

Darlow Excavating
48237 Lake Ave.
McGregor, MN 55760
(218) 426-4320

Ernie Darlow
Septic System
Designs & Installation

**This Enclosed Individual Sewage Treatment System (ISTS)
Is Design Specifically For:**

**For property located in
Sheshebe Point Add.**

**Shamrock Township
Sec.33, Twp.49, Rge.23**

Parcel # 29-1-321800

June 5th, 2005

**A NEW ISTS SITE EVALUATION WILL BE REQUIRED IF SYSTEM IS NOT INSTALLED WITH IN
1 YEAR FROM ABOVE DATE**

**2 Bedroom
Pressure Bed**

Trench and Bed Worksheet

All boxed rectangles must be entered, the rest will be calculated.

1. AVERAGE DESIGN FLOW

- A. Estimated 300 gpd (see figure A-1)
 or measured x 1.5 (safety factor) = 0 gpd
- B. Septic tank capacity 1860 gallons

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 II 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	

2. SOILS (Site evaluation data)

- C. Depth to restricting layer = 5.5 feet
- D. Maximum depth of system Item C - 3 ft = 2.5 feet
- E. Texture Sand Percolation rate 6 to 15 mpi
- F. SSF 1.27 ft²/gpd (see figure D-15)
- G. % Land slope 1 %

Perc Rate mpi	Soil Texture	SSF sq ft/gpd
< 0.1 *	Coarse sand	0.83
0.1-5	Medium sand	0.83
	Loamy sand	
0.1-5**	Fine sand	1.67
6 - 15	Sandy loam	1.27
16 - 30	Loam	1.67
31 - 45	Silt loam, silt	2.00
46 - 60	Clay loam, sandy clay or silty clay	2.20
61 - 120***	Clay, sandy or silty clay	4.20
>120****		

* No trench >25% of total system
 ** Soil with >50% fine sand particles
 *** A mound must be used
 **** An other or performance system

Number of Bedrooms	Minimum Capacity	Capacity with Garb. Disp.	Capacity with Disp. and Lift
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

percolation rate (minutes/inch)	soil texture	lineal feet/gallon/day
Faster than 0.1 *	Coarse Sand	---
0.1 to 5	Medium Sand	0.28
	Loamy Sand	
	Fine Sand **	0.6
6 to 15	Sandy Loam	0.42
16 to 30	Loam	0.56
31 to 45	Silt Loam	0.67
	Silt	
46 to 60	Clay Loam (CL)	0.74
	Sandy CL	
	Silty CL	
slower than 60***	Clay	---
	Sandy Clay	
	Silty Clay	

* Soil too coarse for sewage treatment.
 Use systems for rapidly permeable soils.
 ** Soil having 50% or more fine sand + very fine sand.
 *** Soil with too high a percentage of clay for installation of a standard inground system.

3. TRENCH OR BED BOTTOM AREA

H. For trenches with 6 inches of rock below the pipe:

$A \times F = \underline{300} \text{ gpd} \times \underline{1.27} \text{ ft/gpd} = \underline{381.0} \text{ ft}^2$

I. For trenches with 12 inches of rock below the pipe:

$A \times F \times 0.8 = \underline{300} \text{ gpd} \times \underline{1.27} \text{ ft/gpd} \times 0.8 = \underline{304.8} \text{ ft}^2$

J. For trenches with 18 inches of rock below the pipe:

$A \times F \times 0.66 = \underline{300} \text{ gpd} \times \underline{1.27} \text{ ft/gpd} \times 0.66 = \underline{251.5} \text{ ft}^2$

K. For trenches with 24 inches of rock below the pipe:

$A \times F \times 0.6 = \underline{300} \text{ gpd} \times \underline{1.27} \text{ ft/gpd} \times 0.6 = \underline{228.6} \text{ ft}^2$

L. For gravity beds with 6 or 12 inches of rock below the pipe;

$1.5 \times A \times F = 1.5 \times \underline{300} \text{ gpd} \times \underline{1.27} \text{ ft/gpd} = \underline{571.5} \text{ ft}^2$

