

Fee \$ _____

**City of Lake Elmo
DEVELOPMENT APPLICATION FORM**

- | | | |
|---|---|--|
| <input type="checkbox"/> Comprehensive Plan Amendment
<input type="checkbox"/> Zoning District Amendment
<input type="checkbox"/> Text Amendment
<input type="checkbox"/> Flood Plain C.U.P.
Conditional Use Permit
<input type="checkbox"/> Conditional Use Permit (C.U.P.) | <input checked="" type="checkbox"/> Variance * (See below)
<input type="checkbox"/> Minor Subdivision
<input type="checkbox"/> Lot Line Adjustment
<input type="checkbox"/> Residential Subdivision
Sketch/Concept Plan
<input type="checkbox"/> Site & Building Plan Review | <input type="checkbox"/> Residential Subdivision
Preliminary/Final Plat
<input type="radio"/> 01 – 10 Lots
<input type="radio"/> 11 – 20 Lots
<input type="radio"/> 21 Lots or More
<input type="checkbox"/> Excavating & Grading Permit
<input type="checkbox"/> Appeal
<input type="checkbox"/> PUD |
|---|---|--|

APPLICANT: Suzanne Horning, as Trustee (see attached) 8991 Jane Road North, Lake Elmo, MN 55042
(Name) (Mailing Address) (Zip)

TELEPHONES: 239-765-8708 (Florida Phone Number)
(Home) (Work) (Mobile) (Fax)

FEE OWNER: Suzanne Horning, as Trustee (see attached) 8991 Jane Road North, Lake Elmo, MN 55042
(Name) (Mailing Address) (Zip)

TELEPHONES: 239-765-8708 (Florida Phone Number)
(Home) (Work) (Mobile) (Fax)

PROPERTY LOCATION (Address and Complete (Long) Legal Description): Krause's Addition Lot 9
Subdivision Cd 37425

DETAILED REASON FOR REQUEST: Please see attached.

***VARIANCE REQUESTS:** As outlined in Section 301.060 C. of the Lake Elmo Municipal Code, the Applicant must demonstrate a hardship before a variance can be granted. The hardship related to this application is as follows:
Please see attached.

In signing this application, I hereby acknowledge that I have read and fully understand the applicable provisions of the Zoning and Subdivision Ordinances and current administrative procedures. I further acknowledge the fee explanation as outlined in the application procedures and hereby agree to pay all statements received from the City pertaining to additional application expense.

Suzanne R.W. Horning 4/13/14
Signature of Applicant Date

Signature of Applicant Date



2200 IDS Center
80 South 8th Street
Minneapolis MN 55402-2157
tel 612.977.8400
fax 612.977.8650

February 3, 2014

Christie J. Cirilli
(612) 977-8926
ccirilli@briggs.com

VIA E-MAIL

Kyle Klatt
Planning Director
Lake Elmo City Hall
3800 Laverne Avenue North
Lake Elmo, MN 55042

Re: Application for Variance - Krause's Addition, Lot 9 Subdivision Cd 37425

We represent Suzanne Horning, as Trustee of the Suzanne R.W. Horning Qualified Personal Residence Trust (the "Applicant"), in connection with her application for a variance. The Applicant requests that the City grant a variance for the property legally described as Krause's Addition, Lot 9 Subdivision Cd 37425, located in the City of Lake Elmo (the "Property").

Please find attached as exhibits written statements as required by the Variance Procedure for the City of Lake Elmo. Also included with this letter is (1) the Applicant's completed and signed land use application form; (2) verification of the Applicant's ownership of the Property; (3) address labels for the certified list of property owners located within three hundred fifty (350) feet of the subject property obtained from and certified by a licensed abstractor; (4) the proposed septic design plan for the Property; and (5) copies of a certified survey depicting the Property.

We look forward to working with you in this matter.

Sincerely,

A handwritten signature in blue ink, appearing to read "Christie J. Cirilli".

Christie J. Cirilli

CJC

cc: Sue Horning
Dan Cole

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EXHIBIT A

(List of Current Property Owners/Applicant)

Suzanne R.W. Horning, Trustee of the Suzanne R.W. Horning Qualified Personal Residence Trust under Agreement dated December 26, 2008, by Quit Claim Deed dated December 26, 2008, filed December 31, 2008, as Document No. 3720033.

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EXHIBIT B

(List of Site Data)

1. Legal Description: Krause's Addition, Lot 9 Subdivision Cd 37425
2. Parcel Identification Number: 09.029.21.11.0015
3. Parcel Size (in acres and square feet): 0.785 acres/34,194.6 square feet
4. Existing Use of Land: Vacant parcel
5. Current Zoning: R1 One-Family Residential District

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EXHIBIT C

(Provision of Zoning Code for which Applicant seeks a variance)

The Applicant is seeking a variance under Sections 154.041 and 154.080 of the Zoning Code. Section 154.041, which applies to R-1 One-Family Residential Districts, requires a minimum buildable lot size of 1-1/2 acre per unit without sanitary sewer or 24,000 square feet per unit with sanitary sewer. Section 154.080 contains an exception to this for any "existing lot." An "existing lot" is defined as "a lot or parcel of land in a residential district which was of record as a separate lot or parcel in the office of the County Recorder or Registrar of Titles, on or before the effective date of th[e] chapter." Section 154.080 states that "[a]ny [existing] lot or parcel of land which is in a residential district may be used for single-family detached dwelling purposes, provided the area and width of the lot are within 60% of the minimum requirements of this chapter; provided, all setback requirements of this chapter must be maintained; and provided, it can be demonstrated safe and adequate sewage treatment systems can be installed to serve the permanent dwelling."

The Property at issue therefore qualifies as an exception to the general lot requirements of Section 154.041 and must instead comply with the 60% (0.90 acre) lot requirement of Section 154.080. At 0.785 acres, the Property falls just short of the buildable lot requirements for existing lots in R1 One-Family Residential Districts. As a result, the Applicant is seeking a variance to the existing lot requirement contained in Section 154.080.

Finally, the Applicant is seeking a variance from Section 154.017 of the Zoning Code, which mandates that any variance granted by the City "shall expire if work does not commence within 12 months of the date of granting such variance or if that use ceases for more than 6 consecutive months." Because the Applicant desires to convey the Property to her children through her estate for buildable-lot purposes, any such work performed on the Property would not commence until after the twelve (12) month period required under Section 154.017 of the Zoning Code.

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EXHIBIT D

(Written Description of Proposal)

The Applicant proposes the issuance of a variance to Section 154.080 of the Zoning Code and request that the Property, at 0.785 acres, be characterized as a buildable lot under the Zoning Code.

The Applicant further requests a variance to the requirement under Section 154.017 that work be commenced within twelve (12) months of the variance's issue date. The variance to the buildable lot size will be of no use to the Applicant without a variance to this requirement as well.

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EXHIBIT E

(Narrative of Pre-Application Discussions)

Christie Cirilli, Attorney with Briggs & Morgan, P.A. (the “Applicant’s Counsel”) spoke with Kyle Klatt, the Planning Director for the City of Lake Elmo (the “Planning Director”), on behalf of the Applicant. Applicant’s Counsel discussed Applicant’s pursuance of a variance under Section 154.017 of the Lake Elmo Zoning Code. Applicant’s Counsel inquired regarding the current standard for variances applied by the City of Lake Elmo. The Planning Director confirmed that the “practical difficulties” standard, as discussed in Minnesota Statutes 462.357, had been adopted by the City and incorporated into Section 154.017 of the Lake Elmo Zoning Code.

