Position: (select one)	Shoulder	Slope %:	2.0	Slope shape	Linear, Linear	Elevation-relative to benchmark:	100.0
Vegetation:	Ag. Land	Soil survey map units:	200c			Limiting Layer Elevation:	95
Weather Conditions/Time of Day:	sunny 65	1:00		Date	06/03/22		
Observation #/Location:	3			Observation Type:	Pit		

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0"to7"	Sandy Loam	<35%	10YR 2/2				Granular	Weak	Friable
7"to26"	Sandy Loam	<35%	10YR 4/4				Platy	Weak	Friable
26"	Sandy Loam	<35%	10YR 4/4	7.5YR 5/4	Concentrations	S1	Blocky	Moderate	Friable

Comments

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Kody Throener		4018	6/3/2022
(Designer/Inspector)	(Signature)	(License #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.01.2020

Client:	Cory Wensmann			Location / Address:	

Soil parent material(s): (Check all that apply) ☐ Outwash ☐ Lacustrine ☐ Loess ☑ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter

Landscape Position: (select one)	Shoulder	Slope %:	2.0	Slope shape	Linear, Linear	Elevation-relative to benchmark:	100.0
Vegetation:	Ag. Land	Soil survey map units:	200c			Limiting Layer Elevation:	95
Weather Conditions/Time of Day:	sunny 65	1:00		Date	06/03/22		
Observation #/Location:	4			Observation Type:	Pit		

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0"to7"	Sandy Loam	<35%					Granular	Weak	Friable
7"to24"	Sandy Loam	<35%					Platy	Weak	Friable
24"	Sandy Loam	<35%	10YR 4/4	7.5YR 5/4	Concentrations	S1	Platy	Moderate	Friable

Comments

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Kody Throener	Kody Thr	4018	6/3/2022
(Designer/Inspector)	(Signature)	(License #)	(Date)

Textures:	
C	Clay
SiC	Silty Clay
SC	Sandy Clay
CL	Clay Loam
SiCL	Silty Clay Loam
SCL	Sandy Clay Loam
Si	Silt
SiL	Silt Loam
L	Loam
SL	Sandy Loam*
LS	Loamy Sand*
S	Sand*

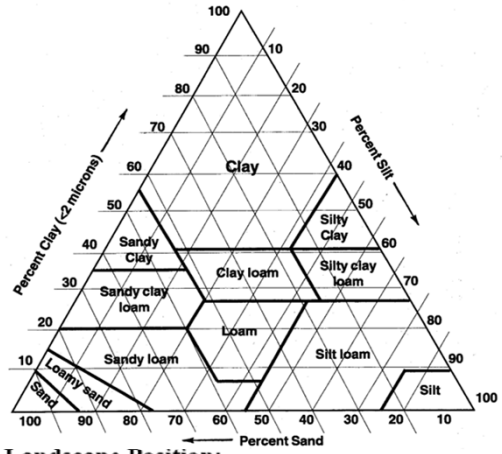
*Sand Modifiers:	
Co	Coarse
M	Medium
F	Fine
VF	Very Fine

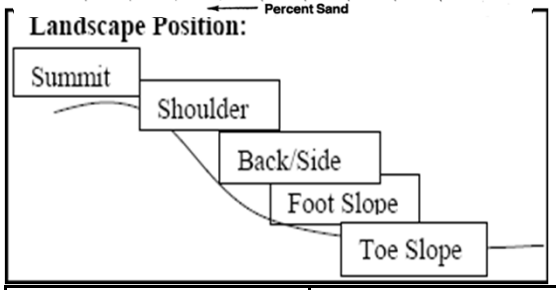
Topsoil Indicator(s) of Saturation:

T1. Wetland Vegetation
T2. Depressional Landscape
T3. Organic texture or organic modifiers
T4. N 2.5/ 0 color
T5. Redox features in topsoil
T6. Hydraulic indicators

Subsoil Indicator(s) of Saturation:

S1. Distinct gray or red redox features
S2. Depleted matrix (value >/=4 and chroma </=2)
S3. 5Y chroma </= 3
S4. 7.5 YR or redder faint redox concentrations or redox depletions



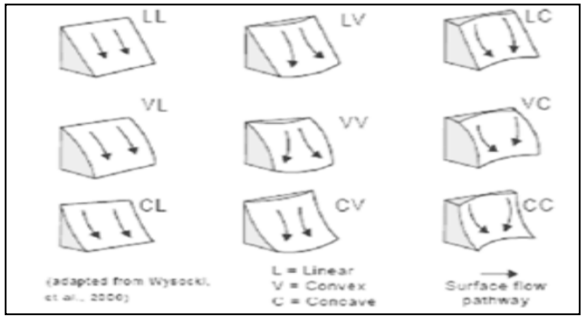


Shape:

Granular	The peds are approximately spherical or polyhedral and are commonly found in topsoil. These are the small, rounded peds that hang onto roots when soil is turned over.
Platy	The peds are flat and plate like. They are oriented horizontally and are usually overlapping. Platy structure is commonly found in forested areas just below the leaf litter or shallow topsoil.
Blocky	The peds are block-like or polyhedral, and are bounded by flat or slightly rounded surface that are castings of the faces of surrounding peds. Blocky structure is commonly found in the lower topsoil and subsoil.
Prismatic	Flat or slightly rounded vertical faces bound the individual peds. Peds are distinctly longer vertically, and faces are typically casts or molds of adjoining peds. Prismatic structure is commonly found in the lower subsoil.
Single Grain	The structure found in a sandy soil. The individual particles are not held together.

