SECTION 817
JACKED AND BORED PIPE / CASING

817-1 DESCRIPTION: The Work covered by this Section includes furnishing all labor, materials and equipment required to jack and bore pipe and/or casings to properly complete construction as described herein as directed by the Engineer and/or as shown on the Contract Documents.

817-1.1 Insurance: If a railroad crossing is required, the Contractor shall obtain the appropriate insurance and permits as required by the owner of the railroad at no additional cost to the Owner.

817-1.2 General:

a. If available, interpretation of soil investigation reports and data, investigating the site and determination of the site soil conditions prior to bidding is the sole responsibility of the Contractor. Any subsurface investigation by the Bidder or Contractor must be approved by the appropriate authority having jurisdiction over the site.

b. Pipe and casing installation shall be performed in a way that will not interfere with, interrupt or endanger roadway surface and activity thereon, and minimize subsidence of the surface, structures, and utilities above and in the vicinity of the bore. The Contractor shall be responsible for all settlement resulting from boring operations and shall repair and restore damaged property to its original or better condition at no additional cost to the Owner.

c. The face of the excavation shall be protected from the collapse of the soil into the pipe or casing.

d. Design of the jacking/receiving pit and required bearing loads to resist jacking forces are the responsibility of the Contractor. The excavation method selected shall be compatible with expected ground conditions. The lengths of the bore shown on the Contract Documents are the minimum lengths required. The length of the bore may be extended for the convenience of the Contractor, at no additional cost to the Owner. Due to restrictive right-of-way and construction easements, bore lengths less than the nominal 20 foot length may be necessary.

e. Contractor shall dewater during installation in accordance with Section 801.

817-2 MATERIALS: Contractor shall comply with all manufacturers' recommendations for the approved products.

817-2.1 Sewer Pipe: Acceptable materials used for direct boring of sanitary sewers without a casing are as follows:

a. Ductile Iron pipe and joints to be in accordance with Section 1016-1. 2 for gravity sewer applications and Section 1016-2.3 for force main applications.

b. Fiberglass Reinforced Polymer (FRP) pipe and joints to be in accordance with Section 1016-1.6 for gravity sewer applications.

Polyethylene (HDPE) butt-welded and fused joints to be in accordance with Section 1016-1.1.2 and 1016-2.2 for gravity sewer applications and force main applications respectively.

817-2.2 Casing:

a. Unless otherwise required by the agency having jurisdiction, the casing shall be welded steel pipe meeting ASTM A53, Grade B, and have a minimum yield strength

of 35,000 psi. The exterior of the casing pipe shall be coated with coal tar epoxy or bituminous asphalt. Minimum wall thickness shall be as shown in the following table:

Table of Minimum Wall Thickness for Steel Casing Pipe for Cooper E80 Loading		
Carrier Pipe Nominal Diameter	**Min. Casing Pipe Diameter (O.D.)**	**Min. Thickness**
6	12	0.250 inch
8	16	0.281 inch
10	20	0.344 inch
12	24	0.375 inch
14	28	0.438 inch
16	30	0.469 inch
18 - 20	36	0.531 inch
21 - 24	42	0.625 inch
30	48	0.688 inch
36	54	0.781 inch
42	60	0.844 inch
48	66	0.938 inch

b. The wall thickness shown above shall be increased to the nearest standard size.

c. The Contractor shall increase casing pipe wall thickness if required due to jacking force load and/or length.

d. Where carrier pipe nominal diameter is greater than 48 inches, then minimum casing pipe diameter (O.D.) shall be great enough to provide a minimum 3 inch radial clearance between the casing pipe and the “bell” O.D. of the carrier pipe. Thickness design shall be calculated by a professional engineer licensed in the state of Louisiana and submitted to the Owner for approval.

817-2.3 Carrier Pipe (Within Casing): The carrier pipe shall be the same material as the sanitary sewer pipeline, unless otherwise directed by Engineer. All pressure carrier pipes shall be restrained jointed in the casing.

817-2.4 Grout Holes: For casing pipes larger than 36 inches in diameter, Contractor may choose to furnish casing pipe with 2-inch diameter threaded grout holes or nipples at centerline and crown for pressure grouting. Spacing of grout holes shall not exceed 5 feet.

817-2.5 Grout for Filling Voids Outside of Casing Larger than 36 Inches in Diameter: Neat cement grout with a minimum compressive strength of 500 psi.

