FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE 5-1-16 , FIELD EVALUATION DATE 5-1-16
PROPERTY OWNER: WAYNE ROYER PHONE 612-868-7751
ADDRESS: CITY,STATE,ZIP:
LEGAL DESCRIPTION:
PIN# SEC T R TWP NAME NORDLAND
FIRE# LAKE/RIVER SETH LAKE LAKE CLASS OHWL FT.

DESCRIPTION OF SOIL TREATMENT AREAS

	AREA #1	AREA #2
DISTURBED AREAS	YES NO X	YES NO X
COMPACTED AREAS	YES NO X	YES NO X
FLOODING	YES NO X	YES NO X
RUN ON POTENTIAL	YES NO X	YES NO X
SLOPE %	6	
DIRECTION OF SLOPE	EAST	
LANDSCAPE POSITION	SIDEHILL	
VEGETATION TYPES	GRASS	

REFERENCE BM ELEV. 100 FT.
REFERENCE BM DESCRIPTION
GROUND LEVEL BY EXISTING TANK

DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1 28', 1A 28', 2 ,2A

BOTTOM ELEVATION--FIRST TRENCH OR BOTTOM OF ROCK BED: #1 112 FT., #2 FT.

SOIL SIZING FACTOR: SITE # 1 1.27 , SITE #2

CONSTRUCTION RELATED ISSUES:

LIC# 127 SITE EVALUATOR SIGNATURE: Larry Liljequist
SITE EVALUATOR NAME: LARRY LILJEQUIST TELEPHONE# 218 820 8886
LUG REVIEW DATE 6/9/16
Comments:

SOIL BORING LOGS ON REVERSE SIDE

Form des 2/20/98

MOUND DESIGN WORKSHEET (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%
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

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 = 2 feet
2. Depth of percolation tests = _____ feet
3. Texture SAND
   Percolation rate 6-15 mpi
4. Soil loading rate _____ gpd/sqft *(see figure D-33)*
5. Percent land slope 6 %

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) = 380 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 cuyd
3. Multiply cubic yards by 1.4 to get weight of rock in tons
   14 cuyd x 1.4 ton/cuyd = 19.6 tons

F. SEWAGE ABSORPTION WIDTH

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

1.5 x 10 ft = 15 ft

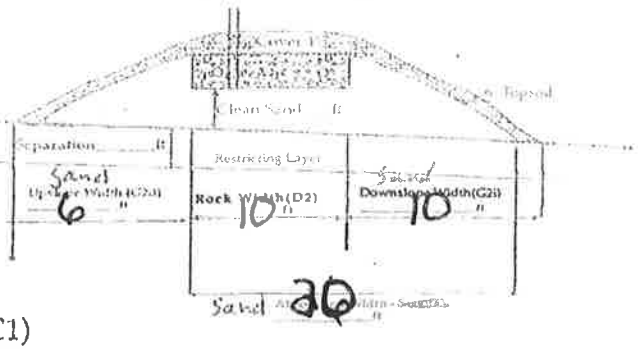
D-33: Absorption Width Sizing Table

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	0.72	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 & LENGTH
(landslope greater than 1%)

Landslope > 1% slope



1. Downslope absorption width = absorption width (F) minus rock layer width (D2)
15 ft - 10 ft = 5 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
3.23 *(see figure D-34)*

d. Upslope width = berm multiplier (G2c) x upslope mound height (G2b):
3.23 x 3 ft = 10 ft

DOWNSLOPE

e. Drop in elevation = rock layer width (D2) x percent landslope (C5) ÷ 100
10 ft x 6 % ÷ 100 = .6 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)
.6 ft + 3 ft = 3.6 ft

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

h. Downslope width = downslope multiplier (G2g) times downslope mound height (G2f)
5.26 x 3.6 ft = 19 ft

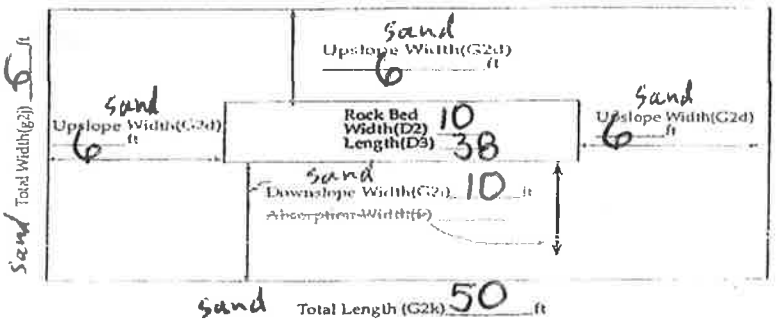
i. Select the greater of G1 and G2h as the downslope width: 19 ft

j. Total mound width is the sum of upslope width (G2d) width plus rock layer width (D2) plus downslope width (G2i)
10 ft + 10 ft + 19 ft = 39 ft

k. Total mound length is the sum of upslope width (G2d) plus rock layer length (D3) plus upslope width (G2d)
10 ft + 38 ft + 10 ft = 58 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:
39 x 58

