FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE 4/22/24, FIELD EVALUATION DATE 04/22/2024
PROPERTY OWNER: Zachary Bryerle PHONE 320-575-0068
ADDRESS: 13514 ST Hwy 65 CITY,STATE,ZIP: McGrath MN 56350
LEGAL DESCRIPTION:
PIN# 38-0-027002 SEC 17 T 43N R 23 TWP NAME Williams
FIRE# X LAKE/RIVER X LAKE CLASS X OHWL X 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 %	4%	
DIRECTION OF SLOPE	SSW	
LANDSCAPE POSITION	Side Slope	
VEGETATION TYPES	Lawn Grasses	

REFERENCE BM ELEV. 100 FT
REFERENCE BM DESCRIPTION
Top of Slope For Home

DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1 12", 1A 15", 2 ___, 2A ___

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

SOIL SIZING FACTOR: SITE # 1 1.67, SITE #2 ___

CONSTRUCTION RELATED ISSUES:

LIC# L2006 SITE EVALUATOR SIGNATURE:

SITE EVALUATOR NAME: Bruce Engdahl TELEPHONE# 320-592-3606

LUG REVIEW ___ DATE ___

Comments:

SOIL BORING LOGS ON REVERSE SIDE

Form des 2/20/98

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

A. Average Design FLOW

Estimated 450 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

1000+ 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 = — feet
3. Texture Sand Loam
   Percolation rate 6-15 mpi
4. Soil loading rate .79 gpd/sqft *(see figure D-33)*
5. Percent land slope 4 %

D. ROCK LAYER DIMENSIONS

1. Multiply average design flow (A) by 0.83 to obtain required rock layer area.
   450 gpd x 0.83 sqft/gpd – 380 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 =
   380 sqft (D1) ÷ 10 ft (D2) = 38 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
   380 sqft x 1 ft = 380 cuft
2. Divide cuft by 27 cuft/cuyd to get cubic yards
   380 cuft ÷ 27 cuyd/cuft = 14.1 cuyd
3. Multiply cubic yards by 1.4 to get weight of rock in tons
   14.1 cuyd x 1.4 ton/cuyd = 19.7 tons

F. SEWAGE ABSORPTION WIDTH

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

10 x 2.0 ft = 20 ft

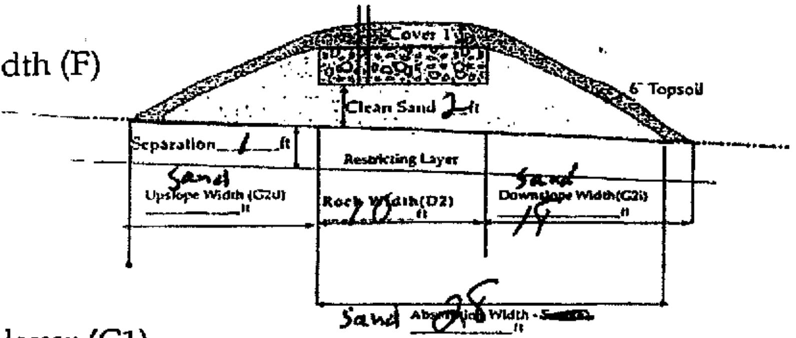
D-33: Absorption Width Sizing Table			
Percolation Rate in Minutes per Inch (MPI)	Soil Texture	Loading Rate Gallons per day per square foot	Absorption Ratio
Faster than 5	Coarse Sand Medium Sand Loamy Sand Fine Sand	1.20	1.00
6 to 15	Sandy Loam	0.79	1.50
16 to 30	Loam	0.60	2.00 ✓
31 to 45	Silt Loam Silt	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

(landslope greater than 1%)

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 - 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 = 4.0 ft

c. Upslope berm multiplier based on land slope 3.45 *(see figure D-34)*

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

3.45 x 4 ft = 13.8 ft

DOWNSLOPE

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

10 ft x 4 % ÷ 100 = .4 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)

4 ft + .4 ft = 4.4 ft

g. Downslope berm multiplier based on percent land slc

4.75 *(see figure D-34)*

h. Downslope width = downslope multiplier (G2g) times downslope mound height (G2f)

4.4 x 4.75 ft = 21 ft

i. Select the greater of G1 and G2h as the downslope width: 21 ft

j. Total mound width is the sum of upslope width (G2d) width plus rock layer width (D2) plus downslope width (G2i)

