Bag 1010 Bonnyville, AB T9N 2J7
P: 780-826-3171 F: 780-826-4524
E: planning@md.bonnyville.ab.ca

M.D. of Bonnyville No. 87 Private Sewage Disposal System Permit Application

Sewer Permit Label

Please call or email the MD office prior to concealment to request an inspection.
A minimum of 48 hours notice is required.

PSDS Permit #: ____________ Roll #: ____________ Application Date: ____________

Building Permit # : ____________ Permit Issue Date: ____________

Permit Type: ☐ Residential Property Owner ☐ Certified PSDS Contractor

Does this installation require building and development permits: Yes ☐ No ☐

Legal Location: PLAN ________ BLK ____ LOT ____ PART ______ 1/4 SEC ______ TWP ______ RG ______ W4M

Rural Address: ____________ Parcel Size: ____________ (acres)

Owner Name: ____________

Mailing Address: ____________ Postal Code: ____________

Phone Number: ____________ Other Phone Number: ____________

Email: ____________

WE PROPOSE TO DO AN INSTALLATION AT THE ABOVE PREMISES ZONED AS: ☐ New ☐ Replacement
☐ Residential ☐ Commercial ☐ Industrial ☐ Institutional ☐ Recreational

DESCRIPTION OF INSTALLATION: ____________

System Design Criteria:

Expected daily volume of effluent: ________ # of Bedrooms: ________
Depth of Water Table if less than 3m from ground surface: ________
Water Softener: Yes ☐ No ☐ Iron Filter: Yes ☐ No ☐
Reverse Osmosis: Yes ☐ No ☐

Water Supply Detail:

Municipal/Community ☐ Dug Well ☐
Drilled Well ☐ Bored Well ☐
Casting Depth (Feet): ________ Capacity (Gallons): ________
Cistern: ☐ Concrete ☐ Fibreglass ☐ Other ________

FOR INSPECTOR USE ONLY

The Permit Holder hereby certifies that this installation will be completed in accordance with the Alberta Safety Codes Act and Regulations and shall be commenced within 90 days. The permit may expire in 2 years. Owner's signature/declaration (homeowner permits only) "I hereby declare I am the owner of the premises in which the work will be conducted and reside on the property. I am doing the work myself and assume responsibility for compliance with the applicable Act and Regulations.

Total Permit Fee: ________ Job Value: ________
Payment: ☐ Cheque ☐ Cash ☐ Interac
☐ MasterCard ☐ Visa ☐ Invoice Account

Permit Issuer Name: ____________
Designation #: ____________
Permit Issuer Signature: ____________
Agency: ________ (6112) Admin: ________ (6114)
Safety Code: ________ (6113) R#: ________

OFFICE USE ONLY

Permit Holder Signature: ____________
Permit Holder Name: ____________
Certification Number: ____________
Estimated Start Date: ____________
Estimated Completion Date: ____________
Company Name: ____________
Mailing Address: ____________
____________ Postal Code: ____________
Phone: ____________ Fax: ____________
Email: ____________

Site Evaluation Details:

Date of Site Evaluation:________________ Time of Day:___________ Number of test pits:_____

Name of Certified Laboratory:_______________________
Design soil texture Classification (attach lab reports and soil bore logs): _________________________

Effluent Loading Rate (gal/sq ft/day):___________ Linear Loading Rate (gal/l ft/day)_____________

Plot Plan:

Attach a drawing showing the layout including:

☐ Location and distances of the septic/holding tank/packaged treatment plant from the house or building, any water sources any bodies of water, property lines, driveways or roadways.

☐ Location and distances of the disposal field from the house or building, any water sources, any bodies of water, property lines and driveways or roadways.

Proposed Treatment and Disposal System:

Tank Information:

Septic	**Holding**	**Packaged Treatment Plant**
☐ Concrete	☐ Concrete	☐ Concrete
☐ Fibreglass	☐ Fibreglass	☐ Fibreglass
☐ Plastic	☐ Plastic	☐ Plastic
☐ Other:______________	☐ Other:______________	☐ Other:___________________

Make/Model:___________________ CSA Standard #_______________ Working Capacity (gal)__________

Discharge Information:

☐ Pump ☐ Siphon

Make/Model:________________________ Horsepower:_____________

☐ Disposal Field ☐ Treatment Mound ☐ Other:____________________

Media:______________ Gravel-depth (inches)______ Chambers-width (feet/inches)________________

Total Length of Perforated Pipe/Chamber (feet):_________ Number of runs:__________

Length of Each Run (feet):________ Trench width (feet):_______ Number of trenches:_______

Total Area of Trench Bottom (sq ft):___________

Attach completed pressure distribution worksheets, trench bottom worksheets and/or mound worksheets from the Alberta Standard of Practice Handbook to support your system design and sizing.

If this sewer system is concealed prior to application approval OR prior to final inspection, pictures of the installation and squirt height test are required to be submitted to the MD and/or the Safety Codes Officer (Inspector). This is to ensure the system has been installed to comply with the Alberta Private Sewage Standard of Practice as well as the Safety Codes Act.

Section 2.1.2.6 of the Alberta Private Sewage Systems Standard of Practice

1) On-site wastewater treatment systems designed under the prescriptive requirements of this Standard shall not receive substances and wastewater that could adversely affect the operation of the system, which include, but are not limited to, the following:[1]

a. Storm water
b. Surface water
c. Abattoir waste
d. Sub-surface seepage water from weeping tile systems, foundation drains, or subsoil foundation drainage pipes
e. Clearwater waste from a hot tub, spa or hydro massage bath that is not of the fill-and-drain design, unless the design of the septic system specifically includes capacity for the additional wastewater flow and instantaneous flow conditions the fixture will cause along with the potential disinfectants in the water
f. Clearwater waste from a swimming pool, except that the waste from the area drains around the pool area may discharge into a system
g. Commercial or industrial process wastes
h. Waste from a water filter or other water treatment device, if the on-site wastewater treatment system has not been designed to receive and treat the discharge from the filter or treatment device [2, 3, 4]
i. Wastes from an iron filter (doesn't matter if it uses chemicals or not)
j. Other wastes not considered in the design of the system

