(Pipeline Organization)

PRELIMINARY RURAL WATER PIPELINE DESIGN BRIEF

Month / Year

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BACKGROUND

Prairie Farm Rehabilitation Administration (PFRA) has been actively involved in the design and installation of rural water pipelines since 1985. From this experience, PFRA has developed a rural water pipeline standard that overcomes the inherent obstacles of distance and sparse population. This pipeline standard has been well received throughout the Prairie Provinces. Several organizations and agencies have requested assistance with respect to incorporating these pipelines into areas where conventional municipal standards may not be economically viable.

The *(Pipeline Organization)* has asked PFRA to determine the feasibility of constructing a rural water pipeline to service the farm community and rural residents *(direction)* of the *City/Town/Village* of *(name)* approximately *(#)* miles *(direction)* of Highway *(#)*. This service area represents Phase 1 of a two phase project, with Phase 2 extending *(direction)* of the *City/Town/Village* of *(name)* and *(direction)* of Highway *(#)*. The source of water will be the *City/Town/Village* of *(name)*. The connection point will be located along Highway *(#)* at the *(direction)* edge of the *City/Town/Village*. The Council of *City/Town/Village* has agreed in principal that they would be willing to supply the *(Pipeline Organization)* with their water requirements and have provided the *(Pipeline Organization)* with written confirmation. (See Appendix D for a typical agreement with your supplier).

PROJECT DESCRIPTION

The *(Pipeline Organization)* project will consist of two phases. Phase 1 will service an area *(direction)* and *(direction)* of the *City/Town/Village* of *(name)* and will have an anticipated construction start date of the *(season)* of *(year)*. Phase 2 will service an area *(direction)* and *(direction)* of the *City/Town/Village* of *(name)* and the *(Pipeline Organization)* anticipates that this phase will commence 1 to 2 years after the completion of Phase 1. The service area of Phase 1 will generally service subscribers *(direction)* of the *City/Town/Village* of *(name)* extending along Highway *(#)* approximately *(#)* miles and extending *(direction)* approximately *(#)* miles.

The water source will be the *City/Town/Village* of *(name)*. The *City/Town/Village* has excess capacity above their own water requirements and has

offered to sell water to the *(Pipeline Organization)*. The *City/Town/Village* has installed several new 6" dia PVC water mainlines throughout the *City/Town/Village* to properly service their residents. One of these 6" dia lines runs along the *(direction)* ditch of Highway *(#)* to the *(direction)* edge of the *City/Town/Village* property. It is at this point that the *(Pipeline Organization)* is proposing to connect into the *City/Town/Village's* water line.

The present proposal will be to construct a booster station immediately after this connection point, *(direction)* of the *City/Town/Village* limits on the *(direction)* side of Highway *(#)*. This booster station will be required to provide adequate pump/pressure capabilities for the proper operation of the project. Post chlorination capabilities will also be addressed with the construction of this booster station.

The water demand for most rural subscribers will be set at 0.5 lgpm per connection for domestic subscribers and between 1.0 lgpm and 2.0 lgpm for any required livestock demand. There will also be a design proposal for the *(Pipeline Organization)* to supply the Town of *(name)* with up to 100 lgpm. The proposed mainline between the *City/Town/Village* of *(name)* and the *City/Town/Village* of *(name)* will parallel Highway *(#)* and will pass close to the *City/Town/Village* of *(name)* treatment facility. If the *City/Town/Village* of *(name)* decides to supply this quantity of water to the *(Pipeline Organization)* Board, a short supply line will be installed between the mainline and the Town of *(name)* treatment plant. A water supply agreement between the *(Pipeline Organization)* and the *City/Town/Village* of *(name)* has between negotiated, although a formal written agreement has not been signed.

The rural lateral system design has been based on the low flow - low pressure design parameter, developed by PFRA and others for rural pipelines, as described below. Details regarding changes in parameters as they relate to this specific project are also described below.

As shown in Figure 1, the project consists of constructing a pipeline with the connection point at an existing 6 inch PVC mainline at the *(direction)* edge of *(place)* adjacent to and on the *(direction)* side of Highway *(#)*, approximately located on the *(land location)*. This buried pipeline will proceed *(direction)* to the *City/Town/Village* of *(name)* paralleling Highway *(#)* and then will continue *(direction)* of the *City/Town/Village* of *(name)* along side Highway *(#)* approximately *(#)* miles. At the connection point at *(place)*, a proposed pumphouse/booster station will be constructed at an acceptable location, probably on the *(land location)*. Water from this 6" supply line will be repressurized, rechlorinated if necessary, and pumped down a HDPE supply line to the proposed clients.

The proposed system, as designed, based on the following assumptions, consists of 50 mm, 75 mm, and possibly 150 mm IPS size high density polyethylene (HDPE) pipe, with the service lines from the curbstop to the houses to be 25 mm (1.0 inch) CTS HDPE with the same or greater pressure series ratings as the mainline to which it is connected.

