INQPCL-1 Parcel Description 6/08/16
Data Set: PRD Production 08:07:59

Parcel/Acct : 15-0-054500 15193
Pri. owner : 113203
CROWTHER, RUSS & KARA
Taxpayer . : 113203 FALCO: 1 F.O.
CROWTHER, RUSS & KARA
Ref. parcel : 00215000054500
Lake #/Name :
Physical adr: 34763 330th Ave
AITKIN 56431
Acres . . . : 40.00
Lot/Block . :
Plat/Desc . :
Sec/Twp/Rge : 32 47.0 25
Description : NE-NW

Asmt/Tax year: 2015 2016 Type: RE
Unit . . . : Hold tax stmt:
Emergency # : Lease Type:
Escrow . . :
Surveyed . : Notes :
Com district: 3 UDI . : 100.00%
MH court nbr: Billing: P
TIF district: KD:
User defined:
UTA-Twp/City: 15 KIMBERLY TWP
School . . : 1 AITKIN
AMBU **** **** ****
00 00 00 00
<--Version: 1

Press Enter to continue or enter new parcel/tax year: 15-0-054500 2016
F1=Help F2=Trans History F3=Exit
F6=Parcel History F7=Name/Addresses F8=Legal F24=More keys

FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE June 6, 2016 FIELD EVALUATION DATE June 7, 2016
PROPERTY OWNER: _____ PHONE 719-580-6205
ADDRESS: _____ CITY, STATE, ZIP: Aitkin, Mn. 56431
LEGAL DESCRIPTION: _____
PIN# _____ SEC 32 T 47 R 25 TWP NAME Kimberly
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 %	11	11
DIRECTION OF SLOPE	N-S	N-S
LANDSCAPE POSITION	E-W	E-W
VEGETATION TYPES	Hay field	Hayfield

REFERENCE BM ELEV. 100 FT.
REFERENCE BM DESCRIPTION Stake in ground

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

BOTTOM ELEVATION–FIRST TRENCH OR BOTTOM OF ROCK BED: #1 99 FT., #2 ____ FT.

SOIL SIZING FACTOR: SITE # 1 Silty Clay Loam, SITE #2 Silty Clay Loam

CONSTRUCTION RELATED ISSUES: _____

LIC# L2132 SITE EVALUATOR SIGNATURE: Tom O'Neil

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

LUG REVIEW TT 6-8-16 DATE _____

Comments: _____

SOIL BORING LOGS ON REVERSE SIDE

APPROVED
___ ONSITE INSPECTION
___ NO ONSITE INSPECTION
SIGN TT 6-8-16 DATE _____

Form des 2/20/98

SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-6	Loam	10yr 3/2
6-12	Sandy loam	10yr 4/3
12-18	Loamy Sand	10yr 4/4
18-22	Silty loam	7.5yr 4/4
22+	Clay loam	5yr 4/4
	Mottles at 18"	

SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-7	loam	10yr 3/2
7-13	Silty loam	7.5yr 3/4
13-16	Silty Clay loam	7.5yr 3/4
	Mottles at 13"	

SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-8	Silty Clay loam	10yr 3/2
8-13	Silty Clay loam	10yr 3/3
13-15	Silty Clay	7.5yr 3/4
	Mottles at 12"	

SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-8	Silty loam	10yr 3/2
8-14	Silty loam	10yr 3/3
14-18	Silty Clay	7.5yr 3/4
	Mottles at 14"	