[1] Intent: Sentence (1) – The wastewater treatment systems identified in this Standard are intended for treating wastewater. Substances, contaminants and wastewater constituents not typically expected in domestic wastewater require special consideration.
[2] Warning: Clause (1)(h) – The use of water softeners and the discharge of regeneration wastes are not specifically prohibited from discharging to an on-site wastewater treatment system. The use of sodium salts in a water softener is generally more harmful to the soil-based treatment component of a treatment system than the use of potassium-based salts. Increased sodium levels will be present I the domestic water used daily in the house, and may be further increased by the inefficient backwash functioning of a water softener that does not control the regeneration by flow volume. High levels of sodium can reduce the effectiveness of the on-site wastewater treatment system and reduce its life expectancy, particularly when it is located in fine-textured clay soils. Sodium occurring naturally in the groundwater or introduced to the water supply by a water softener using sodium salts may affect the ability of the soil to absorb the effluent. High sodium absorption ratio effluent and the presence of expansive clays, such as montmorillonite clay in the soil may cause a soil-based treatment component to fail. Additional considerations from those set out in the Standard may be required.
[3] Note: Clause (1)(h) – The use of potassium salts as a regeneration agent in a water softener is not expected to have the same negative effect on expansive clays as the use of sodium salts.
[4] Warning: Clause (1)(h) – The discharge of waste from water treatment devices can generate large volumes of water that are not included in flow estimates set out in this Standard. They may generate volumes that cannot be accurately predicted or include substances that are difficult to treat or can harm the system and cause a failure.

Clearwater waste, (as defined in the Standard of Practice), from a water softener and/or reverse osmosis system may discharge into a sewage treatment system when the soil-based treatment component of the overall system is sized to receive the additional flow from the water treatment equipment. Clearwater waste from a water softener, reverse osmosis or iron filter that were not part of the initial design, may be separately discharged into a designated drywell. (A drywell is a vertical drainage shaft or chamber constructed with perforations along its wall that aids the drainage of clearwater waste into the surrounding soil. A drywell is surrounded by crushed drainage rock to enhance infiltration capabilities and provides an additional void space for storage)

Private Sewage System Design Template

Treatment Field

PREFACE

This is a design document for a septic tank and treatment field system. It reflects the information needed to demonstrate the design considerations for the particular site and system required by the current Private Sewage Standard of Practice have been made. Considerations needed for a particular site may go beyond those used in this document.

While it is preferable to use a consistent format to facilitate quick review, other formats of the design may be accepted by the Safety Codes Officer (SCO), if the design includes the required information that shows the necessary design considerations were made.

A design is required in support of a permit application. It includes drawings and supporting information as it applies to the specific design. This is the information a SCO will review to evaluate whether design considerations required by the Standard have been adequately made prior to issuing the permit.

Including the design in the operation and maintenance manual that must be provided to the owner, will simplify development of the operation and maintenance manual.

PRIVATE SEWAGE SYSTEM DESIGN CONSIDERATIONS AND DETAIL.

Name:
Mailing Address:
City, Province: Postal Code:

Legal Description of Property: _______1/4 Sec ______ Twp _____ Rge _______ W4M
Plan:________________ Block _____ Lot _____

Municipal Address:

This private sewage system is for a _______ bedroom single family dwelling. The 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 treatment field system. This system is suitable for the site and soil conditions of your property. The design reflected in the following applies, and meets, the requirements of the current Alberta Private Sewage Systems Standard of Practice. The system will achieve effective treatment of the wastewater from this residence.

1 Wastewater Characteristics

1.1. Wastewater Peak flow

The development served is a ______ bedroom single-family dwelling. Based on the characteristics of the home identified during the review the total plumbing fixture unit load in this residence is ________. Fixture unit load is as follows:

- Main bath = _________ fixture units
- Bathroom with shower off master bedroom = ________ fixture units
- Kitchen sink = ________ fixture units
- Laundry stand pipe = ________ fixture units
- Bathroom in basement = _________fixture units
-
-
-

Total peak daily flow used in the design is:	_________ **Imp. gal/day**

1.2. 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.

Projected wastewater strength for the design is:	**BOD** _______ **mg/L** **TSS** _______ **mg/L** **Oil and Grease** _______ **mg/L**

1.3. 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.

2 Site Evaluation Findings

2.1 Site Evaluation

The lot is _________ acres (_______ hectares). The dimensions of the property are shown in the drawing attached in Appendix A. The adjacent land use is ___________________________
____.
There is a ______________ (type of water supply) and a ___________________ (type of sewage system) on the neighbouring property to the ___________ (direction north, south, etc).

___________________________ (name of lake, river, creek, etc.) runs parallel to the _____________ (direction) property line. The _________ (direction) portion of the property has a ______% slope toward the _____________(lake, creek, river, etc.). Seasonally saturated soils were found in the lower slope areas near the ______________ (direction) property line. Line locates confirmed there are no existing utilities in the area selected for the system components. **The area selected for the system must be kept clear of any utilities to be installed.** No utility right-of-ways or easements were noted on the subject site based on a review of the survey plan attached to this design and as indicated by the owner.

The site evaluation assessed the area within in _________ ft (_______ m) of all system design components. The selected treatment site is nominally flat. No significant setback constraints were noted. Pertinent features identified during the site review and the required setback distances are identified on the site plan in Appendix A.

2.2 Soils Evaluation

Two soil test pits were investigated on this site. Test pits 1 and 2 identified soil characteristics suitable for the installation of a treatment field receiving effluent from a septic tank.

There is little variability between test pits 1 and 2 so they are adequate for design purposes. The location of the test pits are shown on the site plan in Appendix A. Soil profile descriptions of each test pit are attached in Appendix B.

3 Key Soil Characteristics and Effluent Loading Rates

3.1. Restrictive Layer Considerations

A restrictive layer exists at ________ feet below surface as indicated by:

- redoximorphic features – mottling at _______ ft; gleying below ________ ft,
- saturated, sandy clay textured soil having massive structure at _________ feet will severely limit downward flow.

3.2. Limiting Condition For Soil Loading Rate Selection

The key soil characteristic affecting effluent loading is:

-

3.3. In Situ Soil Effluent Loading Rate Selection

- **effluent loading rate for primary treated (septic tank) effluent on this soil is __________ Imp. gal/day/ft².**

3.4. Effluent Linear Loading Rates and Design Considerations

The soil profile characteristics do not require the application of linear loading rates set out in the Standard. However, this design minimizes linear loading as the laterals have been oriented to make the field long and narrow and at 90 degrees (perpendicular) to the assumed direction of the underlying ground water flow toward the _____________(creek, river, lake, etc) to the _________________ (direction).

