CITY OF FORT WAYNE MASTER UPDATED: 1/5/15

SECTION 33 05 23.13

Utility Horizontal Directional Drilling

NTS: This section covers the installation of pressure pipe, including water and sanitary, by means of Horizontal Directional Drilling (HDD). Coordinate with appropriate pipe materials and utility installation specification. Edit the section based on the project specific utility type being installed for project. This section must be used in conjunction with the pipe material sections, the trenching and earthwork section and the related utility pipe installation, as each covers different parts of the work.

1. GENERAL
	1. DESCRIPTION
		1. Scope:
			1. Contractor shall furnish and install pipe by horizontal directional drilling (HDD) construction methods, as shown on the drawings and conform to this specification. The Work includes, but is not limited to, excavation, dewatering, removal of all materials encountered in the drilling operations, disposal of all material not required in the Work, as shown on the drawings and as specified herein.
			2. Contractor shall be responsible for the final constructed product, and for furnishing the permits, qualified labor and superintendence necessary for this method of construction.
		2. Coordination:
			1. Review construction sequencing and installation procedures under other Sections.
			2. Contractor responsible to coordinate between other construction contracts that may be on going simultaneously.

NTS: List below only sections covering products, construction, and equipment specifically identified in this section and specified in another section and directly referenced in this specification. Do not list administrative and procedural Division 01 sections.

NTS: Insert at (--1--) the number and name of the Division 33 material section(s). Edit references to suit the project. Include the appropriate utility installation section, based on project specific conditions.

* + 1. Related Sections:
			1. Section 31 00 05, Trenching and Earthwork.
			2. Section (--1--).

NTS: Section “1.2” is to be included if project is bid on unit price basis. Section to be deleted or revised if project is to be bid on lump sum basis.

NTS: Adjust Section “1.2” below for additional work item numbers as needed. Coordinate M&P below with other work specified, measured, and paid in Division 33 Utilities and Division 31 Earthwork.

* 1. MEASUREMENT AND PAYMENT
		1. Measurement and payment for HDD installation of piping and associated appurtenances shall be included in the measurement and payment of each pipe material, except for specific Work items listed in other specification sections.
	2. REFERENCES

NTS: Retain applicable standards below. Add others as required.

* + 1. Standards referenced in this Section are listed below:
			1. ASTM International.
				1. ASTM D2321, Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
				2. ASTM D2774, Practice for Underground Installation of Thermoplastic Pressure Piping.
				3. ASTM D3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
				4. ASTM F-714, Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
			2. American Water Works Association
				1. AWWA C651, Disinfecting Water Mains
	1. QUALITY ASSURANCE
		1. Regulatory Requirements:
			1. Comply with requirements and recommendations of authorities having jurisdiction over the Work, including.

NTS: Insert at additional authorities having jurisdiction over the work, including utility owners as applicable, owners of rights-of-way, and others. Add paragraphs as required.

* + - * 1. Indiana Department of Environmental Management
				2. INDOT Right-of-Way permit and other permits deemed necessary by Owner
			1. Obtain required permits for Work in roads, rights of way, and other areas of the Work, unless otherwise stipulated by Owner.
		1. The Contractor or sub-contractor performing the horizontal directional drilling work shall have previous experience with projects of similar size, type and complexity.
		2. All supervisory personnel must be adequately trained in directional drilling.
	1. SUBMITTALS
		1. The Contractor shall prepare and submit for review only, prior to the start of construction, the following:
			1. Horizontal Directional Drilling Plan describing the equipment, methods, procedures (pilot hole drilling, insertion, reaming, pullback, coating protection, internal cleaning, internal gauging, hydrostatic tests, dewatering, purging, etc.), monitoring procedures (pressures, depth, alignment, placement, entrance and exit points, etc.), construction sequence and scheduling, contingency plans, and other items of concern to be performed during the horizontal directional drilling process.
			2. Project Safety Plan.
		2. Informational Submittals: Submit the following:
			1. Field Quality Control Submittals:
				1. Results of each specified field quality control test.
			2. When requested by Engineer, submit:
				1. Information on previous horizontal directional drilling projects, both firm and employees, of similar size, type and complexity.
				2. A list of references of persons or firms who can attest to the quality of performed work.

NTS: Remove “3 and 4” below if not required for the project.

