2021-000214

AITKIN COUNTY ZONING

PERMIT NUMBER 46545

PARCEL NUMBER 54-0-001601

Location _____ (Lot / Block / Gov't. Lot) 1 (Section) 51 (Twp.) 27 (Rge.)

N 615 FT OF SE SE

Issued 10/19/2021 To Jeffrey & Robyn Smith.

Nature of Authorization Approved for a 3 bdrm Type I mound septic system.

New Construction _____ Alteration _____

Sewer Installation _____

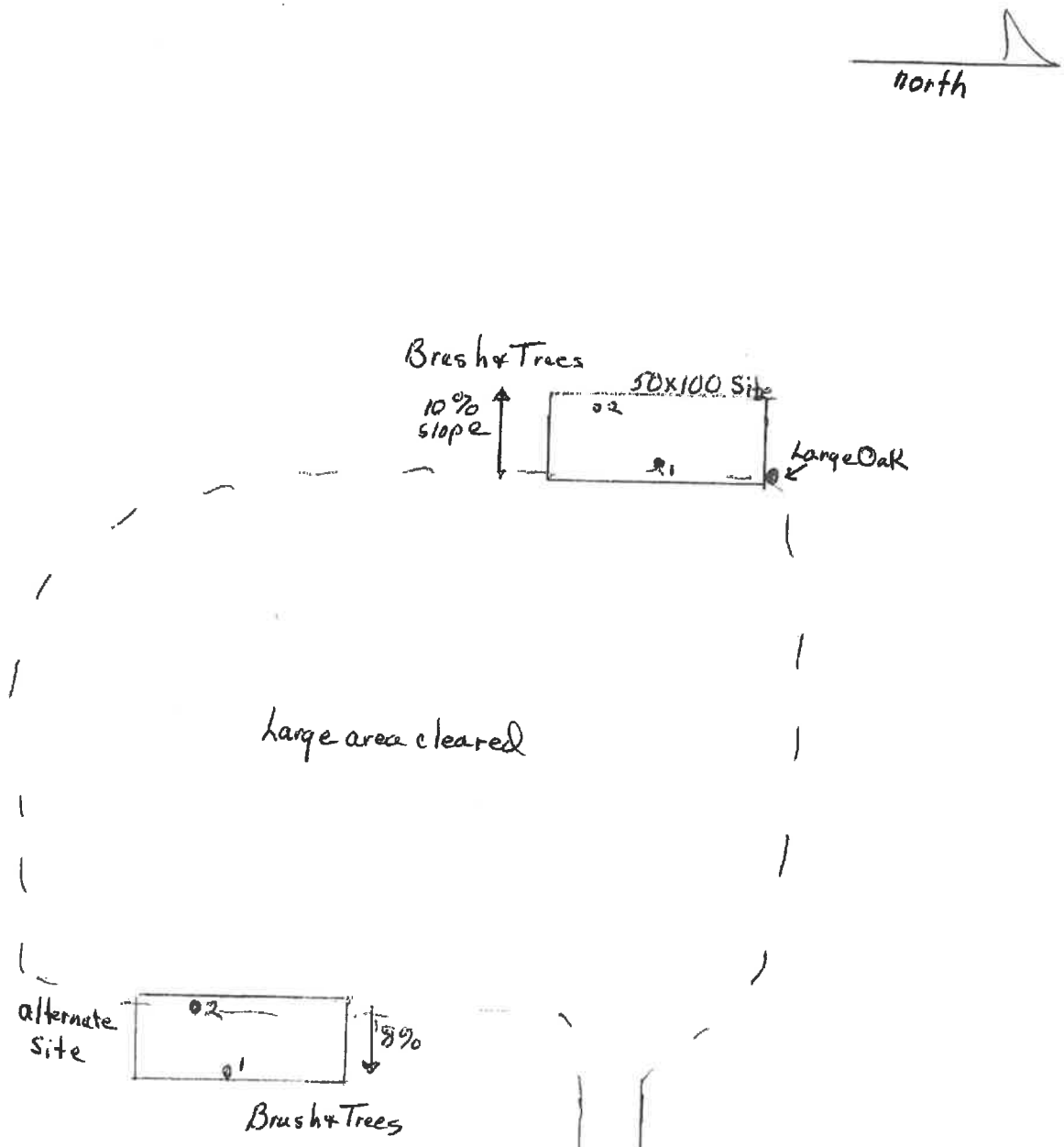
Flood Plain and Lowest Floor Elev. _____

This permit expires one year from date of issuance
NOT TRANSFERABLE

NOTE:
This permit must be posted in a conspicuous place on premises on which work is to be done and remain until work has been completed and inspected.

