Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, MN 55155-4194

Compliance Inspection Form

Existing Subsurface Sewage Treatment Systems (SSTS)

Doc Type: Compliance and Enforcement

Inspection results based on Minnesota Pollution Control Agency (MPCA) requirements and attached forms – additional local requirements may also apply.

Submit completed form to Local Unit of Government (LUG) and system owner within 15 days

For local tracking purposes:

System Status

System status on date (mm/dd/yyyy): 6/15/2020

☒ **Compliant – Certificate of Compliance**
(Valid for 3 years from report date, unless shorter time frame outlined in Local Ordinance.)

☐ **Noncompliant – Notice of Noncompliance**
(See Upgrade Requirements on page 3.)

Reason(s) for noncompliance *(check all applicable)*

- ☐ Impact on Public Health *(Compliance Component #1) – Imminent threat to public health and safety*
- ☐ Other Compliance Conditions *(Compliance Component #3) – Imminent threat to public health and safety*
- ☐ Tank Integrity *(Compliance Component #2) – Failing to protect groundwater*
- ☐ Other Compliance Conditions *(Compliance Component #3) – Failing to protect groundwater*
- ☐ Soil Separation *(Compliance Component #4) – Failing to protect groundwater*
- ☐ Operating permit/monitoring plan requirements *(Compliance Component #5) – Noncompliant*

Property Information

Parcel ID# or Sec/Twp/Range: 36.027.21.11.0004

Property address: 11050 Manning Ave. S Cottage Grove
Reason for inspection: property transfer

Property owner: Kerry Severson
Owner's phone: 612-590-4687

or

Owner's representative:
Representative phone:

Local regulatory authority: Washington County
Regulatory authority phone: 651-430-6655

Brief system description: 3-bedroom house w/2 1000 gallon septic tanks and a 1000 gallon pump tank pumping to 3-60' pressure trenches barn has a bathroom and 1000 gallon grinder tank pumping to first septic tank

Comments or recommendations:

RECEIVED
JUN 24 2020
PUBLIC HEALTH

Certification

I hereby certify that all the necessary information has been gathered to determine the compliance status of this system. No determination of future system performance has been nor can be made due to unknown conditions during system construction, possible abuse of the system, inadequate maintenance, or future water usage.

Inspector name: Dan Voight
Certification number: C6257

Business name: Voight's Septic Service
License number: L3330

Inspector signature: Daniel Voight
Phone number: 651-258-4012

Necessary or Locally Required Attachments

☒ Soil boring logs ☒ System/As-built drawing ☒ Forms per local ordinance

☒ Other information (list): Design from May 1995

Property address: 11050 Manning Ave. S Cottage Grove Inspector initials/Date: | 6/15/2020 *(mm/dd/yyyy)*

1. Impact on Public Health – Compliance component #1 of 5

Compliance criteria:

System discharges sewage to the ground surface.	☐ Yes ☒ No
System discharges sewage to drain tile or surface waters.	☐ Yes ☒ No
System causes sewage backup into dwelling or establishment.	☐ Yes ☒ No

Any "yes" answer above indicates the system is an imminent threat to public health and safety.

Comments/Explanation:

Verification method(s):

- ☒ Searched for surface outlet
- ☒ Searched for seeping in yard/backup in home
- ☐ Excessive ponding in soil system/D-boxes
- ☐ Homeowner testimony *(See Comments/Explanation)*
- ☐ "Black soil" above soil dispersal system
- ☐ System requires "emergency" pumping
- ☐ Performed dye test
- ☐ Unable to verify *(See Comments/Explanation)*
- ☐ Other methods not listed *(See Comments/Explanation)*

2. Tank Integrity – Compliance component #2 of 5

Compliance criteria:

System consists of a seepage pit, cesspool, drywell, or leaching pit. *Seepage pits meeting 7080.2550 may be compliant if allowed in local ordinance.*	☐ Yes ☒ No
Sewage tank(s) leak below their designed operating depth. If yes, which sewage tank(s) leaks:	☐ Yes ☒ No

Any "yes" answer above indicates the system is failing to protect groundwater.

Comments/Explanation:

Verification method(s):

- ☐ Probed tank(s) bottom
- ☐ Examined construction records
- ☐ Examined Tank Integrity Form *(Attach)*
- ☐ Observed liquid level below operating depth
- ☒ Examined empty (pumped) tanks(s)
- ☐ Probed outside tank(s) for "black soil"
- ☐ Unable to verify *(See Comments/Explanation)*
- ☐ Other methods not listed *(See Comments/Explanation)*

3. Other Compliance Conditions – Compliance component #3 of 5

a. Maintenance hole covers are damaged, cracked, unsecured, or appear to be structurally unsound. ☐ Yes* ☒ No ☐ Unknown

b. Other issues *(electrical hazards, etc.)* to immediately and adversely impact public health or safety. ☐ Yes* ☒ No ☐ Unknown
System is an imminent threat to public health and safety.

Explain:

c. System is non-protective of ground water for other conditions as determined by inspector . ☐ Yes* ☒ No
System is failing to protect groundwater.

Explain:

Property address: 11050 Manning Ave. S Cottage Grove Inspector initials/Date: | 6/15/2020 (mm/dd/yyyy)

4. Soil Separation – Compliance component #4 of 5

Date of installation: 1995 (mm/dd/yyyy) ☐ Unknown

Shoreland/Wellhead protection/Food beverage lodging? ☐ Yes ☒ No

Compliance criteria:

For systems built prior to April 1, 1996, and not located in Shoreland or Wellhead Protection Area or not serving a food, beverage or lodging establishment: Drainfield has at least a two-foot vertical separation distance from periodically saturated soil or bedrock.	☒ Yes ☐ No
Non-performance systems built April 1, 1996, or later or for non-performance systems located in Shoreland or Wellhead Protection Areas or serving a food, beverage, or lodging establishment: Drainfield has a three-foot vertical separation distance from periodically saturated soil or bedrock.*	☐ Yes ☐ No
"Experimental", "Other", or "Performance" systems built under pre-2008 Rules; Type IV or V systems built under 2008 Rules (7080. 2350 or 7080.2400 (Advanced Inspector License required) Drainfield meets the designed vertical separation distance from periodically saturated soil or bedrock.	☐ Yes ☐ No

Any "no" answer above indicates the system is failing to protect groundwater.

