

ARTICLE 26

UTILITY LINE INSTALLATION REQUIREMENTS

Index **26.01 JACK AND BORE OPERATIONS**
 26.02 PRESSURE PIPE RESTRAINT
 26.03 PRESSURE CONNECTION

BACK TO TABLE OF CONTENTS

Section **26.01 JACK AND BORE OPERATIONS**

26.01.01 General

The installation of a casing pipe by the method of jacking and boring shall be covered by these Specifications. The overall work scope shall include, but not be limited to, jacking and boring pits and equipment, sheeting, steel casing pipe, skids, steel straps, coatings, location signs as required, miscellaneous appurtenances, and restoration to complete the entire work as specified in the Typical City Details attached as part of this Manual. Jack and bore operations shall be performed within the right-of-way and/or easements shown on the Drawings.

26.01.02 Pipe Material

A) Steel Casing

Steel casings shall conform to the requirements of ASTM A-139 (straight seam pipe only) Grade "B" with a minimum yield strength of 35,000 psi. The casing pipes shall have the minimum nominal diameter and wall thickness as shown on the following table:

<u>Table 26-1</u>		
<u>Carrier Pipe Nominal Diameter</u>	<u>Casing Outside Diameter</u>	<u>Casing Wall Thickness</u>
4"	14"	.250"
6"	16"	.250"
8"	18"	.250"
10"	20"	.250"
12"	24"	.250"
16"	28"	.312"
18"	30"	.312"
20"	34"	.375"
24"	36"	.375"

Field and shop welds of the casing pipes shall conform with the American Welding Society (AWS) standard Specifications. Field welds shall be complete penetration, single-bevel groove type joints. Welds shall be airtight and continuous over the entire circumference of the pipe and shall not increase the outside pipe diameter by more than 3/4 inch.

B) Carrier Pipe

The carrier pipe shall be minimum pipe as described in sequential ARTICLES per the appropriate application with all joints restrained. Ductile iron pipe shall comply with the specification outlined in this Manual.

26.01.03 Inspection

All casing pipe to be installed may be inspected at the site of manufacture for compliance with these Specifications by an independent laboratory selected and paid for by the City. The manufacturer's cooperation shall be required in these inspections.

All casing pipe shall be subjected to a careful inspection prior to being installed. If the pipe fails to meet the Specifications it shall be removed and replaced with a satisfactory replacement at no additional expense to the City.

26.01.04 Other Jurisdictions

For casing pipe crossings under roadways, railroads, or other installations not within the jurisdiction of the City, the Contractor shall comply with the regulations of said authority in regard to design, specifications and construction.

26.01.05 Workmanship

- A) The jack and bore operations shall be done simultaneously with continuous installation until the casing pipe is in final position. Correct line and grade shall be carefully maintained. Add-on sections of casing pipe shall be full-ring welded to the preceding length, development water-tight total pipe strength joints. The casing installation shall produce no upheaval, settlement, cracking, movement or distortion of the existing roadbed or other facilities. Following placement of the carrier pipe within the steel casing, masonry plugs are to be installed at each open end. Casing pipe and welds shall be asphaltic coated using Koppers 300M or equal with a minimum final dry thickness of 20 mils.
- B) Casing pipe holes shall be mechanically bored through the soil by a cutting head on a continuous auger mounted inside the pipe. The auger shall extend a minimum distance beyond the end of the pipe casing to preclude formation of voids outside of the pipe shell.
- C) Required jacking and boring pits or shafts shall be excavated and maintained to the minimum dimension. Said excavations shall be adequately barricaded, sheeted, braced and dewatered as required.

26.01.06 Pipe Handling

Care shall be taken in loading, transporting and unloading to prevent injury to the pipe or coatings. Pipe shall not be dropped. All pipe shall be examined before laying, and no piece shall be installed which is found to be defective. Any damage to the pipe or coatings shall be repaired to the satisfaction of the City.

26.01.07 Work Coordination

It shall be the Contractor's responsibility to perform the jack and bore work in strict conformance with the requirements of the agency in whose right-of-way or easement the work is being performed. Any special requirements of the agency, such as insurance, flagmen, etc., shall be strictly adhered to during the performance of work. The special requirements shall be performed by the Contractor at no additional cost to the City.

26.01.08 Dewatering

Dewatering through the casing during construction shall not be permitted. All dewatering methods shall be approved by the City before construction work begins.

