

FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE 4-17-20, FIELD EVALUATION DATE 4-17-20
PROPERTY OWNER: Ken Warzecha PHONE 320-733-4682
ADDRESS: 39769 Kestrel Ave. CITY, STATE, ZIP: Tamarack MN. 55787
LEGAL DESCRIPTION: NE NE Lot 1 less R/W
PIN# 27-0-008300 SEC 6 T 47 R 22 TWP NAME Salo
FIRE# _____ LAKE/RIVER _____ LAKE CLASS _____ OHWL _____ FT.

DESCRIPTION OF SOIL TREATMENT AREAS

	AREA #1	AREA #2	REFERENCE BM ELEV. _____ FT
DISTURBED AREAS	YES _____ NO <u>X</u>	YES _____ NO _____	REFERENCE BM DESCRIPTION _____
COMPACTED AREAS	YES _____ NO <u>X</u>	YES _____ NO _____	_____
FLOODING	YES _____ NO <u>X</u>	YES _____ NO _____	_____
RUN ON POTENTIAL	YES _____ NO <u>X</u>	YES _____ NO _____	_____
SLOPE %	<u>1</u>	_____	_____
DIRECTION OF SLOPE	_____	_____	_____
LANDSCAPE POSITION	_____	_____	_____
VEGETATION TYPES	<u>Grass</u>		

DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1 11", 1A _____, 2 10", 2A _____

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

SOIL SIZING FACTOR: SITE # 1 _____, 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: _____

SOIL BORING LOGS ON REVERSE SIDE

SOILS CHARTS FOR BOTH PROPOSED AND ALTERNATE SITES

1 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-5"	Top Soil	10yr 3/1
5"-16"	Loam/clay	10yr 4/4
mottling @ 11"		

2 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-5"	Top Soil	10yr 3/1
5"-16"	Loam/clay	10yr 4/4
mottling @ 10"		

1 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
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2 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
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ADDITIONAL SOIL BORINGS MAY BE REQUIRED

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

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

1650 gallons (see figure C-1)

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)

- Depth to restricting layer = 0 feet
- Depth of percolation tests = NA feet
- Texture Clay Loam/clay
 Percolation rate _____ mpi
- Soil loading rate 45 gpd/sqft (see figure D-33)
- Percent land slope 1 %

D. ROCK LAYER DIMENSIONS

- Multiply average design flow (A) by 0.83 to obtain required rock layer area.
300 gpd x 0.83 sqft/gpd = 249 sqft
- Determine rock layer width = 0.83 sqft/gpd x linear Loading Rate (LLR)
 0.83 sqft/gpd x 12 gpd/sqft = 10 ft
- Length of rock layer = area ÷ width =
249 sqft (D1) ÷ 10 ft (D2) = 25 ft

< 120 MPI	≤ 12
≥ 120 MPI	≤ 6

E. ROCK VOLUME

- Multiply rock area (D1) by rock depth of 1 ft to get cubic feet of rock
249 sqft x 1 ft = 249 cuft
- Divide cuft by 27 cuft/cuyd to get cubic yards
249 cuft ÷ 27 cuyd/cuft = 9.25 cuyd
- Multiply cubic yards by 1.4 to get weight of rock in tons
9.25 cuyd x 1.4 ton/cuyd = 13 tons

F. SEWAGE ABSORPTION WIDTH

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

2.67 x 10 ft = 26.7 ft

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)

_____ ft - _____ ft = _____ 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 - _____ ft = _____ 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)

_____ ft + 1ft + 1ft = _____ ft

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

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

_____ x _____ ft = _____ ft

DOWNSLOPE

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

_____ ft x _____ % ÷ 100 = _____ 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)

_____ ft + _____ ft = _____ ft

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

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

_____ x _____ ft = _____ ft

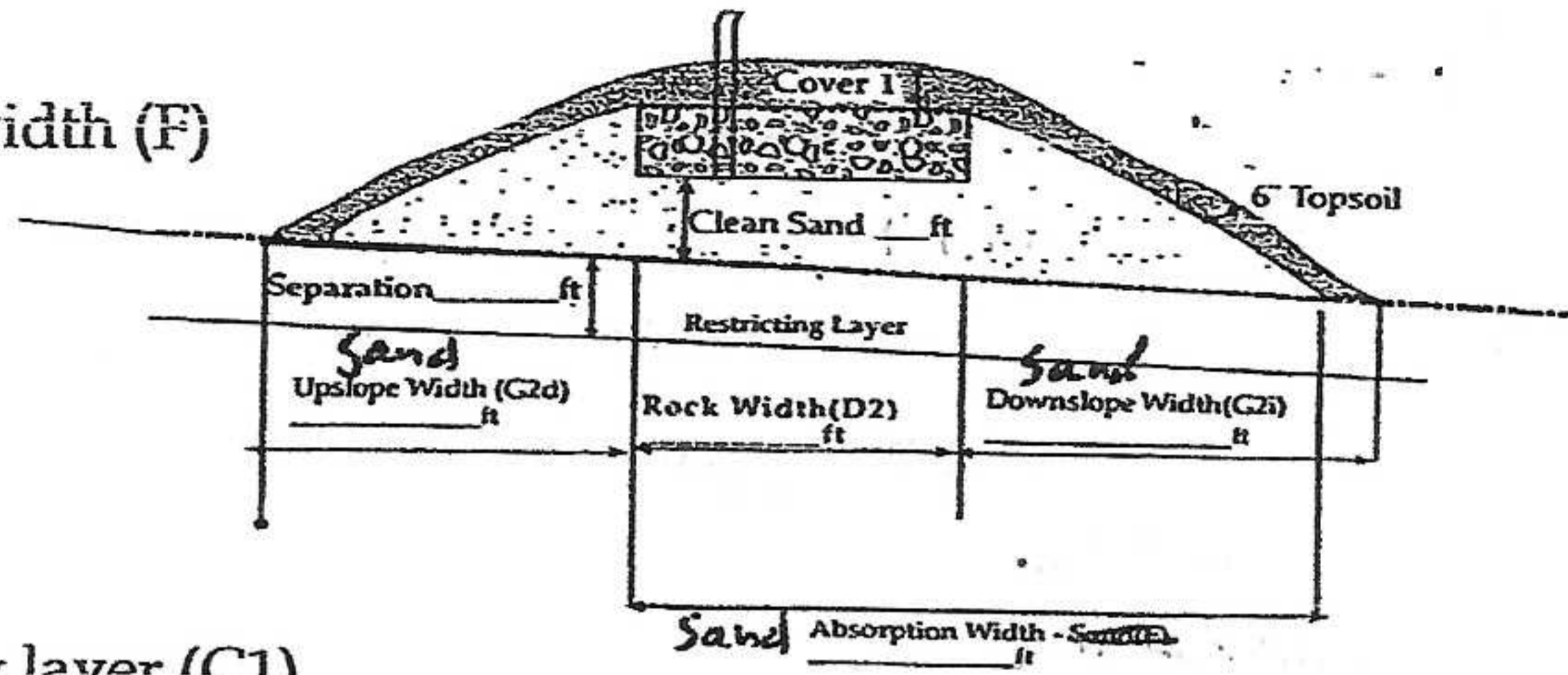
i. Select the greater of G1 and G2h as the downslope width: _____ ft