Verification method(s):

Soil observation does not expire. Previous soil observations by two independent parties are sufficient, unless site conditions have been altered or local requirements differ.

☒ Conducted soil observation(s) *(Attach boring logs)*
☐ Two previous verifications (*Attach boring logs)*
☐ Not applicable *(Holding tank(s), no drainfield)*
☐ Unable to verify *(See Comments/Explanation)*
☐ Other *(See Comments/Explanation)*

Comments/Explanation:

Indicate depths or elevations

A. Bottom of distribution media	20"
B. Periodically saturated soil/bedrock	52"
C. System separation	32"
D. Required compliance separation*	24"

*May be reduced up to 15 percent if allowed by Local Ordinance.

5. Operating Permit and Nitrogen BMP* – Compliance component #5 of 5 ☒ Not applicable

Is the system operated under an Operating Permit? ☐ Yes ☐ No **If "yes", A below is required**

Is the system required to employ a Nitrogen BMP? ☐ Yes ☐ No **If "yes", B below is required**

BMP = Best Management Practice(s) specified in the system design

If the answer to both questions is "no", this section does not need to be completed.

Compliance criteria

a. Operating Permit number: _____ Have the Operating Permit requirements been met?	☐ Yes ☐ No
b. Is the required nitrogen BMP in place and properly functioning?	☐ Yes ☐ No

Any "no" answer indicates Noncompliance.

Upgrade Requirements *(Minn. Stat. § 115.55) An imminent threat to public health and safety (ITPHS) must be upgraded, replaced, or its use discontinued within ten months of receipt of this notice or within a shorter period if required by local ordinance. If the system is failing to protect ground water, the system must be upgraded, replaced, or its use discontinued within the time required by local ordinance. If an existing system is not failing as defined in law, and has at least two feet of design soil separation, then the system need not be upgraded, repaired, replaced, or its use discontinued, notwithstanding any local ordinance that is more strict. This provision does not apply to systems in shoreland areas, Wellhead Protection Areas, or those used in connection with food, beverage, and lodging establishments as defined in law.*

WASHINGTON COUNTY, MINNESOTA
Department of Public Health and Environment 651/430-6688

COTTAGE GROVE CITY

PERMIT NUMBER 220003003 SEWAGE PERMIT

Owner : KERRY SEVERSON
11050 MANNING AVE S
HASTINGS MN 55033
Applicant : KERRY SEVERSON

TANK INSTALLATION	80.00
Total Fees :	80.00
Total Paid :	.00
Total Due :	80.00

PERMISSION IS HEREBY GRANTED

To execute the work specified in this permit on the following described property upon express condition that said persons and their agents, employees and workmen shall conform in all respects to the provisions of the Building Code, and/or Ordinances.
This permit may be revoked at any time upon the violation of any of the provisions of said code and ordinances.

Project Address : 11050 MANNING TR S HASTINGS MN 55033
Legal Description: THE SOUTH 569.00 FEET OF THE NORTH 1064.50 FEET OF THE Geo : 36-027-21-11-0002
Flow Capacity 0 Gal/Day Tank Volume 0
Soil Conditions: Depth to Restriction 0 Inches Perc Rate 0 Min/Inch

Soil Treatment Type:
Bottom Area 0 Rock Depth 0

Authorized Work / Special Conditions
- Install 1000 gal grinder tank for accessory building.

** Permit Expiration Date : Sewage Treatment :

A CERTIFICATE OF OCCUPANCY MUST BE REQUESTED AND ISSUED PRIOR TO USE OR OCCUPANCY OF WORK PERMITTED BY A BUILDING PERMIT.
** This permit shall expire and be null and void if the work authorized by the Building Permit is not commenced within 60 days of the date of issuance or if work is abandoned or suspended for a period of 120 days. Term of the Building Permit is 12 months from Date of Issue. Term of sewage treatment permit is 12 months from date of issue.
Penalty for violation of any of the provisions of building code. Fine not to exceed five hundred dollars ($500.00) or imprisionment for not more than ninety (90) days, or both.

