



## Disposal Field Design Considerations & Details

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Permit Number: **PRPSW**

Roll Number: \_\_\_\_\_

The following information is to accompany the **Private Sewage Disposal Permit Application** for a **Disposal Field**.

### Required Information:

- Private Sewage Disposal Permit Application** - Completed (please put N/A in spaces which are not applicable).
- Signature of Applicant on Permit Applicant Declaration**
- Disposal Field Design Considerations & Details** - This form Completed.
- Site Evaluation Diagram - Appendix A** - Attach a *detailed* site diagram including the system location in relation to buildings, distance to water supply and /or surface water
- Soil Log Report from two (2) test pits with Soil Analysis Report - Appendix B** - Completed.
- Worksheets** - Complete both 'Primary Effluent Treatment Field' - *Appendix C* and 'Pressure Distribution, Orifice, Pipe & Pump Sizing' - *Appendix D*
- Specifications for System Components** - Attached for Initial Treatment Component Design Details, including Septic Tank, Dose Tank, Effluent Pump.
- Detailed System Schematics and Drawings** - Attached
- Any other qualifications or limitations that in your opinion as the designer/installer are needed.**

This private sewage system is for a \_\_\_\_\_ (# of) bedroom single family dwelling. Total peak wastewater flow per day used in this design is \_\_\_\_\_ imperial gallons. The average operating flow is expected to be \_\_\_\_\_ gallons per day.

The sewage system includes a **septic tank and disposal field**. This system is suitable for the site and soil conditions of your property. The design reflected in the flowing applies, and meets the requirements of the current **Alberta Private Sewage Systems Standards of Practice** adopted under the **Safety Codes Act** to achieve effective treatment of the wastewater from this residence.

### Wastewater Characteristics:

Wastewater Peak Flow:

- The development served is a \_\_\_\_\_ (# of) bedroom single family dwelling.
- Fixture Unit Loads (please check all that apply):
  - Main Bathroom = 6 fixture units
  - Ensuite with Shower = 6 fixture units
  - Kitchen Sink = 1.5 fixture units
  - Laundry Stand Pipe = 1.5 fixture units
  - Bathroom in Basement = 6 fixture units
  - High-volume plumbing fixtures were identified in the review of this development (examples: garburator, soaker tubs). *Please include total volume used by these fixtures in the calculation of flow, as per Table 2.2.2.3 of Alberta Private Sewage Systems Standard of Practice 2009.*
  - No high-volume plumbing fixtures were identified in the review of this development (examples: garburator, soaker tubs).
- Total plumbing fixture unit load in this residence: \_\_\_\_\_  
 (based on review of the building)
- Based on the total plumbing fixtures, \_\_\_\_\_ Imp. Gallons per day is required to be added to the base peak daily flow.
- *Note: When the combined total of fixture units exceeds 20 in an occupancy unit, add 50L for each fixture unit over 20 (as per Table 2.2.2.2.A. of the Alberta Private Sewage System Standard of Practice 2009)*

Summary:

Total peak daily flow used in the design is:	_____	Imp. Gal/day
Base Flow:	_____	Imp. Gal
Additional Flow:	_____	Imp. Gal

Wastewater Strength:

- Characteristics of the development were considered to assess sewage strength. **No garbage grinders or other characteristics** were identified that would cause typical wastewater strength to be exceeded.
- The Required wastewater strength for the design is:
  - BOD 220 mg/L
  - TSS 220 mg/L
  - Oil and Grease 50mg/L

Wastewater Flow Variation Considerations:

- The characteristics of this development indicate wastewater flow volumes will not vary substantially during the day, or from day to day. **As a result, no flow variation management is needed.**

**Site Evaluation Findings:**

Site Evaluation Diagram:

- Lot area: \_\_\_\_\_ ac / Ha
- The dimensions of the property are shown in the **Site Evaluation Diagram**, attached in **Appendix A**.
- The site evaluation assessed the area within a **100m (330ft) radius** of all components of the system design. The design conforms to all distances set out in the Standard of Practice (SOP), including the distances to adjacent property features. No significant setback constraints were noted.
- Pertinent features identified during the site review and the required setback distances are identified on the **Site Evaluation Diagram - Appendix A**.

Soil Evaluation:

- Two (2)** soil excavations have been investigated on this site.
- Test Pit 1 is located at the proposed location of the disposal field.
- Soil Logs - Appendix B** have been completed for Test Pit 1 and Test Pit 2.
- The location(s) of the Test Pits are shown on the **Site Evaluation Diagram, Appendix A**.

