

## SECTION 02720

### SANITARY SEWER AND STORM DRAIN SYSTEMS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. The requirements for pipe material and installation in sewer and drainage collection systems. All materials and workmanship shall strictly comply with the Utah State Plumbing Code.

##### 1.02 REFERENCES

- A. Section 02660: Pipeline Testing.
- B. AASHTO-291: Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- C. ASTM D 1248: Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.
- D. ASTM D 2239: Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Inside Diameter.
- E. ASTM D 2321: Standard Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
- F. ASTM D 2657: Standard Recommended Practice for Heat Joining of Thermoplastic Pipe and Fittings.
- G. ASTM D 2774: Standard Recommended Practice for Underground Installation of Thermoplastic Pressure Piping.
- H. ASTM D 3261: Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
- I. ASTM D 3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
- J. ASTM F 405: Standard Specification for Corrugated High Density Polyethylene (PE) Tubing and Fittings.
- K. ASTM F 667: Standard Specification for Large Diameter Corrugated High Density Polyethylene Tubing and Fittings.
- L. ASTM F 1055: Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing.
- M. ASTM C 1479: Standard Practice for Installation of Precast Concrete Sewer, Storm Drain, and Culvert Pipe Using Standard Installations.

##### 1.03 DEFINITIONS

- A. Standard Dimension Ratio (SDR): Average diameter of pipe divided by the minimum wall thickness. The diameter may be either inside or outside measurement depending upon which standard is referenced.
- B. Code Designation: A rating of polyethylene pipe materials by the Plastic Pipe Institute. The designation PE 3408 designates the type of plastic pipe (PE), the grade (34), and the hydrostatic design stress measured in units of 100 psi (08).

#### 1.04 SUBMITTALS

- A. Manufacturer's affidavit certifying product was manufactured, tested and supplied in accordance with applicable references in this section together with a report of the test results and the date each test was completed.

### PART 2 MATERIALS

#### 2.01 REINFORCED CONCRETE SEWER AND STORM DRAIN PIPE

- A. Reinforced concrete pipe shall be used for all sanitary sewers and storm drains where installation does not provide a cover of at least 2 feet over the top of the pipe.
- B. Reinforced concrete pipe shall comply with the requirements of ASTM C76-109 with bell and spigot rubber gasket type joints for sanitary sewers and the alternate option of tongue and groove mortar joints for storm drain lines.
- C. Minimum storm drain size is 18 inches, minimum sewer main size is 8 inches.

#### 2.02 CORRUGATED METAL STORM DRAIN CULVERT PIPE

- A. Galvanized or aluminized steel
  - 1. Material according to ASTM A-929.
  - 2. Pipe according to AASHTO M-36.
  - 3. Design according to ASTM A-796.
  - 4. Installation according to ASTM A-798.
- B. Asphalt dipped according to ASTM A-849.
- C. Pipe shall be Galvanized, Aluminized, or Asphalt dipped as required by City Engineer.
- D. Minimum No. 14 gage plate thickness.
- E. Pipe must be a minimum of 18-inches.

#### 2.03 SUBSURFACE DRAIN PIPE

- A. Pipe
  - 1. Perforated PVC (ASTM D-1784).
  - 2. Perforated Concrete Sewer Pipe (AASHTO M-86 & M-170).

3. Corrugated polyethylene piping (ASTM F-405-77a).

B. Bedding shall be drain rock.

#### 2.04 PLASTIC SEWER PIPE

A. This specification covers rigid polyvinyl chloride pipe and fittings, hereinafter called PVC pipe and PVC fittings. The pipe and fittings shall meet or exceed all of the requirements of ASTM Specification D3034 and ASTM F679.

B. Samples of pipe, physical and chemical data sheets shall be submitted to the City Engineer for approval and his approval shall be obtained before pipe is purchased.

C. This pipe shall be homogeneous throughout and free from cracks, holes, foreign inclusions or other defects. The pipe shall be as uniform as commercially practical in color.

D. Physical Requirements

1. All PVC sewer pipe shall be made from clean, virgin, Type 1, Grade 1, PVC and minimum SDR-35 (PS46), conforming to ASTM resin specification D-1784. SDR-26 (PS115) or thicker shall be used for depths exceeding 12 ft measured from the top of the pipe, unless otherwise approved by the City Engineer. All sewer fittings shall be minimum SDR-26.

2. All sewer pipe installed between manholes shall be of the same SDR and/or classification and shall be the highest classification required along the section.

