TRENCH AND BED WORKSHEET

1. AVERAGE DESIGN FLOW
   A. Estimated 600 gpd *(see figure A-1)*
   or measured ___ x 1.5 *(safety factor)* = ___ gpd
   B. Septic tank capacity 1000 gal *(see figure C-1)*

2. SOILS *(Site evaluation data)*
   C. Depth to restricting layer = 3'6" LEL ft
   D. Max depth of system Item 2C - 3 ft = 6 ft - 3 ft = 3 ft
   E. Texture SAND Percolation rate 6-15 MPI
   F. Soil Sizing Factor (SSF) 1.27 sqft/gpd *(see figure D-15)*
   G. % Land Slope 3 %

3. TRENCH or BED BOTTOM AREA
   H. For trenches with 6 inches of rock below the pipe:
   A x F = _____gpd x _____sqft/gpd = _____ sqft
   I. For trenches with 12 inches of rock below the pipe:
   A x F x 0.8 = _____gpd x _____sqft/gpd x 0.8 = _____ sqft
   J. For trenches with 18 inches of rock below the pipe:
   A x F x 0.66 = _____gpd x _____sqft/gpd x 0.66 =_____ sqft
   K. For trenches with 24 inches of rock below the pipe:
   A x F x 0.6 = _____gpd x _____sqft/gpd x 0.6 = _____ sqft
   L. For gravity beds with 6 or 12 inches of rock below the pipe;
   1.5 x A x F = 1.5 x ____gpd x ___sqft/gpd = ____ sqft
   For pressure beds with 6 or 12 inches of rock below the pipe;
   A x F = 600 gpd x 1.27 sqft/gpd = 762 sqft

4. DISTRIBUTION *(Check all that apply)*
   X Bed (< 6% slope) ___ Drop boxes (any slope) X Rock
   ___ Trenches ___ Distribution box (< 3%) ___ Chamber
   X Pressure ___ Gravity ___ Gravelless

5. SYSTEM WIDTH, LENGTH and VOLUME
   M. Select trench width = 16 ft
   N. If using rock, divide bottom area by width: (H, I, J,K or L) ÷ M =
   762 sqft ÷ 16 ft= 48 lineal feet
   Rock depth below distribution pipe plus 0.5 foot times bottom area:
   Rock depth in feet + 0.5 feet x Area (H,I,J,K, or L)
   (9" ft + 0.5 ft) x 762 sqft = 762 cuft
   Volume in cubic yards = cuft ÷27
   762 cuft ÷ 27 = 29 cuyds
   Weight of rock in tons = cubic yds x 1.4
   29 cuyds x 1.4 = 41 tons
   O. If using 10" Gravelless Pipe, Flow (A) x Gravelless SSF*(see figure D-3)*
   _____gpd x ____lineal feet/gpd = _____ lineal feet
   P. If using Chambers, H,I,J, or K(based on hieght of chamber slats) ÷ width of chamber in feet(M)
   _____sqft ÷ _____ft= _____ lineal ft

6. LAWN AREA
   Q. Select trench spacing, center to center = ____ feet
   R. Multiply trench spacing by lineal feet R x Q = sqft of lawn area
   16 ft x 48 ft = 768 sqft

7. Include a drawing with scale (one inch = _____ft). Show pertinent boundaries, right of way, easements, location of house, garage, driveway, all other imporvements, existing or proposed soil treatment system, well and dimensions of all elevations, setbacks and separation distances.

A-1: Estimated Sewage Flows in Gallons per Day				
number of bedrooms	Class I	Class II	Class III	Class IV
2	300	225	180	50%
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.

