Technical Reference Document for Manure Storage Structures

PIPELINES, APPURTENANCES AND TREATMENT STATIONS

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SECTION 1 - PURPOSE AND SCOPE

1.1. Purpose of the Technical Reference Document – The Technical Reference Document for the Design and Installation of Pipelines and Appurtenances provides specifications and construction procedures to Engineers for the design of manure handling and conveyance appurtenances, manure treatment stations and accessories associated with the operation of manure storage facilities in Manitoba.

1.1.1. This Technical Reference Document is intended as a supplement to the *Technical Reference Manual for Liquid Manure Structures*.

1.1.2. In Manitoba, the regulatory agency is Manitoba Conservation.

1.1.3. The general information that is required by the regulatory agency for obtaining a construction permit for a manure pipeline is specified or referenced herein.

1.2. Definitions – The general reference for this document is the standard 02706 Standard Construction Specifications for Pressure Pipelines of the Manitoba Water Services Board in its most recent version. The definitions listed therein are adopted in this document.

SECTION 2 - ROLES AND RESPONSIBILITIES OF THE ENGINEER

2.1. Qualifications – The Engineer responsible for the design, inspection, and certification of the manure pipeline, lift station, and any other appurtenances or accessories shall be licensed to practice engineering by the Association of Professional Engineers and Geoscientists of the Province of Manitoba.

2.2. Role and Responsibilities – The above Engineer shall comply with the Technical Reference Document *Role and Responsibilities of the Engineer*.

2.2.1. Notwithstanding the requirements outlined in this Technical Reference Document, the Engineer shall ensure that the design meets any other standards or documents of the Technical Reference Manual for Liquid Manure Storage Structures that apply.

2.2.2. It is the responsibility of the client and the developer, where applicable, to ensure that the contract between the developer and the Engineer is adequately covering the design, supervision and construction requirements set out herein and any other standards or documents in the Technical Reference Manual for Liquid Manure Storage Structures that apply.

2.3. Completenesss of Design – The Engineer whose professional seal appears on the design drawings is responsible for both the completeness of the data acquired and the design of the manure pipeline including all appurtenances.

2.4. Other Acts and Regulations – The Engineer is responsible for complying with all of the relevant acts and regulations in force in Manitoba.

2.5. Other Standards – Provincial, national and international standards and their respective abbreviations are listed in Section 11. In all cases, the most current edition of the referenced standard is implied. Additional relevant documents are also referenced in Section 11.

SECTION 3 - INFORMATION REQUIREMENTS

3.1. Submissions – For the purpose of evaluating an application for a new or modified livestock manure pipeline, the Engineer shall submit to the regulatory agency information including, but not limited to the following details of the pipeline design and site characteristics:

3.1.1. Site plan showing the location of the manure storage structure and distances to:

- public roads;
- railroad lines;
- water ways;
- manure source (barn);
- discharge point;
- water wells;
- lift stations;
- cleanouts; and,
- all underground cables and any other public or private services.

3.1.2. Detailed construction drawings drawn to scale, signed and sealed by the Engineer including, but not limited to:

- the manure treatment facility, if applicable;
- piping for manure transfer and handling;
- location and details of cleanouts and access ports;
- location and details of lift stations;
- location and cross-section details of any underground pipelines, in particular for sections constructed under water ways, railroad lines and any public roads;
- construction notes; and,
- site specific operational notes (if the design is dependant on specific operation and management factors).

3.1.3. A design summary including, but not limited to:

- material specifications;
- transportation patterns, vehicular loading and any limitations to vehicular traffic; and
- a statement of full compliance with the Codes and Standards and Technical Reference Document for Liquid Manure Storage Structure cited in this document.

3.1.4. Geotechnical information including, but not limited to:

- depth to seasonal high ground water;
- minimum depth to bedrock over the entire course
- all applicable soil test results; and,
- requirements for construction.

3.1.5. Copies of all relevant permits attained permitting construction including, but not limited to:

- Authorization Permit for construction under a provincial waterway from Manitoba Water Stewardship;
- Agreement for Installation Under Provincial Highways from The Department of Transportation and Government Services;
- Municipal Road Crossing from the Rural Municipality;
- Municipal Construction Agreement from the Rural Municipality;
- Authorization from the federal Department of Fisheries and Oceans, if applicable; and
- Authorizations for crossings all public and private services.

3.1.6. Recommendations for regular inspection, maintenance, and repair including, but not limited to:

- the frequency of inspection, critical features to inspect, and method of the inspection (visual, monitoring data, etc.);
- procedures for regular maintenance and preventative repairs; and
- contingency plans that include procedures for the repair of damaged features.