The Planning Director stated that the Property had been characterized as a non-buildable lot since 1979, but acknowledged that the Property was improperly assessed and taxed as a buildable lot during the Applicant’s ownership of the Property. Applicant’s Counsel explained to the Planning Director that the Property was being assessed and taxed as a buildable lot when the Applicant purchased the Property, and as a result, the Applicant believed she was buying land with buildable lot value. Applicant’s Counsel explained to the Planning Director that the Property was of little or no value to the Applicant or anyone else without characterization as a buildable lot because the Applicant was interested in transferring the Property via her estate to her children for buildable purposes. The Planning Director acknowledged the erroneous taxation of the Property, despite stating that the zoning classification of the property is separate and distinct from the taxation of the parcel – meaning that the fact that the Property was taxed as a buildable lot does not change the fact that it was characterized as unbuildable under the zoning code. The Planning Director confirmed, however, that the fact that the Applicant purchased the parcel at a buildable lot price and for buildable lot value would be considered by the Planning Commission in its decision of whether or not to grant a variance.

The Planning Director explained that he was not sure how much application of the new “practical difficulties” standard would affect the Planning Commission’s analysis and issuance of variances. The Planning Commission has not had many variance applications come before it since the new standard took effect. The Planning Director informed Applicant’s Counsel that, if the Planning Commission were to grant a variance for the Property, work would have to be commenced on the Property within 12 months of the date the variance was granted – otherwise, the variance would expire. Applicant’s Counsel responded that this may be an issue for Applicant, and an additional variance may be requested to waive this requirement.

The Applicant also separately had conversations with the City regarding her Property. In particular, the Applicant spoke with Dean Zuleger, the City Administrator for the City of Lake

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Elmo, who informed the Applicant that he was unaware of any issues with the buildable nature of the Property. Mr. Zuleger acknowledged that other buildable lots in the area were of a similar size to the Property and that he did not see any reason why the Property should not be buildable as well. The discussions with Mr. Zuleger also revealed a prior variance that was issued for the Property in 1985. Upon following up with the Planning Director, there was not much information on file with the City regarding said variance, only that a variance was issued at that time regarding the buildable nature of the Property. This prior variance supports the current application for a variance for the Property.

The Applicant's Counsel further had discussions with Mr. Klatt regarding a variance passed by the Lake Elmo City Council on October 15, 2013, which variance was passed despite a recommendation from the Planning Commission to deny such variance. The property related to the variance request was of a considerably smaller size than the Applicant's property and was located on the shoreline. Mr. Klatt explained that the primary reason for granting the variance was that the property had room for adequate septic systems, and as a result the City Council passed the variance.

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EXHIBIT F

(Explanation of Applicant's Practical Difficulties)

Section 154.017 of the Zoning Code states that a variance shall be granted "where strict enforcement of the [Zoning Code] would cause practical difficulties because of circumstances unique to the individual property under consideration and then only when it is demonstrated that such actions will be in keeping with the spirit and intent of this chapter." Under this Section, the "practical difficulties" standard means that "the property owner proposes to use the property in a reasonable manner not permitted by an official control."

The Applicant is proposing to use the Property in a reasonable manner not permitted by an official control. At 0.785 acres, the Property has been characterized as a non-buildable lot by the Zoning Code, which has a buildable lot size requirement for existing lots of 0.90 acres. The Applicant is proposing to reclassify the Property as a buildable lot prior to her conveyance of the Property through her estate. Given that the Property's acreage constitutes roughly 87% of the buildable lot size requirement, the Property is very close to meeting the required buildable lot size under the Zoning Code. As a result, it is unlikely that any structure built on the Property (that complied with the Zoning Code's building requirements) would be notably more obstructive than structures built on lots meeting the minimum 0.90 acre requirement.

The Property is zoned for residential use and the Applicant will have no use for the Property if it is not classified as a buildable lot. The other lots surrounding the Property are not much larger than the Property and were grandfathered in under the Zoning Code, as the Property at issue should have been. The Property was a platted lot approved by the City at its current size and was intended to be buildable. Therefore, classifying the Property as a buildable lot will not alter the "spirit and intent of the chapter."

Given that the proposed use of the Property is not unreasonable and that the Property should have been previously grandfathered in under the Zoning Code, the Planning Commission should grant a variance given the particularly unusual circumstances of the Applicant, as described on Exhibit G.

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EXHIBIT G

(Explanation of Applicant's Unique Circumstances)

Section 154.017 of the Zoning Code further states that a variance shall only be granted where "[t]he plight of the landowner is due to circumstances unique to the property not created by the landowner." The Applicant at issue has particularly unusual circumstances, which are not by fault of her own.

The Applicant was not the subdivider of the surrounding development and therefore did not create the problem. At the time the Applicant purchased the Property in 1985, the Applicant believed the Property was buildable. The Property was platted and approved by the City at its current size. The surrounding lots were of a similar size and were characterized as buildable. The Applicant paid a buildable lot value for the Property and has been paying taxes, assessed by Washington County, Minnesota, on that buildable lot value for the past twenty-seven (27) years. As a result, the Applicant had good reason to believe that she owned buildable land. The Applicant's belief that the land was buildable affected her decision to purchase and retain the Property.

The Property was specifically characterized as an assessable lot on the City's assessment role on September 10, 1985, at which time the City held a meeting for approval of a special assessment by local property owners. By characterizing the Property as an assessable lot, the City was acknowledging the value the Property was receiving from City improvements and assessing a fee on the Property for those improvements. The Property does not, however, receive any value from City improvements if it is not also buildable. As a result, the City's characterization of the Property as an assessable lot suggests that the Property was intended to be buildable as well.

The Applicant had no reason to believe that her land was not buildable. Any plight of the Applicant was due to the error of other parties. As a result, the Applicant has unique circumstances that she has not created and which justify the City's grant of a variance for the Property.

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EXHIBIT H

(Essential Character of Neighborhood)

In order to obtain a variance from the City, the Applicant is required to show that the issuance of a variance would not alter the essential character of the neighborhood in which the Property is located. In other words, the Property must be consistent and not interfere with the use of the property surrounding it.

The Property is located in Krause's Addition of the City of Lake Elmo. Other lots within Krause's Addition that have houses built on them are not discernibly different in size than the Property. As previously stated, many of these lots were grandfathered in when the Zoning Code requirements changed, and the Property at issue should have been grandfathered in as well. Furthermore, the City Council recently granted a variance on October 15, 2013 for a lot of a considerably smaller size than the Applicant's property, constituting approximately 0.4 acres of land. The City Council's primary reason for granting the variance was that the property had adequate room for appropriate septic systems on the property. The Applicant's Property also has adequate room for appropriate septic systems on the property, with room for both a primary and backup drainfield location, as demonstrated by the septic design submitted in connection with the application. In addition, unlike the property at issue in the October 15, 2013 variance request, the Applicant's property is not located on the shoreline and therefore any building on the Applicant's Property won't interfere with any of the neighboring property rights associated therewith.

Springborn's Green Acres, which adjoins the Property to the North, contains two lots (Lot 2 and Lot 3) that both have less buildable area than the Property at issue, due to drainage and utility easements that bisect each lot. Lot 2 and Lot 3 are shown to each constitute 1.6 acres, but their buildable lot areas are actually only 150 feet by 170 feet due to the easements burdening each lot. Therefore, if granted a variance, the buildable lot area of the Property at issue would be greater than that of both Lot 2 and Lot 3 in Springborn's Green Acres.

