

SECTION 051  
SPECIFICATIONS - SEWER CONSTRUCTION BY TUNNELING, JACKING AND  
PILOT TUBE BORING METHODS

Unless provided within either these Specifications or on the Project plan sheets, information about underground conditions within and near the area of work has not been obtained by the Engineer. The Contractor shall determine the underground conditions near the proposed sewer construction or repair locations and determine the effect of such conditions upon the proposed work. The Contractor shall assume all risks and accept all costs attributable to unknown and unforeseen underground conditions. Underground conditions such as the presence of underground obstructions or poor soil conditions that are unfavorable to the means of sewer construction or reconstruction shall not be a basis for claims for additional compensation.

1.0 Sewer Construction by Tunneling

Where shown, specified or directed, the sewer shall be constructed in tunnels and the following specifications shall govern construction. If the tunnel location is beneath roads, railroads or other structures, construction including all operations and materials shall conform to the regulations and requirements of the Railroad, Highway Department or other agency having jurisdiction. Approval by said agency and by the Engineer of the Sanitary District shall be obtained before any work is started.

The Contractor shall furnish, place, and maintain all sheeting, bracing and lining required to support the sides, floor and heading of the excavation in tunnel shafts. Tunnel lining shall be steel liner plates or tight wood lagging, of sufficient strength to hold all loads under all conditions. The shafts shall be of suitable size and shape and shall be properly equipped to carry on the work. The annular space between the sewer and the tunnel lining shall be packed with lean concrete grout, 1 part Portland Cement and 10 parts sand, and the ends of the tunnel shall be sealed with brick masonry.

2.0 Sewer Construction by Jacking and Pilot Tube Boring Methods

Where shown or directed, using either jacking or pilot tube boring methods, sewers and casings shall be constructed to line and at the depths and grades specified. Jacked construction is the process whereby either sewer pipe or casings sections are jacked in from a drive shaft into the hole formed by either an auger boring machine or tunnel boring machine. Pilot tube boring methods utilize small diameter pilot tubes that are installed and steered through the ground by utilizing a slanted face at the cutting head containing a target with light emitting diodes (LEDs) and a camera mounted theodolite that is located in the shaft to achieve accuracy in line and grade. The hole is enlarged to the same outside diameter of the final product pipe after the installation of the pilot tubes.

Sewer construction by jacking or pilot tube boring methods, including all operations and materials used, shall conform to the regulations of or permits issued by any Department or agency having jurisdiction over the installation.

2.1 Casing Pipe and Sewer Carrier Sewer Pipe Materials and Joining Systems

Unless otherwise specified and approved by the Engineer, sewer carrier sewer pipe shall be constructed using pipe materials and joining systems specified on the Project plan sheets, as specified by the Engineer and in accordance with these Specifications

All ductile-iron carrier pipe joints shall use “gripper-type”, Field Lok 350 gaskets.

Casing pipe shall be new steel pipe conforming to ASTM A-252, Grade 3, and shall be at least 3/8” nominal thickness unless specified otherwise by a permitting authority. The casing pipe shall be sized in accordance with the guidelines below or the Project Plans. Casing pipe shall not be salvaged or reclaimed.

Casing pipe shall be factory-coated externally and internally with a coal tar epoxy coating applied in a minimum of two coats with a cumulative thickness no less than 16 mils. Where the factory-coatings of casing pipes are field disturbed, including welded locations, the casing pipes shall be recoated in the field with the same material and in accordance with these Specifications and the directions of the pipe manufacturer.

Deliveries of casing pipe shall include manifests that indicate the pipe manufacturer, the date and location of its manufacture as well as the pipe specifications.

Sections of steel pipe shall be welded uniformly throughout the circumference of each joint. Welds shall be free of leaks and defects.

For all welders who will assist towards the completion of the Project, the Contractor shall furnish a certificate issued by an approved testing laboratory that demonstrates the welders’ abilities to make groove and fillet welds in all positions. The Contractor shall provide to the Engineer documentation showing that all participating welders have practiced welding continuously since certification. A proposed welder shall not participate in welding operations necessary towards the completion of the Project until a certification demonstrating compliance with these Specifications is submitted to and approved by the Engineer.

2.2 Casing and Sewer Pipe Dimensions

Casing pipe sizing shall be dependent upon both the size of the sewer carrier sewer pipe to be installed within as well as the carrier sewer pipe joining system to be used. The minimum casing pipe diameters are as shown below:

Sewer Pipe Nominal Diameter (inches)	Casing Pipe Diameter (inches) with Belled or Coupled Carrier Pipe Joints	Casing Pipe Diameter (inches) with Flanged Carrier Pipe Joints
49 to 54	72	72
37 to 48	64	72
25 to 36	50	66
4 to 24	36	42

If the carrier pipe joining system includes either belled or coupled joints, in no instance shall the casing pipe diameter be less than thirty-six (36) inches in nominal diameter. If the carrier pipe joining system includes flanged joints, in no instance shall the casing pipe diameter be less than forty-two (42) inches in nominal diameter.

