

**SPECIAL PROVISION**

**REGARDING**

**TRENCHLESS PIPE CULVERT INSTALLATION**

**Description**

This work consists of the installation of a pipe culvert through soil, rock, or unclassified material without the excavation of a trench. This work includes the installation of pipe as specified in the plans and in this provision using a trenchless method. This work includes any engineering design needed due to the contractor’s preferred means and methods in installing trenchless pipe culvert and also includes any layout of line and grade for the trenchless pipe culvert and pits needed for the culvert installation. This work includes all labor, materials, and equipment as may be necessary to make connections with other drainage structures as shown on the plans. This provision is not to be used for the installation of utilities.

The various types of trenchless methods that may be used include jack and boring, jacking, hand tunneling/excavation, tunneling, horizontal directional drilling, or a combination of these methods.

**Materials**

**A. General**

Provide materials as specified in:

Joint Mortar.....	<b>905.02</b>
Rubber Gaskets .....	<b>905.03</b>
Reinforced Concrete Pipe (RCP).....	<b>B.1</b>
Smooth Wall Steel Pipe .....	<b>B.2</b>
Grout .....	<b>921.09</b>

**B. Pipe**

A trenchless method shall be used for installing reinforced concrete pipe where trenchless pipe culvert installation is specified by plans. The trenchless method may include but not be limited to jack and boring, jacking, hand tunneling/excavation, tunneling, horizontal directional drilling, or a combination of these methods. When smooth-wall steel pipe is used for casing, it shall be designed to sufficient strength to resist installation forces and to resist the vertical loading to be encountered over the length of the pipe. As a minimum requirement, provide pipe materials specified in the plans in accordance with the following:

- 1. Carrier Pipe:** Reinforced concrete pipe (RCP), 18-54 inches, Class IV or V meeting **914.02** or AASHTO M 170, M 206, or M 207. The RCP shall be tongue and groove.
- 2. Casing Pipe (if used):** Smooth-Wall Steel Pipe meeting ASTM A139 Grade B. If casing is used, the casing pipe shall be steel pipe fabricated in sections for field welded joints. The diameter and thickness shall meet the requirements for the work but shall have a minimum wall thickness meeting the following.

**Table 607XX-1: Casing Pipe Wall Thickness**

Nominal Pipe Diameter Inches	Minimum Nominal Wall Thickness Inches
30 or less	0.375
31 or more	0.532

**C. Grout**

Provide a non-structural grout mixture with sufficient water to form a flowable consistency that can be delivered under pressure to fill any voids greater than 1 inch outside of the casing pipe and to fill the voids between the carrier pipe and casing pipe.

**D. Lubricant**

If required, provide an approved lubricant for the intended use as a drilling fluid for lubrication or soil stabilization for this work. Do not use chemicals or polymer surfactants in the drilling fluid without written consent from the Engineer. If any chemicals are approved to be allowed, they shall be environmentally safe.

**Equipment**

Provide all the necessary equipment capable of the complete installation of a casing pipe (if used) and/or carrier pipe meeting kind and dimensions shown on the plans and specified in this provision using a trenchless method.

**Submittals**

The contractor will be responsible to investigate site and ground conditions to determine what methods will be needed to complete the pipe installation. Provide and submit details and information of the installation method, equipment and materials. Allow a minimum of 20 working days for the review of the submittals by the Engineer. Obtain acceptance of the submittal prior to ordering pipe materials and the start of any excavation or trenchless work. Submit the following details and information for review:

1. The type of trenchless method proposed and installation sequence.
2. Certification by the manufacturer that all pipe materials (casing pipe, carrier pipe, grout, lubricant) meet requirements.

3. Casing pipe (if used) dimensions to accommodate the carrier pipe size indicated on the plans.
4. Method(s) to control and dispose of ground water (if needed), spoils, temporary shoring, and other materials encountered in the construction of pits and pipe installation.
5. Layout and design of all pits, shoring, and bracing, including calculations, signed and sealed by an engineer registered in the State of Tennessee.
6. The grouting methods and equipment.
7. The line and grade control system.
8. The lubrication system and materials to be used-during installation.
9. The plan for monitoring ground surface movement for settlement or heave of facilities such as roadways, streets, driveways, sidewalks, and utility lines.
10. Contingency plans for the following potential conditions: damage to pipe culvert structural integrity, misalignment; ground surface movement; obstructions; material changes; and change in the type of trenchless method.
11. Method of support and guidance of the carrier pipe. Ensure the carrier pipe is installed at the line and grade indicated in the plans.
12. Method of ensuring worker safety.

**Construction****A. General**

When installing a pipe culvert under facilities such as roadways, streets, driveways, sidewalks, and/or utility lines, the Work will be performed without interfering with traffic or operations of utilities or damaging and/or weakening the roadway, existing structures, or utilities. No excavation for pits will be allowed inside the shoulders of the roadways, and the pits will be separated from traffic.

Perform all Work in accordance with Environmental regulations and permits.