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

_____ ft + _____ ft + _____ ft = _____ ft

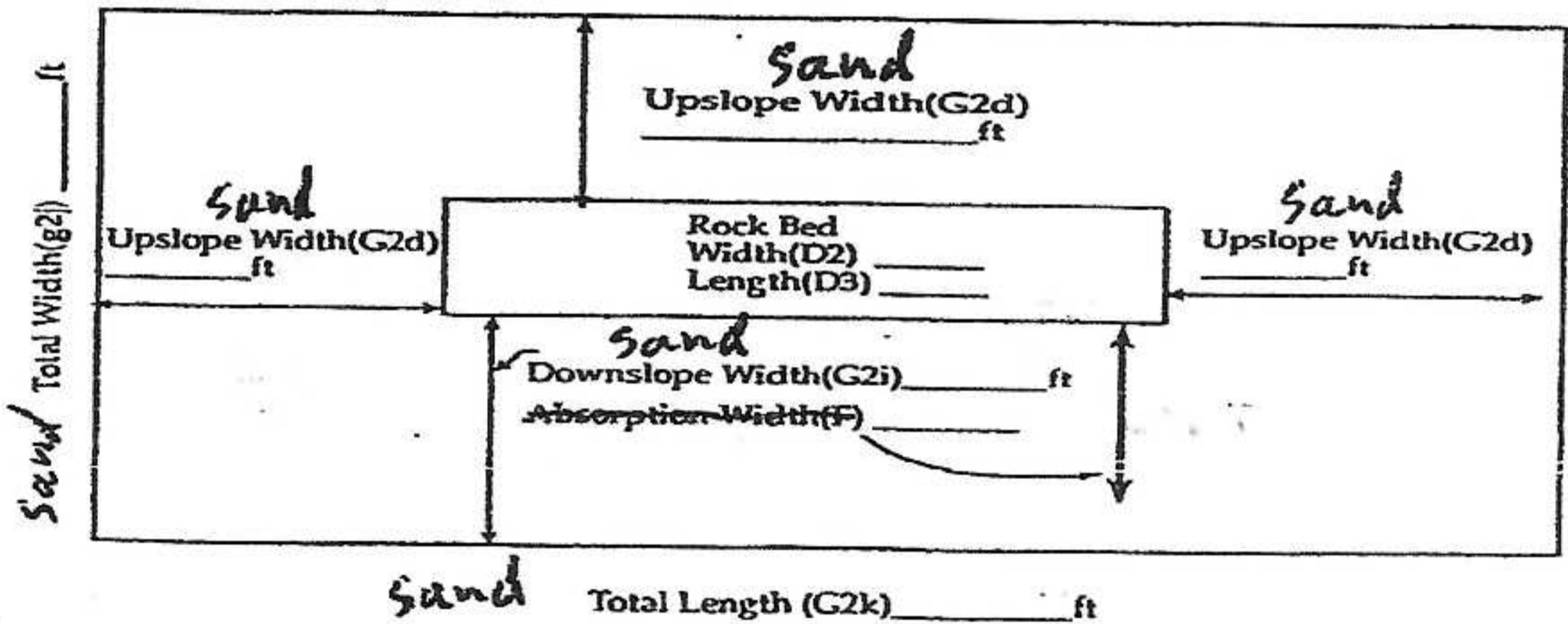
k. Total mound length is the sum of upslope width (G2d) plus rock layer length (D3) plus upslope width (G2d)