3. All pipe joints shall be bell and spigot type with rubber ring gasket to permit expansion and contraction.

4. Pipe and fittings must be assembled with a nontoxic lubricant.

5. All pipe shall be less than 20 feet in length.

6. Spigot ends will have 15° tapered end with a memory mark around the diameter of the pipe to indicate proper insertion depth.

7. Wyes shall be of the same material as the pipe and in no case shall have thinner walls than that of the pipe furnished.

8. Sample wyes must be submitted for the City Engineer's approval and his approval must be obtained before purchase of the wyes.

9. Minimum sewer main line size is 8 inches.

#### 2.05 HIGH DENSITY POLYETHYLENE STORM DRAIN PIPE (HDPE)

A. Smooth pipe systems

1. Material: Polyethylene code designation PE 3408 as rated in ASTM D 2239 with a minimum ASTM D 3350 cell classification of 345434C, and an SDR or pressure class rating as indicated.

2. Fittings: Manufactured of same resin as the pipe.

3. Joints:
  - a. Thermally welded butt fusion in accordance with ASTM D 3261.
  - b. Flanged in accordance with ASTM D 2657.
  - c. Ultra high molecular weight electrofusion tape with a polyethylene coupler meeting ASTM F1055 requirements.
4. Nuts and Bolts: Carbon steel machined heavy hex heads, Class 2 fit in accordance with ASTM A 307; Grade B, threads in accordance with ASME B1.1 Tape wrap steel materials for protection against corrosion after piping installation.

B. Corrugated Pipe Systems

1. Material: "High density polyethylene pipe shall be smooth lined and meet the requirements of AASHTO M294 Type S."
2. Material: Polyethylene, in accordance with ASTM F 405 or ASTM F 667, Type III, Category 4 or 5, Grade P33, Class C, or Grade P34, Class C as defined by ASTM D 1248.
3. Fittings: Manufactured of same resin as the pipe.
4. Joints: Bell and Spigot Type.

C. Pipe Markings

1. Mark pipes continuously to identify:
  - a. Manufacturer's name (or trade mark) and code.
  - b. Nominal size.
  - c. Polyethylene code designation.
  - d. SDR rating. (Not applicable to corrugated polyethylene.)
  - e. Date of manufacture.
  - f. Pressure class. (Not applicable to corrugated polyethylene.)
  - g. ASTM or AWWA designation number.

- D. All storm drain sewer pipe must be a minimum of 18-inch in diameter for main lines.

2.06 SEWER LATERAL CONNECTIONS

- A. All sewer lateral connections to new sewers shall be through preformed wyes.
- B. Connections to existing sewers will be done with sewer tapping machine as shown in Standard Drawings and use a Romac CB sewer saddle. "Inserta Tee" may be used with Public Works approved installation and must be witnessed, inspected, and certified by authorized City agents.
- C. Sewer laterals and fittings shall be constructed of SDR-26 PVC and have a minimum lateral size of 4-inches.
- D. 6-inch laterals shall connect into the main line through sewer manholes.

PART 3 EXECUTION

3.01 PIPE LAYING

- A. All sewer pipe installation shall proceed up grade on a stable foundation with joints closely and accurately fitted.

1. Grade shall not be less than slope required for a full pipe to maintain 2 foot per second velocities.
- B. Gaskets shall be fitted properly in place and care shall be taken in joining the pipe units to avoid twisting of gaskets.
- C. Joints shall be clean and dry and a joint lubricant, as recommended by the pipe supplier, shall be applied uniformly to the mating joint surfaces to facilitate easy positive joint closure.
- D. If adjustment of position of a pipe length is required after being laid, it shall be removed and rejointed as for a new pipe.
- E. When laying is not in progress, the ends of the pipe shall be closed with tight fitting stopper to prevent the entrance of foreign material.
- F. In addition to the above requirements all pipe installation shall comply to the specific requirements of the pipe manufacturer.
- G. HDPE shall be installed as per manufacturer's instructions, ASTM D 2321 or ASTM D 2774 as applicable.
- H. Pipe shall be air tested per state regulations.
- I. Concrete collars are required at all storm drain pipe connections to manholes or inlets. The concrete collar shall seal the storm drain pipe to the manhole or inlet.
- J. All sewer repairs or joints that abut without a bell and spigot or mechanical joint shall use an approved gasketed solid sleeve, a "Fernco Stainless Steel Shear Ring", or a "Shear Guard" with concrete support saddle.

### 3.02 GRAVEL FOUNDATION FOR PIPE

- A. Refer to Section 02225.

### 3.03 BEDDING

- A. Refer to section 02225.

### 3.04 COMPACTION

- A. Refer to Section 02250.

END OF SECTION