

APPENDIX C - PRIVATE SEWER LATERAL PIPE BURSTING TECHNICAL SPECIFICATIONS

A. GENERAL

1. **Description:** This specification shall cover the rehabilitation of existing sanitary sewer laterals from building to the public sewer main using the pipe-bursting method. Pipe bursting is a system in which the bursting head splits the existing pipe while simultaneously installing a new High Density Polyethylene Pipe (HDPE) of the same size or larger size pipe where the old pipe existed, then reconnects existing sewer service house connections, and television inspection of the HDPE is performed. The bursting head tool must be used in conjunction with a constant tension hydraulic winch. Bursting head diameter depends on the diameter of the pipe to be replaced.

B. QUALIFICATIONS

1. HDPE pipe jointing shall be performed by personnel trained in the use of butt-fusion equipment and recommended methods for new pipe connections. Personnel directly involved with installing the new pipe shall receive training in the proper methods for handling and installing the HDPE pipe. Training shall be performed by a qualified representative.
3. The Contractor shall hold the City harmless in any legal action resulting from patent infringements.

C. SUBMITTALS

Submit the following:

1. Certification of workmen training for installing pipe.
2. Television inspection reports and videotapes made after new pipe installation.

D. DELIVERY, STORAGE, AND HANDLING

1. Transport, handle, and store pipe and fittings as recommended by manufacturer.
2. 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 Engineer at the Contractor's expense, before proceeding further.
3. Deliver, store, and handle other materials as required to prevent damage.

E. METHODS FOR NEW PIPE INSTALLATION

The method approved for rehabilitation of existing sanitary sewer laterals by pipe bursting and installation of new polyethylene pipe is either pneumatically operated equipment or static pull equipment.

F. MATERIALS

Polyethylene Plastic 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, ASTM D3350.

1. The size of the new pipe to be used shall be to replace the sewer to its original pipe size, unless otherwise directed by the Engineer to upsize the lateral.
2. All pipe shall be made of virgin material. No rework except that obtained from the manufacturer's own production of the same formulation shall be used.
3. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
4. Dimension Ratios: The minimum wall thickness of the polyethylene pipe shall meet the following:

Depth of Cover (Feet)	Minimum SDR of Pipe
0 - 16.0	17
> 16.1	17

5. Material color shall be white, black, or whatever is specified with interior of pipe having a light reflective color to allow easier/better viewing for television inspection.

G. TESTS

Tests for compliance with this specification shall be made as specific 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 if it fails to meet any requirements of this specification.

H. EQUIPMENT

1. **Pneumatic:** The pipe bursting tool shall be designed and manufactured to force its way through existing pipe materials by fragmenting the pipe and compressing the old pipe sections into the surrounding soil as it progresses. The bursting unit shall be pneumatic and shall generate sufficient force to burst and compact the existing pipeline. See manufacturer's specifications for what size tool should be used in what diameter of pipe, as well as, parameters of what size tool for percentage of upsize allowed.

The pipe-bursting tool shall be pulled through the sewer by a winch located at the upstream manhole. The bursting unit shall pull the HDPE pipe with it as it moves forward. The bursting head shall incorporate a shield/expander to prevent collapse of the hole ahead of the HDPE pipe insertion. The pipe bursting unit shall be remotely controlled.

The pipe bursting tool shall be pneumatic. The bursting action of the tool shall increase the external dimensions sufficiently, causing breakage of the pipe at the same time expanding the surrounding ground. The action shall not only break the pipe, but also create the void into which the burster can be winched and enables forward progress to be made. At the same time, the HDPE pipe, directly attached to the sleeve on the rear of the burster, shall also move forward.

The burster shall have its own forward momentum while being assisted by winching. A winch shall give the burster friction by which it can be moved forward. To form a complete operating system, the burster must be matched to a constant tension winching system.

2. **Static:** The pipe bursting tool shall be designed and manufactured to force its way through existing pipe materials by fragmenting the pipe and compressing the old pipe sections into the surrounding soil as it progresses. The bursting unit shall generate sufficient force to burst and compact the existing pipeline. See manufacturer's specifications for what size tool should be used in what diameter of pipe, as well as parameters of what size tool for percentage of upsize allowed.

The pipe bursting tool shall be pulled through the sewer by a winch located at the receiving excavation or manhole. The bursting unit shall pull the HDPE pipe with it as it moves forward. The pipe bursting unit shall be remotely controlled.

The bursting action of the tool shall increase the external dimensions sufficiently, causing breakage of the pipe at the same time expanding the surrounding soil. To reduce pipe drag, the expander for 4" pipe shall be 5.875" O.D. and expander for 6" pipe shall be 8.00" O.D. Expanders shall be equipped with two steel alloy cutting blades, permanently mounted to the sloped surface of the expander. This action shall fracture the existing pipe and allow bursting tool to make forward progress. At the same time the new HDPE pipe, directly attached to the sleeve on the rear of the burster, shall also move forward.

I. WINCH UNIT

1. **Pneumatic:** A winch shall be attached to the front end of the bursting unit. The winch shall provide a constant tension to the burster in order that it may operate in an efficient manner. The winch shall ensure directional stability in keeping the unit online.

The constant tension winch shall supply sufficient cable in one continuous length so that the pull may be continuous between approved winching points.

