5/8/19

Steinbrecher Companies, Inc.
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Phone (763) 274-0925 Fax (763) 274-0928
ROLL-OFFS ◆ SEPTIC SYSTEMS ◆ EXCAVATING
LANDSCAPING ◆ DEMOLITION

Carmelite Monastery
8249 Demontreville Trail N
Lake Elmo MN 55042

SSTS Design Summary Report

On April 19th, 2019, a site evaluation was conducted at 8249 Demontreville Trail N, MN 55082 in Washington County. The PID number is 09.029.21.12.0002

Scope of Report
The purpose of the design report is to create a plan for a new sub-surface treatment system to treat wastewater from the new chapel to be built at the address above. This design details the plan for the re quired tanks and soil treatment dispersal areas per Washington County Development Code, Chapter Four Subsurface Sewage Treatment System Regulations, Ordinance 206. The system is designed for an Assembly Hall w/ no kitchen plus two (2) full-time employees which will be at the Chapel during day. The system components will be a Type I designed Mound and a total of three Septic & Pump Tanks (1,000-gal; 1,000-gal & 1,000-gal).**See Site Plan**.

Preliminary & Field Evaluation Work
The Washington County Maps GIS data (https://maps.co.washington.mn.us/WCGIS/) was used to determine all property lines, utility Right of Ways, roads and other necessary features required by Ordinance 206, Section 9, Subparts 9.2 thru 9.3 prior to and during site evaluation. See Site Plan for details.

The information available at MN Well Index (https://mnwellindex.web.health.state.mn.us/) does not indicate the location of any wells within 100 feet of the proposed area. Section MN Well Index – Research.

The Web Soil Survey data (https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx), which is provided by the USDA, was gathered to determine the soil characteristics of the area prior to a field evaluation. See Section Web Soil Survey – Research for more details.

The field evaluation included staking a 50’ x 26’ soil absorption area, measurements from all setbacks and property line, elevations for absorption area, tanks and soil observations and a minimum of four (4) soil observations within or on the edge of the proposed absorption area for the Soil Treatment Area (STA) and an additional four (4) soil observations were conducted in second Soil Treatment Area identified for future use located to the South of the new Mound.

Soil Observations
The soil borings and pits were conducted, classified and recorded to meet the Washington County Ordinance 206, Section 9, 9.5 thru 9.7. Redox was observed in all Borings & Soil Pits. The limiting layer was observed at 14” at SB1. **See attached Soil Observation Logs.**

Wastewater Sources & Flows

The new Chapel is expected to have a seat capacity for 80 guests with 2 employees on staff full-time. The estimated Peak Flow rate is 350 gallons per day (gpd) was calculated using values provided by Chapter 7081.0130, Table I: Estimate design sewage flow from other establishments. A safety factor of 20% was applied to calculate the final Design Peak Flow of 400 gpd.

The Organic Load was calculated using the Estimate of Waste Strengths from Other Establishments chart provided with the University of Minnesota – SSTS Design Forms Worksheet (**see U of MN Design Forms**).The total Organic Loading Rate for 400 gpd for 80 guests (.01 #s / seat) & 2 full-time employees (.05 #s /employee) is **.90 pounds of BOD per day** which will need to be treated each day. This equals **269 mg/L of BOD per day**. If the system was used to max capacity each day, this level of effluent would be considered At-Risk Effluent and might need to be sampled regularly to ensure treatment level C prior to dispersal to the Mound. However, the Septic Tanks, the Dose Tank & Soil Treatment Area have been designed to handle the worst-case scenario flow-rate & waste-strength from this building

The septic tanks & dose tank are sized to provide a retention time of 5 days (typical is 3-days retention) & a **storage capacity of 2 x Peak Flow** in the event of unexpected pump failure.

The total size of the **Soil Absorption Area was increased 25%** to account for a potential of At-Risk Organic Loading rates of BOD & TSS. The Peak Design Flow rate of 400 gpd for a typical Type I system receiving Residential Strength Waste (170 mg/L BOD) would require 1,040 sqft of absorption in Silt Loam soil. The increased size was calculated using the University of Minnesota Chart (Table 5.1; Manual for Septic System Professionals in Minnesota) for determining Organic Loading Rate. The equivalent loading rate for Silt Loam is 0.0007 #/sqft. The required absorption for .90 #s/day BOD @ 400 gpd with an Organic Loading rate of .0007 #/sqft is **1,280 sqft**.

Type I Mound

The total area for the STA will impact 3,837 sqft (45.3’ x 84.7’) located to the South of the new Chapel. The newly constructed mound will have an **Absorption Area of 1,300 sqft (26’ x 50’).** The observations found redoximorphic soil conditions at 14 inches from the surface and will require 22” of **washed-mound sand** to achieve the necessary vertical separation from the most limiting layer.

The required materials for the sewer line, distribution network, pumps, piping, sand, rock, fill and cover are detailed in the design worksheets included with this design. Please note, all calculations for materials and pumps are estimates. Actual values may change slightly and will need to field verified for correctness. **See U of MN Worksheets for more details**.

The pump used for dosing the pressure bed must deliver a minimum of **22 gallons per minute** and overcome a total dynamic head pressure of **16 feet**. All supply pipes and laterals shall be built to specifications and drain-out completely after each dose to prevent freezing.

A second 1,300 sqft area was identified and staked-off **for future use**. No structures or vehicle traffic can occur over this area. Precautions should be taken in the years to come to avoid damaging, compacting or disturbing this area.

Special Conditions

1. Due to the large flat area, drainage should be maintained throughout the area to avoid ponding around the tanks or at the edges of the Mound.
2. No final sewer elevation was provided by the builder. Elevation and locations are subject to change. No tank can be buried deeper than 4’ below grade.

3. Drainback for Supply Line & Freezing - The slope from the Pressure Bed Supply Line must drain back to the dose tank. Additional depth or insulation may be necessary to keep line from freezing if the supply line is buried too shallow.
4. Setbacks to Easements & Property Lines –There was no survey performed prior to site evaluation, so all measures are estimates. The owner and Installer will need to make sure all construction is within required setbacks.

Other Considerations

6.1 Building Permit requirements.

No construction shall be allowed by any local unit of government until the permit required for the subsurface sewage treatment system has been issued.9.11 Site Protection

9.11 Site Protection

Prior to and during construction or lot improvements, the proposed initial and replacement soil treatment and dispersal areas shall be protected from disturbance, compaction, or other damage by use of stakes and silt fence or snow fence.

As-Built Drawing

The Licensed Installer must provide an As-built of the final location of all components. The attached Site Plan is only for reference and should not be considered as final survey

End of Report

Disclaimer

As property owner, I agree to use the system within the parameters described above and in the design worksheets. I also agree hold Steinbrecher Companies, Inc and the named designer harmless for any future issues regarding this system.

Owner Signature **Date**

Note – This design is not recommended to be permitted until the following areas, included with this design, are signed by property owner.

- Design Summary Report, Preliminary Evaluation Worksheet (section 2) and Homeowner Maintenance Log

Materials & Specifications

8249 DeMontreville Trail N, Lake Elmo

Tanks – Minnesota Precast

- 1,000-gallon Septic Tank
- 1,000-gallon Septic Tank
- 1,000-gallon Dose Tank

Effluent Filter & Alarm

- Polylok 525 w/ Reed Switch for Alarm
- Dual-Alarm Box located in or near house (or Installer equivalent)
- Electrical wire & Junction Box (~100' from building)
- Dedicated 120V circuit for alarm (10 Amp min.)

Sewer Line

- 4" Sch 40 dia. pipe @ ~ 20'
- Fittings, as necessary

Pump – Gould PE41 (or similar model)

- 23 GPM
- 16 TDH
- Mechanical (120V rated) Float for Pump On/Off
- Electrical wire & Junction Box, as necessary (~100')
- Dedicated 20 amp, 120V circuit from building to pump

Supply Line to Pressure Laterals

- 2" sch 40 pipe @ ~ 100'
- Fittings, as necessary

Pressure Laterals

- 3 – 50' long w/ 1 ½" sch 40 pipe
- 3' spacing (orifices)
- 3/16" diameter orifices (drilled holes)
- Clean-outs at end of each lateral
- 1 ½" Bends, couplings, sweeps and fittings, as necessary

Inspection pipes

- 4" Sch 40 pipe built to spec in Mound design

Mound Sand

- Min. Height – 22"
- Absorption Area – 26' x 50'

Rock Bed

- Dispersal Area – 10' x 50'
- Rock depth – 6" + min 3.5" to cover pipe

Back Fill & Black Dirt for cover

- See calculations on Mound Materials Worksheet

*****Note: All materials quantities for pipe, sand, rock, etc. are only estimates.
**Tonnage calculations for materials may differ from actual volume used onsite.

