



**SECTION 02955
SANITARY SEWER PIPE BURSTING WITH
HIGH-DENSITY POLYETHYLENE PIPE**

PART 1. GENERAL

1.01 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. American Society for Testing and Materials (ASTM):
 - a. D1248, Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
 - b. D2657, Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.
 - c. D3034, Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - d. D3035, Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter.
 - e. D3261, Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
 - f. D3350, Standard Specification for Polyethylene Plastic Pipe and Fittings Materials.
 - g. F585, Standard Practice for Insertion of Flexible Polyethylene Pipe into Existing Sewers.
 - h. F714, Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
 - 2. Plastic Pipe Institute (PPI).

1.02 DEFINITIONS

- A. CCTV: Closed-circuit television.
- B. DVD: Digital Video Disc.
- C. SDR: Standard Dimension Ratio.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Catalog cuts and specifications:
 - a. Pipe.
 - b. Electrofusion fittings.

- c. Joining equipment.
 2. Dimensioned drawings including, installation details and sketches.
- B. Informational Submittals:
1. Manufacturer's Certificates:
 - a. Certificate of material compliance.
 - b. CONTRACTOR Certifications:
 - 1) Certifications of training by pipe bursting system manufacturer stating that operators have been fully trained in the use of the pipe bursting equipment by an authorized representative of the equipment manufacturer.
 - 2) Certification from pipe manufacturer of training in the proper method for handling and installing the new pipe.
 - 3) Certifications of training by the pipe fusion equipment manufacturers that the operators have been fully trained in the use of the fusion equipment by an authorized representative of the equipment manufacturer.
 2. Test Results: Certified factory.
 3. Installation Instructions:
 - a. Detailed construction procedures, and layout plans to include sequence of construction.
 - b. Locations, sizes and construction methods for the service reconnection pits.
 - c. Methods of construction, reconnection and restoration of existing service laterals.
 - d. Detailed descriptions of the methods of modifying existing manholes.
 - e. Detailed procedures for the installation and bedding of the new pipe in the launching and receiving pits.
 - f. Description of the method to remove and dispose of the host pipe, if required.
 4. Sewer Bypass Plan: Methods and list of equipment to be utilized, including:
 - a. Emergency response plan to be followed in event of bypass pumping system failure.
 - b. Backup bypass pump on construction site for the main sewer and sewer service laterals.
 5. Contingency Plan: Provide for the following potential conditions at a minimum:
 - a. Unforeseen obstruction causing burst stoppage, such as unanticipated change in host pipe material, repair section, concrete encasement or cradle(s), buried or abandoned manhole or changes in direction not depicted on Drawings provided by the OWNER.
 - b. Substantial surface heave occurs due to the depth of the existing pipe versus the amount of upsizing.
 - c. Damage to existing service connections or to the replacement pipeline's structural integrity.
 - d. Damage to other existing utilities.
 - e. Soil heaving or settlement.
 - f. Loss of and return to line and grade.
 6. DVD Documentation:



- a. Preinstallation DVD, original.
- b. Post-installation DVD, original.

1.04 QUALITY ASSURANCE

- A. The CONTRACTOR shall be certified by pipe bursting system manufacturer as a fully trained user of the pipe bursting system. Operation of the pipe bursting system shall performed by trained personnel. Such training shall be conducted by a qualified representative of the pipe bursting system manufacturer. The CONTRACTOR shall provide certificates of training for any employee directly involved in the supervision or operation of the pipe bursting system.
- B. Polyethylene pipe jointing shall be performed by personnel trained in the use of butt-fusion equipment and the 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 polyethylene pipe. Such training shall be certified and conducted by a qualified representative of the pipe manufacturer.
- C. Installation of other materials shall be performed by personnel qualified by the specific product manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping:
 - 1. Markings: Pipe materials shall be legibly marked by manufacturer with the following:
 - a. Name and trademark of manufacturer.
 - b. Nominal pipe size.
 - c. SDR.
 - d. Letters PE, followed by polyethylene grade per ASTM D1248, followed by Hydrostatic Design Basis in hundreds of psi.
 - e. Manufacturing standard reference.
 - f. Production code from which date and place of manufacture can be determined.
- B. Acceptance at Site:
 - 1. After unloading and before installation, inspect pipe to verify its condition. Pipe condition inspection report shall be reviewed by OWNER prior to installation.
 - 2. Unload and store pipe to ensure that pipe is not cut, gouged, scored, or otherwise damaged. Pipe segments with pipe wall cuts exceeding 10 percent of wall thickness shall be removed from Site.
- C. Storage and Protection:



1. HDPE pipe without ultraviolet inhibitor shall not be stored unprotected against outside elements.
 2. Store pipe so as not to be deformed axially or circumferentially.
- D. Handling: Use wide band slings for lifting and moving pipe. Use of chains is prohibited.

