

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include but are not limited to:
 - 1. Section 31 23 00 – Excavation and Fill
 - 2. Section 31 23 33 – Trenching
 - 3. Section 33 05 13 – Underground Utility Inspection and Testing
 - 4. Section 33 05 16 – Utility Backfilling
 - 5. Section 33 46 00 – Storm Drainage Structures
 - 6. Section 33 11 00 – Water Utilities
 - 7. Section 32 13 13 – Concrete Paving
 - 8. Section 31 05 19 – Geotextiles for Drainage and Filtration

1.2 SUMMARY

- A. This Section includes furnishing and installing storm utility drainage piping systems including pipe, fittings, accessories, and related appurtenances for stormwater conveyance.
- B. Types of piping included:
 - 1. Reinforced concrete pipe (RCP)
 - 2. High-density polyethylene (HDPE) pipe
 - 3. Polyvinyl chloride (PVC) pipe
 - 4. Ductile iron pipe (DIP)
 - 5. Corrugated metal pipe (CMP)
- C. Work includes:
- D. Excavation, bedding, and backfill for piping
- E. Pipe installation and jointing
- F. Testing and inspection
- G. Connections to structures and appurtenances

1.3 DEFINITIONS

- A. Storm Utility Drainage Piping: Piping designed to collect and convey stormwater away from surfaces and structures to a discharge point or stormwater management system.

1.4 REFERENCES AND STANDARDS

- A. The following codes, standards, and publications form a part of this specification to the extent referenced.

1. American Society for Testing and Materials (ASTM)
 - a) ASTM A536 – Standard Specification for Ductile Iron Castings
 - b) ASTM C76 – Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
 - c) ASTM D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
 - d) ASTM D3034 – Standard Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings
 - e) ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
 - f) ASTM D1248 – Standard Specification for Polyethylene Plastics Molding and Extrusion Materials
 - g) ASTM F2306 – Standard Specification for Corrugated Polyethylene Drainage Pipe
 - h) ASTM A746 – Standard Specification for Ductile Iron Gravity Sewer Pipe
2. American Association of State Highway and Transportation Officials (AASHTO)
 - a) AASHTO M 252 – Corrugated Polyethylene Drainage Pipe
 - b) AASHTO M 36 – Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains
3. American Water Works Association (AWWA)
 - a) AWWA C151 – Ductile-Iron Pipe, Centrifugally Cast, for Water
 - b) AWWA C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances
4. National Association of Sewer Service Companies (NASSCO)
 - a) Pipeline Assessment Certification Program (PACP) – For inspection and condition assessment
5. International Plumbing Code (IPC)
6. International Building Code (IBC)
7. Occupational Safety and Health Administration (OSHA) Standards
8. Local jurisdictional requirements and standards.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Use manufacturers regularly engaged in manufacturing storm drainage piping products of types, materials, and sizes required, with minimum 5 years documented experience.

B. Installer Qualifications:

1. Employ experienced installers with minimum 3 years experience installing storm utility drainage piping.
2. Installer shall be familiar with manufacturer's installation instructions and comply fully.

C. Codes and Standards Compliance:

1. Comply with applicable codes, standards, and regulations referenced in this Section and as required by authorities having jurisdiction.
- D. Testing and Inspection:
1. Perform testing and inspection as specified in Part 3 and as required by regulatory agencies.
 2. Testing shall be conducted by qualified independent testing agency.

1.6 SUBMITTALS

- A. Action Submittals:
1. Product Data: Provide manufacturer's catalog sheets, specifications, and installation instructions for each type of pipe, fittings, and accessories.
 2. Shop Drawings: Include layout drawings showing pipe routing, sizes, slopes, joint details, and connections to structures.
 3. Samples: Submit samples of pipe materials, jointing materials, and accessories for approval.
 4. Qualification Statements: Installer and manufacturer qualifications.
- B. Informational Submittals:
1. Certificates: Material test reports and certifications verifying compliance with specified standards.
 2. Test Reports: Results of pipe pressure, leakage, and deflection tests.
 3. Inspection Reports: Inspection records by independent agencies.
 4. Warranty documentation.
 5. Manufacturer's installation instructions.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original unopened packaging with identification labels intact.
- B. Store pipes and fittings on clean, level surfaces, protected from dirt, moisture, direct sunlight, and physical damage.
- C. Handle pipe with equipment or methods that prevent damage including gouges, cracks, or deformation.
- D. Protect pipe ends with end caps or plugs to prevent entry of dirt or debris during storage and installation.
- E. Store jointing materials as recommended by manufacturer, protecting from moisture and contamination.

