FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE 4-1-16, FIELD EVALUATION DATE 4-1-16
PROPERTY OWNER: MITCH ROACH PHONE
ADDRESS: 19725 327TH AVE CITY,STATE,ZIP: ISLE MN 56342
LEGAL DESCRIPTION: PT OF SE NW & LOT 2
PIN# 16-0-025302 SEC 17 T 44 R 25 TWP NAME LAKESIDE
FIRE# LAKE/RIVER LAKE CLASS OHWL FT.

DESCRIPTION OF SOIL TREATMENT AREAS

	AREA #1	AREA #2
DISTURBED AREAS	YES NO X	YES NO
COMPACTED AREAS	YES NO X	YES NO
FLOODING	YES NO X	YES NO
RUN ON POTENTIAL	YES NO X	YES NO
SLOPE %	0	
DIRECTION OF SLOPE		
LANDSCAPE POSITION		
VEGETATION TYPES	LAWN	

REFERENCE BM ELEV. 100 FT
REFERENCE BM DESCRIPTION
GROUND LEVEL WHERE NEW TANK WILL BE INSTALLED

DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1____, 1A____, 2____, 2A____

BOTTOM ELEVATION--FIRST TRENCH OR BOTTOM OF ROCK BED: #1____FT., #2____FT.

SOIL SIZING FACTOR: SITE # 1____, SITE #2____

CONSTRUCTION RELATED ISSUES: 3 BDRM HOUSE - INSTALLING NEW TANK. DRAINFIELD ALREADY INSTALLED.

LIC# 127 SITE EVALUATOR SIGNATURE: Larry Ljungquist

SITE EVALUATOR NAME: LARRY LJUNGQUIST TELEPHONE# 218-820-8886

LUG REVIEW * DATE

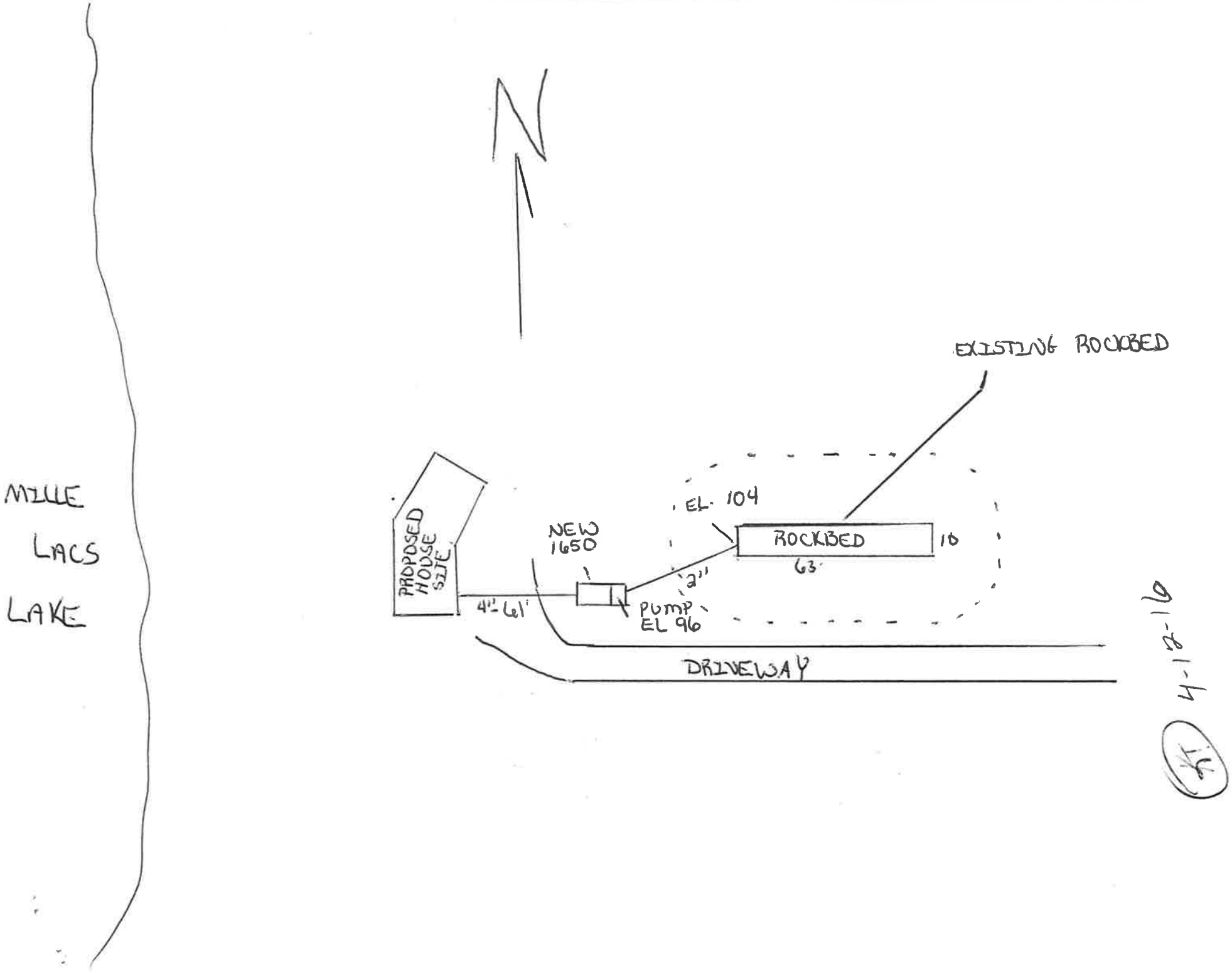
Comments:

SOIL BORING LOGS ON REVERSE SIDE

SIGN [illegible] DATE 4-13-16

APPROVED
ONSITE INSPECTION
NO ONSITE INSPECTION

Form des 2/20/98


N
EXISTING ROCKBED
MILLE
LACS
LAKE
PROPOSED HOUSE SITE
NEW 1650
EL. 104
ROCKBED
10
63'
2"
4"
61'
PUMP EL 96
DRIVEWAY
4-18-19

INDIVIDUAL SEWAGE TREATMENT SYSTEM INSPECTION FORM
AITKIN COUNTY, MINNESOTA

Township Lakeside Date of Inspection 7/12/01 Permit Number #7381

Owner Mitch Roach Parcel Number 16-0-025302

Project Address PT of SE NW & Lot 2 Installer Bob Patterson

City _____ Zip Code _____ New ✓ Repair _____

DIST. or DROP BOX & TYPE _____

SETBACKS:
Buildings to tank(s) 30'
Buildings to drainfield 100'+
Well(s) 50' or 100' 90'
Lake/Creek/Wetland 300'+