Washington County, MN

April 20, 2019

1:4,000

0 187.5 375 750 ft

0 55 110 220 m

CERTIFICATE OF SURVEY

PART OF THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER.
SECTION 4, TOWNSHIP 29 NORTH, RANGE 21 WEST,
AND GOVERNMENT LOT 4 SECTION 9, TOWNSHIP 29 NORTH, RANGE 21 WEST,
CITY OF LAKE ELMO, WASHINGTON COUNTY, MINNESOTA

TOPOGRAPHIC SURVEY
PREPARED FOR:
CARMELITE HERMITAGE
OF THE BLESSED VIRGIN MARY
8249 Demontreville Trail North
Lake Elmo, Minnesota 55042

LEGEND

Orientation of the bearing system is the Washington County Coordinate System, NAD 83, 1986 Adjustment.

Distances are in feet and decimals of a foot.

Contours and elevations were generated using field measurements obtained for this project and are based on North American Vertical Datum 1988 Adjustment unless otherwise noted. Contours are at 1 foot intervals.

- Denotes bituminous surface.
- Denotes concrete surface.
- GM Denotes gas meter.
- ET Denotes electric transformer.
- 24 Denotes a survey control point location and the assigned point number.
- Denotes wire mesh fence.
- Denotes found wood lath.
- Denotes coniferous tree.
- Denotes deciduous tree.
- 8" spruce Denotes size and type of tree.
- BM Denotes (benchmark) location of measurement to surface of concrete. These locations are at an elevation of 1009.01 feet based on the North American Datum 1988 adjustment.

Coordinates are on the Washington County Coordinate System, NAD 83, 1986 Adjustment.

POINT NUMBER	NORTHING	EASTING	ELEVATION	MONUMENT TYPE
20	200193.4270	474261.5140	1007.62	IP CONTROL
22	200096.7710	474263.3700	1009.21	3/4 ROD
23	200524.8150	474247.4430	999.69	MH PUNCH
24	200262.0820	474159.7950	1003.88	3/8 SPIKE
25	200328.5860	474255.7570	1003.00	MAG NAIL
26	200342.8510	474527.2430	1005.66	MAG NAIL
28	200212.5100	474594.5940	1007.12	3/8 SPIKE
29	200272.6200	474504.9570	1007.12	3/8 SPIKE
30	200134.4280	474555.6120	1008.16	3/4 ROD

SCALE IN FEET
0 10 20 40
SCALE: 1 INCH = 20 FEET

Washington County cast iron monument at the S1/4 corner of Section 4, T29N, R21W.
S89°29'21"W 2633.18
north line, Government Lot 4, Section 9
Washington County cast iron monument at the N1/4 corner of Section 9, T29N, R21W.
south line, SW1/4 – SE1/4, Section 4
north line, Government Lot 4, Section 9
Washington County cast iron monument at the SE corner of Section 4, T29N, R21W.
Washington County cast iron monument at the NE corner of Section 9, T29N, R21W.

18 inch reinforced concrete pipe. Invert elevation is 992.4 feet.
catch basin 23
catch basin
18 inch reinforced concrete pipe. Invert elevation is 993.0 feet.
bituminous curb
CONTOURS IN THIS AREA WERE GENERATED USING THE MN DNR LIDAR DATA
8 inch corrugated plastic pipe. Invert elevation is 998.5 feet.
chainlink fence
wire mesh fence
landscape block retaining wall
Garage
Porch
Wood Shop
underground utility
12 inch corrugated plastic pipe. Invert elevation is 999.6 feet.
12 inch corrugated plastic pipe. Invert elevation is 1000.7 feet.
8 inch corrugated plastic pipe. Invert elevation is 1001.5 feet.
drain tile outlets
drain tile outlet
water spigot
4 inch PVC pipe with cap
wood fence
CONSTRUCTION ACCESS
PUMPING ACCESS
grass
brush
woods
tree line
Buildings and Courtyards
Proposed New Chapel
octagon stone pillar
BM
WELL
Window Well
Bushes
50 ft
APPROX IE - 1006.0' Per Floor Plan from Associated Consulting Engineering, Inc, - Page M2.4
FFE - 1008.5' Per Site Plan from Pioneer Engineering
IF THE DRAIN LINE IS IMPACTED, THEN IT MUST BE RESTORED TO ALLOW FROM PROPER DRAINAGE
BENCHMARK - BOTTOM OF APRON AT CORNER OF BUILDING
UNDERGROUND DRAIN (GENERAL DIRECTION)
4 inch PVC pipe with cap
26 inch concrete lid
4 inch PVC pipes with caps
ABSORPTION AREA
SEPTIC AREA
FUTURE SITE (SECONDARY STA)
PROPOSED SEPTIC TANKS LOCATION
3 - 1,000 GALLON TANKS
Min. IE - 1st SEPTIC TANK - 1005.5'
Max IE - 1st SEPTIC TANK- 1003.0'
NO TANK CAN BE BURIED > 4 FT DEEP
THE AREA AROUND TANKS MAY NEED TO BE MODIFIED TO MAINTAIN PROPER BURY DEPTH
THIS IS ONLY A SITE PLAN
ALL SEPTIC LOCATIONS AND MEASUREMENTS ARE ONLY ESTIMATES
AS-BUILT WILL NEED TO PROVIDED BY INSTALLER AFTER CONSTRUCTION
DOWNHILL

ELEVATIONS
Benchmark - 100' (see map)
CHAPEL Sewer Outlet Invert – 30" Below grade
Tank Inlet Invert – 98.6' (3' bury)
Dose Tank Invert – 97.8'
STA
NW - 101.15'
NE - 100.9'
SW - 101.4'
SE - 101.4'
Soil Boring w/ Limiting Layer - SB1
Limiting Layer Depth - 14"
Soil Texture - Sandy Clay Loam

MOUND DIMENSIONS
Rockbed - 50' x 10' (500 sqft)
Absorption Bed - 50' x 26' (1,300 sqft)
Total Mound - 45.3' x 84.7' (3,837' sqft)
Upslope Elev. - 101.4'
Min. Sand Height - 23"' @ 103.3'
Rockbed Laterals Elev. - 103.8'
LATERALS
3 - Laterals @ 50' of 1-1/2" SCH40
Spacing - 3'
Drilled Holes - 3/16"
SUPPLY LINE
95' of 2" SCH40

Revised: November 1, 2018
Added proposed chapel

SURVEY PREPARED BY:
Landmark Surveying, Inc.
21070 Olinda Trail North – P.O. Box 65
Scandia, Minnesota 55073
Office number: 651-433-3421
Cell number: 651-235-8880
E-mail address: inthefield@frontiernet.net

Official copies of this map are crimp sealed.

I hereby certify that this survey, plan or report was prepared by me or under my direct supervision and that I am a duly Licensed Land surveyor under the laws of the State of Minnesota.

Landmark Surveying Inc.

Joel T. Anez Minnesota License No. 13775 June 27, 2018
Date

June 27, 2018

Job Number 2018-13

University of Minnesota Onsite Sewage Treatment Program

Preliminary Evaluation Worksheet

Minnesota Pollution Control Agency

1. Contact Information

v 04.02.2019

Property Owner/Client:	Carmelite Monastery	Date Completed:	4/20/2019
Site Address:	8249 Demontreville Trail N, Lake Elmo	Project ID:	
Email:		Phone:	
Mailing Address:	8249 Demontreville Trail N, Lake Elmo, MN 55402		
Legal Description:			
Parcel ID:	09.029.21.12.0002	TWP:	SEC: RNG:

2. Flow and General System Information

A. Client-Provided Information

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

Project Use: ☐ Residential ☑ Other Establishment: Assembly hall

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)*

☐ 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: Only domestic waste anticipated.

