

ITEM VII – PIPE BURSTING

7.01 Scope

- (a) This Specification consists of the method and process for furnishing all labor, materials, tools, equipment and incidental work necessary to provide complete rehabilitation of existing sanitary sewers by pipe bursting. Pipe bursting is a system by which a bursting unit splits the existing pipe while simultaneously installing a new high density polyethylene (HDPE) pipe of the same size or larger size pipe where the old pipe existed. This process is followed by reconnection of existing sewer service house connections, television inspection of the polyethylene pipe and completion of the installation in accordance with the Contract Documents.

7.02 Qualifications

- (a) The CONTRACTOR or subcontractor performing the pipe bursting work shall be certified by the particular pre-qualified Pipe Bursting System Manufacturer that such a company is a fully trained user of the pipe bursting system.
- (b) Should it become evident to the DISTRICT that the CONTRACTOR does not have a certified technician on the job site and in responsible supervision of the work, the DISTRICT reserves the right to stop any and all construction on this project until such time a certified technician is on the job site and is in responsible supervision of the work. Further, the DISTRICT reserves the right to request a copy of any certification or letter from the manufacturer at any point and to terminate further construction until such information is provided.
- (c) Polyethylene 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 polyethylene pipe. Training shall be performed by a qualified manufacturer's representative.
- (d) The CONTRACTOR shall hold the DISTRICT harmless from any and all claims for damages that may result from this construction as the result of the CONTRACTOR's negligence or failure to comply with the requirements of the Specifications and Special Provisions. Further, the CONTRACTOR shall hold the DISTRICT harmless from any other legal action resulting from patent infringements. The CONTRACTOR shall include in his unit price bid per linear foot of the appropriate size and thickness HDPE pipe, any cost that may be incurred for patent or royalty rights and payments.

7.03 Submittals at Time of Bid

- (a) The Bidder shall submit with his bid the following information:

- (1) Proof that his company, or the subcontractor performing the work, has been in the pipe bursting business for not less than 5 years prior to the date of receipt of bids.
- (2) Proof that his company, or the subcontractor performing the work, has installed not less than 50,000 L.F. of pipe using the pipe bursting method(s) he is proposing to use on these projects.
- (3) Proof that his company is properly licensed to perform construction work within the State of North Carolina.
- (4) Proof that his company and the person in responsible charge of the Work to be performed on these projects is certified by the manufacturer as a qualified installer of HDPE pipe by the pipe bursting method and that the installation crew has been trained in the installation of HDPE by the pipe bursting methods proposed to be used by the Bidder.

7.04 Submittals Prior to Beginning Work

- (a) The CONTRACTOR shall submit at least three (3) copies of shop drawings to the ENGINEER for approval. The shop drawings shall include the items listed below:
 - (1) Catalog data, and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings; Manufacturer's recommendations for handling, storage, and repair of pipe and fittings damaged during work.
 - (2) Method of construction and restoration of existing sewer service connections. This shall include:

Detail drawings and written descriptions of the entire construction procedure to install pipe, bypass sewage flow, and reconnection of sewer service connections.
 - (3) Certification of workman trained for installing pipe.
 - (4) The DISTRICT has digital CCTV information of some of the lines to be replaced under this project. This information will be provided, upon request, to the CONTRACTOR prior to bidding or prior to construction; however, the DISTRICT does not warrant to the CONTRACTOR that this information represents the current conditions existing in the pipe. The CONTRACTOR shall make additional inspections and videos of the pipeline to be pipe bursted prior to beginning construction. A copy of such videos shall be delivered to ENGINEER for review. Upon completion of the project the CONTRACTOR shall make post construction videos and inspection reports of the in place system. Should

the post-construction videos and inspections reveal that the materials or workmanship do not meet the requirements of these specifications, the CONTRACTOR shall make any and all repairs and/or corrections necessary to bring the system into compliance with these Specifications. Upon completion of all work, including any repairs and/or corrections, the CONTRACTOR shall make final videos of the lines as set forth in these Specifications and shall deliver a copy to DISTRICT for its files and records.

7.05 Delivery, Storage, and Handling

- (a) Transportation, handling, and storage of pipe and fittings shall be as recommended by manufacturer.
- (b) If new pipe and/or fittings become damaged before or during installation, they shall be repaired as recommended by the manufacturer or replaced as required by the ENGINEER at the CONTRACTOR's expense.
- (c) The CONTRACTOR shall store and handle all pipe and materials delivered to the job site as per the manufacturer's recommended practices and procedures so as to prevent damage to the pipe and materials. The CONTRACTOR shall be responsible to secure adequate material and equipment storage areas at each job site. The CONTRACTOR shall be responsible for securing any and all permits and/or approvals as may be required for any materials and/or equipment stored or temporarily parked upon public rights of way.