Given the size of lots surrounding the Property and adequate room for appropriate septic systems on the property, the issuance of a variance for the Property would not alter the essential character of the neighborhood.

THE HORNING PROPERTY LOT 9, KRAUSE'S ADDITION 49XX JAMACA AVENUE NORTH CITY OF LAKE ELMO, WASHINGTON COUNTY, MINNESOTA



KEMPER & ASSOCIATES INC.
PROFESSIONAL LAND SURVEYORS

NEW MINNESOTA LICENSE #00112
651-421-2288
651-421-2289
Email: kempers@kai-inc.com
www.kemperandassociates.com



VICINITY MAP
(NO SCALE)

FLOODPLAIN SUMMARY
FLOODPLAIN MAPS AND FLOODPLAIN DATA FOR THE CITY OF LAKE ELMO, MINNESOTA, ARE AVAILABLE FROM THE CITY ENGINEER'S OFFICE, 1000 LAKE ELMO AVENUE NORTH, LAKE ELMO, MN 55002. THE CITY ENGINEER'S OFFICE CAN BE REACHED AT (651) 421-2288.

ZONING REQUIREMENTS

THE CITY OF LAKE ELMO, MINNESOTA, HAS A ZONING ORDINANCE THAT GOVERNS THE USE OF LAND IN THE CITY. THE ZONING ORDINANCE IS AVAILABLE FROM THE CITY ENGINEER'S OFFICE, 1000 LAKE ELMO AVENUE NORTH, LAKE ELMO, MN 55002. THE CITY ENGINEER'S OFFICE CAN BE REACHED AT (651) 421-2288.



LOT 9, KRAUSE'S ADDITION
LAKE ELMO, MINNESOTA



LOT 9, KRAUSE'S ADDITION
LAKE ELMO, MINNESOTA



LOT 9, KRAUSE'S ADDITION
LAKE ELMO, MINNESOTA



LOT 9, KRAUSE'S ADDITION
LAKE ELMO, MINNESOTA



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LAKE ELMO, MINNESOTA



LOT 9, KRAUSE'S ADDITION
LAKE ELMO, MINNESOTA

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CERTIFICATE OF SURVEY

12084 (12084.DWG)



CERTIFICATION
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 PROFESSIONAL LAND SURVEYOR UNDER THE LAWS OF THE STATE OF MINNESOTA.
MARK B. KEMPER, PLS 18407
DATED THIS 18th DAY OF June 2012

KRAUSE'S ADDITION

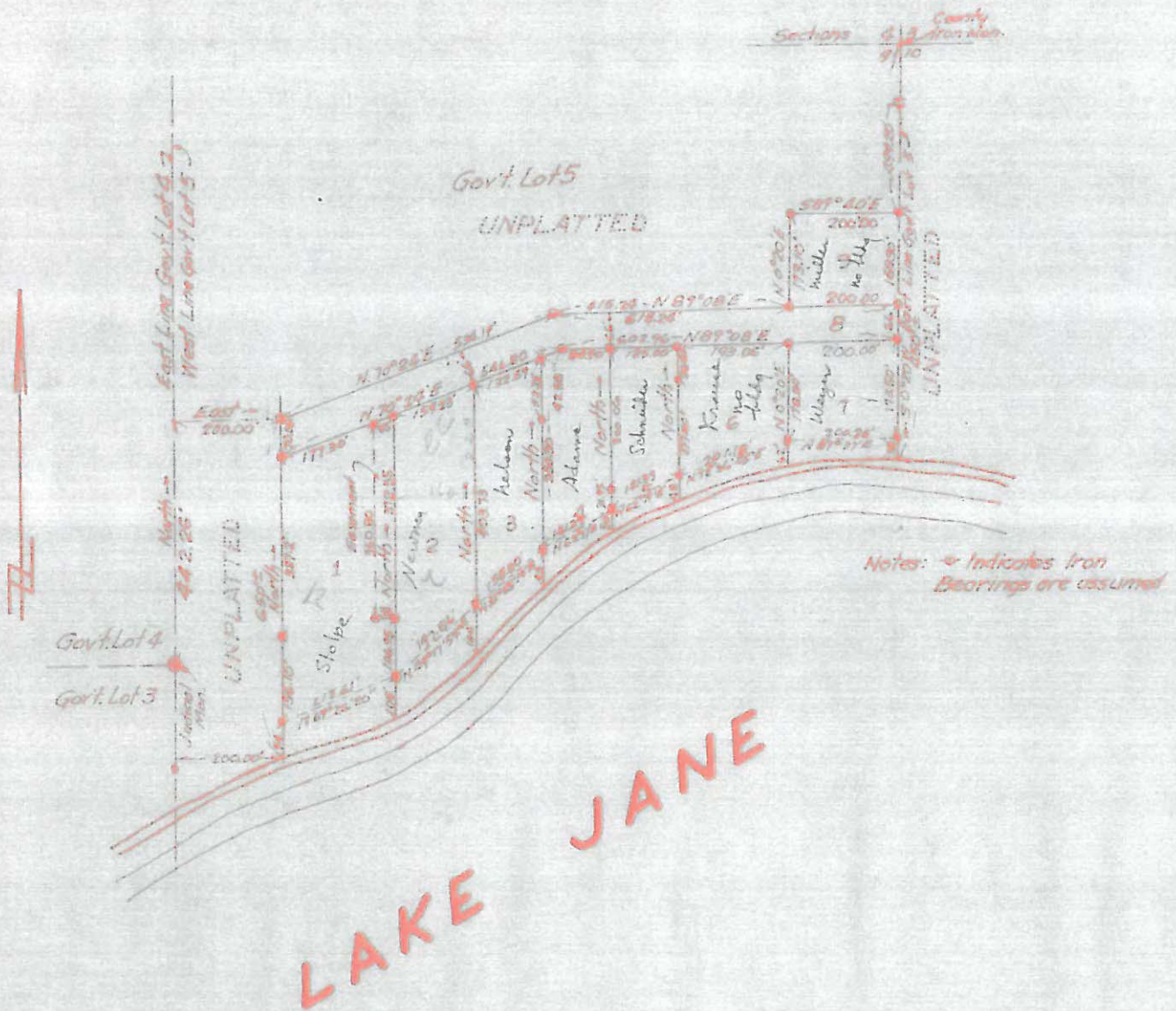
PART OF GOVT. LOT 5 SECTION 9, T. 29 N., R. 21 W.

EAST OAKDALE TOWNSHIP - WASHINGTON COUNTY

MINNESOTA

SCALE: 1" = 200 FT.