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

B. Designer-determined flow Information

Attach additional information as necessary.

Design Flow: 400 GPD Anticipated Waste Type: Other Est. - At-Risk

BOD: 269 mg/L TSS 70 mg/L Oil & Grease 20 mg/L

#	Description	Mn. ID#	Well Depth (ft.)	Casing Depth (ft.)	Confining Layer	STA Setback	Source
1	Monestary Well	Unknown				50	MN Well Index
2							
3							
4							

Additional Well Information: Well is located at NE corner of existing building.

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 a 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?	No	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:	49—Antigo silt loam	Slope Range:	0-2 %
List landforms:	Flats, terraces		
Landform position(s):	Plain		
Parent materials:	Loess and/or silty glaciofluvial deposits		
Depth to Bedrock/Restrictive Feature:	80 in	Depth to Watertable:	80 in

Map Unit Ratings

Septic Tank Absorption Field- At-grade:	Very Limited
Septic Tank Absorption Field- Mound:	Not Limited
Septic Tank Absorption Field- Trench:	Very Limited

5. Local Government Unit Information

Name of LGU:	Washington County
LGU Contact:	
LGU-specific setbacks:	N/A for this site
LGU-specific design requirements:	Contour Late rate for Mound is <= 10
LGU-specific installation requirements:	
Notes:	

Field Evaluation Worksheet

1. Project Information

v 04.02.2019

Property Owner/Client:	Carmelite Monastery	Project ID:	
Site Address:	8249 Demontreville Trail N, Lake Elmo	Date Completed:	4/19/2019

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):	Grass	Landscape position:	Plain		
Percent slope:	2 %	Slope shape:	Convex, Linear	Slope direction:	north

Describe the flooding or run-on potential of site:

Describe the need for Type III or Type IV system:

Note:

Elevations and Benchmarks identified on map? (Y/N):	Yes	If yes, describe:	BM = Bottom of Apron
Proposed soil treatment area protected? (Y/N):	Yes	If yes, describe:	See Site Plan

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: 8	Soil observation logs attached (Y/N): Yes
Percolation tests performed & attached (Y/N):	No

5. Phase I. Reporting Information

	Depth		Elevation				
Periodically saturated soil:	14	in	100.2	ft	Soil Texture:	silt loam	
Standing water:		in		ft	Percolation Rate:		min/inch
Bedrock:		in		ft	Soil Hyd Loading Rate:	0.5	gpd/ft^2
Benchmark:			100	ft			

Benchmarck Location: Bottom of Apron @ SW Corner of Existing building. - See Map

Differences between soil survey and field evaluation: There was no observed loam below silt loam. Depth of layers

Site evaluation issues / comments: Access for construction from NW corner of site.

Anticipated construction issues:

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.02.2019

Client:	**Carmelite Monastery**	Location / Address:	8249 Demontreville Trail N, Lake Elmo

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

Landscape Position: (check one) ☑ Summit ☐ Shoulder ☐ Back/Side Slope ☐ Foot Slope ☐ Toe Slope — Slope shape: Convex, Linear

Vegetation:	Grass	Soil survey map units:	49	Slope %:	2.0	Elevation:	101.4

Weather Conditions/Time of Day:	Sunny / 1:15 pm	Date	04/19/19
Observation #/Location:	SB1 - Mound - See Map	Observation Type:	Auger

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0-9	Silt Loam	<35%	10YR 3/4				Blocky	Weak	Friable
9-14	Silt Loam	<35%	10YR 6/6				Blocky	Strong	Firm
14-20	Clay Loam	<35%	10YR 6/8	10YR 6/2	Depletions	S1	Blocky	Strong	Firm
				10YR 5/8	Concentrations	S1			

Comments: LL= 14" - 100.2'

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

Jesse Kloeppner		**L4043**	**4/19/2019**
(Designer/Inspector)	(Signature)	(License #)	(Date)

Additional Soil Observation Logs

Project ID:

University of Minnesota Onsite Sewage Treatment Program

Client:	Carmelite Monastery			Location / Address:	8249 Demontreville Trail N, Lake Elmo		
Soil parent material(s): (Check all that apply)	☐ Outwash	☐ Lacustrine	☑ Loess	☐ Till	☐ Alluvium	☐ Bedrock	☐ Organic Matter
Landscape Position: (check one)	☑ Summit	☐ Shoulder	☐ Back/Side Slope	☐ Foot Slope	☐ Toe Slope	Slope shape	Convex, Linear
Vegetation:	Grass	Soil survey map units:	49	Slope %:	2.0	Elevation:	101.4
Weather Conditions/Time of Day:	Sunny / 2:45 pm				Date:	04/19/19	
Observation #/Location:	SB2 - Mound - See Map				Observation Type:	Auger	

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0-8	Silt Loam	<35%	10YR 3/3				Blocky	Weak	Friable
8-15	Silt Loam	<35%	10YR 5/6				Blocky	Strong	Firm
			10YR 4/6						
15-20	Sandy Clay Loam	<35%	10YR 4/6	10YR 6/4	Depletions	S1	Blocky	Strong	Firm
				10YR 5/8	Concentrations	S1			

Comments	LL = 15" - 100.15'

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.02.2019

Client:	**Carmelite Monastery**	Location / Address:	8249 Demontreville Trail N, Lake Elmo

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

Landscape Position: (check one) ☑ Summit ☐ Shoulder ☐ Back/Side Slope ☐ Foot Slope ☐ Toe Slope		Slope shape	Convex, Linear
Vegetation: Grass	Soil survey map units: 49	Slope %: 2.0	Elevation (ft): 101.5
Weather Conditions/Time of Day: Sunny / 1:00 pm		Date:	04/19/19
Observation #/Location: SP1 - Mound - See Map		Observation Type:	Soil Pit

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0-8	Silt Loam	<35%	10YR 3/4				Granular	Weak	Friable
8-15	Silt Loam	<35%	10YR 3/6				Blocky	Strong	Firm
15-20	Clay Loam	<35%	10YR 5/6	10YR 6/4	Depletions	S1	Blocky	Strong	Extremely Firm
				7.5YR 5/8	Concentrations	S1			
20-25	Clay Loam	<35%	10YR 6/8				Blocky	Strong	Extremely Firm
25-27	Sandy Clay	~45%	10YR 6/8	5YR 5/8	Concentrations	S1	Blocky	Strong	Firm

Comments LL = 15" - 99.75'

Additional Soil Observation Logs

Project ID:

University of Minnesota Onsite Sewage Treatment Program

Client:	**Carmelite Monastery**	Location / Address:	8249 Demontreville Trail N, Lake Elmo

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

Landscape Position: (check one) ☑ Summit ☐ Shoulder ☐ Back/Side Slope ☐ Foot Slope ☐ Toe Slope — Slope shape: Convex, Linear

Vegetation:	Grass	Soil survey map units:	49	Slope %: 1.0	Elevation (ft): 101.2

Weather Conditions/Time of Day:	Sunny / 2:55 pm	Date:	04/19/19
Observation #/Location:	SP2 - Mound - See Map	Observation Type:	Soil Pit

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure		
							Shape	Grade	Consistence
0-10	Silt Loam	<35%	10YR 3/3				Granular	Weak	Friable
10-15	Silt Loam	<35%	10YR 3/6				Blocky	Strong	Firm
15-21	Clay Loam	<35%	10YR 6/8	10YR 7/2	Depletions	S1	Blocky	Strong	Extremely Firm
				10YR 5/8	Concentrations	S1			
21-25	Clay Loam	<35%	10YR 6/8	10YR 7/2	Depletions	S1	Blocky	Strong	Extremely Firm

Comments LL = 15" - 100.0'

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.02.2019

Client:	**Carmelite Monastery**	Location / Address:	8249 Demontreville Trail N, Lake Elmo

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

Landscape Position: (check one) ☐ Summit ☑ Shoulder ☐ Back/Side Slope ☐ Foot Slope ☐ Toe Slope

