

**SECTION 15070**  
**JACKING AND BORING**

**PART 1 - GENERAL**

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, material, equipment, and appurtenances required to perform complete jacking and boring operation as shown on the Plans.
- B. The work under this section consist of installing a steel casing pipe under the road, railway, etc., in a single bore and jack operation and installing the carrier main within the casing, complete.
- C. All jacking and boring operations shall be performed in accordance with all requirements of the permitting agency or company having jurisdiction over the work area, and as approved by the Department.

1.02 RELATED SECTIONS

- A. Section 15060 - Piping and Fittings

1.03 SUBMITTALS

- A. The steel pipe shall be furnished with an Affidavit of Compliance certifying that the pipe and sleeves comply with the requirements herein and ASTM Standard A139-93a. No pipe described below or sleeve will be accepted until such Certificates have been submitted to and approved by the Engineer.

1.04 QUALITY ASSURANCE

- A. All work performed within the respective railroad, Florida Department of Transportation (FDOT) or other governing agencies' right-of-ways shall comply with all requirements and conditions of the governing authority, permit requirements and all requirements and conditions of these specifications.
- B. The Contractor shall perform his operation in accordance the State of Florida Department of Transportation's Utility Accommodation Guide, Exhibit H, Jacking and Boring Supplement, latest revision. Copies are available from FDOT.
- C. The Contractor shall assume all jacking and boring responsibilities for its permittee while complying with all FDOT; railroad company and governing authority requirements having jurisdiction over their work. The Department reserves the right to enforce any and all requirements.

## **PART 2 - PRODUCTS**

### 2.01 STEEL CASING

- A. Steel casing pipe for boring and jacking shall be of the size and thickness as shown on the Plans. All steel pipe shall conform to the requirements of ASTM Standard A139-93a "Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 in. And Over)", Grade B.
- B. Pipe weld shall be longitudinal, spiral weld not being acceptable. Where required by the permitting agency or company, the pipe and sleeves shall be coated inside and out with two coats of Bitumastic No. 50 as manufactured by Kop-Coat Company, Inc., or approved equal. Paint shall be applied in strict accordance with the manufacturer's recommendations.
- C. The pipe shall have right-angle cut ends with bevel cut for field welding and shall be furnished in 20-foot lengths. Cutting the pipe in the field to accommodate the area for boring and jacking operations will not be permitted without specific approval by the Engineer of Record. The Contractor shall be responsible for determining the size of the pit in relation to the space required for this equipment and 20-foot lengths of steel pipe.

### 2.02 EQUIPMENT

The boring (tunneling) machine may be an open-faced boring machine. Other types of machines such as a closed face boring machine may be considered. Final approval of the boring machine is within the sole discretion of the Engineer of Record and must be obtained prior to its use. This is an absolute reservation of discretion on behalf of the Department due to the critical nature of the work to be performed beneath the railway roadway, etc. Excavation for installation of the casing by use of a labor crew will not be permitted.

## **PART 3 - EXECUTION**

### 3.01 GENERAL

- A. The installation shall be coordinated with the railroad companies, FDOT, or municipality in which the job is to be performed. The Contractor shall not begin work until he has received permission from the Department and the governing authority to do so. In the event the railroad companies or FDOT require payment for any services rendered, including services required due to around-the-clock construction, the costs shall be borne by the Contractor.
- B. The Contractor must obtain approval by the Engineer of Record for the boring equipment he intends to use. His selection of boring machine must be based on his investigation of local conditions and written submission of his thorough investigation of the groundwater and sub-surface soil conditions to be encountered during the boring and jacking operations. This is particularly emphasized when running sand or large quantities of water are indicated. The Engineer of Record may require the Contractor to use a closed face boring machine if he considers it essential, based on information from the Contractor's report; and if, in his opinion, it is necessary to safeguard the public and to protect public or private property.