Permit Issue Date Code Enforcement Officer P-Conrad

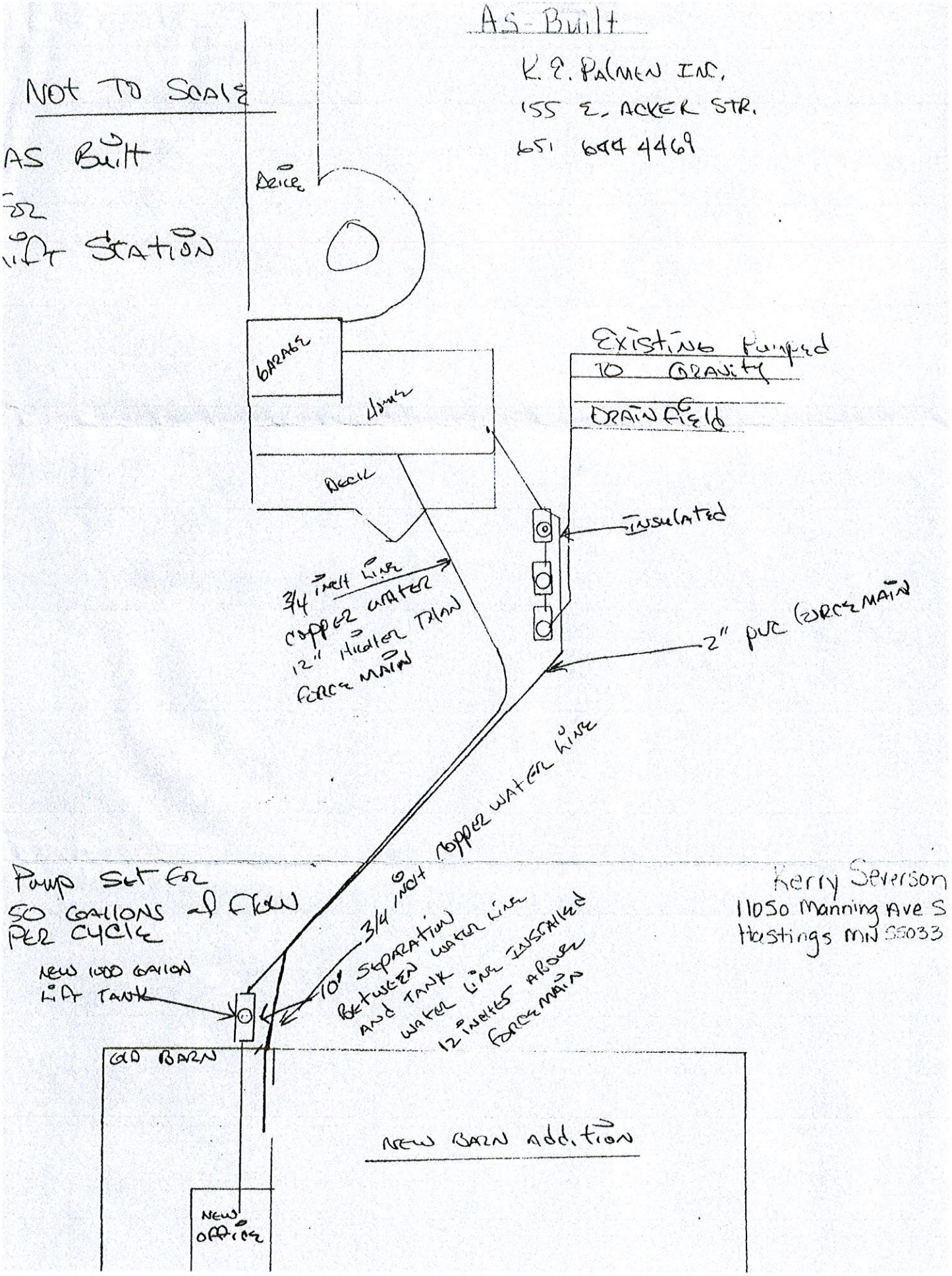
APPLICANT

As Built

K. E. Palmen Inc.
155 E. Acker Str.
651 644 4469

Not To Scale

As Built
for
Lift Station



Kerry Severson
11050 Manning Ave S
Hastings MN 55033

COPY

Ronald E. Palmen
1522 Albany Ave.
St. Paul, Minnesota 55108
612-644-4469

May 31, 1995

Mr. Kerry Severson
209 Tyler Road South
Red Wing, Minnesota 55066
612-388-2267
612-330-7814

Dear Mr. Severson,

At your request soil borings and percolation tests were performed at 11XXX Manning Ave. South on May 29, 1995. This On-Site Sewage Treatment System is designed for a Type 1, three bedroom home. The area thought to be best had mottled soils at four feet as well as very wet conditions. Further investigation found a suitable area up slope slightly and south of the proposed house area. The borings in this area found a medium to fine sandy loam to seven feet in depth. The percolation test performed found a rate of 5.05 minutes per inch.

Local Code requires a 1000 gallon septic tank. Because of the elevation difference between the basement and the drainfield area, a pump chamber and pump with alarm may be necessary to pump the effluent to a pressure trench system. This system will require three trenches 60 feet long and three feet wide, 7 1/2 feet apart, with 18 inches of rock below the two inch pressure pipe. The delivery pipe will need back pitch to drain the pipe of any liquid during winter months to prevent freezing.

All construction traffic MUST be dept off the test area at all times. Traffic on this area would cause soil compaction and reduce the effectiveness of the drain field.

It is important to maintain your septic system by pumping the septic tanks periodically. We recommend every two years. This will insure that no solids reach the drainfield causing it to fail and require replacement. Always try to conserve on water use. Low flush toilets and restricted shower heads would cut your water usage down. If a water softener is installed, it can drain directly to the wetlands or a low spot on the lot as this contains no harmful chemicals and it is legal. Only gray water, (laundry, showers, etc.) human waste and toilet tissue should be disposed of into the septic system. Garbage disposals are not recommended. Larger tanks should be used if a garbage disposal is installed.

Additives are not recommended as they may cause harmful damage to the system. These recommendations are a very good practice to follow on all septic systems.

During the winter months it is also very important to keep all traffic off of the drainfield: snowmobiles, skiing, sliding, etc. If snow becomes compacted it could cause your drainfield to freeze up.

This design must be approved by a city building official and a permit obtained before work can begin.

If you have any questions or concerns please feel free to give us a call.

Ronald E. Palmen
Certification # 1493

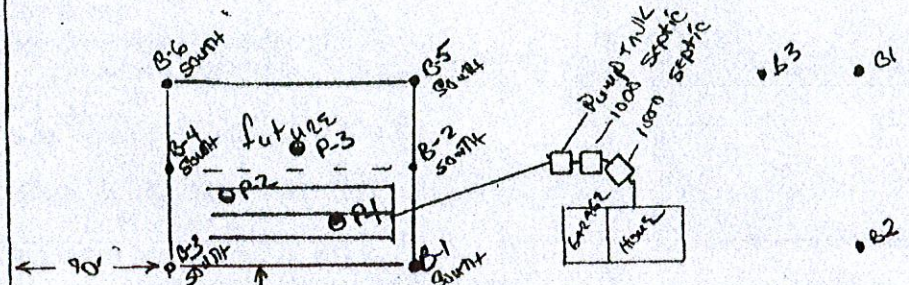
E. Palmen

North

• SOIL BORING
◐ PERC BORING

KERRY SEVERSON
209 TYLER Rd So.
Red WING, MN. 55066

1" = 100'



1531 +-

110XX MANNING AVE. SO.

