

PART 1 - GENERAL

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| 1.1 | Section Includes | .1 | This section specifies methods and procedures for the installation of aluminum pipe culverts. |
| 1.2 | Methods of Measurement and Payment | .1 | In accordance with Section 01 29 01 – Methods of Measurement and Payment. |
| 1.3 | Related Sections | .1 | Section 01 74 11 – Site Cleaning |
| | | .2 | Section 01 35 43 – Environmental Protection |
| | | .3 | Section 01 29 01 – Methods of Measurement and Payment |
| 1.4 | References | .1 | ASTM International |
| | | .1 | ASTM C117-04, Standard Test Method for Material Finer Than 0.075 mm (No. 200) Sieve in Mineral Aggregates by Washing. |
| | | .2 | ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates. |
| | | .3 | ASTM C144-04, Standard Specification for Aggregate for Masonry Mortar. |
| | | .4 | ASTM D698-07e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m). |
| | | .5 | ASTM D1248-05, Standard Specification for Polyethylene Plastics Extrusion Materials For Wire and Cable. |
| | | .6 | ASTM F667-[06], Standard Specification for Large Diameter Corrugated Polyethylene Pipe and Fittings. |
| | | .2 | Canadian General Standards Board (CGSB) |
| | | .1 | CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch. |
| | | .2 | CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric. |
| | | .3 | CSA International |
| | | .1 | CSA A3000-08, Cementitious Materials Compendium. |
| | | .2 | CAN/CSA G401-[07], Corrugated Steel Pipe Products. |
| | | .4 | U.S. Environmental Protection Agency (EPA) / Office of Water |
| | | .1 | EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices. |
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- 1.5 Action and Informational Submittals
 - .1 In accordance with Section 01 33 00 – Submittal Procedures
 - .2 Product data:
 - .1 Submit manufacturer’s specifications, printed product literature and data sheets for pipes and include product characteristics, performance criteria, physical size, finish and limitations.
 - .3 Samples:
 - .1 Inform Departmental Representative of source for bedding materials at least 2 weeks before beginning of work and provide access for sampling.
 - .4 Certification: To be marked on pipe.
 - .5 Test and Evaluation Reports:
 - .1 Submit manufacturer’s test data and certification at least 2 weeks prior to beginning work.
 - .6 Submit erosion and sedimentation control plan in accordance with Section 31 25 05 – Erosion and Sedimentation Control.
 - .7 Submit construction waste management plan in accordance with Section 01 74 19 – Waste Management and Disposal.
 - 1.6 Delivery, Storage and Handling
 - .1 Deliver, store and handle materials in accordance with Section 01 61 10 – Product Requirements.
 - .2 Delivery and Acceptance Requirements: Deliver materials to site in original factory packaging with manufacturer’s name and address.
 - .3 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer’s recommendations.
 - .2 Store and protect pipes from damage.
 - .3 Replace defective or damaged materials with new.
 - .4 Packaging Waste Management: Remove pallets, crates, padding and packaging materials for return, reuse or recycle as specified in Construction Waste Management Plan and in accordance with manufacturer’s specifications.
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PART 2 – PRODUCTS

- 2.1 Structural Plate Corrugated Aluminum Pipe .1 Reference Standards:
- .1 Canadian Highway Bridge Design Code,(CAN/CSA-S6-06)
 - .2 Canadian Standards Association (CAN/CSA G401-01)
 - .3 American Society of Testing and Materials (ASTM).
- .2 Design Criteria:
- .1 Live Loading, (As required by project, i.e. HS-20 Truck), per AASHTO Specifications
 - .2 Design unit weight of soil of 22kN/m³.
 - .3 Corrugated plate shall have a corrugation profile of 230mmx64mm with design properties as specified in ASTM B 746. Design yield strength of corrugated plate is 165MPa.
 - .4 Design height of cover varies depending on the shape, design and loading as specified for the project.
- .3 Materials:
- .1 Aluminum plate to conform to ASTM Standard B209M.
 - .2 Aluminum ribs to conform to ASTM B221, fabricated from 6061-T6 alloy, and shall provide plastic moment resistance as stated in ASTM B 864/B 864 M, Table X2.1.
 - .3 Corrugated aluminum structural plate shall meet the general requirements for 230mmx64mm corrugation profile as specified in ASTM B 790/B 790M. Bolt holes shall be 25mm diameter using 19mm diameter bolts.
 - .4 Bolts and nuts for the structural plate connections shall be heavy hex, meeting the requirements of ASTM B746/B746M. Anchor bolts shall meet ASTM A307. All fasteners and anchor bolts shall hot dip galvanized in accordance with ASTM A153.
 - .5 Backfill material in the engineered backfill zone to be clean, well graded, granular material meeting the strength, compressibility and electro-chemical requirements specified by the structure manufacturer. Project specific backfill requirements are listed on backfill drawings when order is processed.
- 2.2 Granular Bedding and Backfill .1 Granular bedding and backfill material to Section 31 00 00 – Earthwork or as recommended by SPCAP supplier.
- 2.3 Concrete .1 Concrete mixes and materials to Section 03 30 00 – Cast-in-Place
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Concrete.

