



ning

# Individual Sewage Treatment System Permit Application



320110002  
FD DUX 701  
Detroit Lakes, MN  
Phone: (218) 846-7314  
Fax: (218) 846-7266

*Anytime 320110002 sep 03*

### 1. PROPERTY DATA (as it appears on tax statement)

Parcel number(s) of property system will be installed on: 032.0110.002 (3)  
(if parcel is a new split and a parcel number has not yet been issued, indicate the main parcel number from which the new parcel was split from)

Section 10 Twp 141 Range 40 Township Name Sugarbush Lake Name No Lake Lake Classification ---

Legal Description: W 1/2 SW 1/4 SW 1/4 & W 1/2 E 1/4 SW 1/4 SW 1/4

Project Address: 32201 county Hwy 34 Ogloma, MN 56569

### 2. PROPERTY OWNER INFORMATION (as it appears on tax statement, purchase agreement or deed)

First name Larry Muff Last Name Muff

Mailing Address 33111 city Hwy 34 City, State Zip Ogloma, MN 56569

Phone Number 983-3376

### 3. DESIGNER/INSTALLER INFORMATION

Company Name: Muff's Trenching License #: 570 Address: Ogloma, MN

Designer Name: Ron Muff Registration #: 5074 Telephone Number: 983-3377

Will the system be installed by the designer? (circle one) YES NO Unknown/To be bid

COMPLETE INSTALLER INFORMATION IF INSTALLER IS KNOWN AND DIFFERENT THAN THE DESIGNER!

Company Name: \_\_\_\_\_ License #: \_\_\_\_\_ Address: \_\_\_\_\_

Installer Name: \_\_\_\_\_ Registration #: \_\_\_\_\_ Telephone Number: \_\_\_\_\_

### 4. SYSTEM DESIGN INFORMATION

Existing System Status - CHECK ONE	Date of Site Evaluation <u>9/8/01</u>	Size of ALL tank types to be installed:	Check type of drainfield medium to be used:
<input checked="" type="checkbox"/> No existing system - new home/structure	Gallons Per Day <u>450</u>	<u>1000</u> gals SepticTank	<input type="checkbox"/> Chamber
<input type="checkbox"/> Cesspool/Seepage	What will new system serve? CHECK ONE	<u>1000</u> gals LiftStation	<input checked="" type="checkbox"/> Drainfield Rock
<input type="checkbox"/> Failing (other than cesspool/seepage pit)	<input checked="" type="checkbox"/> Dwelling	<input type="checkbox"/> gals HoldingTank	<input type="checkbox"/> Gravelless
<input type="checkbox"/> Undersized (addition to drainfield/tanks needed)	<input type="checkbox"/> Resort/Campground	<input type="checkbox"/> gals OtherTanks	<input type="checkbox"/> No drainfield
<input type="checkbox"/> Repairs needed to existing system	<input type="checkbox"/> Commercial (non-resort)	Drainfield Size sq ft	Check type of drainfield to be installed:
<input type="checkbox"/> Replacement needed of existing system	<input type="checkbox"/> other - explain below	<u>572</u>	<input type="checkbox"/> Trench
<input type="checkbox"/> Unknown			<input checked="" type="checkbox"/> Pressure Bed
<input type="checkbox"/> Other - explain below			<input type="checkbox"/> Seepage Bed
			<input type="checkbox"/> Mound

Explanation:

Check box if system will be experimental

Design Flow <u>450</u> GPD	Well Depth <u>120</u>	Original Soil or Compacted Soil	Depth to Restricting Layer <u>48"</u>
Number of Bedrooms <u>3</u>	Depth of wells of	Type of Soil Observation	Maximum Depth of System <u>12"</u>
Garbage Disposal YES <u>(NO)</u>	within 100 feet	PROBE PIT <u>(BORING)</u>	Perc Rate <u>8.37</u>
Grinder pump/lift station in house YES <u>(NO)</u>	system <u>-</u>		Soil Sizing Factor <u>1.27</u>