SECTION 4 - DESIGN CRITERIA – PIPELINES

4.1. The information provided in this section pertains to both pressure and gravity pipelines, unless otherwise noted.

4.2. Definition – A gravity pipeline is defined as a pipeline that transfers manure and liquid waste by gravity from the source to a manure storage facility or lift station. A pressure pipeline is defined as a pipeline that links a pump to either a lift station, manure storage facility, or land application equipment.

4.2.1. Requirements – Gravity pipelines may be used where a flow of 3m/s (10ft/s) can be provided.

4.3. Pipe Material – The design criteria for pipe material shall conform to the specifications of the standard 02706 of the MWSB for properties, grade, thickness, and pressure rating.

4.3.1. Corrosion Resistance – All pipelines and appurtenances shall either be corrosion proof or be protected from corrosion.

4.4. Appurtenances – Unless otherwise specified in MWSB Section 01001, Special Provisions, appurtenances shall be one of the following:

4.4.1. Polyvinyl chloride (PVC) appurtenances shall be used only in conjunction with PVC Series pipe. The appurtenances shall be manufactured in accordance with the same specifications as the PVC series or class pipe, and shall be of the same, or better, series or class as the pipe with which the fittings are used. PVC appurtenances shall be injection moulded for pipelines with a 300 mm diameter or less.

4.4.2. High density polyethylene (HDPE) appurtenances shall be used only in conjunction with HDPE pipe. The appurtenances shall be manufactured in accordance with the same specifications as the HDPE pipe, and shall be of the same series as the pipe with which the appurtenances are used. HDPE appurtenances shall be injection moulded for pipelines with a 300 mm diameter or less. Fabricated appurtenances shall be reinforced with fibre reinforced polymers (FRP).

4.4.3. Cast iron appurtenances shall be manufactured in accordance with the current AWWA Standard C110, Standard for Gray Iron and Ductile Iron Fittings.

4.5. Joints – bell and spigot push-on and mechanical joint types will no longer be used in manure handling and conveyance appurtenances, manure treatment stations and accessories associated with the operation of manure storage facilities. Venting of gravity pipelines must be provided where the total drop in the line may exert sufficient vacuum to collapse pipes. The following joints are appropriate alternatives:

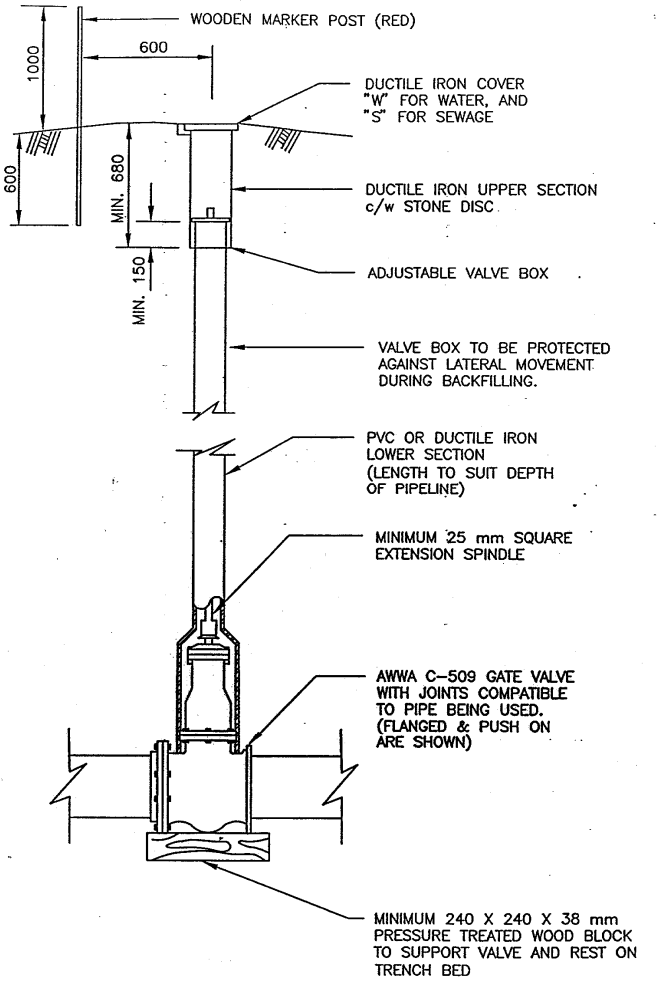
4.5.1. Flanged joints with appropriate full face rubber gasket epoxy coated ductile iron back-up ring, and all stainless steel nuts and bolts when used with HDPE pipe.

4.5.2. Thermal butt fusion joints, and socket fusion joints shall be installed in accordance with the HDPE pipe manufacturer's recommendations. Equipment used shall be approved by the manufacturer for joining HDPE pipe.

