
USACE / NAVFAC / AFCEC / NASA UFGS-33 05 23.13 (November 2013)
Change 1 - 02/16

Preparing Activity: NASA Superseding
UFGS-33 05 23.13 (February 2010)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in Agreement with UMRL dated July 2019

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SECTION 33 05 23.13

UTILITY HORIZONTAL DIRECTIONAL DRILLING 11/13

NOTE: This guide specification covers the requirements for directional drilling systems, equipment, piping and procedures.

Adhere to [UFC 1-300-02](#) Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a [Criteria Change Request \(CCR\)](#).

NOTE: Refer to UFGS Section **33 05 23 TRENCHLESS** UTILITY INSTALLATION for microtunneling gravity sanitary sewer and storm sewer mains **300 mm12 inches** and larger in diameter.

PART 1 GENERAL

1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)

AASHTO T 180 (2017) Standard Method of Test for
Moisture-Density Relations of Soils Using
a 4.54-kg (10-lb) Rammer and a 457-mm
(18-in.) Drop

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926.652 Safety and Health Regulations for
Construction; Subpart P, Excavations;
Requirements for Protective Systems

1.2 SUBMITTALS

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project.

The Guide Specification technical editors have designated those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy,

Air Force, and NASA projects.

An "S" following a submittal item indicates that the submittal is required for the Sustainability eNotebook to fulfill federally mandated sustainable requirements in accordance with Section 01 33 29 SUSTAINABILITY REPORTING. Locate the "S" submittal under the SD number that best describes the submittal item.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.][information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Statement of Qualifications and Records; G[, [____]]

SD-03 Product Data

Polyethylene Pipe; G[, [____]]

Drilling Fluids; G[, [____]]

Additives; G[, [____]]

Mixtures; G[, [____]]

Safety Data Sheets

SD-05 Design Data

Secondary Containment Plan; G[, [____]]

SD-06 Test Reports

Soil Test Data

SD-07 Certificates

Drill Rod

SD-11 Closeout Submittals

Record Drawings

Complete Work Logs of Guided Directional Drill Operations

1.3 QUALITY CONTROL

1.3.1 Qualifications

Ensure that the field supervisor and workers assigned to this project are experienced in work of this nature and have successfully completed similar projects of similar length, pipe type, pipe size, and soil type using directional drilling in the last three (3) years. As part of the bid submission, submit a description of such project(s) which include, at a minimum, a listing of the location(s), date of project(s), owner, pipe type, size installed, length of installation, type, and manufacturer of equipment used, and other information relevant to the successful completion of the project.

1.3.2 Safety

Include in directional drilling equipment machine safety requirements a common grounding system to prevent electrical shock in the event of underground electrical cable strike. Ensure the grounding system connects all pieces of interconnecting machinery; the drill, mud mixing system, drill power unit, drill rod trailer, operators booth, worker grounding mats, and any other interconnected equipment to a common ground. Equip the drill with an "electrical strike" audible and visual warning system that notifies the system operators of an electrical strike.

1.4 DELIVERY, STORAGE, AND HANDLING

Prior to commencement of the work, submit the following:

- a. Polyethylene Pipe
- b. Safety Data Sheets
- c. Statement of Qualifications and Records
- d. Soil Test Data

Provide written documentation of conformance with AASHTO T 180. Submit a complete list of all drilling fluids, additives, and mixtures to be used along with Safety Data Sheets.

Inspect materials delivered to the site for damage. All materials found during inspection or during the progress of work to have cracks, flaws, surface abrasions, or other defects will be rejected. Remove defective materials from the job site.

PART 2 PRODUCTS

2.1 EQUIPMENT

2.1.1 Drill Rod

Select the appropriate drill rod to be used. Submit certified statement that the drill rod has been inspected and is in satisfactory condition for its intended use.

2.1.2 Pipe

Install a 25.4 cm 10-inch [(nominal)][_____] diameter polyethylene pipe,

with a dimensions ratio of [11 (DR11)][_____]

2.2 MATERIALS

2.2.1 Drilling Fluids

Use a high quality [bentonite][_____] drilling fluid to ensure hole stability, cuttings transport, bit and electronics cooling, and hole lubrication to reduce drag on the drill pipe and the product pipe. Use only fluid with a composition which complies with all Federal, State, and local environmental regulations.

PART 3 EXECUTION

3.1 INSTALLATION

Ensure all utilities are located and clearly marked prior to start of excavation or drilling.

3.1.1 Drill Set-Up

Design and construct the drill entrance and exit pits.

3.1.1.1 Drilling Fluids

Mix the [bentonite][_____] drilling fluid with potable water (of proper pH) to ensure no contamination is introduced into the soil during the drilling, reaming, or pipe installation process. Make any required pH adjustments.

3.1.2 Drill Entrance and Exit Pits

Drill entrance and exit pits are required. Maintain at minimum size to allow only the minimum amount of drilling fluid storage prior to transfer to mud recycling or processing system or removal from the site.

Do not allow drilling mud to flow freely on the site or around the entrance or exit pits. Remove spilled mud and restore ground to original condition.[Provide shore pits in compliance with OSHA Standards, [29 CFR 1926.652](#)].

