# FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE _____, FIELD EVALUATION DATE 4-11-2022
PROPERTY OWNER: Dennis Daniello PHONE 320-777-3037
ADDRESS: 30806 454th Ave CITY,STATE,ZIP: Aitkin, MN 56431
LEGAL DESCRIPTION: NE NW lot 2 as in Doc 419975
PIN# 07-0-037800 SEC 19 T 46 R 27 TWP NAME Farm Island
FIRE# 30806 LAKE/RIVER Thornton Lake LAKE CLASS _____ OHWL _____ FT.

## DESCRIPTION OF SOIL TREATMENT AREAS

| | AREA #1 | AREA #2 |
|---|---|---|
| DISTURBED AREAS | YES___ NO X | YES___ NO___ |
| COMPACTED AREAS | YES___ NO X | YES___ NO___ |
| FLOODING | YES___ NO X | YES___ NO___ |
| RUN ON POTENTIAL | YES___ NO X | YES___ NO___ |
| SLOPE % | 22 | _____ |
| DIRECTION OF SLOPE | N | _____ |
| LANDSCAPE POSITION | Summit | _____ |
| VEGETATION TYPES | Basswood or Elm | _____ |

REFERENCE BM ELEV. _____ FT.
REFERENCE BM DESCRIPTION ___

**DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1 2', 1A 2', 2 _____, 2A _____**

**BOTTOM ELEVATION--FIRST TRENCH OR BOTTOM OF ROCK BED: #1 _____ FT., #2 _____ FT.**

**SOIL SIZING FACTOR: SITE # 1 2.00, SITE #2 _____**

**CONSTRUCTION RELATED ISSUES:** _____

LIC# 747 SITE EVALUATOR SIGNATURE: Raymond Schrupp
SITE EVALUATOR NAME: Raymond Schrupp TELEPHONE# 218-820-8090
LUG REVIEW _____ DATE 4-11-22
Comments: _____

**SOIL BORING LOGS ON REVERSE SIDE**

Form des 2/20/98

Dennis Daniello

## SOILS CHARTS FOR BOTH PROPOSED AND ALTERNATE SITES

### 1 (PROPOSED) SOILS DATA

| DEPTH (INCHES) | TEXTURE | MUNSELL COLOR |
|---|---|---|
| 0 to 8 | T.S | 7.5YR 3/3 |
| 8 to 24. | loam | 7.5YR 4/4 |
| | clay | |

### 2 (PROPOSED) SOILS DATA

| DEPTH (INCHES) | TEXTURE | MUNSELL COLOR |
|---|---|---|
| 0 to 8 | T.S | 7.5YR 3/3 |
| 8 + 24 | Loam | 7.5YR 4/4 |

### 1 (ALTERNATE) SOILS DATA

| DEPTH (INCHES) | TEXTURE | MUNSELL COLOR |
|---|---|---|
| 0-8 | T.S. | 7.5yr 3/3 |
| 8-24 | loam | 7.5yr 4/4 |
| | clay | |

### 2 (ALTERNATE) SOILS DATA

| DEPTH (INCHES) | TEXTURE | MUNSELL COLOR |
|---|---|---|
| 0-8 | T.S. | 7.5yr 3/3 |
| 8-24 | loam | 7.5yr 4/4 |
| | clay | |

ADDITIONAL SOIL BORINGS MAY BE REQUIRED

Dennis Daniello

# MOUND DESIGN WORK SHEET (For Flows up to 1200 gpd)

## A. Average Design FLOW

Estimated 300 gpd *(see figure A-1)*
or measured _____ x 1.5 (safety *factor*) = _____ gpd

**A-1: Estimated Sewage Flows in Gallons per Day**

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

## B. SEPTIC TANK Capacity

1080 gallons *(see figure C-1)*

**C-1: Septic Tank Capacities (in gallons)**

| Number of Bedrooms | Minimum Liquid Capacity | Liquid capacity with garbage disposal | Liquid capacity with disposal & lift inside |
|---|---|---|---|
| 2 or less | 750 | 1125 | 1500 |
| 3 or 4 | 1000 | 1500 | 2000 |
| 5 or 6 | 1500 | 2250 | 3000 |
| 7, 8 or 9 | 2000 | 3000 | 4000 |

