

PART 1 – GENERAL

1.1 RELATED SECTIONS

- A. Division 01 – General Requirements
- B. Section 31 23 00 – Excavation and Fill
- C. Section 31 23 33 – Trenching
- D. Section 33 46 00 – Subdrainage Systems
- E. Section 33 46 13 – Storm Drainage Piping and Appurtenances
- F. Section 33 05 13 – Common Work Results for Utilities
- G. Section 31 05 16 – Geotextiles
- H. Section 32 13 13 – Concrete Paving
- I. Section 33 11 00 – Water Utilities
- J. Section 33 05 23 – Water Utilities Testing

1.2 REFERENCES, STANDARDS, AND CODES

- A. American Association of State Highway and Transportation Officials (AASHTO)
 - 1. AASHTO M 252 – Corrugated Polyethylene Drainage Pipe
 - 2. AASHTO M 294 – Corrugated Polyethylene Drainage Pipe (Dual Wall)
- B. American Society for Testing and Materials (ASTM)
 - 1. ASTM C76 – Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
 - 2. ASTM C494 – Chemical Admixtures for Concrete
 - 3. ASTM D3034 – Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
 - 4. ASTM F2306 – Polypropylene (PP) Pipe
 - 5. ASTM D1785 – PVC Plastic Pipe, Schedules 40, 80, and 120
 - 6. ASTM D2321 – Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- C. ASTM C443 – Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
- D. American Water Works Association (AWWA)
 - 1. AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 12 In.
 - 2. AWWA C905 – Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In.
- E. National Association of Sewer Service Companies (NASSCO)
 - 1. PACP – Pipeline Assessment Certification Program
- F. Occupational Safety and Health Administration (OSHA)
 - 1. OSHA 29 CFR Part 1926 – Safety and Health Regulations for Construction
- G. International Building Code (IBC)
- H. National Fire Protection Association (NFPA) Standards as applicable
- I. State and Local Codes and Regulations – Compliance as applicable
- J. Manufacturer’s published installation and product standards and instructions

1.3 DEFINITIONS

- A. Storm Drainage Utilities: Systems and components including pipes, catch basins, manholes, inlets, junction boxes, and associated appurtenances used to collect, convey, and discharge stormwater.
- B. Gravity Flow System: Storm drainage system relying on gravity for water conveyance without mechanical pumping.
- C. Appurtenances: Components such as inlets, catch basins, manholes, junction boxes, and other fittings associated with storm drainage piping.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer shall have a minimum of 5 years' experience installing storm drainage utilities of similar scope and complexity.
 - 2. Manufacturer qualifications shall include a minimum of 10 years producing storm drainage products meeting specified standards.
- B. Testing and Inspection:
 - 1. Perform visual inspections and field testing per ASTM and AASHTO standards to verify compliance.
 - 2. Contracting entity shall retain an independent third-party testing agency for verifying materials and installation quality.
- C. Mock-Up:
 - 1. When requested by the Engineer, provide a representative mock-up of pipe installation and jointing methods for approval prior to full-scale installation.
- D. Compliance:
 - 1. All materials and installation methods shall comply with referenced standards, codes, and manufacturer instructions.
 - 2. Installation shall comply with OSHA safety standards including trench safety and confined space entry.

1.5 SUBMITTALS

- A. Action Submittals:
 - 1. Product Data: Submit manufacturer's technical data, specifications, installation instructions, and certifications for all storm drainage products and materials.
 - 2. Shop Drawings: Submit detailed drawings indicating pipe layout, sizes, slopes, invert elevations, appurtenance locations, joint types, and materials.
 - 3. Quality Control Submittals: Submit proposed testing procedures and certifications for materials and installation.
 - 4. Samples: Provide samples of pipe materials, joint gaskets, and other critical components upon request.

5. Warranties: Submit manufacturer's warranties and installer's warranties as specified. Informational Submittals:
6. Inspection Reports: Submit field inspection reports and test results for materials and installation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Deliver materials in manufacturer's original packaging, labeled with product identification and batch numbers.
2. Schedule delivery to minimize storage time on site and prevent damage.

B. Storage:

1. Store pipes and appurtenances on level surfaces, elevated above ground to prevent contamination and damage.
2. Protect stored materials from sunlight, moisture, dirt, and impact damage in accordance with manufacturer's recommendations.

C. Handling:

1. Handle materials carefully to avoid damage to pipe ends, joints, and coatings.
2. Use lifting devices designed to support pipe weight evenly and prevent deformation.
3. Do not drop or roll pipe down slopes or against hard surfaces.

1.7 WARRANTY

A. Manufacturer's Warranty:

1. Provide manufacturer's standard warranty against defects in materials and workmanship for a minimum period of 10 years from date of substantial completion.

