

SECTION ()

Galvanized Corrugated Metal Pipe (CMP)
Underground Detention and Infiltration Standard Specification

1.0 GENERAL

- 1.1 This item shall govern the furnishing and installation of Underground Detention and Infiltration Systems for all types, sizes and designations as shown on the plans.
- 1.2 Contractor shall furnish all labor, materials, equipment and incidentals necessary to install the CMP System, appurtenances and incidentals in accordance with the Drawings and as specified herein.
- 1.3 A stormwater treatment device upstream of the CMP System is recommended as the appropriate means of pretreating for the purpose of extending the maintenance interval on the CMP System and reducing the life cycle cost. Both engineered solutions shall be provided by a single supplier/manufacturer. Filtration by wrapping a system with geotextile is not an acceptable means of pretreatment.
- 1.4 Applicable provisions of any Division shall govern work in this section.
- 1.5 American Association of State Highway and Transportation Officials (AASHTO)
 - 1.5.1 AASHTO Design Section 12 – Soil-Corrugated Metal Structure Interaction Systems
 - 1.5.2 AASHTO Construction Section 26 – Metal Culverts
 - 1.5.3 AASHTO M36 – Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
 - 1.5.4 AASHTO M218 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized), for Corrugated Steel Pipe
- 1.6 American Society for Testing and Materials (ASTM)
 - 1.6.1 ASTM A760: Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
 - 1.6.2 ASTM A929: Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe
 - 1.6.3 ASTM A798: Standard Practice for Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications
 - 1.6.4 ASTM A998: Standard Practice for Structural Design of Reinforcements for fittings in Factory-Made Corrugated Steel Pipe for Sewers and Other Applications

- 1.7 Site layout drawings, product specifications, materials, corrugation, gage, hydraulic storage data and supported calculations of proposed alternatives shall be submitted to the EOR for review at a minimum of 10 working days prior to bid closing.
- 1.8 Shop drawings shall be annotated to indicate all materials to be furnished and installed under this section, and all applicable standards for materials, required tests of materials and design assumptions for structural analysis:
 - 1.8.1 Before installation of the CMP System, Contractor shall obtain the written approval of the EOR for the stormwater system and the installation drawings.
- 1.9 All proposed alternatives to the CMP System shall conform to applicable above referenced AASHTO and ASTM specifications. NCSPA provides design service life guidance for certain products up to 100 years in recommended environments.

2.0 MATERIALS

- 2.1 Galvanized material shall conform to the applicable requirements of AASHTO M218 or ASTM A929. CMP shall be manufactured in accordance with the applicable requirements of AASHTO M36 or ASTM A760.
- 2.2 The pipe sizes, gauges and corrugations shall be as shown on the project plans. Joint performance requirements are published in Division II, Section 26.4.2, of the current edition of the AASHTO Bridge Construction Specifications.
- 2.3 Soil tight, gravity flow, non-pressure, drainage pipe joints shall conform to AASHTO M36 and ASTM A760. Minimum joint spacing shall be 10 ft.
- 2.4 Overlapping of adjacent pipes are not permitted and appropriate banding must be utilized in order to properly secure individual pipes in place.
- 2.5 Integral End Sections: Each barrel of the CMP System shall either be connected to a fitting composing a manifold for hydraulic distribution or have an integrated bulkhead to resist loading at the end/start of the barrel, end cap sections shall not be permitted.
- 2.6 Material selected shall be flame resistant and capable of retaining 80% of strength when subjected to a temperature of 400 degrees Fahrenheit for one hour.
- 2.7 All fittings shall be manufactured prior to arriving on the jobsite to ensure structural integrity. Fitting reinforcement shall be in accordance with ASTM A998 and reinforcing details.
- 2.8 The manufacturer of the CMP System shall be one that has regularly been engaged in the engineering design and production of these systems for at least fifteen (15) years and which has a history of successful production, acceptable to the EOR. In accordance with the Drawings, the CMP System shall be supplied by:

Contech Engineered Solutions
9100 Centre Pointe Drive
West Chester, OH, 45069
Tel: 1 800 338 1122

2.9 Sampling, testing, and inspection of metal sheets and coils used for manufacturing the CMP System shall be in accordance with to the above applicable referenced specifications. All fabrication of the product shall occur within the United States.

3.0 PERFORMANCE

3.1 The CMP System proposal shall be sized in accordance to the design provided and approved by the Engineer of Record (EOR). Any Contractor deviating from the design shown on the plans, to include: material, footprint, etc., shall provide to the EOR a summary report on stage-storage curves, design calculations, HydroCAD modeling and engineering drawings.