The Contractor shall provide a system of guide pulleys and bracing to center the cable and minimize contact with the existing sewer lateral.

2. **Static:** A winch shall be attached to the front of the bursting unit. The winch shall provide a constant tension to the burster in order that it may operate in an efficient manner. The winch shall ensure directional stability in keeping the unit online.

The winch shall be hydraulically operated providing a constant tension throughout the operation. The winch shall be of the constant tension type and shall be fitted with a direct reading pressure gauge to measure the winching load.

The constant tension winch shall supply sufficient cable in one continuous length so that the pull may be continuous between launching pit and receiving pit or manhole.

The contractor shall provide a system of guide pulleys and bracing at each access hole to minimize cable contact with the existing sewer.

The supports to the trench shoring in the insertion pit shall remain completely separate from the winch boom support system and shall be so designed that neither the pipe nor the winch cable shall be in contact with them.

J. SEWER SERVICE CONNECTIONS

Sewer service connections shall be connected to the new pipe by various methods. The saddles shall be made of a material compatible with that of the mainline pipe.

1. Electrofusion saddles, as manufactured by Central Plastics, shall be installed in accordance with the manufacturers recommended procedures.
2. Conventional fusion saddles as manufactured by Central Plastics, Phillips Driscopipe, or Plexco shall be installed in accordance with the manufacturers recommended procedures.
3. Connection of the new service lateral to the mainline shall be accomplished by means of mechanical rubber sleeve couplings as manufactured by Fernco or approved equal. Install using procedures and equipment as referenced in manufacturer's written installation instructions.

K. PREPARATION

1. By Passing Sewage:
 - a. By-pass pumping: The Contractor, when and where required, shall provide diversion for the pipe bursting/replacement process. The pumps and by-pass lines shall be of adequate capacity and size to handle all flows. All costs for by-pass pumping required during installation of the pipe shall be incidental to the pipe reconstruction item.
 - b. The Contractor shall be responsible for maintaining sanitary sewer service to each facility connected to the section of sewer during the execution of the work.
 - c. If sewage backup occurs and enters buildings, the Contractor shall be responsible for cleanup, repair, and property damage cost and claims.

L. TELEVISION INSPECTION

Television inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed circuit television. Television inspection shall include the following:

1. Videotapes (post) to be submitted to the City, as required.
2. Videotapes to remain property of the City; the Contractor to retain a second copy for his use.
3. Should any portion of the inspection tapes be of inadequate quality or coverage, as determined by the City, the Contractor will have the portion re-inspected and videotaped at no additional expense to the City.

M. CONSTRUCTION METHOD

1. Pneumatic:
 - a. The pipe bursting installation shall be done as one continuous operation. The pneumatic tool operation will be simultaneously complimented by operation of the winch. As the bursting tool moves through the existing sewer lateral, the winch shall provide constant tension to the tool, keeping it in line with the pipe being replaced.
 - b. The Contractor shall install all pulleys, rollers, bumpers, alignment control devices, and other equipment required to protect existing manholes, and to protect the pipe from damage during installation. Under no

circumstances will the pipe be stressed beyond its elastic limit. Winch line is to be centered in pipe to be burst with adjustable boom or other device.

- c. 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. Restraint of pipe ends shall be achieved by means of Central Plastics Electrofusion couplings. The electrofusion couplings shall be slipped over pipe ends against manhole wall and fused in place. Installation of electrofusion couplings shall be done in accordance with the manufacturers recommended procedures.
 - d. Following the relaxation period, the annular space may be sealed. Sealing shall be made with material approved by the Engineer 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.
 - e. The terminating pipe ends in manholes shall be connected by Central Plastics Electrofusion couplings, or other approved method, to eliminate ground water infiltration. Installations of electrofusion couplings or other products shall be done in accordance with the manufacturers recommended procedures.
 - f. Pit Placement Issues: Launching and receiving pits shall be placed at each end of the sewer lateral service to be replaced. Other excavations may be necessary to accommodate changes in direction of the lateral service or to expose other utilities that may be in close proximity to the pipe bursting operation.
2. Static:
 - a. Equipment used to perform the work shall be located away from buildings to minimize noise impact. Provide a silent engine compartment with the winch to reduce machine noise as required to meet local requirements.
 - b. The Contractor shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect existing manholes, and to protect the pipe from damage during installation. Lubrication may be used as recommended by the manufacturer. Under no circumstances will the pipe be stressed beyond its elastic limit. Winch line is to be centered in pipe to be burst with adjustable boom.

N. FIELD TESTING

After the existing sewer lateral is completely replaced, internally inspect with television camera and videotape as required.

Defects which may affect the integrity or strength of the pipe in the opinion of the Engineer shall be repaired or the pipe replaced at the Contractor's expense.

The laterals shall be subject to additional air/vacuum tests as required by the *Standard Construction Specifications*.

O. PIPE JOINING

1. The polyethylene pipe shall be assembled and joined at the site using the 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.

2. 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. 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 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 the 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 shall be discarded and not used.

3. Terminal sections of pipe that are joined within the insertion pit shall be connected with Central Plastics Electrofusion Couplings with tensile strength equivalent to that of the pipe being joined, or other approved connection methods.