

## SECTION 33 05 23.13 – UTILITY HORIZONTAL DIRECTIONAL DRILLING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes: Specifications for installation of pipelines by horizontal directional drilling where called for on Drawings or chosen by CONTRACTOR.
  - 1. Work shall include piping connections to existing piping or to pipes installed by other methods.
    - a. For potable water mains, Work shall include pressure testing, cleaning and disinfection as required in Section 22 11 13 Water Distribution Piping.
    - b. For pumping mains, Work shall include all testing as required in Section 22 13 13 Sanitary Sewers.
- B. Products Installed But Not Supplied Under This Section:
  - 1. Unless otherwise noted on Drawings, or stated in this Section, all piping shall be furnished under the below sections and installed under this section.
    - 1) Section 22 11 13 Water Distribution Piping
    - 2) Section 22 13 13 Sanitary Sewers
  - 2. All necessary joint and coupling materials, including bolts, nuts, gaskets, wall castings or sleeves, supports, anchors, blocking harnesses and other necessary closure pipe sections, and standard or special fittings shall be furnished under the Specification for the piping type.
    - 1) Section 22 11 13 Water Distribution Piping
    - 2) Section 22 13 13 Sanitary Sewers
    - 3) Section 33 05 00 Common Works

#### 1.2 SCHEDULING

- A. CONTRACTOR shall notify MHOG at least 5 working days before beginning Work under this Section.
- B. CONTRACTOR shall notify the Livingston County Road Commission 5 days prior to beginning Work under this Section when working on County Roadways.

#### 1.3 PROJECT CONDITIONS

- A. Safety Requirements: All operations shall be conducted so as not to interfere with, interrupt, or endanger the operation of roadways, or damage, destroy, or endanger the integrity of roadway.
- B. At all times when Work is being progressed, a field supervisor for Work with no less than 12 months experience in the operation of the equipment being used shall be present. The machine operator also shall have no less than 12 months experience in the operation of the equipment being used.

#### 1.4 ACTION SUBMITTALS

- A. Pipe Logs: The requirements for the necessary pipe location logs are found in detail under Field Quality Control. Submit a written report to ENGINEER documenting location and depth of pipe.
  - 1. Submit logs and summary of stresses on pipe during installation

- B. Equipment Data: Furnish data on tracking systems that will be used. Data shall include depth and accuracy capabilities of equipment.
- C. Drilling Fluids: Submit manufacturer's data.
- D. Pipe Design: Submit design calculations.
- E. Pipe: Submit the proposed pipe material including method to be used for joining the pipe segments.

## 1.5 REFERENCES

- A. Reference Standards:
  - 1. Driscopipe, Inc., "Technical Note #41," dated September 1993, may be used as a guideline for HDPE pipe design.

## PART 2 - PRODUCTS

### 2.1 DRILLING FLUID

- A. Drilling fluid shall be bentonite clay mixture. CONTRACTOR may use a polymer additive at CONTRACTOR's option.

### 2.2 PIPE

- A. Pipe shall be DIP or HDPE as specified in Section 22 11 13 Water Distribution Piping and Section 22 13 13 Sanitary Sewers.
  - 1. Ductile iron pipe shall be pressure class 350 or greater with joints designed specifically for directionally drilling applications.
  - 2. HDPE pipe shall be provided to meet the design system pressures, match ductile iron pipe size, and be sized to provide an equal or greater than flow capacity.
- B. CONTRACTOR shall determine the pipe SDR required based on the proposed installation procedures, and the following analysis:
  - 1. Tensile pull load: (Based on pipe weight, pipe friction on the ground, pipe friction in the bore hole, flotation loads, and submersion load; tensile load shall be calculated for a minimum of three conditions: When the pipe enters the borehole, midway through insertion, and as the pipe leaves the ream hole.) Limit tensile stress to 1,600 psi.
  - 2. Bending stress on pipe sidewalls during installation.
  - 3. Net longitudinal compressive stress, based on bending stresses.
  - 4. Total longitudinal axial stress from sustained loads.
  - 5. External differential pressure collapse/buckling resistance.
  - 6. Earth load on pipe following installation at maximum depth.
- C. Summarize results in a tabular format including values used for pipe physical properties.
- D. Include sketches to show critical installation dimensions.

- E. The SDR used shall be the lower of that specified by ENGINEER in 22 11 13 Water Distribution Piping and Section 22 13 13 Sanitary Sewers, or that required by the above analysis.
- F. DIP pipe shall be manufactured by US Pipe with TR Flex joints, Clow with Super-Lock joints, or approved equal.
- G. HDPE pipe shall be manufactured from high density PE 3408 polyethylene resin, having a dimension ratio (DR) of 11 or less. The DR is calculated as the outside diameter of the pipe divided by the minimum wall thickness.