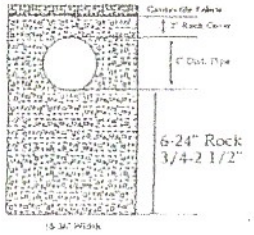
C-1: Septic Tank Capacities (in gallons)			
Number of Bedrooms	Minimum Liquid Capacity	Liquid capacity with garbage disposal	Liquid capacity with disposal & 1/3 reserve
2 or less	750	1125	1500
3 or 4	1000	1500	2000
5 or 6	1500	2250	3000
7, 8 or 9	2000	3000	4000

D-15: Soil Characteristics and Soil Sizing Factor (SSF) (> 3' separation)		
Percolation Rate minutes per inch (mpi)	Soil Texture	Soil Sizing Factor square feet/gallon per day(sqft/gpd)
faster than 0.1*	Coarse sand	0.83
0.1 to 5	Medium sand Loamy sand	0.83
0.1 to 5**	Fine sand	1.67
6 to 15	Sandy loam	1.27
16 to 30	Loam	1.67
31 to 45	Silt loam Silt	2.00
46 to 60	Clay loam Sandy clay Silty clay	2.20
over 61 to 120***	Clay Sandy clay Silty clay	4.20
slower than 120****		

*Use systems for rapidly permeable soils: pressure distribution or serial distribution with no trench >25% of the total system.
**Soil having 50% or more fine sand plus very fine sand
***A mound must be used.
****An other or performance system must be used

D-9: Soil Characteristics and Soil sizing factors (SSF) for Gravelless Pipe		
percolation rate (minutes/inch)	soil texture	lineal feet/ gallon/day
Faster than 0.1 *	Coarse Sand	---
0.1 to 5	Medium Sand Loamy Sand	0.28
0.1 to 5	Fine Sand **	0.6
6 to 15	Sandy Loam	0.42
16 to 30	Loam	0.56
31 to 45	Silt Loam Silt	0.67
46 to 60	Clay Loam (CL) Sandy CL Silty CL	0.74
slower than 60***	Clay Sandy Clay Silty Clay	---

*Soil too coarse for sewage treatment. Use systems for rapidly permeable soils.
**Soil having 50% or more fine sand + very fine sand.
***Soil with too high a percentage of clay for installation of a standard inground system



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

Larry Hymgaard (signature) 127 (license #) 6-21-20 (date)

FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE 5-1-20, FIELD EVALUATION DATE 6-20-20
PROPERTY OWNER: SON DAGEN PHONE
ADDRESS: CITY,STATE,ZIP:
LEGAL DESCRIPTION:
PIN# 09-0-047701 SEC 28 T 46 R 25 TWP NAME GLEN
FIRE# LAKE/RIVER CLEAR 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 %	3	
DIRECTION OF SLOPE	S	
LANDSCAPE POSITION		
VEGETATION TYPES	WOODED - GRASS	

REFERENCE BM ELEV. 100 FT
REFERENCE BM DESCRIPTION
GROUND ELEVATION ON THE DRAINFIELD

DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1 6'+, 1A 6'+, 2 ,2A

BOTTOM ELEVATION--FIRST TRENCH OR BOTTOM OF ROCK BED: #1 98 FT., #2 FT.

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

CONSTRUCTION RELATED ISSUES:

LIC# 127 SITE EVALUATOR SIGNATURE Larry Ljungquist

SITE EVALUATOR NAME: LARRY LILJENQUIST TELEPHONE# 218 820 8886

LUG REVIEW DATE

Comments:

SOIL BORING LOGS ON REVERSE SIDE

Form des 2/20/98

PRESSURE DISTRIBUTION SYSTEM

1. Select number of perforated laterals 5

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.

   48 (Rock layer length) - 2 ft = 46 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 = 46 ft ÷ 3 ft = 15 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.*

   15 spaces + 1 = 16 perforations/lateral

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

   16 perfs/lat x 5 lat = 80 perforations

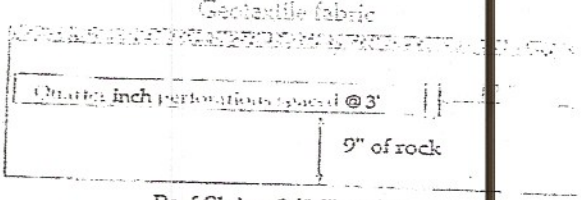
   B. Calculate the square footage per perforation.
   Should be 6-10 sqft/perf. *Does not apply to at-grades.*
   Rock bed area = rock width (ft) x rock length (ft)
   16 ft x 48 ft = 768 sqft
   Square foot per perforation = Rock bed area ÷ number of perfs (6)
   768 sqft ÷ 80 perfs = 9.6 sqft/perf