660 +-

℄ MANNING AVE South

KERRY SCURLOCK

SEWAGE TREATMENT SYSTEM WORKSHEET

FLOW

mated 450 gpd

sured _____ x 1.5 = _____ gpd

SEPTIC TANK VOLUME

1000 gallons Recommended 2 in series NO GARBAGE DISPOSAL

SOILS (Site evaluation data)

Depth to restricting layer = 7 feet

Maximum depth of system C - 3 ft = 4 feet

Percolation rate 5.05 MPI

Soil Sizing Factor 1.67 sq ft/gpd (See table 3)

TRENCH BOTTOM AREA

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

A x F = _____ x _____ = _____ sq ft of bottom area

For trenches with 12 inches of rock below the pipe:

A x F x 0.8 = _____ x _____ x 0.8 = _____ sq ft of bottom area

For trenches with 18 inches of rock below the pipe:

A x F x 0.66 = 450 x 1.67 x 0.66 = 500 sq ft of bottom area

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

A x F x 0.6 = _____ x _____ x 0.6 = _____ sq ft of bottom area

BED BOTTOM AREA

For seepage beds with 6 or 12 inches of rock below the pipe;

1.5 x A x F = 1.5 x _____ x _____ = _____ sq ft of bottom area

ROCK VOLUME IN CU FT

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

M = Rock depth (ft) + 6 inches x Area (H, I, J, L or K)

(1.5 ft + 0.5 ft) x 500 = 750 cu ft

ROCK VOLUME IN CU YDS

N. Volume in cu ft divided by 27

M ÷ 27 = cu yds 750 ÷ 27 = 28 cu yds

ROCK WEIGHT

O. Cubic yards times 1.4 = tons

N x 1.4 = tons 28 x 1.4 = 39 tons

DISTRIBUTION

(Check one based on slope) Pressure Distribution

___ Bed (less than 6% slope)

Trenches

___ Drop boxes (any slope)

___ Distribution box (level to slightly sloping)

TRENCH LENGTH

P. Select trench width = 3 ft

Q. Divide bottom area by trench width: (H, I, J, or K) ÷ P = lineal feet

500 ÷ 3 = 167 lineal feet

LAWN AREA

R. Select trench spacing, center to center = 7.5 feet

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

7.5 x 167 = 1253 sq ft

LAYOUT (Use other side)

1. Select an appropriate scale; one square = _____ feet.
2. Show pertinent property boundaries, right-of-way, easements.
3. Show location of house, garage, driveway, and all other improvements, existing or proposed
4. Show location and layout of sewage treatment system.
5. Show location of water supply well.
6. Dimension all set backs and separation distances.

Estimated Sewage Flows in Gallons per day (gpd)

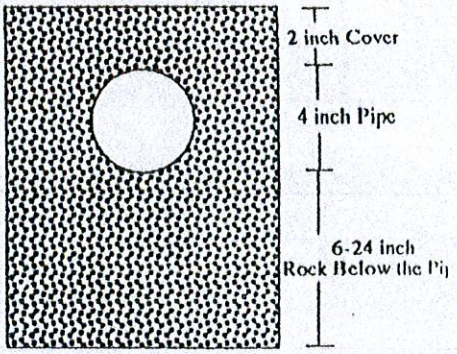
Number of Bedrooms	Type I	Type II	Type III	Type IV
2	300	225	180	
(3)	(450)	300	218	60% of the values in Type I, II or III columns
4	600	375	256	
5	750	450	294	
6	900	525	332	
7	1050	600	370	
8	1200	675	408	

Septic Tank Capacities, in gallons

Number of Bedrooms	Minimum Liquid Capacity	Liquid capacity with garbage disposal
2 or less	750	1125
(3 or 4)	(1000)	1500
4 or 6	1500	2250
7, 8 or 9	2000	3000
over 9	.....	.....

Soil Characteristics and Required Areas for Sewage Treatment

Percolation Rate in Minutes per Inch (MPI)	Soil Texture	Square feet per gallon per day	Gallons per day per square foot
Faster than 0.1 *	Coarse Sand	.....	.....
0.1 to 5	Sand	0.83	1.20
0.1 to 5	Fine sand **	(1.67)	0.60
6 to 15	Sandy Loam	1.27	0.79
16 to 30	Loam	1.67	0.60
31 to 45	Silt Loam	2.00	0.50
46 to 60	Clay Loam	2.20	0.45
Slower than 60 ***	Clay	.....	.....



3 TRENCHES 60' for Pressure Distribution to 18" inches of Rock Below preferred Pipe 2" in Diameter

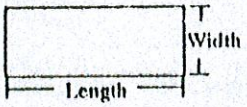
KERRY DEWSON

Sizing of Pump Station

1. Determine Surface Area

Rectangle = Area = L x W

_____ x _____ = _____ square feet



Circle = Area = π x (Radius)²

3.14 x _____ x _____ = _____ square feet

Other = Get Surface Area from Manufacturer

45.5 square feet

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 gallons per inch

Area x 7.5 gpft³ + 12 inchs per foot

45.5 x 7.5 ÷ 12 = 28.44 gallons/inch

3. Calculate Gallons to Cover Pump (with 2 inches of water covering pump)

(Height (in) + 2 inches) x gallons/inch (#2)

(16 + 2) x 28.43 = 512 gallons

Estimated Sewage Flows in Gallons (gpd)			
Number of Bedrooms	Type I	Type II	Type 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

4. Calculate Total Pumpout Volume

a. To maximize pump life select sump size for 4 to 5 pump operations per day.

450 gpd ÷ 4 = 112.5 gallons per dose

b. Calculate drainback

1. Determine total pipe length, 75 feet.
2. Determine liquid volume of pipe, 17.43 gallons per 100 feet.
3. Multiply length by volume: Drainback quantity =

75 feet x 17.45 gallons/100 ft. = 13.07 gallons.

