

Septic System Management Plan Agreement

Property Owner: Joseph Fuchs Phone: _____ Date: 8/29/21

Site Address: 3198 450TH ST Freeport MN Parcel # 100519000

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: Kody Throener Date: 9-12-21
Big Stone Excavating/Mark & Kody Throener/License # L4018

Morrison County P&Z Signature: Jeremy Bartkovicz Date: 10/15/2021

2250 2 comp tank w/a 500 sq ft mound

1. Contact Information

v 04.01.2020

Property Owner/Client: Date Completed:

Site Address: Project ID:

Email: Phone:

Mailing Address:

Legal Description:

Parcel ID: SEC: TWP: RNG:

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: Dwelling Sq.ft.: Unfinished Sq. Ft.:

Adults: # Children: # Teenagers:

In-home business (Y/N): If yes, describe:

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

<input type="checkbox"/> Garbage Disposal/Grinder	<input checked="" type="checkbox"/> Dishwasher	<input type="checkbox"/> Hot Tub*
<input checked="" type="checkbox"/> Sewage pump in basement	<input checked="" type="checkbox"/> Water Softener*	<input type="checkbox"/> Sump Pump*
<input type="checkbox"/> Large Bathtub >40 gallons	<input type="checkbox"/> Iron Filter*	<input type="checkbox"/> Self-Cleaning Humidifier*
<input type="checkbox"/> Clothes Washing Machine	<input type="checkbox"/> High Eff. Furnace*	<input type="checkbox"/> Other: <input type="text"/>

* 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							
2							
3							
4							

Additional Well Information:

Preliminary Evaluation Worksheet

Site within 200' of noncommunity transient well (Y/N)	<input type="text" value="No"/>	Yes, source: <input style="width: 100%;" type="text"/>
Site within a drinking water supply management area (Y/N)	<input type="text" value="No"/>	Yes, source: <input style="width: 100%;" type="text"/>
Site in Well Head Protection inner wellhead management zone (Y/N)	<input type="text" value="No"/>	Yes, source: <input style="width: 100%;" type="text"/>
Buried water supply pipes within 50 ft of proposed system (Y/N)	<input type="text" value="No"/>	
B. Site located in a shoreland district/area?	<input type="text" value="No"/>	Yes, name: <input style="width: 100%;" type="text"/>
Elevation of ordinary high water level:	<input style="width: 50%;" type="text"/> ft	Source: <input style="width: 100%;" type="text"/>
Classification: <input style="width: 150%;" type="text"/>	Tank Setback: <input style="width: 50%;" type="text"/> ft.	STA Setbk: <input style="width: 50%;" type="text"/> ft.
C. Site located in a floodplain?	<input type="text"/>	Yes, Type(s): <input style="width: 100%;" type="text"/>
Floodplain designation/elevation (10 Year):	<input style="width: 50%;" type="text"/> ft	Source: <input style="width: 100%;" type="text"/>
Floodplain designation/elevation (100 Year):	<input style="width: 50%;" type="text"/> ft	Source: <input style="width: 100%;" type="text"/>
D. Property Line Id / Source:	<input type="checkbox"/> Owner <input type="checkbox"/> Survey <input checked="" type="checkbox"/> County GIS <input type="checkbox"/> Plat Map <input type="checkbox"/> Other: <input style="width: 100%;" type="text"/>	
E. ID distance of relevant setbacks on map:	<input type="checkbox"/> Water <input type="checkbox"/> Easements <input type="checkbox"/> Well(s) <input type="checkbox"/> Building(s) <input type="checkbox"/> Property Lines <input type="checkbox"/> OHWL <input type="checkbox"/> Other: <input style="width: 100%;" type="text"/>	

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

Map Units:	<input style="width: 95%;" type="text" value="200B"/>	Slope Range:	<input style="width: 95%;" type="text" value="4 to 8"/> %
List landforms:	<input style="width: 95%;" type="text" value="tress and grass"/>		
Landform position(s):	<input style="width: 95%;" type="text" value="Shoulder"/>		
Parent materials:	<input style="width: 95%;" type="text" value="Till"/>		
	Depth to Bedrock/Restrictive Feature: <input style="width: 50%;" type="text"/> in	Depth to Watertable: <input style="width: 50%;" type="text"/> in	
Map Unit Ratings	Septic Tank Absorption Field- At-grade:	<input style="width: 95%;" type="text" value="Slightly Limited"/>	
	Septic Tank Absorption Field- Mound:	<input style="width: 95%;" type="text" value="Moderately Limited"/>	
	Septic Tank Absorption Field- Trench:	<input style="width: 95%;" type="text" value="Not Limited"/>	

