# FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE 9-29-18 , FIELD EVALUATION DATE 6/1/2020
PROPERTY OWNER: Clint & Kim DuBois
ADDRESS: 26386 170th ST    CITY,STATE,ZIP: McGrath 56350    PHONE 612-232-8594
LEGAL DESCRIPTION:
PIN# 28-0-044600    SEC 28 T 44 R 24 TWP NAME Seavey
FIRE# X LAKE/RIVER X    LAKE CLASS X /OHWL X FT.

## DESCRIPTION OF SOIL TREATMENT AREAS

| | AREA #1 | AREA #2 | |
|---|---|---|---|
| DISTURBED AREAS | YES ___ NO X | YES ___ NO ___ | REFERENCE BM ELEV. 100 FT. |
| COMPACTED AREAS | YES ___ NO X | YES ___ NO ___ | REFERENCE BM DESCRIPTION |
| FLOODING | YES ___ NO X | YES ___ NO ___ | Top of Stake for Home |
| RUN ON POTENTIAL | YES ___ NO X | YES ___ NO ___ | |
| SLOPE % | 8% | | |
| DIRECTION OF SLOPE | SE | | |
| LANDSCAPE POSITION | Sideslope | | |
| VEGETATION TYPES | Wooded Maple, Pine, Pople | | |

DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1 15", 1A 15", 2 ___ ,2A ___

BOTTOM ELEVATION-FIRST TRENCH OR BOTTOM OF ROCK BED: #1 +2 FT., #2 ___ FT.

SOIL SIZING FACTOR: SITE #1 1.27 , SITE #2 ___

CONSTRUCTION RELATED ISSUES: None

LIC# <2006    SITE EVALUATOR SIGNATURE: Dave Engdahl

SITE EVALUATOR NAME: Dave Engdahl    TELEPHONE# 592-3606

LUG REVIEW ___    DATE

Comments:

SOIL BORING LOGS ON REVERSE SIDE

Form des 2/20/98

# Subsurface Sewage Treatment System Management Plan

Property Owner: _Clint + Kim DuBois_  Phone: _612-232-8554_  Date: _6/10/20_

Mailing Address: _26385 170th St_  City: _McGrath_  Zip: _56350_

Site Address: _26385 170th St_  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 or maintenance provider.

System Designer:   Recommends SSTS check every ____ months.
Local Government:   Recommends SSTS check every ____ months.
State Requirement:   Requires SSTS 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 or maintenance 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   (N/A))

## Licensed septic service provider or maintenance provider (Check all that apply):

- [ ] Check to make sure tank is not leaking
- [x] Check and clean the in-tank effluent filter (if exists)
- [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
- [ ] Provide homeowner with list of results and any action to be taken
- [ ] 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."
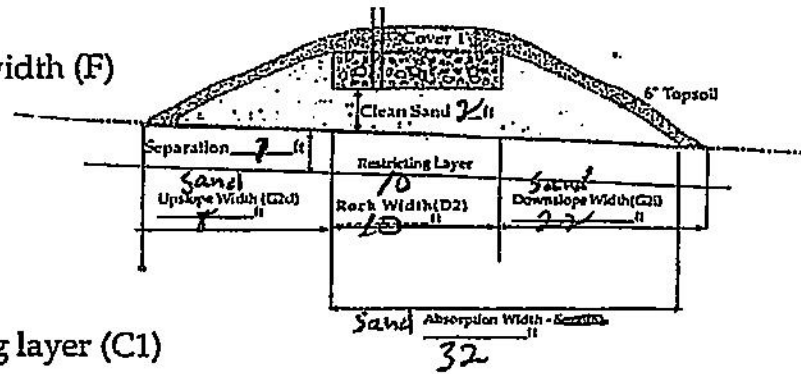
Property Owner Signature: _____  Date: _6/10/2020_

Designer Signature: _____  Date: _6/10/2020_

See Reverse Side for Management Log

**(landslope greater than 1%)**

1. Downslope absorption width = absorption width (F) minus rock layer width (D2)

   _20_ ft - _10_ ft = _10_ ft



2. Calculate mound size

**UPSLOPE**

a. Depth of clean sand fill at upslope edge of rock layer = 3 ft minus the distance to restricting layer (C1)

