

SECTION 33 44 00

STORM DRAINAGE STRUCTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes

1. Storm drainage structures.

1.2 Related Requirements

1. Section 01 40 00 – Quality Control
2. Section 02 32 00 - Earthwork
3. Section 31 23 33 - Excavation, Backfill, and Compaction for Utilities
4. Section 31 35 00 - Slope Protection and Erosion Control

1.3 REFERENCE STANDARDS

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

1. AASHTO M198 - Joints for Circular Sewer and Culvert Pipe Using Flexible Watertight Gaskets
2. AASHTO H170 - Reinforced Concrete Culvert, Storm Drain and Sewer Pipe

B. American Society for Testing and Materials (ASTM)

1. ASTM A185 - Steel welded Wire Fabric, Plain, for Concrete Reinforcement
2. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
3. ASTM C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
4. ASTM C150 - Portland Cement
5. ASTM C206 - Finished Hydrated Lime
6. ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets

1.4 SUBMITTALS

A. Product Data: Provide data on pipe materials, pipe fittings, and accessories.

B. Manufacturer's Certificate: Certify that products meet or exceed specified local requirements.

C. Project Record Documents

1. Accurately record actual locations of pipe runs, connections, catch basins, cleanouts, and invert elevations.
2. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.

1.5 PROJECT CONDITIONS

A. Coordinate work with termination of storm sewer connection including connection to municipal storm sewer system.

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PART 2 - PRODUCTS

2.1 DRAINAGE STRUCTURES

- A. Cast-In-Place concrete for drainage structures including manholes, inlets, catch basins, collars, support blocks, headwalls and paved ditches shall conform to ACI 301.
 - 1. Compressive Strength: Unless shown otherwise on drawings, 4000 psi at 28 days.
 - 2. Reinforcement: ASTM A615, grade 40 or 60 deformed reinforcing bars, and ASTM A185 for wire fabric.
- B. Cement Mortar used for paving inverts, filling lift holes, joints, patching and anchoring castings shall consist of one part Portland cement, type I, ASTM C150, 1/4 part hydrated lime, ASTM C206 and 2-1/2 parts clean, well-graded sand and water free of suspended matter, alkali, and containing no industrial or domestic waste.
- C. If allowed by municipality, precast drainage structures may be provided, but must meet minimum requirements and design parameters of this specification and as shown on drawings.
- D. ADS structures, where indicated on the Drawings, shall be per manufacture specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that trench cut and excavation is ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings.

3.2 PREPARATION

- A. Hand trim excavations to required elevations. Correct over excavation with bedding material.
- B. Remove large stones or other hard matter that could damage piping or impede consistent back-filling or compaction.
- C. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by licensed land surveyor and replaced, as necessary, by same.

3.3 INSTALLATION - PIPE

- A. The pipe shall be inspected for defects and cracks before being lowered into the trench, piece by piece. Any defective, damaged or unsound pipe or any pipe that has had its grade disturbed after lying shall be taken up and replaced. Open ends shall be protected with a stopper to prevent earth or other material from entering the pipe during construction. The interior of the pipe shall be free from dirt, excess water and other foreign materials as the pipe laying progresses and left clean at the completion of the installation.
- B. Excavate pipe trench and place bedding material in accordance with Section 31 23 33.

- C. Installation shall commence at the lowest point for each segment of the route. RCP shall be laid with the groove or bell end upstream.
- D. Lay pipe to the required line and slope gradients with the necessary fittings, bends, manhole, risers and other appurtenances placed at the required location as noted on Drawings.
- E. Do not displace or damage pipe when compacting.
- F. No pipe shall be laid in water or when trench conditions are unsuitable for such work.
- G. Joints:
 - 1. Joints shall be constructed as described herein and in accordance with manufacturer's installation instructions with the intent that they be made watertight.
 - 2. For RCP, the joint surface shall be cleaned and washed with water, if necessary, before the joints are made. For tongue and groove joints in smaller sizes, make joints butting the inside of the bell with a cement mortar before joining. The inside joint shall be wiped clean of excess mortar by brush or a squeegee drawn through the pipe as the laying operations progress. In the larger diameters, which permit the entry of a man, annular space between pipe sections shall be completely filled with mortar and finished off smooth with the inside surface of the pipe.

3.4 INSTALLATION – MANHOLES, CATCH BASINS, INLETS, AND JUNCTION BOXES

- A. Drainage structures shall be constructed in accordance with details shown on Drawings and in accordance with City of Centerton, AR, stormwater management and drainage manual as applicable.
- B. Cast-In-Place sections shall be as shown on the drawings and in accordance with City of Centerton, AR, stormwater management and drainage manual.
 - 1. Form bottom of excavation clean and smooth to correct elevation.
 - 2. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe to be placed at proper elevation.
 - 3. Form and place cast-in-place concrete walls, sleeved at proper elevation to receive storm sewer pipe in accordance with details shown on Drawings.
- C. Invert channels shall be smooth and accurately shaped to a semicircular bottom conforming to the inside of the adjacent sewer section. Invert channels and structure bottoms shall be shaped with cement mortar. Changes in size and grade of invert shall be made gradually and evenly. Changes in direction of the sewer entering branch or branches shall have a true curve of as large a radius as the manhole will permit.
- D. Frames and Covers:
 - 1. Frames and covers shall be set to the proper elevation. The frames shall be firmly embedded in mortar approximately 1 inch thick and aligned to fit the top section of the structure.
 - 2. Bricks set in mortar used to adjust the frame to finished grade shall be limited to no more than four courses.

3. Adjustment rings used to make adjustments in grade shall be made with the initial ring embedded in mortar and the exterior of the rings pargeted with mortar not less than 1/2 inch thick. No adjustment made in this manner shall exceed 8 inches.
- E. Concrete cradles shall be constructed as shown on the drawings and as needed when crossing over and under sewer pipe or utility lines. Concrete shall be 3500 psi mix with a minimum thickness of 6 inches.

3.5 INSPECTION AND TESTING

A. General

1. Storm sewer systems and culverts, upon completion or at such time as directed, shall be cleaned, inspected and tested. The system or culvert shall have a true grade and line. Actual elevations shall be within 0.08 feet of the elevations given on the drawings.
2. After completion of the Work, or any part thereof, the job shall be tested and flow line elevations certified per Section 01 40 00 to determine that it has been installed in accordance with the drawings and specifications. In general, the Work shall prove to be in good condition, installed in accordance with the drawings and specifications and ready for use.

B. Cleaning and Testing

1. Visibly inspect and remove all debris and obstructions from storm pipe. Test for infiltration and exfiltration by hydrostatic testing per ASTM C969. Manholes and pipe shall conform to ASTM C969 leakage criteria.

C. Alignment Test

1. After backfill has been placed and compacted to a depth not less than one foot above top of pipe, a visual inspection shall be made by flashing a light between manholes. Any displacement or misalignment of invert shall be corrected.

END OF SECTION