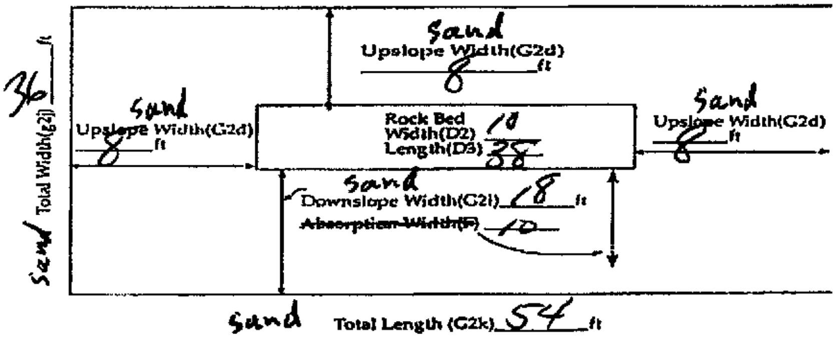
13.8 ft + 10 ft + 21 ft = 44.8 ft

k. Total mound length is the sum of upslope width (G2d) plus rock layer length (D3) plus upslope width (G2d)

13.8 ft + ~~25~~ 38 ft + 13.8 ft = 65.6 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:

44.8 x 65.6

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

Dave Lydahl (signature) C2006 (license #) 04/22/2024 (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

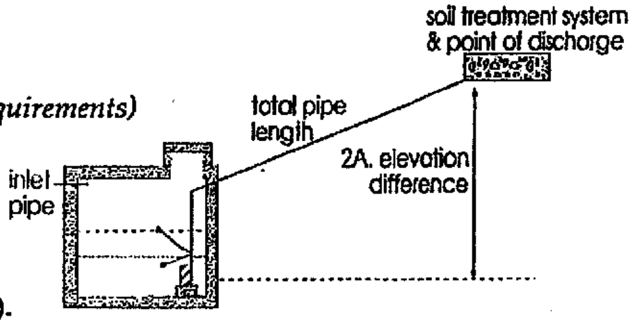
See pressure distribution work sheet

From A or B Selected pump capacity: 38.86 gpm

2. Determine pump head requirements:

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

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



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 = 2.64 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
   45 feet x 1.25 = 56.25 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.
   = 2.64 ft/100ft x 56.25 ÷100 = 1.5 ft

D. Total head required is the sum of elevation difference (A), special head requirements (B), and total friction loss (C4)
7.6 ft + 5.0 ft+ 1.5 ft =

Total head: 14.1 feet

Special Head Requirements	
Gravity Distribution	0 ft
Pressure Distribution	[✓ 5 ft]

E-9: 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

3. Pump selection

A pump must be selected to deliver at least 38.86 gpm (1A or B) with at least 14.1 feet of total head (2D)

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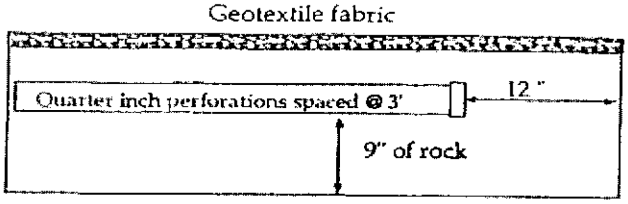
PRESSURE DISTRIBUTION SYSTEM



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

1. Select number of perforated laterals 3

2. Select perforation spacing = 3.0 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.

   38 (Rock layer length) - 2 ft = 36 ft

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

   Perforation spacing = 36 ft ÷ 3 ft = 12 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.*

   12 spaces + 1 = 13 perforations/lateral

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

   13 perfs/lat x 3 lat = 39 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 38 ft = 380 sqft
   Square foot per perforation = Rock bed area ÷ number of perfs (6)
   380 sqft ÷ 39 perfs = 9.7 sqft/perf

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

   39 perfs x .74 gpm/perfs = 28.86 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 = 1½ 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 = X inches.~~

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

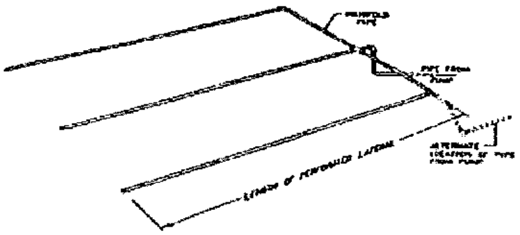
perforation spacing (feet)	1 inch	1.25 inch	1.5 inch	2.0 inch
2.5	8	14	18	28
3.0	8	13	17	26
3.3	7	12	16	25
4.0	7	11	15	23
5.0	6	10	14	22

