

SECTION 071
SPECIFICATIONS - HORIZONTAL DIRECTIONAL DRILLING

Installation of gravity sanitary sewer by use of horizontal directional drilling processes shall conform to the following specifications. Horizontal directional drilling shall refer to the process of pulling specified pipe at the designated location and grade by the use of equipment specifically designed to create a bore hole then ream the hole to the diameter necessary for the simultaneous insertion of the pipe.

1.0 Experience Requirements

Prior to the submission of bids, Contractors shall have completed the installment of at least 5,000 feet of directional-drilling installation of wastewater gravity collection piping. The required 5,000 feet of directionally drilled wastewater piping installation shall include only that experience in the installation of gravity sewer installed at a specified grade. Field supervisory personnel employed by the Contractor shall have both the necessary experience and manufacturer training in the operation of the directional drilling equipment proposed to be used in the performance of the work.

Bidders shall submit documentation showing conformance with the experience requirements at any time after the opening of the Bids. Information must include, but not be limited to, date and duration of work, location, project information (i.e., length, diameter, depth of installation, pipe material, etc.) and project owner information, (i.e., name, address, telephone number, contact person).

Bidders shall also submit a list of field supervisory personnel and their experience with directional drilling operations. At least one qualified field supervisor listed must be at the site and be responsible for all work at all times when directional drilling operations are in progress.

2.0 Pre-Construction Submittals

Before directional drilling work may commence, the Contractor shall submit working drawings and written procedures describing in detail the proposed method of installation. This will include, but not be limited to, size, capacity and setup requirements of equipment, location and siting of drilling and receiving pits and method of monitoring and controlling line and grade. If the Contractor determines that modifications to the method and equipment as stated in the original submittals are necessary, the Contractor will submit details of and reasons for such modifications.

Also, the Contractor shall submit the following information pertaining to the bentonite drilling products: a MSDS sheet(s), any necessary safety precautions and methods of removing spoils.

Drilling operations must not interfere with, interrupt or endanger either surface or subsurface developments. The Contractor must comply with all applicable jurisdictional codes and OSHA requirements.

When available, the Sanitary District will provide soil-boring logs near the location of the proposed work. When available, these logs are included as an appendix to these specifications. If not included, obtaining a subsurface profile of the location of the proposed work shall be the exclusive responsibility

of the Contractor. Furthermore, the Contractor shall not make any claims for additional compensation for additional work made necessary as a result of existing subsurface conditions.

3.0 Materials for Directional Drilling

3.1 Piping Materials

Either high-density polyethylene pipe (HDPE) or restrained joint PVC pipe, and fittings, shall be used for horizontal directional drilling. The material to be used, as well the sizing of the piping, shall be specified on the plan sheets. Piping materials shall conform to Section 027 of these specifications.

3.2 Drilling Fluid

Drilling fluid shall be a mixture of water and bentonite clay. Information regarding other proposed drilling fluids shall be submitted to the Engineer for approval at least two (2) weeks before the opening of bids.

Disposal of excess drilling fluid and spoils shall be the responsibility of the Contractor. Excess drilling fluid and spoils will be disposed at a location approved by the Engineer.

Drilling fluid returns caused by fracturing of formations at locations other than the entry and exit points shall be minimized. The Contractor will immediately clean up any drilling fluid that is exposed through fractures.

The Contractor shall be responsible for making provisions for a clean water supply for the mixing of drilling fluid.

4.0 Execution of Directional Drilling

4.1 Safety

At the location of the work, the Contractor shall be solely responsible for the safety of all parties.

The selection of drilling procedures and equipment shall provide protection against electrical shock. Grounding mats, grounded equipment, hot boots, hot gloves, safety glasses and hard hats shall be used. The drilling equipment shall have an alarm system capable of detecting electrical current.

4.2 Pipe Installation

4.2.1 Drilling Equipment

The drilling equipment must be capable of placing the specified pipe at the planned line and grade without inverted slopes or deflection not in accordance with these Specifications. The equipment

must be capable of pulling pipe from either the downstream or upstream manhole location. The number of pits shall be kept to a minimum. The equipment must be capable of boring the specified lengths, from manhole to manhole, in a single bore.