   3 ft - _1_ ft = _2_ ft

b. Mound height at the upslope edge of rock layer = depth of clean sand for separation (G2a) at upslope edge plus depth of rock layer (1 ft) plus depth of cover (1 ft)

   _2_ ft + 1ft + 1ft = _4_ ft

c. Upslope berm multiplier based on land slope

   _3.03_ (see figure D-34)

d. Upslope width = berm multiplier (G2c) x upslope mound height (G2b):

   _4_ x _3.03_ ft = _12.1_ ft

**DOWNSLOPE**

e. Drop in elevation = rock layer width (D2) x percent landslope (C5) ÷ 100

   _10_ ft x _8_ % ÷ 100 = _.8_ ft

f. Downslope mound height = depth of clean sand for slope difference (G2e) at downslope rock edge plus the mound height at the upslope edge of rock layer (G2b)

   _4_ ft + _.8_ ft = _4.8_ ft

g. Downslope berm multiplier based on percent land slc.

   _5.88_ (see figure D-34)

h. Downslope width = downslope multiplier (G2g) times downslope mound height (G2f)
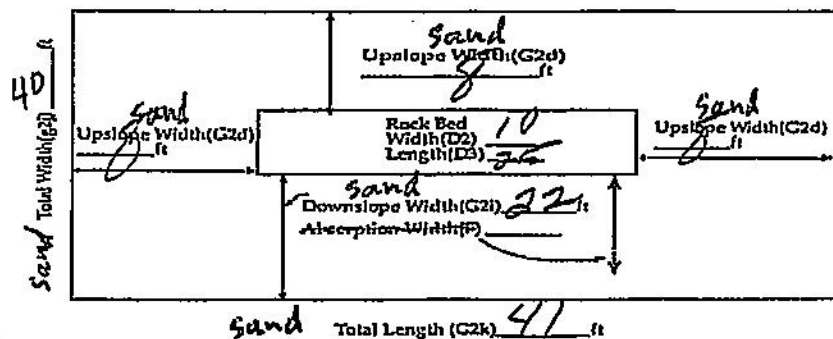
   _4.8_ x _5.88_ ft = _28.2_ ft

i. Select the greater of G1 and G2h as the downslope width: _28.2_ ft

j. Total mound width is the sum of upslope width (G2d) width plus rock layer width (D2) plus downslope width (G2i)

   _12.1_ ft + _10_ ft + _28.2_ ft = _50.3_ ft

k. Total mound length is the sum of upslope width (G2d) plus rock layer length (D3) plus upslope width (G2d)