3.2 The CMP System shall comprise of manhole access with minimum dimensions of 24 inches diameter to provide adequate inspection and maintenance without restrictions and obstructions to entry into interior of the CMP System. Manholes shall be provided to allow full entry into and visual inspection of the complete CMP System, at a minimum as to allow full maintenance of the CMP System. Cleanouts or inspection ports are not acceptable access points for maintenance and inspection nor are any other alternatives which do not allow for full entry into the system.

3.3 CMP spacing, gage (thickness) and stone base thickness can be altered with consultation from Contech Engineered Solutions, LLC.

3.4 The CMP System shall be designed for a minimum HS-20/HS-25 final live loading conditions. The CMP System shall meet HS-20/HS-25 loading requirements with a minimum of 12-inches of cover to bottom of flexible pavement for pipe spans less than or equal to 96 inches and 18 inches of cover to bottom of flexible pavement for pipe spans greater than 96 inches.

3.5 The CMP System shall be designed so as the hydraulic grade line will increase evenly throughout whereas transverse movement from one storage compartment to another shall not be permitted. All storage compartments shall be connected via manifold (or connecting pipe) versus by transporting stormwater through stone.

3.6 A stormwater pretreatment device is **recommended** upstream of the CMP system as follows:

3.6.1 Infiltration: Where feasible, the selected stormwater treatment device upstream of an infiltration system shall be a filter system and have General Use Level Designation (GULD) for Basic Treatment by the Washington State Department of Ecology or demonstrate equivalent performance in independently verified field testing following a peer reviewed testing protocol, and must be sized consistent with the system producing those results.

3.6.2 Detention: Where feasible, the selected Stormwater treatment device upstream of a detention system shall be a separator system and have GULD for

Pretreatment by the WADOE or demonstrate equivalent performance in independently verified field testing following a peer reviewed testing protocol, and must be sized consistent with the system producing those results.

- 3.6.3 Selected pretreatment stormwater device shall incorporate a physical barrier capable of capturing and retaining trash and debris (i.e.: floatable and neutrally buoyant materials) for all flows up to the treatment capacity of the device.
- 3.6.4 The application of wrapping a system with geotextile of any branding or material type, that allows the passage of stormwater, shall not be regarded as an acceptable treatment or pretreatment device.
- 3.6.5 The manufacturer of the selected Stormwater treatment device shall have been regularly engaged in the engineering design and production of systems for the physical treatment of Stormwater runoff for 15 years.
- 3.6.6 In order to not restrict the Owner's ability to maintain the stormwater pretreatment device, the minimum dimension providing access from the ground surface to the sump chamber shall be 20 inches in diameter.

4.0 EXECUTION

- 4.1 The CMP System installation shall be in accordance with AASHTO Standard Specifications for Highways Bridges, Section 26, Division II or ASTM A798 and in conformance with the project plans and specifications.
- 4.2 The CMP System shall be installed in accordance with the manufacturer's recommendations and related sections of the contract documents. Handling & assembly shall be in accordance with National Corrugated Steel Pipe Association's (NCSPA) recommendations.
- 4.3 For temporary construction vehicle loads, an extra amount of compacted cover may be required over the top of the pipe. The Height-of-Cover shall meet the minimum requirements shown in the table below. The use of heavy construction equipment necessitates greater protection for the pipe than finished grade cover minimums for normal highway traffic.

Minimum Cover (ft) Requirements

Pipe Span (inches)	Axle Loads (kips)			
	18 - 50	50 - 75	75 - 110	110 - 150
12 - 42	2.0	2.5	3.0	3.0
48 - 72	3.0	3.0	3.5	4.0
78 - 120	3.0	3.5	4.0	4.0
126 - 144	3.5	4.0	4.5	4.5

- 4.4 Minimum cover may vary, depending on local conditions. The contractor must provide the additional cover required to avoid damage to the pipe. Minimum cover is measured from the top of the pipe to the top of the maintained construction roadway surface.
- 4.5 Refer to the Contech's Corrugated Metal Pipe Detention Design Guide for additional guidance regarding installation, inspection and maintenance.
- 4.6 The contractor shall follow Occupational Safety and Health Association (OSHA) guidelines for safe practices in executing the installation process in accordance with the manufacturer/supplier installation recommendations.
- 4.7 Backfill material shall be placed in 8 inch loose lifts and compacted to 90% AASHTO T99 standard proctor density.
- 4.8 Supplier will conduct an on-site preconstruction meeting with the contractor prior to the scheduled delivery date of the CMP System.