_____ ft + _____ ft + _____ ft = _____ 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



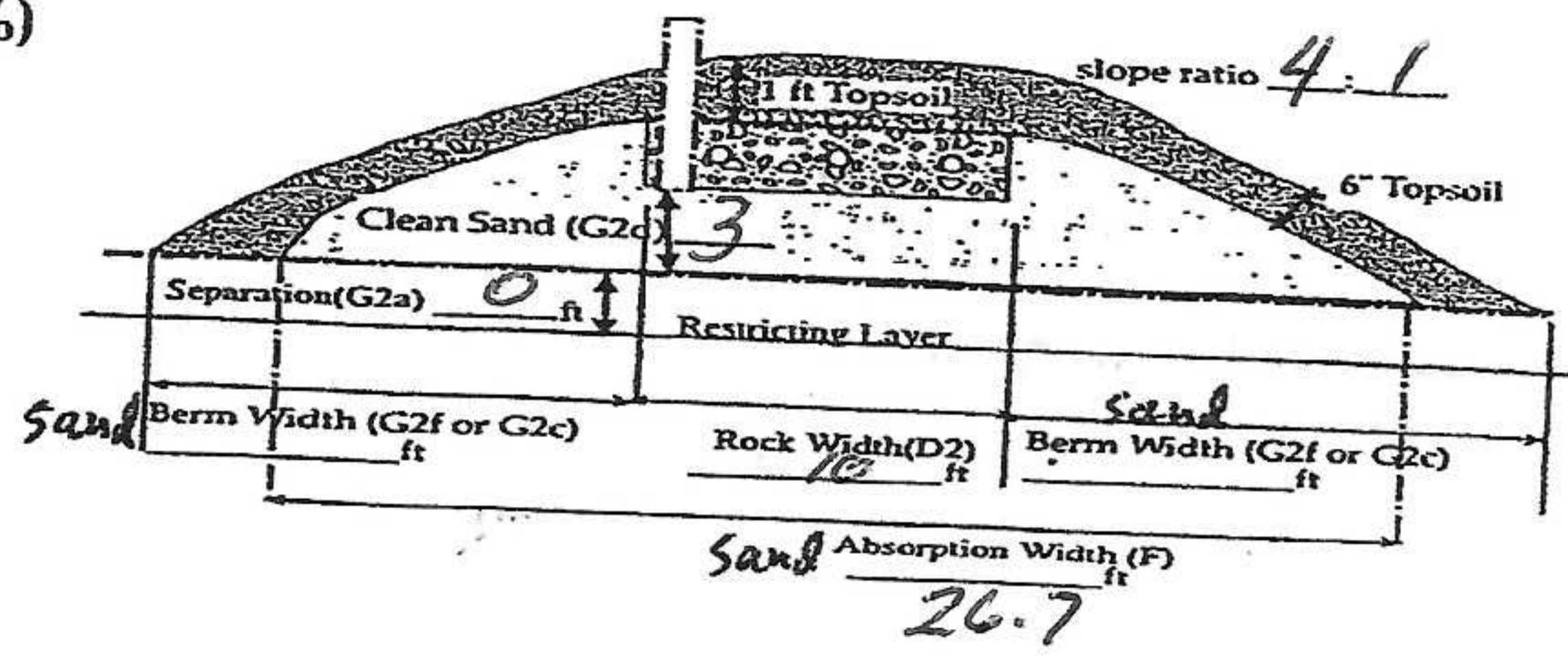
Final Dimensions:
 _____ X _____

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_____ (signature) _____ (license #) _____ (date)

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

← 1:70 LAND Slope



1. Absorption width (F) 26.7 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 - 0 ft = 3 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)

3 ft + 1ft + 1ft = 5 ft

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

5 x 4 = 20 ft

d. The total landscape width is the sum of berm (G2c) width plus rock layer width (D2) plus berm width (G2c): 20 ft + 10 ft + 20 ft = 50 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)

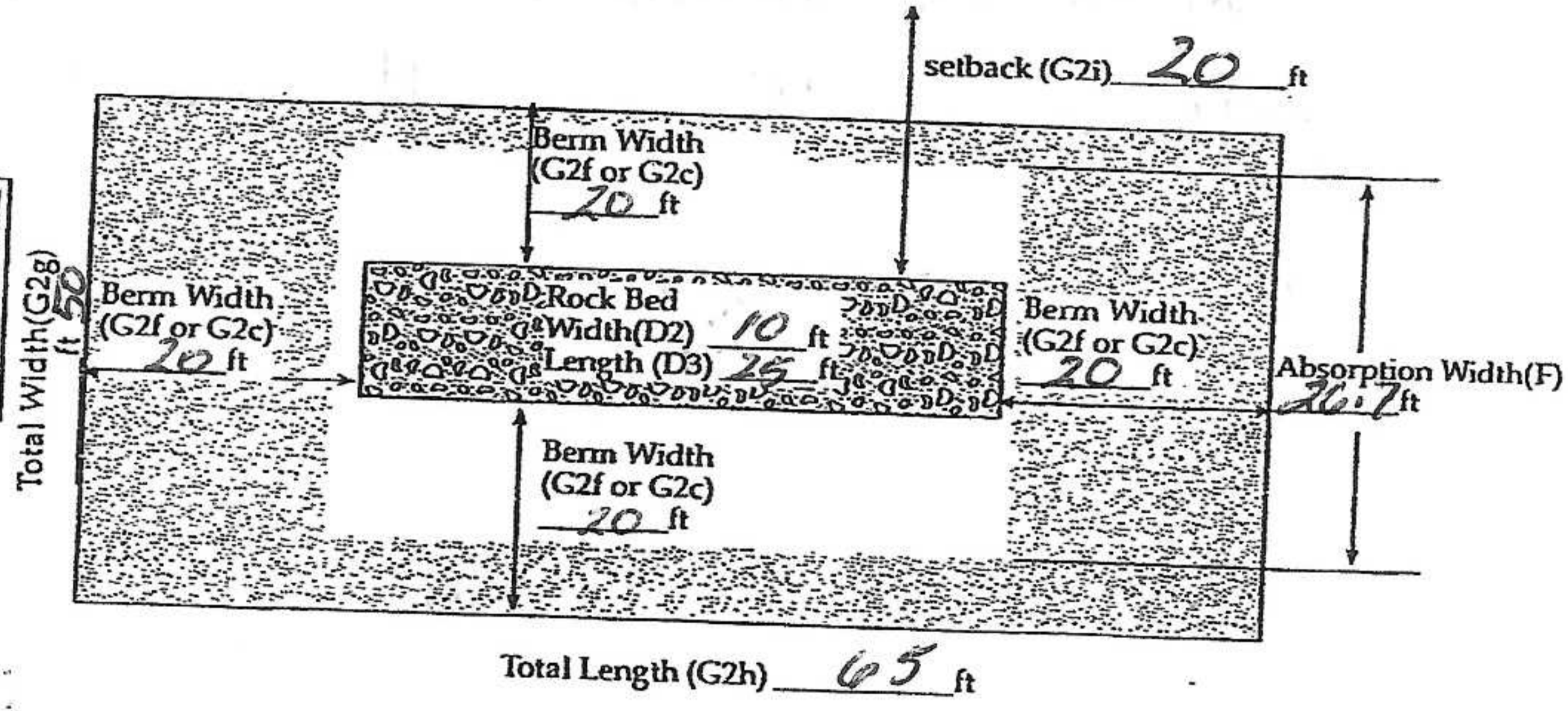
 ft + ft = ft

g. Total mound width is the sum of berm width (G2f or G2c) plus rock layer width (D2) plus berm width (G2f or G2c): 20 ft + 10 ft + 20 ft = 50 ft

h. Total mound length is the sum of berm (G2f or G2c) plus rock layer length (D3) plus berm (G2f or G2c): 20 ft + 25 ft + 20 ft = 65 ft

i. Setbacks from the rockbed are calculated as follows: the absorption width (F) minus the rock bed width (D2) divided by 2: (26.7 ft - 10 ft) ÷ 2 = 16.7 ft