26.01.09 Carrier Pipe Support

The carrier pipes shall be supported within the casing pipes so that the pipe bells do not rest directly on the casing. The load of the carrier pipes shall be distributed along the casing by casing spacers. Casing spacers shall be bolt on style split shells made of either T-304 stainless steel or fusion coated steel (a minimum 0.010 inch thick coating of PVC shall be provided over the entire band). The shell shall be lined with a PVC liner 0.090 inch thick with 85-90 Durometer. All nuts and bolts shall be high strength, low alloy meeting AWWA C-III. Runners shall be made of a high molecular weight polymer with inherent high abrasion resistance and a low coefficient of friction.

26.01.10 Jacking Pits

Excavation adjacent to the roads shall be performed in a manner to adequately support the roads. Bracing, shoring, sheeting or other supports shall be installed as needed. Contractor shall install suitable reaction blocks for the jacks as required. Jacking operations shall be continuous and precautions shall be taken to avoid interruptions which might cause the casing to “freeze” in place. Upon completion of jacking operations, the reaction blocks, braces, and all other associated construction materials shall be completely removed from the site.

Adjust to the roads creating a drop-off hazard as described in the FDOT PPM or Greenbook – Jacking Pits shall be adequately protected meeting FDOT standards.

26.01.11 Miscellaneous Requirements

Correct line and grade shall be carefully maintained. Earth within the casing shall not be removed too close to the cutting edge in order to prevent the formation of voids outside the casing. If voids are formed, they shall be satisfactorily filled with grout by pumping.

The sections of steel casing shall be field welded in accordance with the applicable portions of AWWA C-206 and AWS D-7.0 for field welded pipe joints. Contractor shall wire brush the welded joints and paint with a primer. After completion of jacking, Contractor shall clean the interior of the casing of all excess material. Refer to Approved Manufacturer's List for acceptable products.

The annular space between the carrier pipe and casing shall be filled with clean sand, if required. Masonry plugs are to be installed at each open end of the casing. Plugs shall be suitable for restraining the earth load while allowing drainage of the casing.

Section 26.02 PRESSURE PIPE RESTRAINT

26.02.01 General

Pressure pipe fittings and other items requiring restraint shall be braced with restraining assemblies as specified in this Manual.

All pressure pipe and fittings shall be restrained as specified in this Manual, preventing movement of lines under pressure at bends, tees, caps, valves, hydrants etc. Use of thrust blocks for pressure pipe and fittings 16 inches and larger shall not be allowed. Ductile iron pressure pipe and fittings 12 inches and smaller may be restrained following the criteria established in this Manual.

26.02.02 Thrust Block Construction

Thrust blocks shall not be typical and shall only be used when the City Engineer deems it a hardship or good engineering standards deem it necessary because restraining assemblies are impractical or insufficient. If thrust blocks are used, a thrust block table meeting City standards shall be provided by the Design Engineer. Where undisturbed trench walls are not available for thrust blocking, the Contractor shall furnish additional concrete or install suitable pipe harnesses or ties designed and manufactured specifically for this purpose. Additional concrete, harnesses and/or ties shall be approved by the Engineer and the City. Fittings shall be protected by polyethylene film, minimum 8 mil thick, prior to placing concrete for thrust block.

Concrete for thrust blocking shall have a minimum compressive strength of 3,000 psi. Concrete shall be placed against undisturbed material and shall not cover joints, bolts or nuts, or interfere with the removal of any joint. Wooden side forms shall be provided for thrust blocks where trench conditions require. Thrust blocks shall be properly set and adequately cured prior to pressurizing the system.

26.02.03 Restrained Joint Construction

Sections of piping requiring restrained joints shall be constructed using pipe and fittings with restrained “Locked-type” joints manufactured by the pipe and fitting manufacturer and the joints shall be capable of holding against withdrawal for line pressures 50% above the normal working pressure. Mechanical joint ductile iron pipe retainer glands shall not be permitted. Any restrained joints that allow for elongation upon pressurization will not be allowed in those locations where the pipe comes out of the ground.

The minimum number of restrained joints required for resisting forces at fittings and changes in direction of pipe shall be determined from the length of restrained pipe on each side of fittings and changes in direction necessary to develop adequate resisting friction with the soil.

The required lengths of restrained joint ductile iron pipe shall be determined by the Engineer and shown in a tabular form as depicted on the “Restrained Pipe Table” in the Typical City Details attached as part of this Manual. All calculations shall be based on the method outlined in the publication entitled “Thrust Restraint Design for Ductile Iron Pipe”, latest edition (DIPRA).

Wherever two 45° bends are used in place of a 90° bend and the minimum restrained joints required from one 45° bend extend beyond the other 45° bend, the two 45° bends will be considered as though a 90° bend were located midway between the two 45° bends.

