

PART 1 – GENERAL

1.1 RELATED SECTIONS

- A. Section 31 23 00 – Excavation and Fill
- B. Section 33 05 00 – Common Work Results for Utilities
- C. Section 33 46 00 – Subdrainage Systems
- D. Section 33 70 00 – Stormwater Conveyance
- E. Section 01 33 00 – Submittal Procedures
- F. Section 01 78 00 – Closeout Submittals

REFERENCES, STANDARDS, AND CODES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM A48 – Standard Specification for Gray Iron Castings
 - 2. ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - 3. ASTM C478 – Standard Specification for Precast Reinforced Concrete Manhole Sections
 - 4. ASTM C506 – Standard Specification for Reinforced Concrete Circular Storm Drainage Pipe
 - 5. ASTM C923 – Standard Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals
 - 6. ASTM D3034 – Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
 - 7. ASTM F2306 – Standard Specification for Structural-Grade Polyethylene (PE) Plastic Pipe
- B. American Association of State Highway and Transportation Officials (AASHTO)
 - 1. AASHTO M 170 – Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
 - 2. AASHTO M 198 – Standard Specification for Reinforced Concrete Arch Pipe, Storm Drain, and Sewer Pipe
- C. National Association of Sewer Service Companies (NASSCO)
 - 1. NASSCO PACP – Pipeline Assessment Certification Program Standards
- D. National Fire Protection Association (NFPA)
 - 1. NFPA 820 – Standard for Fire Protection in Wastewater Treatment and Collection Facilities (as applicable)
- E. Occupational Safety and Health Administration (OSHA)
 - 1. OSHA 29 CFR Part 1926 – Safety and Health Regulations for Construction
- F. Local, State, and Federal Codes
 - 1. Local municipal storm drainage and sewer codes
 - 2. State Department of Transportation (DOT) standards
 - 3. Environmental Protection Agency (EPA) regulations on stormwater management

4. Other Industry Standards
5. American Concrete Institute (ACI) 318 – Building Code Requirements for Structural Concrete
6. American Concrete Institute (ACI) 350 – Environmental Engineering Concrete Structures
7. Precast/Prestressed Concrete Institute (PCI) Design Handbook

1.3 SUMMARY

- A. This section includes requirements for the materials, fabrication, installation, and testing of storm drainage structures including manholes, catch basins, inlets, junction boxes, and related accessories.
- B. Types of structures include precast reinforced concrete, cast-in-place concrete, polymer concrete, and plastic drainage structures.
- C. Provide all labor, materials, equipment, and services necessary for complete and proper installation in accordance with the Contract Documents.

1.4 SUBMITTALS

- A. Action Submittals
 1. Product Data: Provide manufacturer's technical data, installation instructions, and certification of compliance with specified standards.
 2. Shop Drawings: Include layout, dimensions, reinforcement details, jointing methods, and accessories.
 3. Samples: Submit representative samples of precast concrete, polymer concrete, or plastic components as applicable.
 4. Quality Assurance Documentation: Include test reports, certifications, and inspection records.
- B. Informational Submittals
 1. Installation Procedures: Detailed step-by-step methods and sequencing.
 2. Manufacturer's Warranty: Provide warranty documentation as specified in this section.
 3. Inspection and Testing Reports: Submit results of inspections and tests conducted during fabrication and installation.
 4. Maintenance Data: Include cleaning, inspection, and repair recommendations.

1.5 QUALITY ASSURANCE

- A. Fabricators and manufacturers of precast concrete and polymer concrete structures shall have a minimum of five years' documented experience in producing storm drainage structures of similar size and complexity.
- B. Testing laboratories performing quality control testing shall be accredited by an accepted authority such as AASHTO Accreditation Program or equivalent.

- C. Comply with requirements of ASTM C478 and ACI 318 for precast reinforced concrete manholes and structures.
- D. Perform dimensional and visual inspections of precast units prior to shipment.
- E. Installer qualifications: Installers shall have at least three years of documented experience with storm drainage structure installation and shall comply with OSHA safety regulations.
- F. Conduct pre-installation conference to review procedures, safety, and quality assurance requirements.
- G. Inspection and testing during installation shall include verification of alignment, grade, joint integrity, and surface finish.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original packaging and containers, labeled with manufacturer's name, product description, and batch number.
- B. Store precast concrete units on firm, level ground with blocking to prevent damage and deformation.
- C. Protect polymer concrete and plastic components from direct sunlight and extreme temperatures during storage.
- D. Handle all materials with care to prevent chipping, cracking, or other damage. Use appropriate lifting devices and follow manufacturer's recommendations.
- E. Store gaskets, sealants, and adhesives in clean, dry locations protected from freezing and contamination.
- F. Protect installed structures from construction traffic and debris until final acceptance.