   _16_ ft + _25_ ft + _16_ ft = _57_ feet

**D-34: SLOPE MULTIPLIER TABLE**

| Land Slope in % | UPSLOPE multipliers for various slope ratios | | | | | | DOWNSLOPE multipliers for various slope ratios | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3:1 | 4:1 | 5:1 | 6:1 | 7:1 | 8:1 | 3:1 | 4:1 | 5:1 | 6:1 | 7:1 |
| 0 | 3.0 | 4.0 | 5.0 | 6.0 | 7.0 | 8.0 | 3.0 | 4.0 | 5.0 | 6.0 | 7.0 |
| 1 | 2.91 | 3.85 | 4.76 | 5.66 | 6.54 | 7.41 | 3.09 | 4.17 | 5.26 | 6.38 | 7.53 |
| 2 | 2.83 | 3.70 | 4.54 | 5.36 | 6.14 | 6.90 | 3.19 | 4.35 | 5.56 | 6.82 | 8.14 |
| 3 | 2.75 | 3.57 | 4.35 | 5.08 | 5.79 | 6.45 | 3.30 | 4.54 | 5.88 | 7.32 | 8.86 |
| 4 | 2.68 | 3.45 | 4.17 | 4.84 | 5.46 | 6.06 | 3.41 | 4.76 | 6.25 | 7.89 | 9.72 |
| 5 | 2.61 | 3.33 | 4.00 | 4.62 | 5.19 | 5.71 | 3.53 | 5.00 | 6.67 | 8.57 | 10.77 |
| 6 | 2.54 | 3.23 | 3.85 | 4.41 | 4.93 | 5.41 | 3.66 | 5.26 | 7.14 | 9.38 | 12.07 |
| 7 | 2.48 | 3.12 | 3.70 | 4.23 | 4.70 | 5.13 | 3.80 | 5.56 | 7.69 | 10.34 | 13.73 |
| 8 | 2.42 | 3.03 | 3.57 | 4.05 | 4.49 | 4.88 | 3.95 | 5.88 | 8.33 | 11.54 | 15.91 |
| 9 | 2.36 | 2.94 | 3.45 | 3.90 | 4.30 | 4.65 | 4.11 | 6.25 | 9.09 | 13.04 | 18.92 |
| 10 | 2.31 | 2.86 | 3.33 | 3.75 | 4.12 | 4.44 | 4.29 | 6.67 | 10.00 | 15.00 | 23.33 |
| 11 | 2.26 | 2.78 | 3.23 | 3.61 | 3.95 | 4.26 | 4.48 | 7.14 | 11.11 | 17.65 | 30.43 |
| 12 | 2.21 | 2.70 | 3.12 | 3.49 | 3.80 | 4.08 | 4.69 | 7.69 | 12.50 | 21.43 | 43.75 |



**Final Dimensions:**

_50.3_ x _57_

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

_____ (signature)   _L2006_ (license #)   _6/10/20_ (date)

# PRESSURE DISTRIBUTION SYSTEM

1. Select number of perforated laterals __3__

2. Select perforation spacing = __2.5__ ft

3. 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.

$$\frac{25}{\text{Rock layer length}} - 2\,\text{ft} = \underline{23}\,\text{ft}$$

4. Determine the number of spaces between perforations. Divide the length (3) by perforation spacing (2) and <u>round down</u> to nearest whole number.

   Perforation spacing = __23__ ft ÷ __2.5__ ft = __9__ spaces

5. 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.*

   __9__ spaces + 1 = __10__ perforations/lateral

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

   __10__ perfs/lat x __3__ lat = __30__ 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)
   __25__ ft x __10__ ft = __250__ sqft
   Square foot per perforation = Rock bed area ÷ number of perfs (6)
   __250__ sqft ÷ __30__ perfs = __8.3__ sqft/perf

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

   __30__ perfs x __.74__ gpm/perfs = __22.2__ gpm

8. 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 = __1½__ inches.

9. 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 = _____ inches.



Geotextile fabric

Quarter inch perforations spaced @ 3'
12"
9" of rock
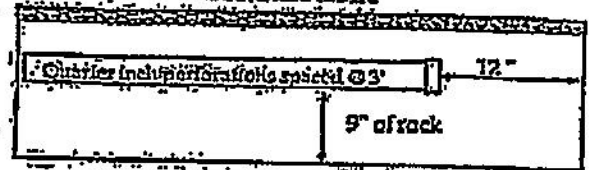
Perf Sizing 3/16" - 1/4"
Perf Spacing 1.5-5'

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 |

E-6: Perforation Discharge 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 | 0.80 | 1.04 |
| 5.0 | 0.41 | 0.94 | 1.26 | 1.66 |

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

MANIFOLD LOCATED AT END OF PRESSURE DISTRIBUTION SYSTEM
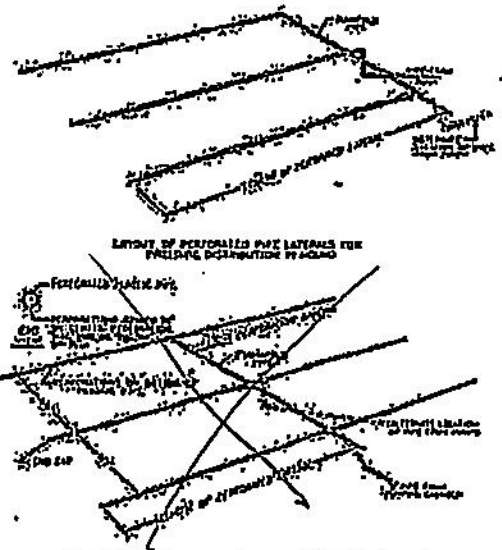
# MOUND DESIGN WORK SHEET (For Flows up to 1200 gpd)