* + - 1. The following product data is required from the pipe supplier and/or fusion provider:
				1. Pipe Size
				2. Dimensionality
				3. Pressure Class per applicable standard
				4. Color
				5. Recommended Minimum Bending Radius
				6. Recommended Maximum Safe Pull Force
				7. Fusion technician qualification indicating conformance with this specification
		1. Closeout Submittals: Submit the following:
			1. Record Documentation:
				1. Maintain accurate and up-to-date record documents in accordance with 01 78 39, Project Record Drawings showing modifications made in the field, in accordance with approved submittals, and other Contract modifications relative to buried piping Work. Submittal shall show actual location of all piping Work and appurtenances at same scale as the Drawings.
				2. Show piping with elevations referenced to Project datum and dimensions from permanent structures. For each horizontal bend in piping, include dimensions to at least three permanent structures, when possible. For straight runs of piping provide offset dimensions as required to document piping location.
				3. Include profile drawings with buried piping Record Documents when the Contract Documents include piping profile drawings.
	1. PRODUCT DELIVERY, STORAGE AND HANDLING

NTS: Edit section B below based on project specific requirements. Add additional requirements as required.

* + 1. Material delivery, storage and handling must conform to requirements in Contract Documents. Refer to Section 01 65 00 Product Delivery Requirements and Section 01 66 00 Product Storage and Handling Requirements.
1. PRODUCTS

NTS: Edit Section 2.1 below, as required for additional project materials. Coordinate with Division 33 piping material specification sections. Piping materials shall not be included below.

* 1. MATERIALS
		1. General:
			1. Refer to division 33 specification sections for pipe material requirements.
		2. Equipment Requirements:
			1. The Contractor shall ensure that appropriate equipment is provided to facilitate the installation. Equipment shall be matched to the size of pipe being installed and shall have appropriate torque and thrust/pullback capacity for the diameter and length of the intended drilling sections. The Contractor will ensure that the drill rod can meet the bend radius required for the proposed installation.
		3. Drilling Fluids:
			1. A mixture of bentonite clay or other approved slurry and potable water shall be used as the cutting and soil stabilization fluid. The viscosity shall be varied to best fit the soil conditions encountered. Water shall be clean and fresh. No other chemicals or polymer surfactant is to be used in the drilling fluid without the written consent of the Engineer and after a determination is made that the chemicals to be added are not harmful or corrosive to the facility and are environmentally safe.
			2. The Contractor shall identify the source of fresh water for mixing the drilling mud. The Contractor shall be responsible for approvals and permits required for such sources as streams, rivers, ponds, or fire hydrants. Any water source other than potable water may require a pH Test.
			3. Monitoring of the drilling fluids such as the pumping rate, pressures, viscosity, and density is required during the pilot bore, back reaming, and pipe installation stages, to ensure adequate removal of soil cuttings and the stability of the bore hole. Relief holes can be used as necessary to relieve excess pressure down hole. To minimize heaving during pullback, the pull back rate is determined in order to maximize the removal of soil cuttings without building excess down hole pressure. Excess drilling fluids shall be contained at entry and exit points until they are recycled or removed from the site. Entry and exit pits shall be of sufficient size to contain the expected return of drilling fluids and soil cuttings.
			4. The Contractor shall ensure that all drilling fluids are disposed of or recycled in a manner acceptable to the appropriate local, state, or federal regulatory agencies. When drilling in suspected contaminated ground, the drilling fluid shall be tested for contamination and disposed of appropriately. Any excess material shall be removed upon completion of the bore.
			5. Restoration for damage caused by heaving, settlement, escaping drilling fluid (fracout) or the directional drilling operation, is the responsibility of the Contractor. Any pavement heaving or settlement damage requires restoration/replacement of the pavement per applicable standards of authorities having jurisdiction.

NTS: Coordinate with project specific utility installation section.

Buried piping identification or tracing wire is typically used for pressure pipe applications. If project is a sanitary utility installation ensure that the tracing wire requirements are listed in Section 33 31 00- Sanitary Sewer Piping Installation.

* + 1. Buried Piping Identification
			1. Refer to applicable Division 33 installation Section.
1. EXECUTION
	1. INSTALLATION
		1. General:
			1. Contractor shall install the pipelines by means of horizontal directional drilling as shown, specified and as recommended by the manufacturer.
			2. Contractor shall be responsible for his means and methods of directional drilling construction and shall ensure the safety of the work, the Contractor’s employees, the public, and adjacent property, whether public or private.
			3. Contractor shall anticipate that portions of the drilled excavation will be below the groundwater table.
			4. Contractor shall comply with all local, state, and federal laws, rules, and regulations at all times to prevent pollution of the air, ground, and water.
			5. If there is a conflict between manufacturer's recommendations and the Drawings or Specifications, request instructions from Engineer before proceeding.
			6. The pipe shall be installed in the location and to the line and grade designated on the drawings.
			7. Provide for testing and cleanup as soon as practicable, so these operations do not lag far behind pipe installation. Perform preliminary cleanup and grading operations immediately after backfilling.
			8. All surfaces shall be finish graded to original contours and ground cover.
			9. Excavated material, which is not removed from the immediate site, shall be stockpiled so as to cause as little inconvenience to the property owners as possible. Driveways and street crossings must be kept clear.
			10. Excavation for entry, recovery pits, slurry sump pits, or any other excavation shall be carried out in accordance with Specification Section 31 00 05, Trenching and Earthwork. Sump areas or holding tanks are required to contain drilling fluids.
			11. After completing installation of the product the work site shall be restored. The work site shall be cleaned of all excess slurry left on the ground. Removal and final disposition of excess slurry or spoils as the product is introduced shall be the responsibility of the Contractor.
			12. Excavated areas shall be restored in accordance with the Contract Documents. The cost of restoring damaged pavement, curb, sidewalk, driveways, lawns, storm drains, landscape, and other facilities is borne by the Contractor.
			13. If underground utilities and/or structures not shown on the Drawings are encountered, notify the Owner and do not proceed until instructions are obtained. Notify the Owner if springs or running water are encountered.