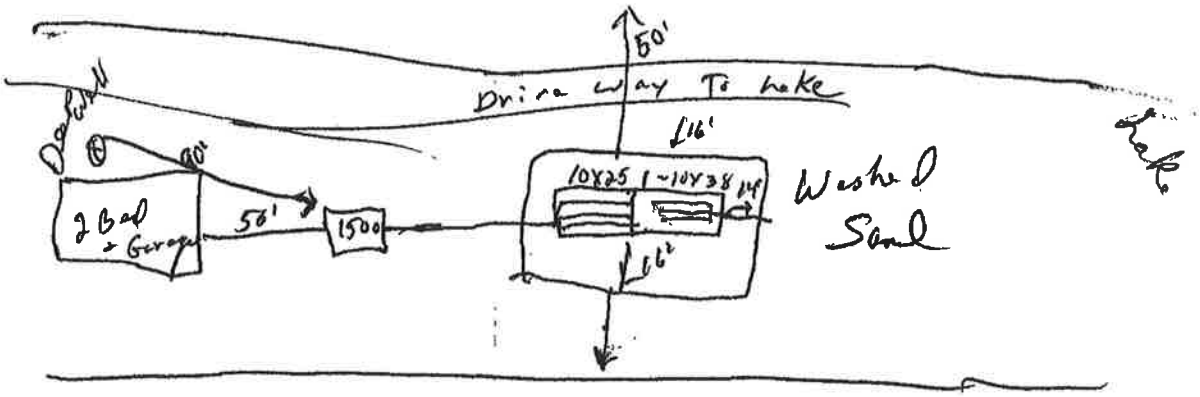
SEPTIC TANKS:
Liquid capacity 1500 combo
Manufacturer & type Pine pre-cast
Type of baffle plastic
Inspection pipes 1 - 4"
Manholes access 1
No. & height of risers 1 - 12"

TRENCHES, BEDS, OR GRAVELLESS LEACHFIELD:
Trench depth _____
Trench length _____
Trench bottom width _____
Trench bottom level _____
Trench spacing _____
Drainfield rock below pipe _____
Size of gravelless pipe _____
Depth of backfill _____
Absorption area: square feet _____
lineal feet _____

MOUNDS:
Percent slope 0
Upslope dike width 16'
Downslope dike width 16'
Sideslope dike width 16'
Drainfield rock below pipe 9"
Depth of sand below rock 24"
Perforation size & spacing 1/4 - 36"
Pipe size & spacing 1 1/2 Lattavals
Dimensions of rock bed 2 Beds in 1 - 10x25 & 10x38
Dimensions of sand base 42x91
Final cover 16" in center 12" on Rock Sides

PUMPS:
Tank capacity 500
Tank manufacturer & type pre-cast
No. & height of risers 1 - 12"
Pump manufacturer & model# Zoller 92
Horsepower & GPM 1/2 - 60
Feet of head 16
Cycles per day 5
Gallons per cycle 100
Size of discharge line 2"
Type of electrical hookup PIST
Type & location of alarm indoor Elec
Cycle counter (commercial) _____

DRAWING OF SYSTEM



Inspector's Comments _____

Corrective Action Required _____

Inspector's Signature _____ Installer's Signature _____

White-County Yellow-Applicant Pink-Installer

AITKIN COUNTY
CERTIFICATE OF COMPLIANCE/NOTICE OF NONCOMPLIANCE

This certificate of compliance/notice of noncompliance has been issued this _____ day of 10/2/01 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: _____

Pt. of SE NW & Lot 2 #251966

Section 17 Township 44 Range 25 Lake Mille Lacs

PERMIT NO. 27381 Owner Name Mitch Koch

Address 14070 Rolling Oak circle, prior Lake, Mn. 55372

Installer Name Bob Pederson

Type of System Inspected 2 Systems in one Mound 2+3 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 Joel Fuhrman

c:\wp61\terry.dir\certform.doc

MOUND DESIGN WORKSHEET

(for flows up to 1200 gpd)

A. FLOW
Estimated 450 gpd
or measured _____ x 1.5 = _____ gpd.

B. SEPTIC TANK LIQUID VOLUMES
unknown gallons

C. SOILS (refer to site evaluation)
1. Depth to restricting layer = 12 inches 1 feet
2. Depth of percolation test = (12) inches
3. Texture Sand Loam Percolation test = 5-10 MPI
4. Land slope <1 %

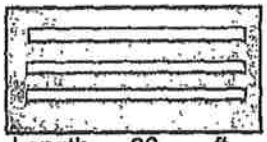
Estimated Sewage Flows in Gallons per day (gpd)				
# bedrooms	Class I	Class II	Class III	Class IV
2	300	225	180	
3	450	300	218	60%
4	600	375	256	of the
5	750	450	294	values in
6	900	525	332	Type I, II or III
7	1050	600	370	columns
8	1200	675	408	

Septic Tank Capacities (in gallons)			
Number of Bedrooms	Min Liquid Capacity	Capacity w/ disposal	Capacity with disposal 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

D. ROCK LAYER DIMENSIONS
1. Multiply flow rate by 0.83 to obtain required area of rock layer: A x 0.83 =
450 gpd x 0.83 sq. ft./ gpd = 373.5 (380) sq.ft.
2. Determine width of rock layer = 0.83 sq. ft / gpd x Linear Loading rate (LLR)
0.83 sq. ft. / gpd x 4 (page D46) = 3.32 ft
3. Length of rock layer = area \ width =
380 sq. ft. / 10 ft. = 38 ft.