Restrictive Soil Conditions:

- Key aspects of the soil conditions that must be addressed in the design are:
  - A restrictive layer exists at \_\_\_\_\_ feet below the surface as indicated by:
   
\_\_\_\_\_
   
\_\_\_\_\_
   
\_\_\_\_\_
   
\_\_\_\_\_
   
therefore, a disposal mound is required.

Limiting Soil Condition - Effluent Loading Rate Selection:

- The key soil Characteristics of the design is based on (soil type):

- This soil type has a effluent loading rate of:

- The effluent loading rate for secondary treated effluent on this soil is :  
 \_\_\_\_\_ Imperial Gallons/day/ft<sup>2</sup>

Effluent Linear Loading Rates and Design Considerations:

- There is a shallow restrictive soil layer at this site. The effluent must move laterally through the soil so linear loading rates must be applied:
  - The dominant soil characteristic is: \_\_\_\_\_
  - Infiltration distance to the restrictive layer: \_\_\_\_\_
  - **Linear Loading Rate:** \_\_\_\_\_ Imperial Gallons/day/ft<sup>2</sup>

System Component Designs have been attached.

**Initial Treatment Component Design Details:**

Details of the initial treatment components are required for this design are attached.

Septic Tank:

- The working capacity of the septic tank specified for this design is \_\_\_\_\_ Imp. Gal.
- Tank Model Number: \_\_\_\_\_
- Specifications for the Model of Septic Tank used are attached.
- The minimum working capacity required for this development is \_\_\_\_\_ Imp. Gallons based on Table 4.2.2.2 of SOP 2009 for a \_\_\_\_\_ bedroom house ( \_\_\_\_\_ Imp. Gal/day plus the additional flow of \_\_\_\_\_ Imp. Gal, as summarized above under *Wastewater Characteristics* ).
- Burial depth of the septic tank at finished grading will be \_\_\_\_\_ inches above the top of the tank.
- This tank is rated for a maximum burial depth of : \_\_\_\_\_
- Insulation of the tank required?
  - Yes - \_\_\_\_\_
  - No

**Dose Tank:**

- The dose chamber is integral to the septic tank. It has a total capacity of \_\_\_\_\_ Imp. Gal. This is sufficient capacity to deliver the \_\_\_\_\_ Imp. Gal required for each dose of effluent. It also provides \_\_\_\_\_ Imp. Gal emergency storage above the high effluent alarm setting **(a minimum of one (1) day emergency supply is required)**.
- Specifications for the Dose Tank are attached.

**High Liquid Level Alarm:**

- Alarm Model Number: \_\_\_\_\_
- The alarm is set to activate \_\_\_\_\_ inches above the floor of the dose tank.

**Effluent Filter:**

- Filter Model Number: \_\_\_\_\_
- Filter diameter: \_\_\_\_\_ inches
- The Filter creates a head loss of 0.5 feet at its rated flow of 80 Imp. Gal/min. A 5.5 foot pressure head allowance has been included in the pump selection to allow for partially clogged conditions.
- A one year service interval is expected with typical flow volumes and wastewater characteristics.

**Soil Treatment Component Design Details:**

- The system designed for this site is a septic tank and treatment mound.
- Key design requirements:

- Expected Peak Daily Flow: \_\_\_\_\_
- Soil Loading Rate: \_\_\_\_\_
- Linear Loading Rate: \_\_\_\_\_
- Minimum in-site soil infiltration area:
  - Soil Infiltration Surface Area: \_\_\_\_\_
  - Minimum Soil Infiltration Width: \_\_\_\_\_

- The location of the disposal field and the layout of laterals are shown on the **Site Evaluation Diagram, Appendix A**
- The trench bottom sizing worksheets are completed and attached - **Appendix C**.
- The layout of the laterals have been included with the **detailed system schematics and drawings**.

