1.0 GENERAL

1.1 REFERENCES

.1 Provide syphons in accordance with the following standards (latest revision) except where specified otherwise.

.2 American Society for Testing and Materials (ASTM)

.1	ASTM A53/A53M	Standard Specification for Structural Pipe, Steel, Black, and Hot-Dipped, Zinc-Coated Welded and Seamless.
.2	ASTM A105/A105M	Standard Specification for Carbon Steel Forgings, for Piping Applications.
.3	ASTM B843	Standard Specification for Magnesium Alloy Anodes for Cathodic Protection.

.3 American National Standards Institute (ANSI)

.1	ANSI B16.5	Pipe Flanges and Flanged Fittings.

.4 Canadian General Standards Board (CGSB)

.1	CAN/CGSB-1.181	Ready-Mixed Organic Zinc-Rich Coating.

.5 Canadian Standards Association (CSA)

.1	CSA-G40.21	Structural Quality Steel.
.2	CAN/CSA-G164-M	Hot-Dip Galvanizing of Irregularly Shaped Articles.
.3	CSA-G401	Corrugated Steel Pipe Products.
.4	CAN/CSA-S16	Limit States Design of Steel Structures.
.5	CSA-W47.1	Certification of Companies for Fusion Welding of Steel Structures.
.6	CSA-W48	Filler Metals and Allied Materials for Metal Arc Welding.
.7	CSA-W59M	Welded Steel Construction (Metal Arc Welding) (Metric Version).

.6 Structural Steel Painting Council (SSPC)

.1	SSPC-SP10	Near White Metal Blast Cleaning.

1.2 SUBMITTALS

.1 Provide the following submittals.

.2 Shop drawings for syphons including related miscellaneous metal work at least 15 days prior to fabrication. On the shop drawings include material specifications, dimensions, weights, finishes, and all connections including the size of welds.

.3 Product data for the valves, couplers, cathodic protection and isolation kits at least 15 days prior to purchasing the materials.

.4 Operations and maintenance data for the couplers and valves.

.5 Manufacturer's written instructions for unloading, handling and storing materials prior to unloading.

.6 Manufacturer's written instructions for installing materials and repairing damaged coatings prior to performing such work.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Inspect each shipment of material and timely replace any damaged materials.

.2 Unload, handle, and store materials in accordance with the manufacturer's written instructions. Use handling methods that do not damage the material or the shop applied coating.

2.0 PRODUCTS

2.1 MATERIALS

.1 Provide materials in accordance with the following.

.2 Pipe and Fittings:

.1 Steel pipe: In accordance with ASTM A53/A53M, Grade B, Standard Weight.

.2 Steel pipe flanges: 680 kPa slip-on welded flanges in accordance with ASTM A105/A105M and ANSI B16.5. Provide non-asbestos red rubber gaskets [except at the isolation flanges].

.3 Isolating flange kits as specified in the Contract Documents. Products and manufacturers include [ ].

.3 Valves and Couplers:

.1 Priming Valves: Threaded bronze ball valves with a minimum working pressure of 680 kPa. Products and manufacturers include [ ].

.2 Couplers for priming: Stainless steel quick connect couplers with a minimum working pressure of 680 kPa. Products and manufacturers include [ ].

.3 Flow control valve: Semi-lug wafer cast body butterfly valve with a minimum working pressure of 680 kPa, and consisting of a semi-lug wafer cast-iron body, aluminum bronze disc, stainless steel shaft, Buna-N seat, and operating handle. Products and manufacturers include [ ].

.4 Cathodic Protection:

.1 [ ] kg magnesium anodes in accordance with ASTM B843, [Grade M1C].

.2 [AWG #12/7 stranded copper wire with type RWU–90 insulation].

.3 Cathodic protection test terminals consisting of brass nickel-plated terminal hardware complete with [5] terminals and [2] bonding straps. Products and manufacturers include [ ].

.5 Priming and valve chambers: Galvanized helically lock seam corrugated steel pipe in accordance with CSA-G401 with a 68 mm by 13 mm corrugation profile.

.6 Miscellaneous metal work items: Galvanized [vortex breaker, intake screen and guides] in accordance with CSA-G40.21, Grade 300W.

.7 Access lids for chambers: Armtec Type [ ] fiberglass lids.

.8 Access ladders: [Aluminum MSU Model 1105 access ladders [complete with Model 3105 double rail access handles and mounting attachments as manufactured by MSU Mississauga Ltd. Provide rubber washers when bolting aluminum ladders to CSP].

2.2 SHOP FABRICATION

.1 Employ a fabricator certified by the Canadian Welding Bureau in accordance with CSA-W47.1, Division 3.

.2 Fabricate in accordance with CAN/CSA-S16. Perform welding in accordance with CSA-W59 using welding electrodes in accordance with CSA-W48. Control and minimize distortion, and include stress relief measures to minimize residual stresses.