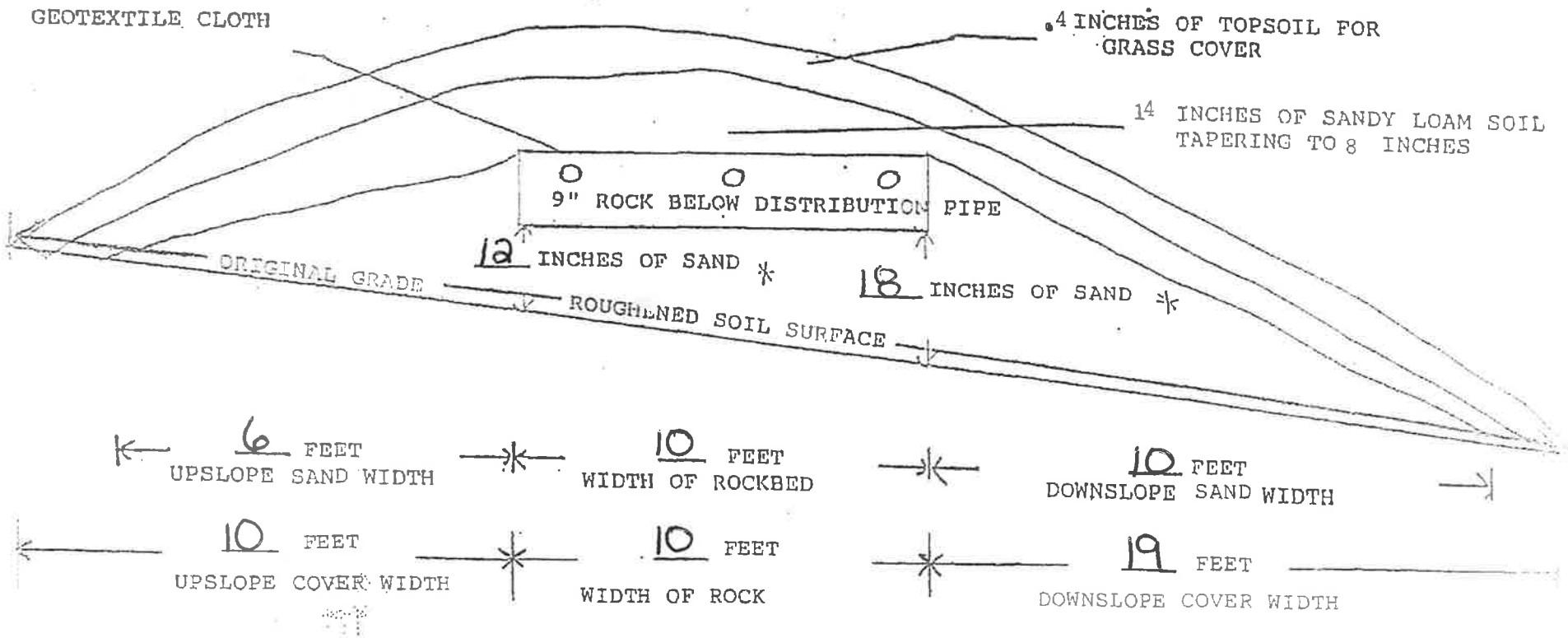
I hereby certify that I have completed this work in accordance with applicable ordinances, rules and laws.

Larry Hymel (signature) 127 (license #) 6-7-16 (date)

MOUND CROSS-SECTION

6 PERCENT SLOPE OF ORIGINAL SOIL

10 FT. x 38 FT. SIZE OF ROCKBED 26 FT. x 50 FT. SIZE OF SANDBASE



PRESSURE DISTRIBUTION SYSTEM

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.

   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 round down 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 = 29 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 = _____ inches.