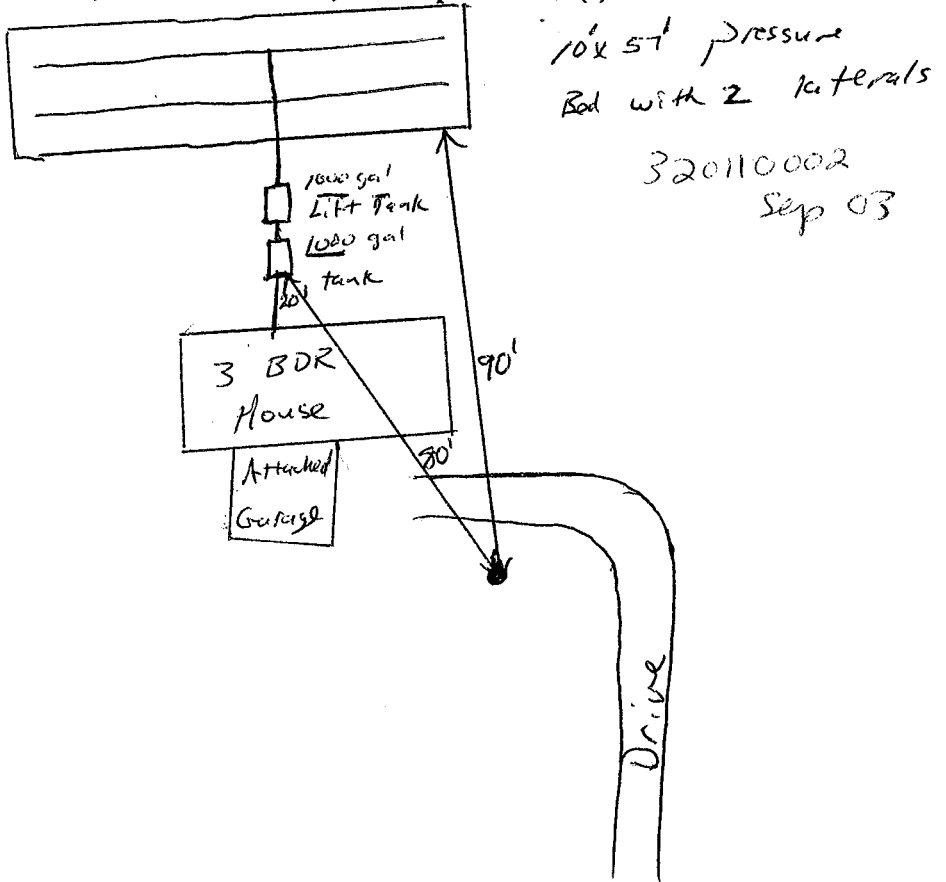
	Tank	Drainfield
Distance to well	<u>50'</u>	<u>90'</u>
Distance to Building	<u>15'</u>	<u>45'</u>
Distance to Property Line	<u>30'</u>	<u>60'</u>
Distance to OHW	<u>-</u>	<u>-</u>
(Ordinary Highwater Mark)		
Distance to Pressure Line	<u>-</u>	<u>-</u>

Depth	Texture	Color	Structure	Depth	Texture	Color	Structure
0-4	Topsoil	Black		0-8	Topsoil	Black	
4-14	Sand	Brown		8-20	Sand	Brown	
14-23	Sandy loam	Light Brown		20-26	sandy loam	Brown	
23-50	Sand	Brown		26-28	Sand	Light Brown	

### 6. SITE PLAN - indicate capacity of all tanks, size of drainfield, and depth of well(s)

SHOW PROPOSED AND/OR EXISTING:

1. Water supply wells w/in 100' of the proposed ISTS
2. Buildings or improvements on the lot
3. Buried water pipes w/in 50' of the proposed ISTS
4. Easements on the lot
5. Ordinary high water level of public waters
6. Property lines
7. ALL required setbacks from the system
8. ALL required setbacks from the system
9. Site contours
10. ISTS
11. Alternative site if lot was created after January 23rd, 1996.
12. Other site characteristics pertinent to system design



### 7. CERTIFIED STATEMENT

I, Ron Muff (PRINT NAME) certify that I have completed the preceding design work in accordance with all applicable requirements (including, but not limited to Minnesota Chapter 7080 and the Becker County Individual Sewage Treatment System Ordinance).

