FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE 5-13-22, FIELD EVALUATION DATE 5-13-22
PROPERTY OWNER: Seth Thorson PHONE 218-820-5607
ADDRESS: 48352 241st Place CITY,STATE,ZIP: McGregor, MN 55760
LEGAL DESCRIPTION: Lot 1 E of road
PIN# 39-0-039100 SEC 22 T 49 R 24 TWP NAME Workman
FIRE# LAKE/RIVER Rat 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 %	0	
DIRECTION OF SLOPE	NA.	
LANDSCAPE POSITION		
VEGETATION TYPES	Wooded	

REFERENCE BM ELEV. FT.
REFERENCE BM DESCRIPTION

DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1 12", 1A , 2 12", 2A

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

SOIL SIZING FACTOR: SITE # 1 1.20, SITE #2

CONSTRUCTION RELATED ISSUES:

LIC# 910 SITE EVALUATOR SIGNATURE: Ernie Darlow Jr
SITE EVALUATOR NAME: Ernie Darlow Jr. TELEPHONE# 218-426-4320
LUG REVIEW DATE

Comments: Adding 2 bedroom to a 2 bedroom - 2' sandbase mound system. Final will be 42' x 82' with a 10' x 50' rockbed.

SOIL BORING LOGS ON REVERSE SIDE

Form des 2/20/98

SOILS CHARTS FOR BOTH PROPOSED AND ALTERNATE SITES

1 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-5"	Top Soil	10yr 3/2
5"-14"	Medium Sand	10yr 5/2
mottling @ 12"		

2 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-5"	Top Soil	10yr 3/2
5"-14"	Medium Sand	10yr 5/2
mottling @ 12"		

1 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

2 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

ADDITIONAL SOIL BORINGS MAY BE REQUIRED

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

A. Average Design FLOW

Estimated 600 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% of the values in the Class 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 Capacity

1860 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 = 1 feet
2. Depth of percolation tests = NA feet
3. Texture medium Sand
   Percolation rate 5 mpi
4. Soil loading rate 1.20 gpd/sqft *(see figure D-33)*
5. Percent land slope 1 %

D. ROCK LAYER DIMENSIONS

1. Multiply average design flow (A) by 0.83 to obtain required rock layer area.
   600 gpd x 0.83 sqft/gpd = 500 sqft
2. Determine rock layer width = 0.83 sqft/gpd x linear Loading Rate (LLR)
   0.83 sqft/gpd x 12 gpd/sqft = 10 ft
3. Length of rock layer = area ÷ width =
   500 sqft (D1) ÷ 10 ft (D2) = 50 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
   500 sqft x 1 ft = 500 cuft
2. Divide cuft by 27 cuft/cuyd to get cubic yards
   500 cuft ÷ 27 cuyd/cuft = 18.5 cuyd
3. Multiply cubic yards by 1.4 to get weight of rock in tons
   18.5 cuyd x 1.4 ton/cuyd = 26 tons

F. SEWAGE ABSORPTION WIDTH

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

1 x 10 ft = 10 ft

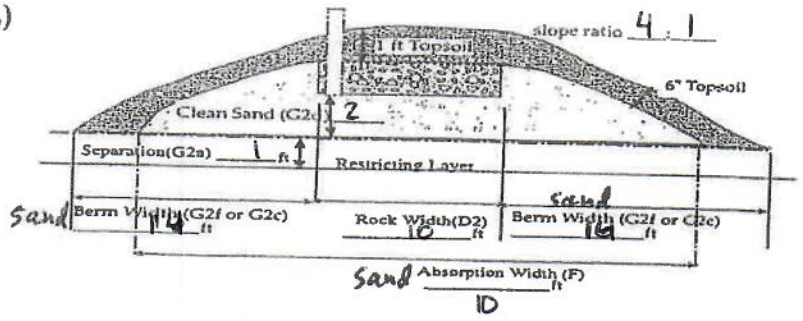
D-33: Absorption Width Sizing Table

Percolation Rate in Minutes per Inch (MPI)	Soil Texture	Loading Rate Gallons per day per square foot	Absorption Ratio
Faster than 5	Coarse Sand Medium Sand Loamy Sand 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 Silt	0.50	2.40
46 to 60	Sandy Clay Loam Silty Clay Loam Clay Loam	0.45	2.67
61 to 120	Silty Clay Sandy Clay Clay	0.24	5.00
Slower than 120*			

