

## SECTION 330524 – DIRECTIONAL DRILLING

**SPECIFIER:** This section is for the underground installation of piping by directional drilling. When specifying this method of piping installation, care must be taken to ensure that the directional drilling contractor, whether a prime or sub, is well qualified and has experience in directional drills of the length and diameter on your project. Prequalification of contractors should be required. The standards for prequalification should include documentation of past experience on at least 3 projects of same or larger diameter and length under similar conditions; for example, river crossings. Notification of a prequalification requirement must be stated in the Advertisement or Invitation to Bid. Qualified and unqualified contractors should be notified prior to the bid date to avoid receiving a bid which cannot be accepted. The Bid Form should include a space for naming the drilling contractor if it is a subcontractor. Coordinate these items with the Project Manager, or the person responsible for the front-end documents.

When crossing or working in a Michigan state highway, see MDOT specs and contact the MDOT regional office for requirements. Contact the local road commission or authority for requirements in other roads.

For crossing under a railroad, contact the specific railroad company's engineering department.

For crossing under a river, stream or wetland, contact the Michigan DEQ.

Soil borings should normally be obtained and the report included in the bidding documents. The front-end documents should state that the bidders can rely on the boring logs for the time and at the location they were taken, and that if the bidder feels more information is required, they may perform additional investigations upon request. These clauses are important to maintain the performance nature of this specification.

Soil borings required for directional drill projects are typically deeper than for most other utility projects. Required soil boring depths will vary depending on soil types, ground water conditions, and profile elevations along the directional drill route. Caution should be used when determining or permitting a bidder to determine additional soil boring locations because unsealed soil boring holes or those too close to the drill path may create avenues for the directional drilling fluid to escape.

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification sections, apply to this section.

#### 1.2 SUMMARY

- A. This section includes the design, furnishing and installation of a pipe crossing under a [ street ] [ highway ] [ railroad ] [ river ] [        ], without disturbing the surface.
- B. Related sections include the following:
  - 1. Division 31 Section "Earthwork."
  - 2. [ Division 33 Section "Water Distribution System." ]

3. [ Division 33 Section "Storm Drainage." ]
4. [ Division 33 Section "Sanitary Sewer System." ]

### 1.3 REFERENCES

- A. Except as herein specified or as indicated on the Drawings, the work of this section shall comply with the following:
  1. ASTM Standard Specifications:
    - a. D2774 - Underground Installation of Thermoplastic Pressure Pipe.
    - b. F1962 - Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings.
  2. MDOT:
    - a. Standard Specifications for Construction.
    - b. Standard Plans.

### 1.4 DESIGN AND PERFORMANCE REQUIREMENTS

- A. Minimum Requirements:
  1. The requirements herein and indicated on the Drawings are minimum requirements.
  2. Select equipment necessary to provide the indicated finished product in the conditions present at the Project site.
  3. Conform to more stringent requirements if necessary to produce the finished product.
  4. Review of submittals by Engineer does not relieve Contractor from responsibilities under this Specification.

### 1.5 SUBMITTALS

- A. Design Data to Include:
  1. Method for directional drill.
  2. Equipment and method for monitoring the location of the drill head.
  3. Information on slurry mixture to be used.
  4. Calculations and drawings to support and identify the pipe class, installation, thrust and tensile forces, and proposed pipe profile to be used.
  5. Calculations and methods for buoyancy modifications during pull back.
- B. Close-Out Submittals:

1. After completion of the directional drilling operation, provide an as-built drawing.
2. Drawing to Include:
  - a. Scale: Same as Project Drawings.
  - b. Tabulation of pipeline depth at 25-foot intervals referenced to a stationed alignment located above the pipe.
  - c. Each horizontal alignment point witnessed to two permanent landmarks.

## 1.6 QUALITY ASSURANCE

### A. Installation Personnel Qualifications:

1. Trained and experienced in the use of directional drilling equipment and installation of the materials, for the specific application of this Project.
2. Knowledgeable of the design and in down hole drilling, impact of drilling in various geological formations, sensing and recording instrumentation and interpreting computer printout data.
3. Experienced in a minimum of [ 3 ] [ ] installations of similar or greater complexity and under similar conditions in the last [ 3 ] [ ] years.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

#### A. Product Pipe:

1. High density polyethylene pipe.
2. Minimum SDR [ 11 ] [ 9 ] [ ]. Determine if thicker walled pipe is necessary based on the proposed drilling depth, Site conditions, and a reference internal design working pressure of [ ] pounds per square inch at elevation [ ].

#### B. Drilling Fluids:

1. Organically inert.
2. Fluid composition must comply with applicable environmental regulations.
3. Select drilling fluid appropriate for conditions encountered at the site.

#### C. Detection Wire:

1. Copper wire, solid or braided, with coating to prevent oxidation and deterioration.
2. Minimum Gage: 12 AWG.

#### D. Staging Area Fencing:

1. Orange, plastic safety fence supported by steel fence posts.
2. Minimum Height: 4 feet.

3. Maximum Fence Post Spacing: 8 feet.
4. No vertical sags greater than 6 inches between posts.

E. Water: [ Contractor ] [ Owner ] shall be responsible for supplying water required for the Work.

**Edit Item 1 following as required.**

1. Water required for the performance of the Work may be obtained through the municipal water supply system. Contractor shall coordinate and pay for temporary connections and usage fees.