M. For pressure beds with 6 or 12 inches of rock below the pipe;

$A \times F = \underline{300} \text{ gpd} \times \underline{1.27} \text{ ft/gpd} = \underline{381.0} \text{ ft}^2$

4. DISTRIBUTION (Check all that apply)

<input checked="" type="checkbox"/>	Bed (<6% slope)	<input type="checkbox"/>	Drop Boxes (any slope)	<input checked="" type="checkbox"/>	Rock
<input type="checkbox"/>	Trenches	<input type="checkbox"/>	Distribution Box (<3%)	<input type="checkbox"/>	Chamber
<input checked="" type="checkbox"/>	Pressure	<input type="checkbox"/>	Gravity	<input type="checkbox"/>	Gravelless

5. SYSTEM WIDTH, LENGTH AND VOLUME

M. Select width = 12 ft

N. If using rock, divide bottom area by width: (H, I, J or K) divided by P = lineal feet

$\frac{\underline{381.0} \text{ ft}^2}{\underline{12.0} \text{ ft}} = \underline{31.8} \text{ lineal feet}$

Rock depth below distribution pipe plus 0.5 foot times bottom area:

(Rock depth + 0.5 foot) x Area (H, I, J, K, L)

$(\underline{0.5} \text{ ft} + 0.5 \text{ ft}) \times \underline{381.0} \text{ ft}^2 = \underline{381.0} \text{ ft}^3$

Volume in cubic yards = volume in cubic feet divided by 27

$\frac{\underline{381.0}}{27} = \underline{14.1} \text{ yd}^3$

Weight of rock in tons = cubic yards times 1.4

$\underline{14.1} \times 1.4 = \underline{19.8} \text{ tons}$

O. If using 10" Gravelless Pipe, length = Flow (A) x Gravelless SSF (see figure D-9)

$\underline{300.0} \text{ gpd} \times \underline{\quad} \text{ ft/gpd} = \underline{0.0} \text{ lineal feet}$

P. If using a Chamber (H, I, J, K [based on height of chamber slats] divided by width of chamber in ft)

$\underline{\quad} \text{ ft}^2 / \underline{\quad} \text{ ft} = \underline{\#DIV/0!} \text{ lineal feet}$

7. LAWN AREA

Q. Select trench spacing, center to center =

12 feet

R. Multiply trench spacing by lineal feet R x Q = sq. ft. of lawn area

$\underline{12} \times \underline{31.8} = \underline{381} \text{ ft}^2$

8. LAYOUT

Select an appropriate scale; one inch =

20 feet

Show pertinent property boundaries, rights-of-way, easements.

Show location of house, garage, driveway, and all other improvements, existing or proposed.

Show location and layout of sewage treatment system, well and dimensions of all elevations

Reviewed by [Signature]

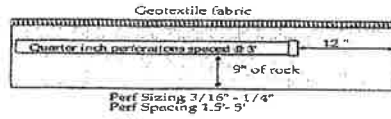
I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws

_____ (signature) _____ (license #) _____ (date)

PRESSURE DISTRIBUTION SYSTEM

All boxed rectangles must be entered, the rest will be calculated.

- Select number of perforated laterals: 3
- Select perforation spacing = 3 ft
- 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
 $\text{38.1} - 2 \text{ ft} = \text{36.1} \text{ ft}$



- Determine the number of spaces between perforations.
 Divide the length (3) by perforation spacing (2) and round down to nearest whole number.
 Perforation spacing = $\text{36.1} \text{ ft} / \text{3} \text{ ft} = \text{12}$
- 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.
 $\text{12} \text{ spaces} + 1 = \text{13} \text{ perforations/lateral}$

Perforation Spacing (feet)	Perforation Spacing			
	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

Head (feet)	Perforations diameter (inches)		
	3/16	7/32	1/4
1 ^a	0.42	0.56	0.74
2 ^b	0.59	0.80	1.04
5	0.94	1.26	1.65