Pipe diameter (inches)	Gallons per
1	4.49
1.25	7.77
1.5	10.5
2	17.40
2.5	24.8
3	38.4
4	66.1

c. Total pump out volume equals dose volume + drainback

112.5 gallons per dose + 13.07 gallons = 125.60 gallons

5. Calculate Volume for Alarm (typically 2 to 3 inches)

Depth (in) x gallons/inch (#2) =

28.44 x 3 = 85 gallons

6. Calculate Reserve Capacity (75% the daily flow)

Daily flow (see page D-7) x .75 =

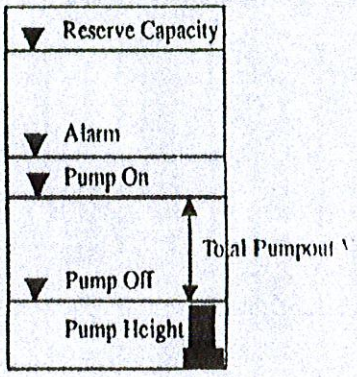
450 x .75 = 338 gallons

7. Calculate total gallons

gallons over pump + gallons pumpout + gallons alarm + gallons reserve capcity

#3 + #4 c + # 5 + # 6

512 + 1125 + 85 + 338 = 1050 gallons



8. Total Depth (Total gallon divided by gallon per inch)

Total Gallon (#7) + gallon/inch (#2)

1050 ÷ 28.44 = 37 inches

9. Float Separation Distance (equal total pumpout volume)

Total pumpout volume (#4c) + gallons/inch (#2)

125 ÷ 28.44 = 4 inches

KERRY SEVERSON

PUMP SELECTION PROCEDURE

A. **Determine pump capacity:**

Gravity Distribution

1. Minimum suggested is 600 gallons per hour (10 gpm) to stay ahead of water use rate.
2. Maximum suggested for delivery to a drop box of a home system is 2,700 gallons per hour (45 gpm) to prevent build-up of pressure in drop box.

Pressure Distribution

1. a. Select number of perforated laterals 3
   b. Select perforation spacing = 3 ft.
   c. Subtract 2 ft. from the rock layer length.
   60 (Rock layer length) - 2 ft. = 58 ft.
   d. Determine the number of spaces between perforations.
   Length perf. spacing = 38 ft. ÷ 3 ft. = 19 spaces
   e. 19 spaces + 1 = 20 perforations/lateral
   f. Multiply perforations per lateral by number of laterals to get total number of perforations.
   3 laterals × 20 perfs/lateral = 60 perforations.
   g. 60 perfs × .74 gpm/perf = 44 gpm.

SELECTED PUMP CAPACITY 44 gpm

B. **Determine head requirements:**

1. Elevation difference between pump and point of discharge.
   5 feet
2. If pumping to a pressure distribution system, add five feet for pressure required at manifold
   10 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. = 3.28 ft./100 ft of pipe
   b. Determine total pipe length from pump to discharge point. Add 25 percent to pipe length for fitting loss, or use a fitting loss chart. Equivalent pipe length - 1.25 times pipe length =
   75 × 1.25 = 94 feet
   c. Calculate total friction loss by multiplying friction loss in ft/100 ft by equivalent pipe length
   Total friction loss = 3.28 × 94 ÷100 = 3.08 feet
4. Total head required is the sum of elevation difference, special head requirements, and total friction loss.

(1) 10 + (2) 3.08 + (3c) 13.08

TOTAL HEAD 13.08 feet

C. **Pump selection**

1. A pump must be selected to deliver at least 44 gpm (Step A) with at least 13 feet of total head (Step B).

END PERFORATION OF A PERFORATED LATER

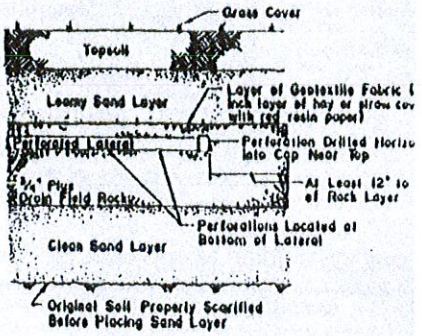
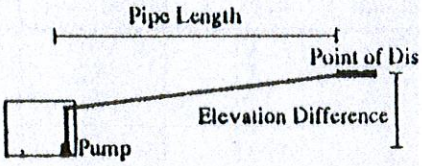


TABLE OF PERFORATION DISCHARGES IN GI

Head	Perforation diameter (inches)	
	7/32	1/4
1.0a	0.56	0.74
1.5	0.69	0.90
2.0b	0.80	1.04
2.5	0.89	1.17
3.0	0.98	1.28
4.0	1.13	1.47
5.0	1.26	1.65

aUse 1.0 foot of head for residential systems.
bUse 2.0 feet of head for other establishments



F-18b

gpm	1.5 inch	2.0 inch	3.0 inch
	Friction loss per 100 ft of pipe		
10	0.69	0.20	
12	0.96	0.28	
14	1.28	0.38	
16	1.63	0.48	
18	2.03	0.60	
20	2.47	0.73	0.11
25	3.73	1.11	0.16
30	5.23	1.55	0.23
35	7.90	2.06	0.30
40	11.07	2.64	0.39
45	14.73	3.28	0.48
50		3.99	0.58
55		4.76	0.70
60		5.60	0.82

Henry Severson

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.

   60 (Rock layer length) - 2 ft. = 58 feet

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 = 58 (#3) ft. + 3 (#2) ft. = 19 spaces

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

   19 spaces + 1 = 20 perforations per lateral

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

   3 (laterals) x 20 (perfs/lateral) = 60 perforations

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

   60 (perfs) x .24 (gpm/perf) = 44 gpm.