Mound LLR	
Perc Rate	LLR
<120 MPI	≤ 12
>120 MPI	≤ 6

Width 10 ft
<120mpi <10'
>120mpi <5'



Length 38 ft

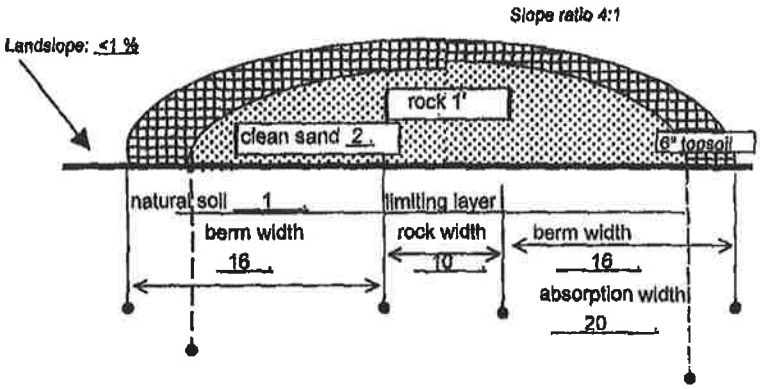
E. ROCK VOLUME
1. Multiply rock area by rock depth to get cubic feet of rock; 380 sq. ft. x 1 ft.
= 380 cu. ft.
2. Divide cu. ft. by 27 cu. ft. / cu. yd. to get cubic yards;
380 cu. ft. / 27 = 14.1 cu. yd.
3. Multiply cubic yards by 1.4 to get weight of rock in tons; 14.1 cu. yd. x 1.4 ton = 20 ton

F. ABSORPTION WIDTH
1. Percolation rate in top 12 inches of soil is 5-10 mpi Texture Sand Loam.
2. Select allowable soil loading rate from table; 0.6 gpd / ft2
3. Calculate adsorption width ratio by dividing rock layer loading rate of 1.20 gpd ft2 by allowable soil loading rate;
1.20 gpd / ft2 / 0.6 gpd / ft2 = 2.0 .
4. Multiply adsorption width ratio by rock layer width to get required absorption width;
10 x 2.00 ft. = 20 ft.

Absorption Width Sizing Table			
Perc Rate in Min per inch	Soil Texture	Gal. per day per sq. ft.	Ratio of absorption width to Rock Layer Width
faster than 0.1	Coarse Sand	1.2	1.00
0.1 to 5	Medium Sand	1.2	1.00
	Loamy Sand		
0.1 to 5	Fine Sand	0.60	2.00
5 to 15	Sandy Loam	0.79	1.52
16 to 30	Loam	0.60	2.00
31 to 45	Silt Loam	0.50	2.40
	Silt		
46 to 60	Clay Loam -CL	0.45	2.67
	Silty Cl		
	Sandy CL		
60 to 120	clay	0.24	5.00
Slower 120	clay	0.20	6.00

Revised Mar 2000 gke

G. BERM WIDTH
(landslope 1% or less)



1. Absorption width (F.4):
   20 feet

2. Calculate minimum mound size

   a. Determine depth of clean sand fill at upslope edge of rock layer:
   Separation: 3' - 1 = 2 **feet**

   b. Add depth of clean sand for separation (2a) at upslope edge, depth of rock layer (1foot) to depth of cover (1foot) to find the mound height at the upslope edge of rock layer; 2 ft + 1ft + 1ft = 4 **feet**

   c. Multiply upslope mound height by 4 to find berm width:
   4 x 4 = 16 feet

   d. The total landscape width is the sum of berm (G.2c) width plus rock layer width (D.2) plus berm width (G.2c):
   16 ft + 10 ft + 16 ft = 42 **feet**

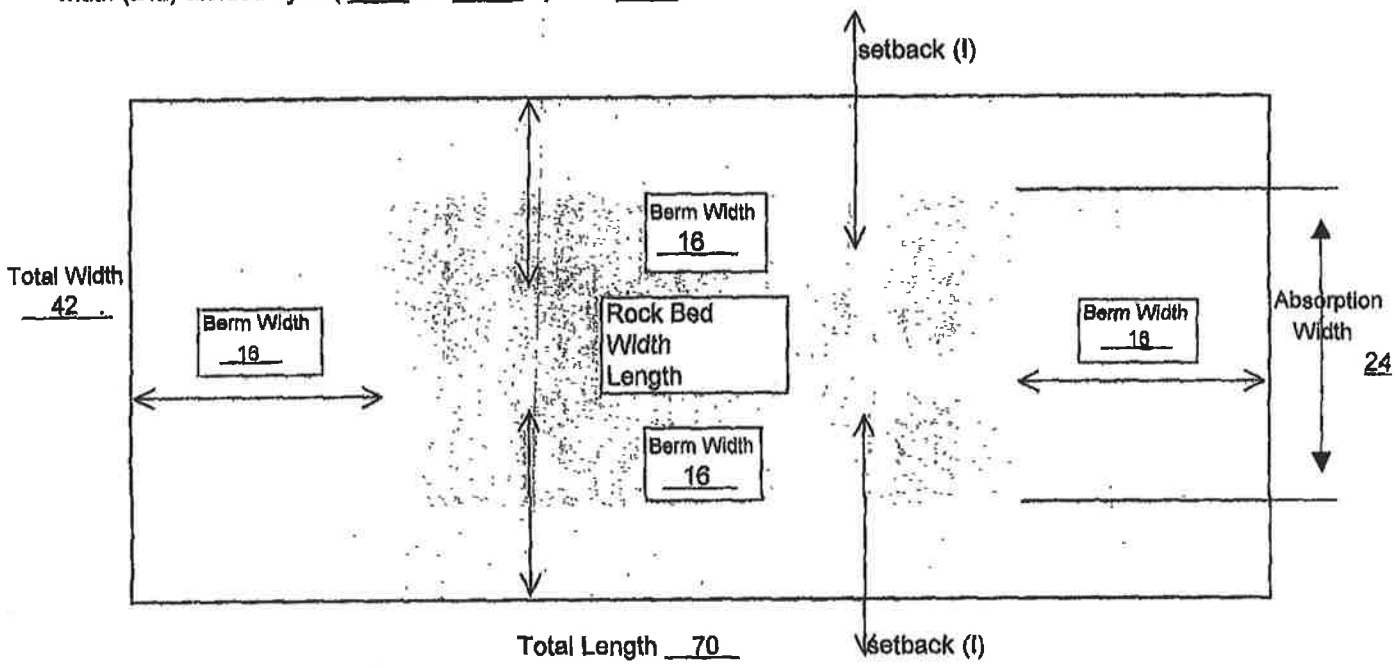
   e. Subtract the landscape width (G2.d) from the absorption width (F.4) to find the additional width necessary for absorption: 24 ft - 42 ft = 0 **feet**

   f. Add the additional width (G2.e) to the berm width (G2.c)
   Final berm width: 42 ft + 0 ft = 42 **feet**

   g. Total mound width is the sum of berm (G2.f) width plus rock layer width (D.2) plus berm width (G.2f):
   16 ft + 10 ft + 16 ft = 42 **feet**

   h. Total mound length is the sum of berm (G2.f) plus rock layer length (D.3) plus berm (G2.f):
   16 ft + 38 ft + 16 ft = 70 **feet**

   I. Setbacks from the rockbed are calculated as follows: the absorption width (F.4) minus the rock bed width (D.2) divided by 2: (24 ft - 10 ft) / 2 = 7 **feet**



Revised Mar 2000 gke

PRESSURE DISTRIBUTION SYSTEM

1. Select number of perforated laterals 3

2. Select perforation spacing = 3 feet

3. Since perforations should not be placed closer than 1 ft. to the edge of the rock layer (see diagram), subtract 2 ft. from the rock layer length.

