

Crow Wing County Planning and Zoning Field Evaluation Sheet

Property Owner: _____ Date: _____

Mailing Address: _____

City/State/Zip: _____

Home Phone Number: _____ - _____ - _____ Cell: _____ - _____ - _____

Site Address: _____

City/State/Zip: _____

Legal Description: _____

Sec. _____ Twp: _____ Range: _____ Township Name: _____

Parcel Number: _____ - _____ - _____

Lake/ River: _____ Lake/River Classification: _____

Description of Soil Treatment Areas

	(Proposed) Site #1		(Alternate) Site #2	
Disturbed Areas	Yes _____	No _____	Yes _____	No _____
Compacted Areas	Yes _____	No _____	Yes _____	No _____
Flooding	Yes _____	No _____	Yes _____	No _____
Run on Potential	Yes _____	No _____	Yes _____	No _____
Limiting Layer Depth	SB1 _____	SB2 _____	SB1 _____	SB2 _____
Slope %	_____		_____	
Direction of Slope	_____		_____	

Soil Sizing Factors							
Perc. Rate	Texture	SSF	GPD/Sq.Ft.	Perc. Rate	Texture	SSF	GPD/Sq.Ft.
<0.1	Coarse Sand			16 to 30	Loam	1.67	0.60
0.1 to 5	Sand	0.83	1.20	31 to 45	Silt Loam	2.00	0.50
0.1 to 5	Fine Sand	1.67	0.60	46 to 60	Clay Loam	2.20	0.45
6 to 15	Sandy Loam	1.27	0.79	> 60	Clay Loam	****	0.24

Soil Texture _____

Soil Sizing Factor _____

Landscape Position _____

Vegetation Types _____

Existing System Information / Reason for Upgrade	
Does the drainfield discharge to the surface?	Yes _____ No _____
Does the drainfield meet separation requirements?	Yes _____ No _____
Is this a cesspool or block tank?	Yes _____ No _____

Print Designer Name and License Number: _____

Home Phone Number: _____ - _____ - _____ Cell: _____ - _____ - _____

Designer Signature: _____ Date: _____

Comments/ Driving Directions: _____

Crow Wing County Planning and Zoning Trench Design Sheet

Property Owner _____ Date _____
 Number of Bedrooms: _____ Type: _____

Well Info: Deep (50'+) _____ Shallow (<50') _____
 Water Using Appliances: Washer _____ Softener _____ Dishwasher _____ Whirlpool _____ Humidifier _____
 Tank(s) to: Well _____ Drainfield to: Well _____ Sewer Line to well _____
 House _____ House _____ Is an Air Test needed? _____
 Prop. Line _____ Prop. Line _____

Flow Data: 2 BR Residential Minimum

A. Estimated GPD _____ Measured GPD _____

Est. Flow in Gallons per Day (GPD)			
Bedrooms	Type 1	Type 2	Type 3
2	300	225	180
3	450	300	218
4	600	375	256
5	750	450	294
6	900	525	332
7	1050	600	370
8	1200	675	408

Tank Sizing

B. Garbage Disposal: _____ Basement Lift Station: _____
 a. Refer to 7080.0130 Subp. 3 C. and D.
 C. Septic Tank Capacity (1,500 gal. Min.) _____
 a. Compartmentalized _____ Filtered _____
 D. Pump Tank Capacity (500 gal. Min.) _____
 a. Alarm Type _____

Septic Tank Capacity		
Bedrooms	Minimum	With GD
2 or less	1,500	2,250
3 or 4	1,500	2,250
5 or 6	1,500	2,250
7 or 8	2,000	3,000
9 or more	Fig. C-2	Fig. C-2