[Drilling near wetlands or water courses requires secondary containment to prevent drilling fluids from entering the wetlands. Secure written approval of a [secondary containment plan](#) from the Contracting Officer.

3.1.3 Drill Entrance and Exit Angle

Ensure entrance and exit angles and elevation profile maintains adequate cover to reduce risk of drilling fluid breakouts and ground exit occurs as specified herein. Ensure that entrance and exit angles generate pullback forces that do not exceed [5][_____] percent strain on the [polyethylene][_____] pipe.

3.1.4 Pilot Hole

The type and size of the pilot string cutting head and the diameter of the drill pipe is at the Contractor's discretion.

Drill the pilot hole along the path shown on the plan and profile

drawings. Pilot hole tolerances are as follows:

- a. Vertical Tolerance: Provide minimum cover below channel bottom as specified on the plans. Pilot hole may go deeper if necessary to prevent breakout.
- b. Horizontal Tolerance: Plus/minus - 152.4 cm 60-inches [_____] from the centerline of the product pipe.
- c. Curve Radius: No curve is acceptable with a radius less than 304.8 m 1,000-feet.
- d. Entry Point Location: Make pilot hole entry point within plus/minus - 152.4 cm 60-inches [_____] of the location shown on the drawings or as directed by the Contracting Officer in the field.
- e. Exit Point Location: Make the exit point location within plus/minus - 152.4 cm 60-inches [_____] of the location shown on the drawings or as directed by the Contracting Officer in the field.
- f. Mandatory pipeline cover requirements are as shown on the drawings or as specified.

3.1.5 Guidance Systems

Walkover guidance systems are not acceptable for this project; use a magnetic survey tool locator installed behind the pilot string cutting head and an electric grid (tru-tracker) system for this project.

3.1.6 Reaming

Conduct reaming operations at the Contractor's discretion. Determine the type of back reamer to be utilized by the type of subsurface soil conditions that are encountered during the pilot hole drilling operation. The reamer type is at the Contractor's discretion.

3.1.7 Pull Back

Fully assemble the entire pipeline to be installed via direction drill prior to commencement of pull back operations.

Support the pipeline during pullback operations in a manner to enable it to move freely and prevent damage. Install the pipeline in one continuous pull.

Minimize torsion stress by using a swivel to connect the pull section to the reaming assembly.

Maximum allowable tensile force imposed on the pull section is not to exceed [90][_____] percent of the pipe manufacturer's safe pull (or tensile) strength. If the pull section is made up of multiple pipe size or materials, the lowest safe pull strength value governs and the maximum allowable tensile force is not to exceed [90][_____] percent of this value.

Minimize external pressure during installation of the pullback section in the reamed hole. Replace damaged pipe resulting from external pressure at no cost to the Government. Buoyancy modification is at the discretion of the Contractor.

3.1.8 Drilling Fluids Disposal

Collect drilling fluid returns in the entrance pit, exit pit, or spoils recovery pit. Immediately clean up any drilling fluid spills or overflows from these pits.

Dispose of fluids in a manner that is in compliance with all permits and applicable Federal, State, and local regulations. Disposal of the drilling fluids may occur on approved land owned by the Government subject to written approval from the Contracting Officer. Spread the drilling slurry over the Government-approved disposal area and plow into the soil.

Conduct disposal in compliance with all relative environmental regulations, right-of-way and work space agreements, and permit requirements.

3.1.9 Connection of Product Pipe to Pipeline

After the product pipe has been successfully installed, allow the product pipe to recover for 24 hours prior to connection of the pipeline. Ensure that a sufficient length of the product pipe has been pulled through the hole so that the pull-nose is not pulled back into bore hole due to stretch recovery of the product pipe.

3.2 FIELD QUALITY CONTROL

Maintain drilling logs that accurately provide drill bit location (both horizontally and vertically) at least every 5.1 cm 2-inches along the drill path. In addition, keep logs that record, as a minimum the following, every 15 minutes throughout each drill pass, back ream pass, or pipe installation pass:

- a. Drilling Fluid Pressure
- b. Drilling Fluid Flow Rate
- c. Drill Thrust Pressure
- d. Drill Pullback Pressure
- e. Drill Head Torque

Make all instrumentation, readings, and logs available to the Contracting Officer at all times during operation.

3.3 CLOSEOUT ACTIVITIES

Immediately upon completion of work, remove all rubbish and debris from the job site. Remove all construction equipment and implements of service leaving the entire area involved in a neat condition acceptable of the Contracting Officer.

Immediately clean "blow holes" or "breakouts" of drilling fluid to the surface and return the surface area to its original condition. Dispose of all drilling fluids, soils, and separated materials in compliance with Federal, State, and local environmental regulations.

Submit an electronic copy and three hard copies of the record drawings to the Contracting Officer within five days after completing the pull back.

Include in the record drawings a plan, profile, and all information recorded during the progress of the work. Clearly tie the record drawings to the project's survey control. Maintain and submit upon completion signed [complete work logs of guided directional drill operations](#).

-- End of Section --