The trench bottom depth of this treatment field will be at a maximum of _________ feet below surface. For this level site the trench bottom elevation for the ____________ weeping lateral trenches are the same.

4 Initial Treatment Component Design Details

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

4.1 Septic Tank and Dose Tank

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

4.1 Septic and Dose Tank Requirements

4.1.1 Septic Tank

The working capacity of the septic tank specified for this design is _________ Imperial gallons. Appendix C includes specifications for septic tank Model ____________________.

The minimum working capacity based on Table 4.2.2.2 of the current SOP for this development is __________ Imp. gal.

Burial depth of the septic tank at finished grading above the top of the tank will be ________ ft ________ inches. This tank is rated for a maximum burial depth of ________ ft __________ inches. Insulation of the tank is not required as the burial depth exceeds ___________ feet.

4.1.2 Dose Tank

The dose tank (second chamber) has a total capacity of _________ Imp. gal. In addition to the single dose volume the tank provides approximately __________ Imp. gal emergency storage above the high effluent alarm setting. Specifications provided by the manufacturer are shown in Appendix C.

4.1.3 Effluent Filter

An inline _______ inch diameter ____________ model ____________ effluent filter having an effective opening of less than _________ inch (__________ mm) is used. When clean the filter is rated at a head loss of ________ feet at a flow of _______ Imp. gal/min. A one year service interval is expected with typical flow volumes and wastewater characteristics.

5 Soil Treatment Component Design Details

5.1 Selection of Soil Infiltration System Design

The system selected for this design is a septic tank and treatment field using __________ inch wide chambers and pressure distribution of effluent. To maintain the required __________ foot vertical separation to the restrictive layer identified in the soil profile the maximum depth of the trench bottom is ___________ feet below grade.

5.2 Treatment Field Size

Trench bottom area:

Expected peak daily flow:	_____________	Imp. gal/day
Soil loading rate:	_____________	Imp.gal/day/ft^2
Trench bottom soil infiltration surface area:	_____________	**ft^2**

The _________ inch chambers receiving primary treated effluent Level 1 that is spread over the trench bottom surface area using pressure distribution receives a _________ width credit, resulting in a credited trench bottom soil infiltration width of ___________ feet.

Total length of trench bottom required: ___________ ft

Layout consists of:

__________ weeping lateral trenches - each _________ feet long.

The location of the treatment field on the property and layout of the laterals and are shown in Appendix A and D. The treatment field sizing worksheets are provided in Appendix E.

6 Effluent Distribution Design Detail

6.1 Effluent Pressure Distribution

_________ (number) __________ ft centre fed pressure effluent distribution laterals are used over the soil infiltration area. The calculations are provided in Appendix E on the pressure distribution worksheets. The pressure distribution lateral layout drawing is included in Appendix D.

6.1.1 Effluent Pressure Distribution Lateral Design

The distribution laterals are center fed resulting in __________(number) __________ ft pressure distribution laterals.

- Each lateral is __________ inch schedule _______________ pipe.
- Each lateral has ___________, _________ inch orifices drilled at _______ foot spacing.
- The laterals shall be installed to maximize the elevation above the soil infiltration surface and exceed the minimum _________________ inches above the soil infiltration surface.
- Pressure distribution lateral piping will be supported at a maximum of _________ foot spacing.
- All orifices shall point up except every _________ orifice shall point down and be equipped with an orifice shield.

The design achieves a minimum __________ foot pressure head at each orifice, resulting in a design flow of __________ Imp. gal/min from each ____________inch orifice.

There are ___________ orifices throughout the effluent pressure distribution system resulting in a **total flow** of ____________ **Imp gal/min**. An additional ____________ Imp. gal/min is added for the ___________ 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 from all orifices for this effluent pressure distribution system is ________ Imp. gal/min (_________ U.S. gal/min).

6.1.2 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 ________ inch Schedule ___________ pipe. The allowance for equivalent length of pipe due to fittings is ___________ feet of pipe. Total equivalent length of pipe is ____________ feet. This is detailed in appendix E.

Pressure head loss due to friction
The friction loss through the piping at the flow of __________ Imp. gal/min is _________ feet of head pressure.

Other friction loss considerations required include:
- Allowance for head loss through the effluent filter under partial plugging is ____________ feet.
- Allowance for pressure head loss along the pressure distribution laterals of ___________ foot.

Total pressure head required to overcome friction loss is _________ feet pressure head.

Pressure head to meet vertical lift requirements include:
- A pressure head at each orifice of ____________ feet.
- Lift distance of effluent from the low effluent level in the tank to the pressure distribution laterals is __________ feet.

Vertical lift and friction loss results in a **total pressure head** requirement of __________ **ft**.

Pump specifications:
Demands for this pressure distribution lateral system are ___________ **Imp. gal/min (_________ U.S. gal/min)** at ____________ **feet** of pressure head.

The pump capacity must exceed these demands to allow for variations in the design and decreased pump performance over time. A _____________ model ____________ effluent pump (____________ hp) is specified for this system. The pump specifications with the effluent distribution system demands plotted on the pump curve are included in Appendix C.

6.1.3 Effluent Dosing Volume and Control settings.
The volume of effluent in the ___________ ft of _________ inch __________ (type of piping example: pvc) lateral piping is ___________ Imp. gal. The volume of an individual dose must be at least _________ times the volume of the pressure distribution laterals, which is _____________ Imp. gal.

The volume in the _________ ft of _______ inch PVC effluent supply line is ________ Imp. gal. **Total individual dose volume** determining float settings is _________ **Imp gal [________ Imp. gal to fill the effluent supply line and deliver the ______________ Imp. gal per dose]**.

7 Controls

All effluent level control floats will be attached to an independent PVC pipe float mast.