Rock Trench Bottom Area

E. Soil Sizing Factor (SSF): _____
 a. Refer to Field Evaluation Sheet
 F. 6 in. A _____ x E _____ = _____ Sq. Ft.
 G. 12 in. A _____ x E _____ x .8 = _____ Sq. Ft.
 H. 18 in. A _____ x E _____ x .66 = _____ Sq. Ft.
 I. 24 in. A _____ x E _____ x .6 = _____ Sq. Ft.
 J. Divide Sq. Ft. by Trench Width for lineal footage:
 (F-I) _____ / _____ = _____ Lineal Feet

Bed Bottom Area

K. Seepage Beds: A _____ x E _____ x 1.5 = _____ Sq. Ft.
 a. Dimensions: _____ Ft. x _____ Ft.
 L. Pressure Beds: A _____ x E _____ = _____ Sq. Ft.
 a. Dimensions: _____ Ft. x _____ Ft.

Rock Volume

M. Sq. Ft. (F-L) _____ x (Rock depth F-L) _____ + .5 ft. /27: _____ Cubic Yards.
 Multiply R by 1.4 for Tonnage: _____ Tons

Chambers

N. Brand: _____ Sidewall Height: _____
 O. 6 in.: A _____ x E _____ = _____ Sq. Ft.
 P. 10 in.: A _____ x E _____ x .87 = _____ Sq. Ft.
 Q. Divide Sq. Ft. by Chamber Width for lineal footage:
 (O or P) _____ / _____ = _____ Lineal Feet.

Crow Wing County Planning and Zoning Mound Design Sheet Page I of II

Property Owner _____ Date _____
 Number of Bedrooms: _____ Type: I II III

Well Info: Deep (50'+) _____ Shallow (<50') _____
 Water Using Appliances: Washer _____ Softener _____ Dishwasher _____ Whirlpool _____ Humidifier _____
 Tank(s) to: Well _____ Drainfield to: Well _____ Sewer Line to well _____
 House _____ House _____ Is an Air Test needed? _____
 Prop. Line _____ Prop. Line _____

Flow Data: 2 BR Residential Minimum

A. Estimated GPD _____ Measured GPD _____

Tank Sizing

B. Garbage Disposal: _____ Basement Lift Station: _____
 a. Refer to 7080.0130

C. Septic Tank Capacity (1,500 gal. Min.) _____ Gals.
 a. Compartmentalized: _____ Filtered: _____

D. Pump Tank Capacity (500 gal. Min.) _____ Gals.
 a. Alarm Type _____

Est. Flow in Gallons per Day (GPD)			
Bedrooms	Type 1	Type 2	Type 3
2	300	225	180
3	450	300	218
4	600	375	256
5	750	450	294
6	900	525	332
7	1050	600	370
8	1200	675	408

Soils

E. Depth to Restricting Layer: _____ In.
 F. Depth of Clean Sand at Upslope Edge: _____ In.
 G. Native Soil Texture: _____
 H. Native Soil Sizing Factor: _____ Perc. Rate (Optional) _____ MPI
 I. Land Slope: _____ %

Septic Tank Capacity		
Bedrooms	Minimum	With GD
2 or less	1,500	2,250
3 or 4	1,500	2,250
5 or 6	1,500	2,250
7 or 8	2,000	3,000
9 or more	Fig. C-2	Fig. C-2

Rock Layer Dimensions and Volume

J. (A) x .83 = _____ Sq. Ft.
 K. Select Rock Layer Width _____ Ft.
 L. Length of Rock Bed: (J) / (K) = _____ Ft.
 M. Multiply Rock Area (J) by Rock Depth: _____ Cu. Ft.
 N. Divide (M) by 27: _____ Cubic Yards
 O. Multiply (N) x 1.4 for tonnage: _____ Tons of Rock

Perc. Rate	Texture	SSF	GPD/SqFt	Abs. Width Ratio
<0.1	Coarse sand		***	1.00
0.1 to 5	Sand	0.83	1.20	1.00
0.1 to 5	Fine Sand	1.67	0.60	2.00
6 to 15	Sandy Loam	1.27	0.79	1.52
16 to 30	Loam	1.67	0.60	2.00
31 to 45	Silt Loam	2.00	0.50	2.40
46 to 60	Clay Loam	2.20	0.45	2.67
60 to 120	Clay	***	0.24	5.00
>120	Clay	***	***	6.00