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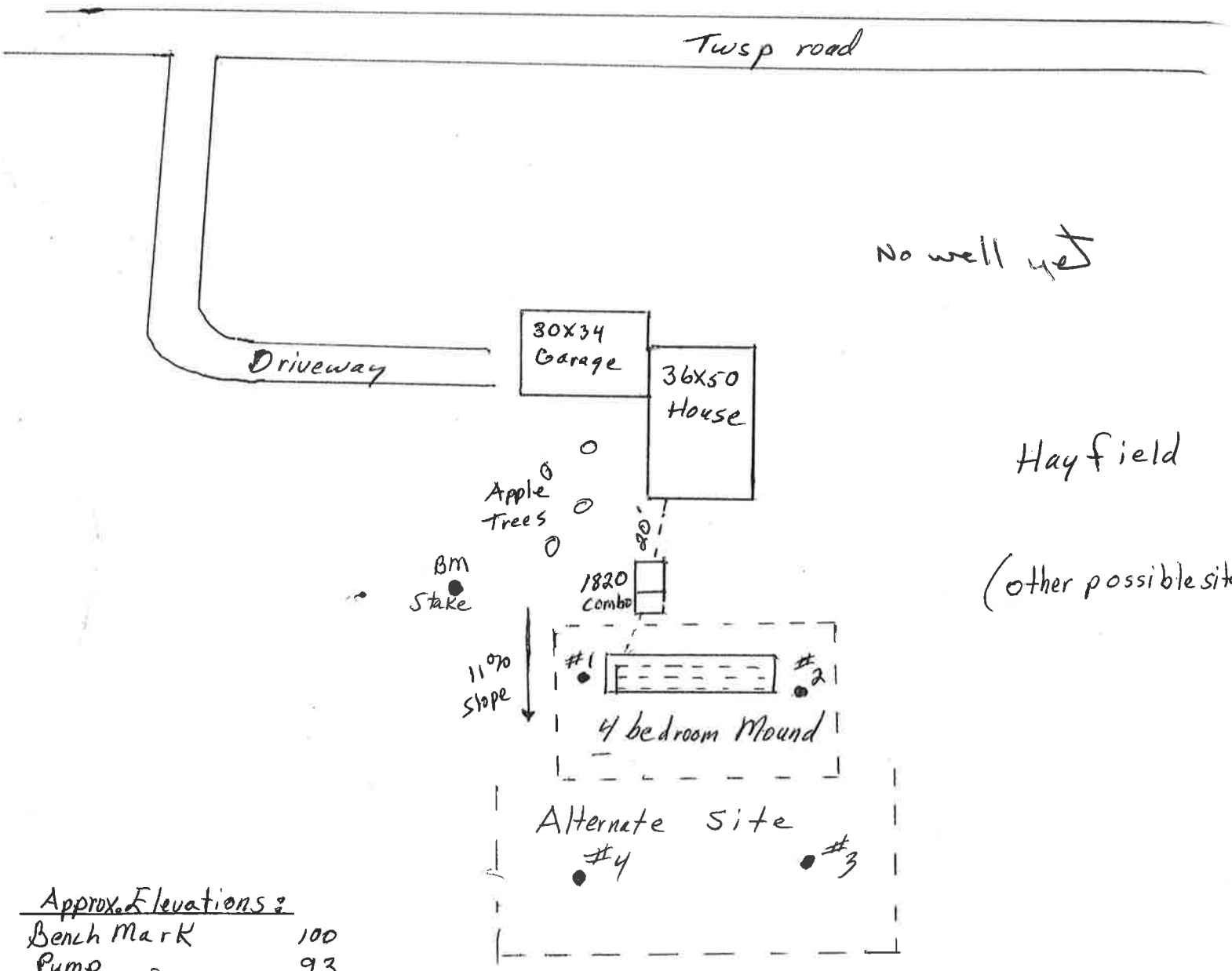

Approx. Elevations:

Bench Mark	100
Pump	93
Bottom of rock	99
Manifold	98.75

KT 6-8-16

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

A. Average Design FLOW

Estimated 600 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)*
Use 1820 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 Silty Clay loam
   Percolation rate 46-60 mpi
4. Soil loading rate .45 gpd/sqft *(see figure D-33)*
5. Percent land slope 11 %

D. ROCK LAYER DIMENSIONS

1. Multiply average design flow (A) by 0.83 to obtain required rock layer area.
   600 gpd x 0.83 sqft/gpd = 500 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 =
   500 sqft (D1) ÷ 10 ft (D2) = 50 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
   500 sqft x 1 ft = 500 cuft
2. Divide cuft by 27 cuft/cuyd to get cubic yards
   500 cuft ÷ 27 cuyd/cuft = 19 cuyd
3. Multiply cubic yards by 1.4 to get weight of rock in tons
   19 cuyd x 1.4 ton/cuyd = 27 tons

F. SEWAGE ABSORPTION WIDTH

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

2.67 x 10 ft = 27 ft

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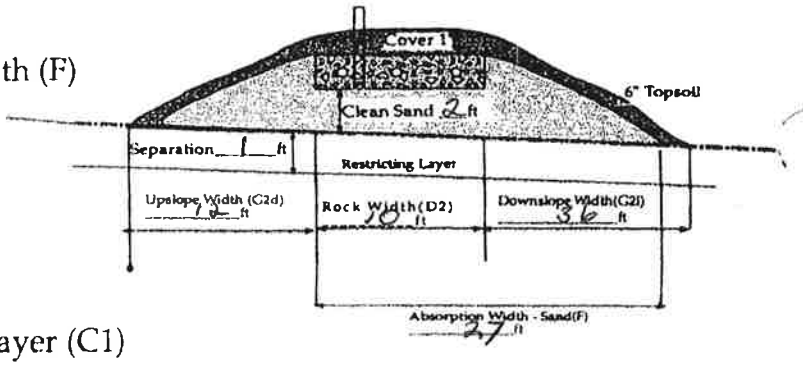
D-33: Absorption Width Sizing Table

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	0.50	2.40
	Silt		
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)
47 ft - 10 ft = 17 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
2.78 *(see figure D-34)*

d. Upslope width = berm multiplier (G2c) times upslope mound height (G2b):
2.78 x 4 ft = 12 ft

