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: _____

The personal information provided in this application package is protected by the Freedom of Information and Protection of Privacy Act. Information supplied in this application package may be used by the Authority having Jurisdiction.

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 Mound

PREFACE

(Version September 30, 2014)

This is a design document for a septic tank and treatment mound 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 as an example in this document.

This document can be used as a template by editing or adding critical information to suit the particular site and system.

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.

Date:

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

Legal Description of Property: **Qtr** _____ **Sec** _____ **Twp** _____ **Rng**_____ **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 mound 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 _____. This requires _____ Imp. gal/day be added to the peak daily flow. 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 + _____ Imp. gal = _____ Imp. gal	**_____ 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 220 mg/L** **TSS 220 mg/L** **Oil and Grease 50 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 body of water) runs parallel to the _____ (direction) property line. The _____ (direction) portion of the property has an increased slope toward the _____ (creek, river, lake, 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 slope at the selected treatment site is _____%. 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

_____ soil test pits were investigated on this site. Test Pit 1_____.
Test Pit 2 _____. A treatment mound is selected to meet the vertical separation requirements.

Little variability was noted between test pits 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:

-
-

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 secondary treated effluent on this soil is _____ Imp. gal/day/ft^2.**

3.4. 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 is _____ inches (_____ feet)
- the slope at the site of the mound is _____%

Linear Loading Rate = _____ Imp. gal/day/ft

The mound is oriented at _____ degrees to the slope direction to address linear loading.

4 Initial Treatment Component Design Details

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 [_____ Imp. gal/day plus the additional flow of _____ 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 4 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

A _____ 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 designed for this site is a septic tank and treatment mound.

5.2 Treatment Mound Size

Key design requirements:

Expected peak daily flow:	_____ Imp. gal/day
Soil loading rate:	_____ Imp.gal/day/ft^2
Linear loading rate:	_____ Imp.gal/day/ft

Sand layer:

Sand layer length:	_____ ft
Sand layer width:	_____ ft
Sand layer area:	_____ ft^2

Minimum in-situ soil infiltration area:

Soil infiltration surface area:	_____ ft^2
Minimum soil infiltration width:	_____ ft [sand layer + downslope berm]

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

6 Effluent Distribution Design Detail

6.1 Effluent Pressure Distribution

Two _____ft centre fed pressure effluent distribution laterals are used over the sand layer. 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 four _____ ft pressure distribution laterals.

- Each lateral is _____-inch schedule _____ PVC pipe.
- Each lateral has _____, _____-inch orifices drilled at _____ foot spacing.
- The laterals will be installed in the gravel above the sand layer.
- Orifices will be offset between the two laterals along its length.
- All orifices 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 required for the 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 _____ PVC 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 is _____ foot.

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

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 _____ 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

The volume of effluent applied to the sand layer in a single dose needs to be less than _____% of the daily flow, which 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 individual dose volume selected 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