## A. Average Design FLOW

Estimated _300_ gpd (see figure A-1)
or measured _____ x 1.5 (safety factor) = _____ gpd

| A-1: Estimated Sewage Flows in Gallons per Day | | | | |
|---|---|---|---|---|
| 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. |

## B. SEPTIC TANK Capacity

_1,000_ gallons (see figure C-1)

## C. SOILS (refer to site evaluation)

| C-1: Septic Tank Capacities (in gallons) | | | |
|---|---|---|---|
| Number of Bedrooms | Minimum Liquid Capacity | Liquid capacity with garbage disposal | Liquid capacity with disposal & filt 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 |

1. Depth to restricting layer = _1.1_ feet
2. Depth of percolation tests = _N/A_ feet
3. Texture _Sandy/Loam_
   Percolation rate _16-30_ mpi
4. Soil loading rate _.60_ gpd/sqft (see figure D-33)
5. Percent land slope _8_ %

## D. ROCK LAYER DIMENSIONS

1. Multiply average design flow (A) by 0.83 to obtain required rock layer area.
   _300_ gpd x 0.83 sqft/gpd – _250_ sqft
2. Determine rock layer width = 0.83 sqft/gpd x linear Loading Rate (LLR)
   0.83 sqft/gpd x _12_ gpd/sqft = _10_ ft
3. Length of rock layer = area ÷ width =
   _250_ sqft (D1) ÷ _10_ ft (D2) = _25_ ft

| Mound LLR | |
|---|---|
| < 120 MPI | ≤ 12 |
| ≥ 120 MPI | ≤ 6 |

## E. ROCK VOLUME

1. Multiply rock area (D1) by rock depth of 1 ft to get cubic feet of rock
   _250_ sqft x 1 ft = _250_ cuft
2. Divide cuft by 27 cuft/cuyd to get cubic yards
   _250_ cuft ÷ 27 cuyd/cuft = _9.3_ cuyd
3. Multiply cubic yards by 1.4 to get weight of rock in tons
   _9.3_ cuyd x 1.4 ton/cuyd = _13_ tons

## F. SEWAGE ABSORPTION WIDTH

Absorption width equals absorption ratio (See Figure D-33)
times rock layer width (D2)

_10_ x _2.0_ ft = _20_ ft

| D-33: Absorption Width Sizing Table | | | |
|---|---|---|---|
| Percolation Rate in Minutes per Inch (MPI) | Soil Texture | Loading Rate Gallons per day per square foot | Absorption Ratio |
| Faster than 5 | Coarse Sand Medium Sand Loamy Sand Fine Sand | 1.20 | 1.00 |
| 6 to 15 | Sandy Loam | 0.77 | 1.50 |
| 16 to 30 | Loam | 0.60 | 2.00 |
| 31 to 45 | Silt Loam Silt | 0.50 | 2.40 |
| 46 to 60 | Sandy Clay Loam Silty Clay Loam Clay Loam | 0.45 | 2.67 |
| 61 to 120 | Silty Clay Sandy Clay Clay | 0.24 | 5.00 |
| Slower than 120* | | | |

*Systems designed for these soils must be slate-of-performance

# PUMP SELECTION PROCEDURE

## 1. Determine pump capacity:

### A. Gravity distribution

1. Minimum required discharge is 10 gpm

2. Maximum suggested discharge is 45 gpm. For other establishments at least 10% greater than the water supply rate, but no faster than the rate at which effluent will flow out of the distribution device.