*System designed for these soils must be other or performance

G. **Mound Slope Width and Length (landslope less than or equal to 1%)**

<=1% land slope



1. Absorption width (F) 10 ft

2. Calculate mound size

a. Determine depth of clean sand fill at upslope edge of rock layer = 3 ft minus the distance to restricting layer (C1)

3 ft - 1 ft = 2 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)

2 ft + 1ft + 1ft = 4 ft

c. Berm width = upslope mound height (G2b) times 4 *(4 is recommended, but could be 3-12)*

4 x 4 = 16 ft

d. The total landscape width is the sum of berm (G2c) width plus rock layer width (D2) plus berm width (G2c): 16 ft + 10 ft + 16 ft = 42 ft

e. Additional width necessary for absorption = absorption width (F) minus the landscape width (G2d)

_____ft - _____ft = _____ft, ***if number is negative (<0) skip to g***

f. Final berm width = additional width (G2e) plus the berm width (G2c)

_____ft + _____ft = _____ft

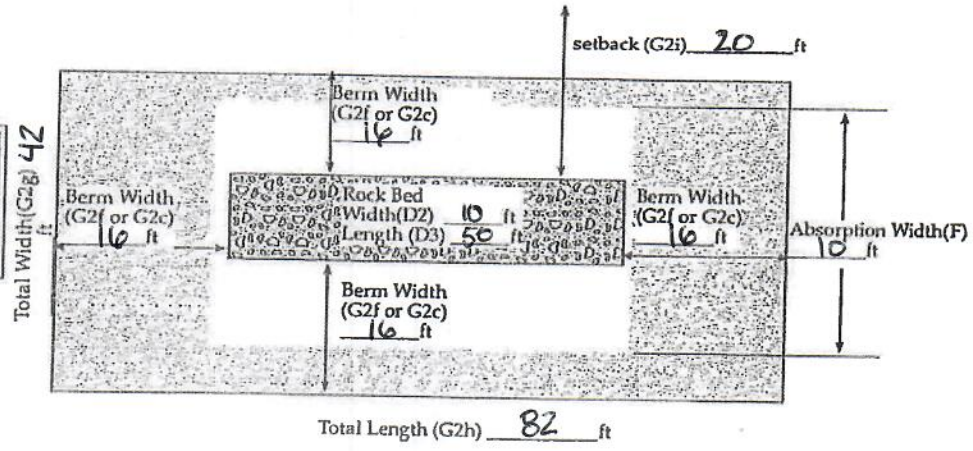
g. Total mound width is the sum of berm width (G2f or G2c) plus rock layer width (D2) plus berm width (G2f or G2c): _____ft + _____ft + _____ft = _____ft

h. Total mound length is the sum of berm (G2f or G2c) plus rock layer length (D3) plus berm (G2f or G2c): 16 ft + 50 ft + 16 ft = 82 ft

i. Setbacks from the rockbed are calculated as follows: the absorption width (F) minus the rock bed width (D2) divided by 2: (10 ft - 10 ft) ÷ 2 = 0 ft

Final Dimensions:

42' x 82'



