**SECTION 3.2**

**TECHNICAL SPECIFICATION FOR**

**REHABILITATION OF EXISTING WASTEWATER MAIN BY PIPE BURSTING (PB)**

**NOVEMBER 2000**

**Part 1: General**

* 1. **Scope of Work**

Furnish all materials, labor, equipment, tools, and required incidentals for the replacement of wastewater mains by Pipe Bursting method. The Pipe Bursting process is defined as the trenchless reconstruction of existing wastewater mains by the simultaneous insertion of liner pipe within the bore of the existing pipe, by breaking and expanding the existing pipe. The scope includes reconnection of existing wastewater service connections, television inspection of the newly rehabilitated pipe and complete installation in accordance with the contract documents. Only hydraulically and pneumatically operated equipment will be allowed for this method.

**1.2 Related Works**

* Technical Specification for "Wastewater Flow Control and Bypass Pumping”
* Technical Specification for "Wastewater Main and Manhole Cleaning"
* Technical Specification for "Television Inspection of Wastewater Mains"

**Part 2: Quality Assurance**

Unless otherwise stated, the latest editions of the following documents are applicable

for this specification:

ASTM D1248 Standard Specification for Polyethylene Plastics Extrusion Materials For Wire and Cable

ASTM D2122 Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

ASTM D2412 Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading

ASTM D3350 Standard Specification for Polyethylene Plastics Pipe and

 Fittings Materials

ASTM D618 Standard Practice for Conditioning Plastics for Testing

ASTM D2657 Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings

ASTM D3212 Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

* 1. **Qualification Requirements**
* The Contractor shall be certified by the manufacturer of the pipe bursting system that it is a fully trained licensed installer of their pipe bursting system. Contractor must provide a letter to the Owner documenting this requirement.
* The Contractor shall have a minimum of three (3) years verifiable experience using the pipe bursting method while meeting the following criteria:

- A minimum total of 100,000 LF of completed pipe bursting footage.

- A minimum total of 50,000 LF of upsizing where similar sized diameter increases have been successfully completed in pipe diameters of 8-inch to 12-inch range.

- A minimum total of 25,000 LF of pipe bursting experience on diameters 18-inch and larger.

* Personnel performing pipe bursting must be certified by manufacturer of pipe bursting system having successfully completed training in:

Operating bursting head

Installing proposed replacement pipe.

Operation and maintenance of all equipment to be used

* + - Personnel performing fusing of liner pipe and fittings must be certified by manufacturer of fusing equipment having successfully completed training in:

Handling replacement pipe materials.

Butt fusion of pipe joints, saddle fusion of fittings for service laterals

Operation and maintenance of all equipment to be used

* 1. **Warranty**
		+ A one-year warranty for the pipe shall be included from the Contractor, and shall cover the cost of replacement pipe and freight to project site, should the pipe have any defects in material or workmanship.
		+ In addition to the standard pipe warranty, the pipe bursting Contractor shall provide in writing a warranty for a period of one year for all the pipe bursting work including material, installation, and pressure testing at no additional to the owner.
		+ Unless otherwise specified, the warranty period shall begin after the Certificate of Acceptance is issued for the Contract.
	2. **Submittals**

The Contractor shall furnish the following documents made in a timely manner so that project schedule can be met:

* + 1. Material Data
		- Shop drawings, catalog data and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings.
		- Manufacturer's recommendation for handling, storage, and repair of pipe and fittings damaged.

2.3.2 Process Demonstration

* Submit detailed installation procedure including pipe bursting method to be used.
* Method of construction and restoration of existing sewer service connections. This shall include detail drawings and written description of the entire construction procedure to install pipe, bypass wastewater flow and reconnection of sewer service connections.

2.3.3 Testing Documentations

Television inspection reports along with video made after new pipe installation.

2.3.4 Reference

Provide a list of minimum three previous projects completed in the last three years by the contractor/installer in where a wastewater main was successfully rehabilitated using the pipe bursting method. Include contact names, addresses and phone numbers of agencies involved.