(SIGNATURE) [Signature] (DATE) 8/28/03

\*\*\*\*\*FOR OFFICE USE ONLY\*\*\*\*\*

Application approved by: [Signature] Date: 8/28/03 259273

### Certificate of Compliance

( ) Certificate is hereby denied

() Certificate is hereby granted based upon the application, addendum forms, plans, specifications and all other supporting data. With proper maintenance, this system can be expected to function satisfactorily, however, this is not a guarantee.

Signature of Registered Qualified Employee [Signature] Date: 9.15.03

320110002  
Sep 03

# Trench and Bed Worksheet

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

## 1. AVERAGE DESIGN FLOW

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

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

## 2. SOILS (Site evaluation data)

- C. Depth to restricting layer =  feet
- D. Maximum depth of system Item C - 3 ft =  - 3 / feet
- E. Texture  Percolation rate  mpi
- F. SSF  ft<sup>2</sup>/gpd (see figure D-15)
- G. % Land slope  %

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	
0.1 to 5	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	

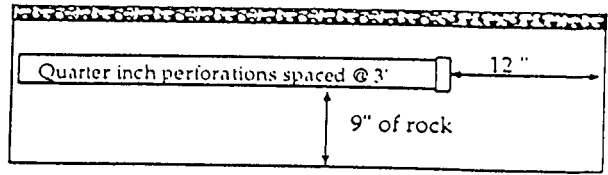
\* Soil too coarse for sewage treatment.  
 Use systems for rapidly permeable soils.  
 \*\* Soil having 50% or more fine sand + very fine sand.  
 \*\*\* Soil with too high a percentage of clay for installation of a standard inground system.



# PRESSURE DISTRIBUTION SYSTEM

320110002 Sep 03  
Geotextile fabric

- Select number of perforated laterals 2
- 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.



Perf Sizing 3/16" - 1/4"  
Perf Spacing 1.5' - 5'

$$\frac{57}{\text{Rock layer length}} - 2 \text{ ft} = 55 \text{ ft}$$

E-4: Maximum allowable number of 1/4-inch perforations per lateral to guarantee <10% discharge variation

perforation spacing (feet)	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

- Determine the number of spaces between perforations. Divide the length (3) by perforation spacing (2) and round down to nearest whole number.

$$\text{Perforation spacing} = 55 \text{ ft} \div 3 \text{ ft} = 18 \text{ spaces}$$

- 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.

$$18 \text{ spaces} + 1 = 19 \text{ perforations/lateral}$$

- A. Total number of perforations = perforations per lateral (5) times number of laterals (1)

$$19 \text{ perfs/lat} \times 2 \text{ lat} = 38 \text{ perforations}$$

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

Rock bed area = rock width (ft) x rock length (ft)

$$10 \text{ ft} \times 57 \text{ ft} = 570 \text{ sqft}$$

Square foot per perforation = Rock bed area ÷ number of perfs (6)

$$570 \text{ sqft} \div 38 \text{ perfs} = 15 \text{ sqft/perf}$$

- Determine required flow rate by multiplying the total number of perforations (6A) by flow per perforation (see figure E-6)

$$38 \text{ perfs} \times .74 \text{ gpm/perfs} = 28 \text{ gpm}$$

- If laterals are connected to header pipe as shown on upper example, 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 lateral =        inches.

