

# **San Antonio Water System Standard Specifications for Construction**

## **ITEM NO. 856**

### **Pipe Jacking**

**856.1 DESCRIPTION:** This item shall govern the furnishing and installation of casing and/or pipe by the method of pipe jacking. Such method to include auger boring, guided boring, pilot pipe jacking, hand mined pipe jacking, and direct pipe jacking as shown in the contract documents and in conformity with this specification. This specification does *not* cover tunneling of any kind such as would involve liner plate or any other method employing a fixed in place liner. This specification does *not* cover microtunneling. All methods not included in this specification require separate special specifications to be developed that are unique to each individual project.

**856.2 REFERENCED STANDARDS:** Reference standards cited in this Specification Item No. 856 refer to the current reference standard published at the time of the latest revision date.

1. San Antonio Water System (SAWS)
  - a. Specification for Water and Sanitary Sewer Construction
  - b. SAWS Material Specifications
2. City of San Antonio (COSA)
  - a. Utility Excavation Criteria Manual.
  - b. Standard Specifications for Construction
3. AASHTO – American Association of State Highway and Transportation Officials
4. American Association of State Highway and Transportation Officials (AASHTO)
5. American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering
6. American Society for Testing and Materials (ASTM)
  - a. ASTM A 36 - Standard Specifications for Carbon Structural Steel
  - b. ASTM A 134 Standard Specification for Pipe, Steel, Electric-Fusion (Arc)-Welded (Sizes NPS 16 and Over)
  - c. ASTM A 283 - Standard Specifications for Low and Intermediate Tensile Strength Carbon Steel Plates.
  - d. ASTM A 307 - Standard Specifications for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
7. Occupational Safety and Health Administration (OSHA)
8. Design Guidance Document for Pipe Jacking Versus Tunneling Methods

**856.3 SUBMITTALS:** Contractor shall submit manufacturer's product data, instructions, recommendations, shop drawings, and certifications including, but not limited to, shop drawings identifying proposed pipe jacking method, installation of pits or shafts, installation of jacking supports/back stop, arrangement and position of jacks and pipe guides, runners, casing spacers, and grouting plan.

**856.4 MATERIALS:**

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1. Carrier Pipe: Carrier pipe shall be of the types and sizes shown in the contract documents and shall conform to the requirements of these specifications.
2. If PVC pipe is to be utilized as carrier pipe, installation shall conform to Item Specification No. 818, "PVC (C-900 and C-909) Pipe Installation" and shall be fully restrained in casing.
3. Sanitary sewers, materials shall conform to Specification Item No. 848, "Sanitary Sewers," or as specified in the contract documents by the Engineer, and in accordance with DD-856 of the Standard Drawing Series.
4. Casing Pipe: Casing, if required, shall be as follows for water and sewer mains:
  - a. Steel
5. Grout: Grout for annular spaces shall be sand cement slurry containing a minimum of 7 sacks of Portland Cement per cubic yard of slurry.
  - a. All slurry shall be plant batched and transit mixed.

### **856.5 CONSTRUCTION:**

1. Pipe Jacking: Suitable pits or trenches shall be excavated for the purpose of jacking operations for placing end joints of the pipe.
  - a. When trenches are cut in the side of embankment, such work shall be securely sheeted and braced.
  - b. Jacking operations shall in no way interfere with the operation of railroads, streets, highways or other facilities and shall not weaken or damage such facilities.
  - c. The pipe to be jacked shall be set on guides to support the section of pipe being jacked and to direct it in the proper line and grade in accordance with submittal.
  - d. Embankment material shall be excavated just ahead of the pipe and material removed through the pipe, and the pipe forced through the opening thus provided.
  - e. The excavation for the underside of the pipe, for at least  $\frac{1}{3}$  of the circumference of the pipe, shall conform to the contour and grade of the pipe.
  - f. A clearance of not more than 2 inches may be provided for the upper half of the pipe.
  - g. The distance that the excavation shall extend beyond the end of the pipe shall depend on the character of the material, but it shall not exceed 2 feet in any case.
  - h. The pipe shall be jacked from the downstream end.
  - i. Permissible lateral or vertical variation in the final position of the pipe from line and grade will be as shown in the contract documents or as determined by the Engineer.
  - j. Any pipe that cannot be repaired to its original condition or is damaged in jacking operations shall be removed and replaced at the Contractor's expense. Jacking pits shall be backfilled immediately upon completion of jacking operations.
  - k. Boring operations may include a pilot hole which shall be bored the entire length of crossing and shall be used as a guide for the larger hole to be bored. Water or drilling fluid may be used to lubricate cuttings.
2. Joints: Joints for pipe for Pipe Jacking shall be as specified in Specification Item No. 848, "Sanitary Sewers," Specification Item No. 857 "Fiberglass Reinforced Pipe for

