

Crow Wing County Atgrade Design

Property Owner: _____ Date: _____

Mailing Address: _____

City: _____ State: _____ Zip: _____

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

Site Address: _____

City: _____ State: _____ Zip: _____

Driving directions if no address issued: _____

Legal Description: _____

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

Parcel Number: _____ - _____ - _____ - _____ - _____

Lake/ River: _____ Lake/River Classification: _____

Flow Data

Number of Bedrooms: _____

Dwelling Classification: I II III

System Type: I II III IV V

GPD: _____

Estimated Flow in Gallons per Day (GPD)			
Bedrooms	Class I	Class II	Class III
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

Wells

Deep Well: Y or N Proposed or Existing

Shallow Well: Y or N Proposed or Existing

Wells to be sealed (if applicable)? _____

Setbacks

Tank(s) to: Well _____ Drainfield to: Well _____ Sewer Line to well: _____

House _____ House _____ Air Test (Y or N) _____

Property Line _____ Property Line _____

Additional System Notes and Information: _____

Designer Name: _____ License Number: _____

Address: _____

City: _____ State: _____ Zip: _____

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

E-Mail Address: _____

I hereby certify that I have completed this work in accordance with all applicable requirements.

Designer Signature: _____ Date: _____

Crow Wing County Atgrade Design

Property Owner: _____

Date: _____ Designer's Initials: _____

Tank Sizing

- A. Septic Tank ☐ *Existing ☐ New

Capacity: _____ Gallons

Compartmentalized (Y or N): _____ Filter (Y or N): _____

Garbage Disposal (Y or N): _____ Bsmt Lift Station (Y or N): _____

Septic Tank Capacity		
Bedrooms	Minimum	GD/BL
5 or less	1,500	2,250
6 or 7	2,000	3,000
8 or 9	2,500	3,750

- B. Pump Tank ☐ *Existing ☐ New

Capacity: _____ Gallons (7080.2100)

- a. Alarm Type: _____

*Sewage Tank Integrity Assessment Form must be attached

Soils

- C. Depth to Restricting Layer: _____ ft.

- D. Native SSF: _____ Texture: _____

- E. Linear Loading Rate (LLR): _____

- F. Land Slope: _____ %

Linear Loading Rates			
Perc Rate	Soil Texture	Other Characteristics in upper 48 inches	LLR
<0.1 mpi	Coarse Sand	No textural change	6
		Saturated soil < 3 ft.	5
		Bedrock < 4 ft.	5
0.1-5 mpi	Sand, Loamy Sand, Fine Sand	No textural change	8
		Layers of other textures	7
		Banding	4
		Saturated Soil < 3 ft. or Bedrock < 4 ft.	5
6-15 mpi	Sandy Loam	Strong to moderate structure	7
		No textural change	7
		Weak structure	6
		Layers of other textures	6
		Platey or massive structure	5
		Saturated soil < 3 ft.	5
		Bedrock < 4 ft.	5
16-60 mpi	Loam, Silt loam, Silt, Sandy Clay Loam, Clay Loam, Silty Clay Loam	Strong to moderate structure	6
		No textural change	6
		Weak structure	5
		Layers of other textures	5
		Platey or massive structure	4
		Saturated soil < 3 ft.	4
		Bedrock < 4 ft.	4

Atgrade Size Calculations

- G. Rock Bed Width

LLR (E): _____ × SSF (D) = _____ ft.

- H. Atgrade Height (1 ft. of rock + 1 ft. of cover): 2ft.

- I. Upslope Berm Width

- a. **Complete if slope is > 0%** Upslope berm multiplier: _____ × (H) 2ft. = _____ ft. (Upslope Width)

- b. **Complete if slope = 0%** Rock Bed Width (G): _____ ft. × 0.5 + 5 ft. = _____ ft. (Upslope Width)

- J. Downslope Berm Width

- a. **Complete if slope is > 0%**

Downslope berm multiplier: _____ × (H): 2ft. = _____ ft. (Downslope Width)

- b. **Complete if slope is > 0%** Rock Bed Width (G): _____ ft. + 5 ft. = _____ ft.

- c. **Complete if slope is > 0%** Choose J.a. or J.b., whichever is larger: _____ ft. (Downslope Width)

- d. **Complete if slope = 0%** Rock Bed Width (G): _____ ft. × 0.5 + 5 ft. = _____ ft. (Downslope Width)

- K. System Width (I.a or I.b.): _____ ft. + (J.c. or J.d.): _____ ft. = _____ ft.

- L. Rock Bed Length GPD: _____ ÷ LLR (E): _____ = _____ ft.

- M. Total System Length (I.a or I.b.): _____ ft. + (I.a or I.b.): _____ ft. + Rock Bed Length (L): _____ ft.

- N. Rock Bed Dimensions: Width (G): _____ ft. by Length (L): _____ ft.

- O. Cubic Yards of Rock (G) × (L) × Rock Depth (1 ft.) ÷ 27 = _____ yds³

- P. Final Atgrade Dimensions Are: Width (K): _____ ft. by Length (M): _____ ft.