7.1 Effluent Dosing Float Setting

The dose tank dimensions result in __________ Imp. gallons per inch of depth. The float control elevations shall be set at:

- _________ inches between float off and on elevations (deliver ________ Imp. gal/dose).
- Off: ___________ inches off floor of dose tank
- On: ___________ inches off floor of dose tank

7.2 High Liquid Level Alarm

The high level alarm specified for this system is a ______________________________________ (manufactured by ___________________________________).

- Alarm control float is set at ___________ inches above pump on elevation or at ____________ inches above the floor of the dose tank/chamber.

8 Operation Monitoring Components

The following components are included in the system design. See detailed drawings in Appendix D for locations.

8.1 Monitoring Ports

Monitoring ports are provided at both ends of the sand layer to enable inspection of the effluent ponding depth that may result.

8.2 Pressure Distribution Lateral Clean Outs

Clean outs are provided at the end of each pressure distribution lateral with access to grade through an access box suitable for its purpose and anticipated traffic.

8.3 Sampling Effluent Quality

Samples of the effluent can be taken from the effluent dose chamber.

9 System Setup and Commissioning

- Clean the septic tank and effluent chamber of any construction debris.
- Flush effluent distribution laterals.
- Conduct a squirt test to assess that 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.

10 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.

Signature and closing by the designer/Installer.

Attachments:

Appendix A – Site Information [Site Plan, Property Subdivision Plan]

Appendix B – Soil Information [Soil Profile Logs, Laboratory Analysis Results]

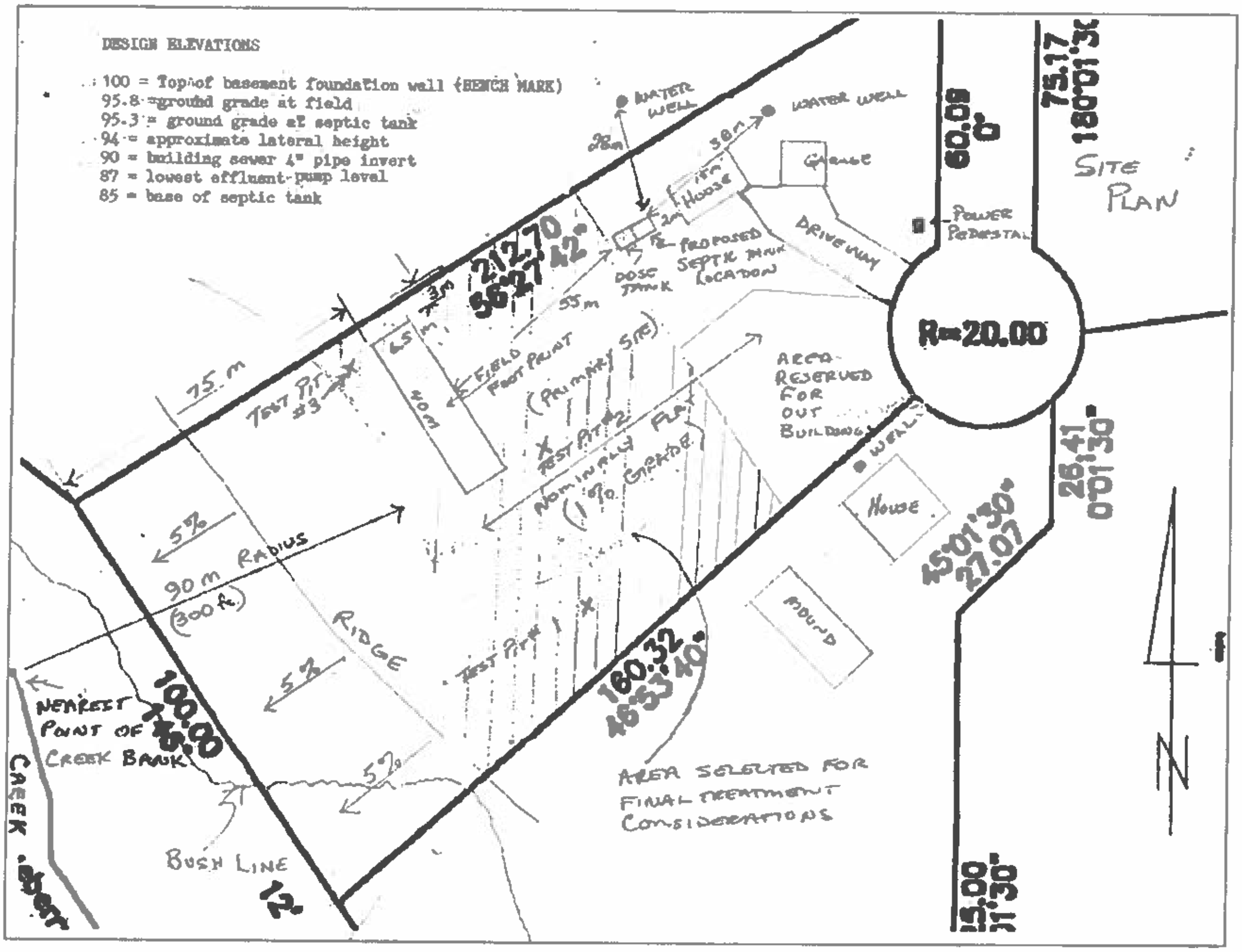
Appendix C – Manufacturer's and Design Specifications for System Components

Appendix D – Detailed System Schematics and Drawings

Appendix E – System Design Worksheets

This design has been developed by (____). This design meets the requirements of the current Alberta Private Sewage Systems Standard of Practice unless specifically noted otherwise and in such case special approval is to be obtained prior to proceeding with installation of this design. *(Carry on with any other qualifications or limitations that in your opinion as the designer/installer are needed.)*

Appendix A – Site Information



Insert your detailed site plan here and label it as above.
The one above is just an example.

(APPENDIX B)

Insert lab analysis results of soil samples taken for determining soil texture!

