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1.0 GENERAL

1.1 [DETAIL DRAWINGS]

- .1 The following detail drawing is appended hereto and forms part of this section:

Number	Title
[]	[Table C: Details of Standard 2:1 Sloped End Sections for SPCSP Round Culverts.]

1.2 REFERENCES

- .1 Provide structural plate corrugated steel pipe (SPCSP) structures in accordance with the following standards (latest revision) except where specified otherwise.
- .2 American Society for Testing and Materials (ASTM)
- .1 ASTM A563 Specification for Carbon and Alloy Steel Nuts.
- .2 ASTM F568M Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners.
- .3 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.181 Ready-Mixed Organic Zinc-Rich Coating.
- .4 Canadian Standards Association (CSA)
- .1 CAN/CSA-G164 Hot-Dip Galvanizing of Irregularly Shaped Articles.
- .2 CSA-G401 Corrugated Steel Pipe Products.

1.3 SUBMITTALS

- .1 Provide the following submittals.
- .2 Shop drawings prior to fabrication, including details of non-standard materials and details of the bevel ends.
- .3 Assembly drawings for each SPCSP structure prior to delivering the materials to the Site.

1.4 QUALITY ASSURANCE

- .1 Provide the Minister with access to the SPCSP manufacturing plant for the purpose of inspecting materials.
- .2 Notify the Minister at least 10 days prior to delivering any materials to the Site.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Inspect each shipment of material, and timely replace any damaged material.
- .2 Ship all SPCSP bolts with the plates.

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- .3 Unload, handle, and store plates according to the manufacturer's written instructions to prevent damage to the galvanized coating and the plates.
- .4 Unload and stockpile the plates in an orderly manner to facilitate inspection. Stockpile plates that are not to be assembled immediately concave down to reduce storage stain damage.

2.0 PRODUCTS

2.1 MATERIALS

- .1 Provide materials in accordance with the following.
- .2 SPCSP:
 - .1 Galvanized SPCSP in accordance with CSA-G401, with a 152 mm by 51 mm corrugation profile.
 - .2

SPCSP Wall Thickness	SPCSP Diameter (D)
[] mm	[] mm
[] mm	[] mm
 - .3 Shop fabricated sloped end sections as specified. Smooth the cut edges by grinding.
 - .4 Galvanizing: Minimum zinc coating of [610 g/m²] [1220 g/m²] when tested by the triple spot test.
 - .5 Clearly mark SPCSP with the following information:
 - Manufacturer's Name or Trade Mark
 - Nominal Thickness and Type of Metal
 - Metal Coating (for non-standard
 - Specification Designation
 - Plant Designation Code
 - Date of Manufacturer
- .3 Bolts and nuts: In accordance with ASTM F568M and ASTM A563. Galvanized finish in accordance with CAN/CSA-G164.

3.0 EXECUTION

3.1 EXCAVATION AND PREPARATION OF THE FOUNDATION

- .1 Excavate the SPCSP 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 structure.
- .5 Place and compact the bedding material as specified in the Contract Documents.
- .6 Shape the bed to conform to the curvature of the bottom plates.
- .7 Where camber is specified in the Contract Documents, provide a gradual crest curve in the bedding with no sudden breaks in the grade

3.2 INSTALLATION

- .1 Do not install any plate until the bedding and shaped bed has been inspected by the Minister. Rectify any defects, including any identified by the Minister.
- .2 Assemble the SPCSP in accordance with the manufacturer's written instructions.
- .3 Install the SPCSP 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 +/-25 mm. Where departures occur that are within the specified tolerance, return to the specified lines, grades, slopes, and elevations at a rate of not more than 5 mm per metre length of the structure. For greater departures, remove and reinstall the structure.
- .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.
- .5 Properly lap each bolted seam to attain continuous contact with each plate for the full width and length of the lap. Provide the bolts in the valley of each longitudinal seam, nearer to the visible edge of the plate than the bolts in the crest.
- .6 Assemble and loose bolt the side arc and top arc plates starting from the upstream end of the structure and progressing towards the downstream end.
- .7 After 2 complete rings have been loosely assembled, check the vertical dimensions and, where necessary, adjust with horizontal cables or struts to obtain the specified rise dimensions.
- .8 Assemble each adjacent ring and adjust in a similar manner until the entire structure is loosely assembled and conforms to the specified geometry with nested plates.
- .9 Assemble the structure such that the vertical axis is upright and the longitudinal seams are straight. Prevent rotation of the SPCSP and/or spiralling of the longitudinal seams.
- .10 When horizontal tie cables are used for shape adjustment, provide adequate measures to distribute concentrated forces at the SPCSP walls. Prevent distortion of the sidewalls at the cable points.

