

**SECTION 33 4923
STORM DRAINAGE WATER RETENTION STRUCTURES**

PART 1 GENERAL**1.01 SECTION INCLUDES**

- A. This section includes stormwater drainage systems for building roof drainage and site area drainage.
- B. Work includes the installation of the StormTech chamber drainage system or approved equal.
- C. Related work includes the installation of drainage inlet structures, manholes and outlet structures.

1.02 RELATED REQUIREMENTS

- A. Section 31 2316 - Excavation.
- B. Section 31 2323 - Fill and Backfill.
- C. Section 33 4211 - Stormwater Gravity Piping.
- D. Section 33 4230 - Stormwater Drains.

1.03 REFERENCE STANDARDS

- A. AASHTO LRFD Bridge Design Specifications Section 3 – Loads and Load Factors
- B. AASHTO LRFD Bridge Design Specifications Section 12 – Buried Structures and Tunnel Liners
- C. AASHTO M 43 – Standard Specification for Sizes of Aggregate for Road and Bridge Construction
- D. AASHTO M 288 – Standard Specification for Geotextile Specification for Highway Applications
- E. AASHTO M 294 – Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm Diameter.
- F. ASTM F 2418 or F 2922 Standard Specification for Polypropylene (PP) or Polyethylene (PE) Corrugated Wall Stormwater Collection Chambers
- G. ASTM F 2787 Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers
- H. ASTM D 2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- I. ASTM F 2306 – Standard Specification for 12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meetings
 - 1. A preinstallation meeting between StormTech representative or selected manufacturer and general contractor is recommended to discuss the chamber system installation.
 - 2. Contact StormTech at least 30 days prior to system installation to arrange a pre-installation consultation.
- B. Sequencing
 - 1. Contractor is responsible for coordinating the installation of the subsurface stormwater chamber system with the installation of permanent structures on site.
 - a. Construction loads for permanent structures may require the subsurface chamber system to be installed after the permanent structure(s) on site.
 - 2. Coordinate with other utility work.

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures. **11/17/25**

**Enclosure #54
Fire Station #227**

- B. Product Specifications for the following:
 1. StormTech chambers and end caps, or approved equal.
 2. ADS PE Pipe, or approved equal.
- C. Product Installation Instructions for the following:
 1. StormTech chambers and end caps, or approved equal.
 2. ADS PE Pipe, or approved equal.
- D. Inspection and Maintenance Instructions for the following:
 1. StormTech Isolator Row, or approved equal.

1.06 QUALITY ASSURANCE

- A. Regulatory Agency Approvals:
 1. Environmental agency compliance: Comply with regulations pertaining to storm drainage systems.
 2. Utility Compliance: Comply with regulations pertaining to storm drainage systems. Include standards of water and other utilities where appropriate.
- B. Qualifications
 1. Manufacturers
 - a. All chamber and end cap products must be produced in an ISO 9001 certified manufacturing facility or shall demonstrate at least 5 years of experience in the production of similar products.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Contractor shall check all materials upon delivery to assure that the proper chamber size and plastic pipe and pipe fittings have been received.
- B. Contractor shall check the chambers for shipping damage prior to installation. Units that have been damaged must not be installed. Contractor shall contact chamber manufacturer immediately upon discovery of any damage. Chambers may be left palletized until the units are ready to be installed.
- C. All chambers, pipe and pipe fittings shall be delivered to the site and unloaded with handling that conforms to the manufacturer's instructions for reasonable care.
- D. Protect chamber and chamber fittings from dirt and damage.
- E. All pipe and chambers shall be protected against impact, shock and free fall, and only equipment of sufficient capacity and proper design shall be used in the handling of the pipe. Storage of the pipe on the job shall be in accordance with the pipe manufacturer's recommendations.
- F. Contractor shall refer to the fabric manufacturer's guidance handling and storage of fabric products on site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers
 1. StormTech, Inc.
 2. Advanced Drainage Systems, Inc.
 3. Hancor, Inc.
 4. Or Approved equal.