5. Local Government Unit Information

Name of LGU:	<input style="width: 95%;" type="text" value="Morriosn County"/>
LGU Contact:	<input style="width: 95%;" type="text" value="320) 632-0170"/>
LGU-specific setbacks:	<input style="width: 95%;" type="text"/>
LGU-specific design requirements:	<input style="width: 95%;" type="text"/>
LGU-specific installation requirements:	<input style="width: 95%;" type="text"/>
Notes:	<input style="width: 95%; height: 40px;" type="text"/>

Field Evaluation Worksheet

1. Project Information		v 04.01.2020	
Property Owner/Client:	JOSEPH & BARBARA ANN FUCHS	Project ID: <input type="text"/>	
Site Address:	3200 450th street freeport MN 56331	Date Completed: 8/29/2021	
2. Utility and Structure Information			
Utility Locations Identified	<input type="checkbox"/> Gopher State One Call # <input type="text"/>	<input type="checkbox"/> Any Private Utilities: <input type="text"/>	
Locate and Verify (see Site Evaluation map)	<input type="checkbox"/> Existing Buildings	<input type="checkbox"/> Improvements <input type="checkbox"/> Easements <input type="checkbox"/> Setbacks	
3. Site Information			
Vegetation type(s):	Grass	Landscape position: Shoulder	
Percent slope:	1 %	Slope shape: Linear, Linear Slope direction: south	
Describe the flooding or run-on potential of site: <input type="text"/>			
Describe the need for Type III or Type IV system: <input type="text"/>			
Note: <input type="text"/>			
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:	<input type="text"/>		
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:	3	Soil observation logs attached (Y/N): Yes	
Percolation tests performed & attached (Y/N):	No		
5. Phase I. Reporting Information			
	Depth	Elevation	
Limiting Condition*:	22 in	93.1 ft	<i>*Most Restrictive Depth Identified from List Below</i>
Periodically saturated soil:	<input type="text"/> in	<input type="text"/> ft	Soil Texture: medium sandy loam
Standing water:	<input type="text"/> in	<input type="text"/> ft	Percolation Rate: <input type="text"/> min/inch
Bedrock:	<input type="text"/> in	<input type="text"/> 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:	drive pad by house		
Differences between soil survey and field evaluation:	soil survey says no limit and its at 18inches		
Site evaluation issues / comments:	pipe need to be instulaed across road		
Anticipated construction issues:	need insulated pipe for going under road		

1. PROJECT INFORMATION		v 04.01.2020
Property Owner/Client:	<input type="text" value="JOSEPH & BARBARA ANN FUCHS"/>	Project ID: <input type="text"/>
Site Address:	<input type="text" value="3200 450th street freeport MN 56331"/>	Date: <input type="text" value="08/29/21"/>
Email Address:	<input type="text"/>	Phone: <input type="text" value="3202907056"/>
2. DESIGN FLOW & WASTE STRENGTH <i>Attach data / estimate basis for Other Establishments</i>		
Design Flow:	<input type="text" value="600"/> GPD	Anticipated Waste Type: <input type="text"/>
BOD:	<input type="text"/> mg/L	TSS: <input type="text"/> mg/L
		Oil & Grease: <input type="text"/> mg/L
Treatment Level:	<input type="text"/> <i>Select Treatment Level C for residential septic tank effluent</i>	
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:	<input type="text"/> Gallons	in <input type="text"/> Tanks or Compartments
Recommended Holding Tank Capacity:	<input type="text"/> Gallons	in <input type="text"/> Tanks or Compartments
Type of High Level Alarm:	<input type="text"/> (Set @ 75% tank capacity)	
Comments:	<input type="text"/>	
4. SEPTIC TANK SIZING		
A. Residential dwellings:		
Number of Bedrooms (Residential):	<input type="text" value="4"/>	
Code Minimum Septic Tank Capacity:	<input type="text" value="1500"/> Gallons	in <input type="text" value="1"/> Tanks or Compartments
Recommended Septic Tank Capacity:	<input type="text" value="1000"/> Gallons	in <input type="text" value="1"/> Tanks or Compartments
Effluent Screen & Alarm (Y/N):	<input type="text" value="Optional"/>	Model/Type: <input type="text"/>
B. Other Establishments:		
Waste received by:	<input type="text"/>	<input type="text"/> GPD x <input type="text"/> Days Hyd. Retention Time
Code Minimum Septic Tank Capacity:	<input type="text"/> Gallons	in <input type="text"/> Tanks or Compartments
Recommended Septic Tank Capacity:	<input type="text"/> Gallons	in <input type="text"/> Tanks or Compartments
Effluent Screen & Alarm (Y/N):	<input type="text"/>	Model/Type: <input type="text"/>
5. PUMP TANK SIZING		
Pump Tank 1 Capacity (Minimum):	<input type="text" value="600"/> Gal	Pump Tank 2 Capacity (Minimum): <input type="text"/> Gal
Pump Tank 1 Capacity (Recommended):	<input type="text" value="600"/> Gal	Pump Tank 2 Capacity (Recommended): <input type="text"/> Gal
Pump 1 <input type="text" value="38.0"/> GPM	Total Head <input type="text" value="12.4"/> ft	Pump 2 <input type="text"/> GPM Total Head <input type="text"/> ft
Supply Pipe Dia. <input type="text" value="2.00"/> in	Dose Vol: <input type="text" value="110.0"/> gal	Supply Pipe Dia. <input type="text"/> Dose Vol: <input type="text"/> Gal

