

---

## **SECTION 02550 SANITARY SEWER PIPE-BURSTING**

### **PART I: GENERAL**

#### **1.1 GENERAL REQUIREMENTS**

- A. Procedure employed for the reconstruction of existing sanitary sewer lines by the pipe-bursting method, followed by replacement with an approved pipe material and appropriate diameter. This Item covers the furnishing of all material, equipment, labor, supervision and all appurtenances necessary to provide for the complete reconstruction of deteriorated sanitary sewer lines.
- B. The pipe-bursting method is defined as the reconstruction of sanitary sewer pipe by displacing the existing pipe and installing an approved pipe material. The process involves the use of a static, hydraulic or pneumatic hammer "moling" device, suitably sized to break out the old pipe. Forward progress of the "mole" may be aided by the use of hydraulic equipment or other apparatus. The replacement pipe is either pushed or pulled into the bore. The method allows for replacement pipe of sizes from eight inches (8 In) through eighteen inches (18 In).

#### **1.2 MEASUREMENT AND PAYMENT**

- A. Unit Prices:
  - 1. Payment for pipe-bursting shall be paid on a per linear foot basis as measured along the centerline of the sanitary sewer line. Payment shall be for complete in-place installation, including all materials, equipment, labor and excavation and backfill.
  - 2. No separate payment shall be made for Television Inspection of pipe-bursted sanitary sewer line.
  - 3. 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 all work in this Section is included in the Total Stipulated Price.

#### **1.3 REFERENCES**

- A. ASTM – American Society for Testing and Materials.
  - 1. ASTM D1248 – Standard Specification for Polyethylene Plastics Extrusion Materials For Wire and Cable.
  - 2. ASTM D2122 – Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings.
  - 3. ASTM D2837 – Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products.
  - 4. ASTM D3034 – Standard Specification for Type PSM Poly (Vinyl

**02550-1**

- Chloride) (PVC) Sewer Pipe and Fittings.
- 5. ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
  - 6. ASTM F714 – Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
- B. CFTS – City of Friendswood Technical Specifications.

#### 1.4 SUBMITTALS

- A. Conform to requirements of Section 01330 – Submittal Procedures.
- B. Submit proposed methods, equipment, materials and sequence of operations for sanitary sewer pipe-bursting construction. Plan operations to minimize disruption of utilities to occupied facilities or adjacent property.
- C. Submit qualifications, proposed methods, equipment, materials and sequence for acceptance testing of sanitary sewer pipe-bursting.
- D. Submit test reports as specified in Part III of this Section.

#### 1.5 QUALITY ASSURANCE

- A. Provide manufacturer's affidavits that replacement pipe was manufactured in compliance with standards and Technical Specifications referenced in this Section.

## PART II: PRODUCTS

### 2.1 SOLID WALL POLYETHYLENE PIPE

- A. The replacement pipe shall be manufactured from a high density, high molecular weight polyethylene compound (HDPE) which conforms to ASTM D1248 and meets the requirements for Type III, Class C, Grade P-34, Category 5, and has a PPI rating of PE 3408. No exceptions to this requirement.
- B. The pipe produced from this resin shall have a minimum cell classification of 335434C under ASTM D3350-80. A higher numbered cell classification limit which gives desirable higher primary property, per ASTM D3350-80, may be approved by the Project Manager. The higher classification limit pipe shall be provided at no additional cost to the City. The value for the Hydrostatic Design Basis shall not be less than one thousand six hundred pounds per square inch (1,600 psi) per ASTM D2837.
- C. Before beginning the Work, the Contractor shall submit for approval the vendor's specific technical data with complete information on resin, physical properties of pipe, and pipe dimensions pertinent to this job. A certificate of "Compliance With Specification" shall also be furnished for all materials to be supplied.
- D. The Contractor shall be responsible for all damage caused by, and the replacement of, failed, unspecified, or unapproved materials.

