APPROVED:
Division Administrator

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By: _____
FEDERAL HIGHWAY ADMINISTRATION

Supplemental Technical Specification for

Trenchless Pipe Installation

SCDOT Designation: SC-M-714-1 (01/25)

1.0 Description

This work consists of installing a reinforced concrete carrier pipe inside a steel casing pipe in the locations designated in the plans or as specified by the RCE. This procedure enables the installation of reinforced concrete pipes underground without the use of open-cut excavation.

The Contractor is responsible for the design, adequacy, methodology, and line and grade of the pipe jacking installation. The methods and details specified herein are intended to indicate the minimum acceptable standard of quality required for pipe installation.

2.0 Materials

2.1 Casing Pipe

Install a steel pipe into place to serve as the casing pipe. The Contractor is responsible for the structural design, size, and wall thickness of the casing pipe based on site conditions, installation methodology, and performance requirements. Ensure that the casing pipe has at least a ½ inch uniform wall thickness. Do not use the steel casing pipe as the carrier pipe.

2.2 Carrier Pipe

Ensure the carrier pipe is a reinforced concrete pipe conforming to the current version of Supplemental Technical Specification SC-M-714. Ensure the carrier pipe meets the minimum requirements of a Class V reinforced concrete pipe and is of the size specified in the plans.

2.3 Grout

Provide a 3000 PSI grout mixture with sufficient water added to produce a flowable mixture that can be delivered at a sufficient pressure to fill any voids outside the casing pipe and to fill in the annular spaces between the casing and the carrier pipes. Furnish and operate suitable equipment for any required grouting operations depending on the condition of the application.

2.4 Lubrication Material

An accepted lubricant may be used during the pipe jacking installation to lower the friction developed on the surface of the pipe. Submit the lubricating systems and materials to the RCE for review and acceptance before use. Ensure the lubricant is intended for use in this application.

3.0 Submittals

Submit Shop Drawings, Temporary Shoring Plans, Material Certifications, Design Calculations, and other information as specified for all materials in this Section in accordance with the requirement for Submittals in these specifications. Ensure Shop Drawings also include complete erection, installation, and adjustment instructions and recommendations. Ensure all submittals requiring structural design are signed and sealed by a Professional Engineer registered to practice engineering in the State of South Carolina.

Allow a minimum of 20 working days for the review of the submittal by the RCE. Obtain acceptance of the submittal prior to ordering pipe materials and the start of any excavation or jacking operations. Additional review time may be needed for installation methods not covered in this special provision. Submit the following items for review and acceptance by the RCE:

1) Manufacturers' data sheets and specifications describing in detail the jacking system to be used and similar projects on which this system has been successfully used.

2) Maximum anticipated jacking loads and supporting calculations signed and sealed by an engineer registered in the State of South Carolina.

3) Calculations for the design of the casing pipe signed and sealed by an engineer registered in the State of South Carolina.

4) Certification by the manufacturer that all pipe materials (casing pipe, carrier pipe, grout, lubricant) conform to the requirements of the Specifications and Plans.

5) Casing pipe dimensions to accommodate the carrier pipe size indicated on the plans.

6) Shaft dimensions, locations, surface construction, profile, depth, and method of excavation.

7) Description of method(s) to control and dispose of ground water, spoil, temporary shoring, and other materials encountered in the maintenance and construction of pits and shafts.

8) Layout and design of all shoring, bracing, and thrust block systems, including calculations, signed and sealed by an engineer registered in the State of South Carolina.

9) Description of grouting methods, manufacturer’s data, mix designs, and specifications for grouting equipment.

10) A description of the grade and alignment control system

11) Description of lubrication system and materials to be employed during installation of the reinforced concrete pipe.

12) Layout plans and descriptions of the construction sequence.

13) A detailed plan for monitoring ground surface movement (settlement or heave) of all structures, roadways, parking lots, and any other areas of concern within 25 feet on both sides of all tunneling pipelines due to the tunneling operation. Ensure the plan addresses the method and frequency of survey measurements at a maximum spacing of 10 feet along the pipeline route.

14) Contingency plans for acceptance for the following potential conditions: damage to pipeline structural integrity; misalignment; ground surface movement; and change in method.

15) Method of support and guidance of the carrier pipe. Ensure the carrier pipe is installed at the line and grade indicated in the plans.

16) Method of ensuring worker safety for hand tunneling (if applicable) including but not limited to ventilation, air quality, and lighting.

17) Estimated total disturbed area and depth of pits and access roads.

4.0 Construction

4.1 Excavations

Ensure all excavations and pits are well sheeted and braced as necessary for safe and adequate access for workmen, inspections, and materials and are of a size suitable to equipment and material handling requirements. Delineate the perimeter of all pits with orange flagging, fencing or other safety devices to notify nearby workers and construction vehicles of the hazardous work area.

Ensure all of the Contractor's plans, specifications, and design computations for pit shoring are signed and sealed by a Professional Engineer registered in the State of South Carolina. Ensure all pits required for the installation of the pipe are located within SCDOT right-of-way and are completely isolated from the roadway traffic with precast concrete barriers installed when necessary in accordance with the Standard Drawings.

