SECTION 02320
TRENCHLESS INSTALLATION OF PRESSURE MAINS BY DIRECTIONAL BORING

PART 1 -- GENERAL

1.1 SECTION DESCRIPTION

A. Portions of the pressure mains shall be installed by the directional boring method within the limits indicated on the contract plans and as specified herein. Generally, as a minimum, the pressure main is to be located within the road right-of-way and shall be installed by directional boring. Piping not designated for installation by a specific method may be installed by open trench or directional boring as approved by the Engineer.

B. This section includes materials, performance and installation standards, and Contractor responsibilities associated with the furnishing of all labor, materials, equipment and incidentals required to install, complete, required trenchless installation of pressure mains, as shown on the Drawings and as specified herein.

1.2 EXPERIENCE

A. The Contractor must demonstrate expertise in trenchless methods by providing a list of ten utility references for whom similar work has been performed in the last two years. The references should include a name and telephone number where contact can be made to verify the contractor's capability. The Contractor must provide documentation showing successful completion of the projects used for reference. Conventional trenching experience will not be considered applicable.

B. All supervisory personnel must be adequately trained and will have at least four years experience in directional boring. The Contractor will have to submit the names and resumes of all supervisory field personnel prior to construction.

C. Because of time constraints, the Contractor may wish to provide multiple experienced directional boring crews.

1.3 SUBMITTALS

A. Submit technical data for equipment including clay slurry material, method of installation with working drawings, and proposed sequence of construction for approval by SLCU.

B. Prior to approval for directional boring, the Contractor must submit the names of supervisory field personnel and historical information of directional boring experience. In addition, the Contractor must submit for approval name plate data for the drilling equipment, mobile spoils removal unit, and MSDS (Material Safety Data Sheets) information for the drilling slurry compounds.

C. The Contractor is required to bring to the attention of SLCU any known design discrepancies with actual tunneling methods that the Contractor will be performing. This shall be stated no later than the pre-construction meeting.

PART 2 -- EXECUTION

2.1 INSTALLATION

A. Installation shall be in a trenchless manner producing continuous bores.

B. The tunneling system shall be remotely steerable and permit electronic monitoring of tunnel depth and location. Accurate placement of pipe within a $\pm$ 2-inch window is required both horizontally and vertically. Turning capability of 90-degrees in 40 feet is required. Continuous monitoring of the boring head is required, including across open water if necessary.

C. The directional boring Contractor will be required to submit certification, by a Professional Engineer or Professional Land Surveyor licensed in the State of Florida, that the directional boring has been performed in accordance to the construction drawings, and provide signed and sealed record drawings of the installation.

D. Tunneling must be performed by a fluid-cutting process (high pressure-low volume) utilizing a liquid clay, i.e. bentonite. The clay lining will maintain tunnel stability and provide lubrication in order to reduce frictional drag while the pipe is being installed. In addition, the clay fluid must be totally inert and contain no environmental risk. The Contractor must also have a mobile vacuum spoils recovery vehicle on-site to remove the drilling spoils from the access pits. The spoils must then be transported from the job site and be properly disposed of. Under no circumstances will the drilling spoils be permitted to be disposed of into sanitary, storm, or other public or private drainage systems.

E. Liquid clay type colloidal drilling fluid shall consist of at least 10 percent of high-grade, carefully processed bentonite to consolidate cuttings of the soil, to seal the walls of the hole, and to furnish lubrication for subsequent removal of cuttings. The slurry, which is heavier than the surrounding material, shall be high in colloids of the bentonite type and shall deposit a thin filter cake of low permeability material

on the walls of the bore. This shall allow only a small amount of the fluid to pass into the surrounding soil and shall also stabilize the bore.

F. Mechanical, pneumatic, or water-jetting methods will be considered unacceptable.

G. After an initial bore has been completed, a reamer will be installed at the termination pit and the pipe will be pulled back to the starting pit. The reamer must also be capable of discharging liquid clay to facilitate the installation of the pipe into a stabilized and lubricated tunnel.

H. Upon completion of boring and pipe installation, the Contractor will remove all spoils from the starting and termination pits. All pits will be restored to their original condition.

2.2 RESTORATION OF PAVED, IMPROVED AND UNIMPROVED AREAS

A. The shoulders, ditches, banks and slopes of roads and railroads crossed and paralleled shall be restored to their former condition and properly sodded so that they shall not wash out before becoming consolidated. Restoration shall be as required by the jurisdictional authority and as specified within the Contract Documents. Road and railroad crossings and parallel installations are to be continuously maintained until the completion of the work. No direct compensation shall be paid for Contractor's repair or maintenance of crossings and parallel installations.

*** * END OF SECTION * ***