**Part 3: Product**

* 1. **Liner Pipe:**

Liner Pipe shall be high-density polyethylene pipe and meet the applicable requirements of ASTM F714 Polyethylene (PE) Plastic Pipe (SDR-PR) based on Outside Diameter, ASTM D1248, and ASTM D3350.

* Sizes of the insertions to be used shall be as shown on the plans or to renew the wastewater main to its original or greater than original flow capacity.
* All pipes shall be made of virgin material. No rework except that obtained from the manufacturer's own production of the same formulation shall be used.
* The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters or other deleterious faults.
* Material color shall be white, gray or light colored, suitable for TV inspection.
* Unless otherwise specified plan or specification, the minimum wall thickness of the polyethylene pipe shall meet the following:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Typical****Application** | **Depth of****Cover****(ft.)** | **Separation Distance from****Water Main (ft.)** | **SDR****(DIPS\* HDPE)** | **Min. Pressure****(psi)** |
| Gravity | < 10.0 | ≥ 9 | 17 | 100 |
| < 9 | 11 | 160 |
| > 10.0 | As Required | 11 | 160 |
| Force Main | As Required | As Required | 11 | 160 |

*\*Note: Only Ductile Iron Pipe Size (DIPS) shall be used unless otherwise specified in the plans and/or specifications.*

**Part 4: Execution**

**4.1 Delivery, Storage and Handling**

Transport, handle and store pipe and fittings as recommended by manufacturer. If new pipe and fittings become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required by the Owner, at the Contractor's expense, before proceeding further. Deliver, store and handle other materials as required to prevent damage.

**4.2 Pre Pipe-Bursting Television Inspection**

A pre pipe-bursting television inspection of wastewater mains shall be performed to locate or /confirm the breaks, obstacles and service connections as per Technical Specification for "Television Inspection of Wastewater Mains". The Owner must review and approve the television inspection video prior to proceed with any rehabilitation.

* 1. **Obstruction Removal**

Identify any point repairs required, such as dropped joints, intruding service connections, collapsed pipe, sags in main or any other obstructions prior to the pipe bursting process. The Contractor shall remove all obstructions to perform pipe bursting operation, as necessary.

The contractor shall notify the inspector for approval to make an excavation after having exhausted all other options to remove any obstruction or retrieve any pipe bursting tool or camera from the wastewater main.

