

FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE: 5-11-16 FIELD EVALUATION DATE: 5-11-16

PROPERTY OWNER: Donna Decker

PHONE: _____

ADDRESS: _____
CITY/STATE/ZIP: _____

PIN# _____
LEGAL DESCRIPTION: _____
LAKELAND SEC T R TWP NAME LAKE CLASS _____
OHMI _____

DESCRIPTION OF SOIL TREATMENT AREAS

AREA #1	AREA #2	REFERENCE BM ELEV. NO.
YES	YES	NO
NO	NO	NO
YES	YES	NO
NO	NO	NO
YES	YES	NO
NO	NO	NO
YES	YES	NO
NO	NO	NO
YES	YES	NO
NO	NO	NO

DISTURBED AREAS
COMPACTED AREAS
FLOODING
RUN ON POTENTIAL
SLOPE %
DIRECTION OF SLOPE
LANDSCAPE POSITION
VEGETATION TYPES

DEPTH TO STANDING WATER OR MOTTLED SOIL - BORING # 1 B, 1A B, 2, 6, 2A

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

SOIL SIZING FACTOR: SITE #1 SITE #2

CONSTRUCTION RELATED ISSUES:

ICF 910

SITE EVALUATOR SIGNATURE: *[Signature]*

THE EVALUATOR NAME: *Ernie Darrow*

TELEPHONE: _____

UG REVIEW: *[Signature]*

DATE: 5-12-16

DATE: _____

SOIL BORING LOGS ON REVERSE SIDE

APPROVED

ON SITE INSPECTION
NO ON SITE INSPECTION

SIGN: *[Signature]*

DATE: 5-12-16

MOUND DESIGN SHEET

PROPERTY OWNER Don Deering TOWNSHIP _____ FIRE# _____

PERMIT# _____ PIN# _____ DATE _____

DESIGNER NAME _____ LICENSE # _____

DESIGNER SIGNATURE: _____ DATE _____

WATER USE APPLIANCES (CHECK ALL THAT APPLY)

CLOTHES WASHER _____ WATER SOFTNER _____ DISHWASHER _____ WHIRLPOOL _____ HUMIDIFIER _____
 NUMBER OF BEDROOMS: 2 TYPE: I GARBAGE DISPOSAL: YES _____ NO X AIR TEST YES _____ NO X
 WELL: DEEP (50'+) _____ SHALLOW X SETBACKS: TANK 50' DRAINFIELD 100' SEWER LINE 50'

FLOW

- A. ESTIMATED 300 GPD OR MEASURED GPD _____
- B. SEPTIC TANK VOLUME 1,000 GALLONS
- C. MINIMUM PUMP TANK VOLUME 500 GALLONS
- C1. ALARM TYPE Electric

SOILS

- D. DEPTH TO RESTRICTING LAYER .5 FEET
- E. DEPTH OF SAND ON UPSLOPE EDGE 3 FEET
- F. SOIL TEXTURE Clay Loam
- G. PERCOLATION RATE 4660 MPI
- H. SOIL SIZING FACTOR 2.2 SQ FT/GPD
- I. LAND SLOPE 0 %

ROCK LAYER DIMENSIONS

- J. (A) x 0.83 = 250 SQ FT
- K. SELECT ROCK LAYER WIDTH 10 FT.
- L. LENGTH OF ROCK BED = (J) + (K) = 25 FT.

