

SECTION 13311  
HORIZONTAL DIRECTIONAL DRILLING (HDD)

PART 1 GENERAL

1.01 SCOPE

- A. Work of this Section includes, but is not limited to:
  - 1. Horizontal directional drilling.
  - 2. Pipe installation in bored hole.
  - 3. Excavation of receiving pit.
  
- B. Related work specified elsewhere:
  - 1. Section 0340 Shop Drawings, Product Data and Samples
  - 2. Section 02110 Clearing
  - 3. Section 02215 Excavation
  - 4. Section 13300 Water Distribution System

1.02 REGULATORY REQUIREMENTS

- A. Perform directional drilling work in compliance with applicable requirements of governing authorities having jurisdiction and obtain all permits as required.
  
- B. Conform to all local, state and federal codes for work and disposal of debris.
  
- C. Maintain traffic control devices in conformance with traffic control plan and authorities having jurisdiction.
  
- D. Permits
  - 1. Owner shall obtain the necessary right-of-way permits from the state, county, and railroad authorities as applicable. Conditions of such requirements are provided in the appendices of the Project Manual. These conditions shall be considered a part of the project manual and the Contractor shall be bound to such conditions thereof.
  - 2. Contractor shall obtain and pay for all other local, state, and federal permits as required by the agencies having jurisdiction.

1.03 JOB CONDITIONS

- A. General
  - 1. Where work under this item involves directional drilling under roadways and/or railways, all operations of the Contractor and his agents shall be subordinate to the free and unobstructed use of the roadway and/or railways without delay or danger to life, equipment, or property.
  - 2. Site Information
    - a. Topography and structures shown on the Drawings have been obtained from existing records and are shown for the convenience of the Contractor. Not all structures may be shown. Contractor shall explore ahead of the excavation to determine the exact location of all structures.
    - b. Locate and protect existing utilities in work area.
    - c. Test soil borings have not been made on the site. No classification of excavated or drilled material will be made. Excavation and drilling includes



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- C. Provide record drawing of bore hole as finally constructed including size and horizontal and vertical dimensions and elevations.

### 1.06 REFERENCE STANDARDS

- A. ASTM – American Standards for the Testing of Materials.

### 1.07 QUALIFICATIONS

- A. HDD Contractor
  - 1. The HDD Contractor shall be trained and certified to operate the Horizontal Direction Drilling equipment with at least 5 years experience in directional drilling obtained over the last five years. Perform HDD operations under the constant direction of a drilling supervisor who shall remain on site and be in responsible charge throughout the drilling operation. The supervisor shall have supervised directional drilling of a minimum of 5,000 linear feet of pipe.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Polyethylene Pipe: Refer to Section 13300, Water Distribution System.
- B. Manufactured Transition Fittings: Restrained joint manufactured transition fittings to match diameter of HDPE to water main, Independent Pipe Products Slip Joint Anchor Fittings, or equal.
- C. Lubricant shall be bentonite or polymer-based slurry.
- D. Cement grout shall consist of a mixture of 1 part cement to 6 parts sand. The amount of cement may be increased or decreased as necessary and as permitted by the Engineer to provide good flowing characteristics.

### 2.02 EQUIPMENT

- A. The drill rig and associated equipment shall be in good condition and capable of completing the project without significant delays.
- B. The drill bit and reamers shall have a closed face and shall be capable of supporting the excavated area (face) during excavation and shutdown. The bit shall be full directional in both the horizontal and vertical directions from the drill rig so that the alignment can be maintained during the entire drilling operation.
- C. The drill bit shall be capable of drilling through all materials encountered including sand, gravel, glacial till and outwash, organics, marine clay, shale, and limestone.

## PART 3 EXECUTION

### 3.01 PROTECTION

- A. Protection of Persons and Property

1. Barricade open excavations occurring as part of this Work and post with warning lights. Operate warning lights during hours from dusk to dawn each day and as otherwise required by state or local agencies.
2. Protect structures, utilities, sidewalks, pavements, and other properties from damages caused by settlement, vibrations, lateral movement, undermining, washout and other hazards created by excavation operations.
3. Comply with the requirements of all agencies having traffic control authority.
4. Protect trees and other plants from damage that are to not to be disturbed.
5. Restore damaged improvements including drainage tile to their original condition, acceptable to parties having jurisdictional ownership.