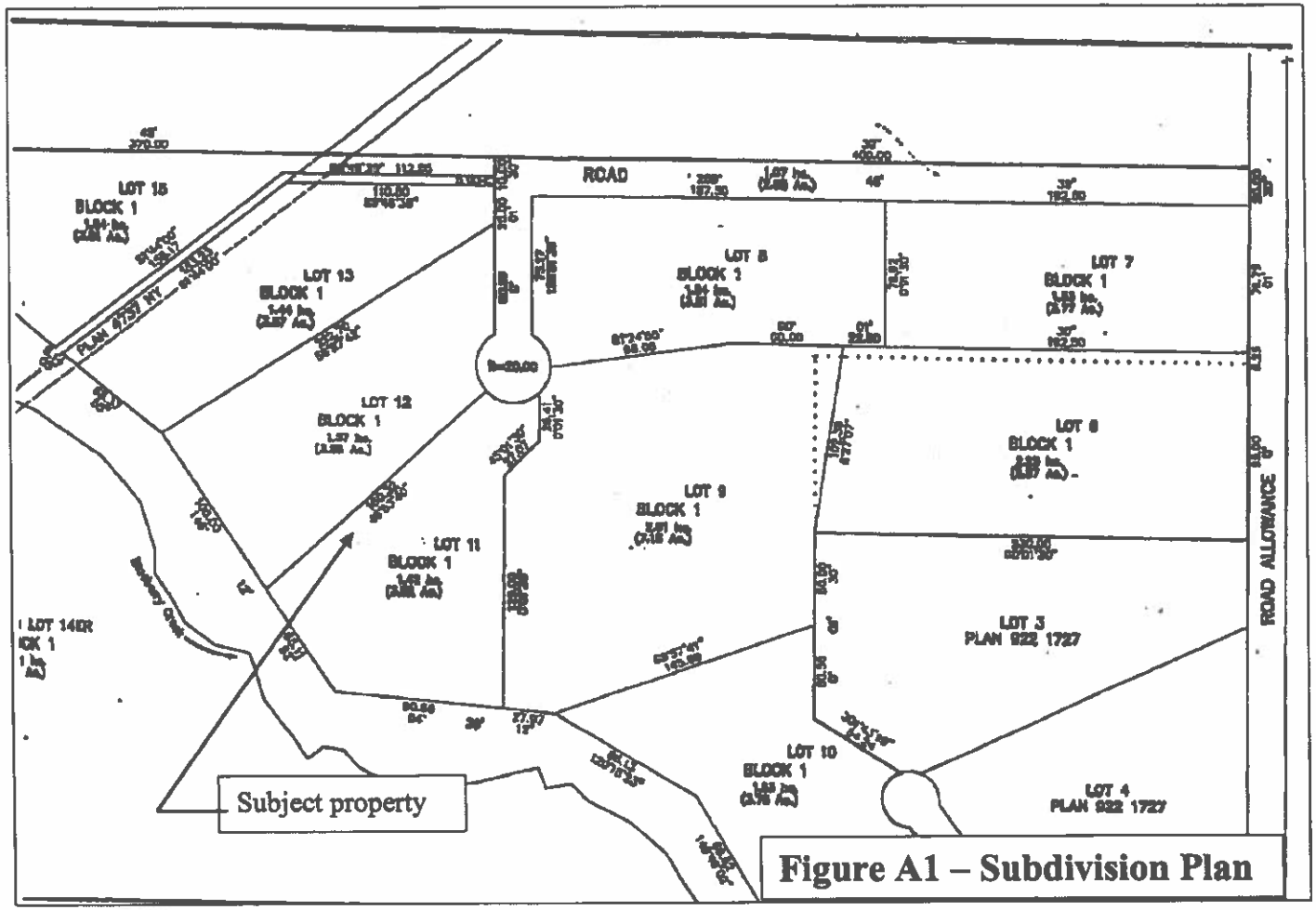


Figure A1 – Subdivision Plan

Insert your own subdivision plan here and label it as above – Figure A1.
The one above is just an example.