## 3.02 INSTALLATION

- A. Installation of the casing pipe shall be a continuous operation until completed, unless revised by the Engineer of Record, FDOT, or other governing agencies having jurisdiction over the work.
- B. Construction by boring and jacking shall be carried out in such a manner that there is no raising or settlement of the ground surface, surface facilities or structures. The casing shall be jacked from one end of the crossing to the other in conjunction with the boring. Material from the boring excavation shall be removed as the jacking proceeds.
- C. The casing and carrier pipe shall be installed level and shall be free of horizontal and vertical deflections. A minimum of two monitoring holes located over the casing shall be provided to verify the casing location.
- D. Adjacent lengths of steel casing pipe shall be welded together throughout the circumference of the pipe with two welding operations at the same time. All welding shall conform to the best accepted practices of the trade and in particular to AWWA Standard C206-88, "Field Welding of Steel Water Pipe Joints".
- E. The Contractor shall furnish the Engineer of Record with five copies of his site surface and sub-surface (soil borings) examination data prior to starting work. The Engineer of Record and the governing authority (railroad company, FDOT, or similar authority) will analyze this information in conjunction with the equipment and methods specified hereinbelow to see if any changes are required. However, no changes will be permitted unless specifically authorized in writing by the Engineer of Record, and the governing authority.
- F. Also, prior to commencing any work hereunder, preferably after a rainfall to indicate low areas by ponding, the Contractor shall take color photographs of the right-of-way over the entire area (length) of the proposed casing. These photographs shall be furnished to the Engineer of Record, who will review them with the Contractor, and representatives of the governing authority. Any pavement cracks, ground settlement ponding, or other unusual conditions indicated on the photographs will be recorded and acknowledged by all parties concerned, otherwise it will be agreed that the entire surface area is free of any pavement cracks, ground settlement or other unusual conditions.
- G. Additionally, in conjunction with the photographs, the Contractor shall furnish the Engineer of Record with a survey prepared by a Registered Land Surveyor indicating elevations of the ground surface at twenty (20) foot intervals, minimum, over the full length of the proposed casings and 50 ft. beyond the casing on both sides. Elevations shall be to the nearest one hundredth of a foot. In addition the track elevations shall be taken 100 feet in both directions on the track from the center of the pipe. Elevation readings shall be taken both with and without the live load of a train. The Surveyor shall report the difference in elevations, if any, to the Contractor, who shall report such to the Engineer of Record. Upon completion of the Contract, but prior to acceptance by the Department, the Contractor shall furnish the Department with a second survey prepared by a Registered Land Surveyor as stated above. If any appreciable difference in elevations between the two surveys indicate settlement, or if pavement cracks or other surface irregularities are apparent, and correction is required by either the railroad company, FDOT or other governing authority, the Contractor shall

immediately correct such problems to their satisfaction, and to the satisfaction of the Department. If any appreciable differences in elevation, indicating settlement, occur or if pavement cracks or other surface irregularities become apparent within the period of the Maintenance Bond, and correction is required by either the railroad company, FDOT, or other governing authority, the Contractor shall immediately correct such problems to their satisfaction and to the satisfaction of the Department.

- H. The Contractor shall be fully responsible for any damage which might occur to the roadway, railroad company's crossing and tracks or other facilities and shall repair or replace such damaged facilities and equipment at his expense and to the satisfaction of the Department the railroad company, the FDOT or other governing authority. No work shall commence hereunder until the Contractor has procured the insurance required by the Department, the railroad company, FDOT or other governing authority; and such insurance has been approved by the Engineer of Record, the railroad company, FDOT, and other governing authority, respectively.

### 3.03 JACKING AND RECEIVING PITS

- A. The jack and bore pits shall be constructed with 4 sides of steel interlocking sheeting designed and sealed by a Professional Engineer registered in the State of Florida. It shall terminate a minimum of 3 ft. above the adjacent ground elevation.
- B. A detailed shop drawing shall be prepared and submitted, to include the method of installing a circular hole 3/4 of an inch in diameter larger than the casing O.D. It shall be made to accommodate the casing and prevent infiltration of water.
- C. Concrete (4,000 psi) and tremie shall be designed and sealed by a Professional Engineer registered in the State of Florida and shall be of sufficient thickness to withstand the uplift.