   38 - 2 ft. = 36 feet.
   Rock layer length

4. Determine the number of spaces between perforations. Divide the length above by perforation spacing and round down to nearest whole number.

   Length perf. spacing = 36 ft. / 3 ft. = 12 spaces
   (3) (2)

5. Number of perforations is equal to one plus the number of perforation spaces.

   12 spaces + 1 = 13 perforations/lateral

6. Multiply perforations per lateral by number of laterals to get total number of perforations

   3 x 13 = 39 perforations.
   laterals x perfs/lateral

   Calculate the square footage per perforation (6-10 sqft/perf) System area: 10 x 38 = 380

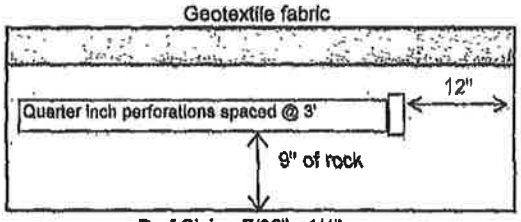
   380 / 39 = 9.7 sqft/perf
   area / perforations

7. Determine required flow rate by multiplying number of perforations by flow per perforation

   39 x 0.74 = 29 gpm.
   perfs gpm/perf

8. If laterals are connected to header pipe as shown on upper example, to select minimum required lateral diameter; enter table with perforation spacing and number of perforations per lateral. Select minimum diameter for perforated lateral = _____ inches.

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

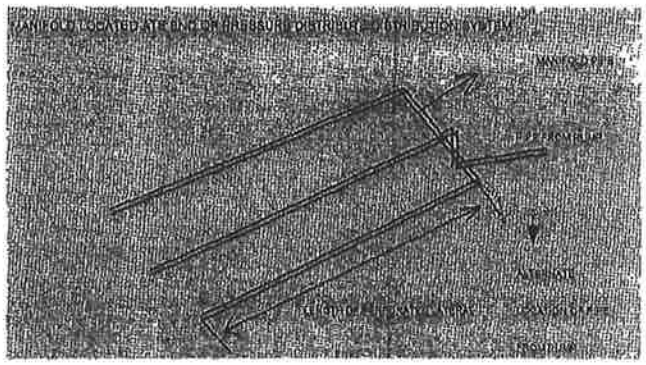


Perf Sizing 7/32" - 1/4"
Perf Spacing 1.5' - 5'

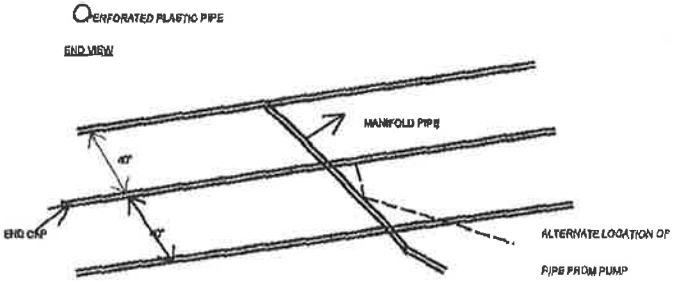
Perforations Discharge in (gpm)				
head (feet)	perforation diameter (inches)			
	1/8*	3/16	7/32	1/4
1.0a	0.18	0.42	0.56	0.74
2.0b	0.26	0.59	0.80	1.04
	0.41	0.94	1.26	1.65

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

Maximum number of quarter inch perforations per lateral to guarantee < 10% discharge variation			
Perforation Spacing (ft)	1 1/4	1 1/2	2
2.5	14	18	28
3.0	13	17	26
3.3	12	16	25
4.0	11	15	23
5.0	10	14	22



LAYOUT OF PERFORATED PIPE LATERALS FOR
PRESSURE DISTRIBUTION IN MOUND



Revised Mar 2000 gka

PUMP SELECTION PROCEDURE

A. Determine pump capacity:

gravity distrubution

1. Minimum required discharge is 10 gpm
2. Maximum suggested dischage is 45 gpm

pressure distribution

see pressure design worksheet

Selected pump capacity: 29 gpm

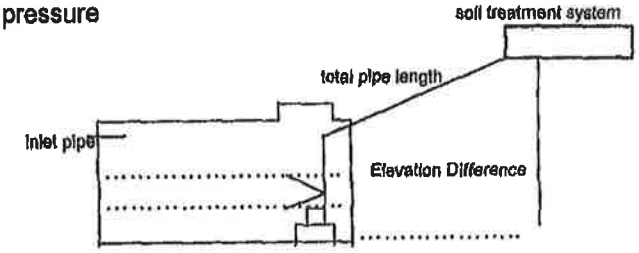
Perforation Discharges in gpm				
head (feet)	perforation diameter (inches)			
	1/8*	3/16	7/32	1/4
1.0*a*	0.18	0.42	0.56	0.74
2.0*b*	0.26	0.59	0.8	1.04
5.0	0.41	0.94	1.26	1.65

a Use 1.0 foot for single-family homes.
b Use 2.0 feet for anyting else.
* Potential for plugging

B. Determine head requirements:

1. Elevation difference between pump and point of discharge.
   8 feet

2. Special head requirement:
   If pumping to a pressure distribution system, five feet for pressure required at manifold. If gravity system, zero. 5 feet



3. Friction loss
   a. Enter Friction loss table with gpm and pipe diameter. Read friction loss in feet per 100 feet from table.
   F.L. = 1.55 ft. / 100 ft of pipe

   b. Determine total pipe length form pump to discharge point. Estimate by adding 25 percent to pipe length for fitting loss. Equivalent pipe length times 1.25 = total pipe length
   100 x 1.25 = 125 feet

   c. Calculate total friction loss by multiplying friction loss in ft/ 100 ft by equivalent pipe length.
   Total friction loss = 125 x 1.55 / 100 = 1.9 feet

Friction Loss (Plastic) Per 100 feet			
Flow rate gpm	Pipe 1.5"	Pipe 2"	Pipe 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		5.6	0.82
65		6.48	0.95
70		7.44	1.09

4. Total head required is the sum of elevation difference, special head requiredments, and total friction loss.
   8 + 5 + 1.9 (1) (2) (3c)