**2.2 STANDARD DIMENSION RATIO**

- A. The Standard Dimension Ratio (SDR), which is the ratio of the outside diameter of the liner pipe to its minimum wall thickness, shall be as specified in TABLE 4.1 – POLYETHYLENE REPLACEMENT PIPE DIMENSIONS in this Section. Dimensions and workmanship shall be in accordance with ASTM F714-81 and D2122. Minimum wall thickness (inches) = O.D./SDR.

**2.3 PIPE CLASSIFICATION**

- A. The SDR Classification for various depths shall be as specified in TABLE 4.2 – POLYETHYLENE REPLACEMENT PIPE SDR in this Section. Depth shall be measured from the upstream and downstream rim of the manhole to the invert of the existing sanitary sewer in the pipe segment to be replaced. The SDR shall be selected for the deeper of the two (2) manholes for a given pipe segment.

**2.4 QUALITY CONTROL**

- A. The physical appearance of the replacement pipe revealing deformities such as concentrated ridges, discoloration, excessive spot roughness, pitting, varying wall thickness, etc., shall constitute sufficient basis for rejection by the Project Manager. The replacement pipe shall be homogeneous throughout, free from visible cracks, foreign inclusions, and other injurious defects. Pipe with gashes, nicks, abrasions, or any such physical damage which may have occurred during storage and/or handling, and which are larger/deeper than ten percent (10%) of the wall thickness, shall not be used and must be removed from the construction site.
- B. In the case of any conflict with, or deviation from, these specifications, the Contractor shall either discuss the matter in the Pre-Bid Conference or report such in writing to the Project Manager during construction for clarification, explanation, and/or approval. The Project Manager's decision shall be final and all costs, if any, incurred due to the Contractor's use of an unapproved replacement pipe and the subsequent work to remove and replace this replacement pipe with an acceptable pipe as specified shall be borne by the Contractor.

**2.5 Clamps**

- A. Where excavations for the insertion of the replacement pipe are made between two (2) manholes, the ends of the replacement pipe shall be joined with an all-stainless steel (including bolts and lugs), full circle, Universal Clamp Coupling with a one-quarter inch (1/4 In) thick grid gasket similar to JCM Industries Type 108 or an approved equal. Clamps shall be selected to fit the outside diameter of the liner pipe. Minimum clamp lengths shall be as specified in TABLE 4.3 – MINIMUM CLAMP LENGTHS in this Section.

**PART III: EXECUTION**

**3.1 PRE-INSTALLATION PREPARATIONS**

- A. The following procedures shall be adhered to unless otherwise approved by the Project Manager.
  - 1. Safety: The Contractor shall carry out his operations in strict accordance with all applicable OSHA Standards.
  - 2. Bypass Pumping: It shall be the Contractor's responsibility to provide all pumps, piping, and personnel to bypass wastewater around the section of sanitary sewer to be replaced by plugging an upstream manhole and pumping to a downstream manhole if site conditions require bypass pumping. Pumps shall be of adequate capacity to handle expected flow. All bypass pumping shall conform to Section 02555 – Sanitary Sewer Bypass Pumping.
  - 3. Pre-Installation Cleaning: The Contractor shall remove all debris, roots, etc. from the existing sanitary sewer before pipe-bursting and replacement. Cleaning shall be by the use of swabs, pigs, washing or other methods as determined by the Contractor and approved by the Project Manager. All pre-installation cleaning shall conform to Section 02530 – Sanitary Sewer Line Cleaning.
  - 4. Pre-Installation Inspection: The Contractor shall review existing video media and logs of the sanitary sewer lines designated for replacement. It shall be the responsibility of the Contractor to conduct a television inspection of the sanitary sewer pipe not previously televised, immediately before the pipe-bursting to assure that the pipe conditions are acceptable for pipe-bursting. Location of all service connections shall be verified from video media and logs for reconnection following replacement operations. All televising of sanitary sewer lines shall conform to Section 02520 – Television Inspection of Sanitary Sewer Lines.
  - 5. Line Obstructions: If inspection reveals an obstruction that cannot be removed by conventional sanitary sewer cleaning equipment, such as heavy solids, severely dropped joints, collapsed pipe that prevents completion of the installation process or reinstallation of a service connection, then a point repair shall be made by the Contractor as approved by the Project Manager. Protruding sanitary sewer service connections are not considered line obstructions and removal is incidental to the Work. See separate specifications for details. All point repairs shall conform to Sections 02540 – Sanitary Sewer Point Repairs and 02560 – Sanitary Sewer Obstruction Removal.
  - 6. Sags In Line: If pre-installation video (TV) inspection reveals a sag in the existing sanitary sewer that is greater than one-half (1/2) the diameter of the existing pipe, it shall be the Contractor's