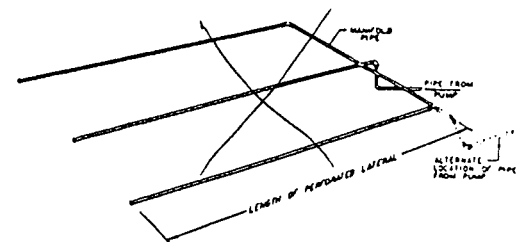
- If perforated lateral system is attached to manifold pipe near the center, lower diagram, perforated lateral length (3) and number of perforations per lateral (5) will be approximately one half of that in step 8. Using these values, select minimum diameter for perforated lateral = 1 1/2 inches.

E-6: Perforation Discharge In gpm

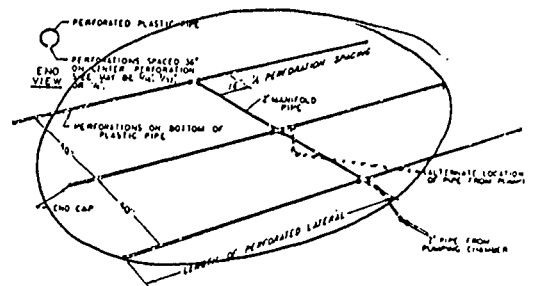
head (feet)	perforation diameter (inches)			
	1/8	3/16	7/32	1/4
1.0 <sup>a</sup>	0.18	0.42	0.56	0.74
2.0 <sup>b</sup>	0.26	0.59	0.80	1.04
5.0	0.41	0.94	1.26	1.65

<sup>a</sup> Use 1.0 foot for single-family homes.  
<sup>b</sup> Use 2.0 feet for anything else.

MANIFOLD LOCATED AT END OF PRESSURE DISTRIBUTION SYSTEM



LAYOUT OF PERFORATED PIPE LATERALS FOR PRESSURE DISTRIBUTION IN MOUND



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

[Signature] (signature) 5074 (license #) 8/28/03 (date)

**PERMIT MUST BE  
POSTED AT THE  
CONSTRUCTION SITE**

Becker County Planning & Zoning  
835 Lake Ave, P O Box 787  
Detroit Lakes, MN 56502-0787  
Phone (218)-846-7314; Fax (218)-846-7266

320110002  
Sep 01

Onsite Septic System Site Evaluation/Design Tax Parcel Number \_\_\_\_\_ 911 Address \_\_\_\_\_

Legal Description: See Attached Legal Section 10 TWP 141N Range 40 W

Lake Name NA Lake Classification NA Township Name Sugarbush

Owner's Name Larry Muff Address 33111 Co. Hwy 34

City Ogema State/Zip MN 56569 Phone Number (218) 983-3376

Number of Bedrooms 4 Well Casing Depth 120' Garbage Disposal  (Yes) (No)   
Design Flow 1000 GPD Depth of other Wells within 100 ft of system NA Grinder Pump/Lift Station In House  (Yes)  (No)

Type of Observation: Probe Pit  Boring  
Original Soil  (Yes) (No)  Compacted Soil (Yes)  (No) Proposed Design Type of Drainfield  
Depth to Restricting Layer 48" ( ) Replace Septic Tank ( ) Standard (gravelless/chamber)  
Maximum of Depth of System 12" ( ) Septic Tank/Drainfield ( ) Standard (rock depth \_\_\_\_\_)  
Perc Rate 8.37 Soil Sizing Factor 1.27 ( ) Drainfield Only ( ) Standard Bed  
( ) Holding Tank ( ) Mound ( ) At Grade  
( ) Lift Station ( ) Pressurized Bed

**SOIL BORING LOG**

DEPTH (INCHES)	TEXTURE	COLOR & MUNSELL NO.	STRUCTURE
0-4	Topsoil	Black	BLOCKY PLATY PRISMATIC NONE
4-14	Sand	Brown	BLOCKY PLATY PRISMATIC NONE
14-23	Sandy Loam	Light Brown	BLOCKY PLATY PRISMATIC NONE
23-50	Sand	Brown	BLOCKY PLATY PRISMATIC NONE