PART 3 – EXECUTION

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| 3.1 | Examination | .1 | Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for pipe culvert installation in accordance with manufacturer's written instructions. |
| | | .1 | Visually inspect substrate in presence of Departmental Representative. |
| | | .2 | Inform Departmental Representative immediately of unacceptable conditions upon discovery. Proceed with installation only after unacceptable conditions have been remedied and upon receipt of approval from Departmental Representative to proceed. |
| 3.2 | Preparation | .1 | Temporary Erosion and Sedimentation Control |
| | | .1 | Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways according Sedimentation and Erosion Control Plan. |
| | | .2 | Inspect, repair and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established. |
| | | .3 | Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal. |
| 3.3 | Trenching | .1 | Conduct all trenching Work in accordance with Section 31 00 00 – Earthworks |
| | | .2 | Obtain Departmental Representative's approval of trench line and depth prior to placement of bedding material and/or pipe. |
| 3.4 | Bedding | .1 | Dewater excavation as required to allow placement of culvert bedding in dry condition. |
| | | .2 | Place 200 mm minimum thickness of approved granular material on bottom of excavation and compact to minimum of 95% of maximum dry density to ASTM D698. |
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- .3 Shape bedding to fit lower segment of pipe exterior so that pipe bottom is in close contact with bedding and to camber as indicated in Drawings, free from sags or high points.
 - .4 Place bedding in unfrozen condition.
- 3.5 Laying Corrugated Aluminum Pipe Culverts
- .1 Commence pipe placement at downstream end.
 - .2 Ensure bottom of pipe is in contact with shaped bed or compacted fill throughout its length.
 - .3 Lay pipe with outside circumferential laps facing upstream and longitudinal laps or seams at side or quarter points.
 - .4 Lay paved invert or partially lined pipe with longitudinal centre line of paved segment coinciding with flow lone.
 - .5 Do not allow water to flow through pipes during construction except as permitted by Departmental Representative.
- 3.6 Joints for Structural Plate Corrugated Aluminum Pipes
- .1 Erect in final position by connecting plates with bolts at longitudinal and circumferential seams.
 - .2 Drift pins may be used to facilitate matching of holes.
 - .3 Place plates in sequence recommended by manufacturer with joints staggered.
 - .4 Draw bolts up tight as indicated in Drawings prior to backfilling.
- 3.7 Backfilling
- .1 Backfill around and over culverts as indicated on Drawings and as directed by Departmental Representative.
 - .2 Place backfill material, approved in writing by Departmental Representative, in 150 mm layers to full width, alternating between either side of culvert so as to prevent displacement.
 - .3 Compact to at least 95% of maximum dry density. Take special care to obtain required density under haunches.
 - .4 Installed culvert must have minimum of 600 mm cover, compacted fill, for heavy traffic to cross.
 - .1 During construction, width of fill at top must extend at least 1.5 m beyond either side of pipe and slopes must not be
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steeper than 1:2.

- .5 Place backfill in unfrozen conditions.
 - .6 Install fluming as indicated on Drawings.
 - .7 Set top edges of fluming flush with side slope.
- 3.8 Cleaning
- .1 Progress Cleaning: In accordance with Section 01 74 11 – Site Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Final Cleaning: Upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Site Cleaning.
 - .3 Waste Management: Separate waste materials reuse and recycling in accordance with Section 01 74 19 – Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at an appropriate facility.

END OF SECTION