Total head: 15 feet

C. Pump selection

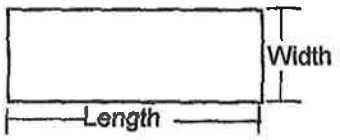
1. A pump must be selected to deliver at least 29 gpm (Step A) with at least 15 feet of total head (Step B).

revised Mar 2000 gka

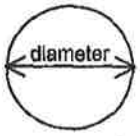
Sizing of Dosing Chamber

example of a 500 gallon lift station

1. Determine surface area
   Rectangle area = L x W
   6 x 3.33 = 20 **sq feet**



   Circle area = 3.14 x (diameter)^2
   3.14 x ___ x ___ = ___ **square feet**



   Other? Get surface area form manufacturer. ____ **sqft**

2. Calculate gallons per inch
   There are 7.5 gallons per cubic foot of volume, therefore you must multiply the area times the conversion factor and divide by 12 inches per foot to calculate gallon per inch.
   Area x 7.5 / 12 = 20 x 7.5 / 12 = 12.5 **gallon per inch**

3. Total tank volume
   Depth (inch) x gallon / inch = 12.5 x 42 = 525 **gallon**

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

4. Calculate gallon to cover pump (with 2-3 inch of water covering pump)
   (Pump & Block height (inch) + 2 inch) x gallon / inch
   (18 + 2) x 12.5 = 250 **gallon**

5. **Calculate Total Pumpout Volume**
   A. To maximize pump life select sump size for 4 to 5 pump operations per day. 450 gpd / 5 = 90 gallons per dose
   B. Calculate drainback
      a. Determine total pipe length, 100 feet.
      b. Determine liquid volume of pipe, 0.17 gallons per foot.
      c. Drainback quantity = 100 ft x 0.17 gal = 17 gal
   C. Total pump out volume
      90 gal / dose + 17 gal = 107 Total gallon

Estimated Sewage Flows in Gallons per day (gpd)				
# bedrooms	Class I	Class II	Class III	Class IV
2	300	225	180	
3	450	300	218	60%
4	600	375	256	of the
5	750	450	294	values in
6	900	525	332	Type I, II or III
7	1050	600	370	columns
8	1200	675	408	

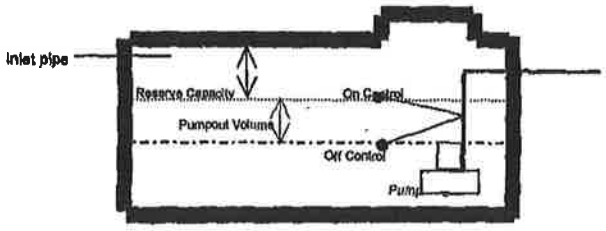
6. Float separation distance (equal total pumpout volume)
   Total pump volume / gal/inch
   107 / 12.5 = 8 1/2 **inch**

Pipe Diameter *Inches*	Gallons per ft
1	0.045
1.25	0.078
1.5	0.11
2	0.17
2.5	0.25
3	0.38
4	0.66

7. Calculate volume for alarm (typically 2 to 3 inches)
   Depth (inches) x gallon/inch = 12.5 x 2 = 25 **gallon**

8. Calculate total gallon
   gallon over pump + gallon pumpout + gallon alarm
   4 + 5 + 7
   250 + 107 + 25 = 382 **gallon**

9. Total depth = total gallon / gallon/inch
   382 / 12.5 = 30 1/2 **Inches**



Recommended:
Calculate reserve capacity (75% the daily flow)
Daily flow x .75 = ___ = ___ **gallons**

Revised Mar 2000 gks

MOUND DESIGN WORKSHEET
(for flows up to 1200 gpd)

A. FLOW
Estimated 300 gpd
or measured _____ x 1.5 = _____ gpd.

B. SEPTIC TANK LIQUID VOLUMES
1000 gallons (part of 1500 combo)

C. SOILS (refer to site evaluation)
1. Depth to restricting layer = 12 inches 1 feet
2. Depth of percolation test = (12) inches
3. Texture Sand Loam Percolation test = 5-10 MPI
4. Land slope <1 %

Estimated Sewage Flows in Gallons per day (gpd)

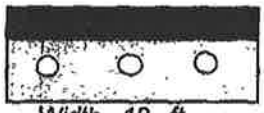
# bedrooms	Class I	Class II	Class III	Class IV
2	300	225	180	
3	450	300	218	60%
4	600	375	256	of the
5	750	450	294	values in
6	900	525	332	Type I, II or III
7	1050	600	370	columns
8	1200	675	408	

Septic Tank Capacities (in gallons)

Number of Bedrooms	Min Liquid Capacity	Capacity w/ disposal	Capacity with disposal 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

D. ROCK LAYER DIMENSIONS
1. Multiply flow rate by 0.83 to obtain required area of rock layer: A x 0.83 =
300 gpd x 0.83 sq. ft./ gpd = 250 sq.ft.
2. Determine width of rock layer = 0.83 sq. ft / gpd x Linear Loading rate (LLR)
0.83 sq. ft. / gpd x 7 = 5.8 ft
3. Length of rock layer = area \ width =
250 sq. ft. / 10 ft. = 25 ft.

Mound LLR	
Perc Rate	LLR
<120 MPI	≤ 12
>120 MPI	≤ 6



Width 10 ft
<120mpi <10'
>120mpi <5'

Length 25 ft

E. ROCK VOLUME
1. Multiply rock area by rock depth to get cubic feet of rock; 250 sq. ft. x 1 ft.
= 250 cu. ft.
2. Divide cu. ft. by 27 cu. ft. / cu. yd. to get cubic yards;
250 cu. ft. / 27 = 9.3 cu. yd.
3. Multiply cubic yards by 1.4 to get weight of rock in tons; 9.3 cu. yd. x 1.4 ton = 13 ton

F. ABSORPTION WIDTH
1. Percolation rate in top 12 inches of soil is 10-15 mpi Texture Sand Loam .
2. Select allowable soil loading rate from table; 0.6 gpd / ft2
3. Calculate adsorption width ratio by dividing rock layer loading rate of 1.20 gpd ft2 by allowable soil loading rate;
1.20 gpd / ft2 / 0.6 gpd / ft2 = 2.0 .
4. Multiply adsorption width ratio by rock layer width to get required absorption width;
10 x 2.0 ft. = 20 ft.