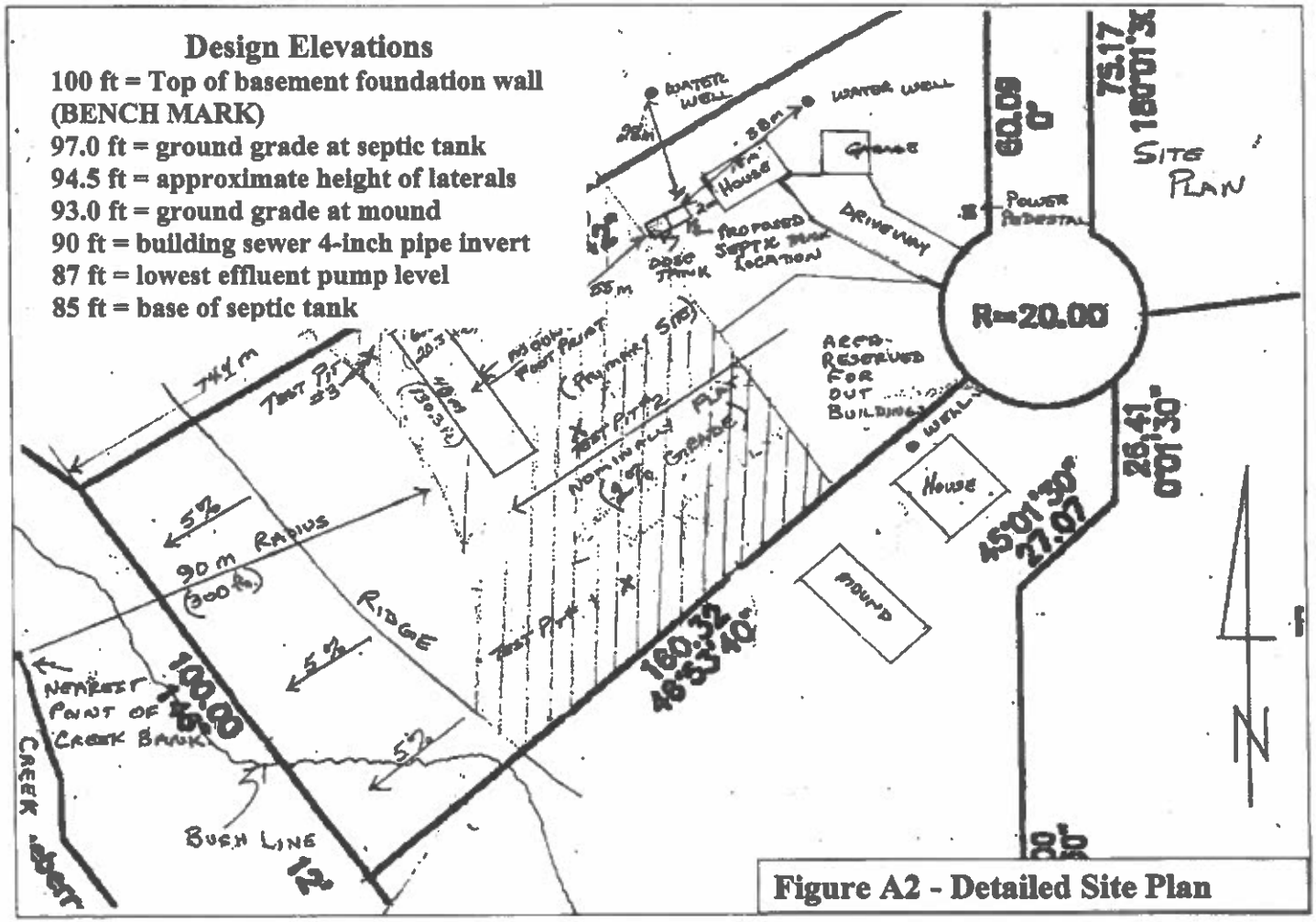


Figure A2 - Detailed Site Plan

Insert your detailed site plan here and label it as above – Figure A2.
The one above is just an example.

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 B)

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

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

Septic Tank Specifications and Float Setting Details.

Insert yours from the manufacturer.
Refer to the example document to see what it looks like.

Appendix C - Pump Specifications

Insert the specifications pertaining to your pump.
Refer to the example document to see what it looks like.

Appendix D- Detailed System Schematics and Drawings

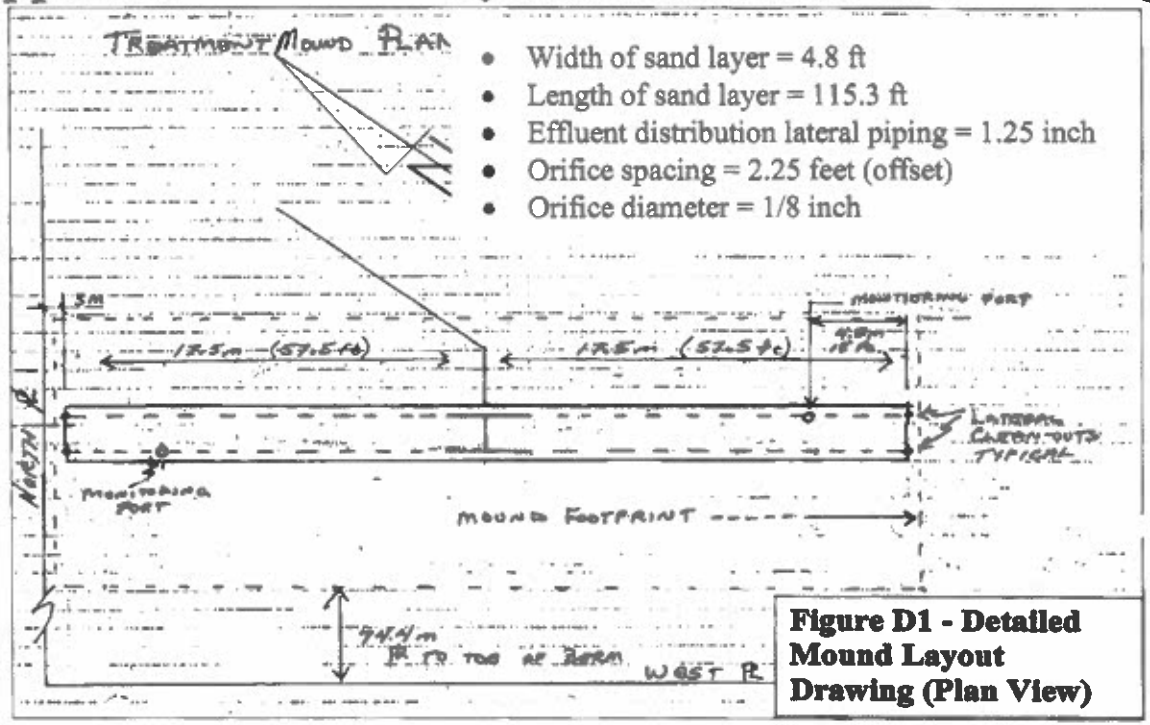


Figure D1 - Detailed Mound Layout Drawing (Plan View)

5 m

Insert your detailed system schematics and drawings here and label it as above – Figure D1. The one above is just an example.

