

## Crow Wing County Pressure Bed/Trench with Pump 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: \_\_\_\_\_ Twp Name: \_\_\_\_\_

Parcel Number: \_\_\_\_\_

Lake/ River: \_\_\_\_\_

Lake/River Classification:

### Flow Data

Number of Bedrooms: \_\_\_\_\_

Dwelling Classification:

System Type:

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:

Shallow Well:

Wells to be sealed (if applicable)? \_\_\_\_\_

### Setbacks

Tank(s) to: Well \_\_\_\_\_

Drainfield to: Well \_\_\_\_\_

Sewer Line to well: \_\_\_\_\_

House \_\_\_\_\_

House \_\_\_\_\_

Air Test:

Property Line \_\_\_\_\_

Property Line \_\_\_\_\_

**Additional System Notes and Information:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Designer Name: \_\_\_\_\_ License Number: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Home Phone Number: \_\_\_\_\_ Cell: \_\_\_\_\_

E-Mail Address: \_\_\_\_\_

Designer Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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## Tank Sizing

- A. Septic Tank Capacity: \_\_\_\_\_ Gallons  
 Tank Type: \_\_\_\_\_ Filter: \_\_\_\_\_  
 Garbage Disposal/Basement Lift Station: \_\_\_\_\_
- B. Pump Tank Capacity: \_\_\_\_\_ Gallons (7080.2100)  
 a. Alarm Type: \_\_\_\_\_

Designer's Initials: \_\_\_\_\_

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

## Soils

- C. Depth to Restricting Layer: \_\_\_\_\_ ft.  
 D. Native SSF: \_\_\_\_\_  
 (Perc. Rate [Optional] \_\_\_\_\_ MPI)

<u>A</u> bsorption <u>W</u> idth <u>R</u> atio Table		
Texture	SSF	AWR
Sand	0.83	1.00
Fine Sand	1.67	2.00
Sandy Loam	1.27	1.52
Loam	1.67	2.00
Silt Loam	2.00	2.40
Clay Loam	2.20	2.67

**\*\*Enter GPD next to the type of system\*\***

## Rock Trenches

- E. 6 in. Trench Depth \_\_\_\_\_ GPD  $\times$  D = \_\_\_\_\_ sq. ft. Cubic Yards of Rock: \_\_\_\_\_ yds<sup>3</sup>  
 F. 12 in. Trench Depth \_\_\_\_\_ GPD  $\times$  D  $\times$  .8 = \_\_\_\_\_ sq. ft. Cubic Yards of Rock: \_\_\_\_\_ yds<sup>3</sup>  
 G. 18 in. Trench Depth \_\_\_\_\_ GPD  $\times$  D  $\times$  .66 = \_\_\_\_\_ sq. ft. Cubic Yards of Rock: \_\_\_\_\_ yds<sup>3</sup>  
 H. 24 in. Trench Depth \_\_\_\_\_ GPD  $\times$  D  $\times$  .6 = \_\_\_\_\_ sq. ft. Cubic Yards of Rock: \_\_\_\_\_ yds<sup>3</sup>  
 I. Divide (E-H) by Trench Width for lineal feet: \_\_\_\_\_  $\div$  \_\_\_\_\_ = \_\_\_\_\_

## Chamber Trenches

- J. Brand: \_\_\_\_\_ Dimensions of one chamber (L x W): \_\_\_\_\_ ft.  $\times$  \_\_\_\_\_ ft.  
 K. 6-11 in. Chamber Depth \_\_\_\_\_ GPD  $\times$  D = \_\_\_\_\_ sq. ft.  
 L. 12 in. Chamber Depth \_\_\_\_\_ GPD  $\times$  D  $\times$  .8 = \_\_\_\_\_ sq. ft.  
 M. Select from (K-L) if installing Chamber Trenches: \_\_\_\_\_  
 N. Divide (M) by Trench Width for lineal feet: \_\_\_\_\_  $\div$  \_\_\_\_\_ = \_\_\_\_\_ Lineal Feet  
 O. Total Chambers Needed (**Round Up**): \_\_\_\_\_ Chambers

## Pressure Beds

- P. Pressure Bed \_\_\_\_\_ GPD  $\times$  D = \_\_\_\_\_ sq. ft.  
 a. Bed Dimensions \_\_\_\_\_ ft.  $\times$  \_\_\_\_\_ ft.  
 b. Cubic Yards of Rock Bed Length  $\times$  Bed Width  $\times$  Rock Depth \_\_\_\_\_ ft.  $\div$  27 = \_\_\_\_\_ yds<sup>3</sup>

**Additional System Notes and Information:** \_\_\_\_\_

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# Crow Wing County Pressure Bed/Trench with Pump Design

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## 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: \_\_\_\_\_

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b) Lateral Size: \_\_\_\_\_ in.

c) Perforation spacing: \_\_\_\_\_ ft.

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.

c) Choose 3a or 3b: \_\_\_\_\_ ft.

4) Total Perforation Determination:

a) Length (3c) ÷ Spacing (2c): \_\_\_\_\_ + 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) Choose 5a if pumping to gravity or 5b for pressure: \_\_\_\_\_ ft.

6) Friction loss:

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

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

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

7) Drainback:

a) Actual Pipe length \_\_\_\_\_ ft. × \_\_\_\_\_ gal/ft. (Table 3) = \_\_\_\_\_ gal

8) (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 Diameter	1/4 Perf Diameter
1.0	0.56 in.	0.74 in.
2.0	0.80 in.	1.04 in.

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

Use 1.0 for single homes, 2.0 for everything else

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
2.5 ft.	14	18	28
3 ft.	13	17	26
3.3 ft.	12	16	25
4 ft.	11	15	23
5 ft.	10	14	22

## Crow Wing County Pressure Bed/Trench with Pump Design

Parcel Number: \_\_\_\_\_ Property Owner: \_\_\_\_\_ Date: \_\_\_\_\_

Designer's Initials: \_\_\_\_\_

### Proposed Site Boring #1

Depth (in)	Texture	Coarse Frag. %	Color	Structure	Redox

### Proposed Site Boring #2

Depth (in)	Texture	Coarse Frag. %	Color	Structure	Redox

### Alternate Site Boring #1

Depth (in)	Texture	Coarse Frag. %	Color	Structure	Redox

### Alternate Site Boring #2

Depth (in)	Texture	Coarse Frag. %	Color	Structure	Redox

### 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	0.78	> 60	Clay Loam	****	0.24

### Description of Soil Treatment Areas

	Proposed Site		Alternate Site	
Disturbed Areas?				
Compacted Areas?				
Flooding Potential?				
Run-on Potential?				
Limiting Layer Depth	Proposed #1:	Proposed #2:	Alternate #1:	Alternate #2:
Slope % and Direction				
Landscape Position				
Vegetation Types				
Soil Texture				
Soil Sizing Factor				

# Crow Wing County Pressure Bed/Trench with Pump Design

Parcel Number: \_\_\_\_\_ Property Owner: \_\_\_\_\_ Date: \_\_\_\_\_

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



*Click in the sketch area below to import an existing sketch (PDF or JPG format).  
Drawing tools are also available in the Comments Toolbar of Adobe Reader.*

**Please show all that apply (Existing or Proposed):**

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

**SSTS Management Plan required to be submitted with this design**

Minnesota Pollution Control Agency Rules Sections 7082.0600 Subp. 1. A and B, and Section 7082.0100 Subpart3. J