J.R. Hoffman
Surveyor



I have surveyed the property described on this plat and to having placed iron monuments at same are correct, there is no undrained road nor easement on or across same the land conveyed in fee in each recorded is the same as the land shown on this plat excepting each particular recorded

This plat approved and accepted by the Town Board of Washington County, Minnesota this 1st day of 1912

Maximilian
Chairman, Town Board

MOUND SYSTEM DESIGN

INDIVIDUAL SEWAGE TREATMENT SYSTEM

Owner's Name	SUZANNE HORNING
Job Site Address	LOT 9, KRAUSE'S ADDITION 49XX JAMACA AVE.
City or Township	LAKE ELMO
Use of Building	SFD

Design Flow Rate	750	Perc Rate	16-30	Land Slope	1	Percent
Two Required Tank Sizes	1500 Gallons 1000 Gallons	Lift Station Tank Size	1200	Gallons		
Rock Bed Width	10	Rock Bed Length	75			
Required Absorption Width	20	Feet		Depth of Clean Sand Fill at Upslope Edge of Rock Layer		Feet
Minimum Downslope Dike Width After Accounting for the Absorption Area			13	Feet		
Minimum Upslope Dike	10	Feet		Minimum Length of Dike	95	Feet
Any Other Special Conditions THIS DESIGN IS INTENDED TO DEMONSTRATE SUITABILITY OF LOT FOR SEPTIC PURPOSES ONLY IN ORDER TO OBTAIN A ZONING VARIANCE. ANY CHANGES OF FUTURE HOUSE OR SEPTIC LOCATION WILL REQUIRE ADDITIONAL TESTING OR SIZING TO SEPTIC SYSTEM						

COMPLETE THE PRESSURE DISTRIBUTION SYSTEM WORK SHEET ATTACHED.

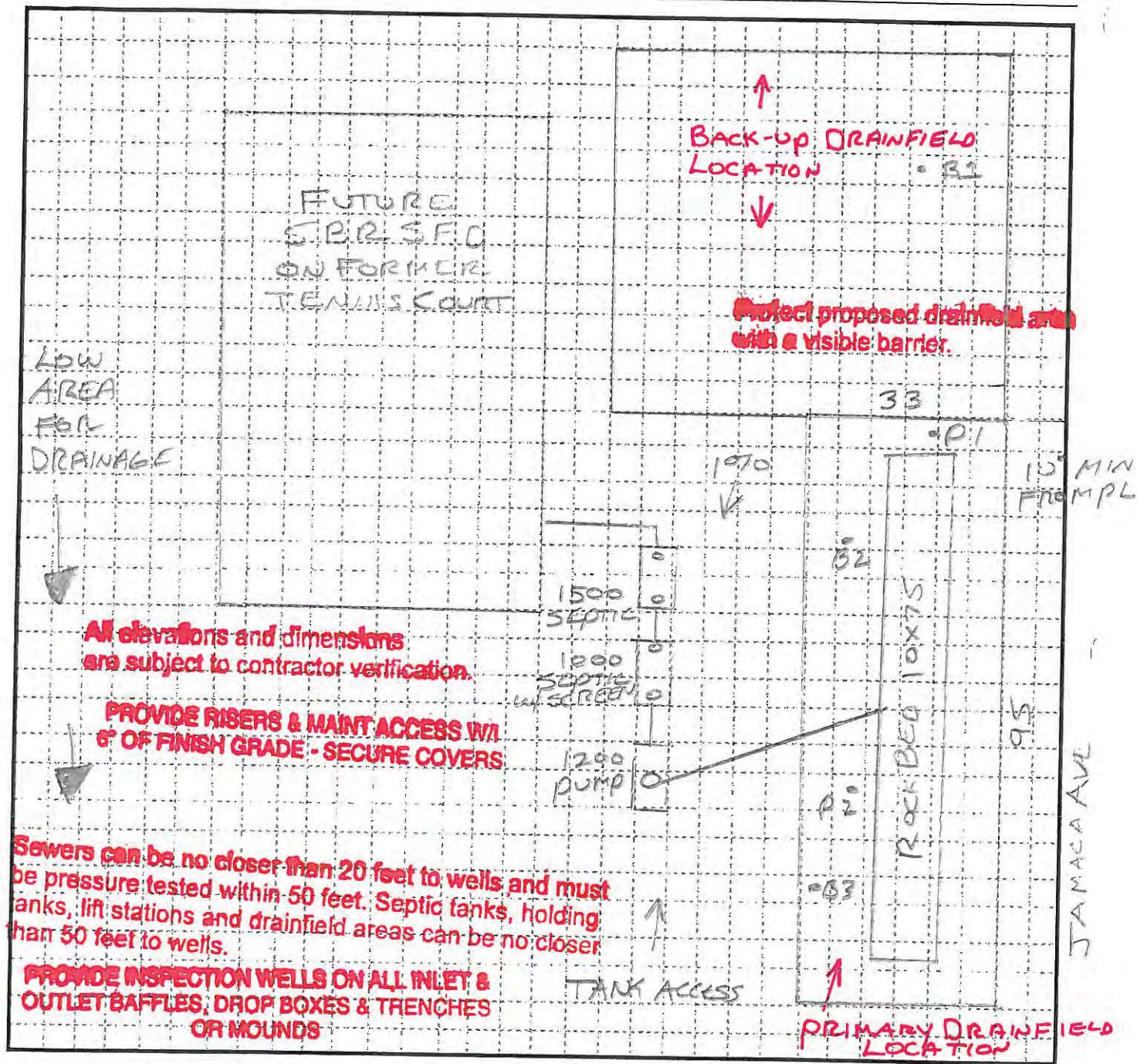
This design <u>must</u> be accompanied by a site plan that clearly shows the location of the area tested and approved by the following (MOUND SYSTEMS SITE PLANS MUST CLEARLY SHOW THE LOCATION OF THE MOUND):	
1.	Use an appropriate scale and indicate direction by use of a north arrow.
2.	Show ALL property boundaries, rights-of-way, easements, wetlands. If necessary, an enlarged detail of house site may also be required.
3.	Show location of house, garage, driveway and all other improvements existing or proposed.
4.	Show location and layout of sewage treatment mound, and back-up mound.
5.	Show location of water supply (well and/or community supply line).
6.	Dimension all setbacks and separation distances.

This system has been designed by a Pollution Control Agency (PCA) Certified Professional.	
Designer Name	TOM TROOEN
PCA Certification #	1568
Address	12020 SQUARE LAKE TR. STILLWATER MN 55080
Phone #	612-594-4496
Signature	Tom Trooen
Date	8-11-12

Site Evaluation Map Date 8-11-12 Site Evaluator TOM TROOEN

Legal location and directions to lot _____

Any surface signs of compaction? _____



Mapping Checklist

Map scale: 1:25

Lot dimensions: JANE ROAD

Indicate north ↑

Locate dwelling _____

and other improvements _____

Locate existing and/or proposed system, _____ replacement area, _____ unsuitable areas _____

Indicate easements: phone _____ electric _____ gas _____ Show slope: _____% direction _____

Indicate setbacks: building 20' _____ property lines 10' _____ water well 100'/50' _____

water suction pipe 50' _____ pressure pipe 10' _____ streams, lakes, rivers 50'/75'/100' _____

Locate borings, perc tests, indicating elevation, _____ horizontal and vertical reference points _____

Is proposed location staked? _____ Accessible for pumping? _____

MOUND DESIGN WORKSHEET

(For Flows up to 1200 gpd)

A. FLOW

Estimated 750 gpd
or measured _____ x 1.5 = _____ gpd.