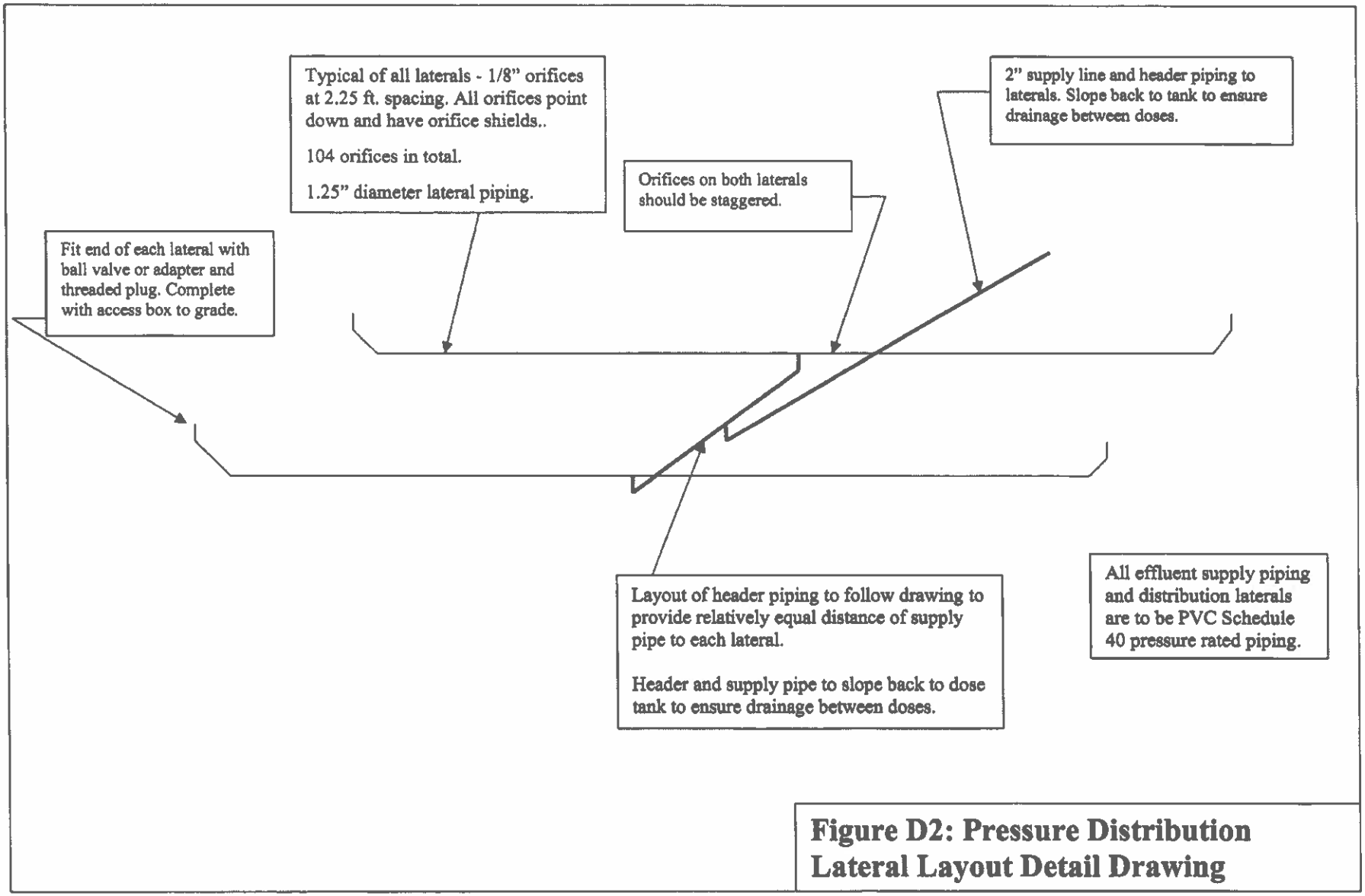