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

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

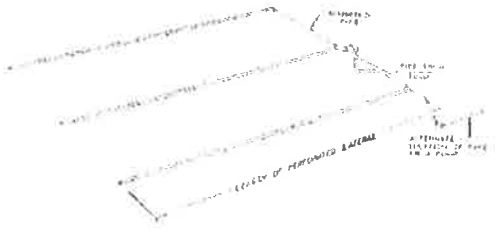
perforation spacing (feet)	1 inch	1.25 inch	1.5 inch	2.0 inch
2.5	8	14	18	28
3.0	8	13	17	26
3.3	7	12	16	25
4.0	7	11	15	23
5.0	6	10	14	22

E-6: Perforation Discharge in gpm

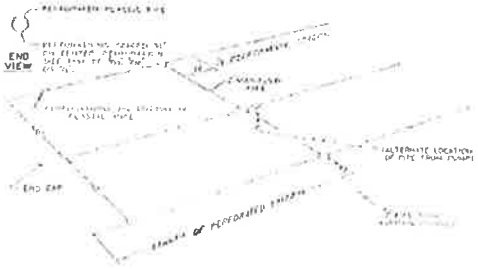
head (feet)	perforation diameter (inches)			
	1/8	3/16	7/32	1/4
1.0[a]	0.18	0.42	0.56	0.74
2.0[b]	0.26	0.59	0.80	1.04
5.0	0.41	0.94	1.26	1.65

[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.

Larry Lyngaas (signature) 127 (license #) 6-7-16 (date)

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: 29 gpm

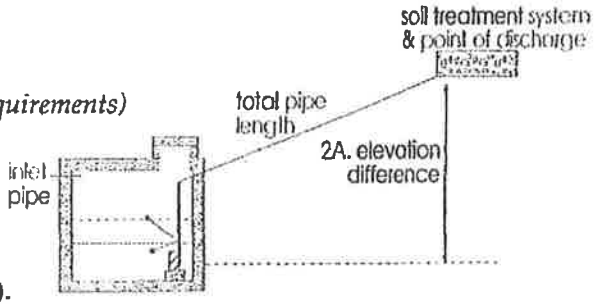
2. Determine pump head requirements:

A. Elevation difference between pump and point of discharge?

18 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 = 1.55 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

   180 feet x 1.25 = 225 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.

   = 1.55 ft/100ft x 225 ÷100 = 3.5 ft

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

18 ft + 5 ft+ 3.5 ft =

Total head: 26.5 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 29 gpm (1A or B) with at least 26.5 feet of total head (2D)

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

Larry Lyngt (signature) 127 (license #) 6-7-16 (date)

Maintenance Log

Activity	Date Accomplished									
Check frequently:										
Leaks: check for plumbing leaks										
Soil treatment area check for surfacing										
Lint filter: check, clean if needed										
Effluent screen: if owner-maintained										
Water usage rate (monitor frequency ____)										
Check annually:										
Caps: inspect, replace if needed										
Sludge & Scum/Pump										
Inlet & Outlet baffles										
Drainfield effluent leaks										
Pump, alarm, wiring										
Flush & clean laterals if cleanouts exists										
Other:_____										
Other:_____										

Notes:_____

_____

_____

_____

Mitigation/corrective action plan:_____

Call a licensed septic professional with problems.

_____

_____

_____

Subsurface Sewage Treatment System Management Plan

Property Owner:_____ Phone:_____ Date:_____

Mailing Address:_____ City:_____ Zip:_____

Site Address:_____ City:_____ Zip:_____

This management plan will identify the operation and maintenance activities necessary to ensure long-term performance of your septic system. Some of these activities must be performed by you, the homeowner. Other tasks must be performed by a licensed septic service provider.

System Designer: check every 36 months.
Local Government: check every 36 months.
State Requirement: check every 36 months.
(State requirements are based on MN Rules Chapter 7080.2450 Subp 2 & 3)

My System needs to be checked every 36 months.

Homeowner Management Tasks

Leaks – Check (look, listen) for leaks in toilets and dripping faucets. Repair leaks promptly.
Surfacing sewage – Regularly check for wet or spongy soil around your soil treatment area.
Effluent filter – Inspect and clean twice a year or more.
Alarms – Alarm signals when there is a problem. Contact a service provider any time an alarm signals.
Event counter or water meter – Record your water use.
-recommend meter readings be conducted (*circle one:* DAILY WEEKLY MONTHLY)

Professional Management Tasks

- [x] Check to make sure tank is not leaking
- [x] Check and clean the in-tank effluent filter
- [x] Check the sludge/scum layer levels in all septic tanks
- [x] Recommend if tank should be pumped
- [x] Check inlet and outlet baffles
- [x] Check the drainfield effluent levels in the rock layer
- [x] Check the pump and alarm system functions
- [x] Check wiring for corrosion and function
- [ ] Check dissolved oxygen and effluent temperature in tank
- [x] Provide homeowner with list of results and any action to be taken
- [x] Flush and clean laterals if cleanouts exist

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

Property Owner Signature:_____ Date:_____

Designer Signature: Harry Lyme III Date:_____

See Reverse Side for Management Log

SOILS CHARTS FOR BOTH PROPOSED AND ALTERNATE SITES

1 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-3	TOPSOIL	
3-18"	SAND LOOSE	10 YR 5/6
18-28"	SAND ROCK	10 YR 4/6