1.8 WARRANTY

- A. Provide manufacturer's standard warranty covering materials and workmanship for a minimum period of five (5) years from date of final acceptance.
- B. Installer shall warrant workmanship and installation for a minimum period of two (2) years from date of final acceptance.
- C. Warranty shall include repair or replacement of defective materials or workmanship at no cost to the Owner.
- D. Provide warranties in written form, executed by authorized representatives of manufacturer and installer.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Precast Concrete Structures:
 - 1. Oldcastle Infrastructure
 - 2. Hanson Pipe & Precast

3. CEMEX
4. Campbell Concrete
- B. Polymer Concrete Structures:
 1. Enduro Composites
 2. Endicott Polymer Products
- C. Plastic Drainage Structures (HDPE, PVC):
 1. Advanced Drainage Systems, Inc. (ADS)
 2. JM Eagle
 3. Charlotte Pipe and Foundry
- D. Accessories and Gaskets:
 1. Press-Seal Gasket Corporation
 2. Denso North America
 3. Romac Industries

2.2 MATERIALS

- A. Precast Reinforced Concrete
 1. Concrete: Minimum compressive strength 4000 psi at 28 days, air-entrained, with admixtures as required for durability.
 2. Reinforcement: ASTM A615 Grade 60 deformed steel bars or welded wire fabric conforming to ACI 318.
 3. Joints: Rubber gaskets conforming to ASTM C443 or resilient connectors conforming to ASTM C923.
- B. Polymer Concrete
 1. Resin matrix: Polyester or epoxy resin system resistant to chemicals commonly found in stormwater.
 2. Aggregate: Silica sand, quartz, or other inert materials meeting manufacturer specifications.
- C. Plastic Structures
 1. Pipe and fittings: HDPE or PVC conforming to ASTM D3034 or ASTM F2306.
 2. Joints: Flexible gasketed joints with water-tight seals.
- D. Cast-in-Place Concrete
 1. Concrete: Minimum 4000 psi compressive strength at 28 days.
 2. Reinforcement: ASTM A615 Grade 60 or as specified.
- E. Frames and Covers
 1. Material: Cast iron conforming to ASTM A48 Class 30B or ductile iron conforming to ASTM A536.
 2. Design: Load ratings as specified by AASHTO HS-20 or as required by project.
 3. Finish: Manufacturer's standard protective coating to resist corrosion.
- F. Sealants and Joint Materials
 1. Sealants: Polyurethane or polysulfide sealants compatible with adjacent materials and resistant to stormwater constituents.

2. Gaskets: Neoprene, rubber, or other elastomeric materials meeting ASTM standards.

2.3 FABRICATION

- A. Precast units shall be fabricated in accordance with ASTM C478 and PCI guidelines.
- B. Provide lifting inserts and points as required to facilitate safe handling and installation.
- C. Ensure all joints are properly formed and gaskets installed per manufacturer instructions.
- D. Frames and covers shall be manufactured to precise dimensions to ensure proper fit and function.
- E. Polymer concrete units shall be cured and finished to provide smooth, impervious surfaces.
- F. Plastic structures shall be fabricated in continuous lengths or sections as specified, with jointing systems tested for watertightness.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify that excavations are complete and dimensions, elevations, and bedding materials conform to project requirements.
- B. Inspect delivered materials for damage, defects, and compliance with Contract Documents.
- C. Notify the Architect/Engineer of any discrepancies or conditions detrimental to installation.

3.2 PREPARATION

- A. Prepare bedding surfaces to provide uniform support and prevent differential settlement.
- B. Install bedding material in accordance with Section 31 23 00 and compact to specified density.
- C. Ensure adjacent pipes and utilities are installed and tested prior to structure installation.

3.3 INSTALLATION

- A. Install storm drainage structures in accordance with manufacturer's instructions, ASTM standards, and Contract Documents.
- B. Maintain alignment, grade, and elevation within tolerances specified.
- C. Set precast units plumb and true; use shims and blocking as necessary.
- D. Install joint gaskets and sealants to provide watertight connections; verify integrity by visual inspection and testing if required.
- E. Place cast-in-place concrete structures with proper formwork, reinforcement, and curing practices.

- F. Install frames and covers securely; adjust to finished grade and ensure smooth operation.
- G. Backfill around structures in layers not exceeding 8 inches loose depth; compact to specified density without damaging structures.
- H. Protect installed structures from damage during subsequent construction activities.

3.4 FIELD QUALITY CONTROL

- A. Inspect installed structures for alignment, grade, plumbness, and joint integrity.
- B. Conduct leakage tests on manholes and inlets as specified or as directed by Engineer.
- C. Verify frame and cover load ratings and installation.
- D. Document inspection results and test reports; submit to Architect/Engineer for review.
- E. Correct deficiencies promptly and retest as required.

3.5 CLEANING

- A. Remove construction debris and excess materials from inside and around storm drainage structures.
- B. Flush pipe and structures to remove sediment and foreign matter prior to final acceptance.
- C. Provide maintenance instructions to Owner for periodic inspection and cleaning.

3.6 PROTECTION

- A. Protect completed storm drainage structures from damage by construction activities and weather until final acceptance.
- B. Repair or replace damaged components at no additional cost to Owner.

END OF SECTION 33 49 00