Slope shape: Convex, Linear

Vegetation:	Grass	Soil survey map units: 49	Slope %: 2.0
Elevation (ft):	101.2		

Weather Conditions/Time of Day:	Sunny / 2:30 pm	Date:	04/19/19

Observation #/Location:	SP3 - Secondary - See Map	Observation Type:	Soil Pit

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I Shape	Grade	Consistence
0-8	Silt Loam	<35%	10YR 3/4				Blocky	Weak	Friable
8-15	Silt Loam	<35%	10YR 3/6				Blocky	Strong	Firm
15-20	Clay Loam	<35%	10YR 5/6	10YR 6/4	Depletions	S1	Blocky	Strong	Extremely Firm
				7.5YR 5/8	Concentrations	S1			
20-25	Clay Loam	<35%	10YR 6/8				Blocky	Strong	Firm

Comments LL = 16" - 99.9'

Additional Soil Observation Logs

Project ID:

University of Minnesota Onsite Sewage Treatment Program

Client:	**Carmelite Monastery**	Location / Address:	8249 Demontreville Trail N, Lake Elmo
Soil parent material(s): (Check all that apply)	☐ Outwash ☐ Lacustrine ☑ Loess ☐ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter		
Landscape Position: (check one)	☐ Summit ☑ Shoulder ☐ Back/Side Slope ☐ Foot Slope ☐ Toe Slope	Slope shape	Convex, Linear
Vegetation: Grass	Soil survey map units: 49	Slope %: 2.0	Elevation (ft): 101.3
Weather Conditions/Time of Day:	Sunny / 1:45 pm	Date:	04/19/19
Observation #/Location:	SB3 - Secondary - See Map	Observation Type:	Auger

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0-6	Silt Loam	<35%	10YR 3/4				Blocky	Weak	Friable
6-12	Silt Loam	<35%	10YR 4/4				Blocky	Moderate	Firm
12-15	Clay Loam	<35%	10YR 4/6	10YR 6/8	Concentrations	S1	Blocky	Moderate	Firm
				10YR 7/8	Concentrations	S1			
15-20	Clay Loam	<35%	10YR 5/6				Blocky	Strong	Extremely Firm

Comments LL = 12" - 100.3'

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.02.2019

Client:	**Carmelite Monastery**	Location / Address:	8249 Demontreville Trail N, Lake Elmo

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

Landscape Position: (check one) ☐ Summit ☑ Shoulder ☐ Back/Side Slope ☐ Foot Slope ☐ Toe Slope

Slope shape: Convex, Linear

Vegetation:	Grass	Soil survey map units: 49	Slope %: 2.0
Elevation (ft):	100.3		

Weather Conditions/Time of Day:	Sunny / 3:00 pm	Date:	04/19/19

Observation #/Location:	SB4 - Secondary - See Map	Observation Type:	Auger

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure		
							Shape	Grade	Consistence
0-5	Silt Loam	<35%	10YR 3/3				Blocky	Weak	Friable
5-11	Silt Loam	<35%	10YR 6/6				Blocky	Moderate	Firm
11-15	Clay Loam	<35%	10YR 5/6 10YR 4/4				Blocky	Strong	Extremely Firm
15-20	Clay Loam	<35%	10YR 5/8	10YR 3/6	Concentrations	S1	Blocky	Moderate	Friable
				10YR 6/8	Concentrations	S1			

Comments LL = 15" - 99.0'

Additional Soil Observation Logs

Project ID:

University of Minnesota Onsite Sewage Treatment Program

Client:	**Carmelite Monastery**			Location / Address:	8249 Demontreville Trail N, Lake Elmo
Soil parent material(s): (Check all that apply)	☐ Outwash ☐ Lacustrine ☑ Loess ☐ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter				
Landscape Position: (check one)	☐ Summit ☑ Shoulder ☐ Back/Side Slope ☐ Foot Slope ☐ Toe Slope			Slope shape	Convex, Linear
Vegetation:	Grass	Soil survey map units:	49	Slope %: 2.0	Elevation (ft): 101
Weather Conditions/Time of Day:	Sunny / 3:15 pm			Date:	04/19/19
Observation #/Location:	SB5 - Secondary - See Map			Observation Type:	Auger

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	I-------- Structure----------I		
							Shape	Grade	Consistence
0-8	Silt Loam	<35%	10YR 3/3				Blocky	Weak	Friable
8-11	Silt Loam	<35%	10YR 6/6				Blocky	Moderate	Firm
			10YR 5/4						
11-14	Sandy Clay Loam	<35%	10YR 5/6				Blocky	Strong	Extremely Firm
14-20	Sandy Clay	<35%	10YR 5/8	10YR 6/2	Depletions	S1	Blocky	Strong	Extremely Firm
				7.5YR 5/8	Concentrations	S1			

Comments LL = 14" - 99.8'

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

1. PROJECT INFORMATION

v 04.02.2019

Property Owner/Client:	Carmelite Monastery	Project ID:	
Site Address:	8249 Demontreville Trail N, Lake Elmo	Date:	04/23/19
Email Address:		Phone:	

2. DESIGN FLOW & WASTE STRENGTH

Attach data / estimate basis for Other Establishments

Design Flow: 400 GPD — Anticipated Waste Type: Other Est. - At-Risk

BOD: 269 mg/L — TSS: 70 mg/L — Oil & Grease: 20 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): ____

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: ____

B. Other Establishments:

Waste received by: Gravity — 400 GPD x 3 Days Hyd. Retention Time

Code Minimum **Septic Tank** Capacity: 1200 Gallons In 2 Tanks or Compartments

Recommended **Septic Tank** Capacity: 2000 Gallons In 2 Tanks or Compartments

Effluent Screen & Alarm (Y/N): Yes — Model/Type: Polylok 525

5. PUMP TANK SIZING

Pump Tank 1 Capacity (Minimum):	500 Gal	Pump Tank 2 Capacity (Minimum):	Gal
Pump Tank 1 Capacity (Recommended):	1000 Gal	Pump Tank 2 Capacity (Recommended):	Gal
Pump 1: 22.0 GPM Total Head	15.6 ft	Pump 2: GPM Total Head	ft
Supply Pipe Dia.: 2.00 in Dose Vol:	80.0 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:	Bottom of Apron @ SW corner
MPCA System Type:		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	
Limiting Condition:	14	inches	1.2	ft	100.2	ft
Minimum Req'd Separation:	36	inches	3.0	ft		
					Elevation	
Code Max System Depth:	Mound	inches	-1.8	ft	102.0	ft

Critical for system compliance

This is the maximum 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:	10	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	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	500.0 ft^2	Bed Length	50.0 ft	Bed Width	10.0 ft
Absorption Width	26.0 ft	Clean Sand Lift	1.8 ft	Berm Width (0-1%)	ft
Upslope Berm Width	15.3 ft	Downslope Berm	20.0 ft	Endslope Berm Width	17.3 ft
Total System Length	84.7 ft	System Width	45.3 ft	Contour Loading Rate	10.0 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	3		Perforation Spacing	3	ft	Perforation Diameter	3/16	in
Lateral Diameter	1.50	in	Min Dose Volume	63	gal	Max Dose Volume	100	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

400 gpd X 269 mg/L X 8.35 ÷ 1,000,00 = 0.90 lbs. BOD/day

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

400 gpd X 269 mg/L X 8.35 ÷ 1,000,00 = 0.90 lbs. BOD/day

Lbs. BOD To Be Removed: 0.00

PreTreatment Technology: _____ *Must Meet or Exceed Target

Disinfection Technology: _____ *Required for Levels A & B

C. Organic Loading to Soil Treatment Area:

269 mg/L X 400 gpd x 8.35 ÷ 1,000,000 ÷ 1300 ft^2 = 0.00069 $lbs./day/ft^2$

10. Comments/Special Design Considerations:

The Soil Treatment Area is designed to handle potential <u>At-risk Organic Loading Rate of BOD</u> (269 mg/L).

- 0.90 [#/day] /.0007 [BOD Organic Loading #/sqft for Silt Loam] = 1,286 sqft required.

- Mound Absorption Area = 50' x 26' = 1,300 sqft

All Mound Materials Calculations are only estimates. Actual material amounts & weights may vary.