### Effluent Distribution Design Detail:

Effluent Pressure Distribution:

- The Pressure Distribution, Orifice, Pipe & Pump Sizing worksheets are completed and attached
  - The Effluent Pressure Distribution is: \_\_\_\_\_

Effluent Pressure Distribution Lateral Design:

- The \_\_\_\_\_ foot long pressure distribution laterals are center fed resulting in \_\_\_\_\_ (# of) pressure distribution laterals. Each lateral is \_\_\_\_\_ inch schedule 40 PVC pipe. Each lateral has \_\_\_\_\_ (# of) 1/8 inch orifices drilled at \_\_\_\_\_ foot spacing. Orifices will be offset between the two laterals along its length.
- The design achieves a minimum of 5 foot pressure head at each orifice, resulting in a design flow of \_\_\_\_\_ Imp. Gal/Minute from each 1/8 inch orifice.
- There are \_\_\_\_\_ (# of) orifices throughout the effluent pressure distribution system resulting in a **total flow** of \_\_\_\_\_ Imp. Gal/minute. An additional 3.2 Imp. Gal/minute is added for the 1/4 inch drain back orifice drilled at the lowest elevation of the effluent piping in the dose tank to achieve drain back of the laterals and supply piping.
- **Total flow required for the effluent pressure distribution system is \_\_\_\_\_ Imp. Gal./minute.**

### Pressure Head:

Pressure Head Requirements:

- The total length of supply piping from the pump to the start of the pressure distribution laterals is \_\_\_\_\_ feet. The supply piping is **2 inch Schedule 40 PVC pipe**. The allowance for equivalent length of pipe due to fittings is \_\_\_\_\_ feet of pipe. The equivalent length of pipe is \_\_\_\_\_ feet. This is detailed in **Appendix D**.

Pressure Head Loss Due to Friction:

- The friction loss through the \_\_\_\_\_ feet of piping and filter at the flow of \_\_\_\_\_ Imp. Gal/min is \_\_\_\_\_ feet of head pressure.

Other Friction Loss Considerations:

- Allowance for head loss through the effluent filter under partial plugging is 5.5 feet.
- Allowance for pressure head loss along the pressure distribution laterals is 1 foot.
- **The total pressure head required to overcome friction loss is \_\_\_\_\_ feet pressure head.**

Pressure Head to Meet Vertical Lift Requirements Included:

- A pressure head at each orifice of 5 feet.
- Light distance of effluent from the low effluent level in the tank to the pressure distribution laterals is \_\_\_\_\_ feet.

- The vertical lift and friction loss results in a **total pressure head** requirement of \_\_\_\_\_

## Pump Specifications:

- Demand for this pressure distribution lateral system is \_\_\_\_\_ Imp. Gal/minute at \_\_\_\_\_ feet of pressure head.
- The pump capacity exceeds these demands to allow for variations in the design and decreased pump performance over time.
- Effluent Pump Model specified for this system: \_\_\_\_\_
- Horsepower of Effluent Pump: \_\_\_\_\_
- The pump specifications with the effluent distribution system demands plotted on the pump curve are attached.

## Effluent Dosing Volume and Control Settings:

- The volume of effluent discharge in a single dose event needs to be less than 20% of the daily flow, which is \_\_\_\_\_ gallons.
- The volume of an individual dose must be at least 5 times the volume of the pressure distribution laterals, which is \_\_\_\_\_ Imp. Gallons.
- Therefore, the individual dose volume selected is \_\_\_\_\_ gallons.

## Effluent Level Float Control Settings:

- The volume in the \_\_\_\_\_ feet of **2 inch PVC** effluent supply is \_\_\_\_\_ gallons.
- The **total individual dose volume** determining float settings is \_\_\_\_\_ Imp. gallons to fill the effluent supply line and deliver the \_\_\_\_\_ Imp. gallons per dose.
- The dose tank dimensions result in \_\_\_\_\_ gallons per inch of depth.
- The float control elevations shall be set at:
  - \_\_\_\_\_ inches between float off and on elevations.
  - Off: \_\_\_\_\_ inches off floor of dose tank.
  - On: \_\_\_\_\_ inches off floor of dose tank.
  - inches off floor based on elevations set out in this design.
- The effluent level control floats will be attached to an independent PVC pipe float mast.**

## Operation Monitoring:

The following components are included in the system design and detailed drawings showing locations have been attached:

- Monitoring Ports - provided at both ends of the laterals to enable inspection of the effluent ponding depth that may result.
- Pressure Distribution Lateral Clean Outs - provided at the end of each pressure distribution lateral with access to grade through an access box suitable for its purpose and anticipated traffic.

## Effluent Quality Sampling:

- Effluent samples can be taken from the effluent dose tank if required.