6. SYSTEM AND DISTRIBUTION TYPE		Project ID:	
Soil Treatment Type:	<input type="text" value="Mound"/>	Distribution Type:	<input type="text" value="Pressure Distribution-Level"/>
Elevation Benchmark:	<input type="text" value="100"/> ft	Benchmark Location:	<input type="text" value="drive pad by house"/>
MPCA System Type:	<input type="text" value="Type I"/>	Distribution Media:	<input type="text" value="Rock"/>
Type III/IV Details:	<input type="text"/>		<input type="text"/>

7. SITE EVALUATION SUMMARY:

Describe Limiting Condition:

Layers with >35% Rock Fragments? (yes/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:	<input type="text" value="22"/> inches	<input type="text" value="1.8"/> ft	<input type="text" value="93.10"/> ft
Minimum Req'd Separation:	<input type="text" value="36"/> inches	<input type="text" value="3.0"/> ft	Elevation <i>Critical for system compliance</i>
Code Max System Depth:	<input type="text" value="Mound"/> inches	<input type="text" value="-1.2"/> ft	<input type="text" value="96.10"/> ft

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

Soil Texture:

Soil Hyd. Loading Rate: GPD/ft² Percolation Rate: MPI

Contour Loading Rate: Note:

Measured Land Slope: % Note:

Comments:

8. SOIL TREATMENT AREA DESIGN SUMMARY

Trench:

Dispersal Area	<input type="text"/>	ft ²	Sidewall Depth	<input type="text"/>	in	Trench Width	<input type="text"/>	ft
Total Lineal Feet	<input type="text"/>	ft	No. of Trenches	<input type="text"/>		Code Max. Trench Depth	<input type="text"/>	in
Contour Loading Rate	<input type="text"/>	ft	Length	<input type="text"/>	ft	Designed Trench Depth	<input type="text"/>	in

Bed:

Dispersal Area	<input type="text"/>	ft ²	Sidewall Depth	<input type="text"/>	in	Maximum Bed Depth	<input type="text"/>	in
Bed Width	<input type="text"/>	ft	Bed Length	<input type="text"/>	ft	Designed Bed Depth	<input type="text"/>	in

Mound:

Dispersal Area	<input type="text" value="500.0"/>	ft ²	Bed Length	<input type="text" value="50.0"/>	ft	Bed Width	<input type="text" value="10.0"/>	ft
Absorption Width	<input type="text" value="20.0"/>	ft	Clean Sand Lift	<input type="text" value="1.2"/>	ft	Berm Width (0-1%)	<input type="text" value="12.0"/>	ft
Upslope Berm Width	<input type="text" value="12.0"/>	ft	Downslope Berm	<input type="text" value="12.0"/>	ft	Endslope Berm Width	<input type="text" value="12.0"/>	ft
Total System Length	<input type="text" value="74.0"/>	ft	System Width	<input type="text" value="34.0"/>	ft	Contour Loading Rate	<input type="text" value="12.0"/>	gal/ft

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 Perforation Spacing ft Perforation Diameter in
 Lateral Diameter in Min Dose Volume gal Max Dose Volume 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								Minimum Dose Volume <input type="text"/> gal
Lateral 2								
Lateral 3								
Lateral 4								Maximum Dose Volume <input type="text"/> gal
Lateral 5								
Lateral 6								

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 ÷ ft² = lbs./day/ft²

10. Comments/Special Design Considerations:

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

Kody Throener (Designer)	<i>Kody Throener</i> (Signature)	4018 (License #)	8/29/2021 (Date)
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1. SYSTEM SIZING: Project ID: _____ v 04.01.2020