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

- A. Total number of perforations = perforations per lateral (5) times number of laterals (1).
 $\text{13} \text{ perfs/lat} \times \text{3} \text{ laterals} = \text{39} \text{ perforations}$

B. Calculate the square footage per perforation.
 Recommended value is 6-10 sqft/perf. Does not apply to at-grades.

- Rock bed area = rock width (ft) x rock length (ft)
 $\text{12} \text{ ft} \times \text{38.1} \text{ ft} = \text{457} \text{ ft}^2$
- Square foot per perforation = Rock Bed Area / number of perfs (6)
 $\text{457.2} \text{ ft}^2 / \text{39} \text{ perfs} = \text{11.7} \text{ ft}^2 / \text{perf}$

- Determine required flow rate by multiplying the total number of perforations (6A) by flow per perforations (see figure E-6)
 $\text{39} \text{ perfs} \times \text{0.56} \text{ gpm / perfs} = \text{21.8} \text{ gpm}$

- If laterals are connected to header pipe as shown in Figure E-1, 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 laterals = inches

- If perforated lateral system is attached to manifold pipe near the center, like Figure E-2, 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 = inches.

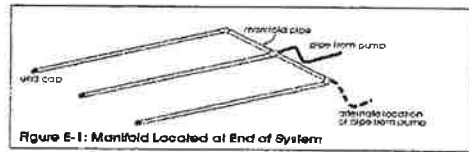


Figure E-1: Manifold Located at End of System

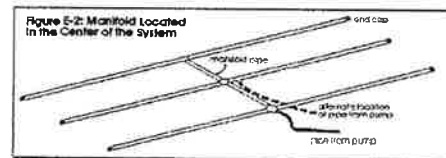


Figure E-2: Manifold Located in the Center of the System

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

_____ (signature) _____ (license #) _____ (date)

PUMP SELECTION PROCEDURE

All boxed rectangles must be entered, the rest will be calculated.

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 design worksheet

Selected Pump Capacity: 21.8 gpm

2. Determine head requirements:

- A. Elevation difference between pump and point of discharge.

6 feet

- B. Special head requirement? (See Figure - Special Head Requirements)

5 feet

- C. Friction loss

1. Select pipe diameter 1.5 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 = 3.73 ft/100 ft of pipe

3. Determine total pipe length from pump discharge to soil system discharge point. Estimate by adding 25 percent to pipe length for fitting loss.

Equivalent pipe length times 1.25 = total pipe length

35 ft x 1.25 = 43.75 feet

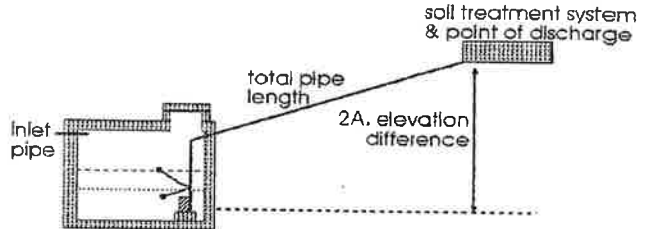
4. Calculate total friction loss by multiplying friction loss (C2) by the equivalent pipe length (C3) and divide by 100.

FL = 3.73 ft/100ft X 43.75 ft / 100 = 1.6 feet

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

6 ft + 5 ft + 1.6 ft

Total Head: 12.6 feet



Special Head Requirements	
Gravity Distribution	0ft
Pressure Distribution	5ft

E-9 Friction Loss in Plastic Pipe per 100 ft			
Flow Rate	nominal pipe diameter		
	1.5"	2.0"	3"
gpm	1.5"	2.0"	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	0.3
40	8.91	2.64	0.39
45	11.07	3.28	0.48
50	13.46	3.99	0.58
55		4.76	0.7
60		5.6	0.82
65		6.48	0.95
70		7.44	1.09

3. Pump Selection

1. A pump must be selected to deliver at least 21.8 gpm (1A or B) with at least 12.6 feet of total head (2D).

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

_____ (signature)

_____ (license #)

_____ (date)

DOSING CHAMBER SIZING

All boxed rectangles must be entered, the rest will be calculated.