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- .11 Torque the bolts at not less than 200 N-m and not more than 340 N-m, including bolts connecting special features to the structure. Where the manufacturer's requirement for torque differs from this range, obtain direction from the Minister.
- .12 Do not distort bolt holes by over-torquing or by utilizing improper assembly methods. Drill additional holes when required. Do not torch cut holes or weld on the structure.
- .13 Maintain the shape of the SPCSP within 2% of the specified dimensions, including the rise, span, and any chords or chord offsets specified in the Contract Documents. Supply and install devices or use methods to monitor and maintain the shape of the structure. Do not use horizontal struts or other devices that cause local distortions or other signs of distress. Leave restraining devices in place until the fill reaches the top of the sidewall and the Minister authorizes their removal.

3.3 FILL AND BACKFILL

- .1 Do not commence fill placement operations until the installed SPCSP structure has been inspected by the Minister. Rectify any defects, including any identified by the Minister.
- .2 Provide fill material, as specified in the Contract Documents, under the haunches and adjacent to the pipe. Fill all corrugations so that direct and continuous contact between the plates 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 the structure, remove stones larger than 80 mm from the fill, and place fill material in lifts not exceeding 100 mm in thickness. Compact each lift of fill using pneumatic or mechanical hand tamping equipment.
- .5 Prevent damage to the galvanized coating and the pipe during fill placement. Do not permit compaction equipment to come into direct contact with the plates.
- .6 Bring the fill up simultaneously and evenly on both sides of the structure. Do not allow construction equipment to pass over the structure 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 structure, until sufficient fill has been placed to allow construction of the embankment in the normal manner.
- .8 Prevent displacement of the structure during fill placement operations or through floatation.
- .9 Maintain the interior of the pipe free of foreign material.

3.4 REPAIR AND DAMAGED GALVANIZED COATING

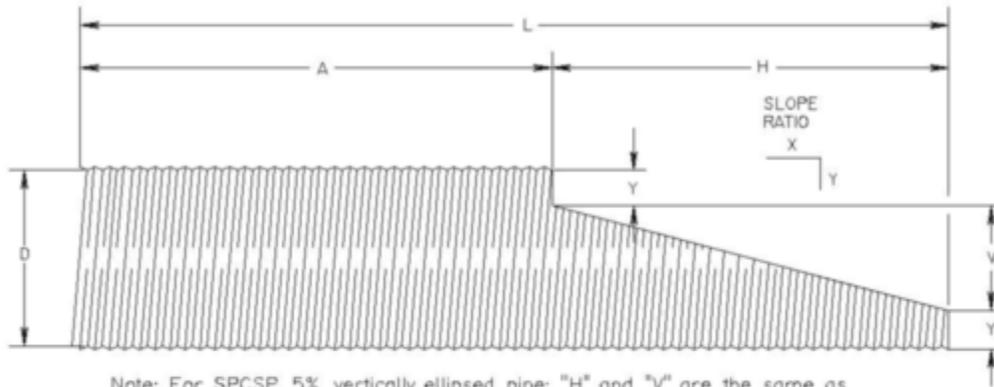
- .1 Repair damaged galvanized surfaces with a zinc-rich paint that is in accordance with CAN/CGSB-1.181.

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- .2 Power tool clean 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

TABLE C
DETAILS OF STANDARD 2:1 SLOPED END SECTIONS
FOR SPCSP ROUND CULVERTS



Note: For SPCSP 5% vertically ellipsed pipe: "H" and "V" are the same as for a round pipe of equivalent diameter; "Y" is variable with the increase in rise.

INSIDE DIAMETER "D" mm	SLOPE RATIO X:Y	"Y" mm	"Y" m
1500	2:1	293	1.828
1660	2:1	373	1.828
1810	2:1	295	2.440
1970	2:1	375	2.440
2120	2:1	298	3.048
2280	2:1	378	3.048
2430	2:1	453	3.048
2590	2:1	533	3.048
2740	2:1	455	3.658
3050	2:1	610	3.658
3360	2:1	765	3.658
3670	2:1	920	3.658
3990	2:1	1080	3.658
4300	2:1	1235	3.658
4610	2:1	1390	3.658
4920	2:1	936	6.096
5230	2:1	1091	6.096
5540	2:1	1246	6.096
5850	2:1	1095	7.320
6160	2:1	1250	7.320
6470	2:1	1405	7.320
6780	2:1	1560	7.320
7090	2:1	1715	7.320
7400	2:1	1870	7.320
7710	2:1	2025	7.320
8020	2:1	2180	7.320