## C. SOILS *(refer to site evaluation)*

1. Depth to restricting layer = 2 feet
2. Depth of percolation tests = _____ feet
3. Texture loam
   Percolation rate 16&30 mpi
4. Soil loading rate 1.60 gpd/sqft *(see figure D-33)*
5. Percent land slope 2 %

## D. ROCK LAYER DIMENSIONS

1. Multiply average design flow (A) by 0.83 to obtain required rock layer area.
   300 gpd x 0.83 sqft/gpd = 250 sqft
2. Determine rock layer width = 0.83 sqft/gpd x linear Loading Rate (LLR)
   0.83 sqft/gpd x 250 gpd/sqft = 10 ft
3. Length of rock layer = area ÷ width =
   250 sqft (D1) ÷ 10 ft (D2) = 25 ft

| Mound LLR | |
|---|---|
| < 120 MPI | ≤12 |
| ≥ 120 MPI | ≤6 |

## E. ROCK VOLUME

1. Multiply rock area (D1) by rock depth of 1 ft to get cubic feet of rock
   250 sqft x 1 ft = 250 cuft
2. Divide cuft by 27 cuft/cuyd to get cubic yards
   250 cuft ÷ 27 cuyd/cuft = 10 cuyd
3. Multiply cubic yards by 1.4 to get weight of rock in tons
   10 cuyd x 1.4 ton/cuyd = 14 tons

## F. SEWAGE ABSORPTION WIDTH

Absorption width equals absorption ratio (See Figure D-33) times rock layer width (D2)

2.00 x 10 ft = 20 ft

**D-33: Absorption Width Sizing Table**

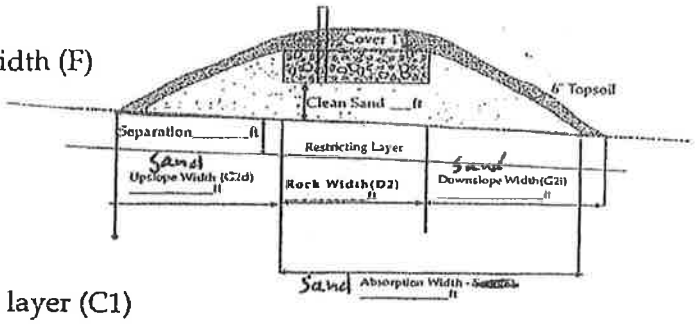
| Percolation Rate in Minutes per Inch (MPI) | Soil Texture | Loading Rate Gallons per day per square foot | Absorption Ratio |
|---|---|---|---|
| Faster than 5 | Coarse Sand<br>Medium Sand<br>Loamy Sand<br>Fine Sand | 1.20 | 1.00 |
| 6 to 15 | Sandy Loam | 0.79 | 1.50 |
| 16 to 30 | Loam | 0.60 | 2.00 |
| 31 to 45 | Silt Loam<br>Silt | 0.50 | 2.40 |
| 46 to 60 | Sandy Clay Loam<br>Silty Clay Loam<br>Clay Loam | 0.45 | 2.67 |
| 61 to 120 | Silty Clay<br>Sandy Clay<br>Clay | 0.24 | 5.00 |
| Slower than 120* | | | |

*System designed for these soils must be either or performance

Dennis Daniello

## G. MOUND SLOPE WIDTH & LENGTH
(landslope greater than 1%)

Landslope > 1% slope




1. Downslope absorption width = absorption width (F) minus rock layer width (D2)
20 ft - 10 ft = 10 ft

2. Calculate mound size

UPSLOPE

a. Depth of clean sand fill at upslope edge of rock layer = 3 ft minus the distance to restricting layer (C1)
3 ft - 2 ft = 1 ft

b. Mound height at the upslope edge of rock layer = depth of clean sand for separation (G2a) at upslope edge plus depth of rock layer (1 ft) plus depth of cover (1 ft)
1 ft + 1ft + 1ft = 3 ft

c. Upslope berm multiplier based on land slope
2.83 *(see figure D-34)*

d. Upslope width = berm multiplier (G2c) x upslope mound height (G2b):
2.83 x 3 ft = 8.5 ft