Absorption Width

P. Select Absorption Width Ratio from Table 3. Absorption Width Ratio = _____
 Multiply Absorption Width Ratio (P) by Rock Layer Width (K) to determine Absorption Width:
 a. Absorption Width Ratio x Rock Bed Width = _____ ft. of Absorption Width

Designer Signature _____ Date: _____ Page _____ of _____

Revision A 11 January 2006

Revision B 2 January 2007 to reflect changes in Tank Sizing Requirements

Crow Wing County Planning and Zoning Minimum Mound Size Design Sheet Page II of II

Property Owner: _____

Date: _____

1. Subtract the rock layer width from the absorption width to obtain the minimum downslope berm toe: (P.a.) _____ ft. - (K) _____ ft. = _____ ft.
2. Determine the depth of clean sand fill at the upslope edge of the rock layer:
 - a. Separation of 3' min. - _____ ft. = _____ ft. of washed sand
3. Add depth of washed sand for separation (2) at upslope edge, depth of rock layer (1ft.) to depth of cover (1ft.) to determine the mound height at the upslope edge of the rock layer:
 - a. _____ ft. + 1ft. + 1ft. = _____ ft.

Berm Multiplier Table											
Slope	Upslope Berm Multipliers						Downslope Berm Multipliers				
%	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

4. Enter upslope berm value from Berm Multiplier table: _____
5. Multiply berm multiplier by the upslope mound height to determine the upslope mound width: (3.a.) _____ x _____ = _____ ft.
6. Multiply rock layer width by landslope to determine the drop in elevation: (K) _____ ft. x _____ % / 100 = _____ ft.
7. Add depth of clean sand for slope difference at down slope edge to upslope rock edge height to determine the downslope height: (6) _____ + (3) _____ = _____ ft.
8. Select down slope berm multiplier: _____
9. Multiply the downslope mound height by the selected berm multiplier to determine the downslope mound height: (7) _____ x (Multiplier) _____ = _____ ft.
10. Compare the values of Step (1) _____ and (9) _____.
 - a. Select the greater of the two as the downslope berm width _____ ft.
11. The total mound width is the sum of the upslope berm width, rock layer width, and the downslope berm width: (5) _____ + (K) _____ + (10.a.) _____ = _____ ft.
12. Total mound length is the sum of the rock layer length plus the upslope berm width added to each end: (5) _____ + (L) _____ + (5) _____ = _____ ft.
13. Final Mound Dimensions: (11) _____ ft. by (12) _____ ft.

Designer Signature: _____ Date: _____ Page _____ of _____

Revision A 11 January 2006

Revision B 5 July 2006 - Deleted Sand Volume from Calculations.

Crow Wing County Planning and Zoning Pump Selection and Pressure Distribution Sheet

Property Owner: _____

Date: _____

A. Gravity Distribution

- a. Minimum flow 10 GPM Maximum flow 45 GPM
- b. If pumping to gravity distribution, go to (E) Pump Head Requirements Section.

B. Pressure Distribution

- a. _____ End Manifold _____ Center Manifold
- b. Select number of laterals: _____ and size _____
 - i. Select perforation spacing: _____ Ft.
- c. End Manifold: Rock bed length: _____ - 2 feet = _____ lateral length
- d. Center Manifold: Rock Bed Length/2 = _____ - 1 foot = _____ lateral length

C. Total Perforation Determination

- a. Length of lateral / perforation spacing + 1 for end cap = Perforations per lateral:
 _____ ft. / _____ spacing = _____ + 1 = _____ perforations per lateral
- b. Total Number of perforations = Number of laterals x perforations per lateral.
 (B.b.) _____ x (C.a.) _____ = _____ Total number of perforations.