4.5.3. Only manufacturer recommended glues and solvents shall be used to joint PVC pipes.

4.6. Gate Valves – Gate valves shall conform to the current AWWA C509 Standard for Resilient Seated Gate Valves and shall be suitable for 700 kPa (100 psi) services. The valves shall have an epoxy coated cast

iron body with Buna-N encapsulated rubber disc trim. Gate valve stem seals shall be O-Ring type. The valve shall be complete with a counter-clockwise opening non-rising spindle. Each gate valve shall be complete with a valve box, including an extension spindle with a 50 mm square operating nut, stone disc, and metal valve box cover and gate valve marker post (see gate valve installation detail attached as an appendix to this document). The box and extension spindle shall be adjustable to suit the depth of bury specified for the pipe, plus or minus 0.3 metres.



4.6.1. Blocks used to support installations of gate valve with nominal diameter less than 120 mm (4") shall be cut from pressure treated hemlock or spruce timber. All cut surfaces shall be treated with wood preservative. An alternative is a fibre glass block.

4.6.2. Blocks used to support installations of gate valve with nominal diameter over 120 mm (6") shall be a concrete block of minimum dimension of 300 x 300 x 50 mm.

4.7. Road and Waterway Crossings - Encasement pipe used in Highway or Provincial Road Crossings shall conform to the plans or as specified in MWSB Section 01001, Special Provisions. Encasement pipe used in highway crossings shall be at least 100 mm in diameter larger than PVC carrier pipe and 50 mm in diameter larger than polyethylene carrier pipe. Encasement pipe for Highway or Provincial Road Crossings shall be PVC SDR 26 or High Density Polyethylene DR 17.

4.7.1. Bends in HDPE encasement pipe – The design submissions shall include the radius of curvature for any bends in the encasement pipe required by the installation.

4.7.2. Waterways crossings may be subject to the federal Department of Fisheries and Ocean in regard to directional drilling operational statement. The submission shall include relevant documents and authorisations from DFO.

4.8. Railroad Line Crossing – Encasement pipes shall be used for all railroad line crossings.

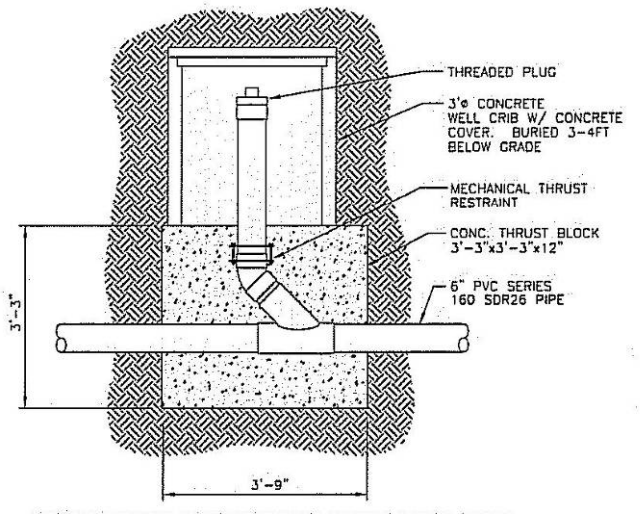
4.8.1. Encasement pipe used in Railway Crossings shall be ASTM A53 Grade B steel pipe with a minimum wall thickness of 7.6 mm, and a minimum yield strength of 242 MPa (35,000 psi).

4.8.2. The design of the crossing shall conform to Transport Canada's *Standards Respecting Pipeline Crossings Under Railways.*

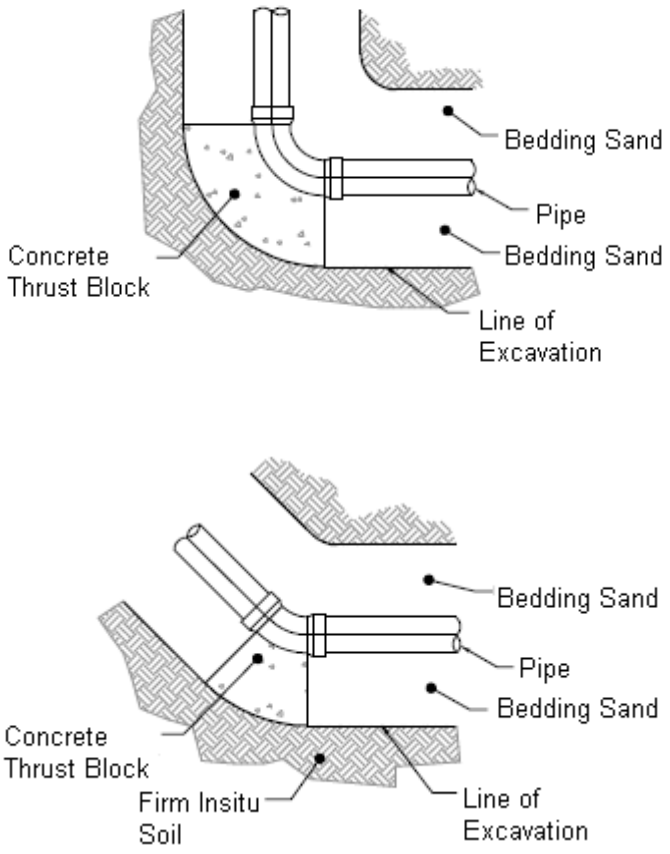
4.9. Cleanouts – Cleanouts that emerge in an area that must be protected from agricultural equipment shall be clearly marked and protected by a concrete pad with curbs 0.7 metres high on each side.