Appendix B - Alberta Private Sewage Treatment System Soil Profile Log Form

Legal Land Location								Test Pit GPS Coordinates	
LSD-1/4	Sec	Twp	Rg	Mer	Lot	Block	Plan	Easting	Northing

Investigation Date:	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):

Appendix B - Alberta Private Sewage Treatment System Soil Profile Log Form

Legal Land Location								Test Pit GPS Coordinates	
LSD-1/4	Sec	Twp	Rg	Mer	Lot	Block	Plan	Easting	Northing

Investigation Date:	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			

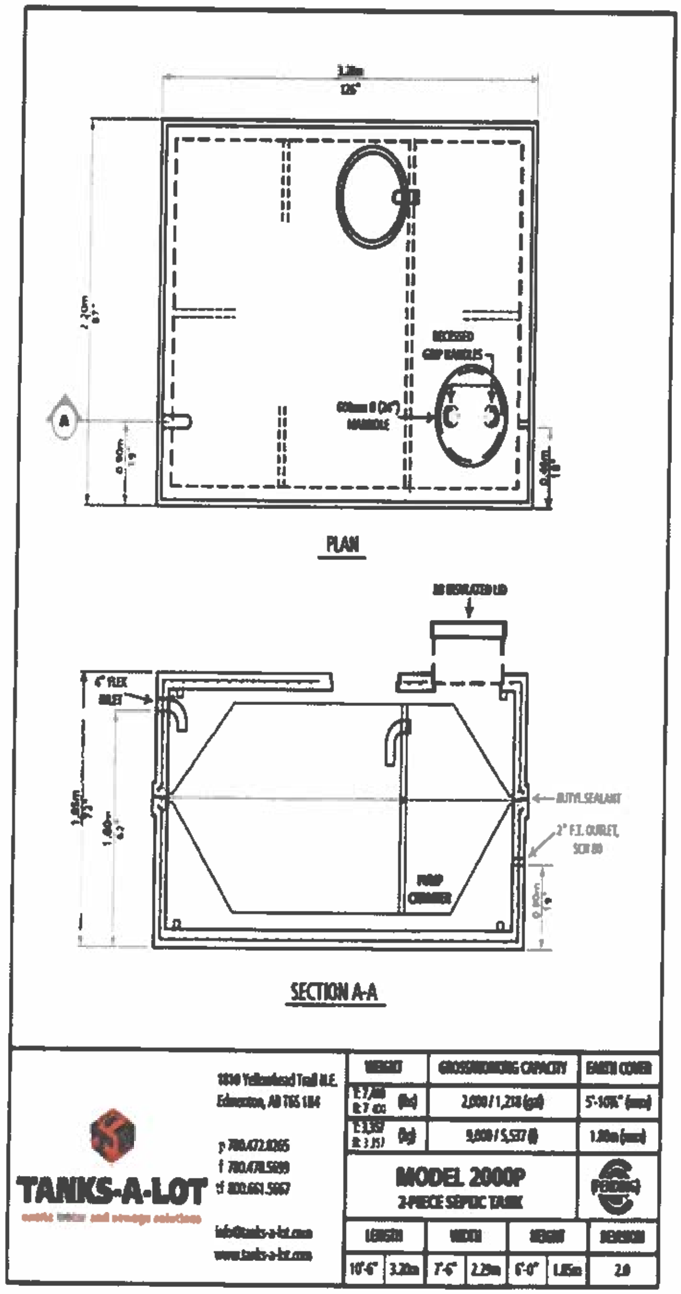
Weather Condition notes:

Comments (such as root depth and abundance or other pertinent observations):

Appendix C - Manufacturer's and Design Specifications for System Components

Septic Tank Specifications and Float Setting Details.

Insert yours from the manufacturer.
This is an example of what it should look like.



Appendix C - Pump Specifications

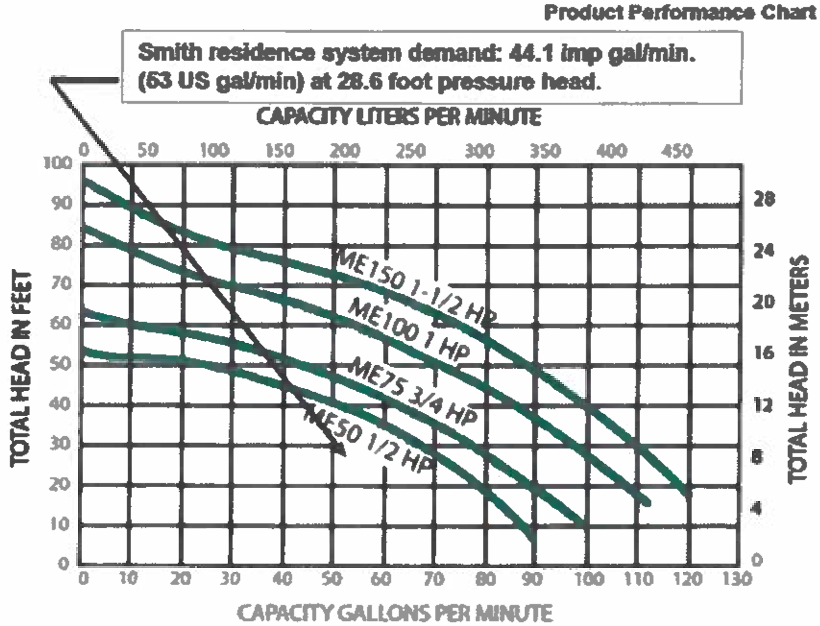
Insert the specifications of your pump.
This is an example of what it should look like.

Myers Model ME50 (1/2 Hp) Selected

Product Capabilities

Capacities:	120 GPM	454 LPM
Shut-Off Head:	95 ft.	28.9 m
Max. Spherical Solids:	3/4 in.	19 mm
Liquids Handling:	domestic effluent and drain water	
Intermittent Liquid Temp.:	up to 140°F	up to 60°C
Motor Electrical Data:	1/2 HP, 115V, 1Ø, 1/2 to 1-1/2 HP, 230V, 1Ø, 208/230/460/575V, 3Ø, oil-filled, permanent split capacitor type, 1Ø, 3450 RPM, 60Hz	
Acceptable pH Range:	6–9	
Specific Gravity:	.9–1.1	
Viscosity:	28–35 SSU	
Discharge, NPT:	2 in.	50.8 mm
Housing:	cast iron	
Min. Sump Diameter: Simplex / Duplex	24 in. / 36 in.	61.0 cm / 91.4 cm
Power Cord:	10 ft.	