**SOIL BORING LOG**

DEPTH (INCHES)	TEXTURE	COLOR & MUNSELL NO.	STRUCTURE
0-8	topsoil	Black	BLOCKY PLATY PRISMATIC NONE
8-20	Sand	Brown	BLOCKY PLATY PRISMATIC NONE
20-26	Sandy Loam	Brown	BLOCKY PLATY PRISMATIC NONE
26-48	Sand	Light Brown	BLOCKY PLATY PRISMATIC NONE

Type of alarm Device on lift Station or Holding tank

Attach perc test Information if Required

Name and Address of Designer Pon Muff Ogema, MN Phone 983-3376

MPCA Number 5074 Date of Site Evaluation 9/8/01 Signature of Designer [Signature]

Name of Installer (if different from Designer) Larry Muff MPCA Number 576

**\*FOR USE BY BECKER COUNTY ENVIRONMENTAL SERVICES DEPARTMENT ONLY\***

- \*\*\* Any changes to the permit must first be approved by Becker County Planning & Zoning. No system shall be covered up without inspection by Becker County Planning & Zoning.
- \*\*\* Inspections must be scheduled at least 24 hours prior to time requested.

Date Received 9-19-01 Application Fee 75.00 State Surcharge .00 Total 75.00

Application is hereby denied  
 Application is hereby granted to Larry Muff to install an individual septic system according to the specifications of the site evaluation and design submitted to the Becker County Environmental Services Office. By Order of: [Signature]

Signature of Becker County Qualified Employee [Signature] Date Permit Issued 9-19-01 Permit Number 16879

This permit expires on 9-19-02

The site plan must be drawn to dimension or to scale:

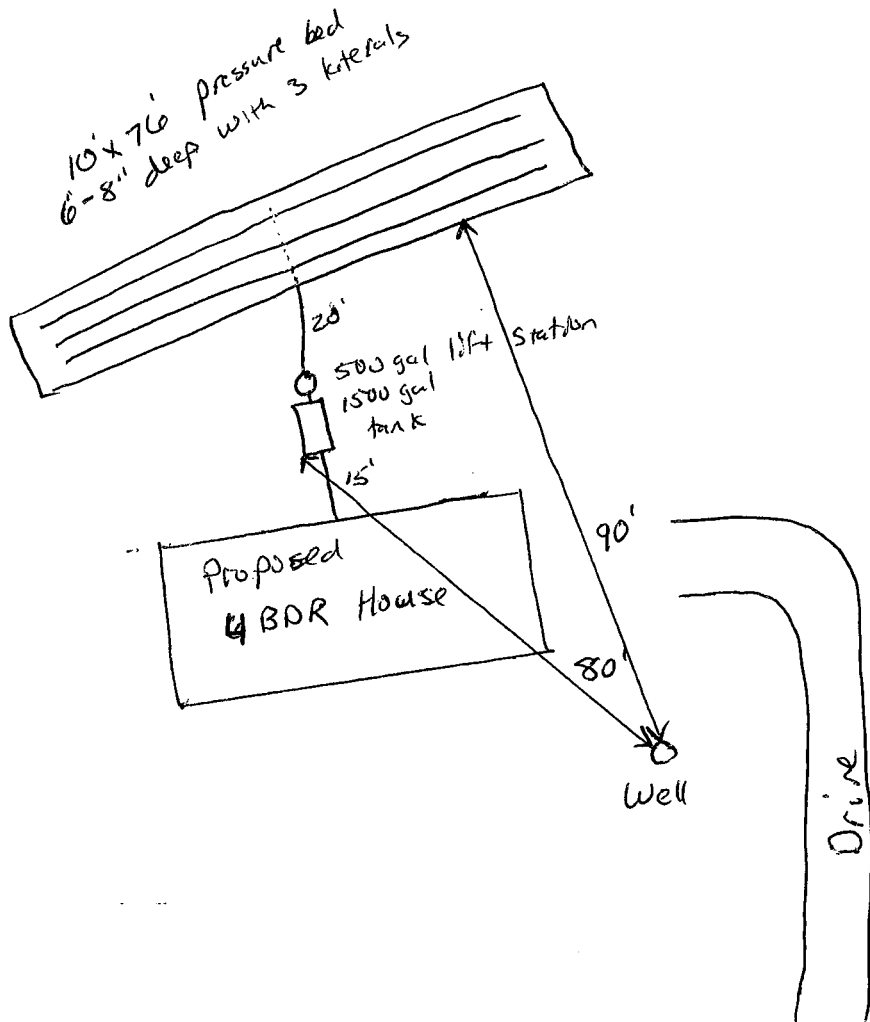
- \*Dimensions of Lot
- \*Existing & Proposed Buildings
- \*Well & Water Line Locations within 100 ft of System
- \*Distance from Property Lines
- \*Distance from OHWM