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Large Diameter Gravity Sanitary Sewer,” Specification Item No. 816 “Steel Pipe Installation,” or Specification Item No. 820 “Concrete Steel Cylinder Pipe Installation” or as shown in the contract documents, shop drawings, or as per additional pipe manufacturer's recommendations.

3. Grouting of Casing and/or Direct Jack Pipe: The annular space between casing pipe or direct jack pipe and limits of excavation (borehole) shall be pressure grouted unless otherwise specified in the contract documents.
4. Grouting of Annular Space between Casing and Carrier Pipe: For sewer pipe, the annular space between casing and carrier pipe shall be pressure grouted unless otherwise specified in the contract documents.

**856.6 MEASUREMENT:** Pipe Jacking shall be measured by the linear foot of bore as measured from face to face of jacking pits.

1. Carrier pipe used in bores or jacked into place shall be measured by the linear foot of pipe installed from end to end of pipe to the limits shown on the plans.
2. Casings, where required by the plans, of the size and material required shall be measured by the linear foot actually installed in accordance with the plans.

**856.7 PAYMENT:** The work performed and materials furnished as specified herein, measured as provided above, shall be paid for at the contract unit bid price per linear foot of pipe jacking which price shall be full compensation for furnishing all materials including carrier pipe and casings (as indicated for each appropriate bid item listed below), casing spacers, grout, labor, tools, equipment and incidentals necessary to complete the work, including excavation, grouting, backfilling, restoration to original ground conditions, end caps, and disposal of surplus materials.

1. Carrier pipe shall be paid for at the contract unit price bid for "Carrier Pipe for Pipe Jacking" per linear foot of pipe installed and measured as described above.
2. Casings shall be paid for at the contract unit price bid for "Casing" per linear foot of casing installed and measured as described above.

**-End of Specification-**

All requirements in the tables below are minimum requirements that apply unless otherwise specified in the contract documents. The engineer of record for each project is responsible for determining the appropriate requirements suitable to each instance and, if more stringent than the minimums stated herein or involving larger diameter pipe and/or casing, shall present such requirements in the contract documents.

Casing Minimum Requirements - General			
Water Main Diameter (Inches)	Nominal Steel Casing Diameter (Inches)	Steel Casing Thickness (Inches)	Steel Casing Weight (Pounds per Foot)
6	18	0.375	70.59
8	24	0.375	94.62
12	24	0.375	94.62
16	30	0.375	118.65
20	36	0.438	166.19
24	42	0.438	194.02
30	48	0.500	259.02
36	54	0.500	291.07