Product Performance Chart



Appendix D – Detailed System Schematics and Drawings

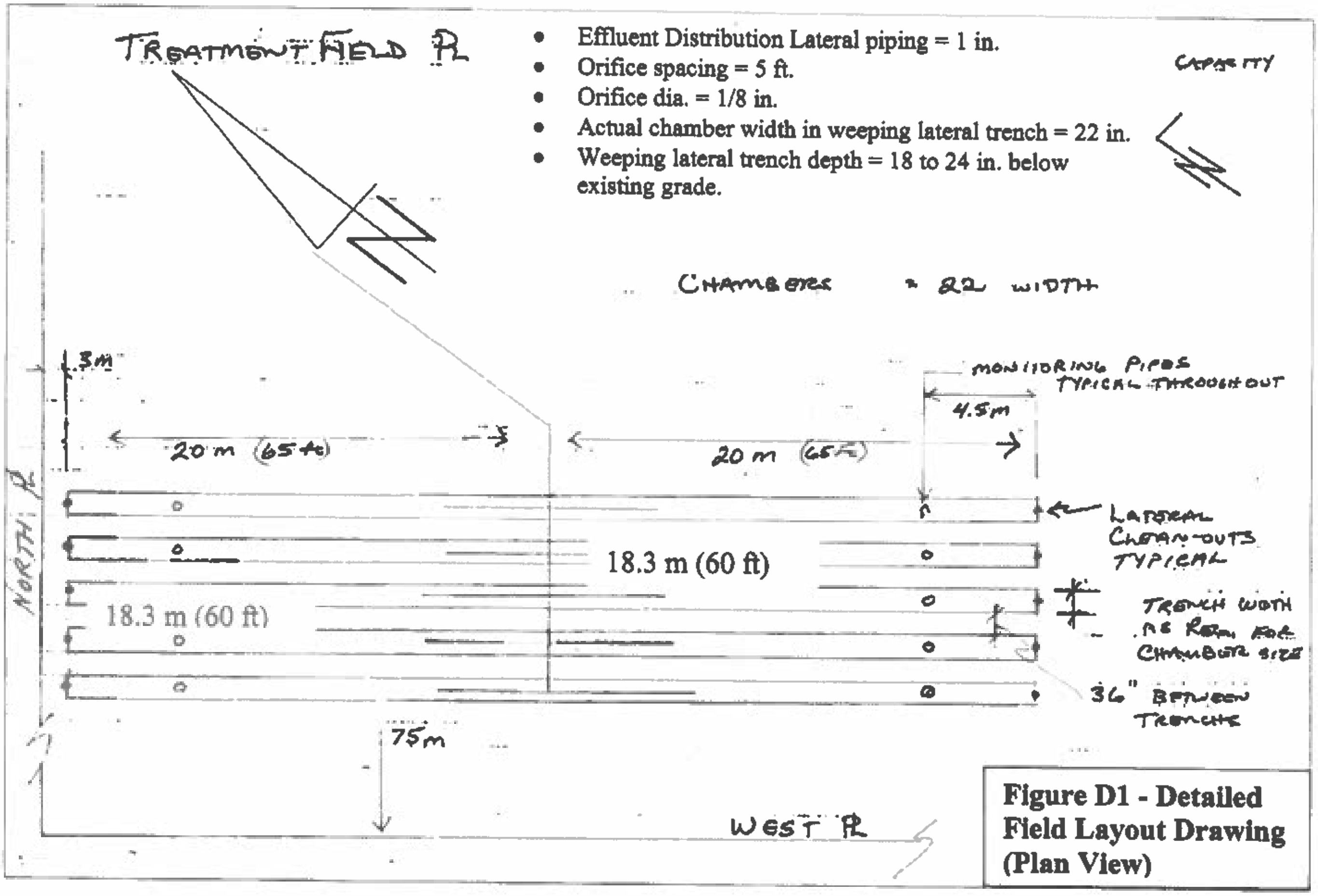


Figure D1 - Detailed Field Layout Drawing (Plan View)

Insert your schematics here and label it Figure D1.
The above is just an example of what is should look like.