1.06 SITE CONDITIONS

- A. Provide adequately designed pipe bursting equipment to accomplish replacement of existing pipe under adverse conditions.
- B. Determine location of receiving and insertion pit excavations needed due to existing manholes that are not designated to be replaced.

1.07 SEQUENCING AND SCHEDULING

- A. Upon completion of pipe insertion and installation, expedite reconnection of lateral service connections so as to minimize inconvenience to customers.

PART 2. PRODUCTS

2.01 MATERIALS

- A. Pipe:
 1. Materials:
 - a. High molecular weight, solid wall, high-density polyethylene pipe, in accordance with ASTM F714.
 - b. Virgin grade material.
 - c. Plastic Pipe Institute (PPI) designation of PE 3408.
 - d. Minimum cell classification of 345434C, D, or E as described in ASTM D3350.
 - e. Meet requirements for Type III, Class B or C, Category 5, Grade P34 material as described in ASTM D1248.
 - f. Shall contain no recycled compound except that generated in manufacturer's own plant from resin of same specification from same raw material.
 - g. Pipe (excluding black colored pipe) stored outside shall not be recycled.
 - h. Pipe shall be manufactured by the following:
 1. Performance Pipe.
 2. Rinker Polypipe.
 3. Uponor North America.
 4. ARNCO.

2. Color:
 - a. Inside: Inner wall shall be light color interior (soft gray or white).
 - b. Outside: Outer wall black with co-extruded green cover or extruded green stripes designating use for sanitary sewer. Pipe with extruded green stripes shall have a minimum of three equally space stripes. Pipe shall have a heat indented print line containing the information required in ASTM D3035. Color print lines are not an acceptable method for designation of sewer mains.
 3. SDR:
 - a. Nominal Size: 8 inches and larger with DIP outside diameters.
 - b. SDR: Minimum 17.
- B. Fittings shall be HDPE butt fusion welded fittings in accordance with ASTM D3261 as modified for the specified material.
- C. Joints:
1. Pipe jointing shall be by butt fusion welding, as specified in Paragraph Pipe Joining.
 2. Electrofusion Couplings:
 - a. May be used for repairs or connecting pipe burst segments in the trench with approval of the OWNER.
 - b. Manufacturers:
 - 1) Central Plastics Company; Central Electrofusion System.
 - 2) IPEX, Inc; Friatec.
- D. Service Connections:
1. Service saddles shall be butt fusion or electrofusion saddle type fitting with DIP outside dimension branch connection:
 - a. Specifically designed for connection to type of HDPE being installed.
 - b. Manufacturers:
 - 1) Central Plastics Company; Central Electrofusion System.
 - 2) IPEX Inc.; Friatec.
 2. Option: For HDPE pipe sizes greater than 10 inches an Inserta Tee by Inserta Fittings Company may be used.
- E. Equipment:
1. Pipe Bursting: Provide equipment of sufficient size and power to accomplish the specified pipe replacement under adverse conditions. Utilize hydraulically powered constant tension static pull pipe bursting system or pneumatic hammer.
 2. Joining: Capable of meeting conditions recommended by pipe manufacturer, including, but not limited to, fusion temperature, alignment, and fusion pressure.

2.02 SOURCE QUALITY CONTROL

- A. Certify laboratory data confirming that said tests have been performed on sample of pipe to be provided under this Contract, or pipe from that production run, and that satisfactory results were obtained prior to shipping.



- B. Pipe shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, or other injurious defects. It shall be uniform in density and other physical properties. Pipe not meeting these criteria shall be rejected.

PART 3. EXECUTION

3.01 PREPARATION

- A. Work shall be supervised by personnel experienced in installation of similar pipe and shall be onsite at all times from time of commencement to time of completion.
- B. Existing pipe shall be clean and free of obstructions so as not to prohibit pipe bursting operations.
 - 1. The CONTRACTOR shall perform a pre-installation CCTV inspection.
 - 2. If the pre-installation CCTV inspection reveals obstructions in the existing sewer (heavy solids, dropped joints, protruding service taps or collapsed pipe) which will prevent completion of the pipe bursting process, and that cannot be removed by conventional sewer cleaning equipment, then a point repair shall be made by the CONTRACTOR, with the approval of the OWNER.
- C. CCTV inspections shall be completed in accordance with Section 02541, Sewer Television Inspection.

