

University of Houston Master Specification

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SECTION 33 3000 – SANITARY SEWER

Maintain Section format, including the UH master spec designation and version date in bold in the center columns of the header and footer. Complete the header and footer with Project information

Edit and finalize this Section, where prompted by Editor's notes, to suit Project specific requirements. Make selections for the Project at text identified in bold.

This Section uses the term "Architect." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

Delete hidden text after this Section has been edited for the Project.

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. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:
 - 1. The current version of the *Uniform General Conditions for Construction Contracts*, State of Texas, available on the web site of the Texas Facilities Commission.
 - 2. The University of Houston's *Supplemental General Conditions and Special Conditions for Construction*.

1.2 SUMMARY

- A. This Section specifies the requirements for furnishing and placing sanitary sewer pipe, laterals, stubs, and appurtenances. The pipe shall be of the size, type and location, and to the lines, grades and elevations shown on the Drawings and shall be constructed in accordance with these Specifications.

1.3 APPLICABLE PUBLICATIONS

- A. The following publications of the latest issues listed below, but referred to thereafter by basic designation only, form a part of this Specification to the extent indicated by the references thereto.
 - 1. American Society for Testing and Materials Standards (ASTM).
 - a. ASTM C-478 – Specification for Precast Reinforced Manhole Sections.
 - b. ASTM D-3034 – Specification for Polyvinyl Chloride (PVC) Pipe.

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- c. ASTM A-48 – Specification for Gray Iron Castings.
 - d. ASTM C-476 – Specification for Grout for Masonry.
 - e. ASTM A-615 – Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - f. ASTM D-3212 – Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
 - g. ASTM F-679 – Specification for Poly (Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings.
 - h. ASTM F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
 - i. ASTM A746 – Standard Specification for Ductile Iron Gravity Sewer Pipe
 - j. ASTM C150 – Standard Specification for Portland Cement
 - k. ASTM C33 – Standard Specification for Concrete Aggregates
 - l. ASTM C890 – Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures
 - m. ASTM C923 – Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
 - n. ASTM
2. Texas Department of Transportation Standard Specifications for Construction of Highways, Street and Bridges (TxDOT).
 - a. Item 465 – Manholes and Inlets
 3. American Water Works Association (AWWA)
 - a. C110 – AWWA Standard for Ductile-Iron and Gray-Iron Fittings
 - b. C111 – AWWA Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - c. C105 – Polyethylene Encasement for Ductile Iron Pipe Systems.
 - d. C600 – Installation of Ductile Iron Water Mains and Their Appurtenances.
- B. American Concrete Institute (ACI)
1. ACI 318 – Building Code Requirements for Structural Concrete.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Any Special pipe fittings as detailed in the Drawings.
2. Shop Drawings: For the following:
 - a. Manholes: Include plans, elevations, sections, details, design calculations, and concrete design-mix report, frames, and covers.
3. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewerage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
4. Field quality-control test reports.

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1.5 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. FRP: Fiberglass-reinforced plastic.
- C. LLDPE: Linear low-density, polyethylene plastic.
- D. PE: Polyethylene plastic.
- E. PP: Polypropylene plastic.
- F. PVC: Polyvinyl chloride plastic.
- G. TPE: Thermoplastic elastomer.

1.6 PROJECT CONDITIONS

- A. When working with sanitary manholes new or existing, Contractor must maintain requirements for confined space entries. In all activities, Contractor shall work in a safe manner as required by OSHA and other governing criteria.
- B. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Follow the University of Houston's Plant Operations Planned and Emergency Utility Outage Guidelines. See "COORDINATION" Article in this Section.
 - 2. If work requires interference with any public sewer systems within or outside of Public Rights of Way or Easements, Contractor shall obtain prior written approval and coordinate with Owner and local municipality before commencing work.

1.7 DELIVERY STORAGE AND HANDLING

- A. Contractor is responsible for protecting materials per manufacturer's recommendations.
 - 1. Do not store plastic manholes, pipe, and fittings in direct sunlight.
 - 2. Protect pipe, pipe fittings, and seals from dirt and damage.
 - 3. Handle cast in place manholes according to manufacturer's written rigging instructions.

1.8 COORDINATION

- A. Complete the Outage Planning Form in the University of Houston's Planned and Emergency Utility Outage Guidelines available in Section 00 6000 of these Specifications.

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PART 2 - PRODUCTS

2.1 PIPE

- A. PVC pipe 6 to 10 inches in diameter shall conform to ASTM D3034, SDR 26. PVC pipe 12 inches and 15 inches in diameter shall conform to ASTM D3034, SDR 35. PVC pipe 18 to 27 inches in diameter shall conform to ASTM F679, SDR 35. All diameters shall use bell and spigot ends for gasketed joints with ASTM F 477 elastomeric seals. For sewers up to 12 inches in diameter that cross over or under waterlines, provide minimum 150 psi pressure rated pipe conforming to ASTM D 2241 with suitable PVC couplings.
- B. Ductile iron pipe shall conform to ASTM A746 and cast iron fittings shall conform to AWWA C110. Gaskets shall conform to AWWA C111, rubber. Wrap pipe with polyethylene per AWWA C 105.

2.2 JOINTS

- A. PVC pipe joints shall conform to ASTM D3212.
- B. Ductile iron pipe joints shall be push-on type unless otherwise indicated on the Drawings.