## Initial Operational Setup Parameters:

The following activities need to be conducted to commission the system:

- Clean the septic tank and effluent chamber of any construction debris.
- Flush effluent distribution laterals.

- Conduct a squirt test to assess the residual head pressure required by the design is achieved and that the volume from each orifice is within allowed tolerances.
- Confirm the correct float levels and ensure this delivers the dose volume required by this design.

**Operation and Maintenance Manual:**

- The Owner's Manual detailing the design, operation, and maintenance of the installed system will be provided to the owner in accordance with **Article 2.1.2.8.** of the **Standard of Practice.**

**Signature and Closing by the Designer/Installer:**

This design has been developed by \_\_\_\_\_. This design meets the requirements of the **Alberta Private Sewage System Standard of Practice 2009** unless specifically noted otherwise and in such case special approval is to be obtained prior to proceeding with installation of this design.

Signature of Designer/Installer: \_\_\_\_\_





# Disposal Field

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## Appendix B - Soil Log Report: Test Pit 1

**Alberta Private Sewage Treatment System Soil Profile Log Form**

Owner Name or Job ID:											
Legal Land Location					Test Pit GPS Coordinates						
LSD-1/4	Sec	Twp	Rg	Mer	Lot	Block	Plan	Easting	Northing		
Vegetation notes:					Overall site slope % Slope position of test pit:						
Test hole No.	Soil Subgroup	Parent Material	Drainage	Depth of Lab sample #1	Depth of Lab sample #2						
Hori- zon	Depth (cm) (in)	Texture	Lab or HT	Colour	Gleying	Mottling	Structure	Grade	Consistence	Moisture	% Coarse Fragments
Depth to Groundwater		Restricting Soil Layer Characteristic									
Depth to Seasonally Saturated Soil		Depth to restrictive Soil Layer									
Site Topography		Depth to Highly Permeable Layer Limiting Design									
Key Soil Characteristics applied to system design effluent loading											
Weather Condition notes:											
Comments: such as root depth and abundance or other pertinent observations:											



# Disposal Field

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## Appendix B - Soil Log Report: Test Pit 2

**Alberta Private Sewage Treatment System Soil Profile Log Form**

Owner Name or Job ID:											
Legal Land Location					Test Pit GPS Coordinates						
LSD-1/4	Sec	Twp	Rg	Mer	Lot	Block	Plan	Easting	Northing		
Vegetation notes:					Overall site slope % Slope position of test pit:						
Test hole No.	Soil Subgroup	Parent Material	Drainage	Depth of Lab sample #1	Depth of Lab sample #2						
Hori- zon	Depth (cm) (in)	Texture	Lab or HT	Colour	Gleying	Mottling	Structure	Grade	Consistence	Moisture	% Coarse Fragments
Depth to Groundwater		Restricting Soil Layer Characteristic									
Depth to Seasonally Saturated Soil		Depth to restrictive Soil Layer									
Site Topography		Depth to Highly Permeable Layer Limiting Design									
Key Soil Characteristics applied to system design effluent loading											
Weather Condition notes:											
Comments: such as root depth and abundance or other pertinent observations:											

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### Appendix C - Primary Effluent Treatment Field

#### Trench Bottom Surface Area & Length Sizing

This design worksheet was developed by Alberta Municipal Affairs and Alberta Onsite Wastewater Management Association.

The complete system is to comply with Alberta Private Sewage Standard of Practice 2009

**This worksheet does NOT consider all of the requirements of the Mandatory Standard.**

Use only Imperial units of measurement throughout (feet, inches, Imperial gallons, etc...)

