



## **SPECIFICATION 330524: BORING AND JACKING**

### **PART 1.0 GENERAL**

#### **1.1 DESCRIPTION**

- 1.1.1 The work of this specification includes all labor, machinery, construction equipment and appliances required to perform in a good workmanlike manner all boring and jacking of pipeline casings and installation of pipe therein.
- 1.1.1.1 The overall work scope must include, but not be limited to, boring and jacking pits and equipment, sheeting, steel casing pipe, skid, steel straps, coatings, location signs as required, installation of the carrier pipe within the casings, miscellaneous appurtenances to complete the entire work as shown on the Construction Drawings, and restoration.
- 1.1.1.2 Boring and jacking operations must be performed within the right-of-way and/or easements shown on the Construction Drawings.
- 1.1.2 The equipment used in boring and jacking casings must be of adequate commercial size and satisfactory working condition for safe operation and may be subject to approval by the County at the discretion of the Project Manager, or the County Inspector. Such approval, however, must not relieve the Contractor of the responsibility for making a satisfactory installation meeting the criteria set forth herein. Only workmen experienced in boring and jacking operations must be used in performing the Work.
- 1.1.3 Provide all structures, safety equipment, and professional services required to provide for the health and safety of the general public and of personnel involved in pipe boring and jacking work in accordance with the requirements of the regulatory agencies having jurisdiction.
- 1.1.4 Take all measures necessary to protect surrounding public and private property, adjacent buildings, roads, drives, sidewalks, drains, sewers, utilities, trees, structures, and appurtenances from damage due to pipe boring and jacking work. Responsibility and payment for correction of such damage, including additional engineering and/or inspection costs incurred by the County, must be the sole responsibility of the Contractor.

#### **1.2 REFERENCE DOCUMENTS**

- American Society for Testing and Materials (ASTM)
- American Water Works Associations (AWWA)
- American Welding Society (AWS)
- Florida Department of Transportation (FDOT)

#### **1.3 SHOP DRAWINGS AND SUBMITTALS**

- 1.3.1 For County projects, shop drawings and related manufacturer's product certification must be made in accordance with the General and Special Conditions of the Contract for approval prior to purchase or fabrication of the material by the manufacturer.
- 1.3.2 Detailed drawings showing location/plan views of all jack and bore pits are required.



- 1.3.3 Certification and test reports for the material, manufacturing, and test of the casing pipe must be performed and furnished by the pipe manufacturer in accordance with the latest standards of the industry as referred to in Part 1.2 herein.
- 1.3.4 For all installations, submit a jack and bore plan with all information to establish the proposed installation strategy. All plans must be reviewed and approved by Hillsborough County Water Resources Department (WRD) prior to starting work. The plan must include all the following information as applicable:
- 1.3.4.1 An indication of where the leading edge of the casing is to be located with respect to the line and grade, and the intervals for checking line and grade during installation. Maintain a record of progress at the job site.
  - 1.3.4.2 Equipment of adequate size and capability to install the product and include the equipment manufacturer's information for all power equipment used in the installation.
  - 1.3.4.3 The means for controlling line and grade.
  - 1.3.4.4 The means for centering the cutting head inside the borehole.
  - 1.3.4.5 Provide a means for preventing voids by assuring:
    - a) The rear of the cutting head must not advance in front of the leading edge of the casing by more than 1/3 times the casing diameter, and in stable cohesive soil conditions this distance must not exceed eight inches.
    - b) In unstable conditions, such as granular soil or loose/flowable materials, the cutting head is retracted into the casing a distance that permits a balance between pushing pressure, pipe advancement and soil conditions.
  - 1.3.4.6 Adequate casing lubrication with a bentonite slurry, or other approved technique.
  - 1.3.4.7 An adequate band around the leading edge of the casing to provide extra strength in loose unstable materials when the cutting head has been retracted into the casing to reduce skin friction as well as provide a method for the slurry lubricant to coat the outside of the casing.
  - 1.3.4.8 At least 20 feet of full diameter auger at the leading end of the casing. Subsequent auger size may be reduced, but the reduced auger diameter must be at least 75% of the full auger diameter.
  - 1.3.4.9 Water to be injected inside the casing to facilitate spoil removal. The point of injection must be no closer than two feet from the leading edge of the casing.
- 1.3.5 Submit a copy of any design exception prior to installation. Design exceptions are issued by the Utility Design Section Manager. Any deviation from the specifications requires a design exception.
- 1.3.6 At completion of the work submit the required Asset information specified in the Hillsborough County Technical Manual, Section 2, to the Engineer of Record or the County Project Manager, or County Inspector (as applicable).

