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**Instruction for use**  
**Construction Specification 54—Boring and Jacking****1. Applicability**

Construction Specification 54 is applicable to boring and jacking a steel casing through an existing earthen foundation, embankment, or earthen abutment. It is not applicable for dams containing a chimney filter or other nonplastic granular material unless the boring and jacking operation can avoid the granular material.

**2. Special contracting considerations**

Proof of contractor boring and jacking experience and cellular foam grouting experience is required. The work must be conducted by an experienced contractor having bored and jacked a minimum of 2,000 feet of 42-inch or larger diameter conduit. Additionally, the cellular foam grout must be installed by a contractor having completed a minimum of 10 cellular concrete installations that are similar in nature to that specified. The contracting officer must be made aware that proof of experience compliant with these requirements must be obtained before awarding the construction contract.

**3. Construction specifications**

Diversion of water is critical during the period between the start of a boring and jacking operation and the completion of the grouting operation to fill the annulus space with cellular concrete. Include Construction Specification 11, Removal of Water, with Construction Specification 54. Require a written plan for diverting surface water.

A filter diaphragm is required for all boring and jacking through embankments that have the potential for temporarily or permanently retaining water. Include Construction Specification 24, Drainfill, with Construction Specification 54.

After the casing is installed and the annular space is filled with cellular concrete, a carrier pipe will be installed inside the casing. Include Construction Specification 85, Conduit Slip-Lining, with Construction Specification 54.

A high degree of quality control is required when boring and jacking and grouting a casing. Include Construction Specification 94, Contractor Quality Control,

with Construction Specification 54. Specify Method 2 for the contractor's quality control system and personnel.

**4. Material specifications**

The following material specifications complement Construction Specification 54:

- Admixtures—Specification 533, Chemical Admixtures for Concrete
- Fly ash—Specification 532, Supplementary Cementitious Admixtures
- Portland cement—Specification 531, Portland Cement
- Steel casing and fittings—Specification 554, Steel Pipe
- Welding electrodes—Specification 581, Metal

**5. Included items**

Items to be included in contract specifications and drawings follow:

- a. Complete engineering detail drawings of the casing installation showing beginning and ending stations relative to the axis of the casing, location of the casing with respect to the dam centerline or other reference; specify the line and grade of the installed casing. Ensure the work limits are adequate considering the following:
  - A minimum size 20 x 40 foot bore pit is generally needed with the 40-foot length being tangent to the axis of the bore.
  - Spoil from the bore pit will be temporarily stockpiled before being removed from the immediate bore pit location.
  - A track hoe generally operates along one side of the bore pit to remove tailings and move sections of conduit.

- Room is needed to temporarily stockpile the material from the bored or excavated tunnel through which the pipe is jacked.
  - Access is needed to move equipment and materials and to remove excavated materials.
  - Casing and carrier pipe will be unloaded and stockpiled near the work.
  - Room will be needed for the grouting operation to transport and stockpile materials and to produce and pump the job mix.
- b. In Section 2, Materials, specify the class of fly ash and type of Portland cement to be used or state that the contractor may choose the class of fly ash or type of Portland cement to be used. These are independent of each other so that one may be specified and the other selected by the contractor.
- c. In Section 6, Installing the casing, specify line and grade tolerances. As a minimum, when horizontal alignment is not critical, grade tolerances should be selected to allow for specification-compliant installation of the carrier pipe. For example, a specification might read, "The maximum variation from planned grade at any point in the drive must be plus or minus 0.25 feet and the maximum variation in horizontal alignment must be plus or minus 5 feet over the entire length of the bore with no abrupt changes." Where horizontal alignment is critical, specify that monitoring of horizontal alignment is required and that auger boring systems employ a bidirectional mechanical steering head. For example, a specification might read, "The maximum variation from planned grade at any point in the drive must be plus or minus 0.25 feet and the maximum variation in horizontal alignment must be plus or minus 1 foot over the entire length of the bore with no abrupt changes. For auger boring systems, use a bidirectional mechanical steering head and monitor the grade and alignment at minimum 20-foot intervals as the casing is advanced."
- d. In Section 8, Grouting, specify the maximum grouting pressure allowed if a maximum grouting pressure less than 4 psi is desired. Depending on the grade of the casing, it may be necessary to grout in stages to control grouting

pressure. Where applicable, include a statement similar to, "Cease grouting before the specified maximum pressure is attained; allow installed grout to set before continuing grout installation."

## 6. Methods

In Section 10, Measurement and payment, the methods are self-explanatory.

## 7. Items of work and construction details

Starting at the top of page 54–8, prepare and outline job specific "Items of work and construction details" in accordance with these instructions.