Final Dimensions:
50 x 65



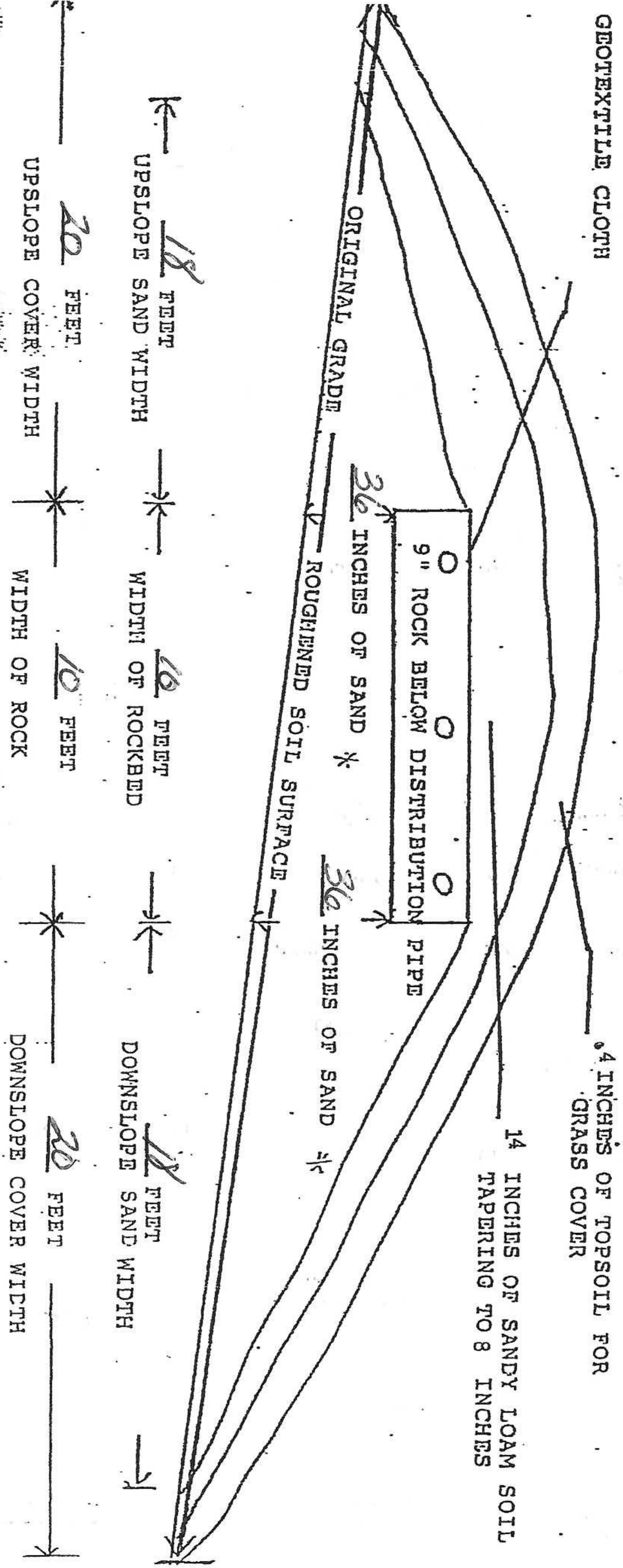
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BOUND CROSS-SECTION

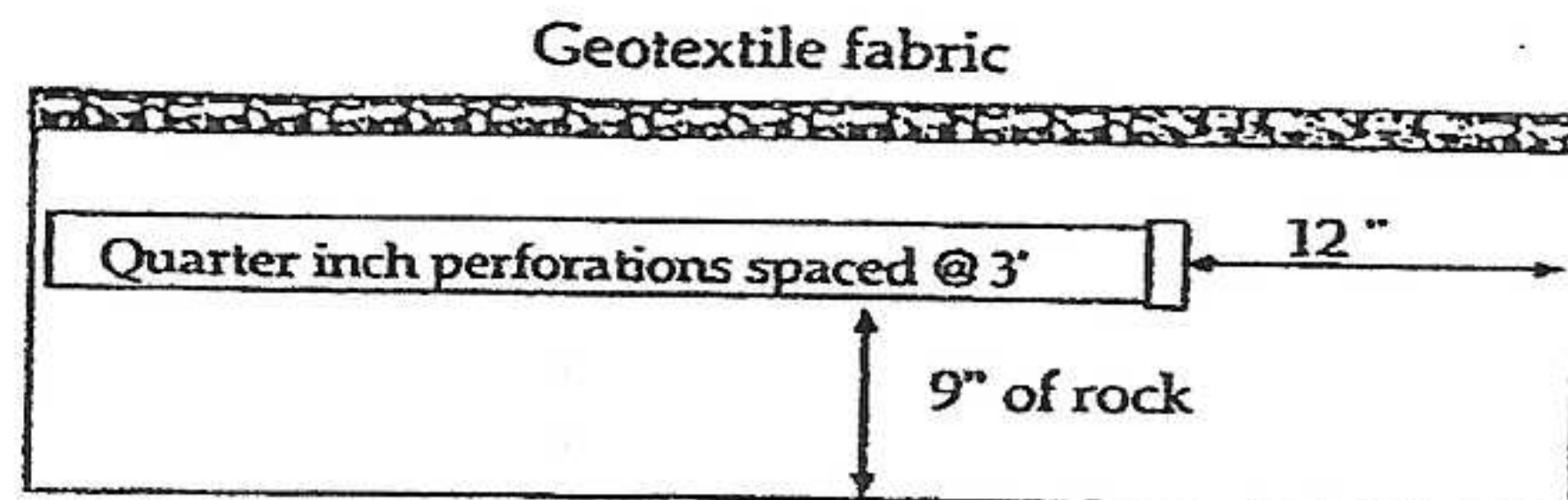
PERCENT SLOPE OF ORIGINAL SOIL

10 FT. X 25 FT. SIZE OF ROCKBED 4 1/2 FT. X 6 1/2 FT. SIZE OF SANDBASE

GEOTEXTILE CLOTH



PRESSURE DISTRIBUTION SYSTEM



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

- Select number of perforated laterals 3
- Select perforation spacing = 3 ft
- 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.

$$\frac{25}{\text{Rock layer length}} - 2 \text{ ft} = \underline{23} \text{ ft}$$

- 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 = 8 spaces

- 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.

8 spaces + 1 = 9 perforations/lateral

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

9 perfs/lat x 3 lat = 27 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 ÷ 27 perfs = 9.25 sqft/perf

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

27 perfs x .74 gpm/perfs = 20 gpm

- 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.