Estimated Sewage Flows in Gallons per day (gpd)

Number of Bedrooms	Type I	Type II	Type III	Type IV
2	300	225	180	60% of the values in Type I, II or III columns
3	450	300	218	
4	600	375	256	
5	750	450	294	
6	900	525	332	
7	1050	600	370	
8	1200	675	408	

B. SEPTIC TANK LIQUID VOLUMES

1500 gallons + 1000

C. SOILS (refer to site evaluation)

- Depth to restricting layer = 29 inches _____ feet
- Depth of percolation tests = 12 inches
- Texture SILT LOAM Percolation rate 16-30 mpi
- Land slope 1 %

Septic Tank Capacities (in gallons)

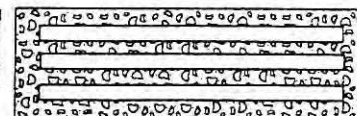
Number of Bedrooms	Minimum Liquid Capacity	Liquid capacity with garbage disposal
2 or less	750	1125
3 or 4	1000	1500
5 or 6	1500	2250
7, 8 or 9	2000	3000

D. ROCK LAYER DIMENSIONS

- Multiply flow rate by 0.83 to obtain required area of rock layer: $A \times 0.83 =$
750 gpd x 0.83 sq. ft./gpd = 750 sq. ft.
- Select width of rock layer (max 10' if <120 mpi max 5') = 10 ft.
- Length of rock layer = area ÷ width =
750 sq. ft. ÷ 10 ft. = 75 ft.



Width 10 ft
<120mpi <10'
>120mpi <5'



Length 75 ft

E. ROCK VOLUME

- Multiply rock area by rock depth to get cubic feet of rock; 750 sq. ft. x 1 ft. = 750 cu. ft.
- Divide cu. ft. by 27 cu. ft./cu. yd. to get cubic yards;
750 cu. ft. ÷ 27 = 28 cu. yd.
- Multiply cubic yards by 1.4 to get weight of rock in tons; 28 cu. yd. x 1.4 ton/cu. yd. = 39 tons.

F. ABSORPTION WIDTH

- Percolation rate in top 12 inches of soil is 16-30 mpi
Texture SILT LOAM
- Select allowable soil loading rate from table;
.60 gpd/ft²
- Calculate adsorption width ratio by dividing rock layer

Absorption Width Sizing Table

Percolation Rate in Minutes per Inch (MPI)	Soil Texture	Gallons per day per square foot	Ratio of Adsorption width to Rock Layer Width
Faster than 0.1	Coarse Sand	1.20	1.00
0.1 to 0.5	Sand	1.20	1.00
0.1 to 0.5	Fine Sand	0.60	2.00
6 to 15	Sandy Loam	0.79	1.52
<u>16 to 30</u>	Loam	<u>0.60</u>	<u>2.00</u>
31 to 45	Silt Loam	0.50	2.40
46 to 60	Clay Loam	0.45	2.67
60 to 120	Clay	0.24	5.00
Slower than 120	Clay	0.20	6.00

loading rate of 1.20 gpd/ft² by allowable soil loading rate;

$$1.20 \text{ gpd/ft}^2 \div \underline{.60} \text{ gpd/ft}^2 = \underline{2.00}$$

- Multiply adsorption width ratio by rock layer width to get required adsorption width;

$$\underline{10} \times \underline{2.00} \text{ ft} = \underline{20} \text{ ft}$$

G. MOUND SLOPE WIDTH & LENGTH (landslope 1% or more)

1. Subtract rock layer width from absorption width
to obtain minimum downslope width

$$20 \text{ ft} - 10 \text{ ft} = 10 \text{ feet}$$

2. Calculate minimum mound size

a. Determine depth of clean sand fill at upslope edge of rock layer:

$$\text{Separation } 3' - 2 \text{ ft} = 1 \text{ foot}$$

b. Add depth of clean sand for separation (2a) at upslope edge, depth of rock layer (1 foot) to depth of cover (1 foot) to find the mound height at the upslope edge of rock layer;

$$1 \text{ ft} + 1 \text{ ft} + 1 \text{ ft} = 3 \text{ feet}$$

c. Enter table with landslope and upslope ratio. Select berm multiplier of 3.85

d. Multiply berm multiplier by upslope mound height to find upslope width:

$$3 \times 3.85 = 12 \text{ feet}$$

e. Multiply rock layer width by landslope to determine drop in elevation;

$$10 \times 1\% \div 100 = .1 \text{ feet}$$

f. Add depth of clean sand for slope difference (2e) at downslope rock edge, to the mound height at the upslope edge of rock layer (2b) to find the downslope mound height;

$$3 \text{ ft} + .1 \text{ ft} = 3.1 \text{ feet}$$

g. Enter table with landslope and downslope ratio. Select downslope multiplier of 4.17

h. Multiply downslope multiplier by downslope mound height to get downslope width:

$$3.1 \times 4.17 = 13 \text{ feet}$$

i. Compare the values of step G.1 10 and Step G.2h 13

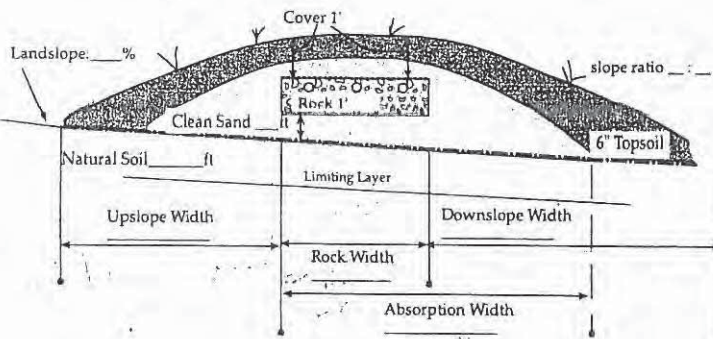
Select the greater of the two values as the downslope width: 13 feet

j. Total mound width is the sum of upslope (G.2d) width plus rock layer width (D.2) plus downslope width (G.2i);

$$10 \text{ ft} + 10 \text{ ft} + 13 \text{ ft} = 33 \text{ feet}$$

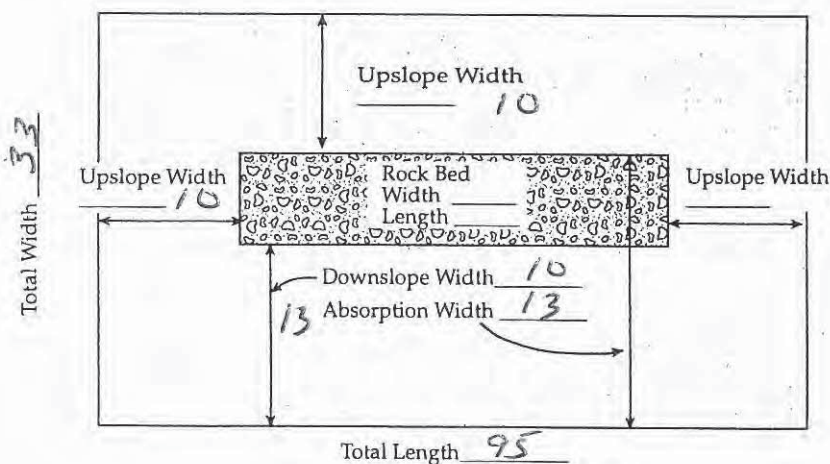
k. Total mound length is the sum of upslope width (G.2d) plus rock layer length (D.3) plus upslope width (G.2d);