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

   80 perfs x .56 gpm/perfs = 45 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'

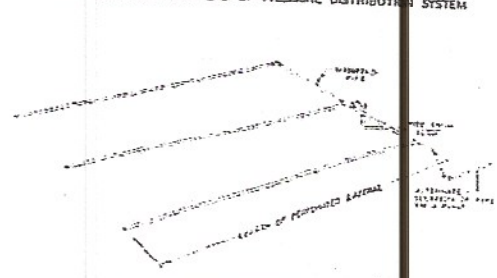
E-4: Maximum allowable number of 1/4-inch perforations per lateral to guarantee <10% discharge variation

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

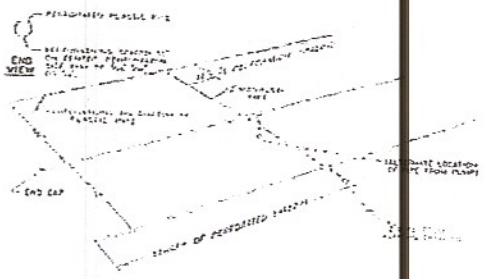
E-6: Perforation Discharge in gpm

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.



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 Hymel (signature) 127 (license #) 6-21-20 (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: 45 gpm

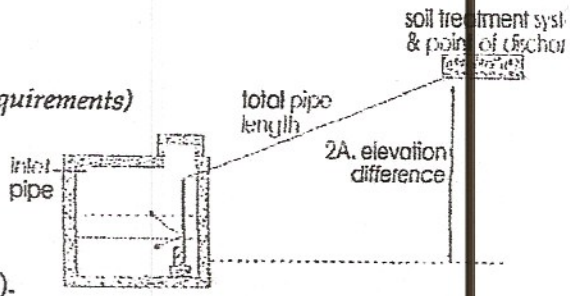
2. Determine pump head requirements:

A. Elevation difference between pump and point of discharge?

13 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 = 3.28 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

   130 feet x 1.25 = 162.5 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.