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

9. If perforated lateral system is attached to manifold pipe near the center, as in lower example, perforated lateral length and number of perforations per lateral will be approximately one half of that in # 6. Using these values, select minimum diameter for perforated lateral from table 2
   perforated lateral = _____ inches

DESIGNER SIGNATURE Ron Adams DATE 5-29-95

END PERFORATION OF A PERFORATED LATERAL

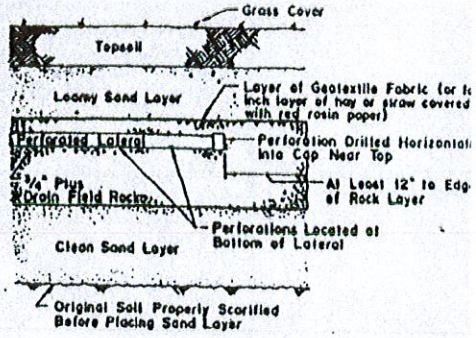


TABLE OF PERFORATION DISCHARGES IN GP

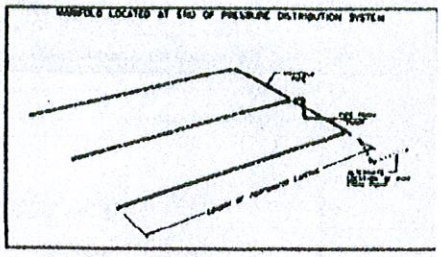
Head	Perforation diameter (inches)	
	7/32	1/4
1.0a	0.56	0.74
1.5	0.69	0.90
2.0b	0.80	1.04
2.5	0.89	1.17
3.0	0.98	1.28
4.0	1.13	1.47
5.0	1.26	1.65

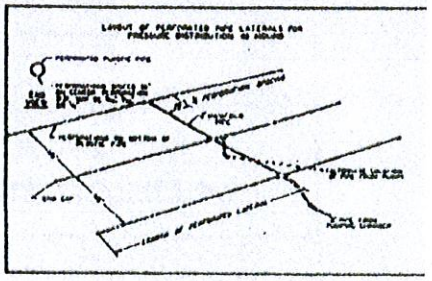
aUse 1.0 foot of head for residential systems.
bUse 2.0 feet of head for other establishments

Table 2

Maximum allowable number of quater inch perforations per lateral to guarantee <10% Discharge variation

perforation spacing (feet)	1.25 inch	1.5 inch	2.0 in
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





48"

PERC TEST SHEET #21

	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
21	START 6 Mins	7 5/16 5 7/8	1 7/16	6 TIME -- 1.44 DROP = 4.17 PERC **A**
AB	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
422 427	REFILL 5	7 1/4 6 1/4	1	5 TIME -- 1 DROP = 5 PERC **B**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
429 435	REFILL 6	7 1/8 6	1 1/8	6 TIME -- 1.13 DROP = 5.30 PERC **C**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
436 443	REFILL 7	6 7/8 5 7/16	1 7/16	7 TIME -- 1.44 DROP = 4.86 PERC **D**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
	REFILL			TIME -- DROP = PERC **E**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
	REFILL			TIME -- DROP = PERC **F**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
	REFILL			TIME -- DROP = PERC **G**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
	REFILL			TIME -- DROP = PERC **H**

CONVERSION
1/16 .06
1/8 .13
3/16 .19
1/4 .25
5/16 .31
3/8 .38
7/16 .44
1/2 .50
9/16 .56
5/8 .63
11/16 .69
3/4 .75
13/16 .81
7/8 .88
15/16 .94

Ten Percent Calculation

15.16 ÷ 3 = 5.05 WHOLE

A,B,C

5 Largest # of ABC -- 4.17 Smallest # of ABC = .83

4.17 Smallest # of ABC x 0.10 = .42

If the top number is larger than the bottom number then take another reading. If the top number is equal or smaller than bottom number average, the three numbers for the perc rate.

B,C,D

5.30 Largest # of BCD -- 5 Smallest # of BCD = .30

5 Smallest # of BCD x 0.10 = .50

If the top number is larger than the bottom number then take another reading. If the top number is equal or smaller than bottom number average, the three numbers for the perc rate.

C,D,E

5.30 Largest # of CDE -- 4.86 Smallest # of CDE = .44

4.86 Smallest # of CDE x 0.10 = .49

If the top number is larger than the bottom number then take another reading. If the top number is equal or smaller than bottom number average, the three numbers for the perc rate.

D,E,F

Largest # of DEF -- Smallest # of DEF = _____

Smallest # of DEF x 0.10 = _____

If the top number is larger than the bottom number then take another reading. If the top number is equal or smaller than bottom number average, the three numbers for the perc rate.

E,F,G

Largest # of EFG -- Smallest # of EFG = _____

Smallest # of EFG x 0.10 = _____

If the top number is larger than the bottom number then take another reading. If the top number is equal or smaller than bottom number average, the three numbers for the perc rate.

F,G,H

Largest # of FGH -- Smallest # of FGH = _____

Smallest # of FGH x 0.10 = _____

If the top number is larger than the bottom number then take another reading. If the top number is equal or smaller than bottom number average, the three numbers for the perc rate.

PERC TEST SHEET

18" H P.2

	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
	START	2 1/2		
	60	5 1/2	2	60 TIME -- 2 DROP = 3 PERC **A**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
11:24	REFILL	7 3/16		
4:30	60	5 7/16	1 3/4	60 TIME -- 1.75 DROP = 3.43 PERC **B**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
4:32	REFILL	2 1/8		
4:37	5	5 3/4	1 3/8	5 TIME -- 1.38 DROP = 3.62 PERC **C**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
4:42	REFILL	7		
4:47	5	5 5/8	1 3/8	5 TIME -- 1.38 DROP = 3.62 PERC **D**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
	REFILL			
				TIME -- DROP = PERC **E**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
	REFILL			
				TIME -- DROP = PERC **F**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
	REFILL			
				TIME -- DROP = PERC **G**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
	REFILL			
				TIME -- DROP = PERC **H**

CONVERSI
1/16 = .0
1/8 = .13
3/16 = .1
1/4 = .25
5/16 = .3
3/8 = .38
7/16 = .44
1/2 = .5
9/16 = .5
5/8 = .63
11/16 = .
3/4 = .75
13/16 = .
7/8 = .88
15/16 = .

Ten Percent Calculation

10.67 ÷ 3 = 3.56 MPI

A,B,C

3.62 Largest # of ABC -- 3 Smallest # of ABC = .62

3 Smallest # of ABC × 0.10 = .30

top number is larger than the bottom number then take another reading.
top number is equal or smaller than bottom number average, the three
bers for the perc rate.

B,C,D

3.62 Largest # of BCD -- 3.43 Smallest # of BCD = .19

3.43 Smallest # of BCD × 0.10 = .34

If the top number is larger than the bottom number then take another reading.
If the top number is equal or smaller than bottom number average, the three numbers for the perc rate.