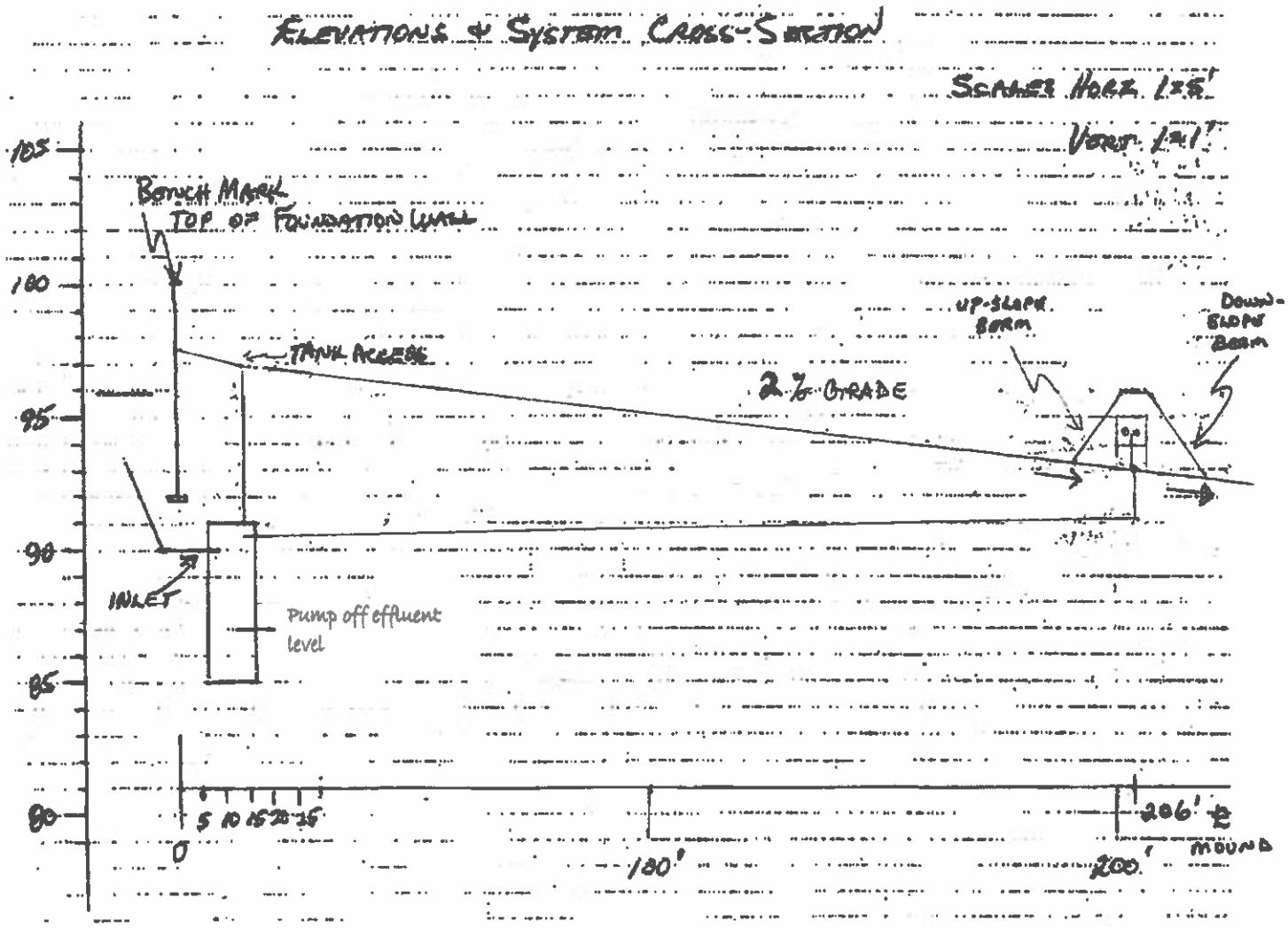


