1.0 GENERAL

1.1 [DETAILED DRAWINGS]

.1 The following detail drawings are appended hereto and form part of this section:

Number	Title
[ ]	[ ]
[ ]	[Sloped End Section]

1.2 REFERENCES

.1 Provide corrugated steel pipe and structures in accordance with the following standards (latest revision) except where specified otherwise.

.2 American Society for Testing and Materials (ASTM)

.1 ASTM D1056 Specification for Flexible Cellular Materials – Sponge or Expanded Rubber.

.3 Canadian General Standards Board (CGSB)

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

.4 Canadian Standards Association (CSA)

.1 CSA-G401 Corrugated Steel Pipe Products.

1.3 SUBMITTALS

.1 Provide the following submittals.

.2 Shop drawings of pipes and structures including [manholes, gatewells, and pumpwells] at least 20 days prior to fabrication.

1.4 DELIVERY, STORAGE, AND HANDLING

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

.2 Unload, handle, and store pipe according to the manufacturer's written instructions to prevent damage to the galvanized coating and the pipe.

2.0 PRODUCTS

2.1 MATERIALS

.1 Provide materials in accordance with the following.

.2 Corrugated Steel Pipes and Structures:

.1 Corrugated steel pipe and structures including [manholes, gatewells, and pumpwells] consisting of galvanized helical corrugated lock seam pipe in accordance with CSA-G401, with a corrugation profile of [68 mm by 13 mm] [125 mm by 25 mm]. Re-corrugate end to provide annular corrugations for couplers.

.2

Pipe Wall Thickness	Pipe Diameter
[2.0 mm	D ≤ 600 mm
2.8 mm	600 mm < D ≤ 900 mm
3.5 mm	D > 900 mm]

.3 Shop fabricated sloped end sections of 3H:1V [4H:1V] as specified. Smooth the cut edges by grinding. For pipes 1000 mm or greater in diameter, weld the lock seams terminating at the cut edges of the sloped end sections with a 75 mm long fillet weld along the lock seam.

.4 Shop fabricated structures and fittings.

.3 Couplers:

.1 Galvanized couplers with annular corrugations and a minimum wall thickness of [2 mm].

.2 For CSP greater than 300 mm in diameter, couplers of sufficient width to cover a minimum of 2 outside crest corrugations on each re-corrugated end.

.3 For CSP greater than 800 mm in diameter, couplers that have a minimum of 3 bolts.

.4 Gaskets: Rubber gaskets in accordance with ASTM D1056.

.4 Galvanizing: Minimum zinc coating of 610 g/m^2 in accordance with CSA-G401 for all components.

.5 Fibreglass Lids: [Armtec Type [ ]].

.6 Ladders: [Aluminum MSU Model 1105 access ladders complete with Model 3104 double rail access handles as manufactured by MSU Mississauga Ltd.]

2.2 SHOP FABRICATION

.1 Perform welding in the shop in accordance with CSA-W59.

.2 For fabricated structures and fittings, employ a proven square groove or vee-groove welding procedure that provides 100% effective throat thickness at the joint. Provide a welded joint that has the same strength as the adjacent corrugated steel material.

.3 Repair zinc coating damaged by welding as specified.

3.0 EXECUTION

3.1 EXCAVATION AND PREPARATION OF THE FOUNDATION

.1 Excavate the pipe and structure 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 of uniform density beneath the entire length of the pipes and structures.

.5 Place and compact the bedding material as specified in the Contract Documents.

.6 Shape the bed to conform to the curvature of the pipe.

3.2 INSTALLATION

.1 Install the pipes and structures at the locations, of the sizes, and to the lines, grades, slopes, and elevations specified in the Contract Documents. The tolerance from the specified lines, grades, slopes, and elevations is +/-15 mm. For structures, the maximum variation from plumb is 1H:300V.

.2 Where departures from the specified tolerance occur along the pipes, that are within the specified tolerance, return to the specified lines, grades, slopes, and elevations gradually at a rate of not more than 5 mm per metre length of the pipe. For greater departures, remove and reinstall the pipe.

.3 Securely join separate sections using couplers installed in accordance with the manufacturer's written instructions. Provide a completed installation that is watertight, and install the pipes so that they are free of depressions and are free draining.

.4 When a laser beam is used to maintain grade, use manual survey methods to check the pipe invert at several intermediate locations and at the termination points.

3.3 FILL AND BACKFILL

.1 Do not commence fill placement until the installed pipes and structures have been inspected by the Minister. Rectify defects, including any identified by the Minister.

.2 Provide the fill material specified in the Contract Documents, and fill all corrugations 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 galvanized coating during fill placement. Do not permit compaction equipment to come into direct contact with the pipe and structure.

.6 Bring fill and compaction layers up simultaneously and evenly on both sides of the pipes and structures. Do not allow construction equipment to pass over the pipe until a minimum cover of 600 mm, or greater if necessary to prevent damage to the pipe, of compacted fill has been placed.

.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 Prevent displacement of the pipe and structure during fill placement operations or through floatation.

.9 Maintain the interior of the pipes and structures free of foreign material.

3.4 REPAIR OF DAMAGED GALVANIZED COATING

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

.2 Power tool clean the 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