INQPCL-1 Parcel Description 08:39:54
Data Set: PRD Production

Parcel/Acct : 07-0-018100 4777
Pri. owner : 107394 Undl Tax Adr: N
→LEDIN, ROBERT & LINDA TRUSTEES
Taxpayer . . : 107394 FALCO: 1 F.O.
LEDIN, ROBERT & LINDA TRUSTEES
Ref. parcel : 00207000018100
Lake #/Name : 1016600 CARLSON LAKE
→Physical adr: 32740 440th Pl
AITKIN 56431
Acres . . . : 29.00
Lot/Block . :
Plat/Desc . :
Sec/Twp/Rge : 9 46.0 27
Description : NW NW LESS 11 ACS PLAT

Asmt/Tax year: 2019 2020
State UTA . . : 8 1 00 Type: RE
Unit . . . : Hold tax stmt: PRE
Emergency # : Lease Type:
Escrow . . :
Surveyed . . : Notes :
Com district: 2 UDI . : 100.00%
MH court nbr: Billing: P
+ TIF district: KD:
User defined:
UTA-Twp/City: 7 FARM ISLAND TWP
School . . . : 1 AITKIN
AMBU **** **** ****
00 00 00 00
<--Version: 1

Press Enter to continue or enter new parcel/tax year: 07-0-018100 2020
F1=Help F2=Trans History F3=Exit
F6=Parcel History F7=Name/Addresses F8=Legal F24=More keys

FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE July 17, 2019, FIELD EVALUATION DATE July 17, 2019
PROPERTY OWNER: Robert + Linda Ledin - Trustees PHONE
ADDRESS: 32740-440th Place CITY,STATE,ZIP: Aitkin, Mn. 56431
LEGAL DESCRIPTION:
PIN# 07-0-018100 SEC 9 T 46 R 27 TWP NAME Farm Island
FIRE# LAKE/RIVER 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 %	8 maximum	6
DIRECTION OF SLOPE	N-S	S-N
LANDSCAPE POSITION	E-W	E-W
VEGETATION TYPES	wooded	wooded

REFERENCE BM ELEV. 100 FT.
REFERENCE BM DESCRIPTION Cover on top of old Tank

DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1 17", 1A 14", 2 13", 2A 13"

BOTTOM ELEVATION--FIRST TRENCH OR BOTTOM OF ROCK BED: #1 105 FT., #2 FT.

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

CONSTRUCTION RELATED ISSUES: Design is for Lundquist Excavating! 2 bedroom Mound with 1820gal. Combo. Tank

LIC# L2132 SITE EVALUATOR SIGNATURE: Tom O'Neil

SITE EVALUATOR NAME: Tom O'Neil TELEPHONE# 218-927-6070

LUG REVIEW (TT) DATE 7-18-19

Comments:

SOIL BORING LOGS ON REVERSE SIDE

APPROVED

____ ONSITE INSPECTION

X NO ONSITE INSPECTION

SIGN (TT) DATE 7-18-19

Form des 2/20/98

(1)

SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-6	Sandy loam	10yr 3/2
6-10	Sandy loam	10yr 4/4
10-18	fine Sand	10yr 5/4
18-24	Sandy Clay loam	7.5yr 5/4

Mottles at 17"

(2)

SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-5	loam	10yr 3/2
5-9	Sandy loam	10yr 4/4
9-14	fine Sand	10yr 5/4
14-20	Clay loam	7.5yr 5/4

Mottles at 14"

(3)

SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-5	loam	10yr 3/2
5-8	Sandy loam	10yr 4/4
8-13	Fine Sand	10yr 5/4
13-20	Clay loam	7.5yr 5/4