$$10 \text{ ft} + 10 \text{ ft} + 75 \text{ ft} = 95 \text{ feet}$$



SLOPE MULTIPLIER TABLE

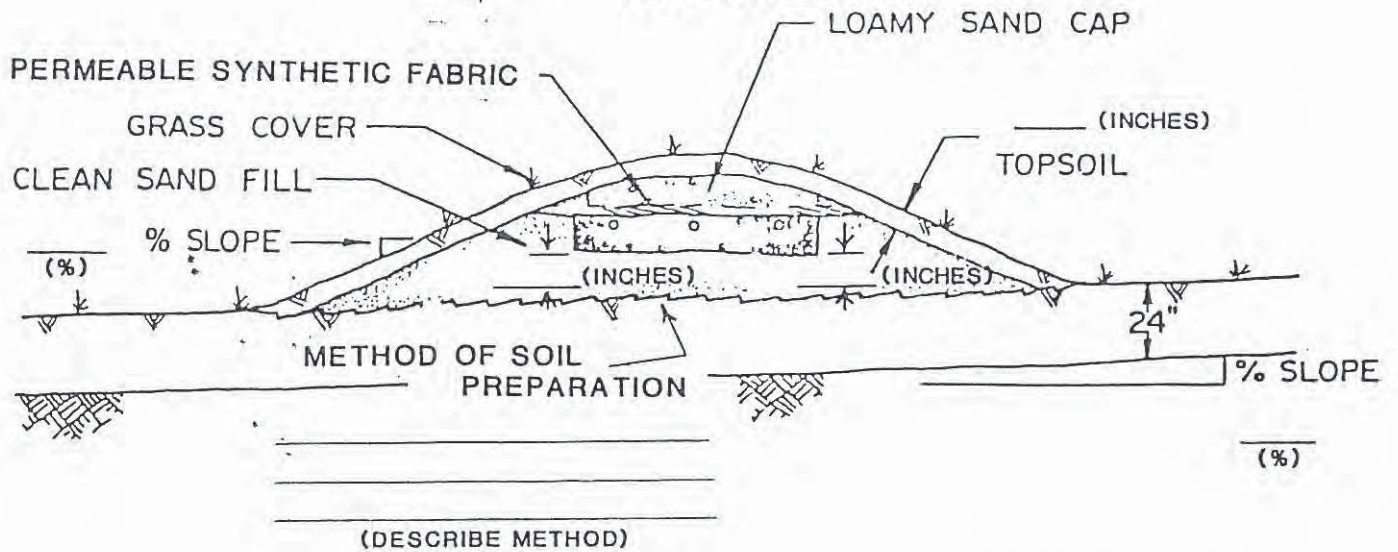
Land Slope, in %	UPSLOPE multipliers for various slope ratios						DOWNSLOPE multipliers for various slope ratios					
	3:1	4:1	5:1	6:1	7:1	8:1	3:1	4:1	5:1	6:1	7:1	
0	3.0	4.0	5.0	6.0	7.0	8.0	3.0	4.0	5.0	6.0	7.0	
1	2.91	3.85	4.76	5.66	6.54	7.41	3.09	4.17	5.26	6.38	7.53	
2	2.83	3.70	4.54	5.36	6.14	6.90	3.19	4.35	5.56	6.82	8.14	
3	2.75	3.57	4.35	5.08	5.79	6.45	3.30	4.54	5.88	7.32	8.86	
4	2.68	3.45	4.17	4.84	5.46	6.06	3.41	4.76	6.25	7.89	9.72	
5	2.61	3.33	4.00	4.62	5.19	5.71	3.53	5.00	6.67	8.57	10.77	
6	2.54	3.23	3.85	4.41	4.93	5.41	3.66	5.26	7.14	9.38	12.07	
7	2.48	3.12	3.70	4.23	4.70	5.13	3.80	5.56	7.69	10.34	13.73	
8	2.42	3.03	3.57	4.05	4.49	4.88	3.95	5.88	8.33	11.54	15.91	
9	2.36	2.94	3.45	3.90	4.30	4.65	4.11	6.25	9.09	13.04	18.92	
10	2.31	2.86	3.33	3.75	4.12	4.44	4.29	6.67	10.00	15.00	23.3	
11	2.26	2.78	3.23	3.61	3.95	4.26	4.48	7.14	11.11	17.65	30.	
12	2.21	2.70	3.12	3.49	3.80	4.08	4.69	7.69	12.50	21.43	43.75	



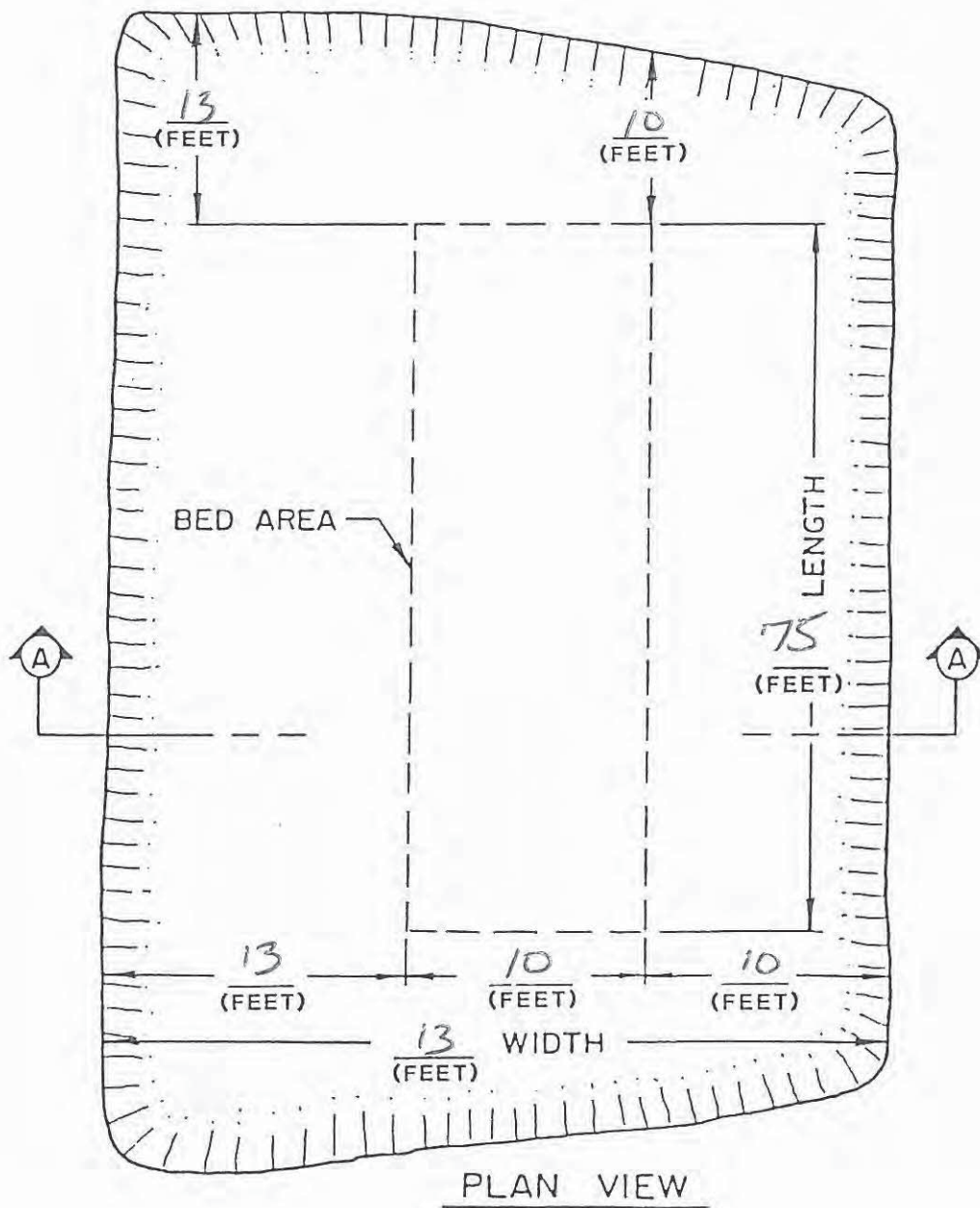
Final Dimensions:

