STANDARD SPECIFICATIONS
SECTION 02446
HORIZONTAL DIRECTIONAL DRILLING

PART 1 GENERAL

1.1 DESCRIPTION

A. Section Includes: Requirements for Horizontal Directional Drilling (HDD) of High Density Polyethylene (HDPE) Pressure Sewer pipe.

1.2 QUALITY ASSURANCE

A. Experience: Actively engaged in horizontal directional drilling for a minimum of 3 years.

B. Field supervisory personnel: Experienced in the performance of the work and tasks as stated herein for a minimum of 3 years.

1.3 SUBMITTALS

A. Submit for information only.
   1. Presentation of similar experience in the last 3 years.
   2. Include, but not limited to, owner name, address, telephone number, contact person, date and duration of work, location, pipe information, and contents handled by pipeline.
   3. Supervisory field personnel and historical information of HDD experience.
      a. At least one of the field supervisors listed must be at site when HDD operations are in progress.

B. Submit following Section 01330.
   1. Working Drawings and written procedure describing in detail proposed method and entire operation for information only including, but not limited to:
      a. Size, capacity and arrangement of equipment.
      b. Location and size of drilling and receiving pits.
      c. Dewatering and methods of removing spoils material.
      d. Method of installing detection wire and pipe.
      e. Type, location and method of installing locator station.
      f. Method of fusion pipe segment and type of equipment.
      g. Type of cutting head.
      h. Method of monitoring and controlling line and grade.
      i. Detection of surface movement.
      j. Bentonite drilling mud for information only:
         1) Products information, material specifications, and handling procedures.
         2) Material safety data sheet and special precautions required.
         3) Method of mixing and application.

1.4 PROJECT CONDITIONS

A. Complete HDD so as not to interfere with, interrupt, or endanger surface and activity thereon.

B. Do not use HDD in rock stratum or subsoil consisting of boulders and underground obstructions that impede the process.

C. Comply with applicable ordinances, codes, statutes, rules, and regulations of State of Maryland, MSHA, applicable County building codes, affected Railroad Company, and applicable regulations of Federal Government, OSHA 29CFR 1926, and applicable criteria of ANSI A10.16-1995 (R2001), "Safety Requirements for Tunnels, Shafts, and Caissons."

PART 2 PRODUCTS

2.1 MATERIALS

A. Pipe.
   1. HDPE: See Section 02533.
   2. HDPE Joints:
      a. Use butt fusion joining technique for joining pipe segments installed by HDD. See Section 02533.
      b. When joining HDPE pipe at ends of directional drilling runs fusion bond to the adjacent pipe section.
         1) Use butt fusion, socket fusion, or electrofusion coupling joining technique: See Section 02533.
      c. Mechanical Couplings are not permitted for joining of directional drilled pipe sections.
   3. Connect to other pipe materials: See Section 02533.

B. Drilling Fluid.
   1. Bentonite drilling mud compatible with the environment.
   2. Waste oil or environmentally non-compatible polymers cannot be part of composition.

C. Detection Wire.
   1. TW, THW, THWN, or HMWPE insulated copper, 10 gage or thicker wire.

D. Locator Station.
   1. Underground, Flush Mounted:
      a. Tube minimum 15 inches long with minimum inside diameter of 2-1/2-inches made of non-corrosive material, schedule 40 PVC, HDPE, or equal.

b. Factory attached cast iron or high-impact plastic collar with ribs to prevent rotation when removing locking lid after locator station is set in concrete.
c. Light blue cast iron or high-impact plastic locking lid that will withstand AASHTO H-20 traffic loads and ultra-violet rays.
d. Mark locking lid to identify pipeline with a permanent identification such as P.S. Locator.
e. Terminal block made of a high dielectric material which is made of phenolic resin, plastic, micarta, Lexan or Bakelite for each locator station.
    1) Terminal block furnished with two 3/16-inch threaded studs, nuts, and washers made of nickel plated brass.
f. Approved manufacturers:
    1) C.P. Test Services, Inc., Model Mini.
    2) Handly, Industries, Model T2IS2.
    3) Or equal.
g. Manhole Mounted:
    1) Waterproof enclosure made from cast aluminum, galvanized steel, high-impact plastic, Lexan, Gyrlyn, or equal.
    2) Light blue schedule 40 PVC pipe or schedule 40 galvanized steel with an outside diameter of at least 3/4-inch to mount enclosure.
    3) Use similar materials for pipe and enclosure to fasten enclosure onto pipe following manufacturer's instructions.
    4) Approved manufacturers:
        a) Cott Manufacturing Company, Model Finklet or Finkplate, 2 leads.
        b) Gerome Manufacturing Company, Inc., Model Testox Series 300, 2 leads.
        c) Or equal.

PART 3 EXECUTION

3.1 PREPARATION

A. Excavate pits following working drawings and Section 02315.

B. Provide equipment to guard against electrocution and an alarm system on drilling equipment capable of detecting electrical current as it approaches electric lines.

C. Test pit underground utilities crossing before HDD operation following Section 01150.

3.2 OPERATION

A. General.
    1. Determine drilling length and equipment pull strength for type of soil encountered.
    2. Provide method to control line and grade.
        a. Provide and maintain instrumentation that accurately locates pilot hole.
        b. Drill pilot hole along path following Drawings to these tolerances:

1) Vertical alignment plus or minus 0.5 foot. Vertical path of the pilot hole must not establish new high points not shown on Drawings.
2) Horizontal alignment plus or minus 1.0 foot.

c. Include electronic monitoring of the horizontal and vertical drilling head location. Obtain an accuracy range within 1 inch of actual position of the pipeline. Record position readings at a maximum of 10 foot intervals.
d. At completion of pilot hole drilling, furnish Engineer tabulations of horizontal and vertical alignment.