NTS: Utility verification listed below is a part of the work. If there are project specific requirements to include potholing as a separate pay item refer to Section 31 00 05 Trenching and Earthwork.

* + 1. Utility Verification (Potholing)
			1. Prior to the start of water main construction, Contractor shall verify all underground utilities (potholing) that may conflict with water main construction. Cost of potholing shall be included in the cost of the pipe installation unit price.
			2. Potholing results shall be presented to the Engineer on a full set of drawings showing accurate locations of utilities. Information marked on the plans should include horizontal tie downs as well as depths related to USGS elevation.
			3. Alignment of the proposed water main (horizontal and vertical) may be adjusted in the field upon review of potholing results by the Engineer.
		2. Locating and Protecting Existing Building Sewers.
			1. Building sewers are considered “private” and are not part of the public sewer system and begin at the inside face of the public sewer.
			2. City Utilities will televise the sanitary sewer main and furnish the Contractor with sanitary sewer tap locations, to the best of their ability, as a measurement from the downstream manhole.
			3. It shall be the Contractor’s responsibility to pothole and verify the location of the underground utility that may be in conflict with the water main construction.
			4. It shall be the Contractor’s responsibility to protect building sewers during all construction activities.
			5. Any and all costs associated with locating, protecting, and repairing building sewers shall be considered incidental to the project cost and the responsibility of the Contractor.
		3. Drilling Operations:
			1. Bore path and alignment are as indicated in the Contract Documents. The path of the bore may be modified based on field and equipment conditions. Entry and exit locations and control-point elevations shall be maintained as indicated in the Contract Documents.
			2. Bend radii shown in the Contract Documents are minimum allowable radii and shall not be reduced.
			3. Directional drilling/boring shall use techniques of creating or directing a borehole along a predetermined path to a specified target location. Directional drilling shall involve use of mechanical and hydraulic deviation equipment to change the boring course and Contractor shall use instrumentation to monitor the location and orientation of the boring head assembly along a predetermined course.
			4. Drilling shall be accomplished with fluid assisted mechanical cutting. The spoils shall be transported from the Site and be properly disposed. Under no circumstances will the drilling spoils be permitted to be disposed into waterways, sanitary, storm, or any other public or private drainage system.
			5. Steering shall be accomplished by the installation of an offset section of drill stem that causes the cutterhead to turn eccentrically about its centerline when it is rotating. When steering adjustments are required, the cutterhead offset section is rotated toward the desired direction of travel and the drill stem is advanced forward without rotation.Pilot hole shall be drilled on bore path with no deviations greater than 5% of depth over a length of 100-feet. In the event that pilot does deviate from the bore path more than 5-feet of depth in 100-feet, Contractor will notify Engineer and Engineer may require Contractor to pull-back and re-drill from the location along bore path before the deviation. In the event that a drilling fluid fracture, inadvertent return, or returns loss occurs during pilot hole drilling operations, Contractor shall cease drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a March funnel and wait another 30 minutes. If mud fracture or returns loss continues, Contractor will discuss additional options with the Engineer and work will then proceed accordingly.
		4. Locating and Tracking:
			1. The Contractor shall at all times provide and maintain instrumentation that will accurately locate the pilot bore/hole and measure drilling fluid flow and pressure.
			2. The Contractor shall describe the method of locating and tracking the drill head during the pilot bore. The Owner recognizes walkover, wire line, and wire line with surface grid verification, or any other system as approved by the Engineer, as the accepted methods of tracking directional bores. The locating and tracking system shall be capable of ensuring that the proposed installation is installed as intended. The locating and tracking system shall provide information on:
				1. Clock and pitch information
				2. Depth.
				3. Battery status.
				4. Position (x,y).
				5. Azimuth, where direct overhead readings (walkover) are not possible (i.e. subaqueous or limited access transportation facility.)
				6. Alignment readings or plot points shall be taken and recorded every 5 feet.
				7. Before commencement of a directional drilling operation, proper calibration of the equipment (if required) shall be undertaken.
			3. Contractor shall provide Engineer access to all data and readout pertaining to the position of the bore head and fluid pressures and flows.
			4. All facilities shall be installed in such a way that their location can be readily determined by electronic designation after installation. For non-conductive installations this shall be accomplished by attachment of tracing wire, as buried piping identification.
			5. The drill path shall be accurately surveyed with entry and exit areas placed in the appropriate locations within the areas indicated on drawings. If using a magnetic guidance system, drill path will be surveyed for any surface geomagnetic variations or anomalies.
			6. Entry and exit areas shall be drilled so as not to exceed the bending limitations of the pipe as recommended by the pipe supplier.
		5. Ream and Pullback:
			1. After an initial bore has been completed, a reamer will be installed at the termination/exit pit and the pipe will be pulled back to the starting/entry pit.
			2. Reaming operations shall be conducted to enlarge the pilot after acceptance of the pilot bore. The number and size of such reaming operations shall be conducted at the discretion of the Contractor.
			3. Back ream hole diameter shall be no greater than the sum of the maximum product outside diameter (OD) plus 6 inches.
			4. The maximum allowable pull exerted on the pipe pipelines shall be measured continuously and limited to the maximum allowed by the pipe manufacturer so that the pipe or joints are not over stressed.
			5. A swivel shall be used to connect the pipeline to the drill pipe to prevent torsional stresses from occurring in the pipe.
			6. The lead end of the pipe shall be closed during the pullback operation.
			7. The pipelines shall be adequately supported by rollers and side booms and monitored during installations so as to prevent over stressing or buckling during the pullback operation.