Volume of Liquid in Pipe	
Pipe Dia.	Gal./Ft.
1.25	0.078
1.5	0.11
2	0.17

Maximum Number of Perfs. Per Lateral				
Spacing	Pipe Diameter			
	Ft./In.	1.25	1.5	2
2.5/30	14	18	28	
3.0/36	13	17	26	
3.3/40	12	16	25	
4.0/48	11	15	23	
5.0/60	10	14	22	

D. Pump Flow Requirements

Perforation Discharges in GPM/perf.

Feet of Head	Perforation Diameter In Inches		
	7/32	1/4	
1.0	0.56	0.74	Use 1.0 for single homes
2.0	0.80	1.04	Use 2.0 feet for anything else

Total Perforations: (C.b.) _____ x GPM/perf. _____ = _____ GPM

E. Pump Head Requirements

- a. Elevation difference between pump and point of discharge: _____ ft.
- b. If pumping to pressure, add 5 feet to (E.f.) or zero if pumping to gravity distribution.
- c. Add 25% to pipe length for friction loss through fittings:
 - i. _____ Length x 1.25 = _____ feet of pipe.

Friction Loss in Plastic Pipe											
Pipe Diam.	Flow Rate in GPM										
	20	25	30	35	40	45	50	55	60	65	70
1.5	2.47	3.73	5.23	6.96	8.91	11.07	13.46				
2	0.73	1.11	1.55	2.06	2.64	3.28	3.99	4.76	5.60	6.48	7.44
3	0.11	0.16	0.23	0.30	0.39	0.48	0.58	0.70	0.82	0.95	1.09

- d. Select Friction Loss from table based on flow and pipe diameter:
 - i. Pipe length (E.c.) _____ x Friction loss _____ / 100 = _____ Ft.
- e. Determine Drainback: Pipe Length _____ x Gal/Ft. _____ = _____ Gallons
- f. Total Head: (E.a.) _____ + (E.b.) _____ + (E.d.) _____ = _____ Ft. of Head

F. Select a pump with at least (D.) _____ GPM and (E.f.) _____ Ft. of Head

Designer Signature _____ Date: _____ Page _____ of _____

Revision A 11 January 2006 Revision B 2 January 2007

Crow Wing County Planning and Zoning Soil Boring Logs for Proposed and Alternate Sites

Property Owner: _____

Date: _____

*Record depths of all horizons.

*Record all Redoximorphic Features, Restricting Layers and Saturated Soils.

*Include all Chroma and Hue values in boring log.