   = 3.28 ft/100ft x 162.5 ÷100 = 5.33 ft

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

13 ft + 5 ft+ 5.33 ft =

Total head: 23.33 feet

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

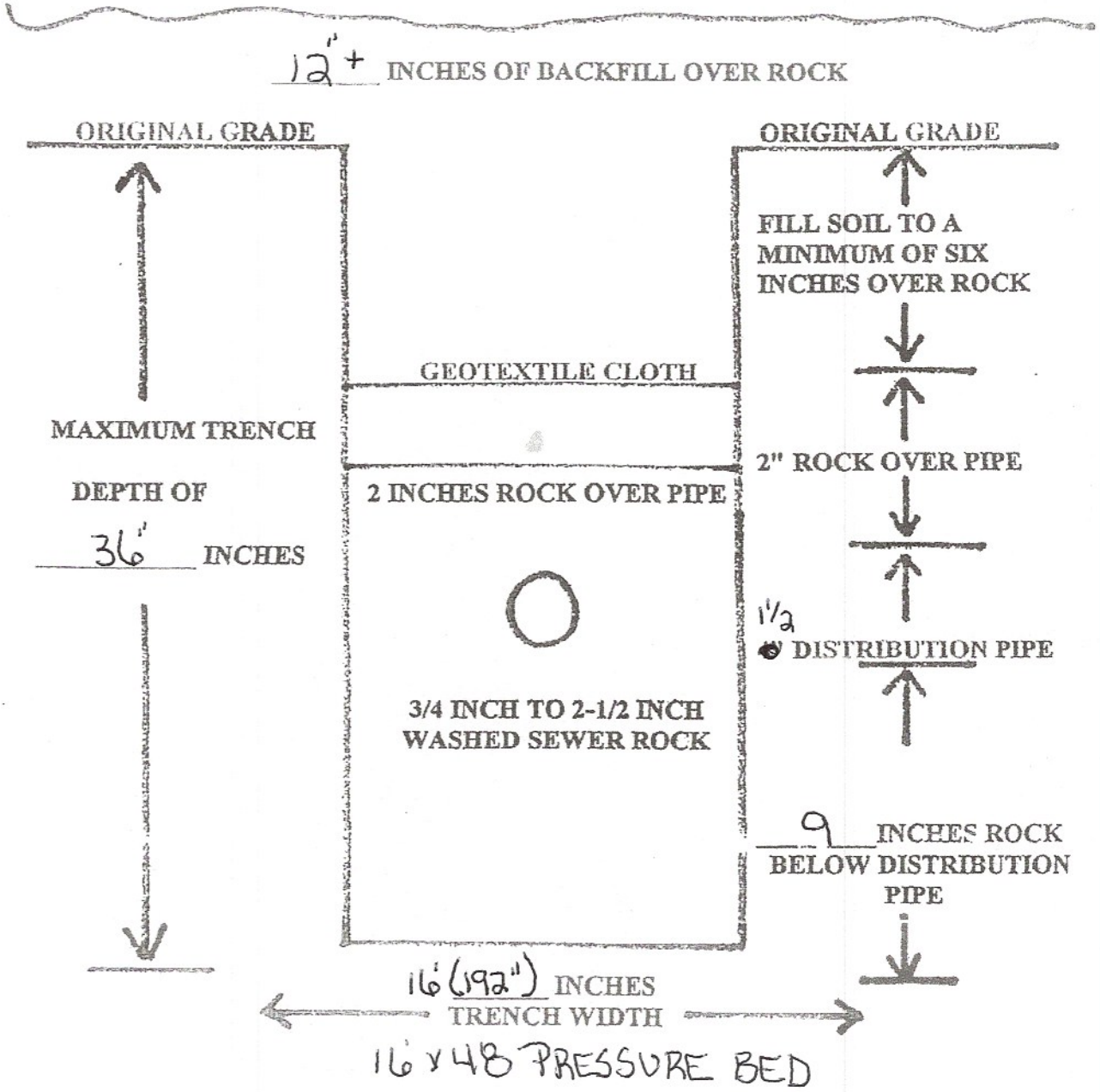
3. Pump selection

A pump must be selected to deliver at least 45 gpm (1A or B) with at least 23.33 feet of total head (2D)

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

Larry Lyngaas (signature) 127 (license #) 6-21-20 (date)

TRENCH CROSS-SECTION



16' x 48' PRESSURE BED

SOILS CHARTS FOR BOTH PROPOSED AND ALTERNATE SITES

1 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-4	TOPSOIL	
4-27	SAND LOOSE	10YR 5/6
27-72	SAND COURSE	10YR 4/4

NO MOTTLING

2 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-4	TOPSOIL	
4-27	SAND LOOSE	10YR 5/6
27-72	SAND COURSE	10YR 4/4

NO MOTTLING

1 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-6	TOPSOIL	
6-24	SAND LOOSE	10YR 5/6
24-72	SAND	10YR 4/4

2 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-6	TOPSOIL	
	SAND LOOSE	10YR 5/6
	SAND	10YR 4/4