DOWNSLOPE

e. Drop in elevation = rock layer width (D2) times percent landslope (C5) ÷ 100
10 ft x 11 % ÷ 100 = 1.1 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)
1.1 ft + 4 ft = 5.1 ft

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

h. Downslope width = downslope multiplier (G2g) times downslope mound height (G2f)
7.14 x 5.1 ft = 36 ft

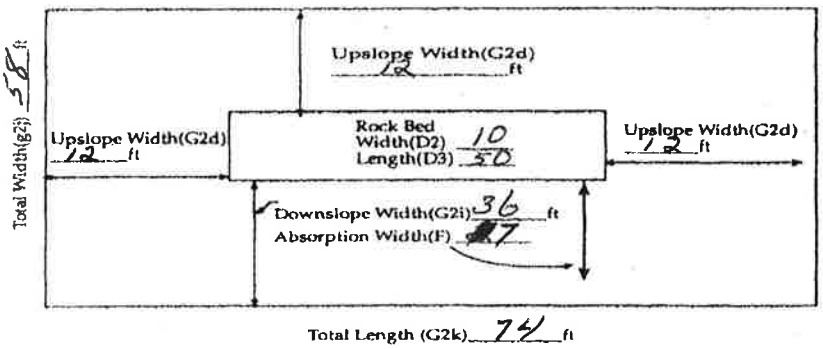
Select the greater of G1 and G2h as the downslope width: 36 ft

Total mound width is the sum of upslope width (G2d) width plus rock layer width (D2) plus downslope width (G2i)
12 ft + 10 ft + 36 ft = 58 ft

Total mound length is the sum of upslope width (G2d) plus rock layer length (D3) plus upslope width (G2d)
12 ft + 50 ft + 12 ft = 74 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:
58 x 74

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

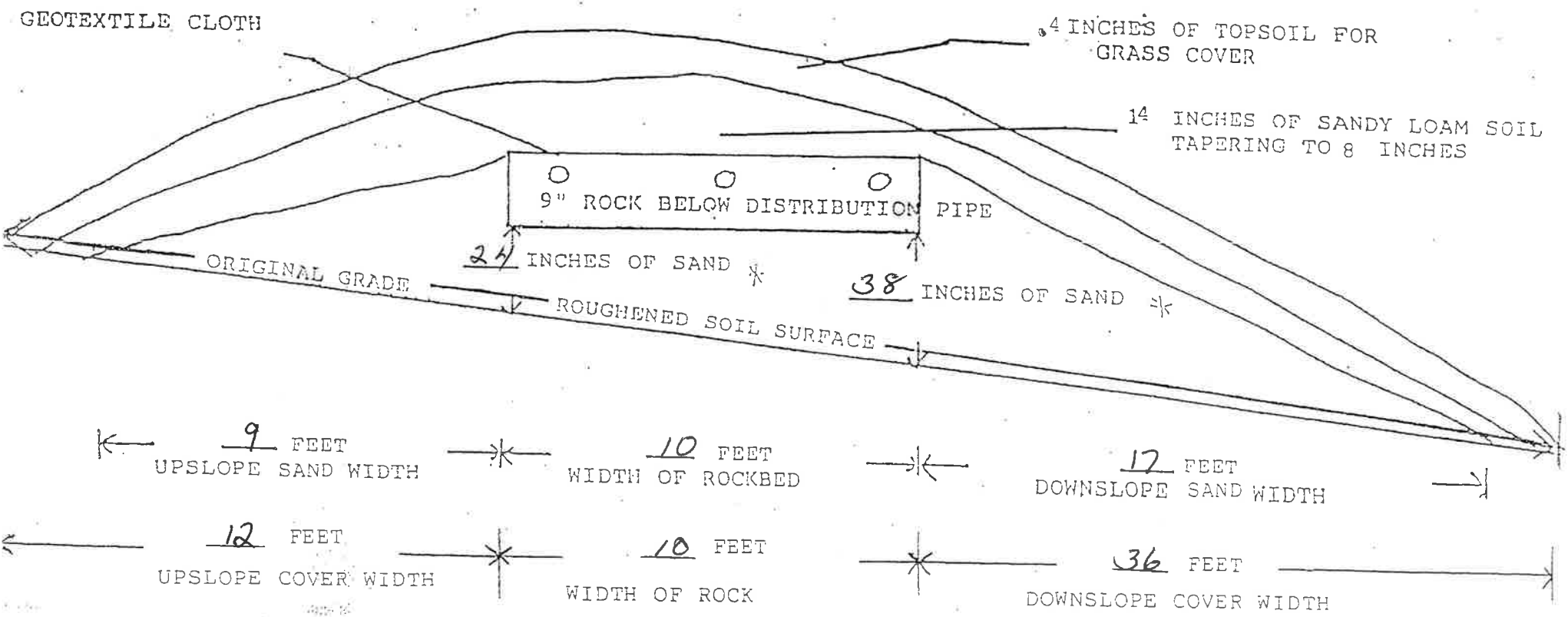
Tom Oliver (signature) 42132 (license #) June 7, 2016 (date)