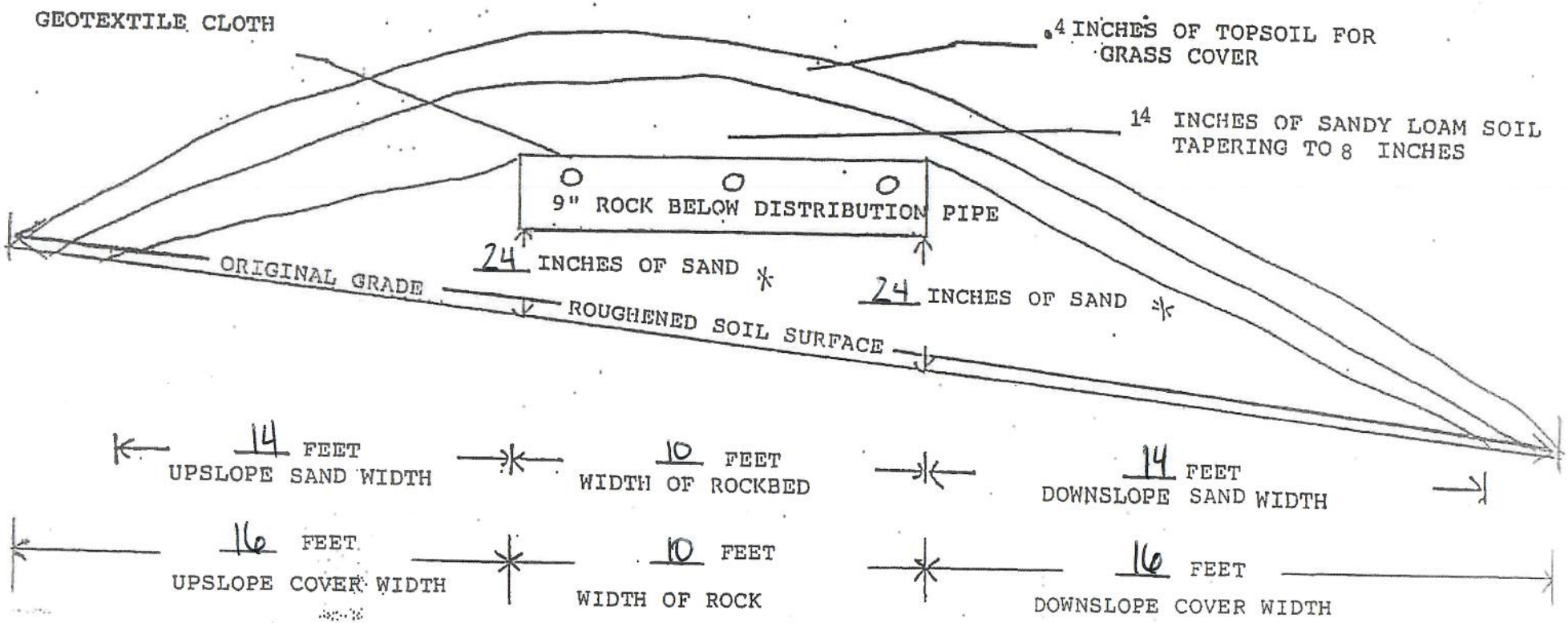
I hereby certify that I have completed this work in accordance with applicable ordinances, rules and laws.

Ernie Parker (signature) 910 (license #) 5-13-22 (date)

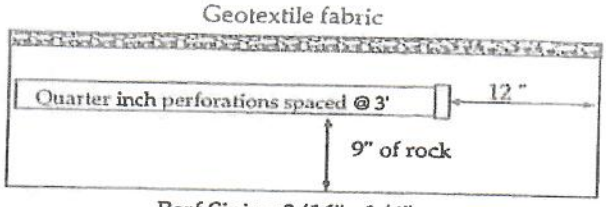
MOUND CROSS-SECTION

1 PERCENT SLOPE OF ORIGINAL SOIL

10 FT. x 50 FT. SIZE OF ROCKBED 38 FT. x 78 FT. SIZE OF SANDBASE



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.

   50 (Rock layer length) - 2 ft = 48 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 = 48 ft ÷ 3 ft = 16 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.*

   16 spaces + 1 = 17 perforations/lateral

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

   17 perfs/lat x 3 lat = 51 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 50. ft = 500 sqft
   Square foot per perforation = Rock bed area ÷ number of perfs (6)
   500 sqft ÷ 51 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)*

   51 perfs x .74 gpm/perfs = 38 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 = 1.5 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 = 1.5 inches.

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

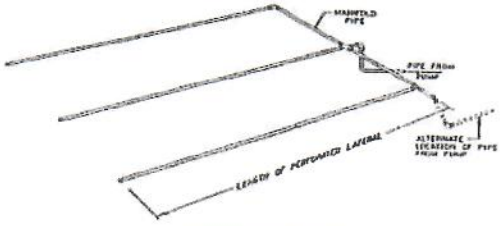
perforation spacing (feet)	1 inch	1.25 inch	1.5 inch	2.0 inch
2.5	8	14	18	28
3.0	8	13	17	26
3.3	7	12	16	25
4.0	7	11	15	23
5.0	6	10	14	22

E-6: Perforation Discharge in gpm

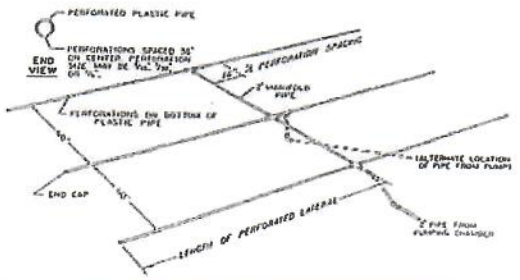
head (feet)	perforation diameter (inches) 1/8	3/16	7/32	1/4
1.0[a]	0.18	0.42	0.56	0.74
2.0[b]	0.26	0.59	0.80	1.04
5.0	0.41	0.94	1.26	1.65