3.02 LOCATING UTILITIES

- A. The CONTRACTOR shall, prior to starting work, verify the location of all adjacent utilities. The minimum clearance from other utilities shall be approximately two feet. The OWNER may at its discretion reduce the minimum clearance with justification from the CONTRACTOR.
- B. The CONTRACTOR shall expose all interfering and crossing utilities by spot excavating at the planar intersection of the pipe and removing the soil from around the utility. The cost of exposing these utilities shall be borne by the CONTRACTOR as part of the pipe bursting operation.
- C. Locate existing utilities in accordance with Section 01725, Underground Utility Damage Act, Protection of Utilities.

3.03 SUB-SURFACE CONDITIONS

- A. OWNER will furnish the CONTRACTOR with available information listed in the Contract Documents, if any are available. The CONTRACTOR shall verify this

information in the field. All additional subsurface investigations deemed necessary by the CONTRACTOR to complete the work shall be included in the Contract at no additional cost to OWNER.

- B. Copies of all reports and information obtained by additional subsurface investigations by the CONTRACTOR shall be provided to the OWNER.
- C. The minimum depth of cover over the installed pipe shall be 4 feet for size on size pipe bursting, and shall be 8 feet for increased pipe size pipe bursting. The CONTRACTOR may request approval of the OWNER reduce the minimum depth of cover.
- D. A minimum amount of ground heaving may be allowed, as determined by the OWNER, if soil conditions are not favorable and up-sizing of the pipe is required.
- E. Unless otherwise noted, settlement or heaving of the ground surface during or after construction will not be allowed. The CONTRACTOR is solely responsible for the costs for repairing any surface heaving, unless specified otherwise.

3.04 LOCATING SERVICE CONNECTIONS

- A. Sewer service connections shall be identified and located by CCTV prior to start of pipe bursting operation and pipe insertion.
- B. The CONTRACTOR shall locate all and expose all sewer service connections prior to pipe insertion to expedite reconnection.
- C. The CONTRACTOR shall exercise due diligence in excavating the existing pipe sufficiently to allow for uniform circumferential expansion of the existing pipe through the service connection pit. Upon commencement of the bursting process, pipe insertion shall be continuous and without interruption from one entry point to another, except as approved by the OWNER.
- D. Upon completion of insertion of the new pipe, the CONTRACTOR shall conduct the reconnection of services to minimize any inconvenience to the customers.

3.05 PIPE JOINING

- A. The HDPE 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.

- B. All equipment and procedures used in shall be in strict compliance with ASTM D2657 and with the pipe manufacturer's recommendations.
- C. Fusion shall be preformed by technicians certified by a manufacturer of pipe fusion equipment.
- D. Prior to pipe installation, two trial fusion welds shall be performed, and reviewed and approved by the OWNER. Full penetration welds shall provide homogeneous material across the cross section of weld. Fusion machine employed for trial welds shall be same machine utilized for project installation.
- E. The butt-fused joint shall be true alignment and shall have uniform rollback beads resulting from the use of proper temperature and pressure. The joint shall be allowed adequate cooling time before removal of pressure.
- F. The fused joint shall be watertight and shall have tensile strength equal to or greater than that of the pipe.
- G. All joints shall be subject to acceptance by the OWNER prior to insertion.
- H. The CONTRACTOR shall cut out and replace defective joints at no additional cost to OWNER.
- I. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than 10 percent of the wall thickness (ASTM F585), shall not be used and shall 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.
- J. 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 OWNER shall be discarded and not used.
- K. Terminal sections of pipe that are joined within the insertion pit shall be connected with an electrofusion coupling (e.g., Central Plastics couplings).
- L. All connections shall be in conformance with the manufacturer's installation procedures.

3.06 BYPASSING OF FLOWS

- A. When blocking flow in upstream sewers is not appropriate, use flow bypass pumping for reducing flow below the maximum depth or for completely bypassing flow.

- B. Bypassing of flows shall be provided in accordance with Section 02542, Sewer Flow Control.