#1 Proposed Site

Depth in Inches	Texture	Munsell Color

#2 Proposed Site

Depth in Inches	Texture	Munsell Color

#1 Alternate Site

Depth in Inches	Texture	Munsell Color

#2 Alternate Site

Depth in Inches	Texture	Munsell Color

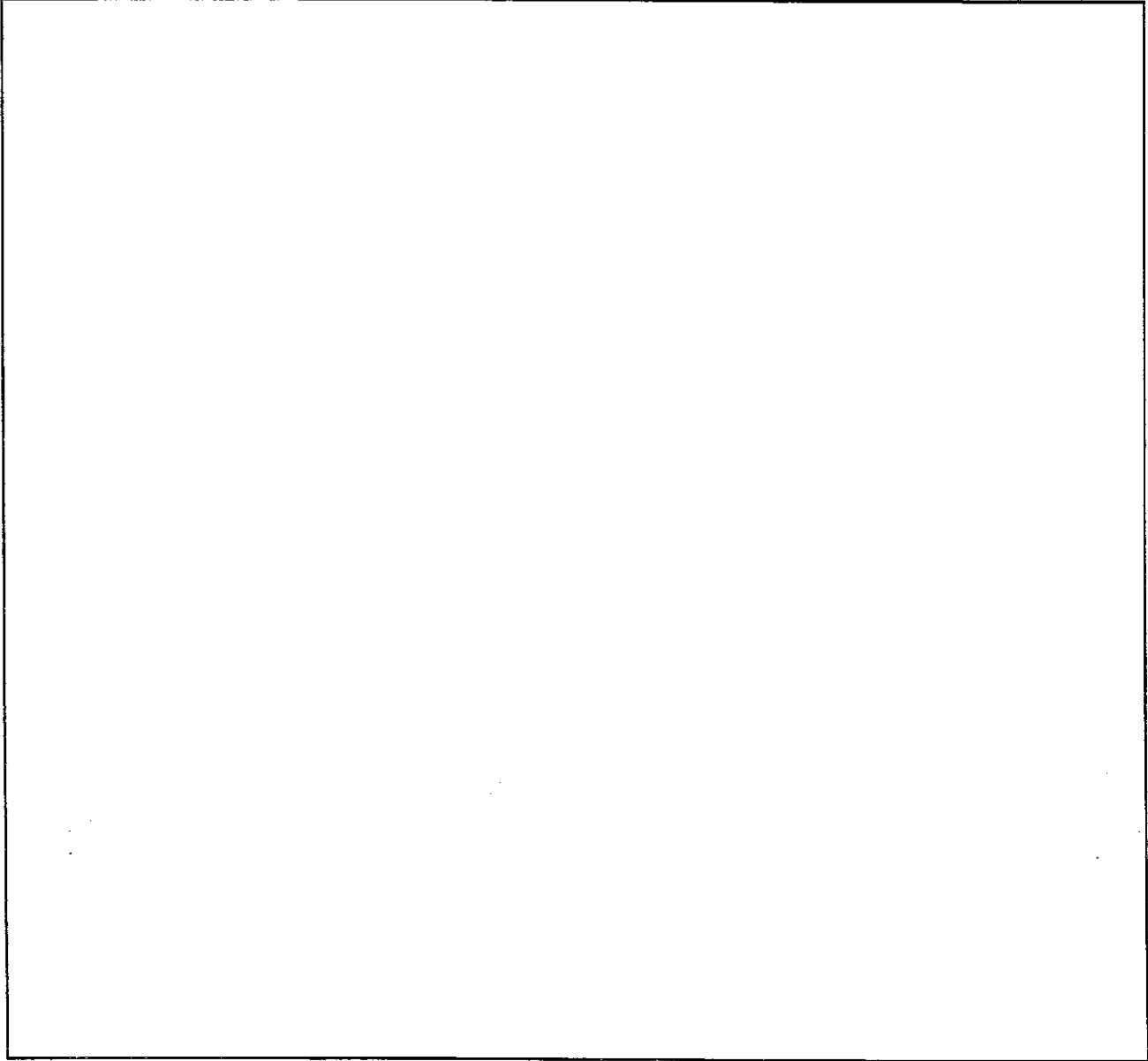
Designer Signature: _____ Date: _____

Page _____ of _____

**Crow Wing County Planning and Zoning
Site Sketch for Septic System**

Property Owner: _____ Date: _____

Please Draw to Scale with North Arrow to top or Left Side of Page



Show Existing or Proposed:

Water Wells within 100 ft. of drainfield Water lines within 10 ft. of drainfield
All Drainfield Areas and Boring Locations Disturbed/Compacted Areas Component Location
OHW as Needed Lot Easements Access Route for Tank Maintenance
Property Lines, all Existing and Proposed Structures, all Relative Setbacks

Elevations:

_____ Benchmark Elevation	_____ Pump Elevation
_____ Elevation of Sewer Line at House	_____ Pump Discharge Elevation
_____ Tank Inlet Elevation	_____ Restricting Layer Elevation
Revision A 11 January 11, 2006	_____ Drainfield Elevation

Designer Signature: _____ Date: _____
License Number: _____ Page _____ of _____