- 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

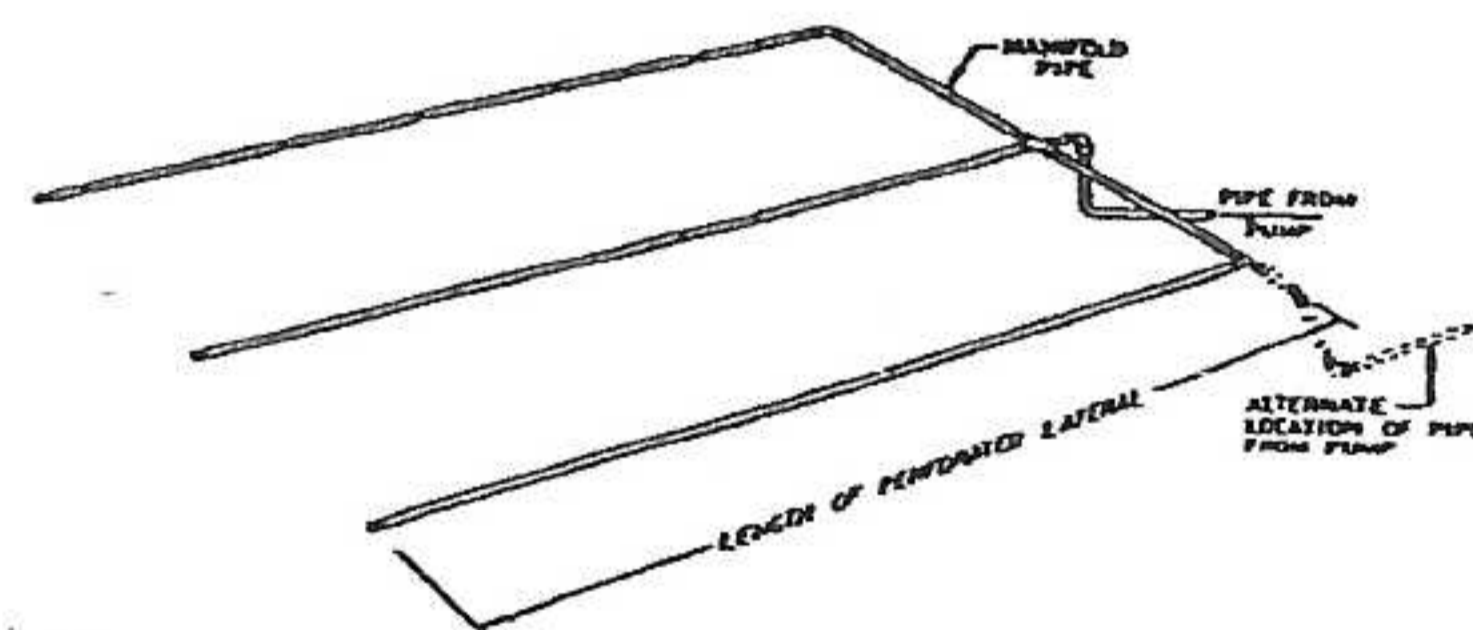
perforation spacing (feet)	1 inch	1.25 inch	1.5 inch	2.0 inch
2.5	8	14	18	28
<u>3.0</u>	8	13	<u>17</u>	26
3.3	7	12	16	25
4.0	7	11	15	23
5.0	6	10	14	22

E-6: Perforation Discharge in gpm

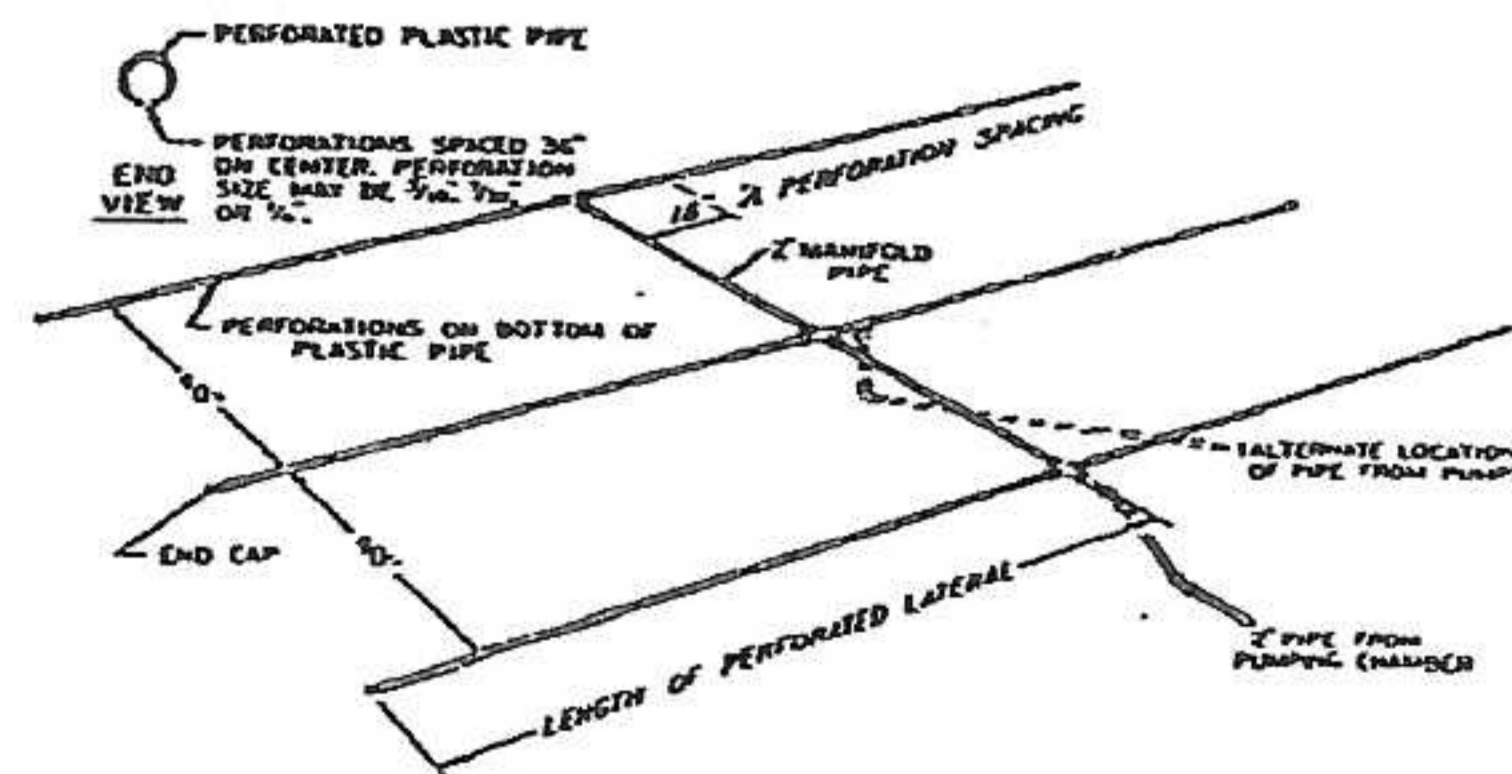
head (feet)	perforation diameter (inches)			
	1/8	3/16	7/32	1/4
<u>1.0^a</u>	0.18	0.42	0.56	<u>0.74</u>
2.0 ^b	0.26	0.59	0.80	1.04
5.0	0.41	0.94	1.26	1.65