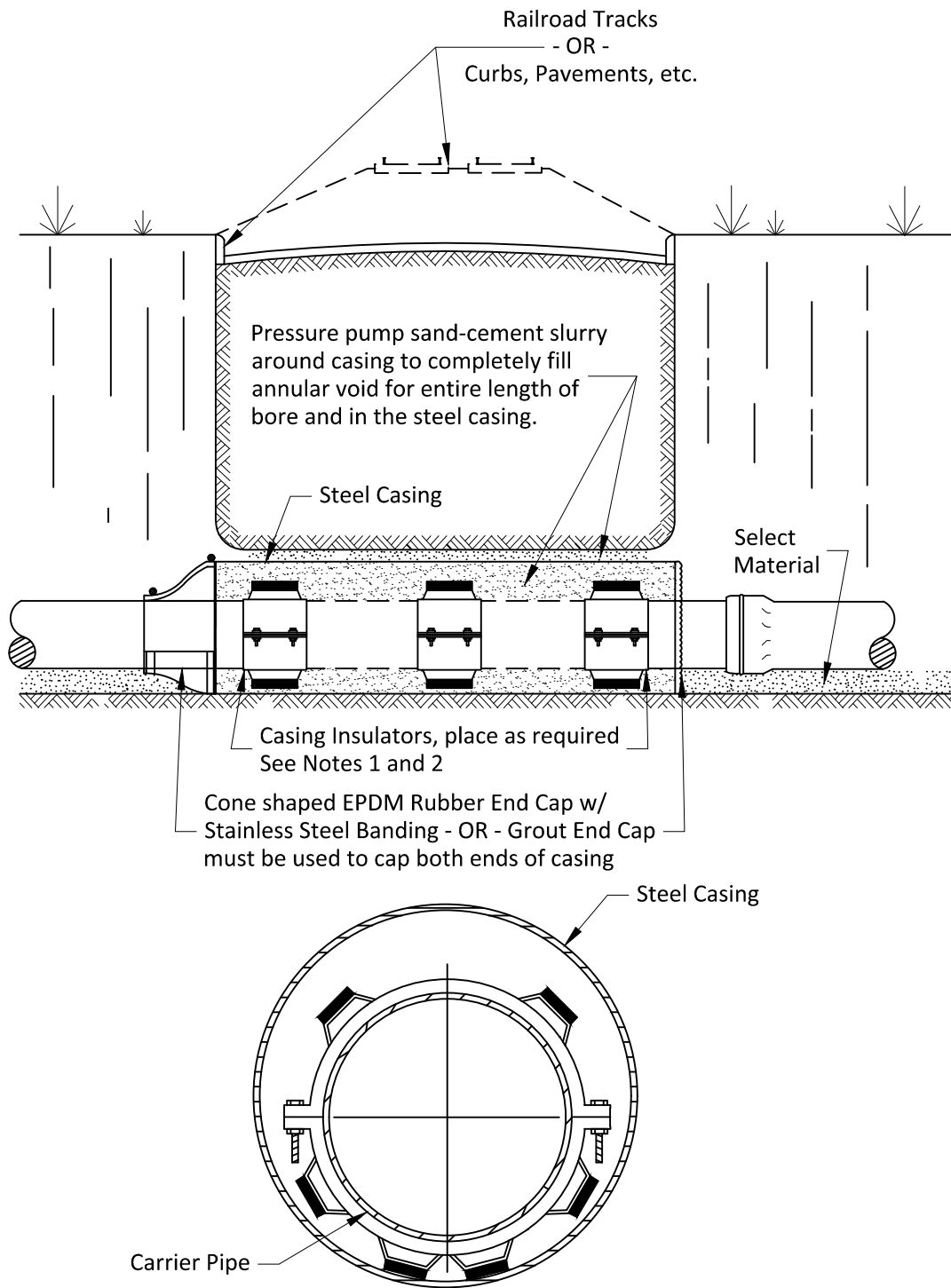
Casing Minimum Requirements - Under Railroad		
Nominal Steel Casing Diameter (Inches)	Steel Casing Thickness (Inches)	Steel Casing Weight (Pounds per Foot)
18	0.375	70.59
24	0.438	110.22
30	0.500	157.53
36	0.562	212.70
42	0.625	276.18
48	0.625	316.53

Railroad notes:

1. Steel casing shall have a minimum yield strength of 35,000 pounds per square inch.
2. Casing pipes larger than 48" diameter or with any portion deeper than 20' shall be submitted to chief engineer of the railroad for approval.

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		March 2008	November 2019
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### CARRIER PIPE IN CASING

#### Notes:

1. Casing insulators shall be in accordance with SAWS Standard Material Specification 05-31

2. The number of runners, configuration, and spacing of casing insulators shall comply with manufacturer's stated specifications in approved submittal.

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### INSTALLATION OF SEWER PIPE IN CASING

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