- \*Easements & setbacks
- \*Tank Access Route
- \*Distance from buildings

- \*Scale - One inch = \_\_\_\_\_ ft
- \*Location of any Unsuitable Soil
- \*Soil Borings & Per Test Locations
- \*Alternate Drainfield Location



320110002  
Sep 01



	Tank (estimated)	Tank (actual)	Drainfield (estimated)	Drainfield (actual)
Distances to Well	80		90	
Distance to Building	15		60	
Distance to Property Line	50		40	
Distance to Pressure Line	-		-	
Distance to Ordinary High Water	-		-	

Tank size 1500  
 Lift station size 500  
 Drainfield size 760 ft<sup>2</sup>  
 Pump HP 1/2  
 Date Installed \_\_\_\_\_

**\*FOR USE BY BECKER COUNTY ENVIRONMENTAL SERVICES DEPARTMENT ONLY\***

**CERTIFICATE OF COMPLIANCE**

( ) Certificate Is Hereby Denied

( ) Certificate is Hereby Granted Based upon the Application, addendum from, plans, specifications and all other supporting data. With property maintenance, this system can be expected to function satisfactory, however, this is not a guarantee.

Signature \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_

(Certificate of Compliance is not valid unless signed by a Registered Qualified Employee)

# TRENCH AND BED WORKSHEET

## 1. AVERAGE DESIGN FLOW

- A. Estimated 600 gpd (see figure A-1)  
 or measured \_\_\_\_\_ x 1.5 (safety factor) = \_\_\_\_\_ gpd
- B. Septic tank capacity 1500 gallons (see figure C-1)

## 2. SOILS (Site evaluation data)

- C. Depth to restricting layer = 4 feet
- D. Max depth of system Item 2C - 3 ft = 4 ft - 3 ft = 1 ft
- E. Texture Sand Percolation rate 8.37 MPI
- F. Soil Sizing Factor (SSF) 1.27 sqft/gpd (see figure D-15)
- G. % Land Slope 2 %

## 3. TRENCH or BED BOTTOM AREA

- H. For trenches with 6 inches of rock below the pipe:  
 $A \times F = \text{_____ gpd} \times \text{_____ sqft/gpd} = \text{_____ sqft}$
- I. For trenches with 12 inches of rock below the pipe:  
 $A \times F \times 0.8 = \text{_____ gpd} \times \text{_____ sqft/gpd} \times 0.8 = \text{_____ sqft}$
- J. For trenches with 18 inches of rock below the pipe:  
 $A \times F \times 0.66 = \text{_____ gpd} \times \text{_____ sqft/gpd} \times 0.66 = \text{_____ sqft}$
- K. For trenches with 24 inches of rock below the pipe:  
 $A \times F \times 0.6 = \text{_____ gpd} \times \text{_____ sqft/gpd} \times 0.6 = \text{_____ sqft}$
- L. For gravity beds with 6 or 12 inches of rock below the pipe;  
 $1.5 \times A \times F = 1.5 \times \text{_____ gpd} \times \text{_____ sqft/gpd} = \text{_____ sqft}$
- For pressure beds with 6 or 12 inches of rock below the pipe;  
 $A \times F = \text{600 gpd} \times \text{1.27 sqft/gpd} = \text{762 sqft}$

