CHAPTER 16.4
PIPE BURSTING

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PART 1 - GENERAL

1.1 SCOPE

A. The work under this Section includes the pipe bursting of existing sewers throughout the service area.

B. This Section covers pipe bursting of 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, reconnecting existing sewer service house connections and performing television inspection of the HDPE pipe.

C. All ancillary work shall be constructed properly in accordance with the Drawings and Specifications. All defects shall be remedied to the Engineer's satisfaction prior to approval.

1.2 RELATED DOCUMENTS

A. Charlotte Water Water and Sewer Design and Construction Standards and Standard Details.

1.3 DEFINITIONS AND ABBREVIATIONS

A. See Sections iii and iv of the Charlotte Water Water and Sewer Design and Construction Standards for common abbreviations and definitions.

1.4 REFERENCE SPECIFICATION, CODES, AND STANDARDS

A. Contractor shall ensure that the products and work comply with the reference specifications and all requirements of Charlotte Water's Water and Sewer Design and Construction Standards (latest version).

B. Contractor shall ensure that the products and work comply with the current version of the applicable American Society for Testing and Materials (ASTM) standards.

1.5 QUALIFICATIONS

A. Contractor shall be fully experienced in installing HDPE pipe via pipe bursting methods. The pipe bursting equipment shall be the Grundocrack System as manufactured by T.T. Technologies, Inc.; the InneReam Pipeline Replacement System by Nowak Pipe Reaming, Inc.; or approved equal. Contractor shall have a minimum of 25,000 linear feet of documented pipe bursting experience.

B. Contractor performing the work shall be fully qualified, experienced and equipped to complete this work expeditiously and in a satisfactory manner and shall be an approved installer as certified and licensed by the product manufacturer.

1.6 SUBMITTALS

A. Submit complete shop drawings and manufacturer's technical data showing complete information on material composition, physical properties, and dimensions of new pipe and fittings. Include manufacturer's recommendations for handling, storage, and repair of pipe and fittings damaged.

B. Submit method of construction and restoration of existing sewer service connections. This shall include detail drawings and written descriptions of the entire construction procedure to bypass sewage flow, install pipe, and reconnect sewer service connections.

C. Submit certification of workmen training for installing pipe by pipe manufacturer.

D. Submit a plan for bypassing sewage around the work area and facilities where sewage flows must be interrupted to complete the work. The plan shall be reviewed by Engineer and shall be acknowledged as acceptable before any work is started. The bypass pumping plan, and requirements for bypass pumping, shall be in accordance with Chapters 11 and/or 17 of Charlotte Water's Water and Sewer Design and Construction Standards.

1.7 DELIVERY, STORAGE, AND SHIPPING

A. 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 by the manufacturer or replaced at the Contractor's expense, before proceeding further.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Replacement pipe installed by pipe bursting shall be HDPE pipe. The pipe shall be manufactured from a high density, high molecular weight polyethylene resin which conforms to ASTM D1248 and meets the requirements for Type III, Class A, Grade P34, Category 5 and has a Plastic Pipe Institute (PPI) rating of PE 3408 when compounded. The pipe produced shall have a minimum cell classification of 345434C under ASTM D3350.

B. The HDPE pipe installed shall be minimum SDR 17 and sized according to the Ductile Iron Pipe Standard (DIPS). The HDPE pipe shall be capable of supporting the full-bearing load. Contractor shall submit thickness calculations during the project's submittal phase before installation. Sections of HDPE pipe shall be butt-fused in accordance with the HDPE pipe manufacturer's specifications.

C. Service saddles shall be Romac CB Saddle as manufactured by Romac Industries, Inc., Electrofuse Saddle as manufactured by GF Central Plastics, or approved equal.

D. Pipe end restraint shall be Central Plastics Electrofusion Flex Restraint Couplings or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

A. Contractor shall perform the pipe bursting in strict accordance with the equipment and HDPE manufacturers' specifications and recommendations. Contractor shall locate all utilities in the area prior to performing the pipe bursting and shall be responsible for all restoration and damage caused by the installation, including upheaval of the ground and damage to adjacent utilities.

B. For main sewer replacement, Contractor shall disconnect existing service laterals from the main sewer prior to pipe bursting to prevent excessive damage to the lateral. After the bursting is complete, Contractor shall connect all active service laterals to the HDPE pipe. All laterals to be replaced shall be a minimum of five (5) feet in length from the sewer main. Refer to the Standard Details of Charlotte Water's Water and Sewer Design and Construction Standards (latest version) for additional requirements.

C. The new HDPE pipe shall be connected to the existing manholes in accordance with the Standard Details of Charlotte Water's Water and Sewer Design and Construction Standards (latest version) for connecting HDPE pipes to manholes. The connection shall be leak-tight.