[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



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Eric Dahlgren (signature) 910 (license #) 5-13-22 (date)

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: 38 gpm

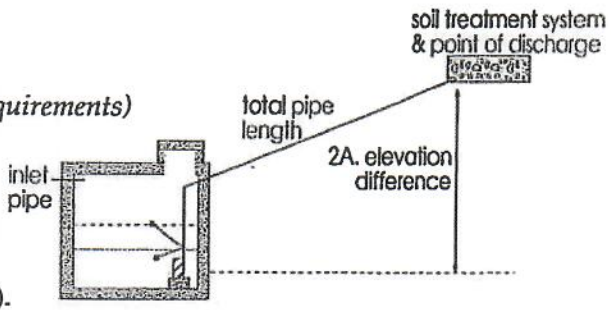
2. Determine pump head requirements:

A. Elevation difference between pump and point of discharge?

8 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 1.5 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 = 8.91 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

   30 feet x 1.25 = 37.5 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.

   = 8.91 ft/100ft x 37.5 ÷100 = 3.34 ft

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

D. Total head required is the sum of elevation difference (A), special head requirements (B), and total friction loss (C4)

8 ft + 5 ft+ 3.5 ft =

Total head: 16.5 feet

3. Pump selection

A pump must be selected to deliver at least 38 gpm (1A or B) with at least 16.5 feet of total head (2D)

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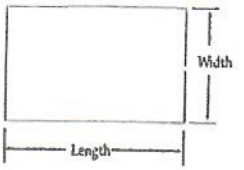
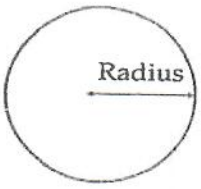
Eric Dark (signature) 910 (license #) 5-13-22 (date)

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 = 15.86 gallon per inch

3. Calculate total tank volume
   A. Depth from bottom of inlet pipe to tank bottom 48.5 in
   B. Total tank volume = depth from bottom of inlet pipe to tank bottom (3A) x gal/in (2)
   = 48.5 in x 15.86 gal/in = 770 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
   (12 in +2 in) x 15.86 gal/in = 222 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 = 600 gpd ÷ 5 doses/day = 120 gallons
   B. Calculate drainback
      1. Determine total pipe length, 30 feet
      2. Determine liquid volume of pipe, .11 gal per ft (*see figure E-20*)
      3. Drainback quantity = 30 ft (5B1) x .11 gal per ft (5B2) = 3.3 gal
   C. Total pump out volume = dose volume (5A) + drainback (5B3)
   120 gal + 3.3 gal = 124 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

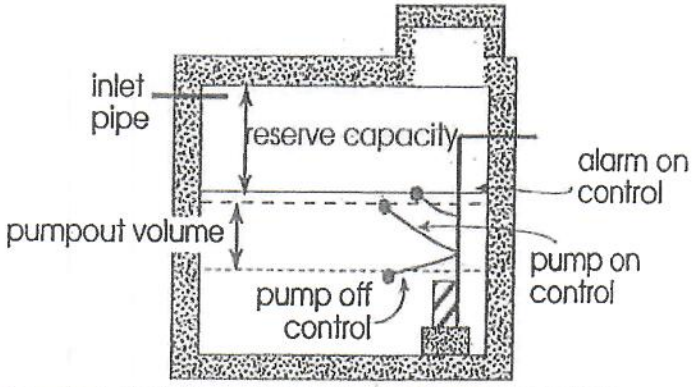
6. Float separation distance (using total pumpout volume)
   Total pumpout volume (5C) ÷ gal/inch (2)
   124 gal ÷ 15.86 gal/in = 7.8 inch

7. Calculate volume for alarm (typically 2 to 3 inches)
   Alarm depth (inch) x gallon/inch (2) = 2 in x 15.86 gal/in) = 32 gal

8. Calculate total gallon = gallons over pump (4) + gallons pumpout (5C) + gallons alarm (7)
   222 gal + 124 gal + 32 gal = 378 gallons

9. Total Tank Depth = total gallon (8) ÷ gallon/inch (2)
   378 gal ÷ 15.86 gal/in = 24. in

Recommended:
Calculate reserve capacity (75% the daily flow)
Daily flow x .75 = 600 x .75 = 450 gallons