1.8 WARRANTY

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

- B. Installer shall warrant installation workmanship for a period of 2 years from date of acceptance.
- C. Warranty shall include repair or replacement of defective piping, joints, or related components at no cost to the Owner.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Reinforced Concrete Pipe:
 - 1. Oldcastle Infrastructure
 - 2. Hanson Pipe & Precast
 - 3. CRH Americas Materials
- B. High-Density Polyethylene (HDPE) Pipe:
 - 1. AGRU America
 - 2. Advanced Drainage Systems (ADS)
 - 3. Chevron Phillips Chemical Company LP
- C. Polyvinyl Chloride (PVC) Pipe:
 - 1. JM Eagle
 - 2. Charlotte Pipe and Foundry Company
 - 3. WL Plastics
- D. Ductile Iron Pipe:
 - 1. U.S. Pipe
 - 2. McWane Ductile
 - 3. American Cast Iron Pipe Company (ACIPCO)
- E. Corrugated Metal Pipe (CMP):
 - 1. Contech Engineered Solutions
 - 2. Armtec
 - 3. National Corrugated Steel Pipe Company

2.2 MATERIALS

- A. Reinforced Concrete Pipe (RCP):
 - 1. Comply with ASTM C76, Class III or heavier as indicated.
 - 2. Pipe shall be reinforced with steel conforming to ASTM A615 Grade 60.
- B. High-Density Polyethylene (HDPE) Pipe:
 - 1. Comply with ASTM F2306 and AASHTO M 252.
 - 2. Pipe shall be smooth interior, corrugated exterior profile unless otherwise indicated.
 - 3. Minimum cell classification shall comply with ASTM D3350 PE4710.
- C. Polyvinyl Chloride (PVC) Pipe:
 - 1. Comply with ASTM D3034 for SDR 35 or as indicated.

2. Pipe and fittings shall be manufactured from virgin PVC resin meeting ASTM D1784.
- D. Ductile Iron Pipe (DIP):
1. Comply with AWWA C151 and ASTM A746.
 2. Pipe shall be cement lined and seal coated per AWWA C104.
- E. Corrugated Metal Pipe (CMP):
1. Comply with AASHTO M 36.
 2. Pipe shall be metallic coated (galvanized or aluminized) per ASTM A123 or ASTM A849.
- F. Joints and Fittings:
1. Provide jointing systems recommended by pipe manufacturer including gasketed bell-and-spigot, restrained joints, or welded joints as applicable.
 2. Provide fittings and adapters compatible with pipe materials and system design pressures.

2.3 ACCESSORIES

- A. Couplings, Adapters, and Transition Fittings:
1. Provide corrosion-resistant couplings compatible with pipe materials and sizes.
- B. Pipe Bedding and Surround Materials:
1. Provide granular bedding material conforming to Section 31 23 00 and local requirements.
- C. Tracer Wire and Warning Tape:
1. Provide continuous tracer wire for all non-metallic piping per local utility requirements.
 2. Provide detectable warning tape above piping as specified in Section 31 05 13.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that trenching, bedding, and structural conditions are ready to receive piping.
- B. Inspect pipe materials for damage before installation; do not install damaged pipe.
- C. Verify invert elevations, slopes, and alignment per drawings.

3.2 PREPARATION

- A. Excavate trenches to lines and grades indicated. Maintain trench bottom free of loose or soft material.
- B. Place bedding material as specified and compact to required density.

3.3 INSTALLATION

- A. Install pipe and fittings in accordance with manufacturer's instructions, ASTM D2321, and AWWA C600 where applicable.
- B. Maintain minimum cover depth as required by code or project documents.
- C. Lay pipe true to alignment and grade, with uniform slope to ensure positive drainage.
- D. Join pipe using recommended jointing method ensuring watertight connections.
- E. Install tracer wire continuously with non-metallic pipe and provide access points at intervals.
- F. Provide adequate support and embedment to prevent displacement or damage.
- G. Install detectable warning tape minimum 12 inches above pipe crown.
- H. Provide protection from floating or shifting during backfilling.

3.4 BACKFILLING

- A. Backfill trenches in layers not exceeding 8 inches, compacting each layer to specified density.
- B. Protect pipe from damage during backfilling operations.

3.5 FIELD QUALITY CONTROL

- A. Inspection and Testing:
 - 1. Perform deflection testing on flexible piping (HDPE, PVC) after backfilling to verify compliance with ASTM D2321.
 - 2. Perform leakage tests on piping systems as specified in Section 33 05 13.
 - 3. Submit test reports and certification of compliance.
- B. Repair or replace defective piping or joints as directed.

3.6 CLEANING

- A. Remove debris and foreign material from piping system prior to final acceptance.
- B. Flush piping with clean water to remove sediment if required.

3.7 PROTECTION

- A. Protect installed piping from damage until final acceptance.
- B. Repair damage to pipe, joints, or coatings at no cost to Owner.

END OF SECTION 33 41 00