4.2 Dewatering

Perform all dewatering as required for the completion of the work. Dispose of all water removed by dewatering operations in accordance with applicable South Carolina Department of Health and Environmental Control regulations.

Ensure the dewatering system is of sufficient size and capacity as required to control groundwater or seepage to permit proper excavation and tunneling operations. Drawdown groundwater to at least the bottom of excavations at all times in order to maintain a dry and undisturbed condition.

Ensure control, by acceptable means, of all water regardless of source. Ensure the entire periphery of the excavation areas are ditched and diked to prevent water from entering the excavation where applicable. The Contractor is fully responsible for disposal of the water and providing all necessary means at no additional expense to the Department. The Contractor is solely responsible for proper design, installation, operation, maintenance, and failure of any component of the system.

The Contractor is responsible for and will repair without cost to the Owner, any damage to work in place and the excavation, including damage to the bottom due to heave and including removal of material and pumping out of the excavated area. The Contractor is also responsible for damages to any other area or structure caused by his failure to maintain and operate the dewatering system proposed and installed.

Take all the steps necessary to become familiarized with the surface and subsurface site conditions. Obtain the data that is required to analyze the water and soil environment at the site to assure that the materials used for the dewatering systems will not erode, deteriorate, or clog to the extent that the dewatering systems will not perform properly during the period of dewatering.

If, in the course of construction, it may be necessary to block a ditch, pipe or other drainage facility, install temporary pipes, ditches or other drainage facilities to maintain adequate drainage, as accepted by the RCE. Upon completion of the work, remove the temporary facilities and restore the permanent facilities.

4.3 Surface Settlement Monitoring

Before beginning the jacking operations, establish a settlement monitoring system that has been accepted by the RCE.

If any settlement or construction damage occurs to pavements, structures, facilities, appurtenances and/or lands, discontinue jacking and submit a revised installation plan for review and acceptance prior to resuming

work. Restoration to original conditions or better shall be undertaken and completed as directed by, and to the satisfaction of, the RCE at the Contractor's expense.

4.4 Casing Pipe Installation

Use any one of the following excavation methods for the pipe jacking operation:

A. Boring
B. Tunneling
C. Microtunneling

Ensure the excavation method used for installing the jacked pipe is of such size and capacity that it will allow tunneling to proceed in a safe and expeditious manner. Ensure the installation of the casing pipe and the tunnel excavation is done as rapidly as possible to prevent voids, cave-ins, or settlement, and avoid damage to any nearby structures.

Install a steel pipe, serving as the casing pipe, with jacks of sufficient capacity to shove the pipe through the resisting material into position true to required line and grade. Continuously monitor and control the pressure of delivery of any lubrication materials to prevent pipe buckling or ground heave. Ensure the lubrication material is used in accordance with the manufacturers' specifications. Check the vertical and horizontal alignment of the casing pipe by survey instrument at least once during each four feet of advance, or as directed by the RCE.

Delays between jacking operations may result in soil settling around the jacked pipe, thus making it difficult and sometimes impossible to resume movement. If conditions arise making it impossible to further jack the pipes without damage, construct the balance of the pipe installation with methods accepted by the RCE.

When jacking is complete, pressure-inject the accepted grout mixture into any voids created outside the casing pipe in excess of 3/4 inch. Ensure the pressure-injected grout completely fills the voids outside the limits of the excavation. Ensure grouting operation does not damage adjacent utilities or other properties. Inject the grout at a pressure that does not distort or imperil any portion of the work or existing installations or structures.

4.5 Cradle Installation

Following the completion of the casing pipe installation, furnish pipe cradles, spiders, or guides within the casing for the purposes of guiding and supporting the installation of the carrier pipe.

4.6 Carrier Pipe Installation

Install the reinforced concrete carrier pipe inside the casing pipe with adequately designed and spaced pipe alignment guides. Bell up the carrier pipe outside of the casing and push the carrier pipe through the casing. Install joint material in accordance with the current version of SC-M-714. Protect the concrete pipe from damage during delivery, staging and installation. Fill the annular space created between the casing and the carrier pipe with the accepted grout mixture.

5.0 Measurement

Make measurement on the basis of linear feet of carrier pipe supplied and installed, complete and accepted. Do not make any measurements for damaged or non-conforming sections that were removed and replaced.

6.0 Payment

The bid schedule provides a unit price for supply and installation of pipe. This price includes full compensation for designing, furnishing and installing the casing pipe, carrier pipe, pipe alignment guides, and for providing all materials, equipment, and labor for excavation, dewatering, jacking, tunneling, grouting, and shoring as required for the complete installation.

No payment will be made until the carrier pipe is installed and all annular space grouted as specified in Section 4.6.

For completing the work specified under this section, and as shown on the Drawings, the RCE will pay the Contractor the Unit Price Bid for the Pay Item stipulated below:

Pay Item	Description	Pay Unit
71418XX	**X" REINFORCED CONCRETE PIPE CLASS V (TRENCHLESS)**	**LF**