4.9.1. All cleanout locations shall be indicated with a sign at least 1.5 metres tall.

4.9.2. A minimum of one cleanout shall be installed on all pipelines and the distance between subsequent cleanouts shall not exceed 400 metres (1400 ft).



4.10. Thrust Blocks – The design and installation of thrust blocks shall be completed according to WAS Design Guidelines for Water and Sewer Section 5.2. Concrete thrust blocks shall be installed at all cleanouts, crosses, tees, elbows, reducers, caps, and inlets, in accordance with the following:



TYPICAL HORIZONTAL THRUST BLOCK CONFIGURATION

4.10.1. The required minimum area, in square metres (m^2), that a concrete thrust block must bear against undisturbed soil shall be calculated by first dividing the total thrust by the allowable bearing capacity of the soil and then multiplying the result by a safety factor of 1.5, in accordance with the following formula:

$$\text{Bearing Area } (m^2) = \frac{\text{Total Thrust (N.)}}{\text{Soil Bearing Capacity } (N/m^2)} X\ 1.5$$

This formula does not consider the weight of pipe and fittings. The engineer may alternately supply thrust block calculations that include the weight of the pipe and fittings to be restrained. Such alternate calculations shall be submitted to the regulatory agency for review and approval.

4.11. Type of Concrete – Concrete used for thrust blocks, anchor blocks, and grouting shall have a 28 day compressive strength of no less than 15 MPa. Cement used in concrete shall be sulphate resistant, meeting the current CSA Standard A23.1, Type GU Portland Cement. Water used for concrete shall be clean and free from oil, acid, alkali, organic matter or other deleterious substances and shall be equal to potable (drinking) water in physical and chemical properties.

SECTION 5 - PIPELINE INSTALLATION PROCEDURES

5.1. Installation Requirements – This portion of the work shall be undertaken in accordance with MWSB Section 02218, "Pipeline Excavation, Bedding and Backfill".

5.1.1. Prior to installation, the interior and joining surfaces of all pipes, accessories, and appurtenances shall be cleaned of dirt and foreign material and wiped dry.

5.1.2. Pipe and other materials associated with the construction of pipelines, shall be stored and handled in accordance with the recommendations of the respective manufacturers and to the satisfaction of the Engineer.

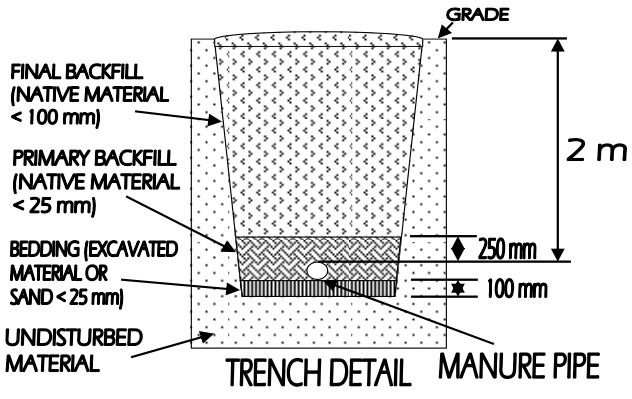
5.2. Depth of Burial - Minimum depth of burial for all livestock manure pipelines designed for year-round operation, measured from normal ground elevation to the top of the pipe, shall be 2 metres.

5.2.1. Where approved by the regulatory authority for pipeline intended to be used only seasonally when soil temperatures are greater than or equal to 0 degrees Celsius, the minimum depth of pipeline burial shall be 1.2 metres or a depth according to the engineer's requirement.

5.2.1.1. Any pipelines used seasonally shall provide for a design allowing for flushing any residual liquid out of the pipeline at the end of its use.