^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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Ernie Decker (signature)

(signature)

910 (license #)

(license #)

5-1-20 (date)

(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: 20 gpm

2. Determine pump head requirements:

A. Elevation difference between pump and point of discharge?

14 feet

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

5 feet

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 = 2.47 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

60 feet x 1.25 = 75 feet

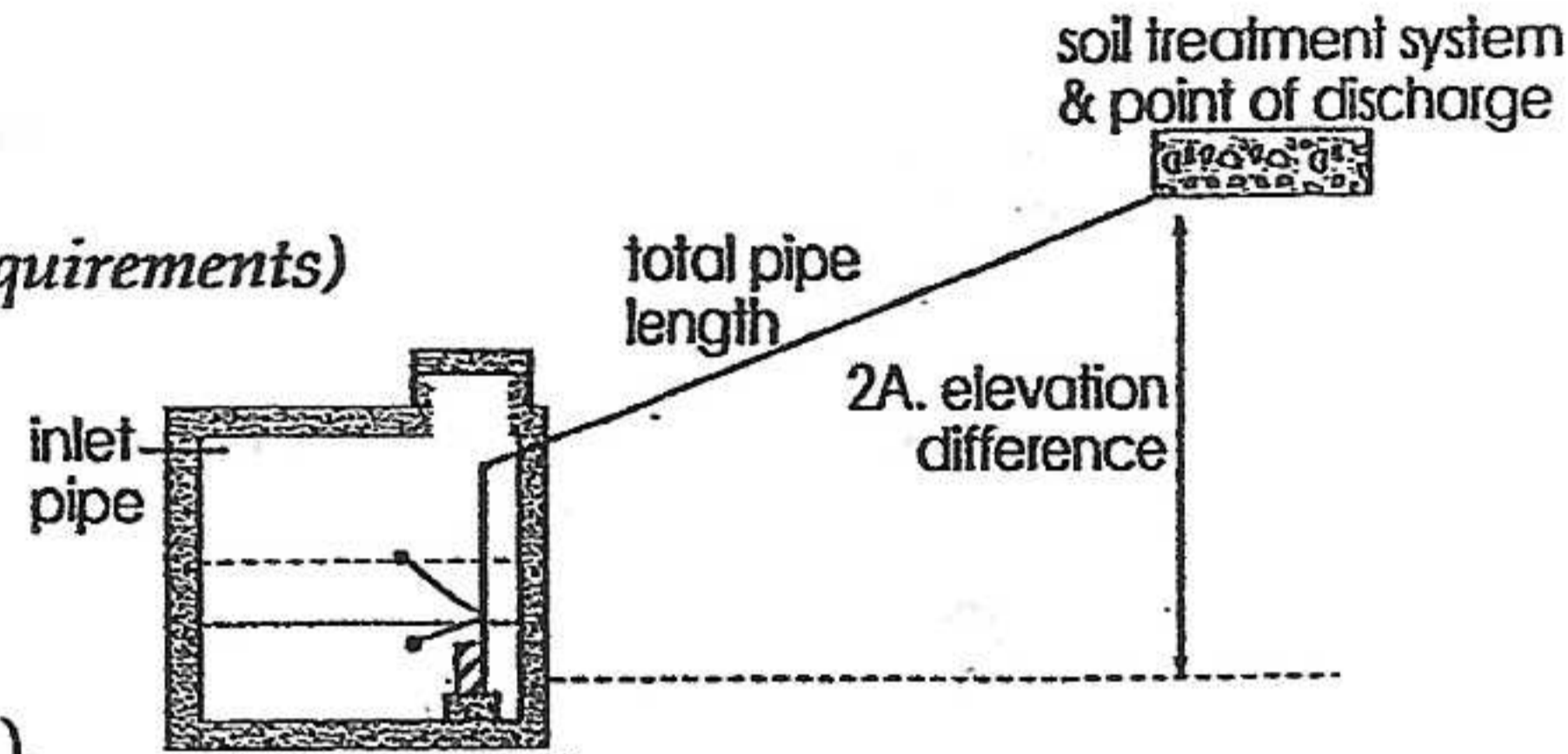
4. Calculate total friction loss by multiplying friction loss (C2) in ft/100 ft by the equivalent pipe length (C3) and divide by 100.

= 2.47 ft/100ft x 75 ÷ 100 = 1.85 ft

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

14 ft + 5 ft + 2 ft =

Total head: _____ feet



Special Head Requirements	
Gravity Distribution	0 ft
Pressure Distribution	5 ft

flow rate gpm	nominal pipe diameter		
	1.5"	2"	3"
<u>20</u>	<u>2.47</u>	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 20 gpm (1A or B) with at least 21 feet of total head (2D)