- A. Design Flow: GPD
- B. Soil Loading Rate: GPD/ft²
- C. Depth to Limiting Condition: ft
- D. Percent Land Slope: %
- E. Design Media Loading Rate: GPD/ft²
- F. Mound Absorption Ratio:

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	-	-	-	-

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

*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

GPD ÷ GPD/ft² = ft²

If a larger dispersal media area is desired, enter size: ft²

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

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

ft² X GPD/ft² = gal/ft *Can not exceed Table 1*

D. Calculate Minimum Dispersal Bed Length: Dispersal Bed Area ÷ Bed Width

ft² ÷ ft = ft

3. ABSORPTION AREA SIZING

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

ft X = 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

ft - ft = ft

4. DISTRIBUTION MEDIA: ROCK

Project ID: _____

A. Rock Depth Below Distribution Pipe

in 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 - 1.8 ft = 1.2 ft Design Sand Lift (optional): ft

B. Upslope Height: Clean Sand Lift + Depth of Media + Depth to Cover Pipe + Depth of Cover (1 ft)

1.2 ft + 0.50 ft + 0.3 ft + 1.0 ft = 3.0 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):

2.91

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

2.91 ft X 3.0 ft = 8.6 ft

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

10.0 ft X 1.0 % ÷ 100 = 0.10 ft

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

3.0 ft + 0.10 ft = 3.1 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):

3.19

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

3.19 x 3.1 ft = 9.8 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:

3.00 *(usually 3.0 or 4.0)*

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

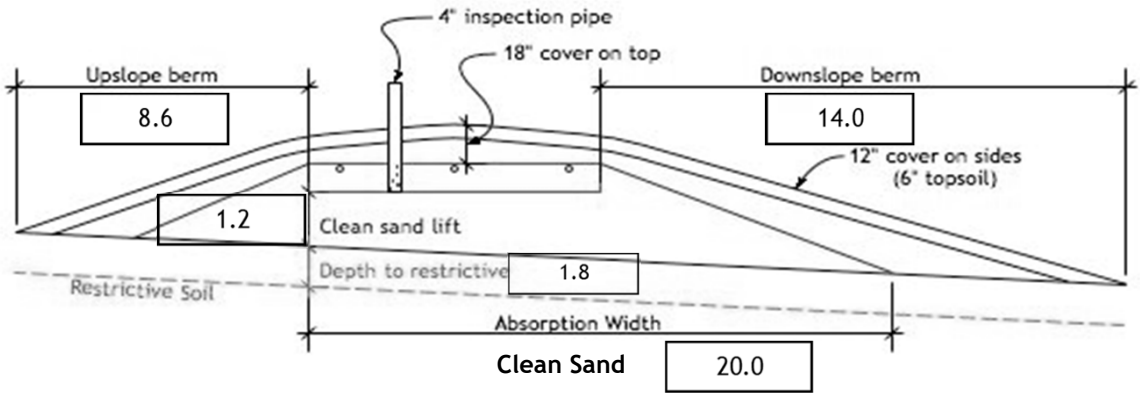
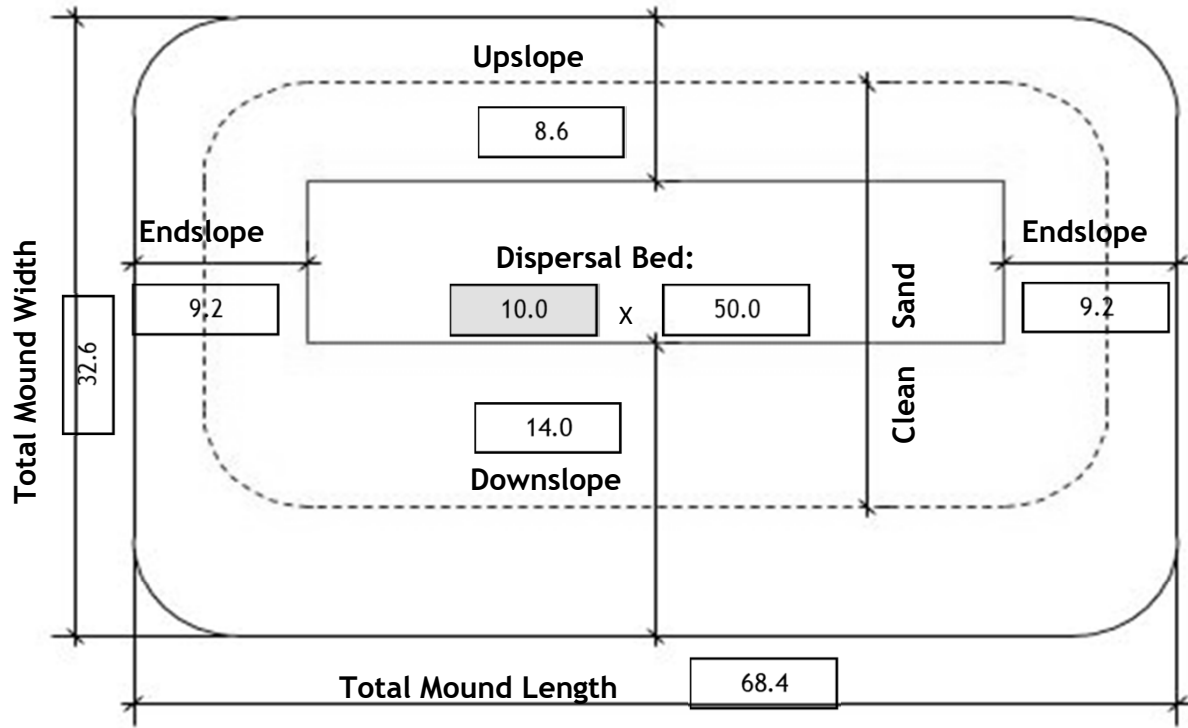
3.00 ft X 3.1 ft = 9.2 ft