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

Jesse Kloeppner		L4043	4/23/2019
(Designer)	(Signature)	(License #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Mound Design Worksheet
≥1% Slope

MINNESOTA POLLUTION CONTROL AGENCY

1. SYSTEM SIZING: Project ID: v 04.02.2019

A. Design Flow:	400	GPD
B. Soil Loading Rate:	0.50	GPD/ft^2
C. Depth to Limiting Condition	1.2	ft
D. Percent Land Slope:	2.0	%
E. Design Media Loading Rate:	1.0	GPD/ft^2
F. Mound Absorption Ratio:	2.60	

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 = ft^2

400 GPD ÷ 1.0 GPD/ft^2 = 400 ft^2

If a larger dispersal media area is desired, enter size: 500 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 1.0 GPD/ft^2 = 10.0 gal/ft *Can not exceed Table 1*

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

500 ft^2 ÷ 10.0 ft = 50.0 ft

3. ABSORPTION AREA SIZING

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

10.0 ft X 2.6 = 26.0 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

26.0 ft - 10.0 ft = 16.0 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. Calculate Minimum Clean Sand Lift: 3 feet minus Depth to Limiting Condition = Clean Sand Lift

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

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

1.8 ft + 0.8 ft + 1.5 ft = 4.1 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 = Upslope Berm Width

3.70 ft X 4.1 ft = 15.3 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 = Downslope Height

4.1 ft + 0.20 ft = 4.3 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: Multiplier X Downslope Height = Downslope Berm Width

4.35 x 4.3 ft = 18.9 ft

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

16.0 ft + 4 ft = 20.0 ft

J. Design Downslope Berm = greater of 4H and 4I: 20.0 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 4.3 ft = 17.3 ft

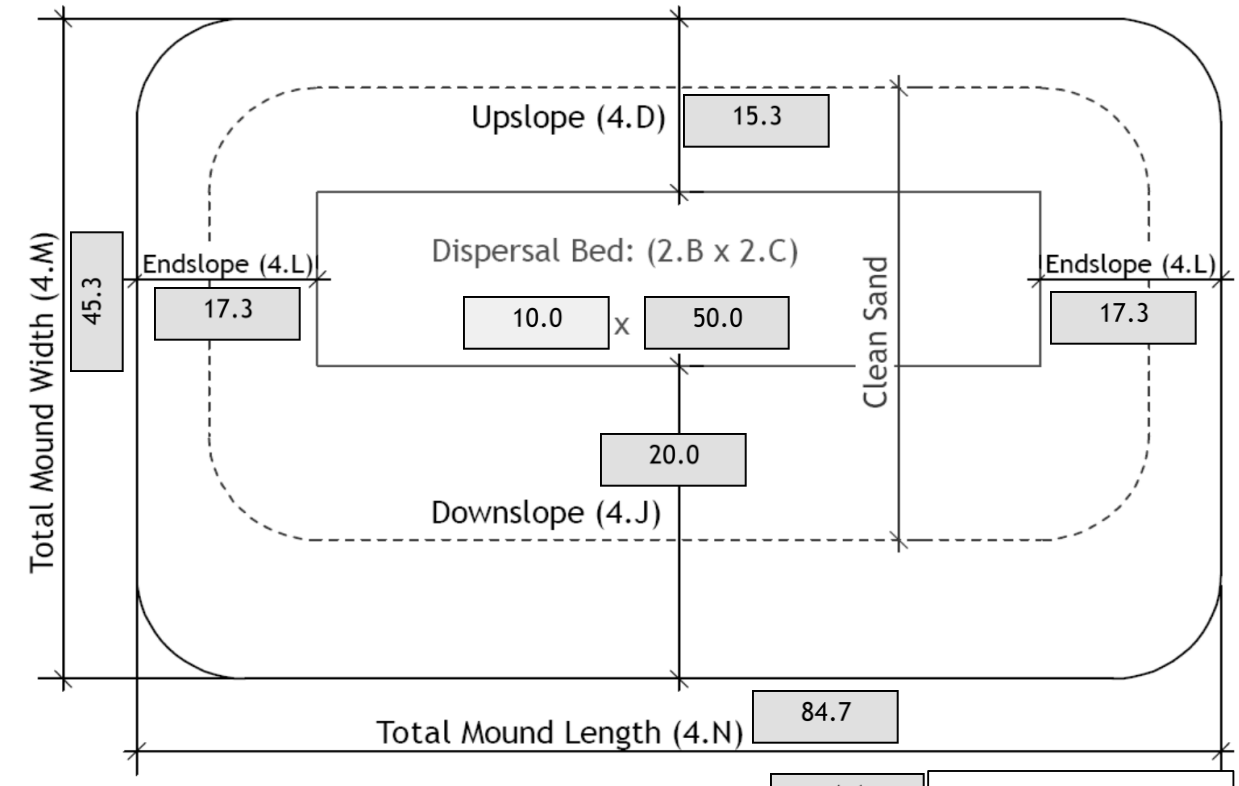
M. Calculate Mound Width: Upslope Berm Width + Bed Width + Downslope Berm Width

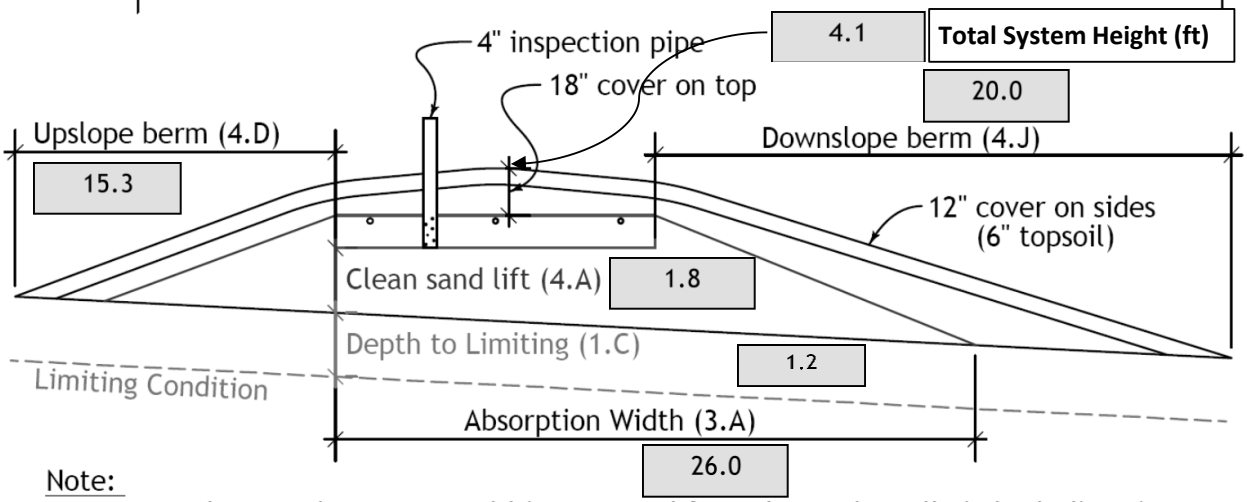
15.3 ft + 10.0 ft + 20.0 ft = 45.3 ft

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

17.3 ft + 50.0 ft + 17.3 ft = 84.7 ft

7. MOUND DIMENSIONS Project ID:





Note:
For 0 to 1% slopes, *Absorption Width* is measured from the *Bed* equally in both directions.
For slopes >1%, *Absorption Width* is measured downhill from the upslope edge of the *Bed*.

Comments:

All berms calculated at 4:1 ratio. Additional material may be needed on downslope to properly grade with hillside.