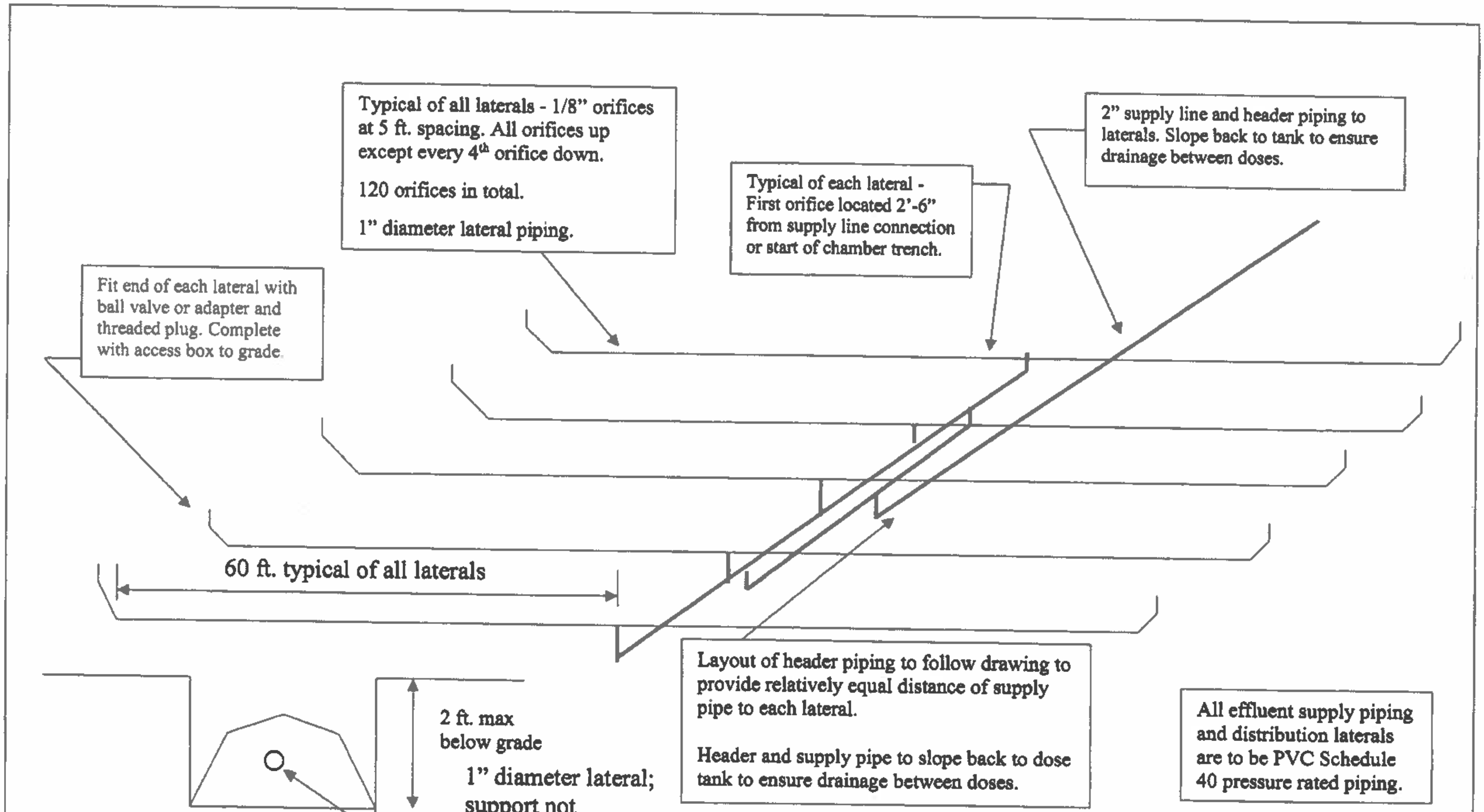
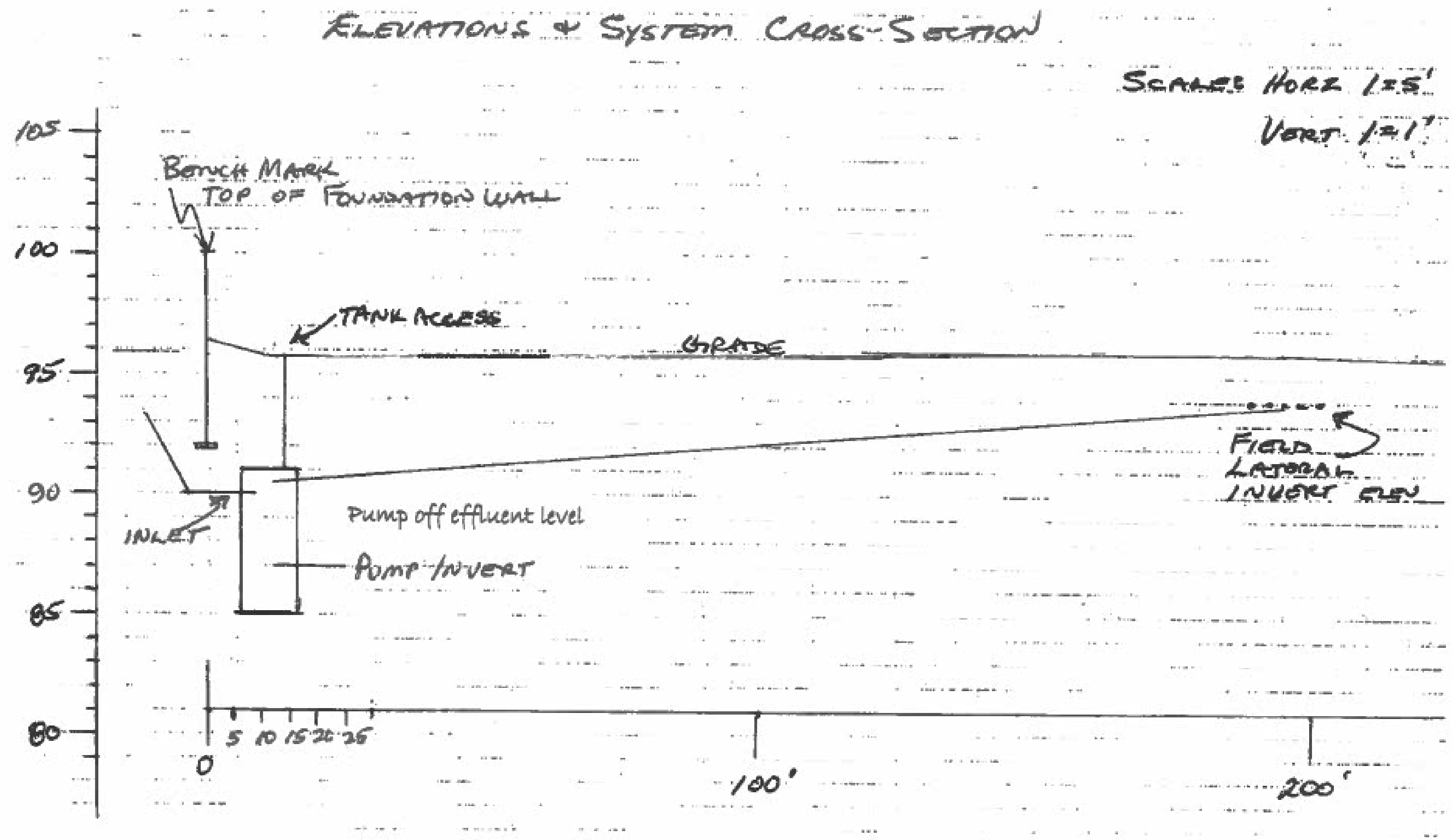


Figure D2: Pressure Distribution Lateral Layout Detail Drawing

Insert your pressure distribution lateral layout detail drawing here and label it Figure D2.
The above is just an example of what it should look like.



Insert your Elevation and System Cross-Section here.
The above is just an example of what it should look like

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 2015
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:

Note: Use Table 2.2.2.2.A. (p.23) & 2.2.2.2.B. (p.24) to determine expected volume of sewage per day. Provide allowance for additional flow factors as detailed in Table 2.2.2.3. (p.25)

Expected Peak Volume of Sewage per Day

[ ] Imp. gal/day **F1**

Assess the initial sewage strength against the requirements of 2.2.2.1.(1) (p.21)
Effluent quality must meet the requirement of Article 8.1.1.6(1)(a) (p. 76).

