

**CHAPTER 16.4  
PIPE BURSTING**

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1 **PART 1 - GENERAL**

2  
3 **1.1 SCOPE**

- 4  
5 A. The work under this Section includes the pipe bursting of existing sewers  
6 throughout the service area.  
7  
8 B. This Section covers pipe bursting of existing pipe while simultaneously installing  
9 a new high-density polyethylene (HDPE) pipe of the same size or larger size pipe  
10 where the old pipe existed, reconnecting existing sewer service house  
11 connections and performing television inspection of the HDPE pipe.  
12  
13 C. All ancillary work shall be constructed properly in accordance with the  
14 Drawings and Specifications. All defects shall be remedied to the  
15 Engineer's satisfaction prior to approval.  
16

17 **1.2 RELATED DOCUMENTS**

- 18  
19 A. CHARLOTTE WATER Water and Sewer Design and Construction Standards and  
20 Standard Details.  
21

22 **1.3 DEFINITIONS AND ABBREVIATIONS**

- 23  
24 A. See Sections iii and iv of the CHARLOTTE WATER Water and Sewer Design  
25 and Construction Standards for common abbreviations and definitions.  
26

27 **1.4 REFERENCE SPECIFICATION, CODES, AND STANDARDS**

- 28  
29 A. Contractor shall ensure that the products and work comply with the reference  
30 specifications and all requirements of CHARLOTTE WATER's Water and Sewer  
31 Design and Construction Standards (latest version).  
32  
33 B. Contractor shall ensure that the products and work comply with the current  
34 version of the applicable American Society for Testing and Materials (ASTM)  
35 standards.  
36

37 **1.5 QUALIFICATIONS**

- 38  
39 A. Contractor shall be fully experienced in installing HDPE pipe via pipe bursting  
40 methods. The pipe bursting equipment shall be the Grundocrack System as  
41 manufactured by T.T. Technologies, Inc.; the InneReam Pipeline Replacement  
42 System by Nowak Pipe Reaming, Inc.; or approved equal. Contractor shall have  
43 a minimum of 25,000 linear feet of documented pipe bursting experience.  
44  
45 B. Contractor performing the work shall be fully qualified, experienced and equipped  
46 to complete this work expeditiously and in a satisfactory manner and shall be an  
47 approved installer as certified and licensed by the product manufacturer.  
48  
49  
50

1       **1.6    SUBMITTALS**  
2

- 3       A. Submit complete shop drawings and manufacturer’s technical data showing  
4       complete information on material composition, physical properties, and  
5       dimensions of new pipe and fittings. Include manufacturer’s recommendations  
6       for handling, storage, and repair of pipe and fittings damaged.  
7  
8       B. Submit method of construction and restoration of existing sewer service  
9       connections. This shall include detail drawings and written descriptions of the  
10       entire construction procedure to bypass sewage flow, install pipe, and reconnect  
11       sewer service connections.  
12  
13       C. Submit certification of workmen training for installing pipe by pipe manufacturer.  
14  
15       D. Submit a plan for bypassing sewage around the work area and facilities where  
16       sewage flows must be interrupted to complete the work. The plan shall be  
17       reviewed by Engineer and shall be acknowledged as acceptable before any work  
18       is started. The bypass pumping plan, and requirements for bypass pumping,  
19       shall be in accordance with Chapters 11 and/or 17 of CHARLOTTE WATER’s  
20       Water and Sewer Design and Construction Standards.  
21

22       **1.7    DELIVERY, STORAGE, AND SHIPPING**  
23

- 24       A. Transport, handle and store pipe and fittings as recommended by manufacturer.  
25       If new pipe and fittings become damaged before or during installation, it shall be  
26       repaired by the manufacturer or replaced at the Contractor’s expense, before  
27       proceeding further.  
28

29       **PART 2 - PRODUCTS**  
30

31       **2.1    MATERIALS**  
32

- 33       A. Replacement pipe installed by pipe bursting shall be HDPE pipe. The pipe shall  
34       be manufactured from a high density, high molecular weight polyethylene resin  
35       which conforms to ASTM D1248 and meets the requirements for Type III, Class  
36       A, Grade P34, Category 5 and has a Plastic Pipe Institute (PPI) rating of PE  
37       3408 when compounded. The pipe produced shall have a minimum cell  
38       classification of 345434C under ASTM D3350.  
39  
40       B. The HDPE pipe installed shall be minimum SDR 17 and sized according to the  
41       Ductile Iron Pipe Standard (DIPS). The HDPE pipe shall be capable of  
42       supporting the full-bearing load. Contractor shall submit thickness calculations  
43       during the project’s submittal phase before installation. Sections of HDPE pipe  
44       shall be butt-fused in accordance with the HDPE pipe manufacturer’s  
45       specifications.  
46  
47       C. Service saddles shall be Romac CB Saddle as manufactured by Romac  
48       Industries, Inc., Electrofuse Saddle as manufactured by GF Central Plastics, or  
49       approved equal.  
50