University of Minnesota Onsite Sewage Treatment Program

Mound Materials Worksheet

Minnesota Pollution Control Agency

Project ID:

v 04.02.2019

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

(6 in + 3.5 in) ÷ 12 | 50.0 ft X 10.0 ft = 395.8 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 395.8 ft^3 ÷ 27 = 14.7 yd^3

Add 30% for constructability: 14.7 yd^3 X 1.3 = 19.1 yd^3

B. Calculate *Clean Sand Volume:*

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

2.2 ft X 10.0 ft X 50.0 ft = 1116.7 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)

(ft - 1) X X ft =

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

(ft - 1) X X ft =

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

ft^3 + ft^3 + ft^3 = 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

((4.1 ft - 1) X 3.0 ft X 50.0) ÷ 2 = 235.0 ft^3

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

((4.3 ft - 1) X 16.0 ft X 50.0) ÷ 2 = 1333.3 ft^3

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

(4.3 ft - 1) X 3.0 ft X 10.0 ft = 100.0 ft^3

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

235.0 ft^3 + 1333.3 ft^3 + 100.0 ft^3 + 1116.7 ft^3 = 2785.0 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 2785.0 ft^3 ÷ 27 = 103.1 yd^3

Add 30% for constructability: 103.1 yd^3 X 1.3 = 134.1 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

(4.2 - 0.5)ft X 45.3 ft X 84.7) ÷ 2 = 7158.4 ft^3

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

7158.4 ft^3 - 2785.0 ft^3 - 395.8 ft^3 = 3977.5 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 3977.5 ft^3 ÷ 27 = 147.3 yd^3

Add 30% for constructability: 147.3 yd^3 x 1.2 = 191.5 yd^3

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

45.3 ft X 84.7 ft X 0.5 ft = 1917.4 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 1917.4 ft^3 ÷ 27 = 71.0 yd^3

Add 30% for constructability: 71.0 yd^3 x 1.3 = 54.6 yd^3

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: 10 ft

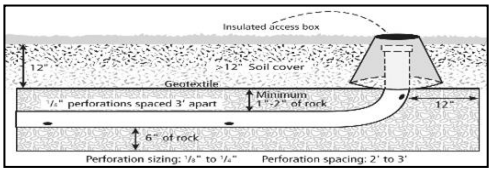
2. Minimum Number of Laterals in system/zone = Rounded up number of [(Media Bed Width - 4) ÷ 3] + 1.

   [(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:* 3/16 in



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

   50.0 - 2ft = 48.0 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 = 48.0 ft ÷ 3.0 ft = 16 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 = 16 Spaces + 1 = 17 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	1¼	1½	2	3		1	1¼	1½	2	3
2	10	13	18	30	60	2	11	16	21	34	68
2½	8	12	16	28	54	2½	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	1¼	1½	2	3		1	1¼	1½	2	3
2	12	18	26	46	87	2	21	33	44	74	149
2½	12	17	24	40	80	2½	20	30	41	69	135
3	12	16	22	37	75	3	20	29	38	64	128

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

   17 Perf. Per Lat. X 3 Number of Perf. Lat. = 51 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)*: 1.50 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)

10	ft	X	50	ft	=	500 ft²

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

500	ft²	÷	51	perforations	=	9.8 ft²/perforations

13. Select *Minimum Average Head*: 1.0 ft

14. Select *Perforation Discharge* (GPM) based on Table: 0.41 GPM per Perforation

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

51	Perfs	X	0.41	GPM per Perforation =		22 GPM

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

17. *Volume of Distribution Piping* =

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

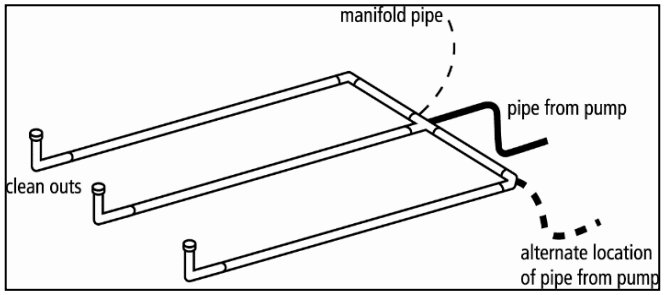
3	X	48	ft	X	0.110	gal/ft	=	15.8 Gallons

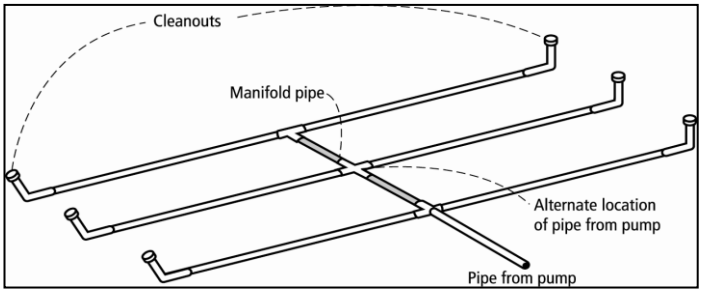
18. Minimum Delivered Volume = Volume of Distribution Piping X 4

15.8	gals	X	4	= 63.4 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

1. PUMP CAPACITY Project ID: v 04.02.2019

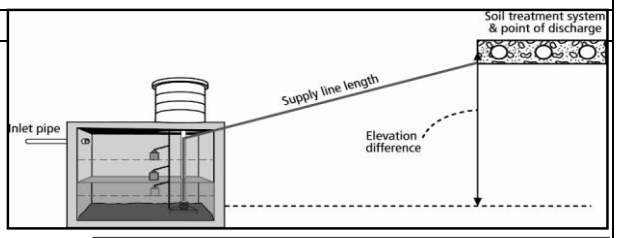
Pumping to Gravity or Pressure Distribution: Pressure

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: 22.0 GPM

3. Enter pump description: Demand Dosing

2. HEAD REQUIREMENTS



A. Elevation Difference between pump and point of discharge: 9 ft

B. Distribution Head Loss: 5 ft

C. Additional Head Loss: 0.0 ft (due to special equipment, etc.)

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

D. 1. Supply Pipe Diameter: 2.0 in

2. Supply Pipe Length: 95 ft

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

Friction Loss = 1.34 ft per 100ft of pipe

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

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*

95 ft X 1.25 = 118.8 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 =

1.34 ft per 100ft X 118.8 ft ÷ 100 = 1.6 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)

9.0 ft + 5.0 ft + 0.0 ft + 1.6 ft = 15.6 ft

3. PUMP SELECTION

A pump must be selected to deliver at least **22.0** GPM (Line 1 or Line 2) with at least **15.6** feet of total head.

Comments:

Pump Tank Design Worksheet (Demand Dose)

DETERMINE TANK CAPACITY AND DIMENSIONS Project ID: v 04.02.2019

1. A. *Design Flow (Design Sum.1A)* : 400 GPD C. Tank Use: **Dosing**
   B. Min. required pump tank capacity: 500 Gal D. Recommended pump tank capacity: 1000 Gal

2. A. Tank Manufacturer: Minnesota Precast B. Tank Model: 1000 Pump Tank
   C. Capacity from manufacturer: 1000 Gallons
   D. Gallons per inch from manufacturer: 25.0 Gallons per inch
   E. Liquid depth of tank from manufacturer: 40.0 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* (2C or 3E)

(10 in + 2 inches) X 25.0 Gallons Per Inch = 300 Gallons

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

-Item 18 of the Pressure Distribution or Item 11 of Non-level 63 **Gallons (Minimum dose)** 2.5 inches/dose

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

Design Flow: 400 GPD X 0.25 = 100 **Gallons (Maximum dose)** 4.0 inches/dose

6 *Select a pumpout volume that meets both Minimum and Maximum:* 80 Gallons

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

400 gpd ÷ 80 gal = 5.00 *Doses*

8 Calculate Drainback:

A. *Diameter of Supply Pipe* = 2 inches

B. Length of Supply Pipe = 95 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*

95 ft X 0.170 gal/ft = 16.2 Gallons

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

80 gal + 16.2 gal = 96 Gallons

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

3 in X 25.0 gal/in = 75.0 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

96 gal ÷ 25.0 gal/in = 3.8 Inches

12. Measuring from bottom of tank:

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

10 in + 2 in = 12 Inches

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

12 in + 3.8 in = 16 Inches

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

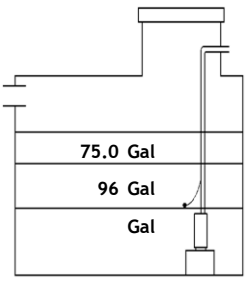
16 in + 3.0 in = 19 Inches

Inches for Dose: 3.8 in

Alarm Depth 18.8 in

Pump On 15.8 in

Pump Off 12.0 in



University of Minnesota Onsite Sewage Treatment Program

Flow Estimation: Other Establishments

Minnesota Pollution Control Agency

v 04.02.2019

Establishment	*7081* Specified Type of Establishment	Unit	# of Units	Design Flow per Unit (See Table I)	Total Avg Daily Flow
1	Assembly hall	seat	80	4.00	320
1	Assembly hall	employee	2	15.00	30
				Total Flow 7081 Establishments (gpd)	350
				Safety Factor (gpd)	50.00
				Total Flow 7081 Establishments (gpd)	400.00