### B. Pressure distribution
*See pressure distribution work sheet*

**From A or B Selected pump capacity:** _22.2_ gpm

## 2. Determine pump head requirements:

A. Elevation difference between pump and point of discharge?
_5.9_ feet

B. Special head requirement? *(See Figure at right - Special Head Requirements)*
_5.0_ feet

C. Calculate Friction loss

1. Select pipe diameter _2_ in

2. Enter *Figure E-9* with gpm (1A or B) and pipe diameter (C1).

   Read friction loss in feet per 100 feet from Figure E-9
   Friction Loss = _1.11_ ft/100ft of pipe

3. Determine total pipe length from pump discharge to soil treatment discharge point. Estimate by adding 25 percent to pipe length for fitting loss. Total pipe length times 1.25 = equivalent pipe length
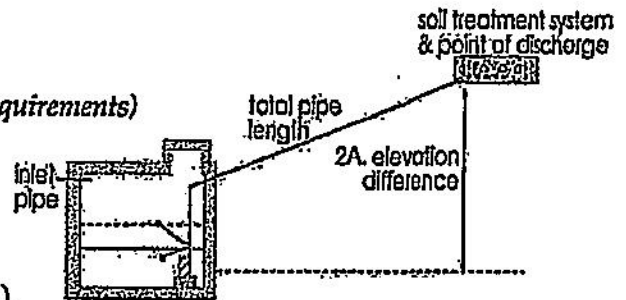   _25_ feet x 1.25 = _32_ feet

4. Calculate total friction loss by multiplying friction loss (C2) in ft/100 ft by the equivalent pipe length (C3) and divide by 100.
   = _1.11_ ft/100ft x _32_ ÷100 = _.35_ ft

D. Total head required is the sum of elevation difference (A), special head requirements (B), and total friction loss (C4)
   _5.9_ ft + _5_ ft+ _.4_ ft =
   **Total head:** _11.3_ feet

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### 3. Pump selection

A pump must be selected to deliver at least _22.2_ gpm
(1A or B) with at least _11.3_ feet of total head (2D)

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soil treatment system
& point of discharge

total pipe length

inlet pipe

2A. elevation difference

| Special Head Requirements | |
|---|---|
| Gravity Distribution | 0 ft |
| Pressure Distribution | 5 ft |

**E-9: Friction Loss in Plastic Pipe Per 100 feet**

| flow rate gpm | nominal pipe diameter 1.5" | 2" | 3" |
|---|---|---|---|
| 20 | 2.47 | 0.73 | 0.11 |
| 25 | 3.73 | 1.11 | 0.16 |
| 30 | 5.23 | 1.55 | 0.23 |
| 35 | 6.96 | 2.06 | 0.30 |
| 40 | 8.91 | 2.64 | 0.39 |
| 45 | 11.07 | 3.28 | 0.48 |
| 50 | 13.46 | 3.99 | 0.58 |
| 55 | | 4.76 | 0.70 |
| 60 | | 5.60 | 0.82 |
| 65 | | 6.48 | 0.95 |
| 70 | | 7.44 | 1.09 |

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

_____ (signature)  _LO0006_ (license #)  _6/10/20_ (date)
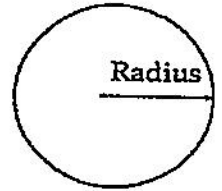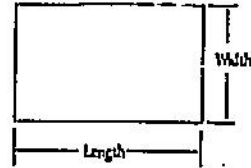
# DOSING CHAMBER SIZING

1. Determine area
   A. Rectangle area = L x W
      _____ x _____ = _____ square feet
   B. Circle area = π (3.14) x radius in feet x radius in feet
      3.14 x _____ ft x _____ ft = _____ sqft
   C. Get area from manufacturer _____ sqft

2. Calculate gallons per inch
   There are 7.5 gallons per cubic foot of volume, therefore multiply the area (1A, B or C) times the conversion factor and divide by 12 inches per foot to calculate gallon per inch.
   Area x 7.5 ÷ 12 = _____ sqft x 7.5 ÷ 12 in/ft = _12.1_ gallon per inch
   \ MANUFACTURE art.