Since pipe selection is dependent upon equipment pullback force, the proposal and approval of the use of equipment with a pullback rating greater than the maximum pullback force specified may invalidate the proposed piping and cause the need for the Engineer to redesign of the proposed piping. If the Engineer determines that a redesign of the proposed piping is necessary, the Contractor shall be responsible for all costs associated with the redesign of the proposed piping, including any costs associated with restocking, transport and complete replacement of materials.

Throughout the insertion process, the Contractor shall constantly measure and record axial tension force readings on the pipe material, the insertion velocity, the mud flow circulation and exit rates and the length of pipe installed. Furthermore, the equipment must have a guidance system that has the capability of measuring inclination and azimuth. The guidance system must have an independent means of ensuring the accuracy of the installation. The Contractor shall demonstrate a viable method to eliminate accumulated error due to the inclinometer (pitch or accelerometer). The guidance system shall be capable of generating a plot of the borehole survey showing depths of the installed piping along its entire length. The scale of the plot of the borehole survey shall be the same as that shown on the project profile sheets. Depths shown on the plot of the borehole survey shall be accurate to 1/10 of a foot. The guidance system must have an inclination accuracy of 0.01% of grade, a range of 1/10 of a foot, an azimuth repeatability of 0.1% of grade and a range of 1/10 of a foot.

The Contractor shall measure the repeatability of the inclination/azimuth before drilling commences.

4.2.2 Site Set-up

Equipment set-up shall be determined by the Contractor and submitted to the Engineer per the requirements as stated in this Section. The entry angle of the pilot hole and the boring process will maintain a curvature that does not exceed the allowable bending radii of the product pipe per the piping manufacturer. The set-up must account for pipe bending in the vertical and horizontal directions, as well as the set-up and spacing needed for the butt-fusion process.

4.2.3 Insertion of Pipe

The Contractor shall follow the pipeline alignment as shown on the drawings and in accordance with the specifications.

In the event of difficulties encountered during boring operations that require the withdrawal of the directional-drilling equipment from the pilot hole, the Contractor shall be allowed to withdraw and abandon the boring and begin a second attempt. With the approval of the Engineer, the Contractor may excavate at the point of the difficulty to correct problems. Unless otherwise directed by the Engineer, any unsuccessful attempts at performing the specified directional drill, including any pipe

installation, and any excavations performed by the Contractor to remove obstructions to the drilling process shall be made part of the contract amount and shall not serve as basis for claims for additional compensation.

The Engineer must be notified immediately if any obstruction is encountered that stops the forward progress of drilling operations. The Engineer shall review both the situation and the Contractor's assessment thereof and then determine the feasibility of continuing drilling operations. When it is determined that it is impossible to continue drilling operations, the Contractor will be allowed to abandon the completed portion in place, unless otherwise directed by the Engineer. Abandonment of installed piping shall be to the satisfaction of the Engineer. The Engineer shall determine the necessity of ordering an alternative construction method in place of horizontal directional drilling.

The sizing of the pilot hole reamed to facilitate the insertion of the specified pipe shall be minimized to maximize support for the pipe. Reaming diameter shall not exceed 120% to 150% of the outside diameter of the pipe being installed. The pipe being pulled into the tunnel will be protected and supported so that it moves freely and is not damaged by stones and debris on the ground during installation.

The Contractor will allow sufficient lengths of product pipe to extend past the termination point to allow for contraction. Pulled HDPE pipe shall be allowed forty-eight (48) hours of stabilization prior to making any connections.

Unless otherwise specified by the Engineer, connections of pipe installed by use of directional drilling methods to new manholes shall be made using press-seal boots as detailed in Section 043 of these specifications.

A tracer wire shall be installed with the pipe, regardless of pipe material. The tracer wire shall be either a solid hard drawn copper conductor or an annealed stranded stainless steel conductor. The conductor shall be insulated with high density polyethylene (HDPE) in accordance with the physical and electrical properties per ASTM D-1248. The Contractor shall appropriately size and install a tracer wire compatible with the pullback rating of the equipment being used, but in no case shall the wire be smaller than ten (10) gage. The tracer wire shall be brought to the surface within a six (6) inch PVC riser. The riser shall have a cast iron cap.

END OF SECTION