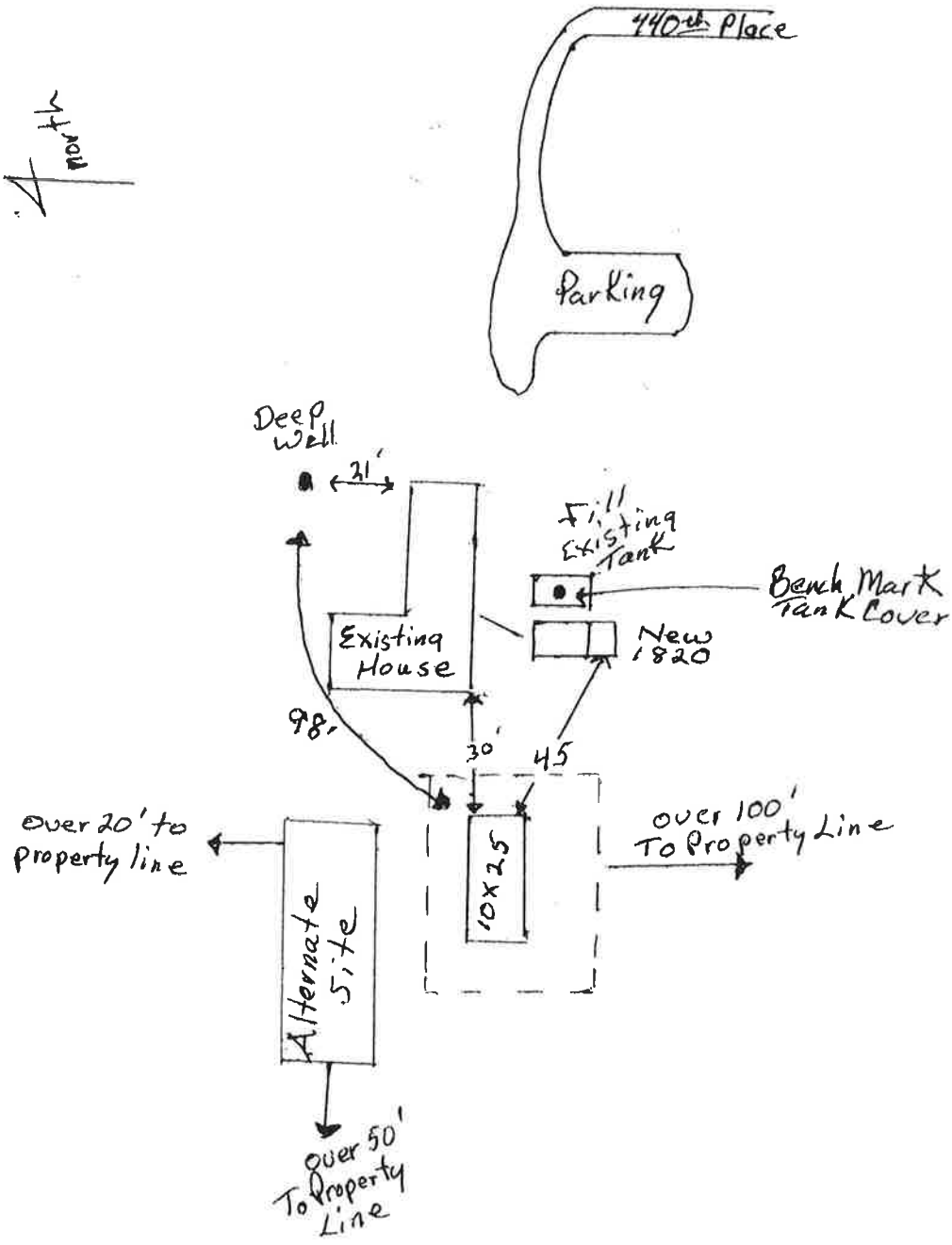
Mottles at 13"

Alternate Site

(4)

SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
Same as 3		



Approximate Elevations

Bench Mark	100
Pump Elevation	94
Tank Inlet	98
Bottom of Rockbed	105
Manifold	105.75

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

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

750 gallons *(see figure C-1)*
use an 1820 gallon combo

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 Loam
   Percolation rate 16-30 mpi
4. Soil loading rate 2.0 gpd/sqft *(see figure D-33)*
5. Percent land slope 8 %