M. Oestreich
ZONING ADMINISTRATOR

No Portion of any Sewage Disposal System shall be Covered Prior to Inspection.



Approximate Elevations:

Bench mark	100
Ground at East side	98
Bottom of rock	100
manifold	100.75
Pump	91

KI 8-23-21

3-Bedroom Mound

FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE August 21, 2021, FIELD EVALUATION DATE August 21, 2021
PROPERTY OWNER: Jeffery J. & Robyn Smith PHONE
ADDRESS: 63125 - 400th Place CITY,STATE,ZIP: Swatara, Mn. 55785
LEGAL DESCRIPTION:
PIN# 54-0-001601 SEC 54 T 51 R 27 TWP NAME Unorganized
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 %	10%	8%
DIRECTION OF SLOPE	W-E	W-E
LANDSCAPE POSITION	N-S	N-S
VEGETATION TYPES	Heavy Brush + Some trees	Heavy Brush + Some trees

REFERENCE BM ELEV. 100 F
REFERENCE BM DESCRIPTION
Mark on tree

DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1 13", 1A 16", 2 16", 2A 14"

BOTTOM ELEVATION--FIRST TRENCH OR BOTTOM OF ROCK BED: #1 100 FT., #2 FT.

SOIL SIZING FACTOR: SITE # 1 2.67, SITE #2 2.67

CONSTRUCTION RELATED ISSUES: Few trees but heavy brush to remove

LIC# L2132 SITE EVALUATOR SIGNATURE: Tom O'Neil

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

LUG REVIEW (KT) DATE 8-23-21

Comments:

SOIL BORING LOGS ON REVERSE SIDE

very dry soils

SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-4	Loam	10yr 3/3
4-7	Loam	10yr 4/4
7-13	ClayLoam	10yr 5/4

SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-4	Loam	10yr 3/3
4-8	Loam	10yr 4/4
8-16	Silty Clay Loam	10yr 5/4

SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-4	Loam	10yr 3/3
4-6	Loam	10yr 4/3
6-8	Loam	10yr 4/4
8-16	SiltyLoam	10yr 5/4

SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-4	Loam	10yr 3/3
4-8	Loam	10yr 4/4
8-14	SiltyLoam	10yr 5/4
14-17	ClayLoam	10yr 5/4

RT 8-23-21

MOUND DESIGN WORK SHEET (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% 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 Minimum gallons *(see figure C-1)*
use a 1650 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 = 13 inches feet
2. Depth of percolation tests = _____ feet
3. Texture Clay Loam
   Percolation rate 40-60 mpi
4. Soil loading rate .45 gpd/sqft *(see figure D-33)*
5. Percent land slope 10 %

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 = 375 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 =
   375 sqft (D1) ÷ 10 ft (D2) = 38 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
   375 sqft x 1 ft = 375 cuft
2. Divide cuft by 27 cuft/cuyd to get cubic yards
   375 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 = 20 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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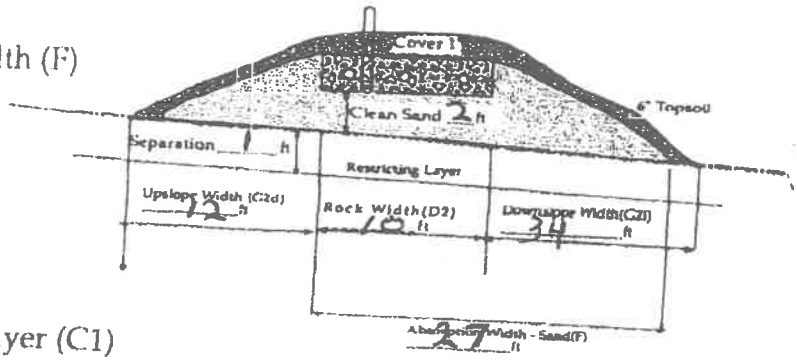
D-33: Absorption Width Sizing Table

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 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)