C,D,E

3.68 Largest # of CDE -- 3.62 Smallest # of CDE = .06

Smallest # of CDE × 0.10 = .0

top number is larger than the bottom number then take another reading.
top number is equal or smaller than bottom number average, the three
bers for the perc rate.

D,E,F

Largest # of DEF -- Smallest # of DEF = _____

Smallest # of DEF × 0.10 = _____

If the top number is larger than the bottom number then take another reading.
If the top number is equal or smaller than bottom number average, the three numbers for the perc rate.

E,F,G

Largest # of EFG -- Smallest # of EFG = _____

Smallest # of EFG × 0.10 = _____

top number is larger than the bottom number then take another reading.
top number is equal or smaller than bottom number average, the three
bers for the perc rate.

F,G,H

Largest # of FGH -- Smallest # of FGH = _____

Smallest # of FGH × 0.10 = _____

If the top number is larger than the bottom number then take another reading.
If the top number is equal or smaller than bottom number average, the three numbers for the perc rate.

Kelly Severson

PERC TEST SHEET # D-3

	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
	START	7 1/16		
F	6 Min	5 5/8	1 7/16	6 TIME -- 1.44 DROP = 4.16 PERC **A**
AB	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
4:26	REFILL	7 1/2		
4:33	7 Min	6 1/16	1 7/16	7 TIME -- 1.44 DROP = 4.86 PERC **B**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
4:34	REFILL	7 3/8		
4:40	6 Min	6 1/16	1 5/16	6 TIME -- 1.31 DROP = 4.58 PERC **C**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
4:46	REFILL	6 15/16		
4:51	5 Min	5 7/8	1 1/16	5 TIME -- 1.06 DROP = 4.72 PERC **D**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
	REFILL			
				TIME -- DROP = PERC **E**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
	REFILL			
				TIME -- DROP = PERC **F**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
	REFILL			
				TIME -- DROP = PERC **G**
TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP	PERC RATE
	REFILL			
				TIME -- DROP = PERC **H**

CONVERSI
1/16 = .0
1/8 = .13
3/16 = .1
1/4 = .25
5/16 = .3
3/8 = .38
7/16 = .44
1/2 = .5
9/16 = .5
5/8 = .63
11/16 =
3/4 = .75
13/16 =
7/8 = .88
15/16 =

Ten Percent Calculation

14:16 & 3 = 4.72 mpi

A,B,C

4.86 -- 4.16 = .70
Largest # of ABC -- Smallest # of ABC =

4.16 x 0.10 = .142
Smallest # of ABC

If the top number is larger than the bottom number then take another reading.
If the top number is equal or smaller than bottom number average, the three numbers for the perc rate.

B,C,D

4.86 -- 4.58 = .28
Largest # of BCD -- Smallest # of BCD =

4.58 x 0.10 = .146
Smallest # of BCD

If the top number is larger than the bottom number then take another reading.
If the top number is equal or smaller than bottom number average, the three numbers for the perc rate.

C,D,E

4.72 -- 4.58 = .14
Largest # of CDE -- Smallest # of CDE =

4.58 x 0.10 = .146
Smallest # of CDE

If the top number is larger than the bottom number then take another reading.
If the top number is equal or smaller than bottom number average, the three numbers for the perc rate.

D,E,F

Largest # of DEF -- Smallest # of DEF = _____

_____ x 0.10 = _____
Smallest # of DEF

If the top number is larger than the bottom number then take another reading.
If the top number is equal or smaller than bottom number average, the three numbers for the perc rate.

E,F,G

Largest # of EFG -- Smallest # of EFG = _____

_____ x 0.10 = _____
Smallest # of EFG

If the top number is larger than the bottom number then take another reading.
If the top number is equal or smaller than bottom number average, the three numbers for the perc rate.

F,G,H

Largest # of FGH -- Smallest # of FGH = _____

_____ x 0.10 = _____
Smallest # of FGH

If the top number is larger than the bottom number then take another reading.
If the top number is equal or smaller than bottom number average, the three numbers for the perc rate.

KERRY SEVERSON

Date: 5-29-95 Address 11033 SOUTH MANNING AVE COHASSET GROVE MINN

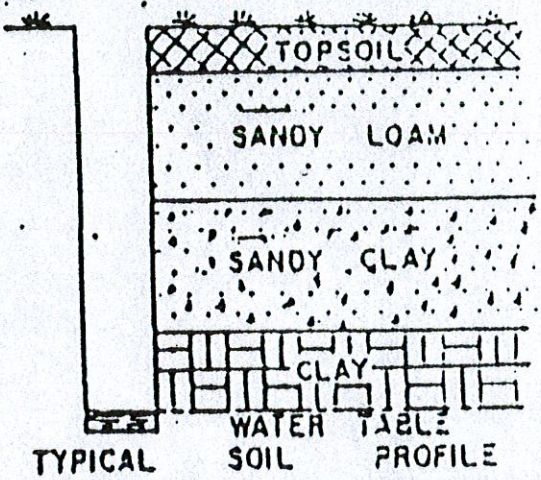
- Soil Borings -

Soil borings are made in order to determine the type and structure of soils at various depths as well as the location of the water table, impervious strata or bedrock.

Borings are most easily made with a hand auger, however other expedients may be utilized - back hoe, post hole auger, etc.

Soils encountered at various depths should be listed as to appearance, texture and composition.

Depth at which water, bedrock or heavy clay layer is encountered should be recorded.



TYPICAL SOIL PROFILE

Soil Borings done by ROD PALMEN, MPCA Certification Number 1493, on 5-29-95 (date).