Enclosure #55
Fire Station #227
11/17/25

2.02 STORMWATER CHAMBER SYSTEM

- A. Chamber Options
 1. Only stormwater chamber systems evaluated by a licensed design engineer and found to meet AASHTO section 12.12 safety factors are allowed.
 2. Stormwater chambers must be designed in accordance with ASTM F 2418 or F 2922 Standard Specification for Polypropylene (PP) or Polyethylene (PE) Corrugated Wall Stormwater Collection Chambers

3. Stormwater chambers must be designed in accordance with ASTM F 2787 Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers
 4. Chamber systems allowed under this specification include:
 - a. StormTech SC-310
 - b. StormTech SC-800
 - c. StormTech DC-780
 - d. StormTech MC-3500
 - e. StormTech MC-4500
 - f. StormTech MC-7200
- Enclosure #56
Fire Station #227
11/17/25
- B. Performance
1. The contractor shall submit a structural evaluation by a registered structural engineer that demonstrates that the safety factors specified in the AASHTO LRFD Bridge Design Specifications, Section 12.12 are met. The 50-year creep modulus data specified in ASTM F 2418 or F 2922 must be used as part of the AASHTO structural to verify long-term performance.
 2. Only mechanical and material properties that were determined in accordance with ASTM test methods shall be allowed for structural design of the chambers.
 3. Only chambers affixed with the ASTM F 2418 or F 2922 designation shall be considered as meeting ASTM F 2418 or F 2922.
 4. Performance of the stormwater treatment system shall be in accordance with Section 2.03 of this specification.
 5. The contractor shall submit design summary by the manufacturer that demonstrates that the system is designed to convey peak flow rates without scour of foundation stone.
- C. Materials
1. Chamber
 - a. Chambers shall be injection molded from virgin polypropylene or polyethylene resin and be yellow in color.
 - b. Chamber rows shall provide continuous, unobstructed internal space with no internal support panels in order to provide ease of access for inspection and maintenance functions.
 - c. Inspection ports shall be installed and constructed per project plans. Note that inspection ports shall only be installed along the Isolator™ Row to allow for inspection of the sediment build up over time.
 - d. The chambers shall be open-bottomed.
 - e. The chamber shall incorporate an overlapping corrugation joint system to allow chamber rows of almost any length to be built. Chamber models may be cut at the job site to improve site optimization and reduce product waste.
 2. End Caps
 - a. End caps shall be injection molded or roto molded from polyethylene or polypropylene resin and allow pipe connections with polyethylene pipe. End caps shall have a curved face capable of resisting typical horizontal and vertical loads. End caps for MC-3500, MC-4500, MC-7200 chambers shall be corrugated.
 - b. All chamber rows shall be terminated with an end cap. End cap placement on end of chamber will vary depending on chamber model.
 - c. End caps may incorporate cutting guides to allow easy field cutting for various diameters of pipe. Cutting guides shall be located at both the top and bottom of each end cap.
 3. Manifold Piping
 - a. Manifold piping shall be designed to ensure that peak flows are distributed to the rows of chambers without scour of foundation stone.
 - b. Manifold piping shall be of dual wall HDPE piping such that accepted equations of hydraulics can be used as a basis for design.
 4. Stone

- a. The foundation, embedment and cover stone shall be in accordance with the chamber manufacturer's installation instructions.
5. Fabric
 - a. Fabric between the chamber bottom and the stone foundation located along the entire length of the Isolator Row and the first 10.5 ft (SC-310, SC-740, DC-780) or 14.5 ft (MC-3500, MC-4500, MC-7200) of all inlet rows. Fabric shall be AASHTO M288 Class 1 Woven for sediment capture, filtration and scour protection.
 - b. Fabric between the top of the Isolator Row chambers and the embedment stone and surrounding the entire chamber system shall be AASHTO M288 Class 2 Non- Woven for filtration. (not required over DC-780, MC-3500, MC-4500, MC-7200 Isolator Row)
 - c. If required, a thermoplastic liner may be installed around the entire system to prevent water migration. See manufacturer's Tech Sheet #2 for guidance on thermoplastic liners for the system.

2.03 STORMWATER TREATMENT SYSTEMS

- A. The stormwater chamber system shall incorporate an Isolator Row for stormwater treatment and system maintenance. An Isolator Row is a chamber row enclosed in geotextile fabric for sediment capture and maintenance.
- B. The stormwater treatment system shall remove a minimum of 80% of Total Suspended Solids (TSS), 80% Total Petroleum Hydrocarbons (TPH), and 80% Suspended Sediment Concentration as verified by 3rd party testing.
- C. Stormwater treatment system inspection and maintenance shall be in accordance with section 3 of this specification and the product manufacturer's published guidance.