Berm Multiplier Table													
Land Slope→	0%	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%
Upslope Multiplier	4.00	3.85	3.70	3.57	3.45	3.33	3.23	3.12	3.03	2.94	2.86	2.78	2.70
Downslope Multiplier	4.00	4.17	4.35	4.54	4.76	5.00	5.26	5.56	5.85	6.25	6.67	7.14	7.69

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Property Owner: _____ Date: _____

Determine Pump Capacity

1) Gravity Distribution Pump Capacity Range: 10 - 45 GPM

*Skip to Pump Head Requirements if pumping to gravity

2) Pressure Distribution:

a) Number of laterals: _____

b) Lateral Size: _____ in.

c) Perforation spacing _____ in.

d) Check Table 4 to see the maximum number of perforations per lateral.

3) Lateral Length (choose):

a) End manifold: rock bed length: _____ - 2 ft. = _____ ft.

b) Center manifold: rock bed length /2: _____ - 1 ft. = _____ ft.

4) Total Perforation Determination:

a) (3a or 3b): _____ ft. ÷ (2c): _____ ft. + 1 = _____ Perforations / Lateral

b) (4a): _____ × (2a): _____ = _____ Total Number of Perforations

c) Select perforation discharge from Table 1 = _____ GPM/Perf.

d) (4b): _____ × (4c): _____ GPM/Perf. = _____ GPM

PUMP HEAD REQUIREMENTS

5) Elevation difference:

a) Elevation difference between pump and point of discharge _____ ft.

b) If pumping to a pressure distribution system, (5a) + 5 = _____ ft.

c) If pumping to a gravity distribution system, (5a) + 0 = _____ ft.

6) Friction loss:

a) Select a value from Table 2: _____ ft. / 100 ft. of pipe

b) Pipe length to drainfield: _____ × 1.25 = _____ ft.

c) (6a): _____ × (6b): _____ ÷ 100 = _____ Total Friction Loss

7) Drainback:

a) Actual Pipe length: _____ ft. × _____ gal/ft. (Table 3) = _____ gal

8) (5b or 5c): _____ ft. + (6c): _____ ft. = _____ Total Head Required

9) Minimum Pump Size: _____ GPM (4d) & _____ ft. of dynamic head (8)

Designer's Initials: _____

Table 1

Perforation Discharge (GPM/perf.)

Ft. of Head	7/32" Perf	1/4" Perf
1.0	0.56	0.74
2.0	0.80	1.04

Use 1.0 for single homes, 2.0 for everything else

Table 2

Friction Loss in Plastic Pipe

Flow (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

Table 3

Volume of Liquid in Pipe

Pipe Diameter	Gal/Ft.
1.25 in.	0.078
1.5 in.	0.11
2.0 in.	0.17

Table 4

Max Perforations/Lateral

Perf. Spacing	1.25" Pipe	1.5" Pipe	2" Pipe
30 in.	14	18	28
36 in.	13	17	26
40 in.	12	16	25
48 in.	11	15	23
60 in.	10	14	22

Crow Wing County Atgrade Design

Property Owner: _____ Date: _____ Designer's Initials: _____

Please record the depths of all horizons, redoximorphic features, restricting layers, and saturated soils. Include all chroma and hue values.

#1 Proposed Site

Depth (in.)	Texture	Color

#1 Alternate Site

Depth (in.)	Texture	Color

#2 Proposed Site

Depth (in.)	Texture	Color

#2 Alternate Site

Depth (in.)	Texture	Color

Soil Sizing Factors/Hydraulic Loading Rates

Perc. Rate	Texture	SSF	HLR	Perc. Rate	Texture	SSF	HLR
<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

Description of Soil Treatment Areas

	Proposed Site					Alternate Site				
Disturbed Areas?	Yes or No					Yes or No				
Compacted Areas?	Yes or No					Yes or No				
Flooding Potential?	Yes or No					Yes or No				
Run on Potential?	Yes or No					Yes or No				
Limiting Layer Depth	Proposed #1		Proposed #2			Alternate #1		Alternate #2		
Slope % and Direction										
Landscape Position										
Vegetation Types										
Soil Texture										
Soil Sizing Factor	0.83	1.27	1.67	2.0	2.2	0.83	1.27	1.67	2.0	2.2

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

Please show all that apply (Existing or Proposed):

Wells within 100 ft. of a Drainfield	Boring Locations	Access Route for Tank Maintenance
Water lines within 10 ft. of a Drainfield	Component Location	Property Lines
Disturbed/Compacted Areas	OHW	Structures
Drainfield Areas	Lot Easements	Setbacks

Elevations:

_____ Benchmark Elevation	_____ Pump Elevation
_____ Elevation of Sewer Line at House	_____ Pump Discharge Elevation
_____ Tank Inlet Elevation	_____ Restricting Layer Elevation
_____ Drainfield Elevation	

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