<p><b>Step 1) Determine the expected volume of sewage per day:</b></p> <p><small>Note: Use Table 2.2.2.2.A. (p.30) &amp; 2.2.2.2.B. (p.31) as a guide to determine expected volume of sewage per day. Provide allowance for additional flow factors as detailed in Table 2.2.2.3. (p.32)</small></p> <div style="text-align: right;"> <p>Expected Volume of Sewage per Day</p> <div style="border: 1px solid black; width: 150px; height: 20px; margin: 0 auto;"></div> <p style="color: red; font-weight: bold;">F1</p> </div> <p><small>Assure that the sewage strength does not exceed the requirements of 2.2.2.1.(2) (p 30) Effluent quality must meet the requirement of Article 8.1.1.6(1)(a) page 97.</small></p>
<p><b>Step 2) Determine the design soil effluent loading rate:</b></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; width: 80px; height: 20px; text-align: center; font-size: 8px;">Texture</div> <span style="font-size: 24px;">&amp;</span> <div style="border: 1px solid black; width: 80px; height: 20px; text-align: center; font-size: 8px;">Structure</div> <span style="font-size: 24px;">&amp;</span> <div style="border: 1px solid black; width: 80px; height: 20px; text-align: center; font-size: 8px;">Grade</div> <span style="font-size: 24px;">=</span> <div style="border: 1px solid black; width: 100px; height: 20px; text-align: center; font-size: 8px;">Soil Effluent Loading Rate [From &gt;30 - 150 mg/L column]</div> <span style="font-size: 24px;">Imp. gal/ sq.ft./day</span> <span style="color: red; font-weight: bold; font-size: 24px;">F2</span> </div> <p><small>Note: Effluent loading rate MUST be determined from soil texture, structure, and grade classification according to Imperial Table A.1.E.1. (p.151).</small></p> <p><small>Note: Ensure infiltration loading rate chosen does not exceed loading rates as set out in 8.1.2.2. (p. 101).</small></p>
<p><b>Step 3) Calculate the required infiltration surface area for the soil BEFORE area reduction factors:</b></p> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="text-align: center;"> <p>Expected Volume of Sewage per day</p> <div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto;"></div> <p style="font-size: 8px;">Imp. gal/day</p> <p style="color: red; font-weight: bold; font-size: 10px;">From F1</p> </div> <span style="font-size: 24px;">÷</span> <div style="text-align: center;"> <p>Soil Effluent Loading Rate</p> <div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto;"></div> <p style="font-size: 8px;">Imp. gal/sq. ft/day</p> <p style="color: red; font-weight: bold; font-size: 10px;">From F2</p> </div> <span style="font-size: 24px;">=</span> <div style="text-align: center;"> <p>Soil Infiltration Area Required</p> <div style="border: 1px solid black; width: 150px; height: 20px; margin: 0 auto;"></div> <p style="font-size: 8px;">sq.ft.</p> <span style="color: red; font-weight: bold; font-size: 24px;">F3</span> </div> </div> <p style="text-align: center; font-size: 10px; margin-top: 5px;">At no time shall primary treated effluent loading rates exceed the loading rates for secondary treated effluent.</p>
<p><b>Step 4) Type and width of trench bottom used:</b></p> <div style="margin-top: 10px;"> <p>Actual Pipe &amp; Rock Trench Width in inches.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; width: 100px; height: 20px; text-align: center; font-size: 8px;"></div> <span style="font-size: 24px;">inches</span> <span style="font-size: 24px;">÷</span> <div style="border: 1px solid black; width: 80px; height: 20px; text-align: center; font-size: 12px;">12</div> <span style="font-size: 24px;">=</span> <div style="border: 1px solid black; width: 100px; height: 20px; text-align: center; font-size: 8px;"></div> <span style="font-size: 24px;">feet</span> <span style="color: red; font-weight: bold; font-size: 24px;">F4</span> </div> </div> <div style="margin-top: 5px;"> <p>Actual Chamber Width in inches</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; width: 100px; height: 20px; text-align: center; font-size: 8px;"></div> <span style="font-size: 24px;">inches</span> <span style="font-size: 24px;">÷</span> <div style="border: 1px solid black; width: 80px; height: 20px; text-align: center; font-size: 12px;">12</div> <span style="font-size: 24px;">=</span> <div style="border: 1px solid black; width: 100px; height: 20px; text-align: center; font-size: 8px;"></div> <span style="font-size: 24px;">feet</span> <span style="color: red; font-weight: bold; font-size: 24px;">F4A</span> </div> </div>

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### Appendix C - Primary Effluent Treatment Field

**Step 5) Calculate optional credited loading rates for distribution systems:**

Primary treated effluent is required to have a minimum 5 feet Vertical Separation below infiltration zone.