1 D. Pipe end restraint shall be Central Plastics Electrofusion Flex Restraint  
2 Couplings, or approved equal.  
3

## 4 **PART 3 - EXECUTION**

### 5 **3.1 GENERAL**

6  
7  
8 A. Contractor shall perform the pipe bursting in strict accordance with the equipment  
9 and HDPE manufacturers' specifications and recommendations. Contractor shall  
10 locate all utilities in the area prior to performing the pipe bursting and shall be  
11 responsible for all restoration and damage caused by the installation, including  
12 upheaval of the ground and damage to adjacent utilities.  
13

14 B. For main sewer replacement, Contractor shall disconnect existing service laterals  
15 from the main sewer prior to pipe bursting to prevent excessive damage to the  
16 lateral. After the bursting is complete, Contractor shall connect all active service  
17 laterals to the HDPE pipe. All laterals to be replaced shall be a minimum of five  
18 (5) feet in length from the sewer main. Refer to the Standard Details of  
19 CHARLOTTE WATER's Water and Sewer Design and Construction Standards  
20 (latest version) for additional requirements.  
21

22 C. The new HDPE pipe shall be connected to the existing manholes in accordance  
23 with the Standard Details of CHARLOTTE WATER's Water and Sewer Design  
24 and Construction Standards (latest version) for connecting HDPE pipes to  
25 manholes. The connection shall be leak-tight.  
26

### 27 **3.2 CONSTRUCTION METHOD**

28  
29 A. To the extent possible, equipment shall be provided with a sound attenuation  
30 enclosure. Sound blankets are required where necessary to meet noise  
31 requirements. Sound blankets shall be free standing and 12-ft high minimum.  
32 Sound blankets shall reduce sound by at least 10 dB at 125 Hz.  
33

34 B. Contractor shall install all pulleys, rollers, bumpers, alignment control devices  
35 and other equipment required to protect existing manholes, and to protect the  
36 pipe from damage during installation. Lubrication may be used as recommended  
37 by the manufacturer. Under no circumstances shall the pipe be stressed beyond  
38 its elastic limit. Winch line shall be centered in pipe to be burst with adjustable  
39 boom.  
40

41 C. The installed pipe shall be allowed the manufacturer's recommended amount of  
42 time, but not less than four (4) hours, for cooling and relaxation due to tensile  
43 stressing, prior to any reconnection of service lines, sealing at manholes, and  
44 backfilling of the insertion pit. Sufficient excess length of new pipe, but not less  
45 than four (4) inches, shall be allowed to protrude into the manhole. Restraint of  
46 pipe ends shall be required as shown on the Standard Details of CHARLOTTE  
47 WATER's Water and Sewer Design and Construction Standards (latest version).  
48 The electrofusion couplings shall be placed on the pipe ends against the  
49 manhole wall and fused in place. Installation of electrofusion couplings shall be  
50 done in accordance with the manufacturer's recommended procedures.

1 Completely seal the connection at the manhole per the Standard Detail to make  
2 a watertight connection.  
3

### 4 **3.3 PIPE JOINING**

- 5  
6 A. The HDPE pipe shall be assembled and joined at the site using the butt-fusion  
7 method to provide a leak proof joint. Threaded or solvent-cement joints and  
8 connections are not permitted. All equipment and procedures used shall be used  
9 in strict compliance with the manufacturer's recommendations. Fusing shall be  
10 accomplished by personnel certified as fusion technicians by a manufacturer of  
11 HDPE pipe and/ or fusing equipment.  
12  
13 B. The butt-fused joint shall be in true alignment and shall have uniform roll-back  
14 beads resulting from the use of proper temperature and pressure. The joint shall  
15 be allowed adequate cooling time before removal of pressure. The fused joint  
16 shall be watertight and shall have tensile strength equal to that of the pipe. All  
17 joints shall be subject to acceptance prior to insertion. All defective joints shall be  
18 cut out and replaced at no cost. Any section of the pipe with a gash, blister,  
19 abrasion, nick, scar or other deleterious fault greater in depth than ten percent of  
20 the wall thickness, shall not be used and must be removed from the site.  
21 However, a defective area of the pipe may be cut out and the joint fused in  
22 accordance with the procedures stated above. In addition, any section of pipe  
23 having other defects such as concentrated ridges, discoloration, excessive spot  
24 roughness, pitting, variable wall thickness or any other defect of manufacturing or  
25 handling shall be discarded and not used.  
26

### 27 **3.4 TESTS**

- 28  
29 A. Tests for compliance with this specification shall be made as specific herein and  
30 in accordance with the applicable ASTM specification. A certificate with this  
31 specification shall be furnished, upon request, by the manufacturer for all  
32 material furnished under this specification. HDPE pipe and fittings may be  
33 rejected in accordance with the requirements of this specification.  
34

