



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 bodies, and other pertinent information (*as per Part 7 of the Private Sewage Standard of Practice 2009*).
- 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.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/ft²

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/ft²

- 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 - **Ap**
- 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.
 - 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

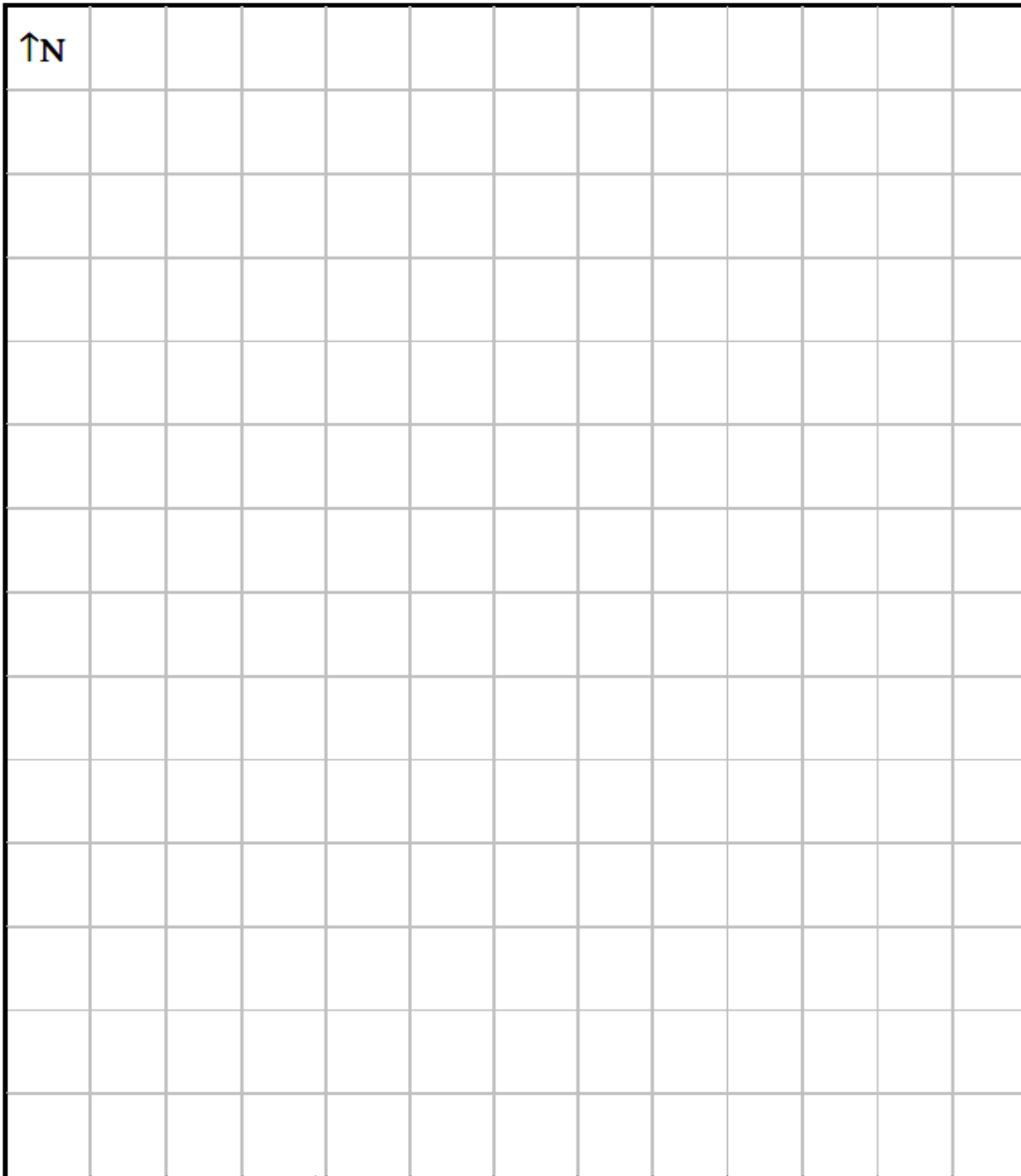
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Appendix A - Site Evaluation Diagram:

Please show the proposed location of the onsite sewage system and indicate the distances from the following:

- | | | | |
|----------------|---------------|-------------------------|-------------------------|
| Bedrock | Trees | Driveways | Easement Lines |
| Outcrops | Floodplains | Existing Sewage Systems | Ditches or Interceptors |
| Buildings | Wells | Underground Utilities | Banks or Steep Slopes |
| Property Lines | Waste Sources | Soil Test Pits | Fills |



Please indicate:

 Drainage Course	 Slope Direction	Test Pit 1 Test Pit 1 <input type="checkbox"/>	Test Pit 2 Test Pit 2 <input type="checkbox"/>
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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											
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
Horizon	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...)

Step 1) Determine the expected volume of sewage per day: <small>Note: Use Table 2.2.2.2.A. (p.30) & 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>			
	Expected Volume of Sewage per Day <input style="width: 150px; height: 20px;" type="text"/>		F1
<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>			
Step 2) Determine the design soil effluent loading rate:			
<input style="width: 80px; height: 20px;" type="text"/> Texture	&	<input style="width: 60px; height: 20px;" type="text"/> Structure	&
<input style="width: 60px; height: 20px;" type="text"/> Grade	=	<input style="width: 80px; height: 20px;" type="text"/> Soil Effluent Loading Rate [From >30 - 150 mg/L column] Imp. gal/ sq.ft./day	F2
<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). Note: Ensure infiltration loading rate chosen does not exceed loading rates as set out in 8.1.2.2. (p. 101).</small>			
Step 3) Calculate the required infiltration surface area for the soil BEFORE area reduction factors:			
<input style="width: 150px; height: 20px;" type="text"/> Expected Volume of Sewage per day Imp. gal/day From F1	÷	<input style="width: 100px; height: 20px;" type="text"/> Soil Effluent Loading Rate Imp. gal/sq. ft./day From F2	=
			<input style="width: 150px; height: 20px;" type="text"/> Soil Infiltration Area Required sq.ft. From F3
<small>At no time shall primary treated effluent loading rates exceed the loading rates for secondary treated effluent.</small>			
Step 4) Type and width of trench bottom used:			
Actual Pipe & Rock Trench Width in inches. <input style="width: 100px; height: 20px;" type="text"/> inches	÷	<input style="width: 60px; height: 20px;" type="text"/> 12	=
			<input style="width: 100px; height: 20px;" type="text"/> feet From F4
Actual Chamber Width in inches <input style="width: 100px; height: 20px;" type="text"/> inches	÷	<input style="width: 60px; height: 20px;" type="text"/> 12	=
			<input style="width: 100px; height: 20px;" type="text"/> feet From F4A



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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.

Pipe & Rock Trench	<div style="border: 1px solid black; width: 100px; height: 30px; margin: 0 auto; text-align: center; font-size: 8px;">Actual Width In Feet</div> From F4	X	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; text-align: center; font-size: 12px;">1</div>	=	<div style="border: 1px solid black; width: 100px; height: 30px; 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: 30px; margin: 0 auto; text-align: center; font-size: 8px;">Actual Width In Feet</div> From F4	X	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; text-align: center; font-size: 12px;">1.2</div>	=	<div style="border: 1px solid black; width: 100px; height: 30px; 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: 30px; margin: 0 auto; text-align: center; font-size: 8px;">Width of Chamber In Feet</div> From F4A	X	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; text-align: center; font-size: 12px;">1.1</div>	=	<div style="border: 1px solid black; width: 100px; height: 30px; 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: 30px; margin: 0 auto; text-align: center; font-size: 8px;">Width of Chamber In Feet</div> From F4A	X	<div style="border: 1px solid black; width: 30px; height: 30px; margin: 0 auto; text-align: center; font-size: 12px;">1.3</div>	=	<div style="border: 1px solid black; width: 100px; height: 30px; 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;"></div> From F3 or F3A	sq. ft.	÷	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto;"></div> From F5, F5A or F5B	ft.	=	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto;"></div> From F6	feet	F6
---	---------	---	--	-----	---	--	------	----