## 1.4 RELATED WORK

- All specifications of Division 03
- All specifications of Division 33
- Hillsborough County Utility Accommodation Guide
- Hillsborough County Public Utilities Technical Manual
- Hillsborough County Transportation Technical Manual



## **PART 2.0 PRODUCT**

### **2.1 PIPE CASING**

- 2.1.1 Steel pipe casings must conform to the requirements of AWWA C200 and ASTM A139 (straight seam pipe only), Grade "B" with a minimum yield strength of 35,000 psi and be of a thickness equal to or exceeding the minimum gauge indicated on the Contract Drawings, and equal to or exceeding the requirements of the applicable governing agency. Pipe casing to be placed by jacking methods must be of appropriate thickness and axial strength to withstand the forces to be encountered during the jacking process. The pipe must be coated externally with coal-tar primer followed by hot coal-tar enamel in accordance with ANSI/AWWA C203. The casing must be shop cut with ends square with centerline, leveled and welded so that the entire length of the casing must be straight and true.
- 2.1.2 Field and shop welds of the casing pipes must conform to the American Welding Society (AWS) standard specifications and must be performed by qualified welders. Field welds must be complete penetration (butt welded), single-bevel groove type joints in accordance with the requirements of ANSI/AWWA C206. Welds must be airtight, continuous over the entire circumference of the pipe, and must not increase the outside pipe diameter by more than 3/4-inch. Nor must there be intrusion of the weld metal into the bore of the casing. It must be the Contractor's responsibility to provide stress transfer across the joints which is capable of resisting the jacking forces involved.

### **2.2 CARRIER PIPE**

The carrier pipe material must be in accordance with the Construction Drawings and specifications and will be restrained with manufacturer's restrained joints.

### **2.3 AUGURING FLUIDS**

Auguring fluids must use a mixture of bentonite clay, or other approved stabilizing agent, mixed with potable water with a minimum pH of 6.0 to create the drilling fluid for lubrication and stabilization, as necessary. Vary the fluid viscosity to best fit the soil conditions encountered. Do not use other chemicals or polymer surfactant in the drilling fluid without written consent of the Engineer. Certify in writing to the Engineer that any chemicals to be added are environmentally safe and not harmful or corrosive to the facility. Identify the source of water for mixing the drilling fluid. Approvals and permits are required for obtaining water from such sources as streams, rivers, ponds, or fire hydrants. Any water source used other than potable water must require a pH test.

## **PART 3.0 EXECUTION**

### **3.1 GENERAL**

- 3.1.1 The installation of pipeline casings under the railroad, highway, or arterial or collector roads (as shown on the Construction Drawings) must be in accordance with all the requirements of the railway company, the Florida Department of Transportation, Hillsborough County, or other governing regulatory agency.
- 3.1.2 Installation of the pipeline casing and insertion of the pipe within the casing must be done under the observation of the the County Inspector, unless prior approval for alternate inspection is received from the Project Manager, or the WRD Lead Inspector.



## **3.2 EXCAVATION**

- 3.2.1 The leading section of casing must be equipped with a jacking head securely anchored to prevent any wobble or variation in alignment during the jacking operation.
- 3.2.2 Excavation must be performed entirely within the jacking head and no excavation in advance thereof must be permitted. Every effort must be made to avoid any loss of earth outside the jacking head.
- 3.2.3 Excavated material must be removed from the casing as excavation progresses, and no accumulation of such material within the casing will be permitted.

## **3.3 BORING AND JACKING**

- 3.3.1 The boring and jacking operations must be done simultaneously with correct line and grade carefully maintained for the casing. Holes for casing must be bored with an auger mounted inside the pipe with the auger extending a short distance beyond the lead end of the pipe to preclude caving.
- 3.3.2 Excavation for jacking pits or shafts must be in accordance with applicable sections of these specifications.
- 3.3.3 Carrier pipes must have manufacturer's restrained joints and must be supported to prevent damages to either carrier pipe or casing pipe. The ends of the casing pipe must be sealed with elastomeric end seals fastened with stainless steel bands installed at each end of casing after installation of the utility pipe. See exhibits in Specifications 331002, 333006, and 339002 for details.
- 3.3.4 The top of the casing must maintain a minimum of 36-inch clearance under the roadway surface or as indicated on the Construction Drawings.
- 3.3.5 The invert elevation of the steel casing for the individual roadway crossings must be set in the field by the Contractor and must be based on the minimum vertical clearance between the top of the carrier pipe, unless otherwise indicated on the Construction Drawings, and the existing utilities on either side of the crossing site unless otherwise noted on the Construction Drawings.
- 3.3.6 Casing invert elevations which are proposed by the Contractor must be submitted to Hillsborough County for approval prior to starting work.