Slope Shape:

Slope shape is described in two directions:
up and down slope (perpendicular to the contour),
and across slope (along the horizontal contour);
e.g. Linear, Convex or LV'.

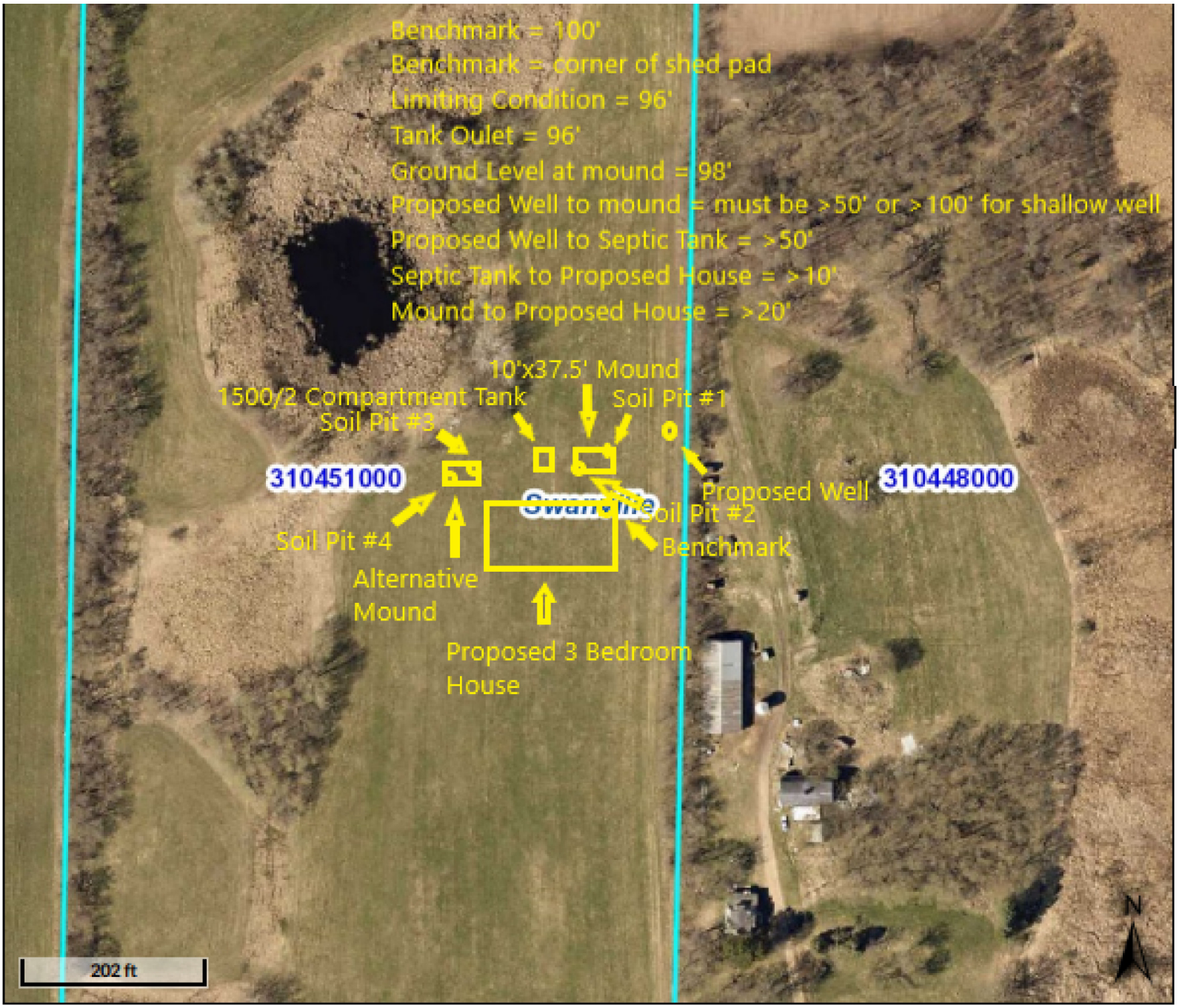


Grade:

Loose	No peds, sandy soil
Weak	Poorly formed, indistinct peds, barely observable in place
Moderate	Well formed, distinct peds, moderately durable and evident, but not distinct in undisturbed soil
Strong	Durable peds that are quite evident in un-displaced soil, adhere weakly to one another, withstand displacement, and become separated when soil is disturbed
Massive	No observable aggregates, or no orderly arrangement of natural lines of weakness

Consistence:

Loose	Intact specimen not available
Friable	Slight force between fingers
Firm	Moderate force between fingers
Extremely Firm	Moderate force between hands or slight foot pressure
Rigid	Foot pressure


Benchmark = 100'
Benchmark = corner of shed pad
Limiting Condition = 96'
Tank Oulet = 96'
Ground Level at mound = 98'
Proposed Well to mound = must be >50' or >100' for shallow well
Proposed Well to Septic Tank = >50'
Septic Tank to Proposed House = >10'
Mound to Proposed House = >20'
10'x37.5' Mound
1500/2 Compartment Tank
Soil Pit #1
Soil Pit #3
310451000
310448000
Proposed Well
Soil Pit #2
Soil Pit #4
Benchmark
Alternative Mound
Proposed 3 Bedroom House
202 ft
N