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;"></div> From F6	ft.	÷	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto;"></div> F7 Designer Determination	=	<div style="border: 1px solid black; width: 100px; height: 20px; margin: 0 auto;"></div> From F8	feet	F8
--	-----	---	--	---	--	------	----

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.



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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	Spacing of Orifices selected for design	÷		=	Resulting number of orifices per lateral	
<input style="width: 100%; height: 20px;" type="text"/> ft.	<input style="width: 100%; height: 20px;" type="text"/> ft.				<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: 100%; height: 20px;" type="text"/>	X	<input style="width: 100%; height: 20px;" type="text"/>	=	<input style="width: 100%; height: 20px;" type="text"/>	
From P3a		Number of Laterals		Total Number of Orifices All Laterals	P3b

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 <input style="width: 100%; height: 20px;" type="text"/> in.	Length of Distribution Lateral <input style="width: 100%; height: 20px;" type="text"/> ft.	Total Orifices Each Lateral <input style="width: 100%; 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: 30px;" type="text"/> From P3b	X	Gal/min for each Orifice at Head Pressure Selected <input style="width: 100%; height: 30px;" type="text"/> Imp. gal /min. From Table A.1.B. (pp 144 & 145)	=	Total flow from all lateral orifices <input style="width: 100%; height: 30px;" type="text"/> Imp. gal /min. P5
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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 P6
--	--	---	--

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. P7 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: 30px;" type="text"/>	+	Equivalent Length of Fittings (ft) <input style="width: 100%; height: 30px;" type="text"/>	=	Length of Pipe for Friction Loss (ft) <input style="width: 100%; height: 30px;" type="text"/> P8
Length from pump to farthest end of distribution header supplying laterals.		Equivalent fitting length from P7 .		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: 30px;" type="text"/>	Divide by 100 ft.	Friction Loss per 100 feet of pipe <input style="width: 100%; height: 30px;" type="text"/> ft.	=	Delivery Piping Pressure Head Loss <input style="width: 100%; height: 30px;" type="text"/> ft. P9
From P8		Use Tables A.1.C. On pp 146 - 150 using flow volume from P5 .		
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		ft.	From P9
	+		
Lift distance of effluent from effluent level in tank to orifices		ft.	Measure from lowest effluent level in tank to elevation of orifices.
	+		
Design pressure at orifices		ft.	From P1
	+		
Head loss allowed if an inline filter is used in pressure piping		ft.	Explain Pressure Loss Allowed if Applied
	+		
Add 1 ft to allow for pressure loss along the distribution lateral	1	ft.	
Total minimum pressure head pump must provide at Imp. gal/min required to supply orifices		ft.	P10

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	
				P11
in.	Imp. gal /min	Imp. gal /min	Imp. gal /min	
		+	=	
	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.
From P11		From P10	
Imp. gal (P11) multiplied by 1.2 = U.S. gallons		Required Flow Rate (US gal/min)	

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



Disposal Field

Permit Number: **PRPSW**

Roll Number: _____

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		X		=	
					+
45° Elbows		X		=	
					+
Gate and Ball Valves		X		=	
					+
Tee-on-Branch (TOB)		X		=	
					+
Tee-on-Runs (TOR)		X		=	
					+
Male Iron pipe Adaptors (M/F Threaded Adaptors)		X		=	
					=
Total Equivalent Length of pipe to allow for fittings in piping system					
					(Enter this total, Box P7)