PART 3 - EXECUTION:

3.1 LINE AND GRADE

A. Pilot Hole Alignment:

**SPECIFIER: For mainline pipes, the drawings should include a profile which indicates minimum pipe depth per permit requirements. Do not specify maximum pipe depth unless there is a very specific reason to do so. The Contractor should propose a depth and pipe wall thickness to withstand the pressure. On service or short pipes, a profile may not be necessary and the vertical and horizontal alignment may need to be determined in the field. For larger projects, disposal of drilling fluids and soils can be significant, especially if they have to be transported offsite.**

**Choose one of the Items 1 following:**

1. [ Follow the grade as submitted by Contractor and reviewed by Engineer:
  - a. Minimum Cover: [ 5 feet at ends and 10 feet elsewhere along pipeline unless otherwise indicated on the Drawings] [As indicated on the Drawings. ]
  - b. Alignment shall be uniform and not include high points greater than 25% of the pipe's inside diameter. ]

1. [ Follow the grade of the ground surface:
  - a. Minimum Cover: [ 5 ] [ ] feet.
  - b. Do not create high points in the pipe. ]

1. [ Lines and grades shall be established in the field by Contractor and reviewed by Engineer. ]
2. Provide Engineer with a tabulation and plot of the pilot hole coordinate data at 25-foot intervals referenced to a datum line located above the entrance and exit elevations of the drill.
3. Obtain written acceptance of pilot hole alignment data from Engineer prior to reaming and pipe installation.

B. Final Product Pipeline: Allowable alignment deflection:

1. Horizontal: [ 5 ] feet.
2. Vertical: [ 2 ] feet.

### 3.2 STAGING AREAS

#### A. Drill Staging Area:

1. Disturb as little area as possible while providing adequate area for workers and equipment.
2. Keep area neat and orderly.
3. Install and maintain staging area fencing around perimeter.

#### B. Pipe Staging Area:

1. Disturb as little area as possible while providing adequate area for workers and equipment and to string, fuse and inspect pipe.
2. Keep area neat and orderly.
3. Install and maintain staging area fencing around perimeter.
4. Provide protection of exposed ends of pipe to prevent entry by children and animals.

#### C. Establish and maintain within right-of-way and easement boundaries identified by Owner.

#### D. Restore to original grade and condition after completion of work.

### 3.3 INSTALLATION

#### A. General:

1. Install pilot hole and pipe in conformance with the reviewed submittals.
2. Minimize subsurface disruption during pilot hole installation.
3. During pilot hole installation, notify Engineer immediately if partial or full blockage is encountered.
4. Complete operation as expeditiously as possible.
5. Disposal:
  - a. Locate an acceptable site for disposal of drilling fluids and excess soils resulting from drilling operation.
  - b. Be responsible for transport of materials to and from the drilling site to the disposal area as well as disposal costs.
  - c. Disposal shall be in compliance with applicable environmental and right-of-way regulations.

#### B. Drilling Fluids:

1. Source:

**SPECIFIER: Coordinate the following with Article 2.1.E.**

a. Supply materials required for drilling fluids [, including but not limited to water ].

2. Inadvertent Returns:

a. Minimize drilling fluid returns at locations other than drilling entry and exit points.

b. Immediately clean up inadvertent returns.

c. Be responsible for paying for costs and obtaining permits required for cleanup efforts.

d. Be responsible to repair damage caused by inadvertent returns.

e. [ Be responsible to repair, clean up, or replace [, including temporary water supply required ] water supply wells affected by inadvertent returns.

C. Drill Head Locating:

1. Establish method for determining the location of the advancing drill head.
2. Calculate and plot true vertical depth, horizontal distance and right and left bearing drift.
3. Verify drill head location at least every 25 feet.

D. Prereaming:

1. Determine if prereaming is required.
2. If Prereaming is Performed:
  - a. Determine required diameter to minimize subsurface disruption and allow unhindered pullback of the product pipeline.
  - b. Ensure that annular space around product pipeline is stabilized to prevent settlement.
3. During the operation, monitor the movement of the reaming head to ensure the hole is free of obstructions along the walls which could reduce the cross section of the installed pipe or which may hinder the pullback of the product pipeline.

E. Placement of Pipe:

1. Pull Back:
  - a. Use appropriate connection equipment between product pipeline and pullback pipe to eliminate transfer of rotational forces to product pipeline.
  - b. Support pipe as required to ensure a smooth, freely moving pull back.

- c. Control and limit tensile load on the pipe by devices such as hydraulic pressure regulators or load sensors.
  - d. The maximum tensile load on the pipe shall not exceed the maximum allowable recommended by the pipe manufacturer.
- 2. Detection Wire:
  - a. Tape the detection wire to the outside top of the pipe at 25-foot intervals.
  - b. Pull detection wire along with the pipe.

END OF SECTION 330524