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

8.6 ft + 10.0 ft + 14.0 ft = 32.6 ft

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

9.2 ft + 50.0 ft + 9.2 ft = 68.4 ft



Comments:

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

$$\left(\boxed{6} \text{ in} + \boxed{4.0} \text{ in} \right) \div 12 \times \boxed{50.0} \text{ ft} \times \boxed{10.0} \text{ ft} = \boxed{416.7} \text{ ft}^3$$

Divide ft³ by 27 ft³/yd³ to calculate cubic yards: $\boxed{416.7} \text{ ft}^3 \div 27 = \boxed{15.4} \text{ yd}^3$

Add 30% for constructability: $\boxed{15.4} \text{ yd}^3 \times 1.3 = \boxed{20.1} \text{ yd}^3$

B. Calculate Clean Sand Volume:

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

$$\boxed{1.2} \text{ ft} \times \boxed{10.0} \text{ ft} \times \boxed{50.0} \text{ ft} = \boxed{600.0} \text{ ft}^3$$

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)

$$\left(\boxed{3.00} \text{ ft} - 1 \right) \times \boxed{5.00} \times \boxed{50} \text{ ft} = \boxed{500.00}$$

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

$$\left(\boxed{3.00} \text{ ft} - 1 \right) \times \boxed{5.00} \times \boxed{10} \text{ ft} = \boxed{100.00}$$

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

$$\boxed{500.0} \text{ ft}^3 + \boxed{100.0} \text{ ft}^3 + \boxed{600} \text{ ft}^3 = \boxed{1200.0} \text{ ft}^3$$

For a Mound on a slope greater than 1%

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

$$\left(\left(\boxed{3.0} \text{ ft} - 1 \right) \times 3.0 \text{ ft} \times \boxed{50.0} \right) \div 2 = \boxed{147.5} \text{ ft}^3$$

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

$$\left(\left(\boxed{3.1} \text{ ft} - 1 \right) \times \boxed{10.0} \text{ ft} \times \boxed{50.0} \right) \div 2 = \boxed{516.7} \text{ ft}^3$$

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

$$\left(\boxed{3.1} \text{ ft} - 1 \right) \times 3.0 \text{ ft} \times \boxed{10.0} \text{ ft} = \boxed{62.0} \text{ ft}^3$$

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

$$\boxed{147.5} \text{ ft}^3 + \boxed{516.7} \text{ ft}^3 + \boxed{62.0} \text{ ft}^3 + \boxed{600.0} \text{ ft}^3 = \boxed{1326.2} \text{ ft}^3$$

Divide ft³ by 27 ft³/yd³ to calculate cubic yards: $\boxed{1326.2} \text{ ft}^3 \div 27 = \boxed{49.1} \text{ yd}^3$

Add 30% for constructability: $\boxed{49.1} \text{ yd}^3 \times 1.3 = \boxed{63.9} \text{ yd}^3$

C. Calculate Sandy Berm Volume:

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

$$\left(\boxed{3.0} - 0.5 \right) \text{ ft} \times \boxed{34.0} \text{ ft} \times \boxed{74.0} \div 2 = \boxed{3166.0} \text{ ft}^3$$

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

$$\boxed{3166.0} \text{ ft}^3 - \boxed{1326.2} \text{ ft}^3 - \boxed{416.7} \text{ ft}^3 = \boxed{1423.1} \text{ ft}^3$$