D. ROCK LAYER DIMENSIONS

1. Multiply average design flow (A) by 0.83 to obtain required rock layer area.
   300 gpd x 0.83 sqft/gpd = 250 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 =
   250 sqft (D1) ÷ 10 ft (D2) = 25 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
   250 sqft x 1 ft = 250 cuft
2. Divide cuft by 27 cuft/cuyd to get cubic yards
   250 cuft ÷ 27 cuyd/cuft = 10 cuyd
3. Multiply cubic yards by 1.4 to get weight of rock in tons
   10 cuyd x 1.4 ton/cuyd = 14 tons

F. SEWAGE ABSORPTION WIDTH

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

2 x 10 ft = 20 ft minimum

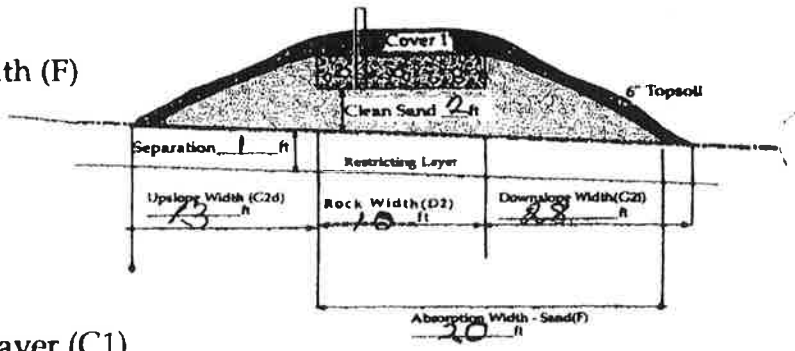
D-33: Absorption Width Sizing Table

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 & LENGTH
(landslope greater than 1%)

Landslope > 1% slope



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 ft

c. Upslope berm multiplier based on land slope

3.03 *(see figure D-34)*

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

3.03 x 4 ft = 13 ft

DOWNSLOPE

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

10 ft x 8 % + 100 = .8 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)

.8 ft + 4 ft = 4.8 ft

g. Downslope berm multiplier based on percent land slop

5.88 *(see figure D-34)*

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

5.88 x 4.8 ft = 28 ft

i. Select the greater of G1 and G2h as the downslope width: 28 ft

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

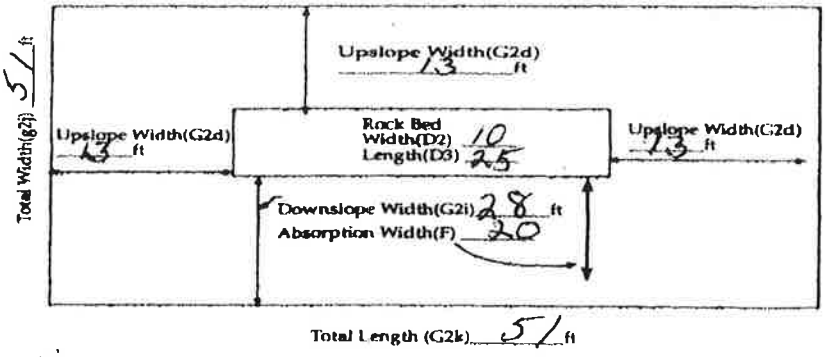
13 ft + 10 ft + 28 ft = 51 ft *maximum*

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

13 ft + 25 ft + 13 ft = 51 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	8.46
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:

51 X 51

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

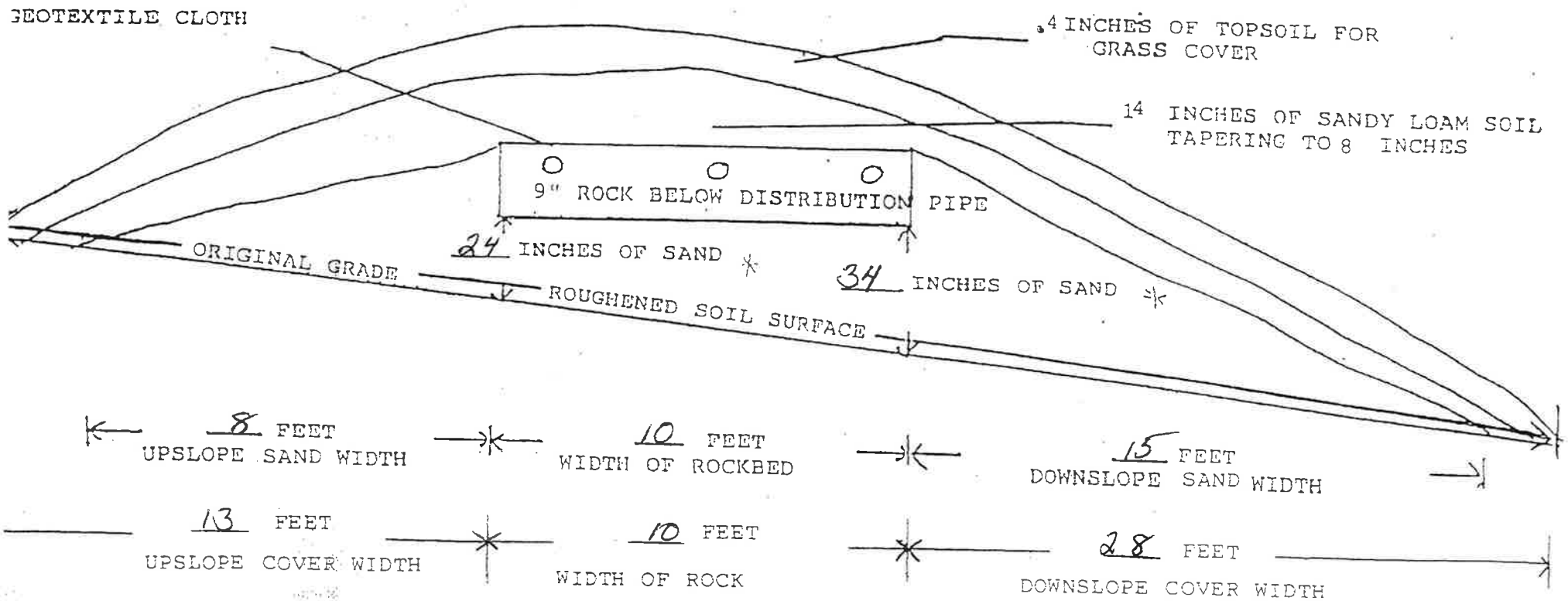
Tom Oliver (signature) L2132 (license #) July 12, 2019 (date)

MOUND CROSS-SECTION

8 PERCENT SLOPE OF ORIGINAL SOIL

10 FT. x 25 FT. SIZE OF ROCKBED

8 FT. x 15 FT. SIZE OF SANDBASE



PRESSURE DISTRIBUTION SYSTEM

1. Select number of perforated laterals 3

2. Select perforation spacing = 2.5 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.

   25 (Rock layer length) - 2 ft = 23 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 = 23 ft ÷ 2.5 ft = 9 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.*

   9 spaces + 1 = 10 perforations/lateral

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

   10 perfs/lat x 3 lat = 30 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 ÷ 30 perfs = 8 sqft/perf

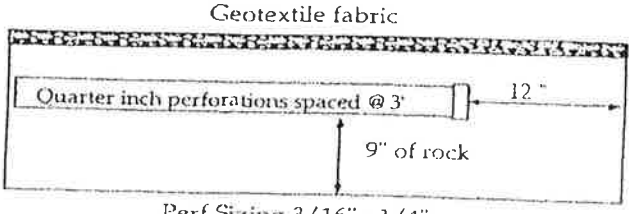
7. Determine required flow rate by multiplying the total number of perforations (6A) by flow per perforation *(see figure E-6)*

   30 perfs x .74 gpm/perfs = 23 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 = 1.25 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 inches.