		X		=	Credited Width of Trench (feet)	
Pipe & Rock Trench	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto; text-align: center; font-size: 8px;">Actual Width In Feet</div> <span style="color: red; font-size: 10px;">From F4</span>	X	<div style="border: 1px solid black; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">1</div>	=	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto; text-align: center; font-size: 8px;">3 ft. Maximum</div>	F5
Pipe & Rock Trench with Pressure Distribution	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto; text-align: center; font-size: 8px;">Actual Width In Feet</div> <span style="color: red; font-size: 10px;">From F4</span>	X	<div style="border: 1px solid black; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">1.2</div>	=	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto; text-align: center; font-size: 8px;">3 ft. Maximum</div>	F5
Chambers - Gravity Feed	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto; text-align: center; font-size: 8px;">Width of Chamber In Feet</div> <span style="color: red; font-size: 10px;">From F4A</span>	X	<div style="border: 1px solid black; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">1.1</div>	=	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto; text-align: center; font-size: 8px;">3 ft. Maximum</div>	F5A
Chambers - Pressure Distribution	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto; text-align: center; font-size: 8px;">Width of Chamber In Feet</div> <span style="color: red; font-size: 10px;">From F4A</span>	X	<div style="border: 1px solid black; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;">1.3</div>	=	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto; text-align: center; font-size: 8px;">3 ft. Maximum</div>	F5B

**Step 6) Determine linear feet of trench required:**

<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto; text-align: center; font-size: 8px;">Infiltration Area Required</div> <span style="color: red; font-size: 10px;">From F3 or F3A</span>	sq. ft.	÷	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto; text-align: center; font-size: 8px;">Credited Width of Trench</div> <span style="color: red; font-size: 10px;">From F5, F5A or F5B</span>	ft.	=	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto; text-align: center; font-size: 8px;">Total Trench Length in Field</div>	feet	F6
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**Step 7) Select number of weeping lateral trenches and Determine length of each of trench:**

<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto; text-align: center; font-size: 8px;">Total Trench Length Required in Field</div> <span style="color: red; font-size: 10px;">From F6</span>	ft.	÷	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto; text-align: center; font-size: 8px;">Number of Individual Weeping Lateral Trenches</div> <span style="color: red; font-size: 10px;">F7 Designer Determination</span>	=	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto; text-align: center; font-size: 8px;">Length of Each Weeping Lateral Trench</div>	feet	F8
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It is good practice is to make the overall field area long and narrow when possible on a particular site.

**Step 8) Summary:**

F1		Imp. gal/day - Daily Flow, including any additional fixtures.
F2		Imp. gal/sq.ft. - Effluent Loading Rate.
F3 or F3A		Sq. Ft. - Soil Infiltration Surface Area.
F4		Ft. - Actual width of Gravel Trench or Chamber.
F5A or B		Ft. - Credited Width of Gravel Trench or Chambers.
F6		Ft. - Total trench length required.
F7		Number of weeping lateral trenches.
F8		Ft. - Length of each weeping lateral trench.

# Disposal Field

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## Appendix D - Pressure Distribution, Orifice, Pipe & Pump Sizing

This design worksheet was developed by Alberta Municipal Affairs and Alberta Onsite Wastewater Management Association.

The completed installation is to comply with Alberta Private Sewage Standard of Practice 2009.

This worksheet is for use in Alberta to: size the orifices in distribution lateral pipes, size effluent delivery piping, and to calculate the required capacity and pressure head capability of the effluent pump.

It can be used for: calculating deliver of effluent to laterals in disposal fields, mounds and sand filters.

**This worksheet does NOT consider all of the mandatory requirements of the Standard.**

**It is intended for use by persons having training in the private sewage discipline.**

Note: Page numbers refer to the Private Sewage Systems Standard of Practice 2009.

Use only Imperial units of measurement throughout (feet, inches, Imperial gallons, etc...).

**Step 1) Select the pressure head to be maintained at the orifices:**  
 Minimum pressure at the orifice:  
 3/16" or less orifice = 5 ft. Minimum - 2.6.2.5 (1), (p 48)  
 larger than 3/16" orifice = 2 ft. Minimum - 2.6.2.5 (1) (p 48)

Design pressure at lateral orifices  ft. P1

Note: worksheet will not provide an adequate design if laterals are at different elevations. Differing elevations will result in a different pressure head and volume of discharge at the orifices in each lateral. Additional considerations must be made for laterals at differing elevations.

**Step 2) Select the size of orifice in the laterals:**

Minimum size: 2.6.1.5. (1)(e) p. 46      1/8"      Orifice Diameter selected  in. P2

Note: larger sizes are less likely to plug.