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DOSING CHAMBER SIZING

1. Determine area

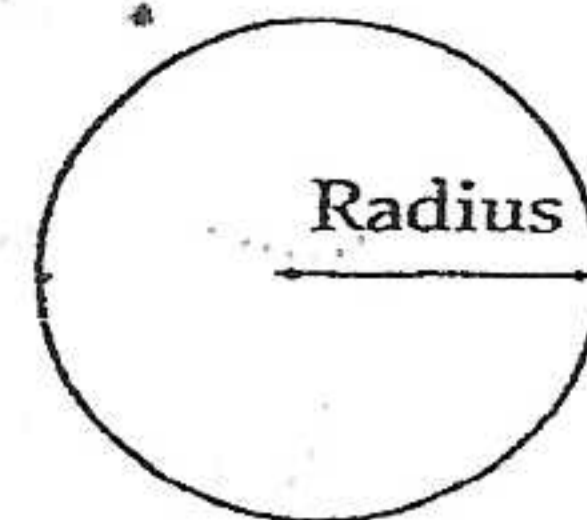
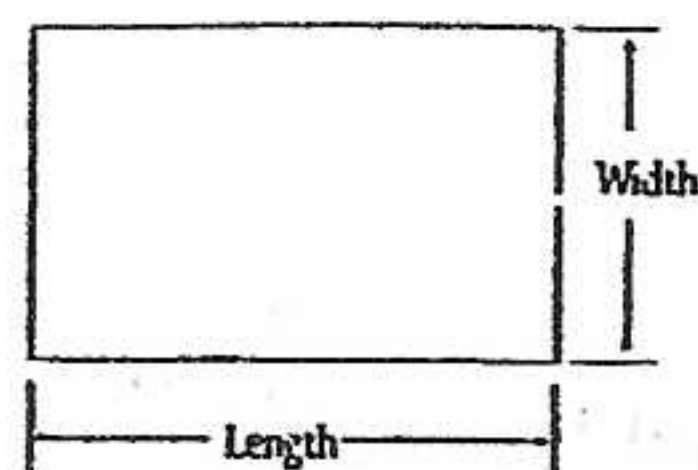
A. Rectangle area = $L \times W$

_____ x _____ = _____ square feet

B. Circle area = $\pi (3.14) \times \text{radius in feet} \times \text{radius in feet}$

$3.14 \times$ _____ 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 = 12.69 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 12.69 gal/in = 615 gal

4. Calculate gallons to cover pump (with 2-3 inches of water covering pump)

(Pump and block height (inch) + 2 inch) x gallon/inch

(14 in + 2 in) x 12.69 gal/in = 203 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 = 300 gpd ÷ 5 doses/day = 60 gallons

B. Calculate drainback

1. Determine total pipe length, 60 feet

2. Determine liquid volume of pipe, .11 gal per ft (see figure E-20)

3. Drainback quantity = 60 ft (5B1) x .11 gal per ft (5B2) = 6.6 gal

C. Total pump out volume = dose volume (5A) + drainback (5B3)

60 gal + 6.6 gal = 66.6 Total gallon

6. Float separation distance (using total pumpout volume)

Total pumpout volume (5C) ÷ gal/inch (2)

66.6 gal ÷ 12.69 gal/in = 5.25 inch

7. Calculate volume for alarm (typically 2 to 3 inches)

Alarm depth (inch) x gallon/inch (2) = 2 in x 12.69 gal/in = 25.4 gal

8. Calculate total gallon = gallons over pump (4) + gallons pumpout (5C) + gallons alarm (7)

203 gal + 66.6 gal + 25.4 gal = 295 gallons

9. Total Tank Depth = total gallon (8) ÷ gallon/inch (2)

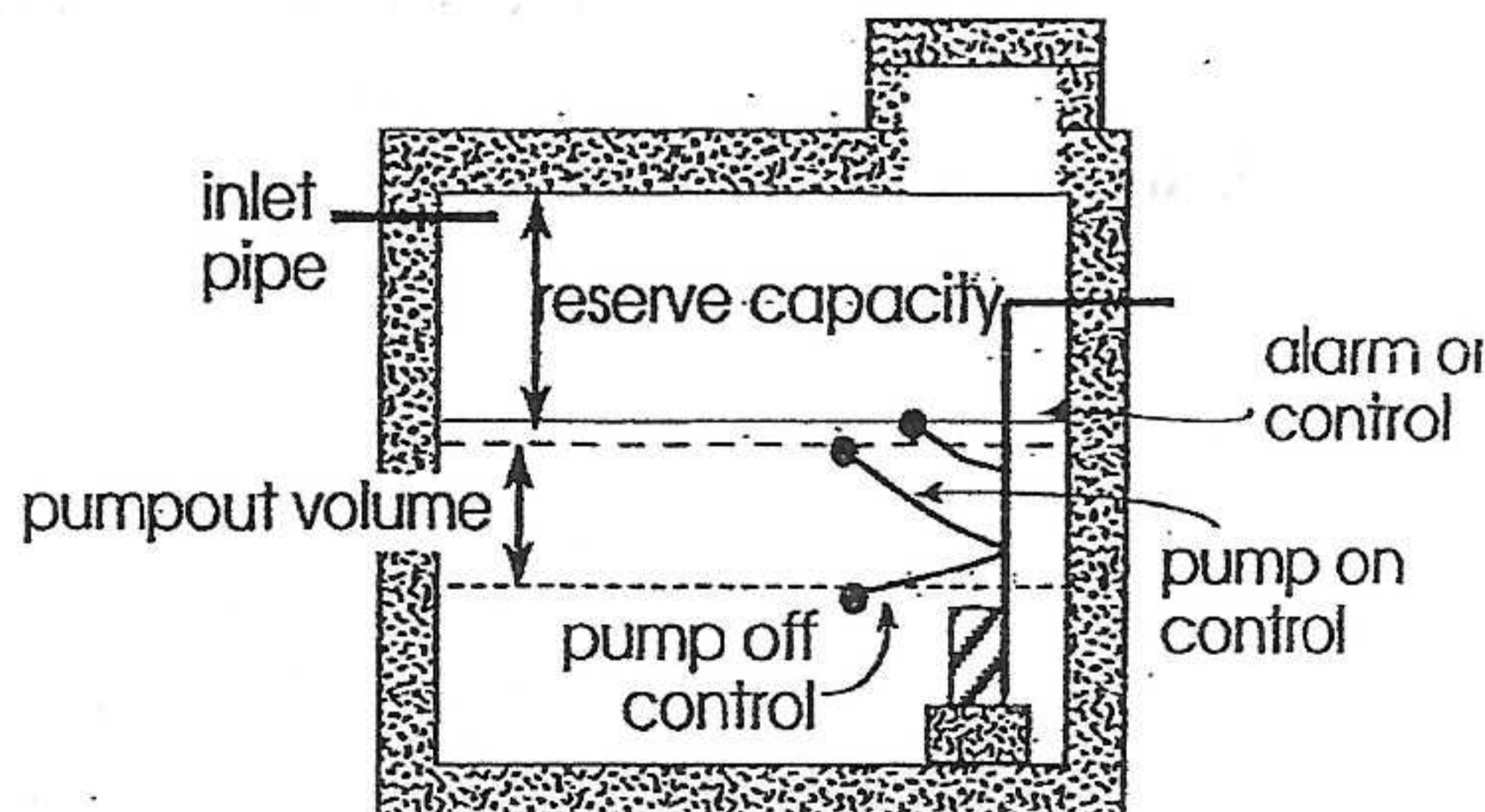
295 gal ÷ 12.69 gal/in = 23.25 in

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

number of bedrooms	Class I	Class II	Class III	Class IV
<u>2</u>	<u>300</u>	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.

