SECTION 02220
HIGH DENSITY POLYETHYLENE (HDPE) PIPE

PART I: GENERAL

1.1 GENERAL REQUIREMENTS
- A. High density polyethylene (HDPE) pipe for gravity sewers and drains, including fittings.
- B. High density polyethylene (HDPE) pipe for sanitary sewer force mains, including fittings.
- C. High density polyethylene (HDPE) pipe for storm sewers culverts.

1.2 MEASUREMENT AND PAYMENT
- A. Unit Prices:
  1. No separate payment will be made for HDPE pipe under this Section. Include cost in unit prices for work, as specified in following sections:
     a. Section 02500 – Gravity Sanitary Sewers.
     b. Section 02510 – Sanitary Sewer Force Mains.
     c. Section 02600 – Storm Sewers.
  2. Refer to Section 01270 – Measurement and Payment for unit price procedures.
- B. Stipulated Price (Lump Sum):
  1. If Contract is Stipulated Price Contract, payment for work in this Section is included in Total Stipulated Price.

1.3 REFERENCES
- A. AASHTO – American Association of State Highway and Transportation Officials.
  1. AASHTO M294 – Standard Specification for Corrugated Polyethylene Drainage Pipe, 18"- 48" diameter.
  2. AASHTO Section 18 – Soil Thermoplastic Pipe Interaction Systems.
  3. AASHTO Section 30 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewer and Other Gravity Flow Applications.
- B. ASTM – American Society for Testing and Materials.
  1. ASTM D618 – Standard Practice for Conditioning Plastics for Testing.
  2. ASTM D1248 – Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
  3. ASTM D2321 – Standard Recommended Practice for Underground Installation of Flexible Thermoplastic Pipe.
  4. ASTM D2657 – Standard Practice for Heat Fusion Joining Polyolefin Pipe and Fittings.

5. ASTM D2837 – Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
6. ASTM D3035 – Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
7. ASTM D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
8. ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
9. ASTM F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
10. ASTM F714 – Standard Specification for Polyethylene Plastic (PE) Pipe (SDR-PR) Based on Outside Diameter.
11. ASTM F894 – Standard Specification for Polyethylene (PE) Large-Diameter Profile Wall Sewer and Drain Pipe.

C. CFTS – City of Friendswood Technical Specifications.

1.4 SUBMITTALS

A. Conform to requirements of Section 01330 – Submittal Procedures.
B. Submit shop drawings showing design of pipe and fittings, laying dimensions, fabrication, fittings, flanges and special details.

1.5 QUALITY CONTROL

A. Provide manufacturer's certificate of conformance to Technical Specifications.
B. Furnish pipe and fittings that are homogeneous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. Provide pipe as uniform as commercially practical in color, opacity, density and other physical properties.
C. The Project Manager reserves the right to inspect pipes or witness pipe manufacturing. Inspection shall in no way relieve manufacturer of responsibilities to provide products that comply with applicable standards and these Technical Specifications.
    1. Manufacturer's Notification: Should the Project Manager wish to witness manufacture of specific pipes, manufacturer shall provide the Project Manager with a minimum of three weeks (3 Wks) notice of when and where production of those specific pipes will take place.
    2. Failure to Inspect: Approval of products or tests shall not be implied by the Project Manager's decision not to inspect manufacturing, testing or finished pipes.
D. Hydrostatic testing of Force Mains and Water Lines using HDPE Pipe shall use testing procedures as outlined in paragraph 3.11 of Section 01475 – Quality Control Testing Procedures.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products

specified in this section with documented experience of a minimum five years (5 Yrs) of pipe installations that have been in successful, continuous service for same type of service as the proposed Work.

PART II: PRODUCTS

2.1 GENERAL

A. For new construction gravity sanitary sewer pipe provide HDPE pipe as specified in TABLE 4.1 SANITARY SEWER FOR DIRECT BURY in this Section.