$$33 \times 95$$

MOUND



CROSS SECTION A-A



Test hole location P1 Hole # _____

TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP (fraction)	WATER DROP (decimal)	PERC RATE CALCULATION
<u>12:45</u> <u>1:15</u>	START 30	<u>8</u> <u>6 1/4</u>	<u>1 3/4</u>	<u>1.75</u>	$\frac{30}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{17}{\text{PERC}}$ A
<u>1:15</u> <u>1:45</u>	REFILL 30	<u>8</u> <u>6 3/4</u>	<u>1 13/16</u>	<u>1.81</u>	$\frac{30}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{17}{\text{PERC}}$ B
<u>1:45</u> <u>2:15</u>	REFILL 30	<u>8</u> <u>6 3/8</u>	<u>1 5/8</u>	<u>1.63</u>	$\frac{30}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{18}{\text{PERC}}$ C
_____ _____	REFILL _____	_____ _____	_____ _____	_____	$\frac{\text{TIME}}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{\text{PERC}}{\text{PERC}}$ D
_____ _____	REFILL _____	_____ _____	_____ _____	_____	$\frac{\text{TIME}}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{\text{PERC}}{\text{PERC}}$ E
_____ _____	REFILL _____	_____ _____	_____ _____	_____	$\frac{\text{TIME}}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{\text{PERC}}{\text{PERC}}$ F
_____ _____	REFILL _____	_____ _____	_____ _____	_____	$\frac{\text{TIME}}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{\text{PERC}}{\text{PERC}}$ G
_____ _____	REFILL _____	_____ _____	_____ _____	_____	$\frac{\text{TIME}}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{\text{PERC}}{\text{PERC}}$ H

conversion
 1/16 = .06
 1/8 = .13
 3/16 = .19
 1/4 = .25
 5/16 = .31
 3/8 = .38
 7/16 = .44
 1/2 = .5
 9/16 = .56
 5/8 = .63
 11/16 = .69
 3/4 = .75
 13/16 = .81
 7/8 = .88
 15/16 = .94

P2

TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP (fraction)	WATER DROP (decimal)	PERC RATE CALCULATION
<u>12:50</u> <u>1:20</u>	START 30	<u>8</u> <u>6 1/8</u>	<u>1 7/8</u>	<u>1.88</u>	$\frac{30}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{16}{\text{PERC}}$ A
<u>1:20</u> <u>1:50</u>	REFILL 30	<u>8</u> <u>6 1/4</u>	<u>1 3/4</u>	<u>1.75</u>	$\frac{30}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{17}{\text{PERC}}$ B
<u>1:50</u> <u>2:20</u>	REFILL 30	<u>8</u> <u>6 1/2</u>	<u>2 1/2</u>	<u>1.5</u>	$\frac{30}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{20}{\text{PERC}}$ C
_____ _____	REFILL _____	_____ _____	_____ _____	_____	$\frac{\text{TIME}}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{\text{PERC}}{\text{PERC}}$ D
_____ _____	REFILL _____	_____ _____	_____ _____	_____	$\frac{\text{TIME}}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{\text{PERC}}{\text{PERC}}$ E
_____ _____	REFILL _____	_____ _____	_____ _____	_____	$\frac{\text{TIME}}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{\text{PERC}}{\text{PERC}}$ F
_____ _____	REFILL _____	_____ _____	_____ _____	_____	$\frac{\text{TIME}}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{\text{PERC}}{\text{PERC}}$ G
_____ _____	REFILL _____	_____ _____	_____ _____	_____	$\frac{\text{TIME}}{\text{TIME}} \div \frac{\text{DROP}}{\text{(Decimal)}} = \frac{\text{PERC}}{\text{PERC}}$ H

conversion:
 1/16 = .06
 1/8 = .13
 3/16 = .19
 1/4 = .25
 5/16 = .31
 3/8 = .38
 7/16 = .44
 1/2 = .5
 9/16 = .56
 5/8 = .63
 11/16 = .69
 3/4 = .75
 13/16 = .81
 7/8 = .88
 15/16 = .94

Date: 8-11-12Project Location: 49XX JAMACA AVE LAKE ELMO, MN 55042

Client: _____

Borings made by: _____

Address: _____

TOM TROOEN1568

City _____

State _____

Zip _____

Lic. # _____

Boring method: Auger ☒ Pit ☐ Probe ☐ Other _____Color classification system: ☒ Munsell ☐ Other _____Boring Number B1

Surface Elevation _____

Soil type at system depth: _____

Boring Number B2

Surface Elevation _____

Soil type at system depth: _____

Depth (Feet)	Texture	Color	Depth (Feet)	Texture	Color
7"	LOAMY TOPSOIL	10YR 3/2	6"	LOAMY TOPSOIL	10YR 3/2
1	FINE SILT LOAM	10YR 4/6	1	FINE SILT LOAM	10YR 4/6
2			2		
3			3		
43"			38"	SANDY SILT LOAM	7.5YR 5/6
4	SANDY SILT LOAM	7.5YR 5/6	46"		
5			5		
6			6		
60"			7		
7					

Slope: 1 %End of boring at 6 feet.Standing water table: yes ☐ no ☒Present at _____ feet of depth,
_____ hours after boring.Mottled soil: MOTTLES @ 52"

Observed at _____ feet of depth.

Not present in boring hole _____

Observations and comments:

Slope: 1 %End of boring at 46" feet.Standing water table: yes ☐ no ☒Present at _____ feet of depth,
_____ hours after boring.Mottled soil: MOTTLES @ 40"

Observed at _____ feet of depth.

Not present in boring hole _____

Observations and comments:

Soil Boring Log

Date: _____

Project Location:

Client: _____ Borings made by: _____
 Address: _____

City _____ State _____ Zip _____ Lic. # _____
 Boring method: Auger _____ Pit _____ Probe _____ Other _____
 Color classification system: Munsell _____ Other _____

Boring Number B3
 Surface Elevation _____
 Soil type at system depth: _____

Boring Number _____
 Surface Elevation _____
 Soil type at system depth: _____

Depth (Feet)	Texture	Color	Depth (Feet)	Texture	Color
—	LOAM/TOPSOIL	10YR 3/2	—		
1 —	FINE SILT LOAM	10YR 5/6	1 —		
—			—		
2 —			2 —		
—	SAND/SILT LOAM	7.5YR 4/6	—		
3 —			3 —		
—			—		
4 —			4 —		
—			—		
5 —			5 —		
—			—		
6 —			6 —		
—			—		
7 —			7 —		

Slope: 1 %
 End of boring at 38" ~~feet~~

Standing water table: yes ☒ no
 Present at _____ feet of depth,
 _____ hours after boring.

Mottled soil: MOTTLES @ 29"
 Observed at _____ feet of depth.
 Not present in boring hole _____
 Observations and comments:

Slope: _____ %
 End of boring at _____ feet.

Standing water table: yes ☐ no
 Present at _____ feet of depth,
 _____ hours after boring.