27 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

2.86 *(see figure D-34)*

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

2.86 x 4 ft = 12 ft

DOWNSLOPE

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

10 ft x 10 % ÷ 100 = 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 ft + 4 ft = 5 ft

g. Downslope berm multiplier based on percent land slop

6.67 *(see figure D-34)*

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

6.67 x 5 ft = 34 ft

i. Select the greater of G1 and G2h as the downslope width: 34 ft

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

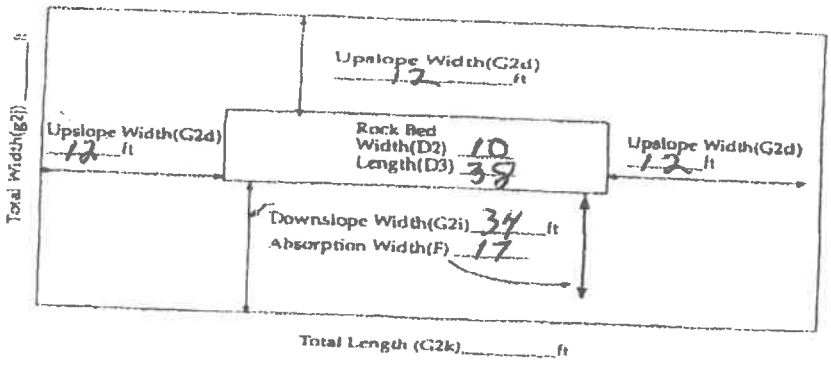
12 ft + 10 ft + 34 ft = 56 ft

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

12 ft + 38 ft + 12 ft = 62 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	4.58	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:

56 x 62

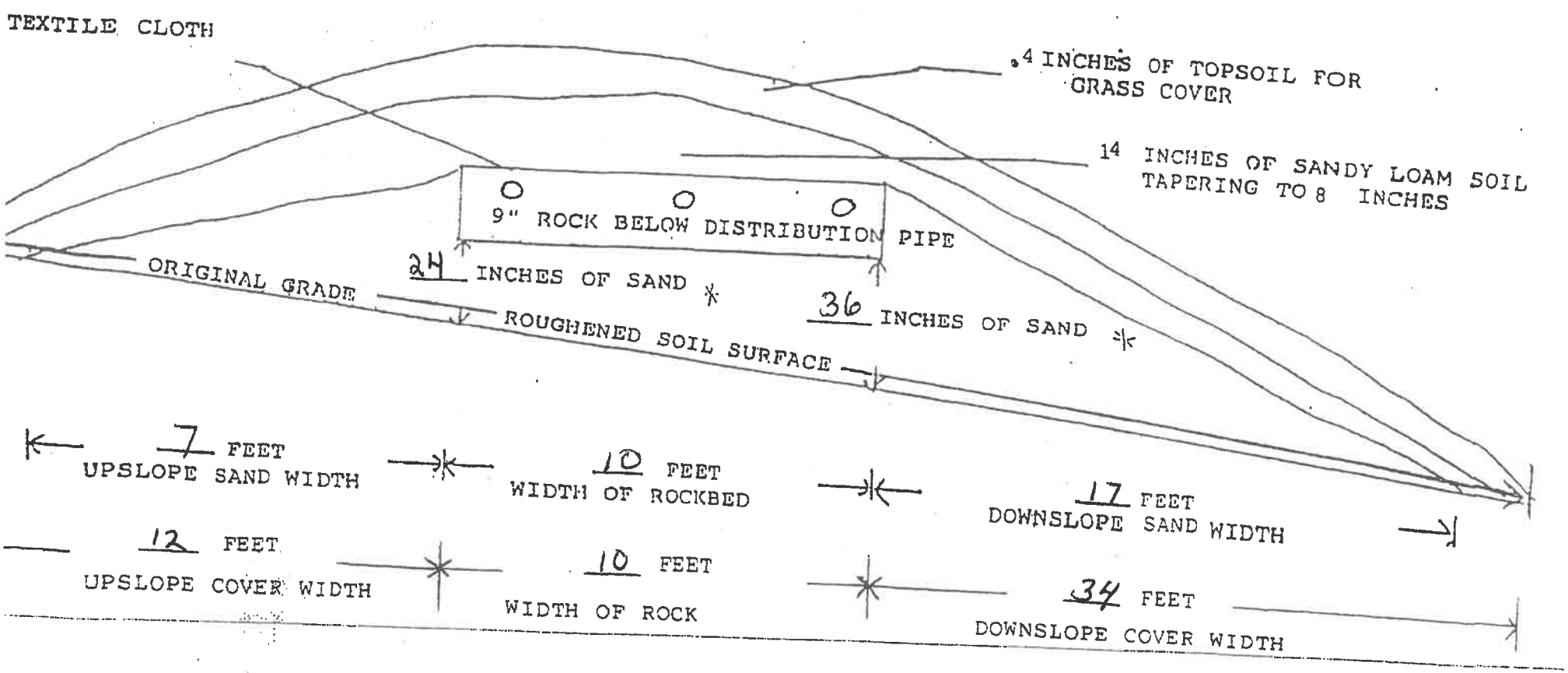
RD 8-23-21

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

MOUND CROSS-SECTION

10 PERCENT SLOPE OF ORIGINAL SOIL

10 FT. x 38 FT. SIZE OF ROCKBED 7 FT. x 17 FT. SIZE OF SANDBASE



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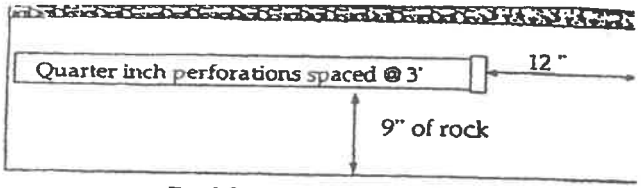
1. Select number of perforated laterals 3

2. Select perforation spacing = 3 ft



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

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

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

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

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

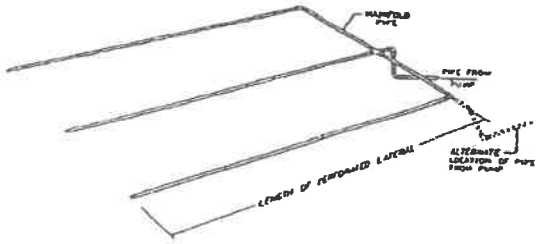
[a] Use 1.0 foot for single-family homes.
[b] Use 2.0 feet for anything else.

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

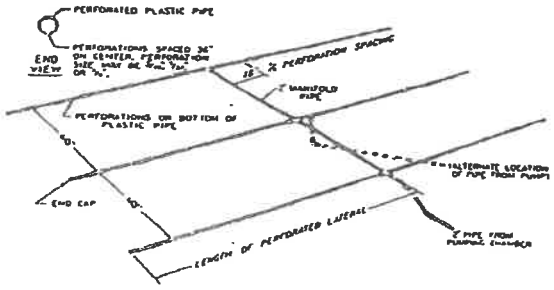
8. If laterals are connected to header pipe as shown on upper example, to select minimum required lateral diameter; enter figure E-4 with perforation spacing (2) and number of perforations per lateral (5) Select minimum diameter for perforated lateral = 1 1/4 inches.

MANIFOLD LOCATED AT END OF PRESSURE DISTRIBUTION SYSTEM



LAYOUT OF PERFORATED PIPE LATERALS FOR PRESSURE DISTRIBUTION IN MOUND

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.



KT 8-23-21

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

Tom Oliver (signature) L2132 (license #) August 21, 2021 (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

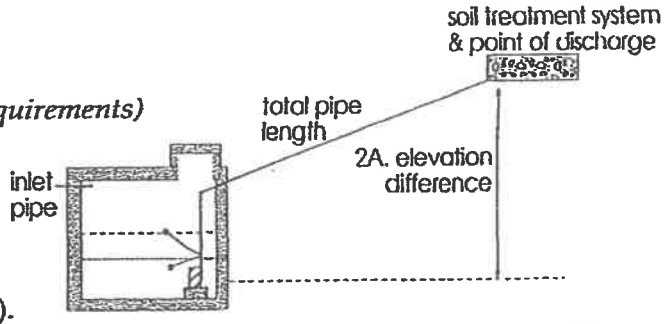
2. Determine pump head requirements:

A. Elevation difference between pump and point of discharge?

10 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

   30 feet x 1.25 = 38 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 38 ÷100 = .59 ft

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

11 ft + 5 ft+ 1 ft =

Total head: 17 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 17 feet of total head (2D)

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

Tom O'Neil (signature) 12132 (license #) August 21, 2021 (date)