DOWNSLOPE

e. Drop in elevation = rock layer width (D2) x percent landslope (C5) ÷ 100
10 ft x 2 % ÷ 100 = .2 ft

f. Downslope mound height = depth of clean sand for slope difference (G2e) at downslope rock edge plus the mound height at the upslope edge of rock layer (G2b)
1 ft + .2 ft = 1.2 ft

g. Downslope berm multiplier based on percent land slc
3.19 *(see figure D-34)*

h. Downslope width = downslope multiplier (G2g) times downslope mound height (G2f)
3.19 x 3.2 ft = 10.2 ft

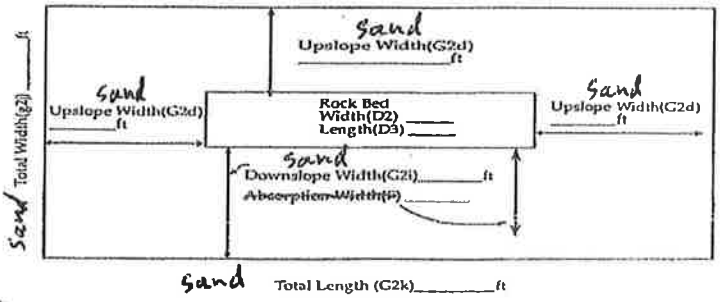
i. Select the greater of G1 and G2h as the downslope width: 10.2 ft

j. Total mound width is the sum of upslope width (G2d) width plus rock layer width (D2) plus downslope width (G2i)
8.5 ft + 10 ft + 10.2 ft = 28.7 ft

k. Total mound length is the sum of upslope width (G2d) plus rock layer length (D3) plus upslope width (G2d)
8.5 ft + 25 ft + 8.5 ft = 42 feet

**D-34: 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 | 23.33 |
| 11 | 2.26 | 2.78 | 3.23 | 3.61 | 3.95 | 4.26 | 4.48 | 7.14 | 11.11 | 17.65 | 30.43 |
| 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:**
28.7 x 42

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

Dawn Schp (signature) 747 (license #) 4-11-22 (date)

