University of Minnesota Site Evaluation Form: Trench / Bed

Property Owner(s)

Address

P.I.D. _______________ Section _______________ Township _______________ N _______________ Range _______________ Weather conditions

Date _______________ Time _______________

Location Information

__ shoreland __ dwelling __ replacement system
__ protection area __ other establishment __ new home construction

(check all that apply)

Homeowner Information

No. of bedrooms (if applicable) _______________ bedrooms (includes possible additions)

No. of residents in home _______________ adults _______________ children _______________

Estimated flow _______________ gpd

Well casing depth _______________ feet

Water using devices (check)

__ Garbage disposal __ Water softener
__ Dishwasher __ Sump pump
__ Large bathtub __ High eff. furnace
__ Laundry/large tub on 2nd floor __ Janitor fence

Water use concerns (check)

__ Toilet/laundry leaks __ Max load laundry/day
__ Hot water heater __ Bedside commode
__ Home business __ Long term prescription medications
__ Leaking gate __ Frequent parties or out of town guests

__ Antifreeze, soap

Soil Data

Soil texture classification:

__ Yes __ No

Unnatural soil (check) __ Probe __ Pit __ Boring

Type of observation (check) __ Probe __ Pit __ Boring

Parent material (check) __ Till __ Outwash __ Loess

Vegetation type (check) __ Wet __ Dry __ Unknown

Slope form (check) __ Summit __ Shoulder __ Back

Drainage (check) __ Good __ Fair __ Poor

Located in floodplain (check) __ Yes __ No

Site Summary Data

Standing water: _______________ inches

Bedrock: _______________ inches

Saturated soil: _______________ inches

Maximum depth of system: _______________ inches

Max elevation at system bottom: _______________ feet

Soil rating factor (SSF): _______________ gpd/ft²

Linear loading rate (LLR): _______________ gpd/ft²

Was a perco test done? __ Yes __ No

Discharge location if checked

__ Long term prescription medications
__ Frequent parties or out of town guests

Soil Survey Data

Map unit sym & name

Land use

Floodplain

Slope

Water table depth

Bedrock depth

Possible system depth

Texture at depth

Permeability (P)

Perc (MPD) = 60 / P

NRCS onsite suitability

Soil Boring Data

Soil Horizons Depth (Inches)

Texture

Color

Structure

Consistence

Soil Horizons Depth (Inches)

Texture

Color

Structure

Consistence
Site Evaluation Map

List any construction issues:

Mapping Checklist

Map scale: 

- Indicate north 
- Show slope 
- % direction 

Locate
- Lot dimensions/property lines
- Dwellings and other improvements
- Existing and/or proposed system(s)
- Replacement area
- Unsuitable area(s)
- Public water supply wells
- Pumping access
- Inner wellhead zone

Easements
- Phone
- Electric
- Gas

Setbacks
- Building
- All water wells within 100 ft
- Pressure pipe
- Water suction pipe
- Streams, lakes, rivers
- Floodway and fringe

Elevations
- Borings
- Benchmark
- Poro tests
- Horiz&vert reference pts

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

(signature) (date) (license #) (phone number)
University of Minnesota Trench and Bed Worksheet

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

1. Flow
   A. Estimated Flow: gpd (Fig. A-1)

   **A-1 Estimated Sewage Flows in GPD**
<table>
<thead>
<tr>
<th>Number of Bedrooms</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>300</td>
<td>225</td>
<td>180</td>
<td>60% of the values</td>
</tr>
<tr>
<td>3</td>
<td>450</td>
<td>300</td>
<td>216</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>600</td>
<td>375</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>750</td>
<td>450</td>
<td>294</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>900</td>
<td>525</td>
<td>332</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1050</td>
<td>600</td>
<td>370</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1200</td>
<td>675</td>
<td>408</td>
<td></td>
</tr>
</tbody>
</table>