CLAY LOAM @ 28"

2 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-3	TOPSOIL	
3-15	SAND	10 YR 5/6
15-28	SAND ROCK	10 YR 4/6

CLAY LOAM @ 28"

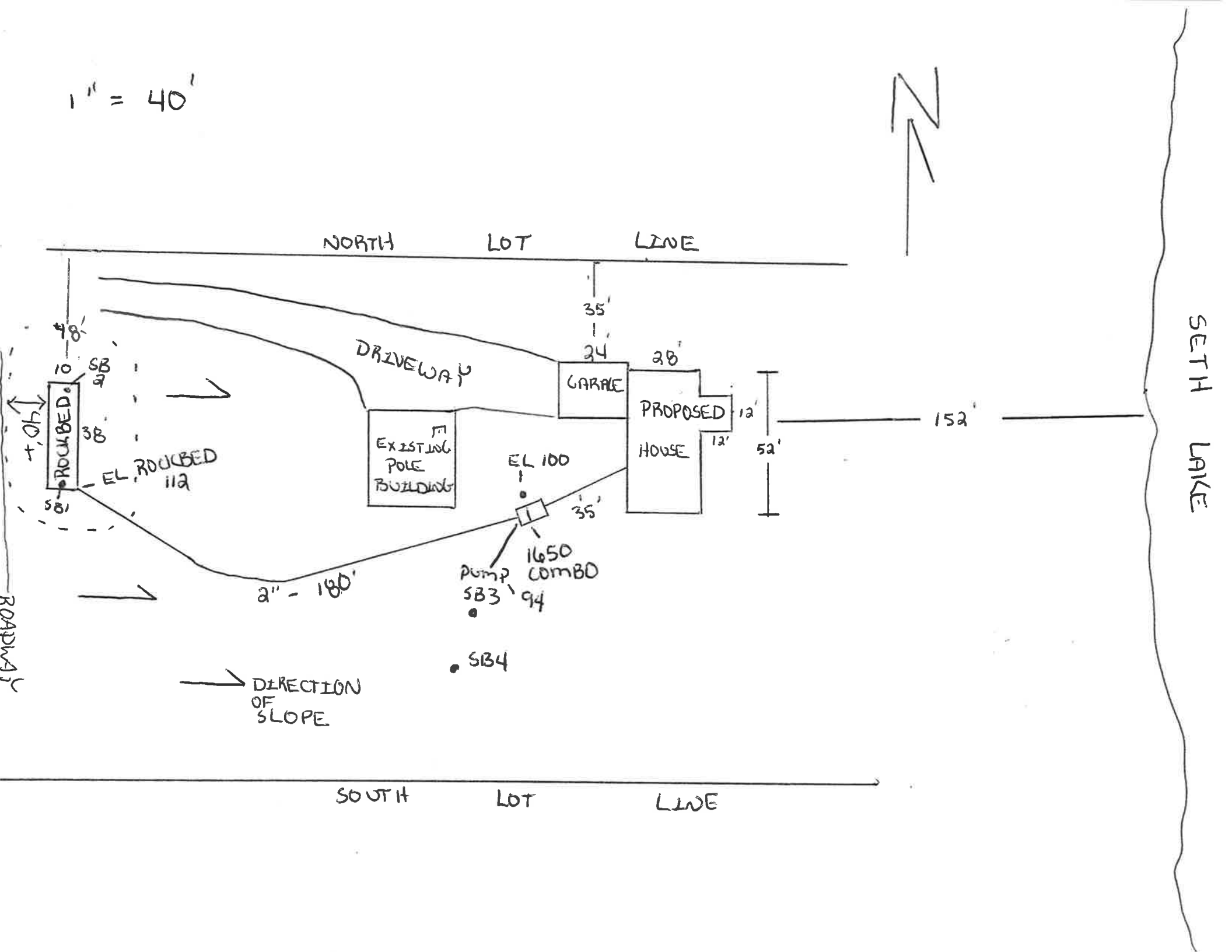
1 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-4	TOPSOIL	
4"-16"	LOAM CLAY	10 YR/53

2 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-5	TOPSOIL	
5-16"	LOAM CLAY	10 YR 5/3

ADDITIONAL SOIL BORINGS MAY BE REQUIRED


1" = 40'
N
NORTH LOT LINE
SOUTH LOT LINE
SETH LAKE
ROADWAY
48'
10'
SB 2
+10'
ROCKBED
38'
EL. ROCKBED 112
SB1
DRIVEWAY
EXISTING POLE BUILDING
GARAGE
24'
35'
28'
PROPOSED HOUSE
12'
12'
52'
152'
EL 100
35'
1650 COMBO
PUMP
SB3
94
2" - 180'
SB4
DIRECTION OF SLOPE