1. Determine area

A. Rectangle area = L x W

0 ft x 0 ft = 0 ft²

B. Circle area = 3.14 x radius²

3.14 x 0 ft = 0.0 ft²

C. Get area from manufacture

0 ft²

2. Calculate gallons per inch

There are 7.5 gallons per cubic foot of volume, therefore multiply the area (1A, B or C) times the conversion factor and divide by 12 inches per foot to calculate gallon per inch.

Surface area x 7.5 / 12 = 0 ft² x 7.5 / 12in/ft = 12.0 gallon per inch

3. Calculate total tank volume

A. Depth from bottom of inlet pipe to tank bottom =

48 in

B. Total tank volume = depth from bottom of inlet pipe to tank bottom(3A) x gal/in(2)

= 48 in x 12.0 gal/in = 576.0 gallons

4. Calculate gallons to cover pump (with 2-3 inches of water covering pump)

(Pump and block height + 2 inches) x gallon per inch

(14 + 2 in) x 12.0 gal/in = 192.0 gallons

5. Calculate total pumpout volume

A. Select pump size for 4-5 doses per day. Gallon per dose = gpd (see Figure A-1) / doses per day =

300 gpd / 5 doses/day = 60 gallons

A-1 Estimated Sewage Flows in GPD

Number of Bedrooms	Class I	Class II	Class III	Class IV
2	300	225	180	60% of
3	450	300	218	the
4	600	375	256	values
5	750	450	294	in the
6	900	525	332	Class I,
7	1050	600	370	II or II
8	1200	675	408	columns

E-20 Volume of Liquid in Pipe

Pipe Diameter inches	Liquid per foot gallons
1	0.045
1.25	0.078
1.5	0.110
2	0.170
2.5	0.250
3	0.380
4	0.660

B. Calculate drainback

1. Determine total pipe length

35.0 ft

2. Determine liquid volume of pipe,

0.11 gal/ft (see figure E-20)

3. Drainback quantity =

35.0 ft (5B1) x 0.11 gal/ft(5B2) = 3.9 gal

C. Total pump out volume = dose volume(5A) + drainback (5B3)

60 gallons + 3.9 gallons = 63.9 gal

6. Calculate float separation distance (using total pumpout volume)

Total pumpout volume(5C) / gal/inch(2)

63.9 gal / 12.0 gal/in = 5.3 inch

7. Calculate volume for alarm (typically 2-3 inches)

Alarm depth (inch) x gallon/inch(2) =

2 in x 12.0 gal/in = 24 gal

8. Calculate total gallons = gallons over pump(4) + gallons pumpout(5C) + gallons alarm(7)

192.0 gal + 63.9 gal + 24.0 gal = 279.9 gal

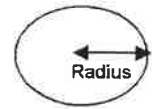
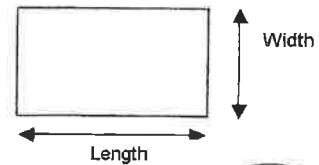
9. Total tank depth = total gallons(8) / gallon/in(2)

279.9 gallons / 12 gal/in = 23.3 in

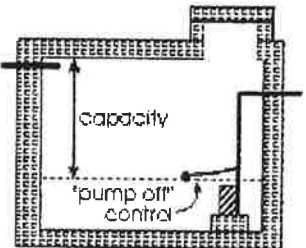
Recommended

Calculate reserve capacity (75% of the daily flow)

Daily flow x 0.75 = 300 x 0.75 = 225 gallons



**Legal Tank:
500 gallons or
100% the daily flow
or Alternating Pumps**



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

(signature)