2.3 MANHOLES

- A. Precast concrete manholes shall conform to ASTM C-478. Joints shall be O-ring gasketed. Thickness for manhole risers shall be as listed under wall "B" in the "Class Tables" of ASTM C76, "Reinforced Concrete Pipe."
- B. Ballast: Increase thickness of concrete as required to prevent flotation.
- C. Resilient Pipe Connectors: ASTM C 923 cast or fitted into manhole walls, for each pipe connection. Use the following materials for metallic mechanical devices as defined in ASTM C923:
 - 1. External clamps: Type 304 stainless steel
 - 2. Internal, expandable clamps: Type 304 stainless steel, 11 gauge minimum.
- D. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and diameter matching manhole frame and cover. Include sealant recommended by ring manufacturer.
- E. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover.
- F. Manhole Frames and Covers: To meet those detailed in the Drawings as specified with precast concrete manholes.

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EDITOR'S NOTE: ALL NEEDS FOR SEALED OR VENTED MANHOLE COVERS ARE TO BE COVERED IN THE DRAWINGS AND DETAILS. IF ADDITIONAL INFORMATION IS NEEDED INCLUDE HERE IN THIS LIST OF ITEMS.

2.4 MORTAR

- A. Mortar for flowline directioning in all manholes shall conform to TxDOT Item 465.2B and ASTM C 476.

2.5 CLEANOUTS

- A. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to clean-out of same material as sewer piping.
- B. Acceptable Manufacturers:
 - 1. Canplas Inc.
 - 2. IPS Corporation.
 - 3. NDS Inc.
 - 4. Plastic Oddities, Inc.
 - 5. Sioux Chief Manufacturing Company, Inc.
 - 6. Zurn Light Commercial Specialty Plumbing Products; Zurn Plumbing Products Group.

PART 3 - EXECUTION

3.1 PIPE SEWERS

- A. No pipe shall be installed in the trench until excavation has been properly constructed per the Drawings and details to at least two pipe lengths beyond the section of pipe being installed and the bottom of the trench has been properly shaped.
- B. Where used, batter boards shall be placed into position properly. Boards shall be nominal 1 x 4 inch lumber, planed on all four sides to parallel faces. The boards and all location stakes shall be protected from injury or change of location.
- C. Pipe shall be so laid that after the sewer is completed, the interior surface shall conform accurately to the grades and alignments fixed and given in the Drawings.
- D. All sewers shall be laid accurately to line and grade, with tongue or spigot end downstream.
- E. Pipes shall be fitted together and matched so that when laid, they form a sewer with a smooth and uniform invert.
- F. Before laying pipes, a sufficient bed shall be prepared at the grade indicated on the Drawings. Backfill shall be placed as outlined in Section 31 2333 "Trenching, Backfilling, and Compaction."

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- G. A minimum clearance of six inches shall be maintained between the sewer and all other lines. Sanitary sewers shall not be routed over water lines.
- H. Sanitary sewers shall not be constructed within nine feet (outside to outside) parallel to a water line. Where sanitary sewers cross under water lines, the pipe material for the sewer shall be an 18 foot length of ductile iron pipe or PVC schedule 80 pressure pipe, centered on the water line.
- I. When trenches exceed five feet in depth, Contractor shall use trench safety measures per Section 31 4133 "Trench Safety."

3.2 MANHOLES

- A. Manholes shall be constructed at locations shown on the Drawings and to the depth indicated thereon.
- B. Manholes shall be constructed of precast concrete sections and to the dimensions shown on the Drawings.
- C. Joints between precast concrete sections shall be O-ring gasketed.
- D. The construction of manholes shall be done as soon as practical after sewer lines into or through the manhole are completed.
- E. All sewers shall be cut neatly at the inside face of the walls of the manhole and pointed up with mortar.
- F. After the masonry work has been completed to the proper elevation, the cast iron manhole cover frame shall be set in a full mortar bed and adjusted to the elevation established on the Drawings.
- G. The inverts of the sewer line or several sewer lines entering the manhole at or near the flow line elevation of the manhole shall be shaped and routed across the floor of the manhole using mortar to obtain the proper contour.
- H. When sanitary sewer pipes enter a manhole two feet or greater above the bottom of the manhole, a drop pipe of equal diameter shall be constructed outside the manhole to the bottom of the manhole per the details on the Drawings.
- I. All manholes are to be backfilled per article 3.2.C.1 in Section 31 2333 "Trenching, Backfilling, and Compaction."

EDITOR'S NOTE: ALL NEEDS FOR STACKS AND SERVICE LEADS ARE TO BE COVERED IN THE DRAWINGS AND DETAILS. IF ADDITIONAL INFORMATION IS NEEDED INCLUDE HERE IN THIS LIST OF ITEMS

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3.3 FRAMES, GRATES, RINGS AND COVERS

- A. Casting shall conform to the type shown on the Drawings. Castings shall be clean, free from sand or blow holes or other defects. Materials shall be not less than Class 30B gray iron conforming to ASTM A-48.
- B. Surfaces of the castings shall be free from burnt-on sand and shall be reasonably smooth.
- C. Bearing surfaces between manhole rings and covers and frames shall be cast or machined with such precision that uniform bearing shall be provided throughout the perimeter area of contact.

3.4 FIELD QUALITY CONTROL AND TESTING

- A. Refer to Section 33 0130 "Testing for Sanitary Sewage Gravity System."

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