   **Pump Tank Minimum Sizing**
   500 gallons or 100% of Average Design Flow (A-1) or dual alternating pump system

2. Minimum Septic Tank Capacity
   B. Septic tank capacity (Fig C-1): gallons
   C. Effluent filter (yes/no)

   **C-1 Minimum Septic Tank Capacity in Gallons**
<table>
<thead>
<tr>
<th>Number of Bedrooms</th>
<th>Minimum Capacity</th>
<th>Capacity with GD*</th>
<th>Capacity with GD and pump in basement **</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 or less</td>
<td>750</td>
<td>1125</td>
<td>1500</td>
</tr>
<tr>
<td>3 or 4</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
</tr>
<tr>
<td>5 or 6</td>
<td>1500</td>
<td>2250</td>
<td>3000</td>
</tr>
<tr>
<td>7, 8 or 9</td>
<td>2000</td>
<td>3000</td>
<td>4000</td>
</tr>
</tbody>
</table>

   * GD = garbage disposal, Must have multiple tanks or compartments
   ** Must have multiple tanks, compartments or effluent screen

3. Pump Tank Specifications
   D. Pump tank needed (yes/no)
   Minimum size if needed: gallons

4. SOILS (Site evaluation data)
   E. Depth to restricting layer = ft
   F. Maximum depth of system Item E - 3 ft = _______ - 3 = _______ ft
   G. Texture
   H. SSF: ft²/gpd (see figure D-15)
   I. % Slope

5. D-15 Soil Characteristics & SSF
<table>
<thead>
<tr>
<th>Perc Rate mpi</th>
<th>Soil Texture</th>
<th>Soil Sizing Factors ft²/gpd</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.1 **</td>
<td>Coarse sand</td>
<td>0.83</td>
</tr>
<tr>
<td>0.1 - 5 **</td>
<td>Medium sand</td>
<td>0.83</td>
</tr>
<tr>
<td>0.1 - 5 **</td>
<td>Loosey sand</td>
<td>1.67</td>
</tr>
<tr>
<td>6 - 15</td>
<td>Sandy loam</td>
<td>1.27</td>
</tr>
<tr>
<td>16 - 30</td>
<td>Loam</td>
<td>1.67</td>
</tr>
<tr>
<td>31 - 45</td>
<td>Silt loam, silt</td>
<td>2.00</td>
</tr>
<tr>
<td>46 - 60</td>
<td>Clay loam, sandy clay or silty clay</td>
<td>2.20</td>
</tr>
<tr>
<td>61 - 120 ***</td>
<td>Clay, sandy or silty clay</td>
<td>4.20</td>
</tr>
<tr>
<td>&gt;120 ****</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Page 1 of 2
5. System Type
   | Pressure Bed (<6% slope) |
   | Gravity Bed (<6% slope) |
   | Trenches |
   Distribution Media Type
   | Rock |
   | Chamber |
   | Gravelless |
   | Other: |
   Method of Distribution
   | Pressure |
   | Drop Boxes |
   | Dist. Box (<3% slope) |
   | Other: |

6. TRENCH OR BED BOTTOM AREA
   J. For trenches with 6 inches of wide wall beneath the pipe or 10" diameter gravelless pipe:
      \[ A \times H = \frac{\text{gpd}}{\text{ft/gpd}} \times \text{ft} = \text{ft}^2 \]
   K. For trenches with 12 inches of sidewall:
      \[ A \times H \times 0.8 = \frac{\text{gpd}}{\text{ft/gpd}} \times \text{ft} = \text{ft}^2 \]
   L. For trenches with 18 inches of sidewall:
      \[ A \times H \times 0.66 = \frac{\text{gpd}}{\text{ft/gpd}} \times \text{ft} = \text{ft}^2 \]
   M. For trenches with 24 inches of sidewall:
      \[ A \times H \times 0.6 = \frac{\text{gpd}}{\text{ft/gpd}} \times \text{ft} = \text{ft}^2 \]
   N. For gravity beds with 6 or 12 inches of rock below the pipe:
      \[ 1.5 \times A \times H = \frac{\text{gpd}}{\text{ft/gpd}} \times \text{ft} = \text{ft}^2 \]
   O. For pressure beds with 6 or 12 inches of rock below the pipe:
      \[ A \times H = \frac{\text{gpd}}{\text{ft/gpd}} \times \text{ft} = \text{ft}^2 \]