Absorption Width Sizing Table

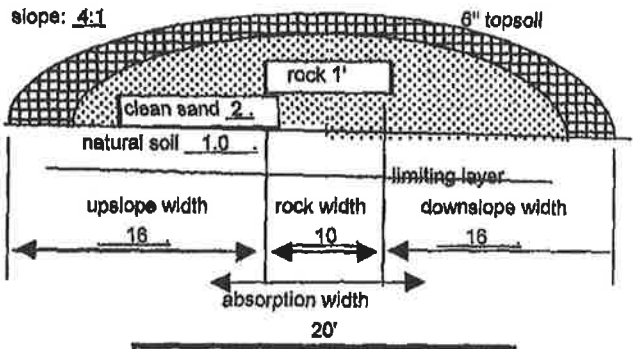
Perc Rate in Min per inch	Soil Texture	Gal. per day per sq. ft.	Ratio of absorption width to Rock Layer Width
faster than 0.1	Coarse Sand	1.2	1.00
0.1 to 5	Medium Sand	1.2	1.00
0.1 to 5	Loamy Sand Fine Sand	0.60	2.00
6 to 15	Sandy Loam	0.79	1.52
16 to 30	Loam	0.60	2.00
31 to 45	Silt Loam Silt	0.50	2.40
46 to 60	Clay Loam -Cl. Silty Cl Sandy CL	0.45	2.67
60 to 120	clay	0.24	5.00
Slower 120	clay	0.20	6.00

Revised Mar 2000 gka

1% or less (2)

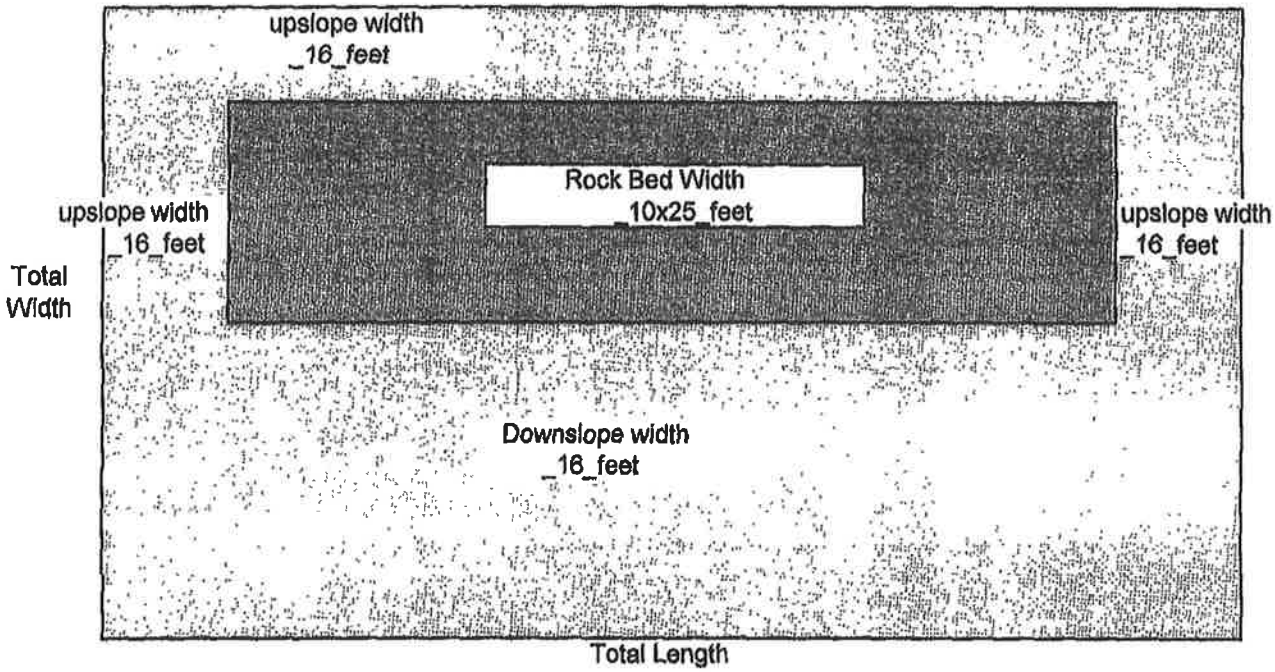
G. DOWNSLOPE DIKE WIDTH

1. If landslope is **1% or less** adsorption width includes both upslope and downslope widths
2. Calculate Minimum mound size based on geometry:
   a. Determine depth of clean sand fill at upslope edge of rock layer: *Separation* 3' - 1 = 2 **feet**
   b. Add depth of clean sand for separation (2a) at upslope edge, depth of rock layer (1foot) to depth of cover (1foot) to find the mound height at the upslope edge of rock layer; 2 ft + 1ft + 1ft = 4 **feet**
   c. Multiply dike multiplier (4) by upslope mound height to find upslope dike width 4 x 4 = 16 **feet**
   d. Multiply rock layer width by landslope to determine drop in elevation; *Slope Difference* 10 x 0 % / 100 = 0 **feet**
   e. Add depth of clean sand for slope difference (2d) at downslope edge, to the mound height at the upslope edge of rock layer (2b) to find the downslope height; 4 ft + 0 ft = 4 **feet**
   f. Multiply dike multiplier (4) by downslope mound height to get downslope dike width: 4 x 4 = 16 **feet**
   l. Minimum mound width is the sum of upslope dike width (2c) plus rock layer width plus downslope dike width (2f); 16 ft + 10 ft + 16 ft = 42 **feet**
   j. Subtract the minimum width (2.l) from the absorption area (F.4) to find the additional downslope area for adsorption 24 ft - 42 ft = 0 **feet**
   k. Add the additional width (2.j) to the up (2c) and down slope (2f) widths and recalculate the total width 0 ft + 42 ft + 0 ft = 42 **feet**



Mound Dimensions

42' X 57'



PRESSURE DISTRIBUTION SYSTEM

1. Select number of perforated laterals 3

2. Select perforation spacing = 2.5 **feet**

3. Since perforations should not be placed closer than 1 ft. to the edge of the rock layer (see diagram), subtract 2 ft. from the rock layer length.

   25 - 2 ft. = 23 **feet.**

   Rock layer length

4. Determine the number of spaces between perforations. Divide the length above by perforation spacing and round down to nearest whole number.