**4.4 Diversion Pumping**

* The Contractor, when and where required, will divert wastewater flows for the cleaning, pipe bursting, television inspection, point repairs, obstruction removals, or other related work in this project as required to complete the work. All works to be done as per as per Technical Specification for "Wastewater Flow Control".
* The Contractor shall be responsible for continuity of sanitary sewer service to each facility connected to the section of sewer during the execution of the work.
* If sewage backup occurs and enters buildings, the Contractor shall be responsible for clean up, repair, property damage cost and claims.
	1. **Insertion Pit or Access Pit**
* Insertion or access pits shall be efficiently located so that total number of pits are minimized and footage of liner pipe installed in a single pull is maximized. Where possible, use existing manholes and excavations at point repair locations for insertion pits.
* To facilitate long insertion runs, intermediate insertion pits may be allowed at the most advantageous location to provide for replacement pipe to be installed in both directions. When insertion pits are required in the lanes of traffic, the operation shall be limited to one (1) lane of traffic or one-half (1/2) of the roadway, whichever is less.
* Insertion pits shall be only as large as required to accommodate the equipment. All pit dimensions and locations shall be approved by the Owner in writing, prior to beginning work.
* Manholes may be placed at insertion pit location as directed by the Owner.
* In the event the pipe bursting process requires the excavation of an insertion pit, the pipe through the pit shall be bedded in the required bedding material.
	1. **Pipe Bursting and Liner Insertion**
* Equipment used to perform the work shall be located away from buildings so as to minimize noise impact. Provide silencers or other devices to reduce machine noise as required to meet requirements.
* The Contractor shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect existing manholes, and to protect the pipe form damage during installation. Lubrication may be used as recommended by the manufacturer. Under no circumstances will the pipe be stressed beyond its elastic limit.
* The installed pipe shall be allowed the manufacturer's recommended amount of time, but not less than four (4) hours, for cooling and relaxation due to tensile stressing prior to any reconnection of service lines, sealing of the annulus or backfilling of the insertion pit. Sufficient excess length of new pipe, but not less than four (4) inches, shall be allowed to protrude into the manhole to provide for occurrence.
* Following the relaxation period, the annular space may be sealed. Sealing shall be made with materials approved by the Engineer and/or his representative and shall extend a minimum of eight (8) inches into the manhole wall in such a manner as to form a smooth, uniform, watertight joint.
* The new wastewater pipe shall be placed without damaging the pipe joints or completed pipe sections. Any pipe which has been damaged during installation shall be replaced by the Contractor.
	1. **Pipe Joining**
* The polyethylene pipe shall be assembled and joined at the site using the thermal butt-fusion method to provide a leak proof joint. Threaded or solvent- cement joints and connections are not permitted. All equipment and procedures used shall be used in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment.
* The butt-fused joint shall be true alignment and shall have uniform roll-back-beads resulting from the use of proper temperature and pressure. The joint shall be allowed adequate cooling time before removal of pressure. When cool, all weld beads shall then be removed from both the inside and outside surface such that the joint surfaces shall be smooth. The fused joint shall be watertight and shall have tensile strength equal to that of the pipe. All joints shall be subject to acceptance by the Engineer and/or his representative prior to insertion. All defective joints shall be cut out and replaced at no cost to the City. Any section of the pipe with a gash, blister, abrasion, nick, scar or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used and must be removed from the site. However, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above. In addition, any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling as determined by the Engineer and/or his representative shall be discarded and not used.
* Terminal sections of pipe that are joined within the insertion pit shall be connected with a full circle pipe repair clamp. The butt gap between pipe ends shall not exceed one-half (1/2) inch.
	1. **External Service Connections**
* In providing re-connection of existing wastewater services, select service connection pipe diameter must match existing service with a minimum diameter of 6”. Any existing service smaller than 6” shall be upsize to minimum of 6”.
* All wastewater service connections shall be identified, located and excavated prior to the pipe insertion to expedite reconnection. Upon commencement, pipe insertion shall be continuous and without interruption from one manhole to another, except as approved by the Owner. Upon completion of insertion of the new pipe, the

Contractor shall expedite the reconnection of services to minimize any inconvenience to the customers.

* Mechanical saddles shall be made of polyethylene pipe compound that meets the requirements of ASTM 01248, Class C; have stainless steel straps and fasteners, neoprene gasket and backup plate. Mechanical saddles shall be heat fusion saddles, Strap-On-Saddle Type as manufactured by Driscoplex™ or Tapping Saddle Manufactured by Fernco Joint Sealer Company, DFW Plastics, Inc. or approved equal. Once the saddle is secured in place; drill hole full inside diameter of saddle outlet in pipe liner.
* At all points where the polyethylene pipe has been exposed, as in starter excavations, at service connection fittings, outside of manholes, etc., the Contractor shall encase the pipe and fittings in minimum of 6-inches of concrete or flowable backfill. If flowable backfill is used, the Contractor shall remove all debris, and create a void along each side of the pipe at the spring line to undisturbed soil, in preparation for the flowable backfill. Width of the void shall not exceed (main outside diameter + 2ft.) or (service line outside diameter + 2ft.).
	1. **Field Testing**

Tests for compliance with this specification shall be made as specified herein and in accordance with the applicable ASTM Specification. A certificate with this specification shall be furnished, upon request, by the manufacturer for all material furnished under this specification. Polyethylene plastic pipe and fittings may be rejected for failure to meet any requirements of this specification.

* 1. **Post-Pipe Bursting Television Inspection**

Upon completion of pipe bursting operation and reconnection of the service laterals, the Contractor shall perform television inspection of the rehabilitated wastewater main as outlined in the technical section "Television Inspection of Wastewater Mains".

**4.11 Final Cleanup**

Upon completion of installation, testing and inspection, clean and restore project area affected by work of this section.

**PART 5: METHOD OF MEASUREMENT AND PAYMENT**

Method of Measurement and Payment for the work included in this section will be in accordance with the payment schedule in the Bid Proposal.

**\*\*END OF SECTION\*\***