NTS: Edit Paragraph F.8. for Certa-Lok pipe.

* + - 1. Support/Rollers shall be spaced at a maximum of 60 feet on centers, and the rollers shall be comprised of a non-abrasive material arranged in a manner to provide support to the bottom and bottom quarter points of the pipeline allowing for free movement of the pipeline during pullback.

NTS: Insert at (--1--) below the required utility installation section where pipe joints are included. Pipe joints are covered in Section 33 11 00 Water Piping Installation or 33 31 00 Sanitary Sewer Installation., include based on project specific conditions.

* + 1. Joining Pipe Sections
			1. Refer to Section (--1--) for pipe jointing requirements.
		2. Transitions from One Type of Pipe to Another:
			1. Provide all necessary adapters, specials and connection pieces required when connecting different types and sizes of pipe or connecting pipe made by different manufacturers.
	1. WORK AFFECTING EXISTING PIPING
		1. Location of Existing Piping:
			1. Locations of existing piping shown on the Drawings shall be considered approximate.
			2. Contractor shall determine the true location of existing piping to which connections are to be made, and location of other facilities which could be disturbed during earthwork operations, or which may be affected by Contractor’s Work.
		2. Taking Existing Pipelines Out of Service:
			1. Do not take pipelines out of service unless approved by Engineer.
			2. Notify Engineer, in writing, at least 48 hours prior to taking pipeline out of service.
	2. QUALITY CONTROL
		1. A representative of the Contractor must be in control of the operation at all times. The representative must have a thorough knowledge of the equipment and the procedures to be performed, and must be present at the job site during the installation.
		2. The Owner must be notified 48 hours in advance of starting work. The installation shall not begin until the Owner’s representative is present at the job site and agrees that proper preparations have been made.

NTS: Edit section A below for the appropriate Division 33 piping installation specification. Insert 33 31 00 Sanitary Sewer Piping Installation or 33 11 00 Water Piping Installation.

* 1. TESTING OF PIPING
		1. General:
			1. Refer to applicable Division 33 piping installation specifications for testing requirements.
			2. When there is any indication a pipe has sustained damage and may leak, the Work is to be stopped and the damage investigated. The Engineer may require a pressure test. The testing may consist of one of the following methods but shall always meet or exceed Engineer’s testing requirements:
				1. Manufacturer's pressure testing recommendations for the type of pipe being installed are followed. The Engineer shall be notified and at his/her option be present during the test for review of the test results for compliance. The pressure test shall be performed within twenty-four (24) hours. A copy of the test results shall be furnished to the Engineer. If the pipe is not in compliance with specifications, the Owner may require it to be filled with flowable fill.
				2. Product carrier pipes installed without a casing shall meet pressure requirements set by the Engineer. A copy of the test results shall be furnished to the Engineer. If the pipe is not in compliance with specifications the Owner may require it to be filled with flowable fill.
	2. CLEANING AND DISINFECTION
		1. General:
			1. Refer to applicable Division 33 piping installation specification for cleaning and disinfection requirements.

+ + END OF SECTION + +