7. Trench and Bed Dimensions
   P. Select required square feet of bottom area required based on depth of rock/gravelless pipe or height of chamber slats
      \[ \text{ft}^2 \]
   Q. Select width of trench or bed
      \[ \text{ft} \]
   R. For trenches or pressure beds the lineal feet required = required square footage / width of bottom of trench or bed
      \[ \frac{\text{ft}^2}{\text{ft}} = \text{lineal feet} \]
   S. For gravity beds the lineal feet required = required square footage / width of bed
      \[ \frac{\text{ft}^2}{\text{ft}} = \text{lineal feet} \]

8. Rock Sizing and Volume
   T. Depth of media below pipe
      \[ \text{ft} \]
   Cubic feet of rock needed = Rock depth below distribution pipe plus 0.5 foot times bottom area:
      \[ (\text{ft} + 0.5 \text{ ft}) \times \text{ft}^2 = \text{ft}^3 \]
   Volume in cubic yards = volume in cubic feet divided by 27
      \[ \frac{\text{ft}^3}{27} = \text{yd}^3 \]
   Weight of rock in tons = cubic yards times 1.4
      \[ \times 1.4 = \text{tons} \]
   Add in 10% extra for constructability = 1.1 \times \text{tons} \]

9. Layout
   Select an appropriate scale; one inch = \[ \text{ft} \]
   Show pertinent property boundaries, rights-of-way, easements.
   Show location of house, garage, driveway, and all other improvements, existing or proposed.
   Show location and layout of sewage treatment system, well and dimensions of all elevations

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

\[ \text{signature} \quad \text{license #} \quad \text{(date)} \]

Local Unit of Government Approval

\[ \text{signature} \quad \text{registration #} \quad \text{(date)} \]
PRESSURE DISTRIBUTION SYSTEM

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

1. Select number of perforated laterals: 

2. Select perforation spacing = ________ ft

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

   ________ ft - 2 ft = ________ ft

   rock layer length

4. Determine the number of spaces between perforations.
   Divide the length (3) by perforation spacing (2) and round down to nearest whole number.
   Perforation spacing = ________ ft / ________ ft = ________ 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.
   ________ spaces + 1 = ________ perforations/lateral

6. A. Total number of perforations = perforations per lateral (5) times number of laterals (1).
   ________ perfs/lat x ________ laterals = ________ perforations

   B. Calculate the square footage per perforation.
   Recommended value is 6-10 sqft/ perf. Does not apply to at-grades.
   1. Rock bed area = rock width (ft) x rock length (ft)
   ________ ft x ________ ft = ________ ft²
   2. Square foot per perforation=Rock Bed Area/number of perfs (6)
   ________ ft² / ________ perfs = ________ ft²/perf

7. Determine required flow rate by multiplying the total number of perforations (6A) by flow per perforations (see figure E-6)
   ________ perfs x ________ gpm/perf = ________ gpm

8. If laterals are connected to header pipe as shown in Figure E-1, to select minimum required lateral diameter; enter figure E-4 with perforation spacing (2) and number of perforations per lateral (5).
   Select minimum diameter for perforated laterals = ________ inches

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

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

_________ (signature)  _________ (license #)  _________ (date)
PUMP SELECTION PROCEDURE

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

1. Determine pump capacity:
   A. Gravity Distribution
      1. Minimum required discharge is 10 gpm
      2. Maximum suggested discharge is 45 gpm
      For other establishments at least 10% greater than the water supply rate, but no faster than the rate at which effluent will flow out of the distribution device.