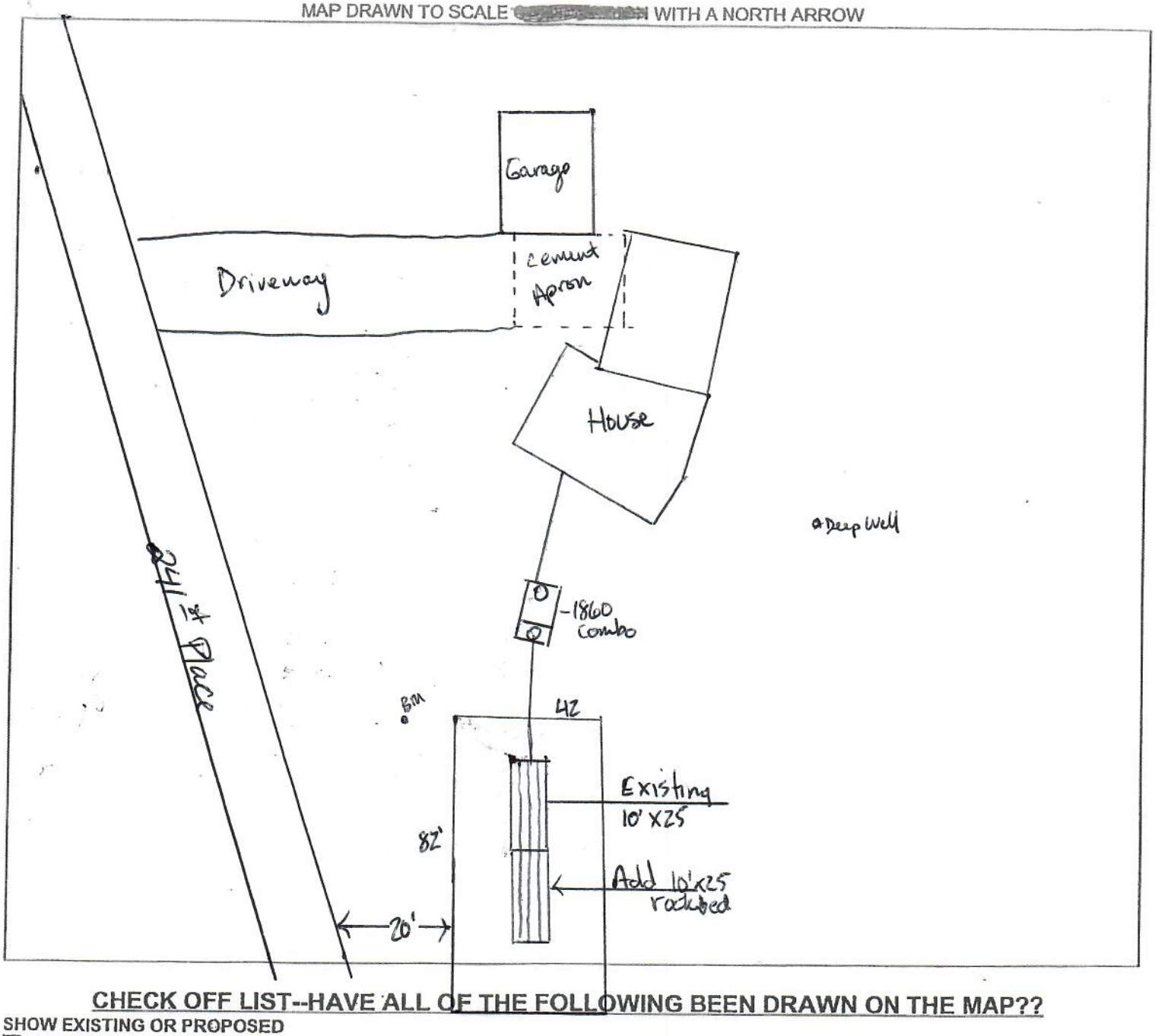
I hereby certify that I have completed this work in accordance with applicable ordinances, rules and laws.

Eric Dahlke (signature) 910 (license #) 5-13-22 (date)

SKETCH SHEET

CLIENT: Seth Thorson 39-0-039100 DATE: 5-13-22

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

100.0	BENCHMARK 100.0
102.0	ELEVATION OF SEWER LINE @ HOUSE
102.4	ELEVATION @ TANK INLET
98.0	ELEVATION @ BOTTOM OF ROCK LAYER
101.0	ELEVATION @ BOTTOM OF BORING OR RESTRICTIVE LAYER
106.4	ELEVATION OF PUMP
97.0	ELEVATION OF DISTRIBUTION DEVICE

DESIGNER SIGNATURE Eric Dahlp

LICENSE# 910 DATE 5-13-22