### 3.04 WATER DISPOSAL

- A. Inflow of water must be limited to slight seepage of the jack and bore pit and limited water intrusion into the pit from the tunnel machine performing the excavation. Water from the pits shall be disposed of in such a manner as will not cause injury to public health, to public or private property, to the work completed or in progress, to the surface of the streets, or cause any interference with the use of the same by the public. The Contractor shall submit his proposed method of handling trench water and locations at which the water will be disposed of to the Department of Environmental Resources Management (DERM), governmental agencies having jurisdiction over this work and to the Engineer of Record for approval and shall not commence the excavation without written approval from the Department, DERM and other governing agencies.
- B. When the invert elevation of the carrier pipe is less than 7 ft. below the finished elevation and the elevation of the water table is less than 2 ft. above the casing invert, the Engineer of Record will allow the jacking and receiving pits to be steel sheeted, shored, and tremied with concrete, and shall be continuously dewatered during the entire installation. The tremied concrete slab in the bottom of the pit shall be sufficient to provide a stable base for the boring machine. The concrete slab shall be removed when this work is completed.

- C. When jacking casing under the railway, roadway, etc. the Contractor shall begin the boring and jacking by constructing the jacking and receiving pits as shown on the Plans and in accordance with the requirements of the permit and these Specifications. The Contractor shall exercise special care during the boring and jacking to prevent damage to any underground utilities, whether shown on the Plans or not.
- D. The receiving pit must be installed and ready to receive the casing pipe prior to any jacking and boring work in the jacking pit.
- E. The Contractor shall provide the necessary pumps, and other means necessary to keep the pits free of water. In addition, he shall also provide standby back-up pumps and equipment at the site to insure against pit flooding in the event of equipment failure. The Contractor shall be responsible for the disposal of the water.
- F. The Contractor's proposed pit construction and dewatering plans shall be submitted to the Engineer of Record for approval prior to construction. These submissions must also meet the approval of the FDOT, DERM and all other regulatory agencies having jurisdiction over this work. No work is to commence without the required approvals.
- G. Upon completion of the work, all sheeting, shoring, concrete, concrete tremie slab and other material shall be removed from the site. Excavations shall be backfilled and compacted and the surface restored to original condition.

### 3.05 INSTALLATION OF CASING PIPE

- A. After the jacking and receiving pits have been prepared, and the boring (tunneling) machine is ready for operation, the casing pipe shall be installed. The installation of the casing pipe shall be a continuous around-the-clock operation, and once started shall not be stopped until the entire run of casing pipe has been installed.
- B. The Contractor shall obtain all necessary permits required for the around-the-clock operation from the various agencies having jurisdiction over the work area unless the 24 hours-a-day operation is withheld. Additionally, the Contractor shall furnish and install temporary noise barriers around the pits as required to comply with noise ordinances of the various agencies having jurisdiction over the work area.
- C. The casing pipe shall be furnished and installed in 20-foot lengths. Adjacent lengths of steel pipe shall be joined by welding. Welds shall be watertight. All welding shall conform to the best accepted practices of the trade and in particular to the AWWA Standard C206-88, "Field Welding of Steel Water Pipe". In order to minimize the welding time, the Contractor shall have at least two qualified welders and two welding machines on the job at all times. After the pipe has been lowered into the pit, it shall be welded to the pipe.
- D. All welding done under this Project shall be performed by operators who are certified by a testing laboratory approved by the Dade County Building and Zoning Department as qualified to weld underhand and overhead. The Contractor shall furnish proof to the Department that his welders are so qualified.

- E. The casing pipe shall have 2-inch tapped holes at 8-foot intervals at 3 and 9 o'clock locations prior to being placed in the pit; and at additional locations as may be required to control the placing of cement grout. The grout shall be pumped through one hole until it appears in the next hole, as soon as the auger is removed, in order to stabilize the soil over and around the casing and to prevent voids.
- F. The pumping of the grout shall be carefully controlled with proper pressure to prevent floating of the casing and the pressure shall be such that all voids over and around the pipe are permanently filled in order to prevent settlement of the earth and facilities above the casing pipe. The holes in the pipe shall then be plugged with malleable iron pipe plugs.
- G. The use of bentonite to install the casing pipe is at the discretion of the Contractor and is not a substitute for the cement grout. The installation of the casing pipe by boring and jacking shall be carried out in such a manner that there is no settlement of the ground surface or surface facilities or structures. Material from the boring excavation shall be removed as the jacking proceeds. The casing pipe shall be installed free of horizontal and vertical deflections unless required by design.