ROCK VOLUME

- M. MULTIPLY ROCK AREA BY ROCK DEPTH = (J) x 1 FT = 250 FT x 1 FT = 250 CU. FT.
- N. DIVIDE (M) BY 27 = CU YD. = 250 CU FT ÷ 27 = 10 CU YD.
- O. MULTIPLY (N) 10 x 1.4 = 14 TONS OF ROCK

ABSORPTION WIDTH

- P. FOR TEXTURE, PERC. RATE, OR SOIL SIZING FACTOR IN (F) (G) OR (H) ABOVE, SELECT ABSORPTION WIDTH RATIO FROM TABLE 3 = 2.67
 - Q. MULTIPLY ABSORPTION WIDTH RATIO (P) BY ROCK LAYER WIDTH (K) = 2.67 x 10 = 26.7 FT.
- ABSORPTION WIDTH

 LUG APPROVAL: (SD) 5-12-16 DATE: _____

TABLE 1			
EST. SEWAGE FLOW IN GALLONS/DAY (GPD)			
NUMBER OF BEDROOMS	TYPE I	TYPE II	TYPE III
2	300	225	180
3	450	300	216
4	600	375	252
5	750	450	288
6	900	525	324
7	1050	600	370
8	1200	675	408

TABLE 2		
NUMBER OF BEDROOMS	MINIMUM TANK CAPACITY GALLONS	MINIMUM CAPACITY GARBAGE DISPOSAL
2 OR LESS	1000	1500
3 OR 4	1000	1500
5 OR 6	1300	2250
7 OR 8	2000	3000
OVER 8	SEE FIG. C-5	(x 1.5)

TABLE 3				
PERC RATE P1	SOIL TEXTURE	SOFT GALLONS /DAY	GALLONS /DAY	ABSORPTION WIDTH RATIO
< THAN 0.1	COARSE SAND	---	---	1.00
0.1 TO 5	SAND	0.80	1.20	1.00
0.1 TO 5	FINE SAND	1.07	0.80	2.00
6 TO 15	SANDY LOAM	1.27	0.70	1.82
16 TO 30	LOAM	1.57	0.60	2.00
31 TO 45	SILT LOAM	2.00	0.50	2.00
46 TO 60	CLAY LOAM	2.20	0.45	2.97
> THAN 60	CLAY	---	(0.24)	3.00
> THAN 120	CLAY	---	---	4.00

SOILS CHARTS FOR BOTH PROPOSED AND ALTERNATE SITES

1 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-5	Top Soil	
5"-13"	Clay Loam	10YR 5/3
		Mottling @ 8"

2 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-6"	Top Soil	
6"-14"	Clay Loam	10YR 5/3
		Mottling @ 7"

1 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

2 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

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ADDITIONAL SOIL BORINGS MAY BE REQUIRED

MINIMUM MOUND SIZE

1. Subtract rock layer width from absorption width to obtain minimum downslope berm toe

$$10 \text{ ft} - 26.7 \text{ ft} = 16.7 \text{ feet}$$

2. Determine depth of clean sand fill at upslope edge of rock layer:

$$\text{Separation } 3' - 0.6 \text{ ft} = 2.5 \text{ feet } (3')$$

3. Add depth of clean sand for separation (2)

at upslope edge, depth of rock layer (1 ft) to depth of cover (1 ft) to find the mound height at upslope edge of rock layer:

$$3 \text{ ft} + 1 \text{ ft} + 1 \text{ ft} = 5 \text{ feet}$$

4. Enter table with landslope and upslope berm ratio.

Select berm multiplier 40.

5. Multiply berm multiplier by upslope mound height to find upslope berm width:

$$5 \times 4 = 20 \text{ feet}$$

6. Multiply rock layer width (K) by landslope to determine drop in elevation:

$$10 \times 0 \% \div 100 = 0 \text{ feet}$$

7. Add depth of clean sand for slope difference (6) at downslope edge to the mound height at the upslope edge of rock layer (3) to find the downslope height:

$$5 \text{ ft} + 0 \text{ ft} = 5 \text{ feet}$$

8. Enter table with landslope and downslope berm ratio.

Select berm multiplier of 4.