Establishment	*7081* Specified Type of Establishment - *BOD*	Unit	# of Units	Design Pounds / Day	Total Avg Daily Flow
1	Assembly hall	seat	80	0.01	0.8
1	Assembly hall	employee	2	0.05	0.1
				Total Orangic Load 7081 Establishments BOD (lbs/unit/day)	0.90
				Total Orangic Load 7081 Establishments BOD (mg/L/day)	269

Estimate of Waste Strengths from Other Establishments

Type of Facility	BOD_5 (mg/L)	BOD_5 (lbs/unit/day)
Airports		
Per passenger	400 - 500	0.02
Per employee	400 - 500	0.05
Apartment houses	240 - 400	0.175/multiple family
Assembly hall (no kitchen)	240 - 400	0.01/seat
Boarding school	240 - 400	
Bowling alley (no kitchen)	240 - 400	0.15/lane
Camps		
Construction (Semi-permanent)	400 - 500	0.140
Country club (member)	400 - 500	0.052/member
Country club (resident)	240 - 400	0.208/resident
Day (no meals)	400 - 500	0.031
Luxury	400 - 500	0.208
Church (no kitchen)	240 - 400	0.02/seat
Country club	400 - 800	0.208/member
Personnel addition	240 - 400	0.04/employee
Day school	240 - 400	0.031/student
Add for showers	240 - 400	0.011/student
Add for cafeteria	500 - 700	0.031/meal
Factory		
No showers	240 - 400	0.073/employee
With showers	240 - 400	0.083/employee
Food service		
Ordinary restaurant	600 - 1500	0.35/seat
24-Hour restaurant	600 - 1500	0.50/seat
Freeway restaurant	600 - 1500	0.70/seat
Tavern (limited food)	400 - 800	0.10/seat
Carry-out (single service)	600 - 800	0.70/100 sqft
Carry-out	200 - 600	0.04/employee
Fast food chain	1000 - 2000	0.80/seat
Kitchen Waste	600 - 1500	0.015/meal
Toilet and Kitchen Waste	600 - 1500	0.021/customer
Additional for bars & cocktail lounges	600 - 1500	0.01/customer
Hospital (not including personnel)	400 - 600	0.518/bed
Laundromat	600 - 800	2.0/machine
Mobile home park	240 - 400	0.40/space
Mobile home park	240 - 400	0.140/person
Motel, Hotel	240 - 400	0.083/bed
Motel, Hotel	240 - 400	0.14/person
Nursing home (not including kitchen or laundry)	400 - 600	0.26/bed
Office building (per 8 hour shift)	240 - 400	0.05/employee
Park, toilets only	400 - 600	0.01/person
Park, bathhouse and flush toilets	240 - 400	0.021/person
Resort hotel, cottage	240 - 400	0.15/room
Add for self-service laundry	600 - 800	2.0/machine
Service station	240 - 400	0.50/toilet or urinal
Service station	240 - 400	0.021vehicle served
Shopping center (no food service or laundry)	400 - 600	0.30/1000 sqft
Shopping center (no food service or laundry)	400 - 600	0.050/employee
Sports Stadium	400 - 600	0.20/person
Swimming pool	300 - 500	0.021/person
Theaters		
Drive-in	400 - 500	0.010/car space
Indoor	240 - 400	0.010/seat
Travel trailer or RV park		
No water/sewer hook up	400 - 800	0.25/space
With water and sewer	400 - 800	0.35/space

UNIVERSITY OF MINNESOTA

Septic System Management Plan for Above Grade Systems

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

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

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

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

Property Owner	Carmelite Monestary	Email	
Property Address	8249 DeMontreville Trail N, Lake Elmo, MN 55402	Property ID	
System Designer	Jesse Kloeppner	Contact Info	763-843-4114
System Installer	Capra's Utilities	Contact Info	651-762-2500
Service Provider/Maintainer		Contact Info	
Permitting Authority	Washington County	Contact Info	
Permit #		Date Inspected	

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

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

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

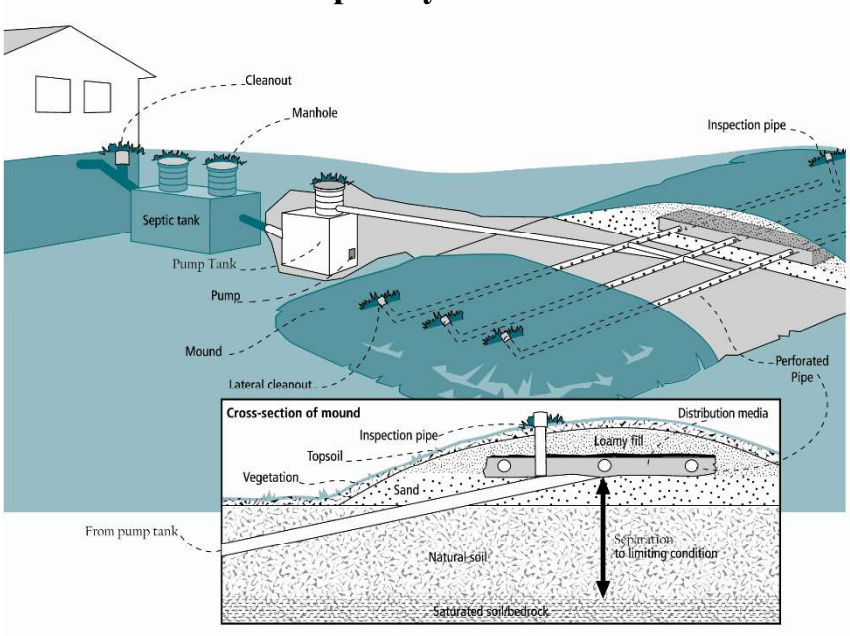
For more information see http://septic.umn.edu

Version: August 2015

UNIVERSITY OF MINNESOTA

Septic System Management Plan for Above Grade Systems

Your Septic System



Septic System Specifics

System Type: (●) I ( ) II ( ) III ( ) IV* ( ) V*

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

**Additional Management Plan required*

☐ System is subject to operating permit*

☐ System uses UV disinfection unit*

Type of advanced treatment unit _____

Dwelling Type

Number of bedrooms: Assembly Hall (no kitchen)

System capacity/ design flow (gpd): 400

Anticipated average daily flow (gpd): 280

Comments_____

Business? : (●) Y ( ) N What type? Church

Well Construction

Well depth (ft): _____

- ❑ Cased well Casing depth: _____
- ❑ Other (specify): _____

Distance from septic (ft): > 50

Is the well on the design drawing? (●) Y ( ) N

Septic Tank

- ❑ First tank *Tank volume:* 1000 *gallons*
  Does tank have two compartments? ( ) Y (●) N
- ❑ Second tank *Tank volume:* 1000 *gallons*
- ❑ Tank is constructed of Concrete
- ❑ Effluent screen: (●) Y ( ) N Alarm (●) Y ( ) N

- ❑ Pump Tank 1000 *gallons*
- ❑ Effluent Pump *make/model*: Installer Choice
  Pump capacity 22 GPM
  TDH 16 Feet of head
- ❑ Alarm location TBD

Soil Treatment Area (STA)

Mound/At-Grade area (width x length): 45.3 ft x 84.7 ft

Rock bed size (width x length): 10 ft x 50 ft

Location of additional STA: South of New Mound

Type of distribution media: Rock

☑ Inspection ports ☑ Cleanouts

☑ Surface water diversions

☐ Additional STA not available

Homeowner Management Tasks

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

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

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

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

Seasonally or several times per year

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

Annually

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

During each visit by a service provider or pumper/maintainer

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

Professional Management Tasks

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

Plumbing/Source of Wastewater

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

Septic Tank/Pump Tanks

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

Pump

- *Pump and controls.* Check to make sure the pump and controls are operating correctly.
- *Pump vault.* Check to make sure it is in place; clean per manufacturer recommendations.
- *Alarm*. Verify that the alarm works.
- *Drainback.* Check to make sure it is draining properly.
- *Event counter or elapsed time meter.* Check to see if there is an event counter or elapsed time meter for the pump. If there is one or both, calculate the water usage rate and compare to the anticipated use listed on Design and Page 2. Dose Volume: 80 gallons: Pump run time: On Demand Minutes