5.3. Bedding – Pipelines shall be laid on 100 mm of bedding, with 250 mm of primary backfill surrounding the pipe. Fine, loose, unfrozen excavated material or sand shall be used as bedding with no particles larger than or equal to 25 mm. Class B or C type of bedding from part 3.06 of the most recent version of Section 02218 of the MSWB shall be used for both bedding and primary backfill.

5.4. Primary Backfill – Unfrozen, native material containing no particles larger than or equal to 25 mm shall be used as primary backfill. Class B or C type of bedding from part 3.06 of the most recent version of



Section 02218 of the MWSB shall be used for both bedding and primary backfill.

5.5. Final Backfill – The remaining soil shall consist of unfrozen material excavated from the trench with no particles larger than 100 mm.

5.6. Construction Below Freezing – Pipes and bedding material shall not be installed into frozen ground.

5.7. Special Installations - Where complete pipelines or any section of a pipeline is not installed in conformance with section 4.6, 4.7 or section 5.2 through 5.5, the design shall be submitted to the regulatory authority for approval prior to installation.

5.8. Pressure Testing – The appropriate hydrostatic pressure test depends on the type of pipe material used for constructing the pipeline.

5.8.1. Prior to hydrostatic testing, the line(s) shall be filled slowly with water and all air shall be expelled from the line. If cleanouts or risers are not installed at all high points, main stops shall be installed at such points to allow the air to be expelled as the pipe fills with water.

5.8.2. Pressure testing shall be carried out under the direct supervision of the Engineer and shall not commence until at least 72 hours after the installation of the last thrust block on the line to be tested.

5.8.3. Gravity pipelines do not require pressure testing.

5.8.4. PVC pipelines - PVC pipelines shall be pressure tested.

5.8.4.1. The tests shall not commence until a minimum of 24 hours has passed since the pipe was filled with water.

5.8.4.2. The duration of each test shall be no less than two hours.

5.8.4.3. At the end of the first hour, the water pressure shall be boosted to its initial value of 700 kPa (100 psi). At the end of the second hour, the water pressure shall be checked.

5.8.4.4. The drop in water pressure shall not exceed 2%. If the pressure drop is in excess of this, the contractor shall find the leak, correct it, and repeat the test until the line can show a water pressure drop of less than 2% in one hour.

5.8.4.5. As an alternative to the above, a pressure drop of no more than 15% over a 12 hour period shall be acceptable.

5.8.5. Alternatively, PVC pipelines can be tested for leakage rate at a test pressure of 700 kPa. The test shall be of a duration of not less than two hours, and the leakage in the pipeline shall not exceed the limits shown in the table 5.1 attached hereto.

5.8.6. HDPE Pipelines - The Leakage Rate Test is the recommended leakage test procedure for HDPE pipelines.

5.8.6.1. HDPE pipelines shall be pressurized for a minimum of 24 hours after the line was filled with water. The line shall be pressurized to 700 kPa (100 psi), and over a four hour period, at hourly intervals sufficient make-up water shall be added to return the line to the test pressure, to compensate for pipe expansion while under pressure.

5.8.6.2. At the end of this four hour period, the pressure shall be brought up to the test pressure of 700 kPa, and over a period not exceeding two hours, the amount of make-up water required to bring the line back up to the test pressure shall be measured.

5.8.6.3. The amount must not exceed the allowable amount given in table 5.2 attached hereto. If the amount exceeds the allowable make up water amount, a minimum of eight hours shall be allowed to pass before the procedure may recommence.

5.8.6.4. Leaks shall be found and corrected, until the pipe passes the test. All corrections for leakage shall be noted on the pressure test report.

5.8.6.5. Where there are no appurtenances on the pipeline, the pipelines shall be leak free after installation (i.e. zero leakage).

5.8.7. Under special circumstances justified by the engineer, and only where pre-approved by the regulatory authority, an alternative test pressure of two times the maximum operating pressure of the lines may be used for pressure test purposes or 200 kPa, whichever is the greatest. A copy of the written authorisation from the regulatory shall accompany the pressure test report.

5.8.8. Pressure Testing Report – Results from all pressure test attempts, inclusive of the amount of make up water used to compensate for any expansion of pipes, shall be reported on the form included as an appendix to this document.

5.9. Repairs

5.9.1. Repair clamps used to make transition connections (or repairs, as directed by the Engineer) shall be wrap around "O" style rings suitable for 700 kPa (100 psi) service.

5.9.2. All metal parts and welds shall be made of type 304 stainless steel which has undergone full passivation. Bolt shanks shall be forged flat to

resist bending. Bolt threads shall be rolled-type, lubricated by an anti-galling compound. Nuts, bolts and washers shall be all stainless steel and shall be connected to turn independently without separating.