### 3.06 INSTALLATION OF CARRIER MAIN

- A. When the installation of the casing pipe is complete, the Contractor shall install the carrier pipe. The carrier pipe may be jacked through the steel casing pipe or may be pulled through with a cable, but under no circumstance shall it be driven or struck. The method selected by the Contractor shall exert no tensile force on any joint in the pipeline.
- B. The carrier pipe shall be held in alignment and supported on creosoted or Wolmanized timber skids (See Section 15065) or other Department approved casing spacer attached to the carrier pipe as shown on the Plans. The timber skids and blocking shall be sized so that the top of the bells or restrained joints of the carrier pipe will be two inches below the inside top of the casing pipe. See Miami-Dade Water and Sewer Department Standard Detail A 8.0. The Department may consider use of alternate casing insulator or spacer systems spaced at least 6 feet, utilizing polymer plastic, polyethylene or HDPE runners and requiring no special tools, grease, or pumping of grout or admixture in the annular space, each on a case by case basis.
- C. After the installation of the carrier main within the casing pipe has been completed, the Contractor shall wash a sufficient quantity of clean sand into the space between the outside of the carrier main and the inside of the casing pipe to form a sand cushion that will come up to the springline of the main. The Contractor shall then plug the ends of the casing pipe as shown on the Plans.
- D. The installation of the galvanized steel vent pipes for the casing pipe and the sign shall be complete as shown in detail on the Plans for the crossing.

### 3.07 STATE ROAD BORE AND JACK CROSSING

In addition to the Plans and the requirements of these Specifications, construction shall be in accordance with the requirements of the permits, along with their General Provisions and the following Special Provisions, unless otherwise modified:

- B. Maintenance of traffic and all traffic control device shall be placed in accordance with the current edition of the FDOT Roadway and Traffic Design Standards.
- C. The permittee shall coordinate the notification of any proposed lane closure(s) and temporary detour(s) at least two (2) weeks in advance of the closure date, by processing the required "anticipated roadway closure" form through the Department representative. Lane closures shall only occur during non peak hours or on non-event weekends. Peak hours are from 6:00 to 9:30 A.M. and from 3:30 to 7:00 P.M. weekdays. Where there exist conflict between the above statements and those contained in permits issued for the work, permitted conditions shall govern the work. The Department representative may adjust peak hours if conditions warrant.
- D. Coordinate pre-construction meeting with FDOT, at least forty-eight (48) hours prior to commencement of work.
- E. Before any work can commence on a State Road right-of-way, the permittee must furnish to the FDOT Inspector on the job site in writing the following:
  - 1. The certification of the steel casing to be used.
  - 2. The width, length and depth of the boring pit and receiving pit.
  - 3. The de-watering plan and equipment to be used.
  - 4. A subsurface report (addressing soil conditions and water table level in the vicinity of the jacking pit and the boring pit).
  - 5. The name, address and telephone number of the contractor that will be performing the jack and bore.
- F. Final restoration shall be coordinated with the Department representative all portions of the State Road right-of-way shall be restored within thirty (30) days upon completion of the permitted installation.
- G. When the permittee's operations encounter or expose any abnormal condition which may indicate the presence of a hazardous waste, toxic waste, or contaminants, such operations shall cease immediately in the vicinity of the abnormal condition and the Department's inspector and Ms. Marjorie Bixby of FDOT's Environmental Management Office (telephone 470-5228) shall be notified. Every effort shall be made by the permittee to minimize the spread of any contamination into uncontaminated areas. Notification of personnel and selection of course of action shall be in accordance with procedure 650-0300 1 O-B, Resolution of Right-of-way Contamination Issues. Under no circumstances will the permittee resume operations in the affected area until so directed by the Department.
- H. Beginning of any work within the right-of-way associated with this work constitutes acceptance of these conditions.

END OF SECTION