   Length perf. spacing = 23 ft. / 2.5 ft. = 9 **spaces**

   (3) (2)

5. Number of perforations is equal to one plus the number of perforation spaces.

   9 spaces + 1 = 10 **perforations/lateral**

6. Multiply perforations per lateral by number of laterals to get total number of perforations

   3 x 10 = 30 **perforations.**

   laterals x perfs/lateral

   Calculate the square footage per perforation (6-10 sqft/perf) System area: 10 x 25 = 250

   250 / 30 = 8 **sqft/perf**

   area perforations

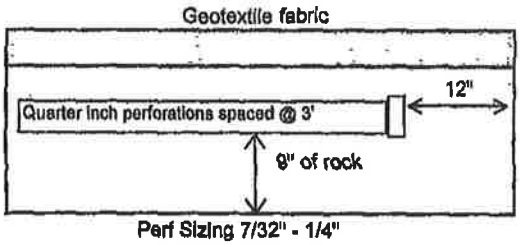
7. Determine required flow rate by multiplying number of perforations by flow per perforation

   30 x 0.74 = 22 **gpm.**

   perfs gpm/perf

8. If laterals are connected to header pipe as shown on upper example, to select minimum required lateral diameter; enter table with perforation spacing and number of perforations per lateral. Select minimum diameter for perforated lateral = 1 1/4 of 1 1/2 inches.

9. If perforated lateral system is attached to manifold pipe near the center, lower diagram, perforated lateral length and number of perforations per lateral will be approximately one half of that in step 8. Using these values, select minimum diameter for perforated lateral = _____ **inches**



Perf Sizing 7/32" - 1/4"

Perf Spacing 1.5' - 5'

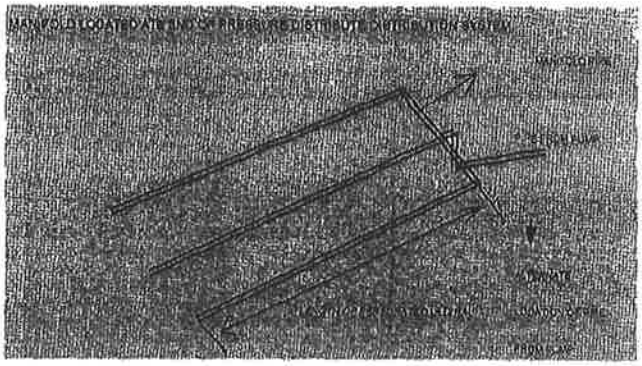
Perforations Discharge in (gpm)				
head (feet)	perforation diameter (inches)			
	1/8*	3/16	7/32	1/4
1.0a	0.18	0.42	0.56	0.74
2.0b	0.26	0.59	0.80	1.04
	0.41	0.94	1.26	1.65

a. Use 1.0 foot for single-family homes.

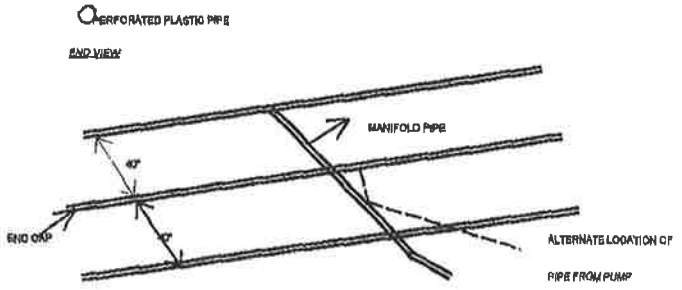
b. Use 2.0 feet for anything else.

* Potential for Plugging

Maximum number of quarter inch perforations per lateral to guarantee < 10% discharge variation			
Perforation Spacing (ft)	1 1/4	1 1/2	2
2.5	14	18	28
3.0	13	17	26
3.3	12	16	25
4.0	11	15	23
5.0	10	14	22



LAYOUT OF PERFORATED PIPE LATERALS FOR PRESSURE DISTRIBUTION IN MOUND



Revised Mar 2000 gka

PUMP SELECTION PROCEDURE

A. Determine pump capacity:

gravity distrubution

1. Minimum required discharge is 10 gpm
2. Maximum suggested dischage is 45 gpm

pressure distribution

see pressure design worksheet

Selected pump capacity: 22 gpm

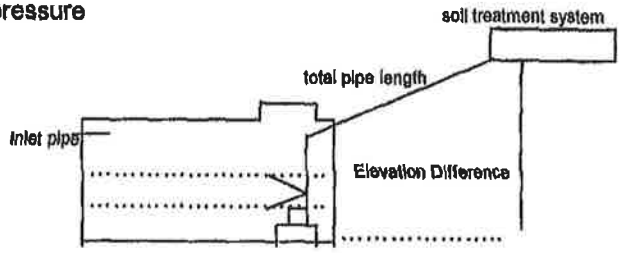
Perforation Discharges in gpm				
head (feet)	perforation diameter (inches)			
	1/8*	3/16	7/32	1/4
1.0*a*	0.18	0.42	0.56	0.74
2.0*b*	0.26	0.59	0.8	1.04
5.0	0.41	0.94	1.26	1.65

a Use 1.0 foot for single-family homes.
b Use 2.0 feet for anyting else.
* Potential for plugging

B. Determine head requirements:

1. Elevation difference between pump and point of discharge.
   8 feet

2. Special head requirement:
   If pumping to a pressure distribution system, five feet for pressure required at manifold. If gravity system, zero. 5 feet



3. Friction loss
   a. Enter Friction loss table with gpm and pipe diameter. Read friction loss in feet per 100 feet from table.
   F.L. = 1.11 ft. / 100 ft of pipe

   b. Determine total pipe length form pump to discharge point. Estimate by adding 25 percent to pipe length for fitting loss. Equivalent pipe length times 1.25 = total pipe length
   100 x 1.25 = 125 feet

   c. Calculate total friction loss by multiplying friction loss in ft/ 100 ft by equivalent pipe length.
   Total friction loss = 125 x 1.11 / 100 = 1.4 feet

Friction Loss (Plastic) Per 100 feet			
Flow rate gpm	Pipe 1.5"	Pipe 2"	Pipe 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		5.6	0.82
65		6.48	0.95
70		7.44	1.09

4. Total head required is the sum of elevation difference, special head requiredments, and total friction loss.
   8 + 5 + 1.4 (1) (2) (3c)