Mottled soil:
 Observed at _____ feet of depth.
 Not present in boring hole _____
 Observations and comments:

Sizing of Pump Station

1. Determine Surface Area

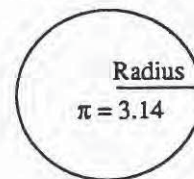
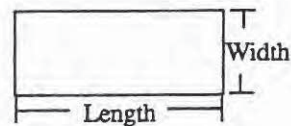
Rectangle = Area = L x W

$$\underline{5} \times \underline{10} = \underline{50} \text{ square feet}$$

Circle = Area = $\pi \times (\text{Radius})^2$

$$3.14 \times \underline{\quad} \times \underline{\quad} = \underline{\quad} \text{ square feet}$$

Other = Get Surface Area from Manufacturer

 square feet

2. Calculate Gallons Per Inch

There are 7.5 gallons per cubic foot of volume, therefore you must multiply the area times the conversion factor and divide by 12 inches per foot to calculate gallons per inch

Area x 7.5 + 12

$$\underline{50} \times 7.5 + 12 = \underline{31} \text{ gallons/inch}$$

3. Calculate Gallons to Cover Pump (with 2 inches of water covering pump)

(Height (in) + 2 inches) x gallons/inch

$$(\underline{10} + \underline{2}) \times \underline{31} = \underline{370} \text{ gallons}$$

4. Calculate Total Pumpout Volume

A. To maximize pump life select sump size for 4 to 5 pump operations per day.

$$\underline{750} \text{ gpd} \div \underline{5} = \underline{150} \text{ gallons per dose}$$

B. Calculate drainback

a. Determine total pipe length, 50 feet.b. Determine liquid volume of pipe, 10 gallons per 100 feet. (see page F-13)

c. Multiply length by volume: Drainback quantity =

$$\underline{50} \text{ feet} \times \underline{10} \text{ gallons} + 100 \text{ ft.} = \underline{5} \text{ gallons.}$$

C. Total pump out volume equals dose volume + drainback

$$\underline{150} \text{ gallons per dose} + \underline{5} \text{ gallons} = \underline{155} \text{ Total gallons}$$

Estimated Sewage Flow in Gallons per Day (gpd)				
Number of Bedrooms	Type I	Type II	Type III	Type IV
2	300	225	180	60% of the volume in this column
3	450	300	218	
4	600	375	256	
5	750	450	294	
6	900	525	332	
7	1050	600	370	
8	1200	675	408	

Pipe diameter (inches)	Gallons per 100 feet
1	4.49
1.25	7.77
1.5	10.58
2	17.43
2.5	24.87
3	38.4
4	66.1

5. Calculate Volume for Alarm (typically 2 to 3 inches)

Depth (in) x gallons/inch =

$$\underline{31} \times \underline{2} = \underline{62} \text{ gallons}$$

6. Calculate Reserve Capacity (75% the daily flow)

Daily flow (see page D-7) x .75 =

$$\underline{750} \times .75 = \underline{560} \text{ gallons}$$

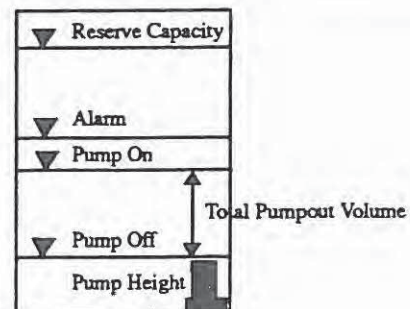
7. Calculate total gallons

gallons over pump + gallons pumpout + gallons alarm + gallons reserve

$$3 + 4 + 5 + 6$$

$$\underline{370} + \underline{155} + \underline{62} + \underline{560} = \underline{1147} \text{ gallons}$$

USE AT
1200 GALLON PUMPTANK



8. Total Depth (Total gallon divided by gallon per inch)

Total Gallon ÷ gallon/inch

$$\underline{\quad} \div \underline{\quad} = \underline{\quad} \text{ inches}$$

9. Float Separation Distance (equal total pumpout volume)

Total pumpout volume ÷ gallons/inch

$$\underline{155} \div \underline{31} = \underline{5} \text{ inches}$$

PUMP SELECTION PROCEDURE

A. Determine pump capacity: gravity distribution

- Minimum required discharge is 10 gpm
- Maximum suggested discharge is 45 gpm

pressure distribution

see pressure design worksheet

Selected pump capacity: 30 gpm

Perforation Discharges in gpm				
head (feet)	perforation diameter (inches)			
	1/8*	3/16	7/32	1/4
1.0 ^a	0.18	0.42	0.56	0.74
2.0 ^b	0.26	0.59	0.80	1.04
5.0	0.41	0.94	1.26	1.65

^a Use 1.0 foot for single-family homes.
^b Use 2.0 feet for anything else.
 * Potential for plugging

B. Determine head requirements:

- Elevation difference between pump and point of discharge.

8 ± feet

- Special head requirement:

If pumping to a pressure distribution system, five feet for pressure required at manifold. If gravity system, zero. 5 feet

- Friction loss

a. Enter friction loss table with gpm and pipe diameter.

Read friction loss in feet per 100 feet from table.

F.L. = 1.55 ft./100 ft of pipe

b. Determine total pipe length from pump to discharge point. Estimate by adding 25 percent to pipe length for fitting loss. Equivalent pipe length times 1.25 = total pipe length

50 x 1.25 = 62.5 feet

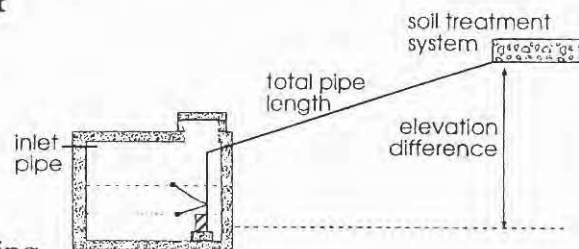
c. Calculate total friction loss by multiplying friction loss in ft/100 ft by equivalent pipe length.

Total friction loss = 62.5 x 1.55 ÷ 100 = 1 feet

- Total head required is the sum of elevation difference, special head requirements, and total friction loss.

8 + 5 + 1 (1) (2) (3c)

Total head: 14 feet



Friction Loss in Plastic Pipe Per 100 feet			
flow rate gpm	nominal pipe diameter		
	1.5"	2"	3"
20	2.47	0.73	0.11
25	3.73	1.11	0.16
30	5.23	1.55	0.23
35	6.96	2.06	0.30
40	8.91	2.64	0.39
45	11.07	3.28	0.48
50	13.46	3.99	0.58
55		4.76	0.70
60		5.60	0.82
65		6.48	0.95
70		7.44	1.09

C. Pump selection

- A pump must be selected to deliver at least 30 gpm (Step A) with at least 14 feet of total head (Step B).

Table III Minimum Setback Distances (Feet)

Feature	Sewage Tank	Soil Treatment Area
Water Supply Well less than 50 feet deep and not encountering at least ten feet of impervious material.	50	100
Any other water supply well or buried water suction pipe	50	50
Buried pipe distributing water under pressure	10	10
Occupied buildings and buildings with basements or crawl spaces	10	20
Non-occupied structures	5	10
Property lines	10*	10*
Above ground swimming pools	10	10
In ground swimming pools	10	10
The Ordinary High Water Mark of:		
Natural Environment Lakes and Streams	150*	150*
Recreation Development Lakes and Streams	75*	75*
General Development Lakes and Streams	75*	75*
All unclassified waters	75*	75*
St. Croix River Rural Districts	150*	150*
St. Croix River Urban Districts	100*	100*
Blufflines:		
St. Croix River Blufflines	40*	40*
Shoreland Blufflines	20*	20*