Soil Treatment Area

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

All other components – evaluate as listed here:

Water-Use Appliances and Equipment in the Home

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

Homeowner Maintenance Log

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

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

*Monthly

**Quarterly

***Bi-Annually

Notes:

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

Property Owner Signature: Date

Management Plan Prepared By: Jesse Kloeppner Certification # C8188

Permitting Authority: Washington County

Soil Map—Washington County, Minnesota
(8249 Demontreville Trail N, Lake Elmo)

Map Scale: 1:728 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 35 70 140 210

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Washington County, Minnesota
Survey Area Data: Version 14, Oct 9, 2018

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

Date(s) aerial images were photographed: Jul 1, 2013—Sep 13, 2016

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
49	Antigo silt loam, 0 to 2 percent slopes	2.5	100.0%
Totals for Area of Interest		**2.5**	**100.0%**

Washington County, Minnesota

49—Antigo silt loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tnz7
Elevation: 690 to 1,900 feet
Mean annual precipitation: 27 to 36 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 80 to 150 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Antigo and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Antigo

Setting

Landform: Flats, terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Loess and/or silty glaciofluvial deposits over loamy glaciofluvial deposits over stratified sandy and gravelly outwash

Typical profile

Ap - 0 to 9 inches: silt loam
E - 9 to 12 inches: silt loam
B/E - 12 to 19 inches: silt loam
Bt1 - 19 to 28 inches: silt loam
2Bt2 - 28 to 31 inches: loam
2Bt3 - 31 to 33 inches: very gravelly sandy loam
3C - 33 to 79 inches: stratified sand to very gravelly coarse sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Forage suitability group: Mod AWC, adequately drained (G090BY005WI)
Other vegetative classification: Acer saccharum/Hydrophyllum (AH), Acer saccharum/Viola-Osmorhiza (AViO)
Hydric soil rating: No

Minor Components

Billyboy

Percent of map unit: 8 percent
Landform: Flats, terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Acer saccharum/Caulophyllum-Circaea (ACaCi), Acer saccharum/Hydrophyllum (AH), Acer saccharum-Tsuga/Maianthemum (ATM), Acer saccharum/Viola-Osmorhiza (AViO)
Hydric soil rating: No

Sconsin

Percent of map unit: 5 percent
Landform: Flats, terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Acer saccharum/Caulophyllum-Circaea (ACaCi), Acer saccharum/Hydrophyllum (AH), Acer saccharum-Tsuga/Maianthemum (ATM), Acer saccharum/Viola-Osmorhiza (AViO)
Hydric soil rating: No

Rosholt

Percent of map unit: 3 percent
Landform: Flats, terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Other vegetative classification: Acer saccharum/Vaccinium-Desmodium (AVDe), Acer saccharum/Athyrium (AAt), Acer saccharum/Caulophyllum-Circaea (ACaCi), Acer saccharum-Quercus/Viburnum=(Vaccinium) (AQVb-V)
Hydric soil rating: No

Brill

Percent of map unit: 2 percent
Landform: Flats, terraces
Landform position (three-dimensional): Tread, rise
Down-slope shape: Linear

Across-slope shape: Linear
Other vegetative classification: Acer saccharum/Athyrium (AAt), Acer saccharum/Caulophyllum-Circaea (ACaCi)
Hydric soil rating: No

Ossmer

Percent of map unit: 2 percent
Landform: Flats, terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, concave
Across-slope shape: Linear
Other vegetative classification: Acer saccharum/Hydrophyllum (AH), Acer saccharum-Tsuga/Maianthemum (ATM), Acer saccharum/Viola-Osmorhiza (AViO), Tsuga/Maianthemum-Coptis (TMC)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Washington County, Minnesota
Survey Area Data: Version 14, Oct 9, 2018

Map Scale: 1:656 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 5 10 20 30

Feet
0 30 60 120 180

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Extremely limited
- Very limited
- Moderately limited
- Slightly limited
- Not limited
- Not rated or not available

Soil Rating Lines

- Extremely limited
- Very limited
- Moderately limited
- Slightly limited
- Not limited
- Not rated or not available

Soil Rating Points

- Extremely limited
- Very limited
- Moderately limited
- Slightly limited
- Not limited
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Washington County, Minnesota
Survey Area Data: Version 14, Oct 9, 2018

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

Date(s) aerial images were photographed: Jul 1, 2013—Sep 13, 2016

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

Septic Tank Absorption Fields — At-Grade (MN)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
49	Antigo silt loam, 0 to 2 percent slopes	Very limited	Antigo (80%)	>= 35% Rock Frags (0.90)	2.2	100.0%
Totals for Area of Interest					**2.2**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Very limited	2.2	100.0%
Totals for Area of Interest	**2.2**	**100.0%**

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Septic Tank Absorption Fields -- Mound (MN)—Washington County, Minnesota
(8249 Demontreville Trail N, Lake Elmo)

Map Scale: 1:728 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 35 70 140 210

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

MAP LEGEND

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

Soils

Soil Rating Polygons
- Extremely limited
- Very limited
- Moderately limited
- Slightly limited
- Not limited
- Not rated or not available

Soil Rating Lines
- Extremely limited
- Very limited
- Moderately limited
- Slightly limited
- Not limited
- Not rated or not available

Soil Rating Points
- Extremely limited
- Very limited
- Moderately limited
- Slightly limited
- Not limited
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Washington County, Minnesota
Survey Area Data: Version 14, Oct 9, 2018

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

Date(s) aerial images were photographed: Jul 1, 2013—Sep 13, 2016

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

Septic Tank Absorption Fields — Mound (MN)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
49	Antigo silt loam, 0 to 2 percent slopes	Not limited	Antigo (80%)		2.5	100.0%
			Billyboy (8%)			
			Rosholt (3%)			
Totals for Area of Interest					**2.5**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Not limited	2.5	100.0%
Totals for Area of Interest	**2.5**	**100.0%**

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Map Scale: 1:656 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 5 10 20 30

Feet
0 30 60 120 180

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

MAP LEGEND

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

Soils

Soil Rating Polygons
- Extremely limited
- Very limited
- Moderately limited
- Slightly limited
- Not limited
- Not rated or not available

Soil Rating Lines
- Extremely limited
- Very limited
- Moderately limited
- Slightly limited
- Not limited
- Not rated or not available

Soil Rating Points
- Extremely limited
- Very limited
- Moderately limited
- Slightly limited
- Not limited
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Washington County, Minnesota
Survey Area Data: Version 14, Oct 9, 2018

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

Date(s) aerial images were photographed: Jul 1, 2013—Sep 13, 2016

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

Septic Tank Absorption Fields — Trench (MN)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
49	Antigo silt loam, 0 to 2 percent slopes	Very limited	Antigo (80%)	>= 35% Rock Frags (0.90)	2.2	100.0%
				Excessive percolation (0.11)		
Totals for Area of Interest					**2.2**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Very limited	2.2	100.0%
Totals for Area of Interest	**2.2**	**100.0%**

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Minnesota Department of Health

Minnesota Well Index

Version 2.0.56, 07/13/18 11:48AM

8249 Demo

Search by | Zoom to | Tools | Base Maps | Other Links | Help

Minnesota Department of Health

Minnesota Well Index

Version 2.0.56, 07/13/18 11:48AM

8249 Demontreville Trl N, Lake Elmo, MN, 55

Search by | Zoom to | Tools | Base Maps | Other Links | Help

Well List selected

Highlighted are Field Verified Wells. Click Unique Well ID to see detailed well infomation

Unique Number	Well Name	Address	City	County	Township	Range	Section	Depth(ft)	Elevation(ft)	Casing Depth(ft)	Casing Diameter
489214	CARMELITE MONASTERY	8251 DEMONTREVILLE TR N	LAKE ELMO	Washington	29	21	9	261	1008	201	6

Selected Wells
Public Wells
Domestic Wells
Irrigation Wells
Monitor Wells
Other Wells
Sealed Wells
Unverified Wells
Township Range Section
DWSMA
SWBCA

Zoom to see wells, TRS, DWSMA and SWBCA

DWSMA: The area managed by a public water supplier to protect their source water

SWBCA: Special Well and Boring Construction Area layer