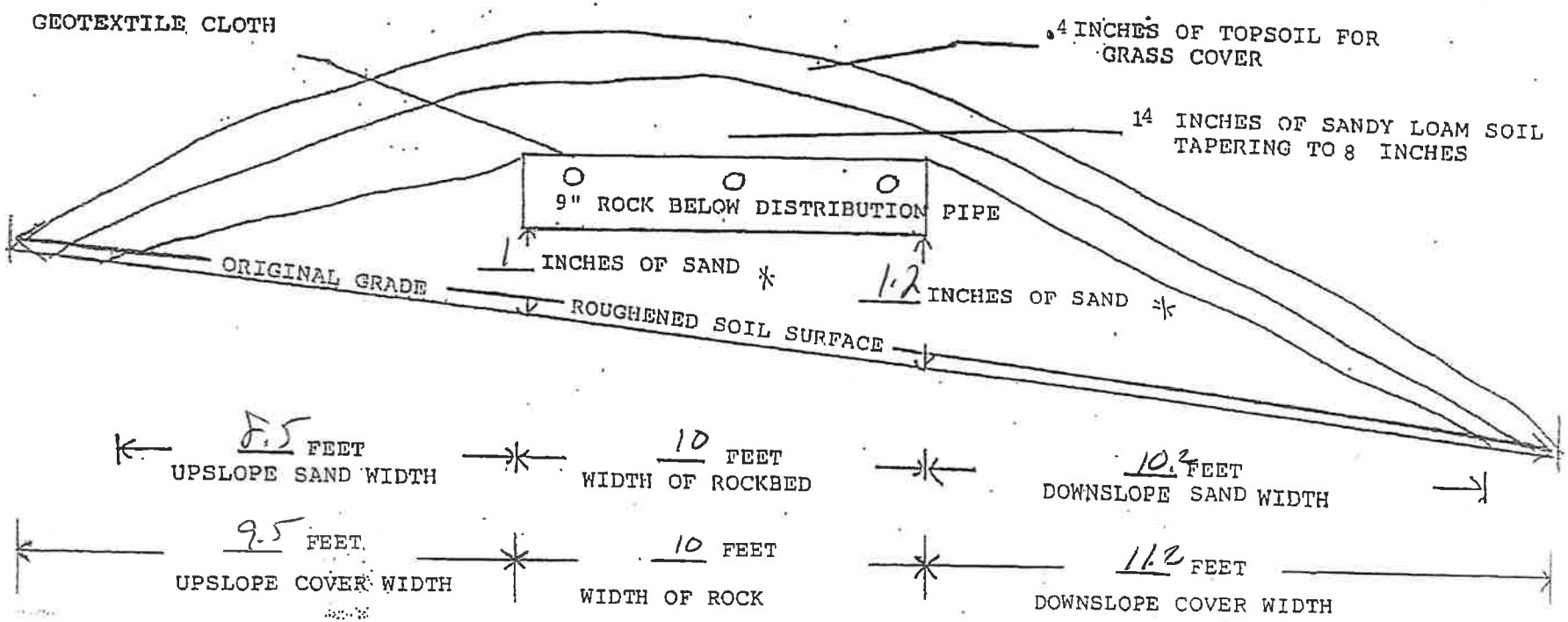
Dennis Vanella

## MOUND CROSS-SECTION

22 PERCENT SLOPE OF ORIGINAL SOIL

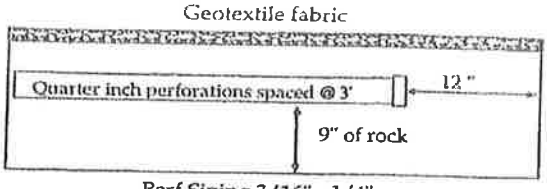
10 FT. x 25 FT. SIZE OF ROCKBED

28.7 FT. x 42 FT. SIZE OF SANDBASE



Dennis Daniello

# PRESSURE DISTRIBUTION SYSTEM




Perf Sizing 3/16" - 1/4"
Perf Spacing 1.5'- 5'

1. Select number of perforated laterals 3

2. Select perforation spacing = 3 ft

3. Since perforations should not be placed closer than 1 foot to the edge of the rock layer (see diagram), subtract 2 feet from the rock layer length.

   25 (Rock layer length) - 2 ft = 23 ft

4. Determine the number of spaces between perforations. Divide the length (3) by perforation spacing (2) and round down to nearest whole number.

   Perforation spacing = 23 ft ÷ 3 ft = 7 spaces

5. Number of perforations is equal to one plus the number of perforation spaces(4). *Check figure E-4 to assure the number of perforations per lateral guarantees <10% discharge variation.*

   7 spaces + 1 = 8 perforations/lateral

6. A. Total number of perforations = perforations per lateral (5) times number of laterals (1)

   8 perfs/lat x 3 lat = 24 perforations

   B. Calculate the square footage per perforation.
   Should be 6-10 sqft/perf. *Does not apply to at-grades.*
   Rock bed area = rock width (ft) x rock length (ft)
   10 ft x 25 ft = 250 sqft
   Square foot per perforation = Rock bed area ÷ number of perfs (6)
   250 sqft ÷ 24 perfs = 10 sqft/perf

7. Determine required flow rate by multiplying the total number of perforations (6A) by flow per perforation *(see figure E-6)*

   24 perfs x 24 gpm/perfs = 18 gpm

8. If laterals are connected to header pipe as shown on upper example, to select minimum required lateral diameter; enter figure E-4 with perforation spacing (2) and number of perforations per lateral (5) Select minimum diameter for perforated lateral = 1 inches.