### 2.3 UTILITY MARKERS

- A. Tracer wire is to be installed on all water main distribution lines and sanitary sewer pumping mains.
  - 1. For directional bores tracer wire shall be:
    - a. Directionally Drilled tracer wire to be Copperhead 'Soloshot' Extra High Strength Directional Drill Wire 1150# Break Load or equal.
  - 2. For conventional open cut construction tracer wire shall be:
    - a. Direct bury tracer wire to be Copperhead 10 CCS High Strength 600# Break Load or equal.
  - 3. Tracer wire shall be installed in a continuous fashion. Install tracer wire on top of pressure process piping and secure to main every five (5) feet with tape.
  - 4. The wire shall be brought to the surface at bore pits, valves, fittings or manholes through utility markers or tracer wire terminal boxes which may serve as access points. Tracer wire shall be brought to the surface at least every five hundred (500) feet unless noted by the OWNER. Care should be taken not to damage the wire coating. If wire coating is damaged, the CONTRACTOR shall repair the damaged coating with electrical tape.
  - 5. Tracer wire systems shall terminate in Rhino Triview Tracing wire stations. Terminals shall be external and colored green for sanitary sewer systems and blue for water distribution systems. Terminals should be located at least every one thousand (1,000) feet or as shown on the drawings.
  - 6. CONTRACTOR shall test the locator system for continuity upon completed installation. Should tracer wires fail to test for continuity then the test shall be considered a failure.
  - 7. Failure of the tracer wire shall result in the installation of utility markers at no additional cost to OWNER.

## PART 3 - EXECUTION

### 3.1 SITE CONDITIONS

- A. CONTRACTOR shall examine the site(s) indicated. The limits of surface excavation are shown on Drawings. CONTRACTOR shall be responsible for locating the borehole and receiving hole sufficiently back from the limits of excavation to allow connection to the horizontally drilled pipe.

### 3.2 PROTECTION

- A. Provide all required sediment and erosion control measurements to prevent drilling fluid or borehole cuttings from entering the wetlands areas or surface waters.

### 3.3 INSTALLATION

- A. Pilot hole shall establish the horizontal plane of the pipeline. A plot of length versus elevation versus left/right variance will dictate the actual as-built plan and profile of the pipeline. Data feedback and electronic guidance systems are supplemental surface tracking systems and shall be used to provide confirmation of position.
  - 1. Minimum depths are indicated on Drawings. Pipe may be installed at greater depths to facilitate the installation if the proposed greater depth is reviewed and approved by ENGINEER before installation.
- B. Reaming shall consist of using an appropriate tool to open the pilot hole to a slightly larger diameter than the carrier pipeline. The percentage over size shall depend on soil types, soil stabilities, depth, drilling fluid hydrostatic pressure, etc. Normal over sizing shall be from 120 to 150 percent of the carrier pipe diameter. Drilling fluid shall be forced down the hole to stabilize the hole and to remove soil cuttings.
- C. Pull back the entire pipeline length in one segment back through the drilling fluid along the reamed hole pathway. Proper pipe handling, cradling, bending minimization, surface force readings, constant insertion velocity, drilling fluid flow circulation/exit rate, and footage length installed shall be recorded. The pull-back speed shall be within the pipe manufacturer's recommendations.
- D. The as-built Drawings are finalized based on the final course followed by the reamer and the installed pipeline. The gravity forces may have caused the reamer to go slightly deeper than the pilot hole and the buoyant pipe may be resting on the crown of the reamed hole.
  - 1. Any bits, drills, reamers, or other tools lost or stuck in the hole shall be removed at CONTRACTOR's expense. If tools cannot be readily removed, CONTRACTOR may at CONTRACTOR's option abandon the hole. No payment shall be made for any lost equipment, material, or work on abandoned holes.
- E. Allowable Tolerances in Pipe Grade: A variation greater than 6 inches from the horizontal plan or designated grade is sufficient reason for rejection of the pipe, and pipe shall be re-bored to proper grade if so directed by ENGINEER at no cost to OWNER.
- F. Drilling Fluid: Drilling fluid to be used to facilitate installation of the pipe shall be adjusted within acceptable limits such that ground heaving and subsurface cavity formation through erosion are prevented.

### 3.4 CLEAN UP AND RESTORATION

- A. Spent drilling fluid and cuttings shall be confined to vicinity of drilling rig.
  - 1. Any drilling fluid which enters the pipe shall be removed by flushing or other suitable means.
  - 2. CONTRACTOR shall be responsible for clean up and restoration should the bore hole blow out due to excessive pressure in the drilling fluid. No additional payment shall be made for clean up costs required by OWNER, ENGINEER, or regulatory agencies due to a loss of drilling fluid. This includes all requirements of any MDEQ required frac-out plan.
- B. Restoration: Pits excavated to permit connection of bored pipe shall be backfilled, and disturbed surface shall be restored as described in the Township Standards.

### 3.5 FIELD QUALITY CONTROL

- A. Pipe Logs: Logs shall be kept giving the horizontal and vertical position of the transmission main or force main at 25-foot intervals along the pipe points to confirm its conformance to specified depth and line and grade shown on Drawings. No payment for any length pipe shall be made without a log accompanying it.

END OF SECTION 33 05 23.13