Total head: 15 feet

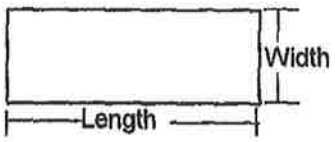
C. Pump selection

1. A pump must be selected to deliver at least 22 gpm (Step A) with at least 15 feet of total head (Step B).

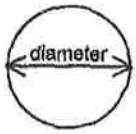
revised Mar 2000 gka

Sizing of Dosing Chamber

1. Determine surface area
   Rectangle area = L x W
   6 x 3.33 = 20 **sq feet**



   Circle area = 3.14 x (diameter)^2
   3.14 x ___ x ___ = ____ **square feet**



   Other? Get surface area form manufacturer. _____ **sqft**

2. Calculate gallons per inch
   There are 7.5 gallons per cubic foot of volume, therefore you must multiply the area times the conversion factor and divide by 12 inches per foot to calculate gallon per inch.
   Area x 7.5 / 12 = 20 x 7.5 / 12 = 12.5 **gallon per inch**

3. Total tank volume
   Depth (inch) x gallon / inch = 12.5 x 42 = 525 **gallon**

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

4. Calculate gallon to cover pump (with 2-3 inch of water covering pump)
   (Pump & Block height (inch) + 2 inch) x gallon / inch
   (18 + 2) x 12.5 = 250 **gallon**

5. **Calculate Total Pumpout Volume**
   A. To maximize pump life select sump size for 4 to 5 pump operations per day. 300 gpd / 5 = 60 gallons per dose
   B. Calculate drainback
      a. Determine total pipe length, 100 feet.
      b. Determine liquid volume of pipe, 0.17 gallons per foot.
      c. Drainback quantity = 100 ft x 0.17 gal = 17 gal
   C. Total pump out volume
      60 gal / dose + 17 gal = 77 Total gallon

Estimated Sewage Flows in Gallons per day (gpd)				
# bedrooms	Class I	Class II	Class III	Class IV
2	300	225	160	
3	450	300	218	60%
4	600	375	256	of the
5	750	450	294	values in
6	900	525	332	Type I, II or III
7	1050	600	370	columns
8	1200	675	408	

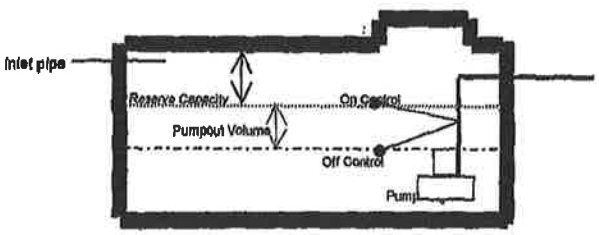
6. Float separation distance (equal total pumpout volume)
   Total pump volume / gal/inch
   77 / 12.5 = 6 **inch**

Pipe Diameter *Inches*	Gallons per ft
1	0.045
1.25	0.078
1.5	0.11
2	0.17
2.5	0.25
3	0.38
4	0.66

7. Calculate volume for alarm (typically 2 to 3 inches)
   Depth (inches) x gallon/inch = 2 x 12.5 = 25 **gallon**

8. Calculate total gallon
   gallon over pump + gallon pumpout + gallon alarm
   4 + 5 + 7
   250 + 77 + 25 = 352 **gallon**

9. Total depth = total gallon / gallon/inch
   352 / 12.5 = 28 **inches**



Recommended:
Calculate reserve capacity (75% the daily flow)
Daily flow x .75 = ___ = ____ **gallons**

Revised Mar 2000 gke

DSPPRCL1 **Display Parcel Description** 9/22/00 15:55:13

Parcel number/Tax year: **16-0-025302** **2001** Reference parcel#: **00216000025302**

Owner(s): **94808**
ROACH, MITCHELL & MARY
14070 ROLLING OAK CIRCLE
PRIOR LAKE MN 55372

Taxpayer: **94808** FALCO: **1 F.O.**
ROACH, MITCHELL & MARY
14070 ROLLING OAK CIRCLE
PRIOR LAKE MN 55372

Alternate taxpayer:

Parcel type : **RE** Hold tax stmt:
Com district: **3** Misc1/2:
Escrow agent:
Mortgage hld:
UTA: Twp/City School ******** ******** ******** ********
016 **0473** **00** **00** **00** **00**
TIF district: **000 000**
Lake#/name : **48-0002 MILLE LACS**
Property adr:

Emergency# :
Twp/City Plt: **LAKESIDE TWP**
Sec/twp/rge : **17 44.0 25** Acres: **2.15**
Plat:
Description: Lot/Block . :
PART OF SE NW & LOT 2 IN DOC #251966

Press Enter to continue or enter new parcel/tax year. **16-0-025302** **2001**
F1=Full desc F2=Trans hist F3=Exit F6=Prcl hist F7=Backward F9=Escrow hist
F12=Cancel F17=Display notes F18=Rebate

125
5
6 25

Subsurface Sewage Treatment System Management Plan

Property Owner:_____ Phone:_____ Date:_____

Mailing Address:_____ City:_____ Zip:_____

Site Address:_____ City:_____ Zip:_____

This management plan will identify the operation and maintenance activities necessary to ensure long-term performance of your septic system. Some of these activities must be performed by you, the homeowner. Other tasks must be performed by a licensed septic service provider.

System Designer: check every 36 months.
Local Government: check every 36 months.
State Requirement: check every 36 months.
(State requirements are based on MN Rules Chapter 7080.2450, Subp 2 & 3)

My System needs to be checked every 36 months.

Homeowner Management Tasks

Leaks – Check (look, listen) for leaks in toilets and dripping faucets. Repair leaks promptly.
Surfacing sewage – Regularly check for wet or spongy soil around your soil treatment area.
Effluent filter – Inspect and clean twice a year or more.
Alarms – Alarm signals when there is a problem. Contact a service provider any time an alarm signals.
Event counter or water meter – Record your water use.
-recommend meter readings be conducted (*circle one:* DAILY · WEEKLY MONTHLY)

Professional Management Tasks

- [x] Check to make sure tank is not leaking
- [x] Check and clean the in-tank effluent filter
- [x] Check the sludge/scum layer levels in all septic tanks
- [x] Recommend if tank should be pumped
- [x] Check inlet and outlet baffles
- [x] Check the drainfield effluent levels in the rock layer
- [x] Check the pump and alarm system functions
- [x] Check wiring for corrosion and function
- [ ] Check dissolved oxygen and effluent temperature in tank
- [x] Provide homeowner with list of results and any action to be taken
- [x] Flush and clean laterals if cleanouts exist

"I understand it is my responsibility to properly operate and maintain the sewage treatment system on this property, utilizing the Management Plan. If requirements in the Management Plan are not met, I will promptly notify the permitting authority and take necessary corrective actions. If I have a new system, I agree to adequately protect the reserve area for future use as a soil treatment system."

Property Owner Signature:_____ Date:_____

Designer Signature: Harry Lyng Jr. Date:_____

See Reverse Side for Management Log