Divide ft³ by 27 ft³/yd³ to calculate cubic yards: $\boxed{1423.1} \text{ ft}^3 \div 27 = \boxed{52.7} \text{ yd}^3$

Add 30% for constructability: $\boxed{52.7} \text{ yd}^3 \times 1.3 = \boxed{68.5} \text{ yd}^3$

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

$$\boxed{34.0} \text{ ft} \times \boxed{74.0} \text{ ft} \times 0.5 \text{ ft} = \boxed{1258.0} \text{ ft}^3$$

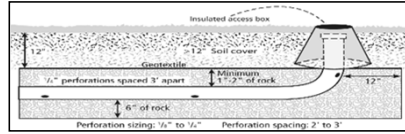
Divide ft³ by 27 ft³/yd³ to calculate cubic yards: $\boxed{1258.0} \text{ ft}^3 \div 27 = \boxed{46.6} \text{ yd}^3$

Add 30% for constructability: $\boxed{46.6} \text{ yd}^3 \times 1.3 = \boxed{60.6} \text{ yd}^3$

Project ID:

v 04.01.2020

- Media Bed Width: ft
- Minimum Number of Laterals in system/zone = Rounded up number of $[(\text{Media Bed Width} - 4) \div 3] + 1$.
 $[(\text{10} - 4) \div 3] + 1 = \text{3}$ laterals *Does not apply to at-grades*
- Designer Selected Number of Laterals: laterals
Cannot be less than line 2 (Except in at-grades)
- Select Perforation Spacing: ft
- Select Perforation Diameter Size: in
- Length of Laterals = Media Bed Length - 2 Feet.

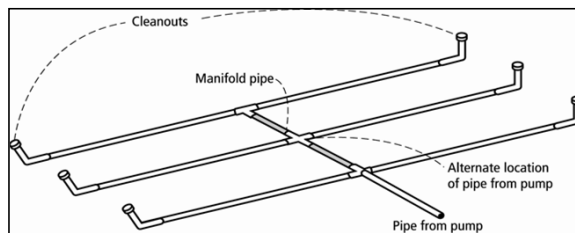
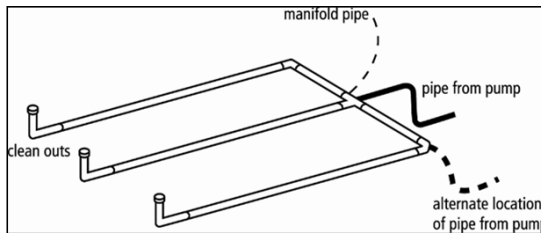


- 2ft = ft *Perforation can not be closer than 1 foot from edge.*

- Determine the Number of Perforation Spaces. Divide the Length of Laterals by the Perforation Spacing and round down to the nearest whole number.
 Number of Perforation Spaces = ft \div ft = Spaces
- Number of Perforations per Lateral is equal to 1.0 plus the Number of Perforation Spaces. Check table below to verify the number of perforations per lateral guarantees less than a 10% discharge variation. The value is double with a center manifold.

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

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



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

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

- Spacing of laterals; Must be greater than 1 foot and no more than 3 feet: ft
- Select Type of Manifold Connection (End or Center):
- Select Lateral Diameter (See Table): in

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)

ft X ft = ft²

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

ft² ÷ perf = ft²/perf

14. Select *Minimum Average Head* :

ft

15. Select *Perforation Discharge* based on Table:

GPM per Perf

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

Perfs X GPM per Perforation = GPM

17. *Volume of Liquid Per Foot of Distribution Piping (Table II)* :

Gallons/ft

18. *Volume of Distribution Piping* =

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

X ft X gal/ft = Gallons

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

gals X 4 = Gallons

		Perforation Discharge (GPM)			
		Perforation Diameter			
Head (ft)	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				

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:

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: 38.0 GPM

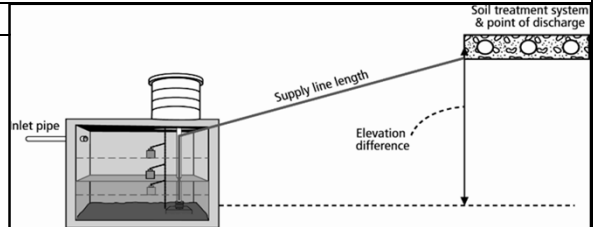
C. Enter pump description: Demand Dosing

2. HEAD REQUIREMENTS

A. Elevation Difference 6 ft
 between pump and point of discharge:

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: 30 ft

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

Friction Loss = 3.67 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*

30 ft X 1.25 = 37.5 ft

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

Supply Friction Loss = 3.67 ft per 100ft X 37.5 ft ÷ 100 = 1.4 ft

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

6.0 ft + 5.0 ft + ft + 1.4 ft = 12.4 ft

3. PUMP SELECTION

A pump must be selected to deliver at least **38.0** GPM with at least **12.4** feet of total head.