MOUND CROSS-SECTION

11 PERCENT SLOPE OF ORIGINAL SOIL

10 FT. x 50 FT. SIZE OF ROCKBED

36 FT. x 68 FT. SIZE OF SANDBASE



9 FEET
UPSLOPE SAND WIDTH

10 FEET
WIDTH OF ROCKBED

17 FEET
DOWNSLOPE SAND WIDTH

12 FEET
UPSLOPE COVER WIDTH

10 FEET
WIDTH OF ROCK

36 FEET
DOWNSLOPE COVER WIDTH

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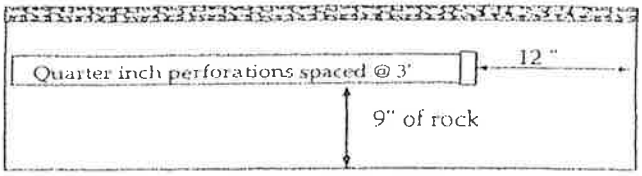
PRESSURE DISTRIBUTION SYSTEM



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

1. Select number of perforated laterals 3

2. Select perforation spacing = 3 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.

   50 (Rock layer length) - 2 ft = 48 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 = 48 ft ÷ 3 ft = 16 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.*

   16 spaces + 1 = 17 perforations/lateral

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

   17 perfs/lat x 3 lat = 51 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 50 ft = 500 sqft
   Square foot per perforation = Rock bed area ÷ number of perfs (6)
   500 sqft ÷ 51 perfs = 10 sqft/perf

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

   51 perfs x .74 gpm/perfs = 38 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 = 1.5 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 = 1.25 inches.

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

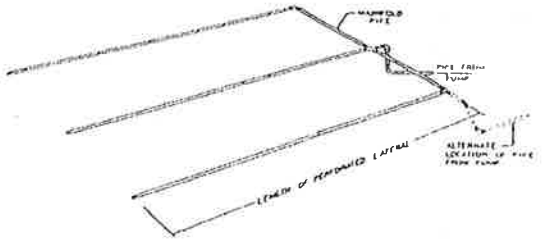
perforation spacing (feet)	1 inch	1.25 inch	1.5 inch	2.0 inch
2.5	8	14	18	28
3.0	8	13	17	26
3.3	7	12	16	25
4.0	7	11	15	23
5.0	6	10	14	22

E-6: Perforation Discharge in gpm

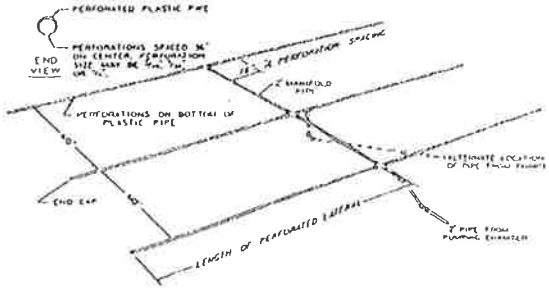
head (feet)	perforation diameter (inches) 1/8	3/16	7/32	1/4
1.0[a]	0.18	0.42	0.56	0.74
2.0[b]	0.26	0.59	0.80	1.04
5.0	0.41	0.94	1.26	1.65

[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 #) June 7, 2016 (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 gpm

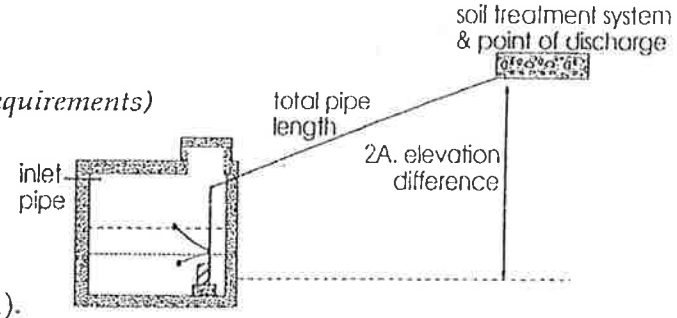
2. Determine pump head requirements:

A. Elevation difference between pump and point of discharge?

6 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 = 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

   25 feet x 1.25 = 32 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 32 ÷100 = 1 ft

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

6 ft + 5 ft+ 1 ft =

Total head: 12 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 38 gpm (1A or B) with at least 12 feet of total head (2D)

6-8-16

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

Tom Nevin (signature) L2132 (license #) June 7, 2016 (date)