E-6: Perforation Discharge in gpm

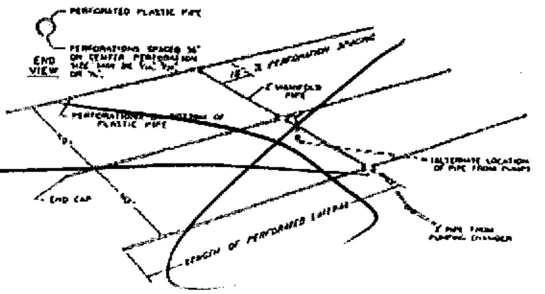
head (feet)	perforation diameter (inches) 1/8	3/16	7/32	1/4
1.0[a]	0.18	0.42	0.56	0.74
2.0[b]	0.26	0.59	0.80	1.04
5.0	0.41	0.94	1.26	1.65

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

MANIFOLD LOCATED AT END OF PRESSURE DISTRIBUTION SYSTEM



LAYOUT OF PERFORATED PIPE LATERALS FOR PRESSURE DISTRIBUTION IN MOUND



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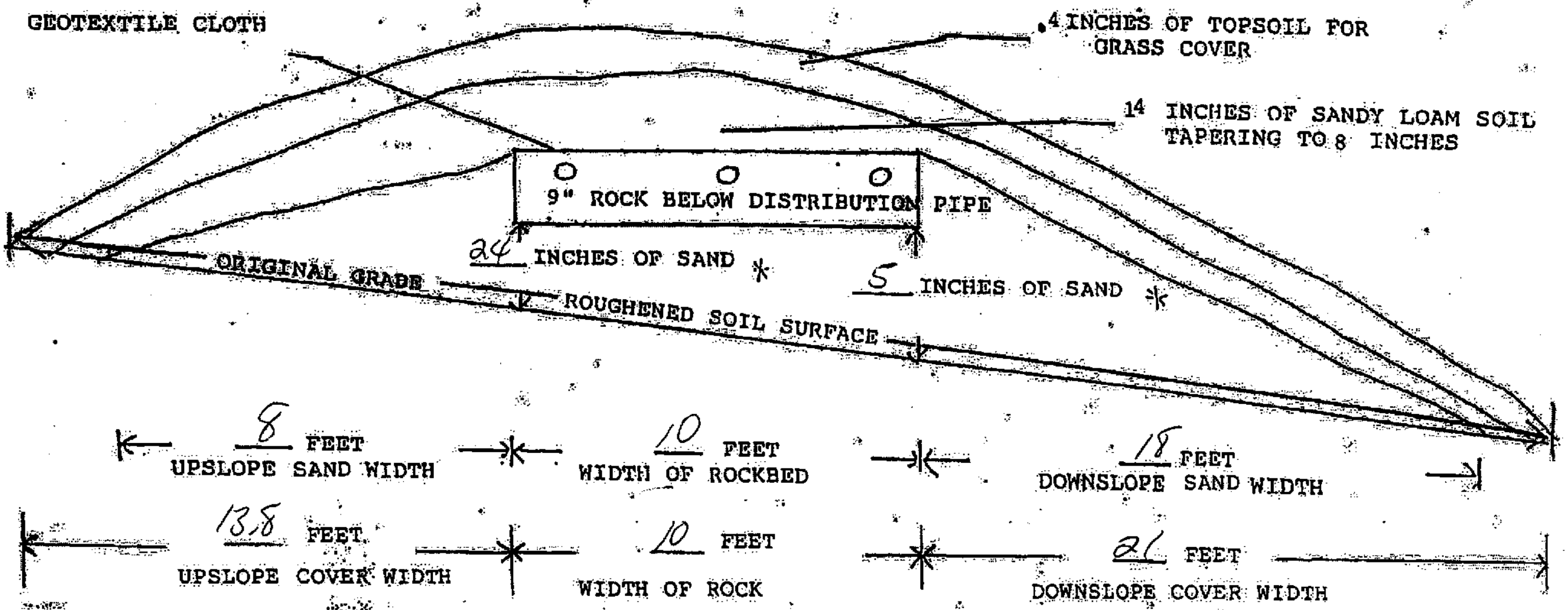
MOUND CROSS-SECTION

4% PERCENT SLOPE OF ORIGINAL SOIL

10 FT. x 38 FT. SIZE OF ROCKBED 36 FT. x 44.8 FT. SIZE OF SANDBASE



SOILS CHARTS FOR BOTH PROPOSED AND ALTERNATE SITES

1 (PROPOSED) SOILS DATA

B-1

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-4	F.S SANDLOAM ROOTS FRIABLE	7.5YR 3/3
4-15	SAND LOAM	7.5yR 3/4
15+	Sand Loam Wet. 20% Rocky	7.5YR 4/4 46/5/2 Redox

2 (PROPOSED) SOILS DATA

B-2
Pit-

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-6	Fine Sand Loam FRIABLE No Rocks ROOTS	7.5YR 3/4
6-12	SAND LOAM FRIABLE NO Rocks	7.5YR 4/4
12+15		10YR 3/3 7.5YR 4/4/ 5/3 Redox.