**Step. 3) Select the spacing of orifices and determine the number of orifices to be installed in distribution laterals:**

Length of Distribution Lateral From system design drawings	ft.	÷	Spacing of Orifices selected for design	ft.	=	Resulting number of orifices per lateral	
<input style="width: 100%; height: 20px;" type="text"/>			<input style="width: 100%; height: 20px;" type="text"/>			<input style="width: 100%; height: 20px;" type="text"/>	P3a

Select a spacing of orifices to attain even distribution over the treatment area:  
 Maximum spacings are determined for :  
 \* 5 ft. Primary treated effluent: 2.6.1.5 (e) (pp. 46 - 47)  
 \* 3 ft. Secondary treated effluent: 8.1.1.8 & 2.6.2.2 (c) (pp 98 & 47 - 48)  
 \* 3 ft. On sandy textured soils: 8.1.1.8 (p. 98)

<input style="width: 80%; height: 20px;" type="text"/>	X	<input style="width: 80%; height: 20px;" type="text"/>	=	<input style="width: 95%; height: 20px;" type="text"/>	P3b
From P3a		Number of Laterals		Total Number of Orifices All Laterals	

If laterals are of differing lengths, calculate each separately and add the number of orifices together.

**Step 4) Determine the minimum pipe size of the distribution laterals:**

Enter the system design information into the 3 boxes below. If distribution laterals are of differing lengths, each lateral must be considered separately.

Orifice Diameter	Length of Distribution Lateral	Total Orifices Each Lateral
<input style="width: 95%; height: 20px;" type="text"/> in.	<input style="width: 95%; height: 20px;" type="text"/> ft.	<input style="width: 95%; height: 20px;" type="text"/>
From P2	From System Design Drawings	From P3a

Use Table A.1.A. (pp 140 - 143) when applying the information entered in this step to determine the minimum size of the distribution lateral pipe.

Size of Distribution Lateral Pipe  in. P4

From Table A.1.A.

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### Appendix D - Pressure Distribution, Orifice, Pipe & Pump Sizing

**Step 5) Determine the total flow from all orifices:**

Total Number of Orifices in all laterals <input style="width: 100%; height: 20px;" type="text"/> From P3b	X	Gal/min for each Orifice at Head Pressure Selected <input style="width: 100%; height: 20px;" type="text"/> From Table A.1.B. (pp 144 & 145)	Imp. gal /min.	=	Total flow from all lateral orifices <input style="width: 100%; height: 20px;" type="text"/> Imp. gal /min.	<b>P5</b>
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**Step 6) Select the type and size of effluent delivery pipe:**

Use Tables A.1.C.1 to A.1.C.4 (pp 146 - 149) to aid in decision. A larger pipe will reduce pressure loss.

	Type of pipe used for effluent delivery <input style="width: 100%; height: 20px;" type="text"/>	Pipe size selected <input style="width: 100%; height: 20px;" type="text"/>	inch - NPS	<b>P6</b>
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Choose a friction loss from Tables A.1.C.1 to A.1.C.4 in between the bolded lines to ensure a flow velocity between 2 to 5 feet per second. The pipe size selected will affect the amount of friction loss the pump must overcome to deliver effluent.

**Step 7) Calculate the equivalent length of pipe for pressure loss due to fittings:**

Insert total from Worksheet "A" on last page (p.5) of this Pressure Distribution Worksheet

	Equivalent Length of All Fittings <input style="width: 100%; height: 20px;" type="text"/>	ft.	<b>P7</b>
		For Pressure Loss	

**Step 8) Calculate the equivalent length of pipe from pump to the farthest end of header of distribution laterals for pressure loss:**

Length of Piping (ft) <input style="width: 100%; height: 20px;" type="text"/>	+	Equivalent Length of Fittings (ft) <input style="width: 100%; height: 20px;" type="text"/>	=	Length of Pipe for Friction Loss (ft) <input style="width: 100%; height: 20px;" type="text"/>	<b>P8</b>
Length from pump to farthest end of distribution header supplying laterals.		Equivalent fitting length from <b>P7</b> .		Used to determine total pressure head loss due to friction loss in piping.	

**Step 9) Calculate the pressure head loss in delivery pipe including fittings:**

Total Length of Pipe for Friction Loss <input style="width: 100%; height: 20px;" type="text"/>	Divide by 100 ft.	Friction Loss per 100 feet of pipe <input style="width: 100%; height: 20px;" type="text"/>	ft.	=	Delivery Piping Pressure Head Loss <input style="width: 100%; height: 20px;" type="text"/>	ft.	<b>P9</b>
From P8		Use Tables A.1.C. On pp 146 - 150 using flow volume from <b>P5</b> .					
Don't forget to divide the length by 100 feet to match the factors in the tables.							