5.9.3. The rubber gasket shall have tapered ends, a grid surface and stainless steel armours. Gaskets shall be made of a synthetic equivalent to natural rubber.

5.9.4. Clamps for all pipes with a nominal internal diameter (nom. i.d.) of 250 mm and less shall have a minimum of one row of no less than three bolts. Clamps for 300 mm and 350 mm nom. i.d. pipe shall have a minimum of two rows of no less than three bolts. Clamps for 400 mm nom. i.d. pipe and larger shall have three rows of no less than four bolts. Clamp lengths shall be no less than two times the nom. i.d. of the pipe on which the clamp is to be installed.

SECTION 6 - DESIGN CRITERIA FOR LIFT STATIONS

6.1. Requirements for Construction – Lift stations are generally used in situations where the elevation of the source is not sufficient for gravity flow into a manure storage facility or manure treatment station.

6.1.1. An emergency power source shall be in place in the event of power loss, or else provisions for operating pumps from the auxiliary power lines shall be provided.

6.1.1.1. Where impractical to provide an emergency power source, the top elevation of the lift station shall be 500 mm higher than the highest level of liquid manure attainable in the livestock production facilities.

6.1.2. The size and number of pumps should be selected so that the range of influent flow rates can be met without starting and stopping pumps too frequently and without excessive wet-well storage.

6.2. Pre-Cast Concrete Manholes - The most common lift station consists of stacks of pre-cast concrete cribs. Lift stations constructed in this fashion shall comprise an impervious bottom cap and be made impervious through appropriate grouting.

6.2.1. The thickness of the lift station wall shall depend on the diameter of the pre-cast concrete manholes. For lift stations 750 mm (30 inches) in diameter, the wall thickness shall be 75 mm (3 inches). For 900 mm (36 inches), the thickness shall be 100 mm (4 inches), and for 1200 mm (48 inches), the thickness shall be 125 mm (5 inches).

6.2.2. Pre-cast concrete manholes of diameters in excess of 1200 mm shall have a minimum wall thickness of 200 mm.

6.2.3. Concrete used in pre-cast concrete manholes shall be sulphate resistant concrete adequate for a S1 exposure. This requires the use of Type HS cement.

6.2.4. The joints between each pre-cast section of the lift-station, the bottom cap of the lift-station and the upright section thereof and any pipe protrusions shall be grouted with a caulking or sealing product suited for exposure to manure. Application of the product shall be in strict compliance with the manufacturer's specification.

6.3. Oversized Lift Stations – Large, cast in place lift-stations may be required in certain manure handling design to either serve a dual purpose of holding tank or mixing tank. Such large, often cast in place lift-stations shall be designed as per the *Technical Reference Document for Liquid Manure Storage Structures – Concrete Manure Storage Structures*, and conform to all construction installation specifications stated therein.

6.4. Ventilation – Dry-wells and wet-wells shall be ventilated properly in order to prevent the build up of toxic and/or explosive gas.

6.5. Lift Stations and Wet Wells Location – Where manure influent lift stations or wet wells are to be installed onto the berm of an earthen manure storage structure, they shall be located on the inside berm of the structure so as to guide any overflow or spill from the appurtenance into the earthen manure storage structure.

SECTION 7 - MANURE TREATMENT STATIONS

7.1. Definition - A manure treatment station is defined as any building or facility designed to house solid/liquid separation systems, settling or mixing tanks, and parts of, or a complete manure treatment systems. These stations are essentially designed to temporarily contain manure between the primary manure handling system within livestock housing barn and final, long term storage facilities. Excluded from this definition are all appurtenances and accessories previously described in this document.

7.2. Submission - The engineering submission shall include a floor and elevation layout of the building clearly identifying all main components, inclusive of pipelines.

7.3. Manure By-Pass Requirement -The design of pipelines shall allow for a complete by-pass of all treatment system components as a fail-safe measure designed to re-route manure directly to the storage facility if necessary

7.4. Treatment Station Location - Siting of the treatment station shall conform to all setbacks prescribed for manure storage facilities stated in *The Livestock Manure and Mortalities Management Regulation* MR 42/98.

7.5. Treatment Station Building Design - The design of the structure into which, or onto which the treatment systems facility will be operated shall provide secondary containment for a spill volume equivalent to either the total volume of all above grade tanks or above the grade portion thereof, or else one volume of the lift station servicing the treatment station.

7.5.1. Secondary containment may be provided through a sloped floor design or provision of a suitably high continuous curb running all around the perimeter of the building or the rooms wherein the treatment components are located.