## **3.4 GROUTING**

After jacking is completed, the Contractor must drill holes in the casing at the locations of ground loss and elsewhere where voids are suspected and must force grout in to fill voids to refusal at satisfactory pressures, but not to exceed 50 psi. This must be done only in casings with large enough diameter to provide adequate working room.

## **3.5 LOSS OF GROUND**

- 3.5.1 Should appreciable loss of ground occur during the jacking operation, the voids must be backpacked promptly to the extent practicable with soil cement consisting of a slightly moistened mixture of one-part cement to five parts granular material. Where the soil is not suitable for this purpose, the Contractor must provide suitable material at his expense.



- 3.5.2 The soil cement must be thoroughly mixed and rammed into place as soon as possible after the loss of ground.

### **3.6 TOLERANCES**

Extreme care must be exercised by the Contractor to maintain line and grade during jacking operation, and the Contractor may be required to modify the manner in which he is conducting his jacking operation to correct any deviation when deemed necessary by the Hillsborough County Project Manager or Inspector.

### **3.7 RESPONSIBILITY**

The Contractor must be fully responsible for the placement of the casing. The details shown on the Construction Drawings are to be considered minimum only.

### **3.8 INSTALLATION OF PIPE**

- 3.8.1 The pipe must be installed in the casing using approved manufactured casing spacer centered on pipe length.
- 3.8.2 The pressure of sliding carrier pipe into the casing must not be applied directly to carrier pipe. A plank, timber, or other material acceptable to the Project Manager or Hillsborough County Inspector must be placed over the pipe end, during pushing, to protect it from damage.
- 3.8.3 Adjust the pipe grade as required by changing the thickness of the spacers to compensate for any grade variations of the casing.
- 3.8.4 If the alignment of the casing is such that the pipe grade cannot be met, the grade of the pipe must be adjusted, if required by the Project Manager or Hillsborough County Inspector. If realignment is not deemed feasible, another casing meeting the required grade must be installed. The abandoned casing must be filled with sand and the ends plugged with 12-inch thick masonry plugs. Realignment or replacement work must in no way result in extra cost to the County.
- 3.8.5 Ends of casing pipe must be sealed with elastomeric end seals fastened with stainless steel bands. See exhibits in Specifications 331002, 333006, or 339002 for details.

### **3.9 INSURANCE REQUIREMENTS AND FEES**

- 3.9.1 With respect to the railway line crossings, the Contractor must provide insurance in accordance with the railroad company requirements.
- 3.9.2 All pipeline casing work performed within the State of Florida Department of Transportation rights-of-way or within the Railroad property limits must be in accordance with the requirements of those agencies which are hereby made a part of these specifications. It is the responsibility of the Contractor to determine all requirements of these agencies and to comply with said requirements including any necessary bonds, cash deposit, or insurance.
- 3.9.3 The Contractor will not be permitted to commence work on a railroad or highway crossing until bonds, cash deposits, or insurance furnished pursuant to the above by the Contractor is to the satisfaction of the Railroad Company or Florida Department of Transportation.



### **3.10 SUCCESSFUL COMPLETION**

- 3.10.1 The Contractor must be considered as having completed the requirements of any one boring or jacking when he has successfully completed the work to the satisfaction of the Engineer of Record.
- 3.10.2 The locations of any second or third attempts must have the concurrence of the County Project Manager, or Inspector. If, after three attempts, the Contractor is not able to complete a boring or jacking, he may request authorization to use a trench. If such authorization is granted, the installation of the pipe and restoration of the surface must be at no additional cost except that the Contractor must be reimbursed for any casing abandoned in place at the unit price set forth in the Unit Price Schedule for Change Orders. If such authorization is not granted and the Contractor is required to utilize other methods approved by the WRD, it must be considered additional work. However, appropriate credit must be given for not having performed the borings or trenching.