3.2 CONSTRUCTION METHOD

A. To the extent possible, equipment shall be provided with a sound attenuation enclosure. Sound blankets are required where necessary to meet noise requirements. Sound blankets shall be free standing and 12-ft high minimum. Sound blankets shall reduce sound by at least 10 dB at 125 Hz.

B. 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 shall the pipe be stressed beyond its elastic limit. Winch line shall be centered in pipe to be burst with adjustable boom.

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 at manholes, and 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. Restraint of pipe ends shall be required as shown on the Standard Details of Charlotte Water's Water and Sewer Design and Construction Standards (latest version). The electrofusion couplings shall be placed on the pipe ends against the manhole wall and fused in place. Installation of electrofusion couplings shall be done in accordance with the manufacturer's recommended procedures.

Completely seal the connection at the manhole per the Standard Detail to make a watertight connection.

3.3 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. 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 HDPE pipe and/ or fusing equipment.

B. The butt-fused joint shall be in 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 prior to insertion. All defective joints shall be cut out and replaced at no cost. Any section of the pipe with a gash, blister, abrasion, nick, scar or other deleterious fault greater in depth than ten percent 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 shall be discarded and not used.

3.4 TESTS

A. 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. HDPE pipe and fittings may be rejected in accordance with the requirements of this specification.

3.5 EQUIPMENT

A. The pipe bursting tool shall be designed and manufactured to force its way through existing pipe material 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. The bursting tool shall be selected in accordance with the manufacturer's recommendations to meet the project specific requirements for the type and size of pipe being burst and upsized if specified.

B. 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 tool shall be capable of being set into reverse, unlocked from the burst head, and backed out of the manhole through the new pipe to the entry point.

C. The action of the pipe bursting tool shall increase the external dimensions sufficiently, causing breakage of the pipe at the same time expanding the surrounding ground. This action shall not only break the pipe but also create the void into which the burster can be winched enabling forward progress. At the same time the HDPE pipe, directly attached to the bursting head, shall also move forward.

D. The burster shall provide its own forward momentum while being assisted by winching. A hydrostatic 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 hydrostatic winching system.

3.6 WINCH UNIT

A. 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 and grade.

B. The winch shall be hydrostatically operated and automatically provide a constant tension throughout the operation. The winch shall be of the constant tension type and shall be fitted with a direct reading load gauge to measure the winching load.

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

D. The winch cable and cable drum must be provided with safety cage and supports so that it may be operated safely without injury to persons or property.

E. Contractor shall provide a system of guide pulleys and bracing at each manhole to minimize cable contact with the existing sewer between manholes.

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

3.7 SEWER SERVICE CONNECTIONS

A. All sewer service connections shall be identified, located and disconnected from the main prior to the pipe insertion to prevent damage to the laterals and to expedite reconnection. Upon commencement, pipe insertion shall be continuous and without interruption from one manhole to another.

B. Connection of the new service lateral to the mainline shall be accomplished by means of a compression-fit service connection or an electrofuse saddle. The service connection shall be specifically designed for connection to the sewer main being installed. All laterals to be replaced shall be a minimum of five (5) feet in length from the sewer main. Install the saddles using procedures and equipment as referenced in manufacturer's written installation instructions.

3.8 ACCEPTANCE TESTS

A. The following acceptance tests shall be performed to verify proper installation of the new HDPE pipes. The Engineer and/or Engineer's representative shall witness all tests.

1. All new main sewers installed from manhole to manhole shall be tested via low pressure air testing in accordance with ASTM F1417-11A. The tests shall be performed from manhole to manhole and include any service laterals connecting to the main sewer. To perform the test, plugs shall be installed at each manhole and at cleanouts installed at the edge of the property line and road or sewer right-of-way, and the isolated sewers shall be tested as a system. Contractor shall provide all necessary equipment and pressure gauges to use for the testing. If new service laterals are not installed from the main sewer to the edge of the sewer or road R/W and/or a new cleanout is not installed, then the air test will not be required.

   The air test pressure shall be performed in accordance with ASTM F1417-11A and shall be increased by 0.5 psi for every foot of ground water above the crown of the sewer pipe. If the ground water level is 2 ft or more above the top of the pipe at the upstream end, or if the air pressure required for the test is greater than 9-psi gauge, this air testing practice should not be used. Before this air testing practice is used, the ground water level should be lowered by pumping or dewatering. If ground water levels cannot be determined in the field, then the test pressures shall be increased by a minimum of one (1) psi.

   Refer to ASTM F1417-11A for additional requirements.

2. All new main sewers and service laterals shall be inspected via closed circuit television (CCTV) inspection after all work is completed. Refer to Chapter 16, Sewer Cleaning and Television Inspection, of Charlotte Water's Water and Sewer Design and Construction Standards, for requirements.

B. Defects which may affect the integrity or strength of the pipe shall be repaired at the contractor's expense.

END OF SECTION

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