responsibility to install the replacement pipe in a manner that results in an acceptable grade without the sag. The Contractor shall take the necessary measures to eliminate these sags either:

- a. pipe replacement;
- b. digging a sag elimination pit and bringing the bottom of the pipe trench to a uniform grade in line with the existing pipe invert;
- c. or by other means that shall be acceptable to the Project Manager.

**3.2 INSTALLATION**

A. The Contractor shall submit information, in detail, of the procedure and the steps to be followed for the installation of the pipe-bursting method. All such instructions and procedures submitted shall be carefully followed during installation. Any proposed changes in installation procedures shall require submittal of revised procedures and acceptance by the Project Manager.

- 1. Process Limitations
  - a. Though the installation process may be licensed or proprietary in nature, the Contractor SHALL NOT change any material, thickness, design values or procedural matters stated or approved in the submittals, without the Project Manager's prior knowledge and pre-approval. The Contractor shall submit, in writing, full details about component materials, their properties and installation procedures and abide by them fully during the entire course of the project.
  - b. All sanitary sewer rehabilitation by pipe-bursting systems are considered structurally equal processes as far as "end product" required by the City. The minimum required performance criteria, and/or standards, physical/structural properties, chemicals resistance tests, and the replacement pipe thicknesses as given in this specification shall be strictly complied with. It shall be the responsibility of the Contractor to comply with the specifications in full without any request for any change after the award of the Contract. The City reserves the right to accept, reject, or modify any later requests for changes, which would be at no additional cost to the City or credit for the City.
- 2. Finished Pipe
  - a. The installed replacement pipe shall be continuous over the entire length of each pipe segment from manhole to manhole and shall remain free from visual defects as specified in Paragraph 2.4 of this Specification. The

replacement pipe passing through or terminating in a manhole shall be carefully cut out in a shape and manner approved by the Project Manager. The invert and benches shall be streamlined and improved for smooth flow. The installed pipe shall meet the leakage requirements of the pressure test in Paragraph 3.3.

- 3. Insertion or Access Pits
  - a. The location and number or insertion, or access, pits shall be determined by the Contractor and approved by the Project Manager prior to excavation. The pits shall be located such that their total number shall be minimized, and the footage of replacement pipe installed in a single pull shall be maximized to the limit of Paragraph 3.2.A.4.b.
  - b. Before any excavation is done for any purpose, it shall be the responsibility of the Contractor to locate water lines and taps and check with the various utility companies and determine the location of their facilities. Any necessary temporary construction easements and/or right-of-way areas shall be arranged for by the Contractor at no cost to the City.
  - c. Any damage done to any utilities and the resulting repair, temporary service, cost, etc. and restoration of temporary easements and right-of-way areas shall be borne by the Contractor. Access pits shall be backfilled in accordance with Section 02125 – Excavation and Backfilling for Utilities. Excavation shall comply with provisions of Sections 02280 – Trench Safety Systems and 02125 – Excavation and Backfilling for Utilities.
  - d. Existing clean-outs may be removed as required for pit excavation. After completion of pipe replacement and testing, clean-out shall be reinstalled and pit backfilled.
  - e. All existing facilities (fencing, structures, drives, sidewalks, trees, gardens, etc.) damaged or removed to facilitate pipe-bursting and pipe replacement shall be restored to, or better than, their condition prior to the start of the Work. All cost shall be borne by the Contractor.
- 4. Pipe Jointing
  - a. Sections of replacement pipe shall be assembled and joined on the job site above ground. Jointing shall be accomplished by the heating and butt-fusion method in strict conformance with the manufacturer's recommendation.
  - b. The butt-fusion method for pipe jointing shall be carried out in the field by operators with at least two years (2