Geotextile fabric



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

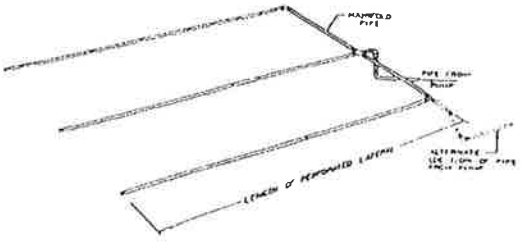
perforation spacing (feet)	1 inch	1.25 inch	1.5 inch	2.0 inch
2.5	8	14	18	28
3.0	8	13	17	26
3.3	7	12	16	25
4.0	7	11	15	23
5.0	6	10	14	22

E-6: Perforation Discharge in gpm

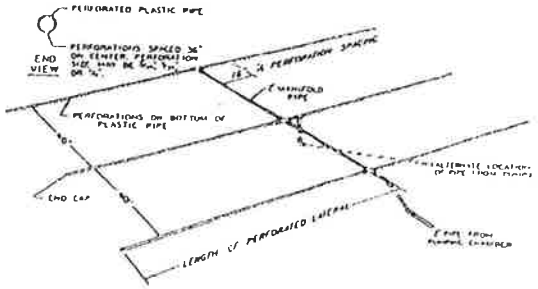
head (feet)	perforation diameter (inches) 1/8	3/16	7/32	1/4
1.0[a]	0.18	0.42	0.56	0.74
2.0[b]	0.26	0.59	0.80	1.04
5.0	0.41	0.94	1.26	1.65

[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.

Tom O'Neil (signature) L2132 (license #) July 17, 2019 (date)

PUMP SELECTION PROCEDURE

A. Determine pump capacity

Gravity distribution

1. Minimum is 10 GPM
2. Maximum is 45 GPM

Pressure Distribution

3. a. Select number of perforated laterals 3
   b. Select perforation spacing = 2.5 ft.
   c. Subtract 2 ft from rock layer length:

25 - 2 = 23 feet. (Length of Laterals)

ROCK LAYER LENGTH

d. Determine the number of spaces between perfs:

23 / 2.5 = 9 spaces

(length of lateral) / (perf. spacing)

e. 9 spaces + 1 = 10 perforations per lateral

f. Multiply perforations per lateral by number of laterals to get total number of perforations:

10 x 3 = 30

(perfs/lateral) x (laterals) = (perforations)

g. 30 X .74 = 23 GPM

(Perforations) x (gpm/perfs)

SELECTED PUMP CAPACITY 23 GPM

B. Determine head requirements:

1. Elevation difference beteween pump & point of discharge: 12 feet
2. If pumping to a pressure distribution system, add 5 feet; for gravity add zero: 5 feet
3. Friction Loss
   a. Enter friction loss table with GPM and pipe diameter. Read friction loss in feet per 100 ft in table.
      F.L. = 1.11 ft/100 of pipe
   b. Determine total pipe length from pump to discharge point. Add 25% to pipe length for fitting loss.
      48 length x 1.25 60 feet.
   c. Calculate total friction loss by multiplying friction loss in 100 ft. of pipe by equivalent pipe length (B):

Total friction loss = 1.11 x 60 /100 = .67 feet

4. Total head required is the sum of the elevation difference, special head requirements and total friction loss:

12 (1) + 5 (2) + 1 (3c) TOTAL HEAD 18

SELECT A PUMP TO DELIVER AT LEAST 23 GPM WITH AT LEAST 18 FEET OF TOTAL HEAD.

If laterals are connected to a header pipe in a pressure system, select the minimum size lateral diameter; enter the table with perforation spacing and the number of perforations per lateral.

Select minimum size of lateral 1 1/4"

For a center manifold system the values will be ½ of above.

Perforation Discharges in GPM

Head (feet)	Perforation diameter (inches)	
	7/32	1/4
1.0a	0.56	(0.74)
1.5	0.69	0.90
2.0b	0.80	1.04

a. Use 1.0 foot single homes

b. Use 2.0 feet for anything else

FRICTION LOSS IN PLASTIC PIPE

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

Max. No. of 1/4" perfs per lateral. (10%var)

Perforation spacing. (feet)	1 1/4"	1 1/2"'	2"
2.5 feet	14	18	28
3.0 feet	13	17	26
3.3 feet	12	16	25
4.0 feet	11	15	23
5.0 feet	10	14	22