.3 Do not conduct welding operations when the ambient temperature is below 0°C, or when the base metal temperature is below 0°C. Preheat and maintain the base metal at a minimum temperature of 25°C during welding.

.4 Accurately fabricate metal fabrications true to line and free from warps, twists, bends, and open joints. Reject metal fabrications that have sharp kinks or bends.

.5 Do not carry out metal fabrications with welds other than those specified in the Contract Documents unless authorized by the Minister.

.6 Shop coat the exterior surfaces of pipe, pipe fittings and flanges, and the control valves as follows:

.1 Surface preparation: In accordance with [SSPC-SP10].

.2 Primer Coat: [ ].

.3 Finish Coat: [ ]. Colour: [black].

.7 Hot-dip galvanized metal work, except for painted, bronze, stainless steel and aluminum components, in accordance with CAN/CSA-G164-M. Employ measures to minimize distortions due to galvanizing. Galvanize all items after fabrication, except parts that are bolted together are to be galvanized before final assembly. Galvanize to provide a zinc coating of not less than 610 g/m^2.

3.0 EXECUTION

3.1 EXCAVATION AND PREPARATION OF THE FOUNDATION

.1 Excavate the foundation to the lines, grades, slopes, and elevations specified in the Contract Documents.

.2 Provide care of water to permit the work to be carried out in the dry.

.3 The Minister will identify unsuitable bearing soils when encountered at the earth foundation level. Perform [excavation, as classified by the Minister,] [Authorized Structure Over-Excavation] to remove unsuitable bearing soils and replace with [fill materials] [Authorized Fill Placement] as directed by the Minister.

.4 Compact the base of the excavation to provide a firm foundation throughout the entire length of the syphon.

3.2 INSTALLATION

.1 Install syphon pipes at the locations, of the sizes, and to the lines, grades, slopes, and elevations specified.

.2 Install flanges, valves, couplers, [isolation flange kits] in accordance with the manufacturers' written instructions.

.3 Install cathodic protection in accordance with the manufacturer's written instructions. Use the thermite weld method to make all wire connections. Place the anode at the same depth and at least 1000 mm away from the pipe at the specified locations. Isolate the valve chambers [and existing pipelines].

3.3 FILL AND BACKFILL

.1 Do not commence fill placement until the assembled syphon has been inspected by the Minister, and field testing has been successfully completed. Rectify defects, including any identified by the Minister.

.2 Provide the fill material specified in the Contract Documents, so that direct and continuous contact between the pipe wall and the fill material is attained.

.3 Compact each lift of fill at the moisture content and to the density specified in Section 02331 – Fill Placement.

.4 Within 600 mm of pipes and 1000 mm of structures, remove rocks larger than 80 mm in diameter, and place fill material in lifts not exceeding 100 mm in thickness. Compact each lift using pneumatic or mechanical hand tamping equipment.

.5 Prevent damage to pipes and structures including the coating during fill placement. Do not permit compaction equipment to come into direct contact with the pipes and structures.

.6 Bring fill and compaction layers up simultaneously and evenly on both sides of the pipes and structures.

.7 Operate compacting equipment parallel to the longitudinal axis of the pipe, until sufficient fill has been placed to allow construction of the embankment in the normal manner.

.8 Do not allow any construction equipment that may cause the pipe to deflect or settle beyond the specified tolerances to pass over the pipe. Where construction access is required, provide detours, ramps, pads or other measures as authorized by the Minister to protect the pipe.

.9 Prevent displacement of the pipes and structures during fill placement operations or through floatation.

.10 Maintain the interior of the syphon free of foreign matter.

3.4 FIELD TESTING

.1 Prior to placing backfill, test the completely assembled syphon for leaks by pressurizing the syphon and maintaining an air pressure of [0.31 MPa (45 psi)] for at least 3 hours. The maximum allowable leakage over the [3] hour test period is [0.007 MPa (1 psi)].

.2 Prior to backfilling, use a voltmeter, test probe or similar device to verify that the required electrical continuity along the syphon pipe, and discontinuity with the valve chambers and other items requiring isolation has been attained. Verify that the test points are operating properly.

3.5 INSTALLATION TOLERANCES

.1 For the syphon pipe, the tolerance from the specified lines, grades, slopes, and elevations is +/-25 mm.

.2 Provide a completed pipe installation with a vertical deflection no greater than 3% of the pipe diameter specified in the Contract Documents.

3.6 REPAIR DAMAGED COATING

.1 Power tool clean surfaces to be repaired and re-coat in accordance with the paint manufacturer's written instructions.

.2 Repair damaged galvanized surfaces with a zinc-rich paint that is in accordance with CAN/CGSB-1.181.

.3 Power tool clean galvanized surfaces to be repaired to a bright metal surface. Apply multiple coats of zinc-rich paint in accordance with the manufacturer's written instructions to obtain a minimum dry film thickness of 50 microns or greater where required by the paint manufacturer.

END OF SECTION