3.07 PIPE INSTALLATION

- A. Pipe insertion shall be continuous and without interruption from one manhole to another, except as approved by OWNER.
- B. Advancement of bursting head with “chain” shall be prohibited.
- C. Void created by bursting device shall be sufficient in size to accommodate HDPE pipe.
- D. Rescue Shafts:
 1. In the event that the pipe-bursting machine encounters an obstruction and is halted, the CONTRACTOR will be required to excavate down to the machine to free the obstruction and continue the installation.
 2. The CONTRACTOR is notified that the construction of such shafts will be considered incidental to the installation by the pipe bursting construction method.
 3. Any rescue shafts will be properly braced, shored, or utilize trench boxes to meet applicable Federal, State, and local requirements.
 4. Backfill and compaction for such rescue shafts shall be in accordance with Section 02321, Excavation, Bedding, and Backfill for Utilities.

3.08 LUBRICATION

- A. Lubrication shall be used if in the opinion of CONTRACTOR such lubrication is necessary to ensure the successful completion of the job.
- B. The CONTRACTOR shall make arrangements for the injection of bentonite into the annular space behind the pipe bursting head, as the lubricant if required.

3.09 SERVICE RECONNECTION

- A. The installed pipe shall be allowed the manufacturer’s recommended amount of time but not less than 4 hours, for cooling and relaxation due to tensile stressing prior to any reconnection of service lines.
- B. Prior to reconnecting sewer services, installed pipe shall have been successfully tested.
- C. The CONTRACTOR, after a suitable relaxation period and testing shall reconnect all service connections as approved by the OWNER.



- D. Sewer service connections shall be connected to new pipe and installed in a hole drilled to the full inside diameter of the outlet. Service connections shall be an Inserta-T or an electrofusion saddles per the requirements above.
- E. The slope of the existing lateral toward the newly installed sewer main shall be maintained at the existing slope. For reconstructed laterals, a minimum pipe slope of 1 percent is required.

3.10 RESTORATION

A. Restoration of Manholes:

- 1. The CONTRACTOR shall restore all manholes and associated surface areas to their original condition.
- 2. Prior to restoring manholes the installed pipe shall be allowed the manufacturer's recommended amount of time, but not less than 4 hours, for cooling and relaxation due to tensile stressing prior to the sealing of the annulus or backfilling of the insertion pit.
- 3. Sufficient excess length of new pipe, but not less than 2 inches to 4 inches, shall be allowed to protrude into the manhole. Connections to manholes shall be per Section 02530, Manholes.

B. Restoration of Pits:

- 1. The CONTRACTOR shall restore all lateral, launching pits and associated surface areas to their original condition.
- 2. Prior to backfilling lateral and launching pits the CONTRACTOR shall ensure that the new pipe is properly supported and on the required grade.
- 3. Backfill per Section 02321, Excavation, Bedding, and Backfill for Utilities shall be used for the new pipe as support in order to avoid sagging after backfill and compaction.

3.11 POST INSTALLATION CCTV INSPECTIONS

- A. The CONTRACTOR shall perform post-installation CCTV inspections in accordance with Section 02541, Sewer Television Inspection.
 - 1. Post construction video tapes shall be submitted to the OWNER on DVD's in Subcam software format for review prior to final payment. Should any portion of the inspection video be of inadequate quality or coverage, as determined by the OWNER, the CONTRACTOR will have that portion re-video taped at no additional expense to the OWNER.
 - 2. All original DVD's remain property of the OWNER. The CONTRACTOR may retain a second copy, if desired.



- B. From the CCTV inspection, the newly installed pipe shall be visibly free of defects, which may affect the integrity or strength of the pipe. If in the opinion of the OWNER such defects exist, the pipe shall be repaired or replaced at the CONTRACTOR's expense.
- C. If the CCTV inspection reveals a sag in the new sewer after pipe bursting has been completed, the CONTRACTOR shall notify the OWNER to determine if a point repair is necessary to correct the sag. At the direction of the OWNER, the CONTRACTOR shall take the necessary measures to eliminate these sags by performing a point repair and bringing the bottom of the newly installed pipe to a uniform grade by excavating the pipe, lifting it, and placing compacted crushed stone bedding under and around the pipe to eliminate the sag.

3.12 TESTING OF GRAVITY SEWERS

- A. Testing of gravity sewers shall be in accordance with Section 02532, Sanitary Sewers (Gravity).

3.13 FIELD QUALITY CONTROL

- A. Low pressure air testing from manhole to manhole section of sanitary sewer shall be performed after the pipe has been bursted and prior to service lines being connected. Air testing shall be in accordance with ASTM F1417.

3.14 FINAL CLEANING

- A. Prior to inspection and acceptance of pipe by OWNER, flush and clean system to remove accumulated construction debris, rocks, gravel, sand, silt, and other foreign material.

END OF SECTION