26.02.04 Mechanical Restraining Devices

Mechanical restraining devices as specified herein may be substituted for the restrained “Locked-Type” joints manufactured by the ductile iron pipe and fitting manufacturer. The required lengths of restrained joint ductile iron pipe shall be determined by the Engineer and shown in a tabular form as depicted on the “Restrained Pipe Table” in the Typical City Details attached as part of this Manual.

Mechanical joint restraint shall be incorporated in the design of the follower gland and shall include a restraining mechanism which, when actuated, imparts multiple wedging action against the pipe, increasing its resistance as the pressure increases. Flexibility of the joint shall be maintained after burial. Glands shall be manufactured of ductile iron conforming to ASTM A-536. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 BHN. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI A-21.11 and ANSI/AWWA C-153/A-21.53. Twist-off nuts shall be used to insure proper actuating of the restraining devices.

The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2 to 1.

Section 26.03 PRESSURE CONNECTION

26.03.01 General

Installations of pressure connections 4 inches and larger shall be made in accordance with this Section.

26.03.02 Tapping Sleeves

Tapping sleeves shall be mechanical joint sleeves or fabricated steel sleeves as specified below. All pressure connections to asbestos cement pipe and all “size on size” taps shall utilize full body mechanical joint sleeves.

A) Mechanical Joint Sleeves

Sleeves shall be cast of gray-iron or ductile-iron and have an outlet flange with the dimensions of the Class 125 flanges shown in ANSI B-16.1 properly recessed for tapping valve. Glands shall be gray-iron or ductile iron. Gaskets shall be vulcanized natural or synthetic rubber. Bolts and nuts shall comply with ANSI/AWWA C-III/A-21.11. Sleeves shall be capable of withstanding a 200 psi working pressure.

B) Steel Tapping Sleeves

Sleeves shall be fabricated of stainless steel. Outlet flange shall meet AWWA C-207, Class “D” ANSI 150 lb drilling and be properly recessed for the tapping valve. Bolts and nuts shall be high strength low alloy steel to AWWA C-III (ANSI A-21.11). Gasket shall be a full circumferential gasket be vulcanized natural or synthetic rubber.

26.03.03 Tapping Valves

Tapping valves shall meet the requirements of this Manual except that units shall be flange by mechanical joint ends. Valves shall be compatible with tapping sleeves as specified above and specifically designed for pressure connection operations.

26.03.04 Notification and Connection to Existing Mains

All connections to existing mains shall be made by the Contractor only after the connection procedure and work scheduling has been reviewed and approved by the City. The Contractor shall submit a written request to the City a minimum of 5 working days prior to scheduling said connections. In this request, the Contractor shall outline the following:

A) Points of Connection, fittings to be used, and method of flushing and disinfection if applicable.

B) Estimated construction time for said connections.

All connections shall be made only on the agreed upon date and time. If the Contractor does not initiate and complete the connection work in the agreed upon manner, the Contractor shall be required to reschedule the said connection by following the procedure outlined above. The Contractor shall not operate any valves in the system.

26.03.05 Construction Details

Sufficient length of main shall be exposed to allow for installation of the tapping sleeve and valve and the operation of the tapping machinery. The main shall be supported on concrete pedestals or bedding rock at sufficient intervals to properly carry its own weight, plus the weight of the tapping sleeve, valve and machinery. Any damage to the main due to improper or insufficient supports shall be repaired at the Contractor's expense. Adequate restrained joint fittings shall be provided on the existing main as well as the new main to prevent movement of the installation when test pressure is applied. Provisions of this Manual shall apply.

The inside of the tapping sleeve and valve, the outside of the main, and the tapping machine shall be cleaned and swabbed or sprayed with 10% liquid chlorine prior to beginning installation for water system pressure connections. After the tapping sleeve has been mounted on the main, the tapping valve shall be bolted to the outlet flange, making a pressure tight connection. Prior to beginning the tapping operation, the sleeve and valve shall be pressure tested at 150 psi to ensure that no leakage will occur.

For pressure connections through 12 inch diameter or less the minimum diameter cut shall be ½ inch less than the nominal diameter of the pipe to be attached. For 14 inch through 20 inch installations the minimum diameter shall be 1½ inches less; for larger taps the allowable minimum diameter shall be 2 to 3 inches less than the nominal diameter of the pipe being attached. After the tapping procedure is complete the Contractor shall submit the coupon to the City.

For pressure connections to wastewater force mains the tapping valve shall be placed horizontally. After the tapping procedure is complete a plug valve shall be attached to the tapping valve. The tapping valve shall be left in the open position prior to backfilling.