Comments:

DETERMINE TANK CAPACITY AND DIMENSIONS Project ID: v 04.01.2020

1. A. Design Flow (Design Sum. 1A): 600 GPD C. Tank Use: Dosing

B. Min. required pump tank capacity: 600 Gal D. Recommended pump tank capacity: 600 Gal

2. A. Tank Manufacturer: bm B. Tank Model:

C. Capacity from manufacturer: 609 Gallons

D. Gallons per inch from manufacturer: 13.4 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

(12 in + 2 inches) X 13.4 Gallons Per Inch = 188 Gallons

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

-Item 18 of the Pressure Distribution or Item 11 of Non-level 98 Gallons (Minimum dose) 7.3 inches/dose

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

Design Flow: 600 GPD X 0.25 = 150 Gallons (Maximum dose) 11.2 inches/dose

6 Select a pumpout volume that meets both Minimum and Maximum: 110 Gallons

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

600 gpd ÷ 110 gal = 5.45 Doses

8 Calculate Drainback:

A. Diameter of Supply Pipe = 2 inches

B. Length of Supply Pipe = 30 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

30 ft X 0.170 gal/ft = 5.1 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

9. Total Dosing Volume = Delivered Volume plus Drainback

110 gal + 5.1 gal = 115 Gallons

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

2 in X 13.4 gal/in = 26.8 Gallons

DEMAND DOSE FLOAT SETTINGS

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

Total Dosing Volume / Gallons Per Inch

115 gal ÷ 13.4 gal/in = 8.6 Inches

12. Measuring from bottom of tank:

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

12 in + 2 in = 14 Inches

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

14 in + 8.6 in = 23 Inches

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

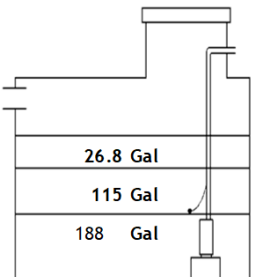
23 in + 2.0 in = 25 Inches

Inches for Dose: 8.6 in

Alarm Depth: 24.6 in

Pump On: 22.6 in

Pump Off: 14.0 in





Soil Observation Log

Project ID:

v 04.01.2020

Client: JOSEPH & BARBARA ANN FUCHS				Location / Address: 3200 450th street freeport MN 56331							
Soil parent material(s): (Check all that apply)				<input type="checkbox"/> Outwash	<input type="checkbox"/> Lacustrine	<input type="checkbox"/> Loess	<input checked="" type="checkbox"/> Till	<input type="checkbox"/> Alluvium	<input type="checkbox"/> Bedrock	<input type="checkbox"/> Organic Matter	
Landscape Position: (select one)		Shoulder	Slope %:	1.0	Slope shape	Linear, Linear		Elevation-relative to benchmark:		100.0	
Vegetation:		Grass	Soil survey map units:			200B		Limiting Layer Elevation:		93.1	
Weather Conditions/Time of Day:		sunny 70				Date	08/29/21				
Observation #/Location:		1				Observation Type:		Pit			
Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	----- Structure-----				
							Shape	Grade	Consistence		
0" to 6"	Sandy Loam	<35%	10YR 2/2				Granular	Weak	Friable		
6" to 22"	Sandy Loam	<35%	10YR 4/4				Blocky	Moderate	Friable		
22" to 30"	Sandy Loam	<35%	10YR 4/4	7.5YR 5/4		S1	Platy	Moderate	Firm		

Comments

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

Kody Throener (Designer/Inspector)	<i>Kody Throener</i> (Signature)	4018 (License #)	8/29/2021 (Date)
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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:

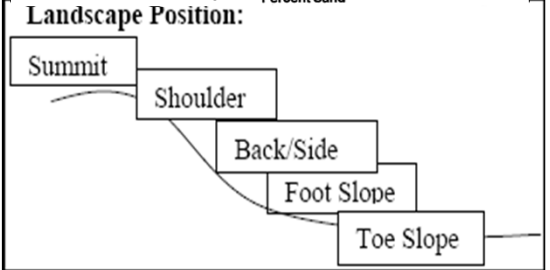
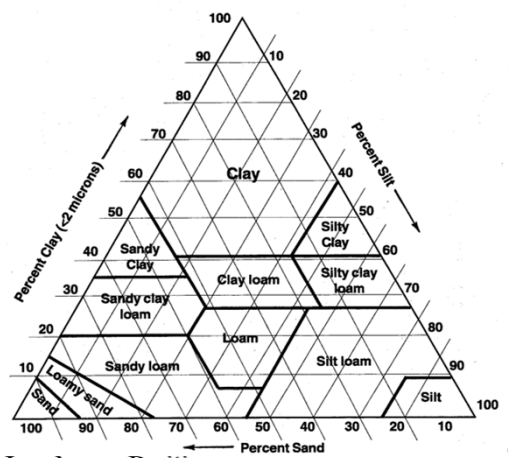
<u>Granular</u>	The peds are approximately spherical or polyhedral and are commonly found in topsoil. These are the small, rounded peds that hang onto roots when soil is turned over.
<u>Platy</u>	The peds are flat and plate like. They are oriented horizontally and are usually overlapping. Platy structure is commonly found in forested areas just below the leaf litter or shallow topsoil.
<u>Blocky</u>	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.
<u>Prismatic</u>	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.
<u>Single Grain</u>	The structure found in a sandy soil. The individual particles are not held together.

Grade:

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

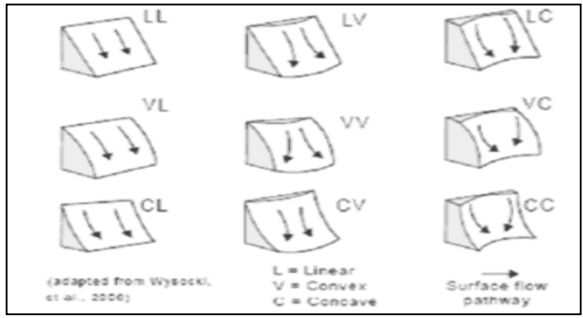
Consistence:

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



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'.





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Project ID:

v 04.01.2020

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Landscape Position: (select one)		Shoulder	Slope %: 1.0	Slope shape		Linear, Linear	Elevation-relative to benchmark: 100.0		
Vegetation: Grass		Soil survey map units: 200B			Limiting Layer Elevation: 93.1				
Weather Conditions/Time of Day:		sunny 70			Date		08/20/21		
Observation #/Location:		2			Observation Type: Pit				
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SC Sandy Clay
CL Clay Loam
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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:
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T3. Organic texture or organic modifiers
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S1. Distinct gray or red redox features
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Shape:

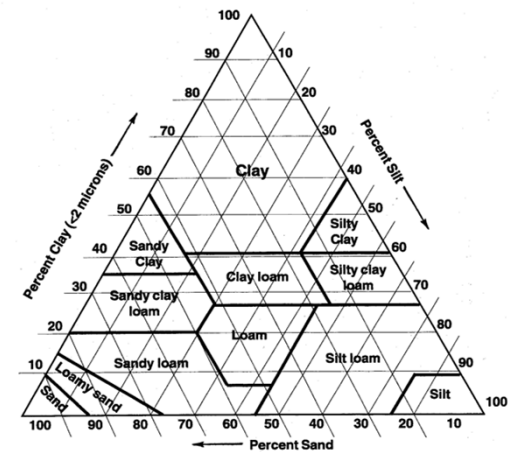
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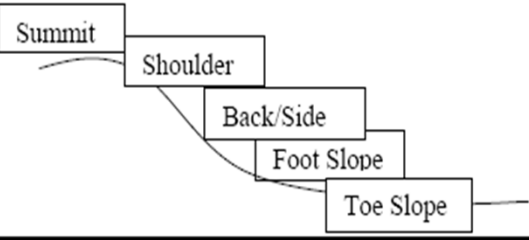
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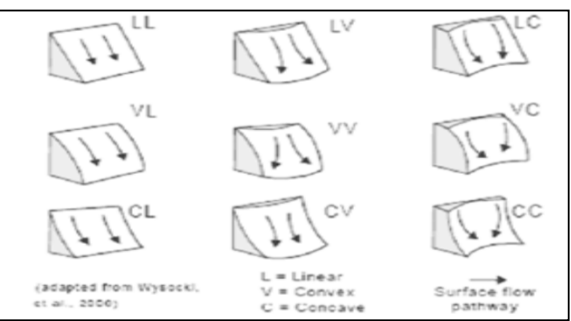


Landscape Position:



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'.





Benchmark = 100'
Benchmark is cement pad of driveway
Limiting Condition = 93'10"
Tank Outlet = minimum of 92'
Elevation ground level at mound = 95'
Well to Septic Tank = >50'
Well to Mound = >100'
Septic Tank to House = >50'
Mound to House = >50'

100519000
Elmdale