Yrs) prior experience of fusing replacement pipe with similar equipment using proper jigs and tools per standard procedures outlined by the pipe manufacturer. These joints shall have the acceptable appearance of a smooth, uniform, double roll back bead made while applying the proper melt, pressure and alignment. It shall be the sole responsibility of the Contractor to provide an acceptable butt-fusion joint in the field. All joints shall be inspected by the Project Manager before insertion. The replacement pipe shall be joined on the job site in appropriate working lengths near the insertion pits. The maximum length of continuous replacement pipe which shall be assembled above ground and pulled on the jobsite at any one (1) time shall be six hundred linear feet (600 Lf) unless approved by the Project Manager.

- 5. Use of Clamp and Encasement
  - a. Where excavations for the insertion of the replacement pipe are made between two (2) manholes, the ends of the replacement pipe shall be cut smooth and square to the axis, so that it can be joined in a workman like manner such that both ends meet and touch uniformly and continuously. An all stainless steel (including bolts and lugs) clamp with gasket as described in paragraph 3.2.A.5.b shall be used.
  - b. In all excavations where the replacement pipe is exposed (i.e. insertion pits, sag elimination pits), an encasement shall be placed under (bedding) around and above the replacement pipe using cement-stabilized sand. The compacted thickness of this encasement shall be a minimum of six inches (6 In) below the pipe and twelve inches (12 In) above and on the sides of the pipe. It shall not be backfilled without the Project Manager's approval.
- 6. House or Building Service Connections
  - a. The exact location and number of house or building sanitary sewer service connections shall be determined from TV inspection tapes and/or in the field. Any and all such locations shown on the Plans and/or Exhibits are only approximate, as are the number of said connections in the bid proposal. It shall be the Contractor's responsibility to field locate all existing sanitary sewer service connections, whether in service or not, along the sanitary sewer line which has been rehabilitated. The Contractor shall disconnect all such connections prior to pipe-bursting and reconnect all such connections,

- including those that go to unoccupied or abandoned buildings or houses or vacant lots, as directed by the Project Manager. Accordingly, each vacant lot shall have at least one (1) existing sanitary sewer service connection left in service. All services which are reconnected to the rehabilitated sanitary sewer shall be properly shown on the "As Rehabilitated" Plans and/or Exhibits with the exact distances from the nearest downstream manhole. All existing sanitary sewer connections shall be properly disconnected from the existing sanitary sewer and then reconnected to the replacement pipe per instructions and procedures as outlined below or as approved by the Project Manager.
- b. After the replacement pipe has been pulled into place and allowed to normalize to ambient temperature as well as recover from any imposed stretch, each existing sanitary sewer service connection, as directed by the Project Manager, shall be reconnected to the replacement pipe with a prefabricated polyethylene saddle or an approved alternate. The polyethylene saddle shall be a one (1) piece saddle equipped with a neoprene gasket so that a complete seal is accomplished when the strap-on saddle is tightened with two (2) stainless steel bands, one (1) on each end. The stub-out attached to the saddle must protrude into the replacement pipe a distance equal to the wall thickness of the installed replacement pipe. The new four inch (4 In) stub-out, or lateral, shall be connected to the existing sanitary sewer service line with a flexible PVC coupling, "Fernco" or an approved equal.
  - c. The flexible coupling shall be secured to the existing sanitary sewer service lateral and new stub-out and/or stack with stainless steel bands. All such connections shall be completely encased in cement-stabilized sand a minimum of six inches (6 In) below, and twelve inches (12 In) above and on the sides of the pipe at a cost incidental to such sanitary sewer service connections. All such connections shall be tested and approved by the Project Manager before backfilling. A remote tap shall not be allowed.
  - d. Service connections on an existing sanitary sewer shall have a minimum diameter four inches (4 In). Gasketed PVC sanitary sewer pipe (ASTM D-3034, SDR 26) may be used for all stubs. PVC saddles with neoprene gaskets may be used in lieu of polyethylene saddles.
  - e. The Contractor shall utilize existing taps/service