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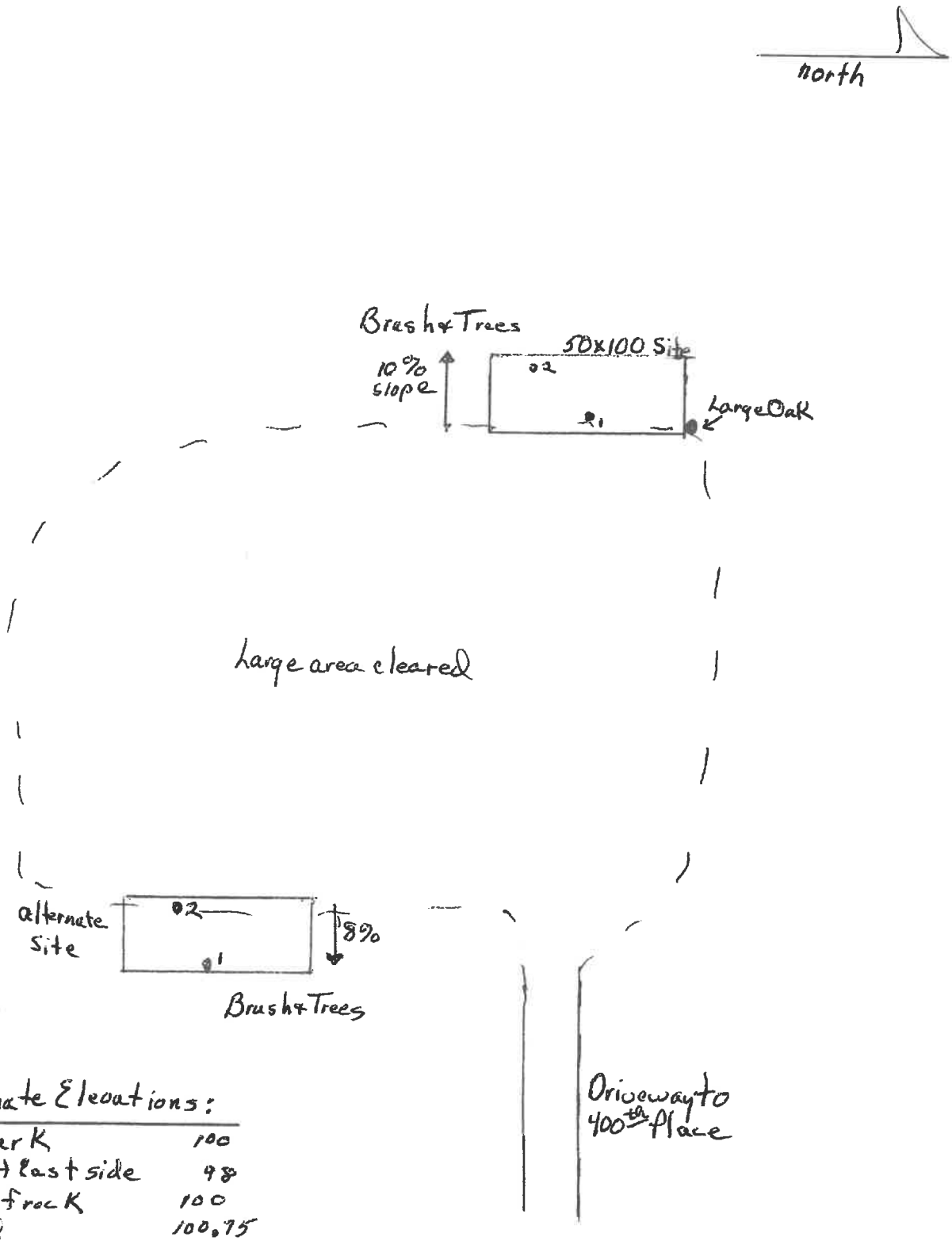

Approximate Elevations:	
Bench mark	100
Ground at last side	98
Bottom of rock	100
manifold	100.75
Pump	91

KT 8-23-21

Subsurface Sewage Treatment System Management Plan

Property Owner: Jeffrey & Robyn Smith Phone: _____ Date: 10-19-21

Mailing Address: 11955 Highland Rd City: Elk River, Mn Zip: 55330

Site Address: 23125 458th PL City: Sweetser, Mn Zip: 55785

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 _____ 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: Jeffrey Smith Robyn Smith Date: 11-1-21

Designer Signature: Tom Ahrens Date: _____

See Reverse Side for Management Log