Figure D2: Pressure Distribution Lateral Layout Detail Drawing

Insert the pressure distribution lateral layout detail drawing here and label it as above – Figure D2. The one above is just an example.



Insert your system elevations & system cross section here.
The one above is just an example.

Appendix E – System Design Worksheets

Include Mound Worksheet Calculations, Berm Slope Worksheet and Pressure Distribution, Orifice, Pipe & Pump Sizing Calculation Worksheets

PSDS Design - Worksheet "M"

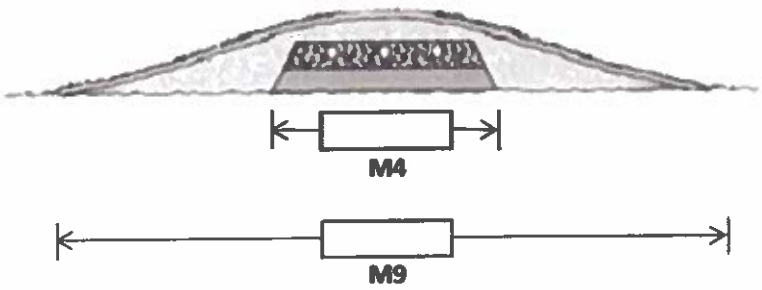
Treatment Mound: Area Sizing

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...)

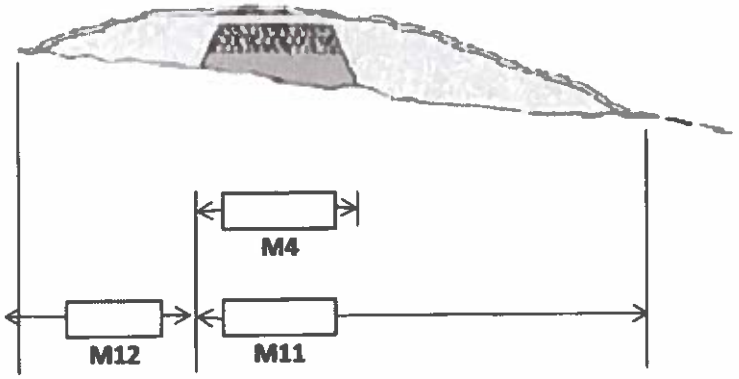
Level Site



Sand Layer Length (ft.) ____ M4

Overall Length of Mound (ft.) ____ M9

Sloping Site



Slope ____ M8

Revised November 14, 2016

PSDS Design - Worksheet "M"

Treatment Mound: Area Sizing

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:

Volume of sewage per day. Provide allowance for additional load factors as detailed in Table 2.2.2.3 - (p. 25)

Assure that the sewage strength does not exceed the requirements of 2.2.2.1 (1) - (p.21)

Expected Volume of Sewage per Day: _____ gal. / day **M1**

Step 2) Calculate the treatment area of the sand layer:

Expected Volume of Sewage per Day		Sand Layer Loading Rate		Area Required for Sand Layer	
_____ gal. / day	÷	0.83 gal. / sq.ft. per day	=	_____ sq.ft.	**M2**
From **M1** (this worksheet)		Note: Reduction required by 8.4.1.4 (1)(b) or 8.4.1.5 (1)(d)			

Step 3) Calculate the length of the sand layer:

Expected Volume of Sewage per Day		Hydraulic Linear Loading Rate (if applicable)		Length of Sand Layer	
_____ gal. / day	÷	_____ gal./day/lin.ft.	=	_____ ft.	**M3**
M3a		**M3b**			
From **M1** (this worksheet)		Table A.1.E.1 - (p. 129)			

Step 4) Calculate the minimum width of the sand layer:

Area of the Sand Layer		Length of the Sand Layer		Width of the Sand Layer	
_____ sq.ft.	÷	_____ ft.	=	_____ ft.	**M4**
From **M2**		From **M3**			

Step 5) Determine the infiltration soil effluent loading rate:

Note: Effluent loading rate can be determined from soil texture classification according to 8.4.1.7 (1)(a & b) - (p. 94) and Table A.1.E.1 (pp. 129-130) with consideration for Article 8.1.2.2 - (p. 81)

Soil Effluent Loading Rate: _____ gal./sq.ft./day **M5**

Step 6) Calculate the in situ soil infiltration area required:

Expected Volume of Sewage per Day		Soil Effluent Loading Rate		Required Soil Infiltration Area	
_____ gal./day	÷	_____ gal./sq.ft./day	=	_____ sq.ft.	**M6**
From **M1** (this worksheet)		From **M5** (this worksheet)			

Revised November 14, 2016

PSDS Design - Worksheet "M"

Treatment Mound: Area Sizing

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 7) Calculate the required width of the infiltration area:

Required Infiltration Area		Length of Sand Layer		Width of Required Soil Infiltration Area	
_____ sq.ft.	÷	_____ ft.	=	_____ ft.	M7
From M6 (this worksheet)		From M3 (this worksheet)			

Step 8) Determine the slope criteria of the installation site:

If the slope of the installation site exceeds 1%, proceed to Step 11. If the slope is 1% or less, proceed to Step 9.