connections to reconnect the service lines to the replacement pipe unless approved otherwise by the Project Manager.

7. Sealing and Benches in Manholes
  - a. The replacement pipe shall be installed with a tight fitting seal with the existing or new manhole. Half-inch (1/2) diameter activated oakum band soaked in Scotch seal 5600 or equal shall be applied circumferentially on the replacement pipe and encased with a cementitious mortar to prevent inflow at the manhole. The top one-half (1/2) of the pipe within the manhole shall be neatly cut off and not broken or sheared off, at least four inches (4 In) away from the manhole walls. The channel in the manhole shall be a smooth continuation of the pipe(s) and shall be merged with other lines or channels if any. Channel cross-section shall be U-shaped with a minimum height of one-half (1/2) pipe diameter to three-quarters (3/4) of the pipe diameter for fifteen inches (15 In) and larger. The side of the channels shall be built up with mortar/concrete, as specified, to provide benches at a maximum of one (1) in twelve (12) pitch towards the channel.
  - b. The replacement pipe in the manhole shall be sealed as specified above before proceeding on to the next manhole section and all manholes shall be individually inspected for replacement pipe cut-offs, benches and sealing work.
  - c. The replacement pipe shall be allowed to normalize to ambient temperatures as well as recover from any imposed stretch, usually eight hours (8 Hrs) to ten hours (10 Hrs) in the case of polyethylene, before being cut to fit between manholes and proceeding with reshaping and/or smoothing the manhole invert.

### 3.3 TESTING OF REPLACEMENT PIPE

- A. All costs for testing the replacement pipe by a pressure method shall be incidental to the installation. All testing shall conform to Section 02525 – Acceptance Testing for Gravity Sanitary Sewer Lines.

**PART IV: TABLES**

**4.1 POLYETHYLENE REPLACEMENT PIPE DIMENSIONS**

| IPS<br>NOMINAL<br>O. D.<br>(inches) | MINIMUM<br>O. D.<br>(inches) | MINIMUM WALL THICKNESS<br>(inches) |        |        |        |
|-------------------------------------|------------------------------|------------------------------------|--------|--------|--------|
|                                     |                              | SDR 26                             | SDR 21 | SDR 19 | SDR 17 |
| 7                                   | 7.125                        | .274                               | .339   | .375   | .419   |
| 8                                   | 8.625                        | .332                               | .411   | .454   | .507   |
| 10                                  | 10.750                       | .413                               | .512   | .566   | .632   |
| 12                                  | 12.750                       | .490                               | .607   | .671   | .750   |
| 14                                  | 14                           | .538                               | .667   | .737   | .824   |
| 16                                  | 16                           | .615                               | .762   | .842   | .941   |

**4.2 POLYETHYLENE REPLACEMENT PIPE SDR**

| HDPE PIPE SDR | MAXIMUM DEPTH (Feet) |
|---------------|----------------------|
| 26            | 8.0                  |
| 21            | 14.0                 |
| 19            | 19.0                 |
| 17            | 26.0                 |

**4.3 MINIMUM CLAMP LENGTHS**

| OUTSIDE DIAMETER<br>OF THE LINER PIPE<br>(Inches) | MINIMUM<br>LENGTH OF CLAMP<br>(Inches) |
|---|--|
| 4.500   | 12                                     |
| 6.625   | 12                                     |
| 8.625   | 18                                     |
| 10.750 and larger                                 | 30                                     |

**END OF SECTION**