1 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

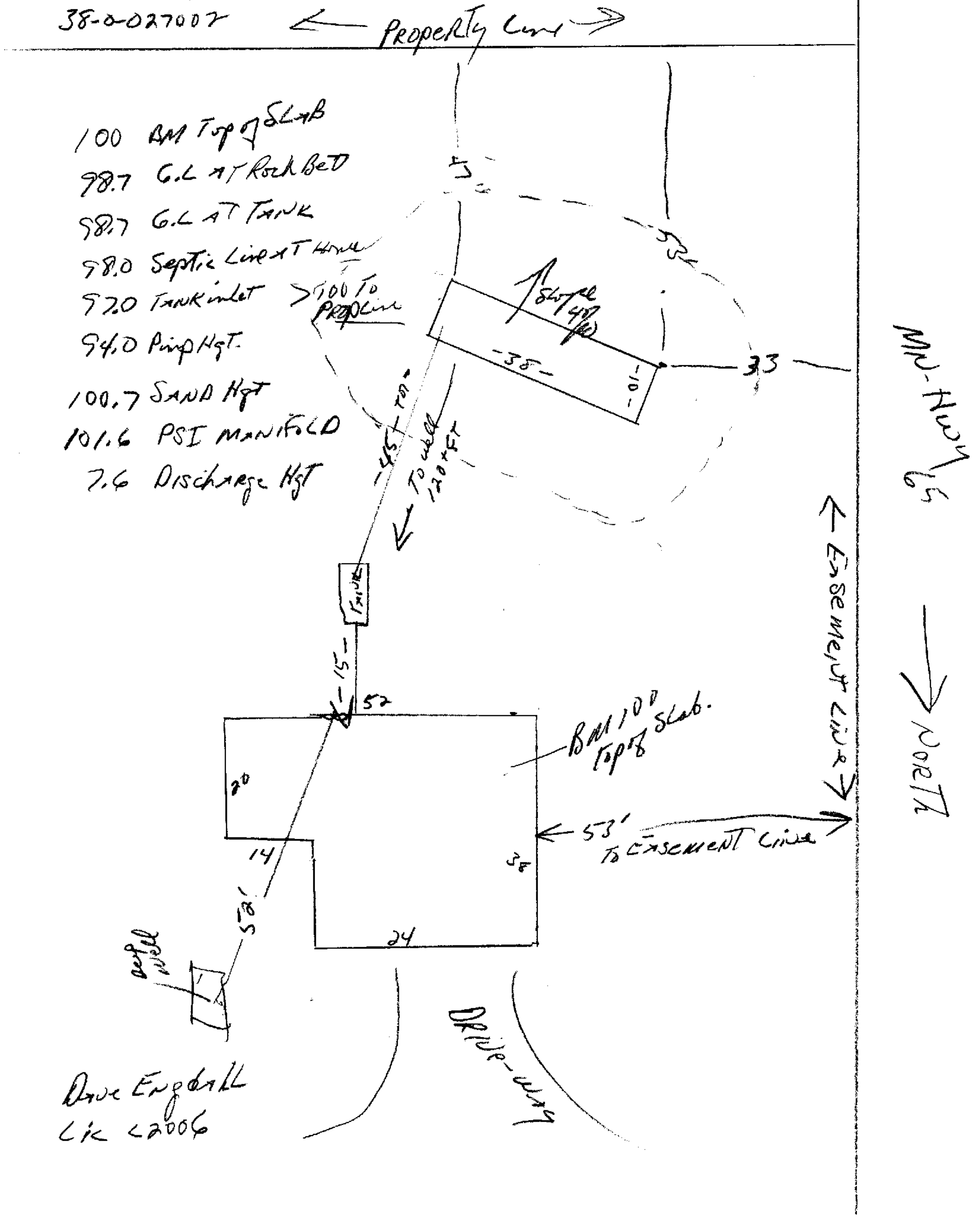
2 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

ADDITIONAL SOIL BORINGS MAY BE REQUIRED

Zachary Bayerle
38-0-027007

100	BM Top of Slab
98.7	G.L AT Rock BeD
98.7	G.L AT TANK
98.0	Septic Line AT Home
97.0	TANK inlet
94.0	Pump Hgt.
100.7	SAND Hgt
101.6	PSI MANIFOLD
7.6	Discharge Hgt



Dave Engdahl
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