B. Existing Utilities Protection

1. Locate existing underground utilities in the areas of Work. If utilities are to remain in place, provide adequate means of protecting during excavation operations.
2. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Owner immediately. Cooperate with the Owner and public or private utility companies in keeping their respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner.
3. Do not interrupt existing utilities occupied and used by the Owner or others, except when permitted in writing, and then only after acceptable temporary utility services have been provided.

3.02 PROCEDURE

A. General

1. Methods and procedures shall conform to the requirements and recommendations of ASTM F1962, Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstructions, Including River Crossings and referenced standards.

B. Equipment

1. Drilling equipment shall be capable of providing the thrust, pullback and reaming operations. Properly secure equipment to ground for operation.
2. Crews shall be trained by the drilling equipment manufacturer and have the proper field experience.
3. Provide a breakaway link designed to prevent the pullback force from exceeding the strength of the pipe as recommended by the pipe manufacturer.
4. Provide a swivel between the reamer and the pipe designed to prevent torsional loads on the pipe during pullback.

C. Boring Procedures

1. Boring shall proceed by creating a pilot drilled hole guided by a drill head capable of being steered in the direction desired.
2. The guidance system shall have the capability of measuring vertical and horizontal positions and roll. The guidance system must meet the following accuracy levels:

Vertical position	+/- 1 inch at	1.5 to 8	feet of depth
	+/- 2 inches at	8 to 12	feet of depth
	+/- 4 inches at	12 to 15	feet of depth
	+/- 6 inches at	15 to 25	feet of depth
Horizontal position	+/- 2 inches at	1.5 to 8	feet of depth
	+/- 4 inches at	8 to 12	feet of depth

	+/- 6 inches at 12 to 15 feet of depth
	+/- 12 inches at 15 to 25 feet of depth
Roll	+/- 0.1 degree over a range of 0 to 360 degrees

3. A tracking system shall allow the location and depth of the bore head by a manually operated overhead receiver. Document the locations and depth of the drill head at minimum 20-foot intervals and at all obstacles or other changes in soil material that may alter the direction of the drill head.
4. Make visual inspection of the surface above the boring to look for signs of settlement on an hourly basis during the time of active drilling. Establish surface settlement monitoring points above the boring for use in monitoring.
5. Record location of monitoring points with elevations on hard (pavement, concrete, etc.) surfaces to the nearest 0.01 feet. Ground (non-paved or non hard) surface movement (settling or heaving) shall not exceed 0.05 feet. Report any loss of ground, roadway, drives, or sidewalk cracking immediately.
6. Submit an as-built survey of the pilot hole prior to pre-reaming and an as-built survey of the carrier pipe upon work completion, indicating conformance with the specified requirements.
7. HDD operations shall limit vibrations transmitted to surrounding structures so as not to cause damage.
8. Jet fluid, mechanical cutting, or a combination of both shall be utilized in the boring operation.
9. Pullback head shall prevent soil, drilling mud or other material from entering the pipe.
10. Multiple passes of reaming and pullback may be used to gradually enlarge the size of the borehole to permit the installation of the pipe.
11. Drill the borehole to the size required to permit installation of the pipe.
12. Do not exceed maximum pipe deflection as recommended by the pipe manufacturer.
13. Install #6 trace wire with the pipe. Bring the wire to grade in a curb box at each end of the installation.
14. Pressure grout the annular space around the final pipe if the final ream produces a theoretical annular space of more than 0.2 cu. Ft. per linear foot of pipe.
15. Install restrained joints to transition from HDPE to water main. Restrained joints shall incorporate a manufactured HDPE fitting meeting the HDPE pipe pressure rating with collar for backup ring and stainless steel stiffeners (stiffener must be located under the gasket and clamp. The fitting shall include the necessary retraining glands, bell restraint ring, back-up ring, tie rods, etc.

D. DRILLING FLUID

1. Drilling fluid shall be utilized to stabilize the borehole, remove cuttings, cool the drill head and provide lubricant for the drill string.
2. Drilling fluid shall consist of bentonite or polymer additives and shall be considered as non-hazardous by all federal, state and local regulations.
3. All excess drilling fluid shall be promptly removed using vacuum truck equipment and properly disposed of off-site. No wastes shall be left on site or be permitted to migrate from the site. Provide protection of any waste from entering ditches or streams.
4. No drilling fluid shall be allowed to discharge into a ditch or waterway.

END OF SECTION