9. If perforated lateral system is attached to manifold pipe near the center, lower diagram, perforated lateral length (3) and number of perforations per lateral (5) will be approximately one half of that in step 8. Using these values, select minimum diameter for perforated lateral = 1 inches.

**E-4: Maximum allowable number of 1/4-inch perforations per lateral to guarantee <10% discharge variation**

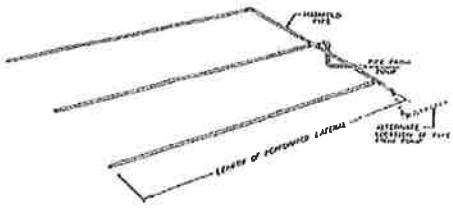
| perforation spacing (feet) | 1 inch | 1.25 inch | 1.5 inch | 2.0 inch |
|---|---|---|---|---|
| 2.5 | 8 | 14 | 18 | 28 |
| 3.0 | 8 | 13 | 17 | 26 |
| 3.3 | 7 | 12 | 16 | 25 |
| 4.0 | 7 | 11 | 15 | 23 |
| 5.0 | 6 | 10 | 14 | 22 |

**E-6: Perforation Discharge in gpm**

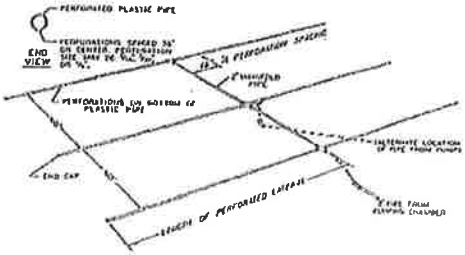
| head (feet) | perforation diameter (inches) | | | |
|---|---|---|---|---|
| | 1/8 | 3/16 | 7/32 | 1/4 |
| 1.0[a] | 0.18 | 0.42 | 0.56 | 0.74 |
| 2.0[b] | 0.26 | 0.59 | 0.80 | 1.04 |
| 5.0 | 0.41 | 0.94 | 1.26 | 1.65 |

[a] Use 1.0 foot for single-family homes.
[b] Use 2.0 feet for anything else.

MANIFOLD LOCATED AT END OF PRESSURE DISTRIBUTION SYSTEM



LAYOUT OF PERFORATED PIPE LATERALS FOR PRESSURE DISTRIBUTION IN MOUND



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

Karen Schyp (signature) 747 (license #) 4-11-22 (date)

Dennis Daniello

# PUMP SELECTION PROCEDURE

## 1. Determine pump capacity:

### A. Gravity distribution

1. Minimum required discharge is 10 gpm
2. Maximum suggested discharge is 45 gpm. For other establishments at least 10% greater than the water supply rate, but no faster than the rate at which effluent will flow out of the distribution device.

### B. Pressure distribution

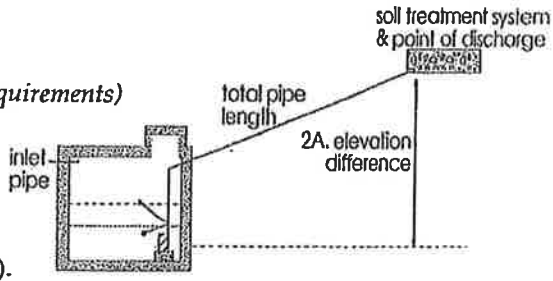
*See pressure distribution work sheet*

**From A or B Selected pump capacity: 18 gpm**

## 2. Determine pump head requirements:

A. Elevation difference between pump and point of discharge?
9 feet

B. Special head requirement? *(See Figure at right - Special Head Requirements)*
5 feet




| Special Head Requirements | |
|---|---|
| Gravity Distribution | 0 ft |
| Pressure Distribution | 5 ft |