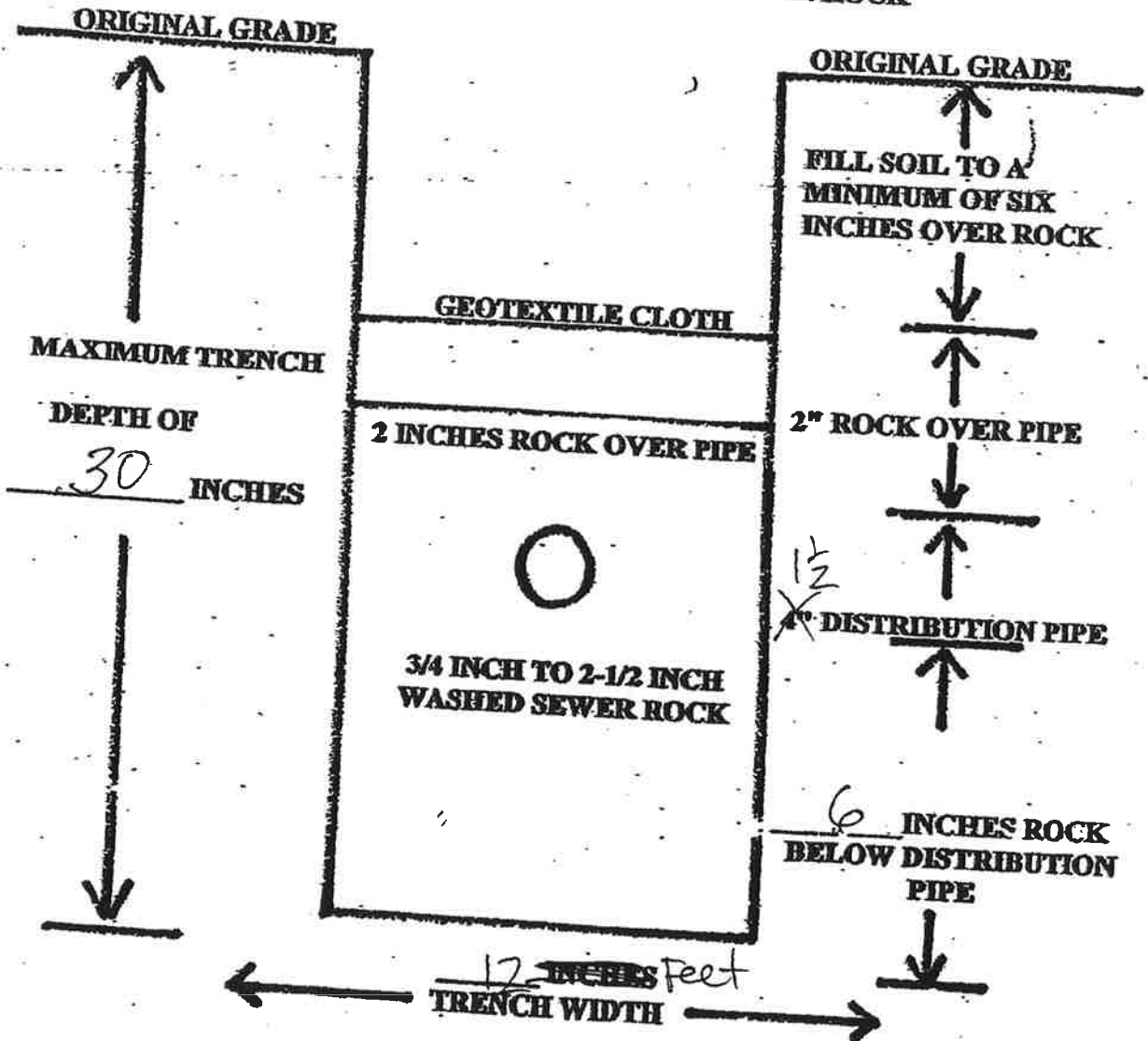
(license #)

(date)

TRENCH CROSS-SECTION

FINISHED GRADE

12 INCHES OF BACKFILL OVER ROCK



Site Evaluation

Property owner(s): _____

Address: 2702 182nd Lane East Bethel, MN 55092

P.I.D. _____ Section: 33 Township 49 N Range 23 W

Date: 6-Jun-05 Time: 5:00 Weather conditions: Clear

Check all that apply: shoreland dwelling in wellhead protection area food, bev, or lodging estab.
 new existing class V