LOG OF SOIL BORINGS

BORING NO. 1		BORING NO. 2		BORING NO. 3		BORING NO. 4	
DEPTH IN FEET	SOIL DESCRIPTION	DEPTH IN FEET	SOIL DESCRIPTION	DEPTH IN FEET	SOIL DESCRIPTION	DEPTH IN FEET	SOIL DESCRIPTION
0	20" Topsoil	0	16" Topsoil	0	8" Topsoil	0	
1/2		1/2		1/2		1/2	
1		1		1		1	
1 1/2		1 1/2	wet clay loam	1 1/2	wet clay loam	1 1/2	
2	wet clay loam	2		2		2	
2 1/2		2 1/2		2 1/2		2 1/2	
3		3		3		3	
3 1/2		3 1/2		3 1/2		3 1/2	
4		4		4	Rocky material @ 4'	4	
4 1/2		4 1/2		4 1/2		4 1/2	
5		5		5		5	
5 1/2		5 1/2		5 1/2		5 1/2	
6		6		6		6	
6 1/2		6 1/2		6 1/2		6 1/2	
7		7		7		7	
7 1/2		7 1/2		7 1/2		7 1/2	
8		8		8		8	
8 1/2		8 1/2		8 1/2		8 1/2	
9		9		9		9	

Kerry Severson

Date: 5/29/95 Address 110XX South Manning Ave.

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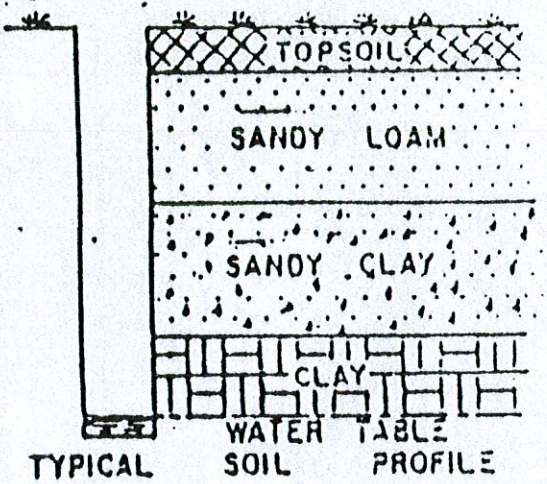

TYPICAL SOIL PROFILE

Soil Borings done by Ron Palmer, MPCA Certification Number 1493, on 5-29-95 (date).

LOG OF SOIL BORINGS

B-1 South B-2 South B-3 South B-4 South

BORING NO. 1		BORING NO. 2		BORING NO. 3		BORING NO. 4	
DEPTH IN FEET	SOIL DESCRIPTION	DEPTH IN FEET	SOIL DESCRIPTION	DEPTH IN FEET	SOIL DESCRIPTION	DEPTH IN FEET	SOIL DESCRIPTION
0	Topsoil 12"	0	16" Topsoil	0	10" Topsoil	0	16" Topsoil
1/2		1/2		1/2		1/2	
1	Clay loam moist	1	Moist clay loam	1		1	Moist clay loam
1 1/2		1 1/2		1 1/2	Moist clay loam	1 1/2	
2		2		2		2	
2 1/2		2 1/2		2 1/2		2 1/2	
3	Rock @ 4' 1 1/2" Auger to 5' Rock	3	Sandy fine loam to 7 1/2'	3	Sandy loam	3	Sand loam
3 1/2		3 1/2		3 1/2		3 1/2	
4		4		4		4	6 1/2 Rock
4 1/2		4 1/2		4 1/2	fine water Sand to 5'	4 1/2	
5	Sandy loam	5	1 1/2 Auger	5		5	1 1/2 Auger
5 1/2		5 1/2		5 1/2		5 1/2	to 7'
6		6		6		6	
6 1/2	7.5	6 1/2		6 1/2		6 1/2	10YR
7	4/4	7	4/4	7		7	5/4
7 1/2		7 1/2		7 1/2		7 1/2	
8		8		8	Pale yellow	8	
8 1/2		8 1/2		8 1/2		8 1/2	
9		9		9		9	

Kenny Sturgeon

Date: 5-29-95 Address: 110XX Manning Ave SD
Cottage Grove, MN

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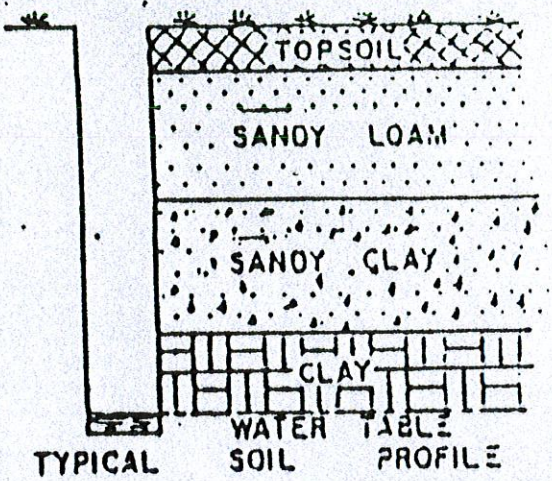

TYPICAL SOIL PROFILE

Soil Borings done by Ron Palmer, MPCA Certification Number 1493, on 5-29-95 (date).

LOG OF SOIL BORINGS

B-5 Sount B-6 Sount

BORING NO. 1		BORING NO. 2		BORING NO. 3		BORING NO. 4	
DEPTH IN FEET	SOIL DESCRIPTION	DEPTH IN FEET	SOIL DESCRIPTION	DEPTH IN FEET	SOIL DESCRIPTION	DEPTH IN FEET	SOIL DESCRIPTION
0	10" Topsoil	0		0		0	12" Topsoil
1/2		1/2		1/2		1/2	
1	Moist fine clay loam	1		1		1	Moist clay loam
1 1/2		1 1/2		1 1/2		1 1/2	
2		2		2		2	
2 1/2		2 1/2		2 1/2		2 1/2	
3	Sandy fine loam to 71 10YR 5/4	3		3		3	Sandy fine loam to 6 1/2 1/2 above 10YR 5/4
3 1/2		3 1/2		3 1/2		3 1/2	
4		4		4		4	
4 1/2		4 1/2		4 1/2		4 1/2	
5		5		5		5	
5 1/2		5 1/2		5 1/2		5 1/2	
6		6		6		6	
6 1/2		6 1/2		6 1/2		6 1/2	
7		7		7		7	
7 1/2		7 1/2		7 1/2		7 1/2	
8		8		8		8	
8 1/2		8 1/2		8 1/2		9 1/2	
9		9		9		9	