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### Appendix D - Pressure Distribution, Orifice, Pipe & Pump Sizing

**Step 10) Calculate the total pressure head required at pump:**

Delivery piping pressure loss	<input style="width: 100%;" type="text"/>	ft.	<b>From P9</b>
	+		
Lift distance of effluent from effluent level in tank to orifices	<input style="width: 100%;" type="text"/>	ft.	Measure from lowest effluent level in tank to elevation of orifices.
	+		
Design pressure at orifices	<input style="width: 100%;" type="text"/>	ft.	<b>From P1</b>
	+		
Head loss allowed if an inline filter is used in pressure piping	<input style="width: 100%;" type="text"/>	ft.	Explain Pressure Loss Allowed if Applied <input style="width: 100%; height: 20px;" type="text"/>
	+		
Add 1 ft to allow for pressure loss along the distribution lateral	<input style="width: 100%; text-align: center; value: 1;" type="text"/>	ft.	
	=		
<b>Total minimum pressure head pump must provide at Imp. gal/min required to supply orifices</b>	<input style="width: 100%;" type="text"/>	ft.	<b>P10</b>

**Step 11) Select the size of the drain back orifice if used and determine the flow from the drain back orifice. Then calculate total flow requirement for pump:**

Size of Drain Back Orifice	Determine flow using Head Pressure at Drain Back Orifice	Flow from all lateral orifices		Total Imp. Gallons per Minute from the pump	
<input style="width: 100%;" type="text"/> in.	<input style="width: 100%;" type="text"/> Imp. gal /min	+	<input style="width: 100%;" type="text"/> Imp. gal /min	=	<input style="width: 100%;" type="text"/> Imp. gal /min <b>P11</b>
	Use pressure head from P10 to find flow from Extended Table A.1.B.1		From P5		

**Step 12) Details of the pump specifications required:**

Required Flow Rate (Imp. gal/min)	@	Required Pressure Head (ft)	Select the appropriate pump by reviewing the pump curve of available pumps. Select a pump that exceeds the requirements set out in this step by approximately 10% considering both pressure head and volume.
<input style="width: 100%;" type="text"/>		<input style="width: 100%;" type="text"/>	
From P11		From P10	
Imp. gal (P11) multiplied by 1.2 = U.S. gallons		Required Flow Rate (US gal/min)	
		<input style="width: 100%;" type="text"/>	

**Step 13) Consider the pumping demands of the system. If they are considered excessive, redesign the pressure distribution system and recalculate the pump demands.**

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**Appendix D - Pressure Distribution, Orifice, Pipe & Pump Sizing**

Worksheet "Appendix A" Determine Equivalent Length of Pipe due to fittings in piping system.

Determine the equivalent length of pipe to allow for friction loss due to fittings in the piping system:

	Number of Fittings		Friction loss as per Table A.1.C.5 or 6 (p. 150)		Total	
90° Elbows	<input style="width: 100%;" type="text"/>	X	<input style="width: 100%;" type="text"/>	=	<input style="width: 100%;" type="text"/>	
					+	
45° Elbows	<input style="width: 100%;" type="text"/>	X	<input style="width: 100%;" type="text"/>	=	<input style="width: 100%;" type="text"/>	
					+	
Gate and Ball Valves	<input style="width: 100%;" type="text"/>	X	<input style="width: 100%;" type="text"/>	=	<input style="width: 100%;" type="text"/>	
					+	
Tee-on-Branch (TOB)	<input style="width: 100%;" type="text"/>	X	<input style="width: 100%;" type="text"/>	=	<input style="width: 100%;" type="text"/>	
					+	
Tee-on-Runs (TOR)	<input style="width: 100%;" type="text"/>	X	<input style="width: 100%;" type="text"/>	=	<input style="width: 100%;" type="text"/>	
					+	
Male Iron pipe Adaptors (M/F Threaded Adaptors)	<input style="width: 100%;" type="text"/>	X	<input style="width: 100%;" type="text"/>	=	<input style="width: 100%;" type="text"/>	
					=	
Total Equivalent Length of pipe to allow for fittings in piping system					(Enter this total, Box P7)	<input style="width: 100%;" type="text"/>