B. For rehabilitation of gravity sanitary sewer pipe provide HDPE pipe as follows for new construction as specified in TABLE 4.2 SANITARY SEWER FOR SLIPLINING in this Section.

C. For Residential Driveway Culverts provide HDPE as follows:
   1. N-12 and N-12 HC by Advanced Drainage Systems, Inc. (ADS).
   2. Sure-Lok F477 by Hancor, Inc.

D. Furnish solid wall pipe with plain end construction for heat joining (butt fusion) conforming to ASTM D2657. Utilize controlled temperatures and pressures for joining to produce fused leak-free joint.

E. Furnish profile-wall gravity sewer pipe with bell-and-spigot end construction conforming to ASTM D3212. Joining shall be accomplished with elastomeric gasket in accordance with manufacturer's recommendations. Use integral bell-and-spigot gasketed joint designed so that when assembled, elastomeric gasket, contained in machined groove on pipe spigot, is compressed radially in pipe bell to form positive seal. Design joint to avoid displacement of gasket when installed in accordance with manufacturer's recommendations.

F. Furnish solid wall pipe for sanitary sewer force mains with a minimum working pressure rating of one hundred fifty pounds per square inch (150 psi) and with inside diameter equal to or greater than nominal pipe size indicated on the Drawings.

G. Furnish corrugated polyethylene pipe (CPP) for gravity storm sewer pipe. Joints shall be installed such that connection of pipe sections shall form continuous line free from irregularities in flow line. Suitable joints are:
   1. Integral Bell and Spigot: Bell shall overlap a minimum of two (2) corrugations of spigot end when fully engaged.
   2. Exterior Bell and Spigot: Bell shall be fully welded to exterior of pipe and overlap spigot end so that flow lines and ends match when fully engaged.

H. Jointing:
   1. Gaskets:
      a. Meet requirements of ASTM F477. Use gasket molded into circular form or extruded to proper section and then spliced into circular form. When no contaminant is identified, use gaskets of properly cured, high-grade

elastomeric compound. Basic polymer shall be natural rubber, synthetic elastomer or blend of both.

b. Pipes allowed to be installed in potentially contaminated areas, where free product is found near elevation of proposed sewer, shall have gasket materials for noted contaminant as specified in TABLE 4.3 – GASKET MATERIAL REQUIRED FOR CONTANIMANTS in this Section.

2. Lubricant: Use lubricant for assembly of gasketed joints which has no detrimental effect on gasket or on pipe, in accordance with manufacturer's recommendations.

2.2 MATERIALS FOR SANITARY SEWER

A. Pipe and Fittings: High density, high molecular weight polyethylene pipe material meeting requirements of Type III, Class C, Category 5, Grade P34, as defined in ASTM D1248. Material meeting requirements of cell classification in accordance with ASTM D3350 are also suitable for making pipe products under these specifications.

B. Other Pipe Materials: Materials other than those specified in Paragraph 2.2.A, Pipe and Fittings, may be used as part of profile construction, e.g., as core tube to support shape of profile during processing, provided that these materials are compatible with base polyethylene material and are completely encapsulated in finished product and in no way compromise performance of pipe products in intended use. Examples of suitable material include polyethylene and polypropylene.

2.3 MATERIALS FOR RESIDENTIAL DRIVEWAY CULVERTS

A. Pipe and Fittings: High density, high molecular weight polyethylene HDPE virgin compound material meeting requirements of cell class outlined in AASHTO M294, AASHTO MP7 and ASTM D3350.

B. Types: CPP shall meet one (1) or both of following:

1. Type S: Outer corrugated wall with smooth inner liner.
2. Type D: Inner and outer smooth walls braced circumferentially or spirally with projections or ribs.

C. Lubricant: Use lubricant for assembly of gasketed joints, which has no detrimental effect on gasket or on pipe, in accordance with manufacturer's recommendations.