7.06 Site Conditions

- (a) The CONTRACTOR shall satisfy himself of the condition of the sewer sections or pipeline to be pipe bursted. Prior to ordering materials, the CONTRACTOR shall be responsible for verifying the size and condition of the existing sewer and his ability to burst the line, by CCTV inspection. CONTRACTOR shall not receive compensation for excavations to remove obstructions due to existing conditions of which he could have informed himself by due diligence.
- (b) Prior to entering access areas such as manholes or inspection hatches and performing inspection or cleaning operations, an evaluation of the atmosphere to determine the presence of toxic, flammable vapors or lack of oxygen shall be performed by the CONTRACTOR in accordance with local, state and federal OSHA safety regulations.
- (c) Television Inspection
 - (1) All sewer sections and pressure pipelines, which are to be burst, are to be inspected by closed circuit television prior to bursting operations. All sewers or pipelines are to be cleaned as stated below prior to the television inspection.

- (2) The television inspection shall be performed in order to supply a visual and audio record of the location of obstructions in the sewer that would interfere with or prohibit bursting of the sewer, and also to provide the location of service laterals that are to be reconnected to the main line after pipe bursting. Final CCTV inspection shall not be performed until all connections have been completed, including connections at manholes.
- (3) DVD's and a written log shall be made for each line inspected. The quality of the CCTV information shall be such that obstructions and service lateral locations are clearly identified and can be located. The CONTRACTOR shall make the information available to the ENGINEER for review. The CCTV information shall be turned over to the ENGINEER at the completion of the work.
- (4) If there is an obstruction in the sewer line that will not allow the television camera to pass, then the camera shall be backed out of the line and an attempt shall be made to televise the line from the manhole at the other end. If the entire length of the sewer line cannot be televised because of two or more obstructions, then the ENGINEER shall be notified and a determination of how to proceed shall be made by the ENGINEER.
- (5) The cost of the television inspection and CCTV information shall be included in the unit cost of the pipe bursting.
- (6) DISTRICT intends to perform an additional video inspection of the lines prior to the expiration of the one (1) year warranty.

7.07 Warranty

- (a) The CONTRACTOR shall warrant all materials to be free from defects in workmanship and materials for a period of one (1) year after final acceptance.

7.08 Materials

- (a) Polyethylene Plastic Pipe shall be high density polyethylene pipe and meet the applicable requirements of ASTM F 714-05 Polyethylene (PE) Plastic Pipe SDR-PR) Based on Outside Diameter, ASTM D 2321-05, ASTM D 2774-04, ASTM F 585-94, ASTM F 2620 and ASTM D 3261/1248, ASTM D3550.
- (b) All pipe shall be made of virgin material and shall be obtained from the manufacturer's own production of the same formulation.
- (c) The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

- (d) Dimension Ratios: The wall thickness of the polyethylene pipe shall be as shown on the Project Plans.

7.09 Tests

- (a) All materials used on this project shall meet or exceed the requirements as set forth in these Specifications and as in the appropriate ASTM Specification. Materials failing to meet any of the above referenced standards shall be removed from the job site and new materials meeting the Specification shall be provided at the CONTRACTOR's expense. The manufacturer, upon request by ENGINEER, shall provide a certificate of compliance to ASTM Specification.

7.10 Equipment

- (a) The pipe-bursting tool shall be designed and manufactured to force its way or be drawn through existing pipe materials while fragmenting or splitting the pipe and compressing the old pipe sections into the surrounding soil as it progresses. It may be a static or pneumatic type, and shall generate sufficient force to burst and displace the existing pipeline. The manufacturer's specifications shall be followed to determine what size tool should be used for the specified diameter of pipe, as well as parameters for tool size for percentage of upsize allowed.
- (b) The pipe bursting tool shall be pulled through the sewer by a winch. 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.
- (c) The pipe bursting tool may be static or pneumatic. The bursting action of the tool shall not only break the pipe but also create a void into which the pipe can be winched. The HDPE pipe, directly attached to the sleeve on the rear of the burster, shall also move forward.
- (d) For pneumatic bursting, the burster shall have its own forward momentum powered by an internal pneumatic device, while being generally guided by winching. A winch shall guide the burster forward through the existing pipe. To form a complete operating system, the burster must be matched to a constant tension winching system.

7.11 Sewer Service Connections

- (a) All sewer service connections shall be identified and located by the CONTRACTOR prior to the pipe bursting. The bursting process shall be continuous and without interruption from one manhole to another, except as approved by the ENGINEER. After bursting and subsequent "resting" period referred to in section 7.13 (a) (3), the CONTRACTOR shall expedite the reconnection of services so as to minimize any inconvenience to the customers or sewer backups.

- (b) In general, house sewers shall be constructed from the main sewer to a point located at the public right-of-way or at the edge of the sewer easement.
- (c) Cleanouts shall consist of the following: service (cleanout) wye, vertical section of pipe and fittings, hub and cap, cast iron box, and reconnection of existing service or plug (whichever is applicable).
- (d) Sewer service connections may be connected to the new pipe by the following methods.
 - (1) Electrofusion saddles installed in accordance with the manufacturer's recommended procedures.
 - (2) Conventional Fusion saddles as manufactured by Central Plastics, Phillips Driscopipe, or Plexco installed in accordance with the manufacturer's recommended procedures.
 - (3) A compression-fit service connection. The compression fitting shall be manufactured by Inserta Fittings Company, or approved equal. The service connection shall be specifically designed for connection to the sewer main being installed. Install using procedures and equipment as referenced in manufacturer's written installation instructions. Metal hardware shall be stainless steel.