Soil Survey Data

	Soil #1	Soil #2	Soil #3
Map Unit Sym & Name			
Landscape Position			
Flooding			
Slope			
Watertable depth			
Bedrock Depth			

	Soil #1	Soil #2	Soil #3
Possible system depth			
Texture at depth			
Permeability			
60=Perc(MPI)			
NRCS onsite suitability			

Soil Classification: Sand
 Unsuitable/Disturbed/Compacted: yes or no
 Type of observation: Probe Pit Boring
 Parent material: Till Outwash Loess Bedrock Alluvium
 Vegetation type: Wet Dry Unknown

Flow Information:
 No. of bedrooms: 2
 Garbage disposal: yes or no
 Home Classification: I II III IV
 Design flow: 300 gpd

Slope form: _____
 Drainage (select one): Good Fair Poor Ponding Flooding

Floodplain: yes or no

Elevation of Boring(s): _____ feet Location: _____

Depths Information: Standing water: _____ inches
 Bedrock: _____ inches
 Saturated soil: _____ inches
 Maximum depth of system: _____ inches
 Maximum Elevation of bottom of system: _____ feet
 Well Casing depth (from well log): _____ feet

Soil sizing factor (SSF): _____ gpd/ft²
 Linear loading rate (LLR): _____ gpd/ft
 Percolation Test Data Was a perc test done? NO YES

Results if available

	Location	Depth	MPI
Hole #1			
Hole #2			
Hole #3			

Soil Boring Data

Boring 1					Boring 2						
Soil Horizons	Depth (Inches)	Texture	Color	Structure	Consistence	Soil Horizons	Depth (Inches)	Texture	Color	Structure	Consistence
	0 to 6"	Top Soil	10YR 3/2				0 to 5"	Top Soil	10YR 3/2		
	6" to 36"	Sand	10YR 4/6				5" to 16"	Sand	10YR 4/2		
	36" to 64"	Sand	10YR 4/4				16" to 64"	Sandy Loam	10YR 4/6		
Good sand & no Mottling					Good sand & no Mottling						
Boring 3					Boring 4						
Soil Horizons	Depth (Inches)	Texture	Color	Structure	Consistence	Soil Horizons	Depth (Inches)	Texture	Color	Structure	Consistence

Reviewed by [Signature]

I hereby certify that I have completed this work in accordance with applicable ordinances, rules and laws.
[Signature] (signature) 910 (license #) 6/5/05 (date)
48237 Lake Ave McCreep MN address 218 426-4320 phone number
55760

AITKIN COUNTY
CERTIFICATE OF COMPLIANCE/NOTICE OF NONCOMPLIANCE

This certificate of compliance/notice of noncompliance has been issued this _____ day of 6/24/05 to certify compliance/noncompliance with Aitkin County's Individual Sewage Treatment System and Wastewater Ordinance No.

1. The premises covered by this certificate are legally described as: _____

Lot 2 PT Vacated McGregor Rd

Section 33 Township 49 Range 23 Lake NA

PERMIT NO. 33032 Owner Name _____

Address _____

Installer Name Dorion Exc

Type of System Inspected Rock pressure Bed

The certificate of compliance/notice of noncompliance was based on, No 1 of the following:

- 1) Inspection of the installation or construction as in accordance with the above referenced permit and application design.
- 2) Review of as-built plans submitted in accordance with Subdivision 4.21 C. Of Aitkin County's Individual Sewage Treatment System and Wastewater Ordinance No. 1.

If the above permitted individual sewage treatment system is in noncompliance with Aitkin County's Individual Sewage Treatment System and Wastewater Ordinance No. 1, then the following shall serve as a Notice of Violation:

- 1) Statement of the findings of fact through inspections or investigations: _____
- 2) List of specific violations of Ordinance: _____
- 3) Requirements for correction or removal of violations: _____
- 4) Time schedule for compliance: _____

Failure to correct or remove the above violations will result in this matter being turned over to the Aitkin County Attorney's Office for further legal action which may result in revocation of licenses or registrations, fine's and/or imprisonment.