2.04 ACCESSORIES

- A. Spacers can be used to obtain the required minimum spacing between chamber rows.
- B. During construction FlexStorm Catch It inlet filters or pipe plugs on all inlet pipes to the stormwater chamber system can be used to prevent construction sediment from entering the Isolator Row system. Pipe plugs to be removed once construction of the system is complete and no further construction sediment loading is expected.

PART 3 EXECUTION

3.01 PREPARATION

- A. General
 1. Installing contractors are required to use and understand the latest manufacturer's installation instructions prior to beginning system installation.
 - a. See Section 1.06 for manufacturer preinstallation meeting information.
 - b. Chamber products must be designed and installed in accordance with the manufacturer's minimum requirements. Failure to do so will void the manufacturer's limited warranty.
 2. The contractor shall install all drainage structures, pipe and chambers in the locations shown on the design engineer's drawings and/or as approved by the Owner. Pipe shall be of the type and sizes specified on the drawings and shall be laid accurately to line and grade. Structures shall be accurately located and properly oriented.
 3. Chambers, pipe and drainage structures shall be inspected prior to installation and any defective or damaged product shall be replaced accordingly.
 4. Contact local underground utility companies prior to construction.
 5. The contractor must apply erosion and sediment control measures to protect the stormwater system during all phases of site construction per local codes and design engineer's specifications.
- B. Site Preparation
 1. Excavation must be free of standing water. Dewatering measures must be taken if required.

Enclosure #57
Fire Station #227
11/17/25

- a. When groundwater is present in the work area, dewater to maintain stability of in-situ and imported materials. Maintain water level below pipe bedding and foundation to provide a stable trench bottom.
2. Prepare the chamber bed's subgrade soil as outlined in the engineer's drawings. Requirement for subgrade soil bearing capacity should meet or exceed the chamber manufacturer's required allowable subgrade soil bearing capacity. The contractor must report any discrepancies with subgrade soil's bearing capacity to the design engineer.

3.02 CHAMBER INSTALLATION AND BACKFILLING

- A. Install chamber system flat or at constant slope between points an elevations indicated.
- B. Construct fabric and stone foundation per chamber manufacturer's installation instructions.
- C. Construct the chamber bed by joining the chambers lengthwise in rows. Attach chambers by overlapping the end corrugation of one chamber onto the end corrugation of the last chamber in the row.
- D. See pipe manufacturer's installation instructions for pipe assembly.
- E. Stone placement between chamber rows and around perimeter must follow instructions as indicated in the most current version of the chamber manufacturer's installation instructions.
- F. The contractor must refer to the chamber manufacturer's installation instructions for a table of acceptable vehicle loads at various depths of cover. The contractor is responsible for preventing vehicles that exceed the chamber manufacturer's requirements from traveling across or parking over the chamber system. Temporary fencing, warning tape and appropriately located signs are commonly used to prevent unauthorized vehicles from entering sensitive construction areas.
- G. Refer to the chamber manufacturer's installation instructions for minimum requirements for backfill material above the stormwater chamber system.
- H. See pipe manufacturer's installation instructions for guidance on installing the plastic pipe fittings to the chamber system.

3.03 PROTECTION

- A. Protect all inlets to the stormwater chamber system during construction. As noted in Section 2.05, pipe plugs in the inlet manhole pipes or FlexStorm Catch It inlet filters may be used to prevent construction sediments from clogging the system. Once construction has ceased, the pipe plugs are removed to allow normal system functionality.
- B. All inlet and outlet structures should be protected against construction sediments.

3.04 INSPECTION AND MAINTENANCE

- A. As noted in Section 2.02, chambers may incorporate an optional inspection port to allow for inspection of the stormwater system during normal operations.
 1. Inspection can also be accomplished through the inlet manhole connected to the Isolator Row which may require confined space entry certification of the inspector.
- B. Refer to the chamber manufacturer's Isolator Row Operation and Maintenance manual for guidance on inspection intervals during normal system operation
- C. Maintenance of the Isolator Row shall utilize a JetVac process to remove sediments that have accumulated in the Isolator Row over time.

END OF SECTION

Enclosure #58
Fire Station #227
11/17/25