9. Multiply berm multiplier by downslope mound height to get downslope berm width:

$$5 \times 4 = 20 \text{ feet}$$

10. Compare the values of Step (1) 16.7 and Step(9) 20. Select the greater of the two values as the downslope berm width: 20 feet

11. Total mound width is the sum of upslope berm (5): width plus rock layer width (K) plus downslope berm width (9):

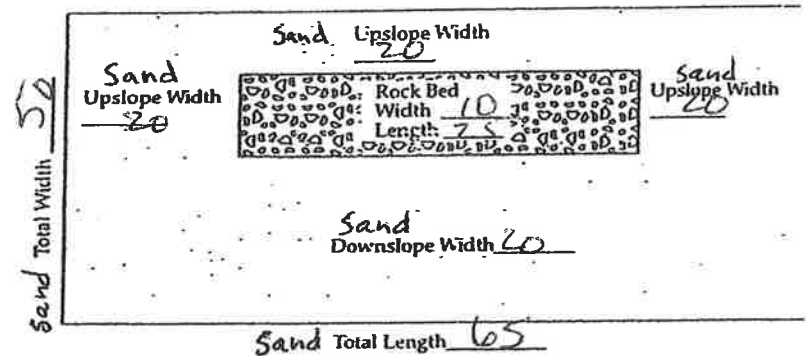
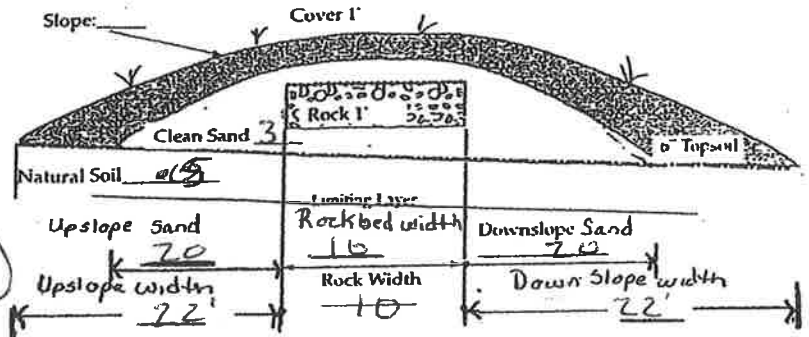
$$20 \text{ ft} + 10 \text{ ft} + 20 \text{ ft} = 50 \text{ feet}$$

12. Total mound length is the sum of upslope berm width (5) plus rock layer length (L) plus upslope berm width (5):

$$20 \text{ ft} + 25 \text{ ft} + 20 \text{ ft} = 65 \text{ feet}$$

Final Cover Dimension

50 x 65



BERM SLOPE MULTIPLIERS

Land Slope, in %	DOWNSLOPE berm multipliers for various berm slope ratios					UPSLOPE berm multipliers for various berm slope ratios					
	3:1	4:1	5:1	6:1	7:1	3:1	4:1	5:1	6:1	7:1	8:1
0	3.0	4.0	5.0	6.0	7.0	3.0	4.0	5.0	6.0	7.0	8.0
1	3.09	4.17	5.26	6.38	7.53	2.91	3.85	4.76	5.66	6.54	7.4
2	3.19	4.35	5.56	6.82	8.14	2.83	3.70	4.54	5.36	6.14	6.98
3	3.30	4.54	5.88	7.32	8.86	2.75	3.57	4.35	5.08	5.79	6.4
4	3.41	4.76	6.25	7.89	9.72	2.68	3.45	4.17	4.84	5.46	6.0
5	3.53	5.00	6.67	8.57	10.77	2.61	3.33	4.00	4.62	5.19	5.71
6	3.66	5.26	7.14	9.38	12.07	2.54	3.23	3.85	4.41	4.93	5.41
7	3.80	5.56	7.69	10.34	13.73	2.48	3.12	3.70	4.23	4.70	5.13
8	3.95	5.88	8.33	11.54	15.91	2.42	3.03	3.57	4.05	4.49	4.8
9	4.11	6.25	9.09	13.04	18.92	2.36	2.94	3.45	3.90	4.30	4.62
10	4.29	6.67	10.00	15.00	23.33	2.31	2.86	3.33	3.75	4.12	4.4
11	4.48	7.14	11.11	17.65	30.43	2.26	2.78	3.23	3.61	3.95	4.26
12	4.69	7.69	12.50	21.43	43.75	2.21	2.70	3.13	3.49	3.80	4.08