Slope of Installation Site: _____ % M8

Note: The following calculations apply ONLY to the minimum height configuration of a mound. If it is necessary to raise the sand layer, (for example to provide vertical seperation from restrictive layer to the water table) the following calculations are NOT adequate for the design.

For Slopes of 1% or Less, Use Steps 9 to 10.

Step 9) Determine the toe to toe width of the mound:

Toe to Toe Width Based on 3:1 Slope Requirement		Width of Area Required Infiltration Area Within Berm		Toe to Toe Width of Mound	
_____ ft.	or	_____ ft.	=	_____ ft.	M9
M9a		M9b		The greater of M9a or M9b	
3:1 Slope Requirement - 8.4.2.9. Refer to Berm Dimensions Diagram (this worksheet or determine by calculation)		From M7 (this worksheet)			

Step 10) Proceed to Step 14:

Steps 11 to 13 are used only for installations where the slope exceeds 1%.

PSDS Design - Worksheet "M"

Treatment Mound: Area Sizing

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...)

For Slopes Exceeding 1%, Use Steps 11 to 14.

Step 11) Determine the width of the sand layer plus downslope berm:

The width of the mound is based on the greater of:

- the width as determined by the 1:3 slope requirement, or
- the width required to provide adequate infiltration area

Downslope Berm Width Based on 3:1 Slope Requirements

_____ ft.

M11a

Refer to Berm Dimensions Diagram (this worksheet)

+

Width of Sand Layer

_____ ft.

M11b

From M4 (this worksheet)

Width of Required Infiltration Area Under Sand Layer and Downslope Berm		**Width of Sand Layer and Downslope Berm**	
_____ ft.	or	_____ ft. =	_____ ft. **M11**
M11c		**M11d** From M7 (this worksheet)	3:1 Slope Requirement is the greater of M11c or M11d

Step 12) Determine the width of the upslope berm:

Width based on 3:1 Slope Requirement (refer to 8.4.2.9)

Refer to Berm Dimensions Diagram (this worksheet) or determine by calculation.

Width of Upslope Berm

_____ ft. **M12**

Step 13) Determine the toe to toe width of the mound:

Width of Sand Layer and Downslope Berm		**Width of Upslope Berm**		**Toe to Toe Width of Mound**
_____ ft.	+	_____ ft.	=	_____ ft. **M13**

Revised November 14, 2016

PSDS Design - Worksheet "M"

Treatment Mound: Area Sizing

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...)

Summary

Step 14) Summarize the information:

Width of Sand Layer (From M4 this worksheet)		ft.
Length of Sand Layer (From M3 this worksheet)		ft.
Slope of Installation Site (From M8 this worksheet)		%
Toe to Toe Width of Mound <1% slope (From M9 this worksheet)		ft.
Toe to Toe Width of Mound>1% slope (From M13 this worksheet)		ft.

Step 15) Complete the berm diagram dimensions on the first page:

Fill the appropriate diagram on the first page with the numbers calculated in this worksheet.

Step 16) Confirm the design complies with the Standard of Practice:

This worksheet does NOT consider all the requirements of the mandatory Standard. Please work safely and follow safe practices near trenches and open excavations.

PSDS Design - Worksheet "M"

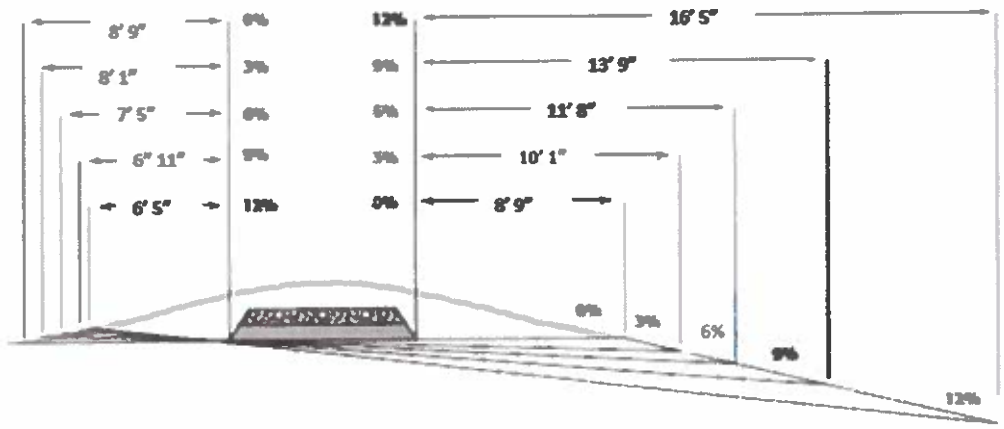
Treatment Mound: Area Sizing

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...)

