SPECIFICATION FOR CORRUGATED METAL PIPE

Aluminized Steel Corrugated Metal Pipe (CMP) Underground Detention and Perforated Infiltration Standard Specification

1. GENERAL

1.1. This item shall govern the furnishing and installation of Underground Detention and Infiltration Systems for the application of collection and storage of surface storm water runoff.

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 sediment collection sump or 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.

1.3.1. Wrapping geotextile around a portion of a system causing collection of sediment and debris within the pipe and allowing for infiltration is not acceptable means of pretreatment.

2. RELATED STANDARDS, SECTIONS AND DIVISIONS

2.1. Applicable provisions of any Division shall govern work in this section.

2.2. American Association of State Highway and Transportation Officials (AASHTO)

2.2.1. AASTHO Design Section 12 – Soil-Corrugated Metal Structure Interaction Systems

2.2.2. AASHTO Construction Section 26 – Metal Culverts

2.2.3. AASHTO M36 – Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains

2.2.4. AASHTO M274 – Standard Specification for Steel Sheet, Aluminum-Coated (Type 2), for Corrugated Steel Pipe

OR where allowed:

2.2.5. American Iron and Steel Institute – Structural Design of Corrugated Steel Pipe

2.2.6. National Corrugated Steel Pipe Association – Installation & Construction Procedures

2.3. American Society for Testing and Materials (ASTM)

2.3.1. ASTM A760: Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains

2.3.2. ASTM A929: Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe

2.3.3. ASTM A798: Standard Practice for Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications

2.3.4. ASTM A998: Standard Practice for Structural Design of Reinforcements for fittings in Factory-Made Corrugated Steel Pipe for Sewers and Other Applications

3. MATERIALS

3.1. Aluminized Type II material shall conform to the applicable requirements of AASHTO M 274 or ASTM A929. CMP shall be manufactured in accordance with the applicable requirements of AASHTO M-36 or ASTM A760.

3.2. 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.

3.3. Soil tight, gravity flow, non-pressure, drainage pipe joints shall conform to AASHTO M36 and ASTM A760. Minimum joint spacing shall be 10 ft.

3.4. Pipe barrels shall be connected at the ends by use of a collecting manifold on at least one end allowing for distribution of stored stormwater throughout the system. Use of bulkhead plates as pipe ends may be substituted for one end of the system. When only one manifold is utilized then cross over equalizer pipes are recommended to connect the pipes.

3.5. 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.

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4. PERFORMANCE

4.1. The CMP System proposal shall be sized in accordance to the design provided and approved by the Engineer of Record (EOR). If the installing contractor proposes an alternate material or system type (other than corrugated steel pipe) the contractor shall provide to the EOR a summary report on stage-storage curves, design calculations, HydroCAD modeling and engineering drawings and the EOR shall be compensated for time spent evaluating the proposed alternate.

4.2. The CMP System shall include manhole access with minimum dimensions of 24 inches diameter (30" is recommended) to provide adequate access to the system for inspection and maintenance. A minimum of two manholes is recommended to provide safe access and regress. 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.

4.3. The CMP System shall be designed for 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 diameters less than or equal to 96 inches, 18 inches of cover to bottom of flexible pavement for pipe spans 102 inches to 120".

4.3.1. Refer to TrueNorth Steel guidance documents for minimum cover requirements.

4.4. The CMP System shall be designed so as the hydraulic grade line will increase evenly throughout the barrels of the system. Transverse movement of stormwater from one storage compartment or barrel to an adjacent compartment or barrel as one barrel is filled shall not be permitted. All storage compartments shall be connected via manifold (or connecting pipe) versus by transporting stormwater through stone voids in backfill.

4.5. It is recommended that a stormwater quality pretreatment system be utilized to remove sediment and debris from stormwater entering the detention system especially if infiltration into underlying soils is to be utilized.

4.5.1. The pretreatment system shall provide a minimum of 50% removal of TSS at the design flow rate and shall be listed as approved on the New Jersey Department of Environmental Quality and or the New Jersey Corporation of Advanced Technologies "NJCAT" list which may be accessed at: http://www.nj.gov/dep/stormwater/treatment.html

4.5.2. The pretreatment system must be designed to carry support project specific live and dead load conditions. Calculations shall be supplied by the manufacturer upon request.

4.5.3. The use of manhole "sumps" to remove sediment and debris from stormwater entering the system is not recommended.

5. SUBMITTALS

5.1. Site layout drawings, product specifications, materials, corrugation, gage, hydraulic storage data, and supported calculations of proposed alternative products or materials shall be submitted to the EOR for review at a minimum of 10 working days prior to bid closing.

5.2. 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:

5.2.1. Before installation of the CMP System, Contractor shall obtain the written approval of the EOR for the stormwater system and the installation drawings.

5.3. 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.

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6. PRODUCTS

6.1. The manufacturer of the CMP System shall be one that has regularly been engaged in the engineering design and production of underground detention and infiltration 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:
TrueNorth Steel, 701 13th Avenue East, West Fargo, ND 58078

6.2. 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.

6.3. All fabrication of the product shall occur within the United States.

7. EXECUTION

7.1. 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.

7.2. 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.

7.3. Backfill materials for the corrugated steel pipe system shall be approved by the EOR.

7.4. Installing contractor shall conduct a preconstruction meeting a minimum of one week prior to installation and this meeting shall include the EOR, the manufacturer of the system and any subcontractors employed for any additional phases of construction. Paving and building contractors should be notified of the design load limits of the system.

7.5. 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. Once the construction vehicle loadings are ceased, the cover can be reduced to those shown on the plans.

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’