Note: The product of the multiplier and the height results in the horizontal distance to where the berm meets the original land slope. Example: Height at upper edge of rock layer is 3.0 feet, rock layer is 10 feet wide, land slope is 6% and berm slope ratio is 4:1. Upslope berm width is 3.23 x 3.0 = 9.7 ft; height at lower edge of rock layer is 3.0 + 10 x 0.6 = 3.6 ft and downslope berm width is 3.6 x 4 = 14.4 ft.

AT 5-12-16

MOUND CROSS-SECTION

①

PERCENT SLOPE OF ORIGINAL SOIL

10 FT. X 25 FT. SIZE OF ROCKBED 50 FT. X 65 FT. SIZE OF SANDE

GEOTEXTILE CLOTH

4 INCHES OF TOPSOIL FOR GRASS COVER

14 INCHES OF SANDY LOAM SC TAPERING TO 8 INCHES

9" ROCK BELOW DISTRIBUTION PIPE

36 INCHES OF SAND *

36 INCHES OF SAND *

ORIGINAL GRADE

ROUGHENED SOIL SURFACE

20 FEET UPSLOPE SAND WIDTH

10 FEET WIDTH OF ROCKBED

20 FEET DOWNSLOPE SAND WIDTH

22 FEET UPSLOPE COVER WIDTH

FEET WIDTH OF ROCK

22 FEET DOWNSLOPE COVER WIDTH

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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 = 3 ft.
- c. Subtract 2 ft from rock layer length:
 $\underline{25} - 2 = \underline{23}$ feet. (length of laterals)

ROCK LAYER LENGTH

d. Determine the number of spaces between perfs:

$$\frac{\underline{23}}{\text{(length of lateral)}} \div \frac{\underline{3}}{\text{(perf. spacing)}} = \underline{\hspace{2cm}} \text{ spaces}$$

e. 8 spaces + 1 = 9 perforations per lateral

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

$$\frac{\underline{9}}{\text{(perfs/lateral)}} \times \frac{\underline{3}}{\text{(laterals)}} = \frac{\underline{27}}{\text{(perforations)}}$$

g. $\frac{\underline{27}}{\text{(Perforations)}} \times \frac{\underline{.74}}{\text{(gpm/perfs)}} = \underline{20}$ GPM

SELECTED PUMP CAPACITY 20 GPM

B. Determine head requirements:

1. Elevation difference between pump & point of discharge:

$$\underline{10} \text{ feet}$$

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.

$$\text{F.L.} = \underline{.73} \text{ ft/100 of pipe}$$

b. Determine total pipe length from pump to discharge point.

Add 25% to pipe length for fitting loss.

$$\underline{30'} \text{ length} \times 1.25 = \underline{37.5} \text{ feet.}$$

c. Calculate total friction loss by multiplying friction loss in 100 ft. of pipe by equivalent pipe length (B):

$$\text{Total friction loss} = \underline{.73} \times \underline{37.5} / 100 = \underline{.27} \text{ feet}$$

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

$$\frac{\underline{10}}{(1)} + \frac{\underline{5}}{(2)} + \frac{\underline{.27}}{(3c)} \text{ TOTAL HEAD } \underline{15.27}$$

SELECT A PUMP TO DELIVER AT LEAST 20 GPM WITH AT LEAST 15.27 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 1/2"

For a center manifold system the values will be 1/2 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"
<u>20</u>	2.47	<u>0.73</u>	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

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- 100 ————— Benchmark
- 98 ————— Elevation of Line at House
- 96 ————— Elev. at Tank Inlet
- 92 ————— Elev. of Pump
- 102. — Elev. @ Bottom of Rock Layer
- 102.5 — Elev. of Distribution Device
- 99 — Elev. of Restricting Layer