Step 2) Determine the design soil effluent loading rate:

Soil Effluent Loading Rate [30 - 150 mg/L cBOD₅ column]

[ ] Texture & [ ] Structure & [ ] Grade = [ ] Imp. gal/ft²/day **F2**

If result is less than 0.2 gal/ft²/day a treatment field cannot be used. Article 8.2.1.13. (1) Page 85

Note: Effluent loading rate MUST be determined from soil texture, structure, and grade classification according to Imperial Table A.1.E.1. (p.128) (For metric measurement use Table 8.1.1.10 on Page 79)

Step 3) Calculate optional credits for effluent loading rate:

Primary treated effluent requires a minimum 5 feet Vertical Separation below infiltration surface area.
Refer to Article 8.1.1.4. (1)a) and 8.1.1.4. (1)d) p. 75 & 76.
Effluent loading rate factors cannot be taken for soils with textures Coarse Sand (COS), Medium Sand (MS), Loamy Coarse Sand (LCOS), Loamy Medium Sand (LMS) and;
Coarse Sandy Loam (COSL) or Medium Sandy Loam (MSL) having Prismatic, Blocky or Granular structure of Grade 2 or 3.

	Effluent Loading Rate		Factor		Effluent Loading Rate with Factor Applied	
Pipe & Rock Trench - Gravity Distribution	From F2	X	1	=	ELR	F3
OR						
Pipe & Rock - Pressure Distribution	From F2	X	1.2	=	ELR	F3A
OR						
Chambers - Gravity Distribution'	From F2	X	1.1	=	ELR'	F3B
OR						
Chambers - Pressure Distribution'	From F2	X	1.3	=	ELR	F3C

*****See Article 8.2.1.8.1) regarding calculation of trench bottom using gravel. Page 84 AB SOP 2015. See Article 8.3.1.5.(1) regarding calculation of trench bottom area using chambers. Page 90 AB SOP 2015*****

Note: Ensure infiltration loading rate chosen does not exceed loading rates as set out in 8.1.2.2. (p. 81).

Step 4) Calculate the minimum required infiltration surface area for the soil using adjusted effluent loading rates:

Expected Peak Volume of Sewage per day		Effluent Loading Rate with Factor Applied		Minimum Soil Infiltration Area Required	
	÷		=		F4
Imp. gal/day		Imp. gal/ft²/day		ft²	
From F1		From F3, F3A ,F3B or F3C			

Step 5) Type and width of trench bottom used:

Actual Pipe & Rock Trench Width in inches.						
	inches	÷	12	=	feet	F5

Actual Chamber Width in inches						
	inches	÷	12	=	feet	F5A

* **Note: Chamber width is calculated using the exterior width at the base of the chamber. (Article 8.3.1.4, p. 90)**

Step 6) Determine total weeping lateral trench length required:

Infiltration Area Required			Width of Trench			Minimum Weeping Lateral Trench Length Required		
	ft²	÷		ft	=		feet	F6
From F4			From F5 or F5A					

Step 7) Select number of weeping lateral trenches and determine length of each of trench:

Minimum Weeping Lateral Trench Length Required			Number of Weeping Lateral Trenches Required		Minimum Length of Each Weeping Lateral Trench		
	ft	÷		=		feet	F8
From F6			F7 See Note Below²				

² Refer to Article 8.2.1.12. (p.84) Treatment Field Layout with regards to Linear Loading and potential for groundwater mounding

Step 8) Summary:

F1		Imp gal/day - Peak Daily Flow, including any additional fixtures.
F2		Imp gal/ft²/day - Soil Effluent Loading Rate.
F3 - F3C		Imp gal/ft²/day - Effluent Loading Rate with Factor Applied
F4		Ft² - Minimum Soil Infiltration Area Required
F5 or F5A		Ft - Actual Width of Gravel Trench or Chambers.
F6		Ft - MINIMUM Weeping Lateral Trench Length Required.
F7		Total Number of Weeping Lateral Trenches.
F8		Ft - Length of Each Weeping Lateral Trench.

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 2015.

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 delivery 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 2015.

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 38)
larger than 3/16" orifice = 2 ft. Minimum - 2.6.2.5 (1) (p 38)

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. 37 **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**	
[ ]	ft.	÷	[ ]	ft.	=	[ ]	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. (1)(e) p. 37
* 3 ft. Secondary treated effluent: 8.1.1.8 & 2.6.2.2 (c) (pp 77 & 38)
* 3 ft. On sandy textured soils: 8.1.1.8 (p. 77)

[ ]	X	[ ]	=	[ ]	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
	in.		ft.	
From P2		From System Design Drawings		From P3a

Use Table A.1.A. (pp 118 - 121) when applying the information entered in this step to determine the minimum size of the distribution lateral pipe.

Size of Distribution Lateral Pipe From Table A.1.A. [ ] in. P4

Step 5) Determine the total flow from all orifices:

Total Number of Orifices in all laterals		Gal/min for each Orifice at Head Pressure Selected			Total flow from all lateral orifices		
	X		Imp. gal /min.	=		Imp. gal /min.	P5
From P3b		From Table A.1.B. (pp 122 & 123)					

Step 6) Select the type and size of effluent delivery pipe:

Use Tables A.1.C.1 to A.1.C.4 (pp 124 - 127) to aid in decision. A larger pipe will reduce pressure loss.

Type of pipe used for effluent delivery line	Pipe size selected		
		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 selcted 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 [ ] 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)		Equivalent Length of Fittings (ft)		Length of Pipe for Friction Loss (ft)	
	+		=		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		Friction Loss per 100 feet of pipe		Delivery Piping Pressure Head Loss	
Divide by 100 ft.	x	ft.	=	ft.	P9
From P8					
Don't forget to divide the length by 100 feet to match the factors in the tables.		Use Tables A.1.C. On pp 124 - 127 using flow volume from P5.			

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		
[ ]	in.	[ ]	Imp. gal /min	+	[ ]	Imp. gal /min	=	[ ]	Imp. gal /min	P11
		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)
[ ]	@	[ ]
From P11		From P10

Select the appropriate pump by reviewing the pump curve of available pumps. Select a pump that exceeds the requirments set out in this step by approximately 10% considering both pressure head and volume.

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.

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. 128)**		**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 (MIP) (M/F Threaded Adaptors)		x		=	
					=

Total Equivalent Length of pipe to allow for fittings in piping system (Enter this total, Box P7) [ ]