3. Calculate total tank volume
   A. Depth from bottom of inlet pipe to tank bottom __43__ in
   B. Total tank volume = depth from bottom of inlet pipe to tank bottom (3A) x gal/in (2)
      = _43_ in x _12.1_ gal/in = _520_ gal

4. Calculate gallons to cover pump (with 2-3 inches of water covering pump)
   (Pump and block height (inch) + 2 inch) x gallon/inch
   (_12_ in +2 in) x _12.1_ gal/in = _____ gallon

5. Calculate total pumpout volume
   A. Select pump size for 4-5 does per day. Gallon per dose = gpd (see *figure A-1*)
      / doses per day = _300_ gpd ÷ _5_ doses/day = _60_ gallons
   B. Calculate drainback
      1. Determine total pipe length, _30_ feet
      2. Determine liquid volume of pipe, _.17_ gal per ft (*see figure E-20*)
      3. Drainback quantity = _30_ ft (5B1) x _.17_ gal per ft (5B2) = _5.1_ gal
   C. Total pump out volume = dose volume (5A) + drainback (5B3)
      _60_ gal + _5_ gal = _65_ Total gallon

6. Float separation distance (using total pumpout volume)
   Total pumpout volume (5C) ÷ gal/inch (2)
   _65_ gal ÷ _12.1_ gal/in= _5.3_ inch

7. Calculate volume for alarm (typically 2 to 3 inches)
   Alarm depth (inch) x gallon/inch (2) = _2_ in x _12_ gal/in) = _24_ gal

8. Calculate total gallon = gallons over pump (4) + gallons pumpout (5C) + gallons alarm (7)
   _168_ gal + _65_ gal + _24_ gal = _257_ gallons

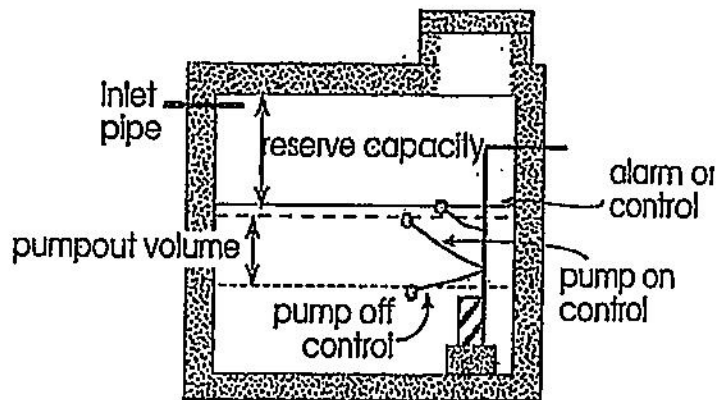9. Total Tank Depth = total gallon (8) ÷ gallon/inch (2)
   _257_ gal ÷ _12_ gal/in = _21.4_ in

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**Recommended:**
Calculate reserve capacity (75% the daily flow)
Daily flow x .75 = _300_ x .75 = _225_ gallons

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

**A-1: Estimated Sewage Flows in Gallons per Day**

| 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. |

**E-20: Volume of Liquid in Pipe**

| Pipe Diameter inches | Gallons per foot |
|---|---|
| 1 | 0.045 |
| 1.25 | 0.078 |
| 1.5 | 0.11 |
| 2 | 0.17 |
| 2.5 | 0.25 |
| 3 | 0.38 |
| 4 | 0.66 |

Inlet pipe
reserve capacity
alarm or control
pumpout volume
pump off control
pump on control

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

_____ (signature)   _L2006_ (license #)   _6/10/20_ (date)

Kim & Clint Dubois

## Pit 1

0-10    T.S             7.5yr 3/2
        Sand Loam
        Lots Roots
        Friable
        Blocky

10-15   Sand Loam   7.5yr 4/3
        Blocky
        Friable
        Roots

15-22   Sand Loam
        Firm        7.5yr  5/3
                           4/4
        Blocky             4/4
        Redox
        Few Roots

## Pit 2

0-7     T.S
        Sand Loam
        Roots
        Friable

7-14    Sand    7.5yr 4/3
        Loam
        Friable
        Blocky
        Roots

15+     Sand Loam
        Firm        7.5yr  4/4
        Blocky
        Few Roots          5/3
                           4/6

_[signature]_
< 2006    4/10/20