7.5.2. The Engineer shall provide information on the volume required for secondary containment for the facility.

7.5.3. Floors of the treatment station where tanks or piping are located partially or totally above grade shall be designed as impervious concrete floors in conformance with the *Technical Reference Document for Liquid Manure Storage Structures - Concrete Manure Storage Structures.*

7.5.4. Below grade components, such as but not limited to tanks and gutters permanently containing liquid manure shall include a leak detection system.

7.5.4.1. The leak detection system shall include an impervious barrier and a leachate collection component.

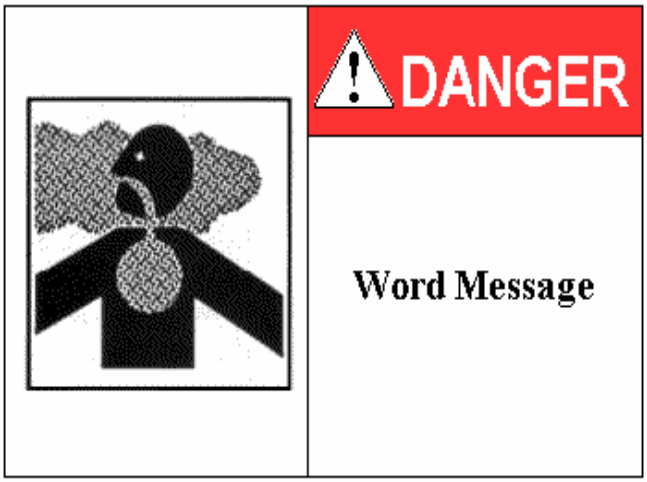
7.5.4.2. Unless otherwise approved by the regulatory authority, a 250 μm (10 mil) thick continuous polyethylene sheet placed under a 150 mm layer of 20 mm aggregates with a maximum of 5% finer aggregates will be provided as part of the leak detection system.

7.5.4.3. The sump design must include an impervious bottom and provide for easy water sample collection.

7.6. Pressure Testing - All below grade pressure pipelines servicing any component associated with the treatment station shall be pressure tested according to section 5.8 herein.

SECTION 8 - SAFETY

8.1. General Safety – Refer to *Technical Reference Manual for Liquid Manure Storage Structures*, for general safety information. All designs, construction work and operation of the facilities described in this document shall conform and be carried out in accordance with the Manitoba Workplace Safety and Health Regulation 217/2006.



8.2. Manure Gases – The gases generated by the storage of liquid manure can be fatal and explosive in confined areas. Inhalation of these gases can be a serious health risk. The concentration of manure gases is higher and more dangerous in confined areas where the liquid manure is stored. Liquid manure storage structures with covered tops are particularly dangerous. NEVER ENTER A LIFT STATION without the proper breathing apparatus.

8.3. Signage - The Engineer is responsible for ensuring that proper signage will be installed.

8.3.1. Signage shall inform the reader of the requirements of the Manitoba Workplace Safety and Health Regulation 217/2006 regarding entry in confined spaces.

8.4. Use of Compressed Air - Proper procedures shall be implemented to prevent accidents when compressed air is to be used for flushing pipelines.

8.5. Trench Protection – For excavation depths greater than 1.5 metres, the current Regulations of the Manitoba Department of Labour for excavation and trenching shall be followed.

8.6. Access – Access limiting devices shall be included in the design for all manure storage stations, manure treatment system components, and any appurtenances associated with the design.

8.6.1. No workers shall enter any areas or spaces, defined as confined spaces by the Manitoba Workplace Safety and Health Regulation 217/2006, without proper certification and strict adherence to confined spaces entry protocols.

8.6.2. Lift stations, valve access holes, pump out access ports, and other similar appurtenances large enough to allow for workers', operators', or by-standers' access are all confined spaces and shall be securely capped with a locked or sealed cover, grate, or latch door fabricated from weather and manure resistant material.

SECTION 9 - QUALITY ASSURANCE

9.1. Quality Control

9.1.1. Concrete - The Engineer shall carry out such tests on concrete (used in thrust blocks) as s/he considers necessary in accordance with the current CSA Standard A23.2, Methods of Test for Concrete. Such tests shall be at the expense of the owner, except that the Contractor shall furnish any and all test samples free of charge. Water used for mixing concrete shall be clean and free of oil and alkali, organic matter or other deleterious substances. Water shall be equal to potable water (drinking water) in physical and chemical properties.

9.1.2. Pressure Test - The Contractor shall pressure test the pipeline under the direct supervision of the Engineer.

9.2. Final Inspection – The Engineer shall make arrangements with the regulatory authority for a joint final inspection after completion of the installation and before commissioning of the manure pipeline and/or appurtenances.