INSPECTOR SIGNATURE [Signature]

33032



INDIVIDUAL SEWAGE TREATMENT SYSTEM INSPECTION FORM AITKIN COUNTY, MINNESOTA

Township Shamrock Date of Inspection 6/23/05 Permit Number 33032
 Owner [REDACTED] Parcel Number 89-1-321800
 Project Address lot 2 + pt. vacated mcgregor rd + part of lot 13 Installer Darlow Exc
+ pt vacated trail as per Doc 361329
 City _____ Zip Code _____ New Repair _____

DIST. or DROP BOX & TYPE _____

SETBACKS:

Buildings to tank(s) NA
 Buildings to drainfield NA
 Well(s) 50' or 100' NA
 Lake/Creek/Wetland NA

SEPTIC TANKS:

Liquid capacity 1600 Combo
 Manufacturer & type Ping pre-cast
 Type of baffle plastic
 Inspection pipes 1-4"
 Manholes access 1
 No. & height of risers 24"

MOUNDS:

Percent slope _____
 Upslope dike width _____
 Downslope dike width _____
 Sideslope dike width _____
 Drainfield rock below pipe _____
 Depth of sand below rock _____
 Perforation size & spacing 1/4 - 3"
 Pipe size & spacing 1 1/2 - 3 latrads.
 Dimensions of rock bed 12 x 30
 Dimensions of sand base _____
 Final cover _____

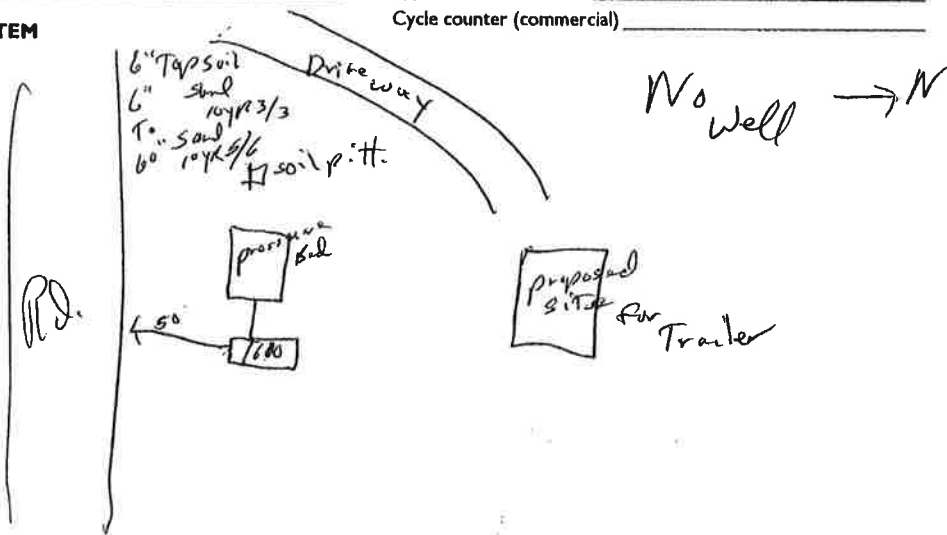
TRENCHES, BEDS, OR GRAVELLESS LEACHFIELD:

Trench depth 24"
 Trench length 32'
 Trench bottom width 12
 Trench bottom level yes
 Trench spacing pressure B.C.
 Drainfield rock below pipe 9"
 Size of gravelless pipe _____
 Depth of backfill 1 1/2'
 Absorption area: square feet _____
 lineal feet _____

PUMPS:

Tank capacity 600
 Tank manufacturer & type Ping
 No. & height of risers 24"
 Pump manufacturer & model# _____
 Horsepower & GPM _____
 Feet of head 10
 Cycles per day 5
 Gallons per cycle 100
 Size of discharge line 2"
 Type of electrical hookup POST
 Type & location of alarm OUT DOOR ELE
 Cycle counter (commercial) _____

DRAWING OF SYSTEM



Inspector's Comments _____

Corrective Action Required _____

Inspector's Signature [Signature] Installer's Signature [Signature]
 White-County Yellow-Applicant Pink-Installer