PROJECT ASSUMPTIONS

The pipeline has been designed to deliver the required flow at each tapoff as detailed in Table 1 and Figure 1. The minimum delivery pressure (critical path hook-up) under maximum design flow is 14 metres (20 p.s.i.). In house pressure regulation to a maximum of 35 m (50 p.s.i.) is required. The maximum design velocity is 1.0 m/s (3.3 fps)

The pipeline lengths were determined from 1:50,000 scale EMR maps and RM maps.

The pipeline is a low flow system meaning each hook-up requires a cistern and individual pressure system from that cistern to deliver the water to the household plumbing system.

Backflow prevention (and/or air gap separation) is required before the cistern and is usually a requirement of the local Health District inspectors.

Air release and isolation valves are kept to a minimum. Air release valves are located at *extreme* high points where the possibility of trapped air may exist. These air release valves are all manual air release valves as shown on the accompanying typical drawing sheet.

The pipe recommended is high density polyethylene (HDPE) with butt-fused joints. Connection to the various valves and appurtenances is to be accomplished using compression couplings or fused flanges.

Pipeline construction will include all work up to and into the subscriber's residence including the installation of a curbstop. The curbstops will be installed as close as is reasonable to the subscriber's residence or point of use.

The pipe is generally laid using the plough method, chain trench method or open trench excavation method; however, ground conditions must be evaluated prior to construction tendering to determine which method will be most suitable for this project.

The minimum pipe burial is 2.70 metres (8.85 feet) to the top of the pipe.

Minimum pipe diameter of all mainlines and laterals will be 50 mm (2 inch).

Pipe diameter from the curbstop to the houses will be 25 mm (1.0 inch) CTS HDPE pipe to be installed by the Horizontal Directional Drilling Method.

The minimum pressure rating on all pipe shall be Series 896, SDR 13.5 (130 psi).

This project has two possible design scenarios. One proposal would be for the project to consist of serving only the farm and rural residents which would involve the construction of approximately 10,000 m of 75 mm dia HDPE and 26,000 m of 50 mm

dia HDPE pipe. The maximum design pressure head at the proposed pumphouse would be approximately 65 to 70 m when operating under the maximum design flow of 2.2 l/sec.

The second proposal would involve the ___*(Pipeline Organization)*___ supplying the *City/Town/Village* of ___*(name)*___ with approximately 7.0 to 8.0 l/sec of water to their existing treatment plant. This proposal would involve the installation of approximately ___*(#)*___ meters of 150 mm dia HDPE pipe as well as the installation of the 50 mm dia and 75 mm dia pipe. With this scenario, the maximum design pressure head at the proposed pumphouse would be approximately 60 m at a proposed design flow of 9.75 l/sec.

PROJECT PIPE SCHEDULE

The type, diameter, pressure rating and quantity of the pipe required for the two scenarios of this project are proposed in the following tables:

SCENARIO #1 - FARM USE ONLY

Item	Pipe Type	Diameter (mm)	Pressure Rating (kPa)	Estimated Length (m)
1	IPS HDPE	50	896	*Length of Pipe*
2	IPS HDPE	75	896	*Length of Pipe*

PROJECT COST SUMMARY

1. Supply of Pipe ..... $$$
2. Installation of Pipe ..... $$$
3. Crossings, Valves, Air Releases..... $$$
4. Farm Connection Costs, Directional Boring, Curbstops ..... $$$
5. Booster Station ..... $$$
6. Engineering ..... Not Included.
7. Miscellaneous and Contingencies ..... Not Included.
8. ***Total Estimated Cost..... $$$***
   Plus Engineering and Contingencies

The estimated costs are based on the past tenders and estimates received by other pipeline organizations working with PFRA.

SCENARIO #2 - FARM USE c/w SUPPLYING THE TOWN OF *(name)*

Item	Pipe Type	Diameter (mm)	Pressure Rating (kPa)	Estimated Length (m)
1	IPS HDPE	50	896	*Length of Pipe*
2	IPS HDPE	75	896	*Length of Pipe*
3	IPS HDPE	150	896	*Length of Pipe*

PROJECT COST SUMMARY

1. Supply of Pipe ..... $$$
2. Installation of Pipe ..... $$$
3. Crossings, Valves, Air Releases..... $$$
4. Farm Connection Costs, Directional Boring, Curbstops ..... $$$
5. Booster Station ..... $$$
6. Engineering ..... Not Included.
7. Miscellaneous and Contingencies ..... Not Included.
8. ***Total Estimated Cost..... $$$***
   Plus Engineering and Contingencies

The estimated costs are based on the past tenders and estimates received by other pipeline organizations working with PFRA.