When installing a pipe culvert under a railroad, the trenchless installation requirements must meet the railroad's specifications and be approved by the railroad.

**B. Preliminary Work**

Perform Clearing and Grubbing, Removal of Structures and Obstructions, Excavation and Undercutting, Embankment Construction and placement of Erosion Control Devices as specified in **201**, **202**, **203**, **205**, and **209** respectively.

**C. Excavations**

Locate and excavate pits for the trenchless pipe installation meeting requirements of **204** and this provision. Ensure all pits required for the installation of the pipe are located within right-of-way and meet all safety requirements.

Delineate the perimeter work area of the pits with orange flagging, fencing or other safety devices.

**D. Dewatering**

If needed, perform all dewatering as required for the completion of the work. Dispose of all water removed by dewatering operations in accordance with applicable environmental regulations.

If, in the course of construction, it may be necessary to block or excavate through an existing ditch, install temporary diversion pipes, ditches or other drainage facilities as well as sufficient EPSC control measures to maintain adequate drainage, as accepted by the Engineer. Upon completion of the work, remove and restore back to original condition.

**E. Surface Monitoring**

Continuously monitor ground surface movement for settlement or heave of facilities such as roadways, streets, driveways, sidewalks, and utility lines.

If any settlement or heaving or construction damage occurs to roadways, streets, driveways, sidewalks, or utility lines, discontinue work and submit a revised installation plan for review and acceptance prior to resuming work. Repair to original conditions or better shall be undertaken and completed as directed by the Engineer at no cost to the Department.

**F. Carrier Pipe and Casing Pipe (if used) Installation**

Ensure the type of trenchless method used for installing the pipe is adequate to allow-the Work to proceed in a safe and expeditious manner. Ensure that the diameter of the excavation conforms to the outside diameter of the pipe as closely as possible.

Ensure the installation of the pipe is done as a continuous operation to prevent voids, cave-ins, settlement or heaving, and avoid damages to any roadways, streets, driveways, sidewalks, existing structures, and utility lines.

Continuously monitor and control the delivery of any lubrication materials to prevent pipe buckling or ground heave. Ensure the lubrication material is used in accordance with the manufacturers' specifications. Contain excess fluids, slurry and soil cuttings in pits until they are recycled or removed from the site. Ensure that all fluids and other materials are disposed of or recycled in a manner acceptable to the appropriate environmental regulations.

Install carrier pipe joint material rubber ring gaskets meeting ASTM C443 to form a flexible watertight seal or other types of joints recommended by the pipe manufacturer and approved by the Engineer. Install or construct them in accordance with the manufacturer's recommendations.

If casing pipe is used, the joints shall be continuously field welded around the entire circumference to be watertight as installation progresses. The welds shall be strong enough to withstand the forces exerted from the trenchless work and the vertical loading imposed on the pipe. The welds shall provide a smooth, non-obstructing joint in the interior of the pipe.

Continuously check the line and grade of the pipe during installation.

If needed after pipe installation is complete, pressure-inject a grout mixture into any voids created outside the casing pipe in excess of 1 inch. Ensure grouting operation does not damage any portion of the work, adjacent utilities or existing installations or structures.

If casing pipe is used, following the completion of the installation, furnish pipe cradles, spiders, or guides within the casing for the purposes of guiding and supporting the installation of the carrier pipe to control the line and grade.

If casing pipe is used, fill the voids that are between the casing pipe and the carrier pipe with the pressure-injected grout mixture.

If conditions arise making it impossible to further install the pipe without damage, construct the balance of the pipe installation with methods accepted by the Engineer.

If the carrier pipe installation extends beyond what is needed for the installation of the casing pipe (if used), then the carrier pipe shall be installed as specified in **607**.

**G. Backfilling and Post Installation Inspection**

When the installation is complete, the pipe culvert shall be cleaned of debris prior to the inspection. Cleaning shall be accomplished by means of water jetting or other approved methods. Perform a visual or a video inspection using a high-resolution color video camera and provide the Engineer with video of the inspection.

All sections of pipe culvert found to be damaged or where joint failure is evident shall be repaired or replaced as approved by the Engineer at no additional cost to the Department.

After completing the installation, backfill the excavated pits and trenches meeting requirements of 204 and **205**.

**Method Of Measurement**

The Department will measure pipe culvert for trenchless installation of the different classes, shapes, and sizes specified, by the linear foot of carrier pipe, installed and accepted.

**Basis of Payment**

The Department will pay for accepted quantities at the contract prices as follows:

<b>Item No.</b>	<b>Description</b>	<b>Unit</b>
607-##.##	XX" Concrete Pipe Culvert (Class xx) Trenchless	Linear Feet

Such payment will be full compensation for all work specified in this provision including compensation for design, furnishing casing pipe and carrier pipe, line and grade, and surface monitoring. It shall also include providing all labor, materials, equipment, tools, and incidentals for excavation, temporary shoring, dewatering, casing pipe and carrier pipe installation, grouting, backfilling, inspection as required for complete installation.