To minimize soil collapse over the casing, the bore-hole shall be sized with minimal overcut relative to the casing pipe size and the correct pressures shall be maintained within the annulus.

Sewer carrier sewer pipe sizes and joining systems shall be in accordance with the directions of the Engineer.

### 2.3 Casing Pipe Installation

Where specified by the Engineer, casing pipes shall be constructed using either jacking or pilot tube boring methods. Forces experienced by the casing pipe during construction shall not exceed the maximum loading recommended by the casing pipe manufacturer and shall be distributed uniformly around the circumference of the casing. The movement of casing pipes along the pipe alignment shall be consistent and uniform throughout the installation process. Casing pipe alignment shall be straight and consistent with that planned.

During casing pipe installation using jacking methods, the Contractor shall use a Dutch level and a steering head to control and monitor the casing pipe location.

After installation of the casing pipe and prior to the installation of the carrier sewer pipe, the Contractor shall allow internal inspection of the casing pipe and determine the installed alignment of the casing using a pipe laser. In accordance with these Specifications, the Contractor shall provide an internal inspection of the casing pipe using CCTV.

The ends of casing pipe not receiving carrier sewer shall be sealed by welding a ¼" steel plate with 2" x 2" x ¼" angles for reinforcement to the ends. Welds shall be uniform and free of leaks and defects. End plates shall be coated externally and internally with a coal tar epoxy coating.

### 2.4 Carrier Sewer Pipe Installation and Casing Spacers

The carrier sewer pipe shall be installed at depths and grade specified on the Project plan sheets or as specified by the Engineer. The carrier sewer pipe must be installed freely within the casing pipe without binding or resistance that requires excess force to overcome. The carrier pipe shall be installed without vertical or horizontal deflections.

Casing spacers shall be attached to the carrier sewer pipe so that the completed sewer will be at the required line and grade, centered within the casing pipe, and restrained against flotation. Spacers shall be Pipeline Seal and Insulator (PSI), Inc., Model S stainless steel casing isolators, the BWM Company, Model BWM SS Stainless Steel Casing Spacers or CCI Pipeline Systems, LLC, stainless steel band casing spacers, Model CSS, or equal as approved by the Engineer prior to the receipt of proposals for completion of the Project.

Widths and sizes for spacers and isolators shall be based upon both the manufacturer's recommendations and the specific application. Spacers and isolators shall be placed in accordance with the following guidelines:

1. Two spacers or isolators shall be placed no more than one (1) foot apart and no more than one (1) foot from both the entrance and exit of carrier sewer pipe into and out of casings.
2. One (1) spacer or isolator shall be placed no more than one (1) foot on both sides of a joint between two sections of carrier sewer pipe.
3. No more than ten (10) feet of carrier sewer pipe shall be placed without the placement of a spacer or isolator.

After the carrier sewer pipe has been installed and centered within the casing, unless specified otherwise

by the Engineer, the ends of the casing pipe shall be sealed with appropriately-sized, pull-on end seals, Model BWM-PO, as manufactured by the BWM Company. Wrap-around end seals shall not be allowed.

### 2.5 Vent Pipe Construction

Where specified by the Engineer or required by a permitting authority, casing pipes shall be vented above ground. Vent pipes shall be constructed at both ends of a casing, one at the upstream end and another at the downstream end of the casing pipe. Vents shall not be positioned such that they are directly over or under any spacer or end seal; care shall be taken to assure that vent pipes are not blocked during carrier pipe construction.

Vent pipe construction shall be in accordance with these Specifications and any directions provided within a permit or agreement granted by a permitting authority; however, when in conflict, directions provided by the permitting authority shall govern. Vents shall be designed and constructed to prevent intrusion of water and debris; the top of vents shall be fitted with down-turned and screened elbows. Vent pipes shall be constructed using stainless steel pipe and fittings and sized such that their inside diameters are not less than the greater of either ten percent (10%) of the nominal size of the carrier pipe or two (2) inches. Vent pipes shall extend at least four (4) feet above the local ground surface.

### 3.0 Internal Inspection of Casing Pipes and Carrier Sewer Pipes

The Contractor shall allow the District time to inspect both the casing pipe prior to insertion of the carrier sewer pipe and the carrier sewer pipe prior to the introduction of sewer flows. Inspections will be made of the full lengths of casing and carrier sewer pipes including the full circumference of joints and welds.

The Contractor shall not claim additional compensation for delay caused by the District's inspection of either the casing pipe or the carrier sewer pipe and its subsequent inspection of the inspection recordings. The Contractor shall not proceed with carrier sewer pipe installation until the District has accepted the casing pipe installation. Likewise, the Contractor shall not proceed with introduction of sewer flows into the carrier sewer pipe until the District has accepted its installation.

END OF SECTION