ADDITIONAL SOIL BORINGS MAY BE REQUIRED

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

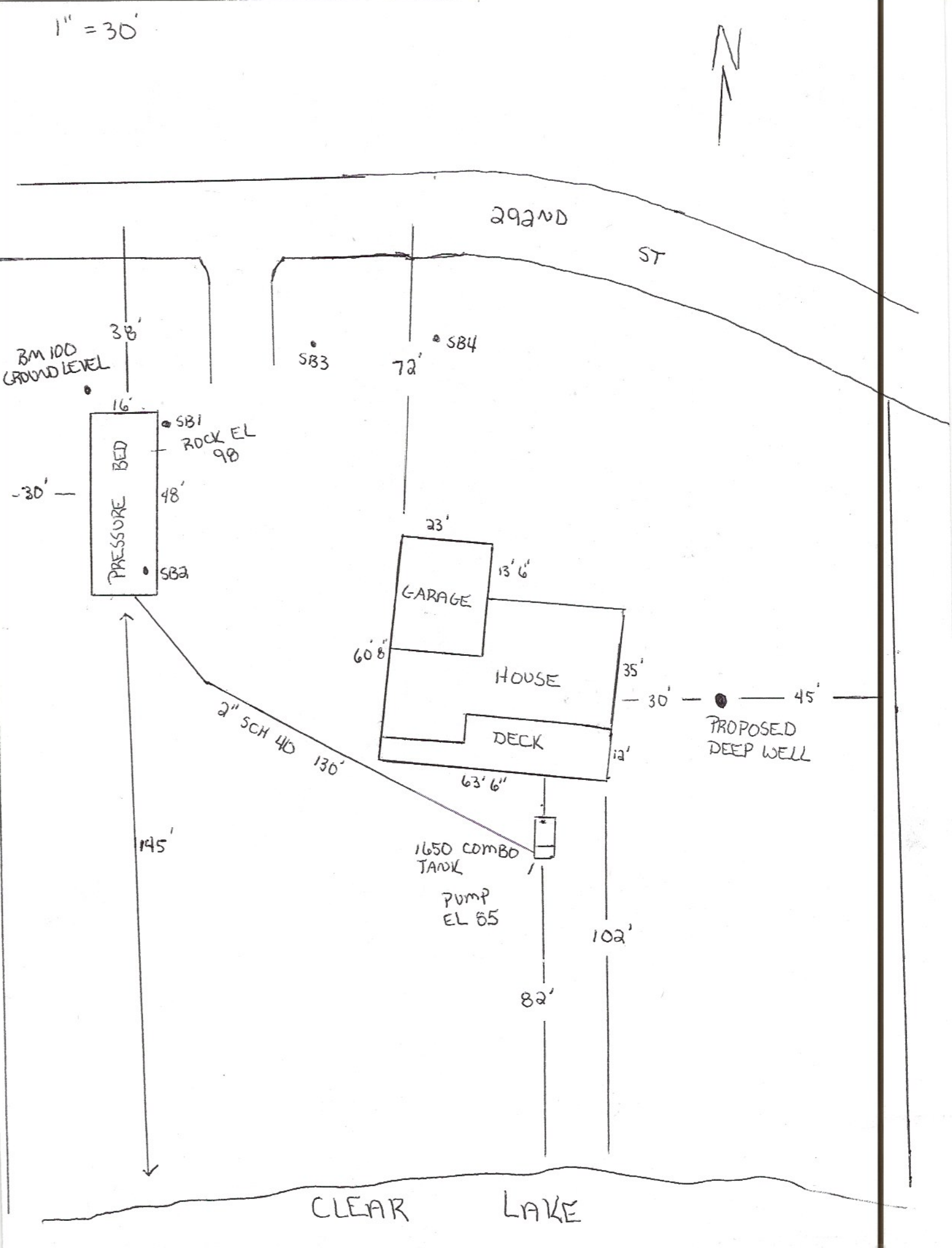
- ☒ Check to make sure tank is not leaking
- ☒ Check and clean the in-tank effluent filter
- ☒ Check the sludge/scum layer levels in all septic tanks
- ☒ Recommend if tank should be pumped
- ☒ Check inlet and outlet baffles
- ☒ Check the drainfield effluent levels in the rock layer
- ☒ Check the pump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

See Reverse Side for Management Log


1" = 30'
N
292ND ST
38'
BM 100
GROUND LEVEL
16'
SB1
ROCK EL
98
PRESSURE BED
48'
30'
SB2
SB3
72'
SB4
23'
13' 6"
GARAGE
60' 8"
HOUSE
35'
30'
45'
PROPOSED
DEEP WELL
DECK
12'
63' 6"
2" SCH 40 130'
145'
1650 COMBO
TANK
PUMP
EL 85
102'
82'
CLEAR LAKE