   B. Pressure Distribution - see pressure design worksheet

Selected Pump Capacity: □□□□ gpm

2. Determine head requirements:
   A. Elevation difference between pump and point of discharge.
      □□□□ feet

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

   C. Friction loss
      1. Select pipe diameter □□□□ 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= □□□□ ft/100 ft of pipe

      3. Determine total pipe length from pump discharge to soil system discharge point
         Estimate by adding 25 percent to pipe length for fitting loss.
         Equivalent pipe length times 1.25 = total pipe length
         □□□□ ft x 1.25 = □□□□ feet

      4. Calculate total friction loss by multiplying friction loss (C2)
         by the equivalent pipe length (C3) and divide by 100.
         FL= □□□□ ft/100ft x □□□□ ft / 100 = □□□□ feet

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

Total Head: □□□□ feet

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

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

□□□□□□□□ (signature) □□□□□□□□ (license #) □□□□□□□□ (date)
**PERCOLATION TEST DATA**

- **TWO TESTS ARE REQUIRED** -

<table>
<thead>
<tr>
<th>Diameter of hole</th>
<th>Perc test #1</th>
<th>Perc test #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth to bottom of hole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did the hole require presoaking?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time</th>
<th>Interval (min)</th>
<th>Water Depth</th>
<th>Water Drop</th>
<th>Percolation Rate</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

**PERCOLATION RATE**: **GSF**:  

**Anticipated construction related concerns:**

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Todd County
Septic System Management Plan Agreement

Property Owner: ____________________ Phone: ____________________ Date: ____________________

Site Address: ____________________ Parcel #: ____________________

System Designer: ____________________ Company: ____________________ Name: ____________________ License #: ____________________

This management plan agreement will identify the operating and management activities necessary to ensure the long-term performance of the septic system. This agreement must determine the responsibilities of the system owner and those of the system designer in conducting regular maintenance and monitoring of the septic system.

Identify the service intervals recommended by the system designer and Todd County Planning and Zoning. The tank assessment for the system must be the shortest interval of these three intervals. Pumping and cleaning of tanks must be done by a licensed professional.

System Designer: check every ____ months
Todd County P&Z: check every ____ months
State Requirement: check every ____ months

My tank needs to be checked every ____ months

Tank pumping and tank maintenance is contracted with ____________________

Management Tasks required seasonally or several times per year:
- Leaks. Check (listen, look) for leaks in toilets and dripping faucets. Repair leaks promptly.
- Surfacing sewage. Regularly check for wet or spongy soil around your treatment area. If surfacing sewage or strong odors are not corrected by pumping the tank or fixing broken caps, call your service professional. Untreated sewage may make humans and animals sick.
- Alarms. Alarms signal when there is a problem; contact your maintainer any time the alarm signals.
- Lint filters. If there is a lint filter, check for buildup and clean when necessary.
- Effluent screen. If there is an effluent screen, inspect and clean it twice a year or per manufacturer recommendations.

Management Tasks required annually and/or scheduled maintenance:
- Inspection Caps. Check to make sure they are properly capped. Replace caps that are damaged.
- Pumps and controls. Check to make sure the pump and controls are operating correctly and inspect wiring for corrosion and function.
- Event counter or water meter. Monitor the average daily water use (if applicable).
- Septic tank integrity. Scheduling of pumping and cleaning of tanks at the recommended interval is very important. This maintenance must be conducted through the manhole openings and include verification that tank and tank components are watertight and in good operating condition.

These management tasks are the responsibility of the septic system owner/septic designer (Circle one)

Property Owner Signature: ____________________ Date: ____________________
Designer Signature: ____________________ Date: ____________________
Todd County P&Z Signature: ____________________ Date: ____________________

"I understand it is task manager's responsibility to properly operate and maintain the sewage treatment system on this property, utilizing the Management Plan. If requirements of the Management Plan are not met, I will promptly notify Todd County Planning & Zoning 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."

Todd County Planning & Zoning will not accept sewer designs unless accompanied by a signed Septic System Management Plan Agreement.

Management Plan Agreement Form
Revised 1/1/2014