C. Calculate Friction loss

1. Select pipe diameter 2 in
2. Enter *Figure E-9* with gpm (1A or B) and pipe diameter (C1).
   Read friction loss in feet per 100 feet from Figure E-9
   Friction Loss = .73 ft/100ft of pipe
3. Determine total pipe length from pump discharge to soil treatment discharge point. Estimate by adding 25 percent to pipe length for fitting loss. Total pipe length times 1.25 = equivalent pipe length
   20 feet x 1.25 = 25 feet
4. Calculate total friction loss by multiplying friction loss (C2) in ft/100 ft by the equivalent pipe length (C3) and divide by 100.
   = .73 ft/100ft x 25 ÷100 = 1 ft

D. Total head required is the sum of elevation difference (A), special head requirements (B), and total friction loss (C4)
9 ft + 5 ft+ 1 ft =

**Total head: 15 feet**

| E-9: Friction Loss in Plastic Pipe Per 100 feet | | | |
|---|---|---|---|
| | nominal pipe diameter | | |
| flow rate gpm | 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 |

### 3. Pump selection

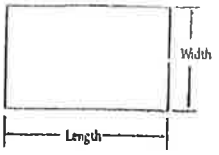
A pump must be selected to deliver at least 18 gpm (1A or B) with at least 15 feet of total head (2D)

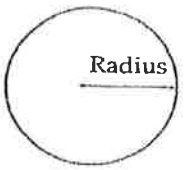
I hereby certify that I have completed this work in accordance with applicable ordinances, rules and laws.

Daniel Schipp (signature) 747 (license #) 4-11-22 (date)

Dennis Daniello

# DOSING CHAMBER SIZING




1. Determine area
   A. Rectangle area = L x W
   _____ x _____ = _____ square feet
   B. Circle area = π (3.14) x radius in feet x radius in feet
   3.14 x _____ ft x _____ ft = _____ sqft
   C. Get area from manufacturer _____ sqft

2. Calculate gallons per inch
   There are 7.5 gallons per cubic foot of volume, therefore multiply the area (1A, B or C) times the conversion factor and divide by 12 inches per foot to calculate gallon per inch.
   Area x 7.5 ÷ 12 = _____ sqft x 7.5 ÷ 12 in/ft = 11.9 gallon per inch

3. Calculate total tank volume
   A. Depth from bottom of inlet pipe to tank bottom 42 in
   B. Total tank volume = depth from bottom of inlet pipe to tank bottom (3A) x gal/in (2)
   = 42 in x 11.9 gal/in = 500 gal

***Legal Tank:***
***500 gallons or***
***100% the Daily flow***
***or***
***Alternating Pumps***

4. Calculate gallons to cover pump (with 2-3 inches of water covering pump)
   (Pump and block height (inch) + 2 inch) x gallon/inch
   (13 in +2 in) x 11.9 gal/in = 178 gallon

5. Calculate total pumpout volume
   A. Select pump size for 4-5 does per day. Gallon per dose = gpd (see *figure A-1)*
   / doses per day = 250 gpd ÷ 4 doses/day = 62 gallons
   B. Calculate drainback
      1. Determine total pipe length, 20 feet
      2. Determine liquid volume of pipe, 0.17 gal per ft (*see figure E-20)*
      3. Drainback quantity = 20 ft (5B1) x 0.17 gal per ft (5B2) = 3.4 gal
   C. Total pump out volume = dose volume (5A) + drainback (5B3)
   62 gal + 3.4 gal = 65 Total gallon

| A-1: Estimated Sewage Flows in Gallons per Day | | | | |
|---|---|---|---|---|
| number of bedrooms | Class I | Class II | Class III | Class IV |
| 2 | 300 | 225 | 180 | 60% |
| 3 | 450 | 300 | 218 | of the |
| 4 | 600 | 375 | 256 | values |
| 5 | 750 | 450 | 294 | in the |
| 6 | 900 | 525 | 332 | Class I, |
| 7 | 1050 | 600 | 370 | II, or III |
| 8 | 1200 | 675 | 408 | columns. |

| E-20: Volume of Liquid in Pipe | |
|---|---|
| Pipe Diameter inches | Gallons per foot |
| 1 | 0.045 |
| 1.25 | 0.078 |
| 1.5 | 0.11 |
| 2 | 0.17 |
| 2.5 | 0.25 |
| 3 | 0.38 |
| 4 | 0.66 |