Pipe Diameter inches	Gallons per foot
1	0.045
1.25	0.078
<u>1.5</u>	<u>0.11</u>
2	0.17
2.5	0.25
3	0.38
4	0.66

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

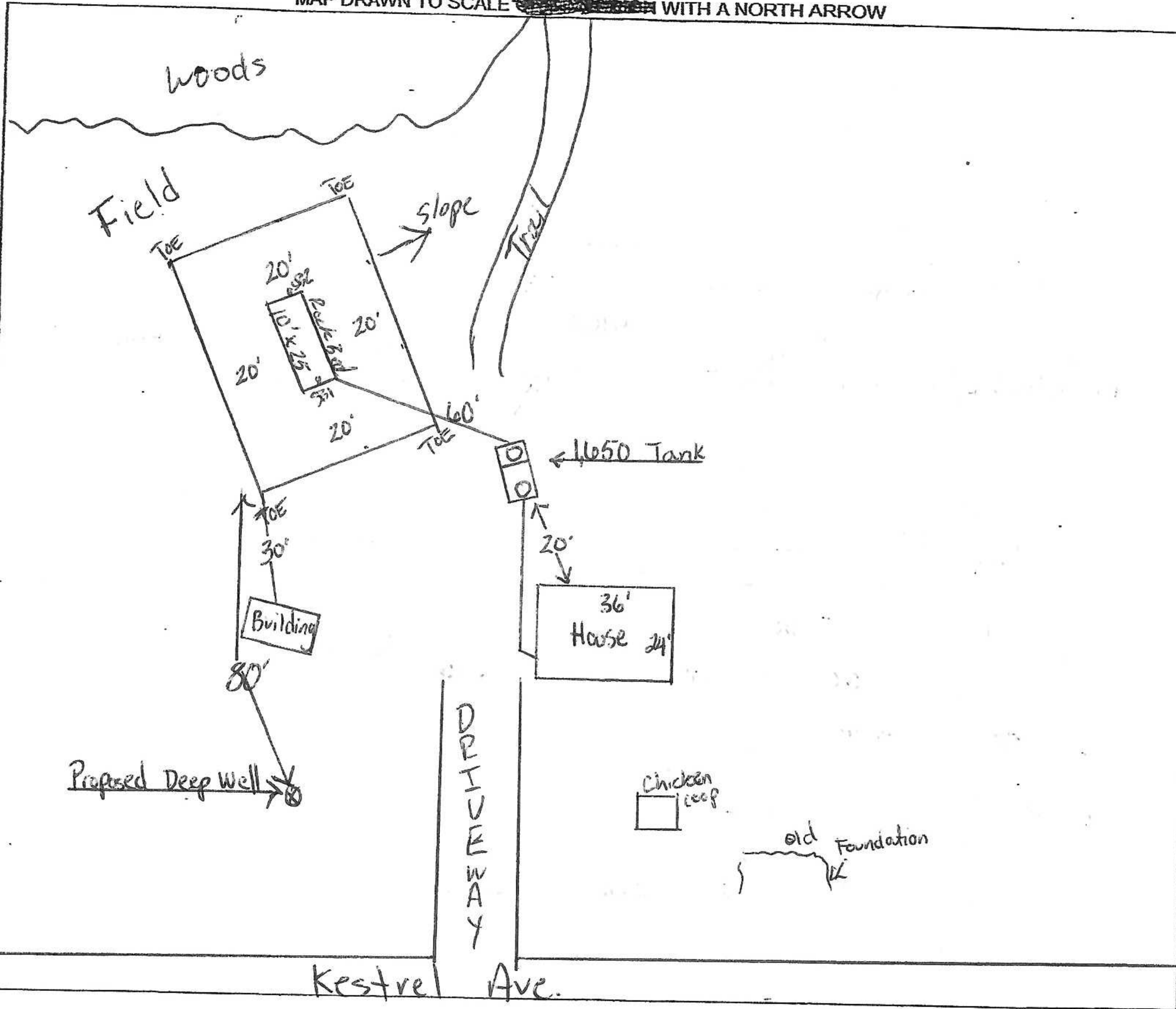


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Ernie Danks (signature) 910 (license #) 5-1-20 (date)

CLIENT: _____

DATE: _____

MAP DRAWN TO SCALE 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
 - ALL SOIL TREATMENT AREAS
 - HORIZONTAL AND VERTICAL REFERENCE
 - POINT OF SOIL BORINGS
 - LOT EASEMENTS
 - DISTURBED/COMPACTED AREAS
 - SITE PROTECTION-LATHE AND RIBBON EVERY 15 FT
 - ACCESS ROUTE FOR TANK MAINTENANCE

- LOT IMPROVEMENTS
- ALL ISTS COMPONENTS
- DIRECTION OF SLOPE
- ALL LOT DIMENSIONS

REQUIRED SETBACKS

- STRUCTURES
- OHWL
- PROPERTY LINES

COMMENTS:

INDICATE ELEVATIONS

- 100.0 BENCHMARK Corner of house
- 101.0 ELEVATION OF SEWER LINE @ HOUSE
- 103.0 ELEVATION @ TANK INLET
- 97.0 ELEVATION @ BOTTOM OF ROCK LAYER
- 100.0 ELEVATION @ BOTTOM OF BORING OR RESTRICTIVE LAYER
- 107.0 ELEVATION OF PUMP
- 96.0 ELEVATION OF DISTRIBUTION DEVICE

DESIGNER SIGNATURE Ernie Daulton
910

DATE 5-1-20