SECTION 10 - ISSUANCE OF CERTIFICATES

10.1. Certificate – The Engineer shall provide the regulatory authority with a final letter of certification indicating that the manure pipeline has been completed in conformance with the submitted **engineering plans** and **meets required codes, regulations and Technical Reference Documents mentioned herein.**

10.1.1. The letter of certification shall be affixed with the Engineer's seal in a manner acceptable to the guidelines of the Association of Professional Engineers and Geoscientists of the Province of Manitoba.

10.2. Construction Report – The letter of certification shall be accompanied by a construction report.

10.2.1. In the case of manure pipelines, the construction report shall provide accurate information on the following aspects of the construction work:

- "As Built" drawings;
- all pressure test reports for all test trials;
- depth of burial; and,
- road, railway, waterway and public and/or private services crossings.

10.2.2. Certification can be provided if construction details do not conform to engineering plans submitted provided these details were pre-approved by the regulatory authority and referenced in a construction report.

Reference	Abbreviation Used
ASTM D1784 *Standard for Rigid Polyvinyl Chloride Compound*	ASTM D1784
ASTM D2241 *Standard for Polyvinyl Chloride Plastic Pipe*	ASTM D2241
ASTM 714 *Specifications for Polyethylene Plastic Pipe*	ASTM 714
AWWA C110 *Standard for Gray-Iron and Ductile Iron Fittings*	AWWA C110
AWWA C509 *Standard for Resilient Seated Gate Valves*	AWWA C509
AWWA C900 *Standard for Polyvinyl Chloride Pressure Pipe*	AWWA C900
CSA B137.0 *Definitions, General Requirements and Methods of Testing for Thermoplastic Pressure Piping*	CSA B137.0
CSA B137.1 *Polyethylene Pipe, Tubing and Fittings for Cold Water Pressure Services*	CSA B137.1
CSA B137.3 *Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications*	CSA B137.3
CSA A23.1 *Concrete Materials and Methods of Concrete Construction*	CSA A23.1
CSA A23.2 *Methods of Test for Concrete*	CSA A23.2
MWSB Section 01001 *Special Provisions*	MWSB 01001
MWSB Section 02706 *Pressure Pipelines*	MWSB 02706
MWSB Section 02218 *Pipeline Excavation, Bedding and Backfill*	MWSB 02218
Transport Canada Transport Canada's *Standards Respecting Pipeline Crossings Under Railways*	

Societies	
American Society for Testing and Material	ASTM
American Waste and Water Association	AWWA
Canadian Standards Association	CSA
Manitoba Water Services Board	MWSB
Water Agencies' Standards	WAS

HYDROSTATIC PRESSURE TEST FORM

Livestock Operation:_____ Date:_____

Permit #: _____ Test # : _____

Contractor: _____ Engineer: _____

Location:

_____

Trust block installed on line? ☐ If so, indicate date and time _____

Forcemain: ☐ Test Pressure 700 kPa (100 psi) Test Pressure: _____

WATER LEAKAGE CALCULATIONS SHALL BE BASED ON DISTANCE BETWEEN NEIGHBOURING VALVES

(SEE TABLES 5.1 AND 5.2 FOR ALLOWABLE LEAKAGE TABLES)

Diameter of Pipe	Total Length	Pipe Type	Leakage Rate	Allowable Leakage

Total Allowable Leakage _____

Hour /Time	Water Pressure		Volume to re-pressurize line	Total Leakage	Water Pressure Drop (Max. 2% in one hour)
	Initial	Test			
0			xxxxxxxxxxxxx		
1					
2			+ =	**PVC _____**	%
3					
4					
5					
6			+ =	**HDPE_____**	

Pass ☐ **Fail** ☐

Comments: _____

_____

_____

_____

Signature_____

Signed by (print):

Manitoba Conservation, Environmental Services - February 2008 - Use this form for recording test results according to MWSB pipeline pressure testing protocol in: *Standard Construction Specifications*, section 07206 - Pressure Pipelines, subsection 3.18 Hydrostatic Testing. Published by The Manitoba Water Services Board Box 22080, 2022 Currie Blvd, Brandon MB R7A 6Y9

TABLE 5.1
ALLOWABLE LEAKAGE - PVC

TYPE OF PIPE	LENGTH OF PIPE SECTION (METRES)	WATER LEAKAGE -ml PER HOUR/km OF PIPELINE PER mm OF NOM. I.D.
PVC	3.0	162
PVC	3.9	125
PVC	6.0	81

TABLE 5.2

ALLOWABLE LIMIT FOR MAKE-UP WATER - HDPE PIPES (2 HOUR TEST)	
Nominal Pipe Size (mm)	**Litres per km of Pipe**
50	13.0
75	18.6
100	31.0
150	74.5
200	124.2
250	165.6
275	248.4
300	289.8
350	341.5
400	414.0
450	538.2

Notes: _____