## 4. DISTRIBUTION (Check all that apply)

- Bed (< 6% slope)     Drop boxes (any slope)     Rock
- Trenches     Distribution box (< 3%)     Chamber
- Pressure     Gravity     Gravelless

## 5. SYSTEM WIDTH, LENGTH and VOLUME

- M. Select trench width = \_\_\_\_\_ ft
- N. If using rock, divide bottom area by width: (H, I, J, K or L) ÷ M =  
 \_\_\_\_\_ sqft ÷ \_\_\_\_\_ ft = \_\_\_\_\_ lineal feet
- Rock depth below distribution pipe plus 0.5 foot times bottom area:  
 Rock depth in feet + 0.5 feet x Area (H, I, J, K, or L)  
 (\_\_\_\_\_ ft + 0.5 ft) x \_\_\_\_\_ sqft = \_\_\_\_\_ cuft
- Volume in cubic yards = volume in cuft divided by 27  
 \_\_\_\_\_ cuft ÷ 27 = \_\_\_\_\_ cu yds
- Weight of rock in tons = cubic yards times 1.4  
 \_\_\_\_\_ cu yds x 1.4 = \_\_\_\_\_ tons
- O. If using 10" Gravelless Pipe, Flow (A) x Gravelless SSF (see figure D-9)  
 \_\_\_\_\_ gpd x \_\_\_\_\_ lineal feet/gpd = \_\_\_\_\_ lineal feet
- P. If using Chambers, H, I, J, or K (based on height of chamber slats) +  
 width of chamber in feet (M)  
 \_\_\_\_\_ sqft ÷ \_\_\_\_\_ ft = \_\_\_\_\_ lineal feet

## 6. LAWN AREA

- Q. Select trench spacing, center to center = \_\_\_\_\_ feet
- R. Multiply trench spacing by lineal feet R x Q = sqft of lawn area  
 \_\_\_\_\_ ft x \_\_\_\_\_ lineal feet = \_\_\_\_\_ sqft

## 7. LAYOUT

Include a drawing with scale (one inch = \_\_\_\_\_ feet). Show pertinent property boundaries, rights-of-way, easements, location of house, garage, driveway, and all other improvements, existing or proposed soil treatment system, well and dimensions of all elevations, setbacks and separation distances.

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

320110002 Sep 01

Number of Bedrooms	Minimum Liquid Capacity	Liquid capacity with garbage disposal	Liquid capacity with disposal & lift inside
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

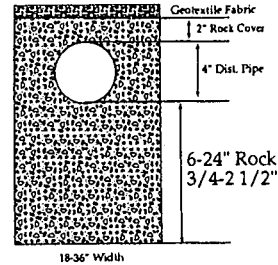
Percolation Rate (minutes per inch (mpi))	Soil Texture	Soil Sizing Factor square feet/gallon per day (sqft/gpd)
faster than 0.1*	Coarse sand	0.83
0.1 to 5	Medium sand	0.83
	Loamy sand	
	Fine sand	1.67
0.1 to 5**	Sandy loam	1.27
6 to 15	Loam	1.67
16 to 30	Silt loam	2.00
31 to 45	Silt	
46 to 60	Clay loam	2.20
	Sandy clay	
	Silty clay	
over 61 to 120***	Clay	4.20
	Sandy clay	
	Silty clay	
slower than 120****		

\*Use systems for rapidly permeable soils: pressure distribution or serial distribution with no trench > 25% of the total system.  
 \*\*Soil having 50% or more fine sand plus very fine sand  
 \*\*\*A mound must be used.  
 \*\*\*\*An other or performance system must be used

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
0.1 to 5	Sandy Loam	0.42
6 to 15	Loam	0.56
16 to 30	Silt Loam	0.67
31 to 45	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.

Flow x  
 = lineal length



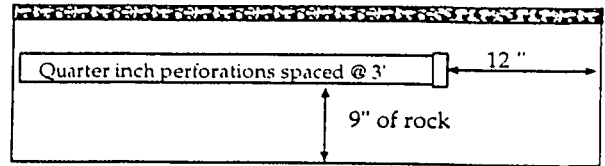
I hereby certify that I have completed this work in accordance with applicable ordinances, rules and laws.