7.12 Preparation

- (a) Bypassing Sewage
 - (1) By-pass Pumping: The CONTRACTOR shall provide pumping 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 bursting item, Bypass pumping shall be in accordance with Section 2.19 of the Technical Specifications.
 - (2) The CONTRACTOR shall make every effort to maintain sewer service usage throughout the duration of the project. In the event that a service will be interrupted, the maximum amount of time shall be 8 hours. The CONTRACTOR shall be required to notify DISTRICT and all affected properties whose service laterals will be out of commission and to advise against water usage until the sewer main is back in service. Such notifications shall be provided at least one week prior to service disconnection.
 - (3) If sewage backup occurs and enters buildings, the CONTRACTOR shall be responsible for clean-up, repair, property damage cost and claims.

(b) Cleaning and Television Inspection

Television inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles and service connections by closed circuit color television (CCTV).

Provide CD(s) or DVD(s) containing MPEG files for post CCTV inspections. The CD(s) or DVD(s) may be filled to capacity with as many MPEG files that will fit them. Each MPEG file shall be formatted and labeled with corresponding manhole numbers of the line segment inspected. For example, a file containing CCTV information inspected from manhole 28000 to manhole 28001 would be labeled "28000-28001.MPEG". Any current MPEG format is acceptable (MPEG 1, 2, 3 or 4). CCTV information shall include voice description as appropriate, with stationing of services indicated, and shall begin at Station 0.0 ft.

CCTV inspection shall include the following:

- (1) Two (2) copies of DVD's (pre-construction and post-construction) to be submitted to the DISTRICT before final invoice.
- (2) DVD's shall remain property of the DISTRICT; CONTRACTOR to retain additional copies for his use.
- (3) All flows are to be completely by-passed during inspection, if necessary or required by the DISTRICT.
- (4) Pre-construction cleaning and CCTV inspection must be complete prior to pipe bursting operations to determine locations of service connections. Data and stationing shall be digitally shown on the video. Pipe defects shall be rated per the MSD Standard Defect Rating Manual.
- (5) Should any portion of the inspection videos be of inadequate quality, including station formatting/labeling, the CONTRACTOR will have the portion re-inspected at no additional expense to the DISTRICT.

7.13 Installation

(a) Construction Method

- (1) Equipment used to perform the work shall be located away from buildings so as not to create adverse noise impacts. The winch shall have a silenced engine compartment to reduce machine noise as required to meet local requirements.
- (2) The CONTRACTOR shall install all pulleys, rollers, bumpers, alignment control devices and other equipment required to protect existing manholes,

and to 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. The winch line is to be centered in pipe to be burst with adjustable boom.

- (3) Immediately after installation, the installed pipe shall “rest” for cooling and relaxation of induced tensile stresses, in accordance with the manufacturer’s recommended amount of time. In no case shall this time be less than 4 hours, before any reconnection of service lines, sealing of the annulus or backfilling of the insertion pit. Following the relaxation period, sufficient excess length of new pipe, but not less than 4 inches, shall be provided for a collar inside the manhole.
- (4) Following the relaxation period, the annular space shall be sealed. Sealing shall be made with material approved by the ENGINEER and shall extend through the full thickness of the manhole wall, to form a watertight joint.

Connections to new precast manholes shall be made in accordance with Section VI, Item 2.11 (e) of the Technical Specifications, or as approved by the ENGINEER.

- (5) Insertion or retrieval pits shall be built in accordance with OSHA regulations. Underground utility locates shall be performed prior to the excavation of pits.

(b) Field Testing

- (1) Gravity sewers rehabilitated by pipe bursting shall be leak tested according to Section VI, Item 2 of the Technical Specifications.
- (2) After all construction is complete, the CONTRACTOR shall internally inspect the new line with CCTV equipment. The finished video shall be continuous over the entire length of the sewer between two manholes. CCTV videos shall be in accordance with 7.12 (b) above.
- (3) Defects which may affect the integrity or strength of the pipe, in the opinion of the ENGINEER, shall be repaired or the pipe shall be replaced at the CONTRACTOR’s expense. All service line connections noted as leaking shall be repaired or replaced at the CONTRACTOR’S expense.

(c) Pipe Joining

- (1) The polyethylene pipe shall be heat fused at the site using the butt-fusion method to provide a leak proof joint. Threaded or solvent-cement joints and connections are not permitted.
- (2) 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 the manufacturer of the polyethylene pipe and/or fusing equipment.

- (3) The butt-fused joint shall be true in alignment and 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 are subject to acceptance by the ENGINEER prior to insertion.
- (4) All defective joints shall be cut out and replaced at no cost to the DISTRICT. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater than 10% of the wall thickness, shall not be used and must be removed from the site. 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 and/or his representative shall be discarded and not used.
- (5) Terminal sections of pipe that are joined within the insertion pit shall be connected with Electrofusion Couplings or connectors with tensile strength equivalent to that of the pipe being joined.