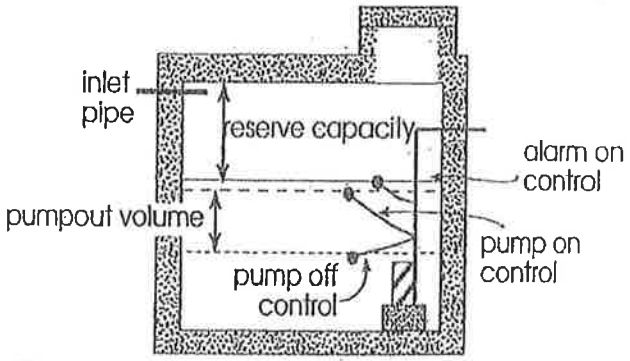
6. Float separation distance (using total pumpout volume)
   Total pumpout volume (5C) ÷ gal/inch (2)
   65 gal ÷ 11.9 gal/in = 5.5 inch

7. Calculate volume for alarm (typically 2 to 3 inches)
   Alarm depth (inch) x gallon/inch (2) = 3 in x 11.9 gal/in) = 36 gal

8. Calculate total gallon = gallons over pump (4) + gallons pumpout (5C) + gallons alarm (7)
   178 gal + 65 gal + 36 gal = 279 gallons

9. Total Tank Depth = total gallon (8) ÷ gallon/inch (2)
   279 gal ÷ 11.9 gal/in = 23 in

**Recommended:**
Calculate reserve capacity (75% the daily flow)
Daily flow x .75 = 300 x .75 = 225 gallons

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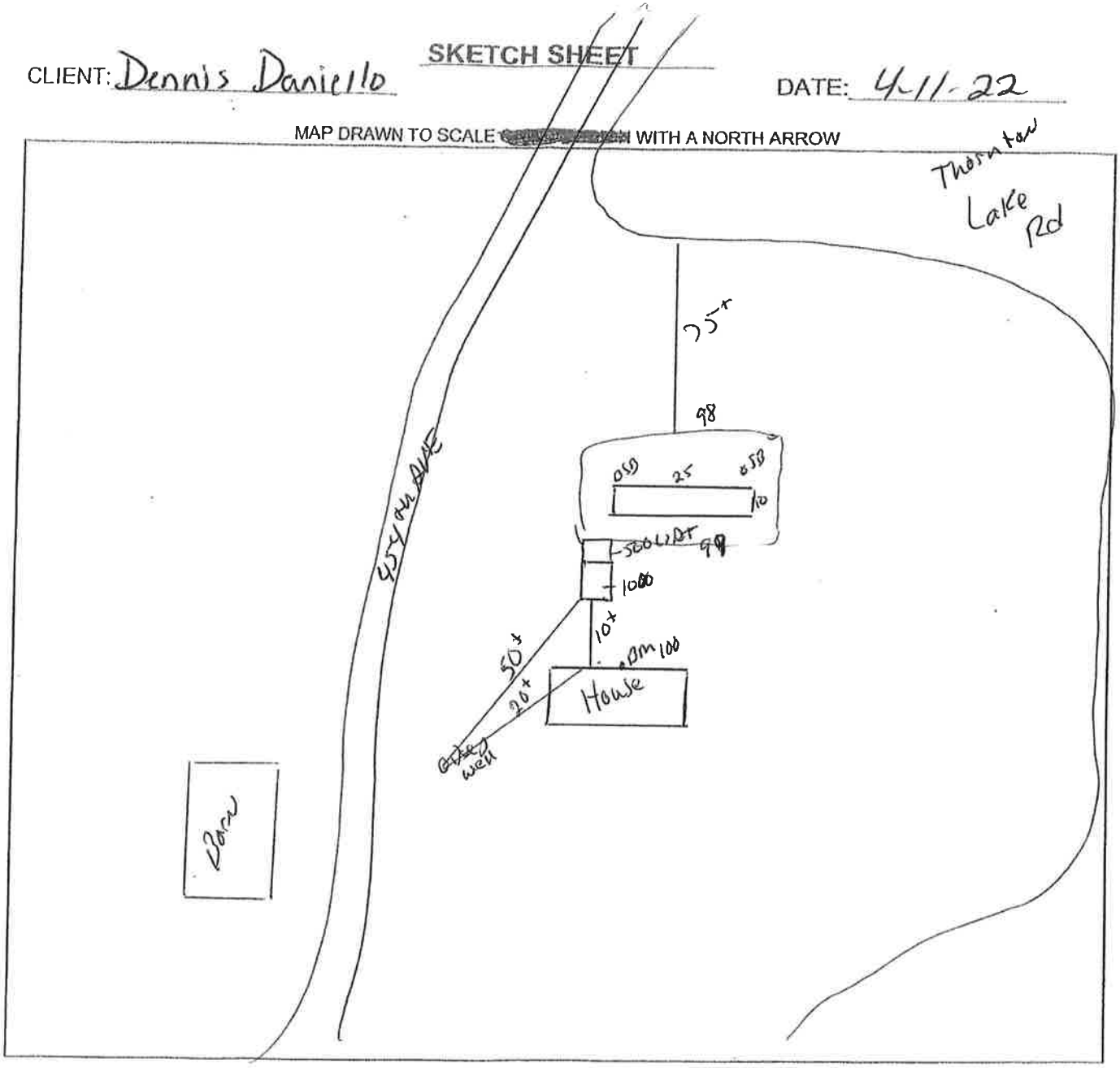
Dawn Schp (signature) 747 (license #) 4-11-22 (date)