B. Installer's Warranty:

1. Installer shall warrant all workmanship and installation for a minimum period of 2 years from date of acceptance by Owner.
2. Warranty shall include repair or replacement of defective components and restoration of disturbed areas.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Advanced Drainage Systems, Inc.
- B. Charlotte Pipe and Foundry Company
- C. JM Eagle
- D. Forterra, Inc.
- E. Hanson Pipe & Products

- F. McWane, Inc.
- G. Smith-Blair, Inc.
- H. Hancor, Inc.
- I. National Pipe & Plastics, Inc.
- J. CertainTeed Corporation

2.2 PIPE MATERIALS

- A. High-Density Polyethylene (HDPE) Pipe:
 - 1. Corrugated HDPE pipe conforming to AASHTO M 252 or M 294.
 - 2. Pipe diameters and wall thickness as indicated on drawings.
 - 3. Joints: Integral bell and spigot with gasket per ASTM D3212.
- B. Polyvinyl Chloride (PVC) Pipe:
 - 1. PVC pipe for storm drainage per ASTM D3034 or ASTM F679.
 - 2. Joints: Elastomeric gasketed joints conforming to ASTM D3212 and ASTM F477.
- C. Reinforced Concrete Pipe (RCP):
 - 1. Reinforced concrete pipe conforming to ASTM C76.
 - 2. Joints: Rubber gasket joints per ASTM C443.
- D. Polypropylene (PP) Pipe:
 - 1. Polypropylene pipe complying with ASTM F2306 for storm drainage applications.
 - 2. Joints: Heat-fused or gasketed joints as recommended by manufacturer.
- E. Ductile Iron Pipe:
 - 1. Ductile iron pipe meeting AWWA C151, with protective coatings per AWWA C104.
 - 2. Joints: Mechanical or push-on per AWWA C111.

2.3 APPURTENANCES

- A. Manholes:
 - 1. Precast concrete manholes conforming to ASTM C478.
 - 2. Round or rectangular as indicated.
 - 3. Include watertight gaskets and watertight covers where specified.
- B. Catch Basins and Inlets:
 - 1. Precast concrete or polymer concrete units complying with ASTM C913 or equivalent.
 - 2. Frames and grates cast iron, meeting ASTM A48 Class 30B.
- C. Junction Boxes:
 - 1. Precast concrete or polymer concrete units as indicated.
 - 2. Include watertight covers if specified.
- D. Pipe Fittings:

1. Provide fittings compatible with pipe materials and meeting applicable ASTM or AWWA standards.
- E. Joint Materials:
 1. Gaskets shall be elastomeric, resistant to chemical and environmental degradation.
 2. Joint sealants as recommended by manufacturer.

2.4 BEDDING AND BACKFILL MATERIALS

- A. Provide bedding material conforming to Section 31 23 00 and local standards.
- B. Material shall be clean, free-draining granular material with particle sizes and gradation per project requirements.
- C. Backfill shall be free of debris, organic matter, and comply with compaction requirements.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify trench excavations, bedding conditions, and subgrade are ready to receive storm drainage utilities.
- B. Notify Engineer of any unsuitable conditions before installation.
- C. Verify dimensions, elevations, and locations of utilities with layout drawings.

3.2 PREPARATION

- A. Install geotextile fabric as required under bedding and backfill.
- B. Provide dewatering and maintain dry trench conditions during installation.
- C. Verify pipe materials and accessories match approved submittals.

3.3 PIPE INSTALLATION

- A. Install pipe in accordance with manufacturer's instructions, ASTM D2321, and AASHTO standards.
- B. Maintain pipe alignment, grade, and invert elevations as indicated.
- C. Assemble joints using specified gaskets and lubricants.
- D. Do not exceed allowable bending radii for flexible pipes.
- E. Provide necessary supports or cradles for rigid pipes where required.
- F. Avoid damage to pipe during placement; replace damaged sections immediately.
- G. Temporarily plug pipe ends when work is not in progress to prevent debris entry.

3.4 INSTALLATION OF APPURTENANCES

- A. Set precast manholes, catch basins, inlets, and junction boxes on prepared bedding.
- B. Align and level appurtenances to design elevations.
- C. Seal joints between precast units with watertight gaskets or approved sealants.
- D. Install frames, covers, and grates securely and flush with adjacent surfaces.
- E. Provide watertight seals for manhole covers where specified.

3.5 BEDDING AND BACKFILL

- A. Place bedding material in uniform layers not exceeding 6 inches compacted thickness.
- B. Compact bedding to 95 percent of maximum dry density per ASTM D698 or as specified.
- C. Backfill pipe zone with select material and compact to specified density.
- D. Place final backfill in layers and compact as specified in Section 31 23 00.

3.6 FIELD QUALITY CONTROL

- A. Inspect all joints for proper assembly and tightness before backfilling.
- B. Conduct leakage and infiltration tests as specified:
 - 1. Low-pressure air test for concrete pipe or as specified in project documents.
 - 2. Mandrel or deflection test for flexible pipe.
- C. Repair or replace defective pipe sections or joints as directed.
- D. Provide test reports and certifications to Engineer.

3.7 CLEANING

- A. Remove debris, dirt, and construction materials from inside pipe and appurtenances.
- B. Flush system with water to clear sediment before final acceptance.
- C. Ensure system is free flowing and unobstructed.

3.8 PROTECTION

- A. Protect installed storm drainage utilities from damage during remaining construction.
- B. Repair damage immediately at no additional cost to Owner.

3.9 MAINTENANCE

- A. Maintain storm drainage utilities until final acceptance.
- B. Provide emergency repairs if damage or failure occurs during maintenance period.

END OF SECTION