Treatment Mound Berm Dimensions on Slopes

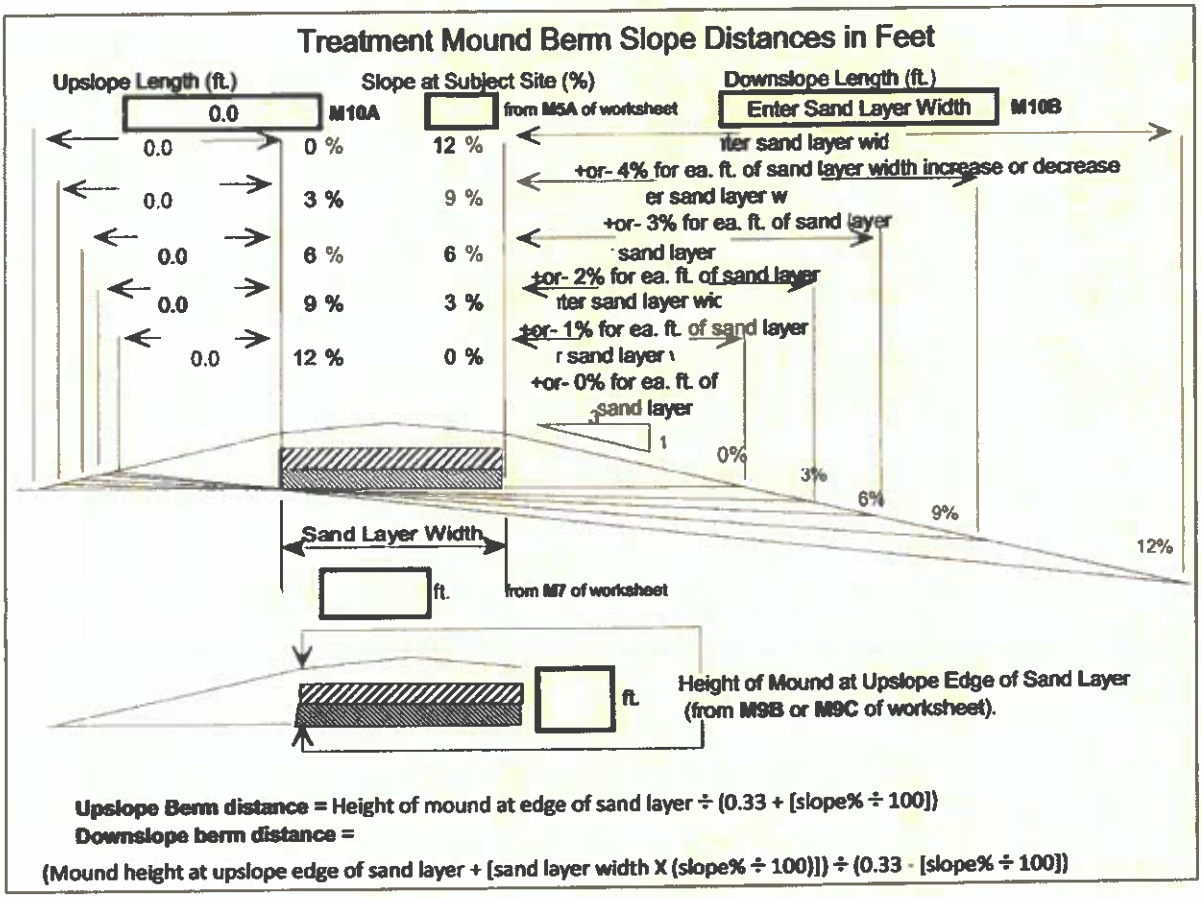


This Diagram is Based on a Minimum Mound Height and a Minimum Berm Slope of 3:1

Based on:3 inches top soil
6 inches fill material
12 inches of chamber height
2 inches of washed rock
12 inches of sand media
35 inches of height

Based on minimum height requirements from 2015 SOP

Revised November 14, 2016



Upslope Berm distance = Height of mound at edge of sand layer ÷ (0.33 + [slope% ÷ 100])

Downslope berm distance =

(Mound height at upslope edge of sand layer + [sand layer width X (slope% ÷ 100)]) ÷ (0.33 - [slope% ÷ 100])

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 minumum 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 IPT 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)**