(signature) \_\_\_\_\_ (license #) \_\_\_\_\_ (date) \_\_\_\_\_



# PRESSURE DISTRIBUTION SYSTEM

Geotextile fabric



Perf Sizing 3/16" - 1/4"  
Perf Spacing 1.5' - 5'

E-4: Maximum allowable number of 1/4-inch perforations per lateral to guarantee <10% discharge variation

perforation spacing (feet)	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

- 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.

$$\frac{76}{\text{Rock layer length}} - 2 \text{ ft} = \underline{74} \text{ ft}$$

- Determine the number of spaces between perforations. Divide the length (3) by perforation spacing (2) and round down to nearest whole number.

$$\text{Perforation spacing} = \underline{74} \text{ ft} \div \underline{3} \text{ ft} = \underline{25} \text{ spaces}$$

- 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.

$$\underline{25} \text{ spaces} + 1 = \underline{26} \text{ perforations/lateral}$$

- A. Total number of perforations = perforations per lateral (5) times number of laterals (1)

$$\underline{26} \text{ perfs/lat} \times \underline{3} \text{ lat} = \underline{78} \text{ perforations}$$

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

Rock bed area = rock width (ft) x rock length (ft)

$$\underline{76} / 10 \text{ ft} \times \underline{76} \text{ ft} = \underline{760} \text{ sqft}$$

Square foot per perforation = Rock bed area ÷ number of perfs (6)

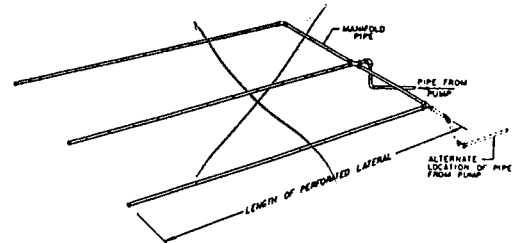
$$\underline{760} \text{ sqft} \div \underline{78} \text{ perfs} = \underline{9.7} \text{ sqft/perf}$$

E-6: Perforation Discharge in gpm

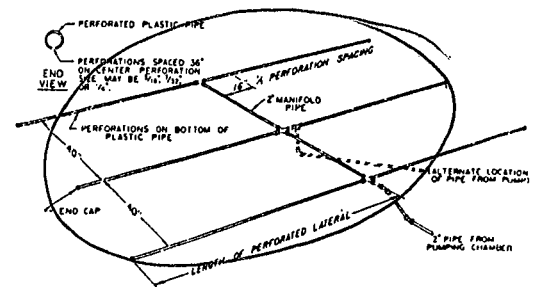
head (feet)	perforation diameter (inches)			
	1/8	3/16	7/32	1/4
1.0 <sup>a</sup>	0.18	0.42	0.56	0.74
2.0 <sup>b</sup>	0.26	0.59	0.80	1.04
5.0	0.41	0.94	1.26	1.65

<sup>a</sup> Use 1.0 foot for single-family homes.  
<sup>b</sup> Use 2.0 feet for anything else.

MANIFOLD LOCATED AT END OF PRESSURE DISTRIBUTION SYSTEM



LAYOUT OF PERFORATED PIPE LATERALS FOR PRESSURE DISTRIBUTION IN MOUND



- Determine required flow rate by multiplying the total number of perforations (6A) by flow per perforation (see figure E-6)

$$\underline{78} \text{ perfs} \times \underline{.74} \text{ gpm/perfs} = \underline{58} \text{ gpm}$$

- If laterals are connected to header pipe as shown on upper example, 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 lateral = 2 inches.

- If perforated lateral system is attached to manifold pipe near the center, lower diagram, 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 = 1 1/2 inches.

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

\_\_\_\_\_ (signature) \_\_\_\_\_ (license #) \_\_\_\_\_ (date)