### 35 **3.5 EQUIPMENT**

- 36  
37 A. The pipe bursting tool shall be designed and manufactured to force its way  
38 through existing pipe material by fragmenting the pipe and compressing the old  
39 pipe sections into the surrounding soil as it progresses. The bursting unit shall  
40 generate sufficient force to burst and compact the existing pipeline. The bursting  
41 tool shall be selected in accordance with the manufacturer's recommendations to  
42 meet the project specific requirements for the type and size of pipe being burst  
43 and upsized if specified.  
44  
45 B. The pipe bursting tool shall be pulled through the sewer by a winch located at the  
46 upstream manhole. The bursting unit shall pull the HDPE pipe with it as it moves  
47 forward. The tool shall be capable of being set into reverse, unlocked from the  
48 burst head, and backed out of the manhole through the new pipe to the entry  
49 point.  
50

- 1 C. The action of the pipe bursting tool shall increase the external dimensions  
2 sufficiently, causing breakage of the pipe at the same time expanding the  
3 surrounding ground. This action shall not only break the pipe but also create the  
4 void into which the burster can be winched enabling forward progress. At the  
5 same time the HDPE pipe, directly attached to the bursting head, shall also move  
6 forward.  
7
- 8 D. The burster shall provide its own forward momentum while being assisted by  
9 winching. A hydrostatic winch shall give the burster friction by which it can be  
10 moved forward. To form a complete operating system, the burster must be  
11 matched to a constant tension hydrostatic winching system.  
12

### 13 3.6 WINCH UNIT

- 14
- 15 A. A winch shall be attached to the front of the bursting unit. The winch shall provide  
16 a constant tension to the burster in order that it may operate in an efficient  
17 manner. The winch shall ensure directional stability in keeping the unit on line  
18 and grade.  
19
- 20 B. The winch shall be hydrostatically operated and automatically provide a constant  
21 tension throughout the operation. The winch shall be of the constant tension type  
22 and shall be fitted with a direct reading load gauge to measure the winching load.  
23
- 24 C. The constant tension winch shall supply sufficient cable in one continuous length  
25 so that the pull may be continuous between approved winching points.  
26
- 27 D. The winch cable and cable drum must be provided with safety cage and supports  
28 so that it may be operated safely without injury to persons or property.  
29
- 30 E. Contractor shall provide a system of guide pulleys and bracing at each manhole  
31 to minimize cable contact with the existing sewer between manholes.  
32
- 33 F. The supports to the trench shoring in the insertion pit shall remain completely  
34 separate from the winch boom support system and shall be designed so that  
35 neither the pipe nor the winch cable shall be in contact with them.  
36

### 37 3.7 SEWER SERVICE CONNECTIONS

- 38
- 39 A. All sewer service connections shall be identified, located and disconnected from  
40 the main prior to the pipe insertion to prevent damage to the laterals and to  
41 expedite reconnection. Upon commencement, pipe insertion shall be continuous  
42 and without interruption from one manhole to another.  
43
- 44 B. Connection of the new service lateral to the mainline shall be accomplished by  
45 means of a compression-fit service connection or an electrofuse saddle. The  
46 service connection shall be specifically designed for connection to the sewer  
47 main being installed. All laterals to be replaced shall be a minimum of five (5)  
48 feet in length from the sewer main. Install the saddles using procedures and  
49 equipment as referenced in manufacturer's written installation instructions.  
50  
51

1           **3.8 ACCEPTANCE TESTS**  
2

3           A. The following acceptance tests shall be performed to verify proper installation of  
4           the new HDPE pipes. The Engineer and/or Engineer's representative shall  
5           witness all tests.  
6

7           1. All new main sewers installed from manhole to manhole shall be tested via  
8           low pressure air testing in accordance with ASTM F1417-11A. The tests  
9           shall be performed from manhole to manhole and include any service laterals  
10           connecting to the main sewer. To perform the test, plugs shall be installed at  
11           each manhole and at cleanouts installed at the edge of the property line and  
12           road or sewer right-of-way, and the isolated sewers shall be tested as a  
13           system. Contractor shall provide all necessary equipment and pressure  
14           gauges to use for the testing. If new service laterals are not installed from the  
15           main sewer to the edge of the sewer or road R/W and/or a new cleanout is  
16           not installed, then the air test will not be required.  
17

18                   The air test pressure shall be performed in accordance with ASTM F1417-  
19                   11A and shall be increased by 0.5 psi for every foot of ground water above  
20                   the crown of the sewer pipe. If the ground water level is 2 ft or more above  
21                   the top of the pipe at the upstream end, or if the air pressure required for the  
22                   test is greater than 9-psi gauge, this air testing practice should not be used.  
23                   Before this air testing practice is used, the ground water level should be  
24                   lowered by pumping or dewatering. If ground water levels cannot be  
25                   determined in the field, then the test pressures shall be increased by a  
26                   minimum of one (1) psi.  
27

28                   Refer to ASTM F1417-11A for additional requirements.  
29

30           2. All new main sewers and service laterals shall be inspected via closed circuit  
31           television (CCTV) inspection after all work is completed. Refer to Chapter 16,  
32           Sewer Cleaning and Television Inspection, of CHARLOTTE WATER's Water  
33           and Sewer Design and Construction Standards, for requirements.  
34

35           B. Defects which may affect the integrity or strength of the pipe shall be repaired at  
36           the contractor's expense.  
37

38   END OF SECTION  
39

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2  
3  
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