3. When water is encountered.
   a. Provide and maintain a dewatering system of sufficient capacity to remove water.
   b. Keep excavation free of water until backfill operation is in progress.
   c. Perform dewatering in such a manner that removal of soils particles are held to a minimum.
   d. Dewater into a sediment trap following Section 01570.
4. Maintain close observation to detect settlement or displacement of surface and adjacent facilities.
   a. Notify Engineer immediately if settlement or displacement is detected.
   b. Act to maintain safe conditions and prevent damage.

B. Drilling Operation.
   1. Drilling Fluids.
      a. Maintain drilling fluid in bore hole to increase stability of the surrounding soil and reduce drag on pulled pipe.
      b. Dispose of drilling fluid and other spoils at location following laws, ordinances, rules, and regulations of local jurisdiction.
      c. Transport excess fluids and other spoils to the disposal site, at no additional cost to the Commission.
      d. Minimize drilling fluid at locations other than entry and exit points. Immediately clean up any drilling fluids that inadvertently surface.
      e. Provide clean water for drilling, at no cost to the Commission, at Engineer's requirement.
   2. Pilot Hole Drilling.
      a. Angle entry hole so that curvature of pilot hole does not exceed allowable bending radius of HDPE pipe.
      b. Be able to make a turn of up to 90 degrees and maintain a curvature not to exceed allowable bending radius of HDPE pipe.
      c. Alignment Adjustment and Restarts.
         1) Follow pipeline alignment on Drawings within tolerances specified herein. Before adjustments, notify Engineer for approval.
         2) Notify Engineer when forward motion of operation is stopped by an obstruction.
            a) Abandon in place with drilling fluid, unless Engineer directs otherwise.

b) Upon Engineer's approval, attempt a second installation at approved location or excavate at the point of difficulty and install the HDPE pipe by trench method as specified in Section 02533.

3) Withdrawals, abandonments, and restarts are at no additional cost to the Commission when HDD is provided as an option of installation of pipe.

4) Exercise caution including, but not limited to, locating utilities following Section 01150, drilling downholes (test pits) to observe drill stems or reamer assembly to clear other existing utilities at locations following Drawings.

5) Keep the number of boring pits to a minimum, no closer than following distances, unless otherwise approved by Engineer.

a) Equipment must be capable of boring following lengths in a single bore.

Iron Pipe Size (IPS)	Boring Distance (In feet)
1-1/4	400
1-1/2	400
2	350
2-1/2	350
3	300
4	250

3.3 INSTALLATION

A. Installing HDPE Pipe.

1. Provide a swivel to reaming assembly and pull section of pipe to minimize torsional stress on pull section after drilling pilot hole.
2. Hold reaming diameter to 1.5 times the outside diameter of HDPE pipe being installed.
3. Protect pull section as it proceeds during pull back so that it moves freely and is not damaged.
4. Pull detection wire along with HDPE pipe. Extend wire into locator station at each end of HDPE pipe.
5. When connecting to adjacent pulled or non-pulled section of HDPE pipe, allow pull section of pipe to extend past termination point. Make tie-ins the next day after pullback of HDPE pipe.
6. Test pit pipe installation to verify horizontal and vertical alignment at Engineer's direction.
   a. One test pit for every 500 feet along length of pipeline.
   b. Engineer may order additional test pit for each test pit that reveals pipeline installation is not in compliance with the Contract Documents at no additional cost to the Commission.
7. Replace portions of the pipeline not in compliance with the Contract Documents at Engineer's direction and at no additional cost to the Commission.

B. Installing Locator Station.
   1. Locator Stations.
      a. Provide locator stations, following Standard Details or Drawings, at each end of the HDPE pipe.
      b. Flush mount underground locator: See Standard Details.
      c. When HDPE pipe is connected to another type of pipe material, continue detector wire over the connecting pipe, so locator station is installed out of paved area.
      d. In areas scheduled to be improved identify and protect station locations immediately after installation.
         1) Space 3 stakes equally around the station.
         2) Extend at least 4 feet above existing grade.
         3) Flag with orange fluorescent wrap within 6 inches from top of stakes.
      e. Manhole mounted locator station: See Standard Details.
   2. Detection Wire.
      a. Install detection wire without splices as shown on Standard Details.
      b. Terminate detection wire inside locator box using proper sized crimp type connectors on wire ends.
      c. Connect each wire to a terminal maintaining at least 18 inches slack in each wire for underground flush mounted locator stations.
      d. Neatly coil slack wire in test station below terminal board.
      e. Locate wires on top and along HDPE pipe.
      f. Allow adequate slack and support to protect wires from damage during backfilling operations.
      g. Test each detection wire for continuity after backfill is completed.
         1) If test for continuity is negative, repair or replace at Engineer's direction.
         2) After continuity is verified, connect each detection wire to terminal block in locator station.

3.4 FIELD QUALITY ASSURANCE

A. Perform field testing of HDPE pipe following Section 02533.

PART 4 MEASUREMENT AND PAYMENT

4.1 Payment for HDPE pipe installed by HDD or by open cut trench method measured and paid for following Section 02533.

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