2.4 TEST METHODS FOR SANITARY SEWER

A. Conditioning: Conditioning of samples prior to and during tests is subject to approval by the Project Manager. When referee tests are required, condition specimens in accordance with Procedure A in ASTM D618 at seventy-three and four-tenths degrees Fahrenheit (73.4°) plus or minus three and six-tenths degrees Fahrenheit (±3.6° F) and fifty percent (50%) relative humidity plus or minus five percent (5%) relative humidity for not less than forty hours (40 Hrs) prior to test. Conduct tests under same conditions of temperature and humidity unless otherwise specified.

B. Flattening: Flatten three specimens of pipe, prepared in accordance with Paragraph 2.5.A, in suitable press until internal diameter has been reduced to forty percent (40%) of original inside diameter of pipe. Rate of loading shall be uniform and at two inches (2 In) per minute. Test specimens, when examined under normal light and with unaided eye, shall show no evidence of splitting, cracking, breaking or separation of pipe walls or bracing profiles.

C. Joint Tightness: Test for joint tightness in accordance with ASTM D3212, except replace shear load transfer bars and supports with six inch (6 In) wide support blocks that can be either flat or contoured to conform to pipe's outer contour.

D. Purpose of Tests: Flattening and joint tightness tests are not intended to be routine quality control tests, but rather to qualify pipe to a specified level of performance.

2.5 TEST METHODS FOR RESDENTIAL DRIVEWAY CULVERTS

A. Pipe stiffness at five percent (5%) deflection, when determined in accordance with ASTM D2412, shall be as specified in Section 7.4 of AASHTO M294.

B. Minimum inner wall thickness shall be as specified in Section 7.2.2 of AASHTO M294.

2.6 MARKING

A. Mark each standard and random length of pipe in compliance with these Technical Specifications with following information:
   1. Pipe size.
   2. Pipe class.
   3. Production code.
   4. Material designation.

PART III: EXECUTION

3.1 INSTALLATION

A. Conform to requirements of following Sections:
   1. Section 02500 – Gravity Sanitary Sewers.
   2. Section 02510 – Sanitary Sewage Force Mains.
   3. Section 02525 – Acceptance Testing of Sanitary Sewers.
   4. Section 02600 – Storm Sewers.

B. Install pipe in accordance with the manufacturers recommended installation procedures.

C. HDPE pipe is not approved in applications requiring augering of pipe.

D. Bedding and backfill: Conform to requirements of Section 02125 – Excavation and Backfill for Utilities.

PART IV: TABLES

4.1 SANITARY SEWER FOR DIRECT BURY

INSTALLATION SPEC NO.	GENERIC NAME	TRADE NAME OR MANUFACTURER	ASTM OR AASHTO	SDR (NUMERIC INDEX)	PIPE STIFFNESS (NUMERIC MINIMUM)	SIZE RANGE
02220	Solid Wall Polyethylene (HDPE)	Chevron Plexco Phillips 66 Quail Poly Pipe	ASTM F-714	DR 17 DR 21	115 46	8” – 10” 12” – 48”
02500	Polyethylene Profile Wall	Spirolite	ASTM F-894	n/a	46	18” – 120”

4.2 SANITARY SEWER FOR SLIPLINING

INSTALLATION SPEC NO.	GENERIC NAME	TRADE NAME OR MANUFACTURER	ASTM OR AASHTO	SDR (NUMERIC INDEX)	PIPE STIFFNESS (NUMERIC MINIMUM)	SIZE RANGE
02220	Solid Wall Polyethylene (HDPE)	Chevron Plexco Quail Poly Pipe AmeriFlow (NAPCO) AmeriFlow (KWH)	ASTM F-714	DR 21	46	8” – 48” 3” – 12” 14” – 63”
02500	Polyethylene Profile Wall	Spirolite	ASTM F-894	n/a	46	18” – 120”

4.3 GASKET MATERIAL REQUIRED FOR CONTANIMANTS

CONTAMINANT	GASKET MATERIAL REQUIRED
Petroleum (diesel, gasoline)	Nitrile Rubber
Other Contaminants	As recommended by pipe manufacturer

END OF SECTION