CLIENT: Dennis Daniello

## SKETCH SHEET

DATE: 4-11-22

MAP DRAWN TO SCALE [redacted] WITH A NORTH ARROW




### CHECK OFF LIST--HAVE ALL OF THE FOLLOWING BEEN DRAWN ON THE MAP??

**SHOW EXISTING OR PROPOSED**

- ☐ WATER WELLS WITHIN 100 FT OF TREATMENT AREAS
- ☐ PRESSURE WATER LINES WITHIN 10 FT OF TREATMENT AREAS
- ☐ STRUCTURES
- ☐ LOT IMPROVEMENTS
- ☐ ALL SOIL TREATMENT AREAS
- ☐ ALL ISTS COMPONENTS
- ☐ HORIZONTAL AND VERTICALREFERENCE
- ☐ POINT OF SOIL BORINGS
- ☐ DIRECTION OF SLOPE
- ☐ LOT EASEMENTS
- ☐ ALL LOT DIMENSIONS
- ☐ DISTURBED/ COMPACTED AREAS
- ☐ SITE PROTECTION--LATHE AND RIBBON EVERY 15 FT
- ☐ ACCESS ROUTE FOR TANK MAINTENANCE

**REQUIRED SETBACKS**

- ☐ STRUCTURES
- ☐ PROPERTY LINES
- ☐ OHWL

COMMENTS:

**INDICATE ELEVATIONS**

BENCHMARK
ELEVATION OF SEWER LINE @ HOUSE
ELEVATION @ TANK INLET
ELEVATION @ BOTTOM OF ROCK LAYER
ELEVATION @ BOTTOM OF BORING OR RESTRICTIVE LAYER
ELEVATION OF PUMP
ELEVATION OF DISTRIBUTION DEVICE

DESIGNER SIGNATURE Dawn Schaap
LICENSE# 747

DATE 4-11-22




ArcGIS Web Map

1:4,514 | 0 0.0225 0.045 mi | 1 inch = 376 feet | Web AppBuilder for ArcGIS

Aitkin County

Date: 4/12/2022