817-2.6 Welding of Casing Pipe:

a. Connect each section of the casing with a full penetration butt weld around the entire circumference of the joint, to achieve a water tight joint. Welding requirements shall be in accordance with ANSI/AWWA C206, and develop the full strength of the casing wall. Welding procedures shall be required for, at a minimum, longitudinal and girth or special welds for pipe cylinders, casing joint welds, reinforcing plates, and grout coupling connections.

b. Welding shall be done by skilled welders, welding operators, and tackers who have had adequate experience in the type of materials to be used. Welders shall be qualified under the provisions of ANSI/AWS D1.1 by an independent local, approved testing agency not more than 6 months prior to commencing work on the casing or

pipeline. Machines and electrodes similar to those used in the Work shall be used in qualification tests. The Contractor shall be responsible for all material and bear the expense of qualifying welders.

817-2.7 Casing Spacers: Casing spacers shall be sized sufficiently to provide a minimum clearance of two (2) inches between outside of carrier pipe bells or couplings and inside of casing. The spacers shall consist of the following components:

a. Spacer Band Material: Minimum 14-gauge steel band of either Type T-304 stainless steel or Carbon steel coated with fusion bonded epoxy or PVC coating.

b. Spacer Liner Material: Ribbed liner of PVC or EPDM rubber designed to overlap the edges of the spacer band and prevent slippage. Liner shall have a minimum thickness of 0.090 inches and a hardness of 85-90 durometer "A".

c. Spacer Width: As recommended by spacer manufacturer for the specific application. Minimum width shall be 8 inches. Manufacturer's approval in writing shall be required for installations exceeding 300 feet in length, carrier pipes in excess of 48 inches in diameter or multiple carrier pipes in casing.

d. Spacer Risers and Runners must be:

    1. Risers must be minimum 10-gauge steel risers of same material and requirements as spacer band. Risers shall be MIG welded to spacer band and prior to coating. Risers must be suitable for supporting the weight of carrier pipe.

    2. Runners shall be manufactured of an abrasion resistant material having a low coefficient of friction (0.1 to 0.6) and designed to support the carrier pipe without damage or excessive wear. Runner material shall be of glass reinforced polyester or nylon and have a minimum compressive strength of 18,000 psi (ASTM D 695).

e. All hardware and fasteners shall be stainless steel.

f. Hardwood skids shall NOT be used in place of manufactured casing spacers.

g. Fill material is not required in the annular space.

817-2.8 Casing End Seals: End seals shall be made of synthetic rubber, conical shape, pull-on or wrap-around style with Type 304 stainless steel bands. For carrier pipe greater than 24 inches in nominal diameter the annular space between the carrier pipe and the casing pipe at the ends shall be bricked in conjunction with the end seals.

817-3 SUBMITTALS:

a. Documentation that pipe and/or casing pipe material including the standard to which it is manufactured, outside diameter, wall thickness, joint configuration, and certificate of compliance certifying that the pipe and/or casing pipe meets these specifications.

b. Details of casing spacers, including manufacturer's recommended spacing.

c. Details of end seals for casing.

d. Dewatering Plan, if required.

817-4 EQUIPMENT: Contractor shall utilize equipment and methods designed to install pipe and/or casing as shown in the Contract Documents. Operation of equipment shall be performed by qualified personnel, experienced in this type of work. Selected equipment shall be capable of accurate alignment and grade control, and shall protect against subsidence or other disturbance of ground, existing utilities, existing road surface, railroad facilities and existing structures.

817-5 PREPARATION: Confirm location of all known existing utilities prior to start of jacking/receiving pit excavation and pipe installation. The Contractor shall provide the detailed layout required to keep the bore on grade. Notify the Engineer no less than 7 working days before beginning shaft excavation. Before beginning construction of jacking/receiving pit, adequately protect existing structures, utilities, trees, shrubs, and other existing facilities. Place fencing, gates, lights, and signs, as necessary around shafts and staging areas to provide for public safety. When preparing to install casing pipe, verify casing pipe minimum wall thickness is adequate for anticipated jacking loads.

817-6 INSTALLATION:

817-6.1 Jacking/Receiving Pit: Methods of construction for jacking/receiving pits shall be such as to ensure the safety of the Work, Contractor's employees, the public, existing utilities, and adjacent property and improvements, whether public or private and shall comply with specifications in Section 801. Provide complete groundwater control for excavations at all times. Perform jacking/receiving pit excavations using appropriate excavation or large hole drilling methods, as required. Inspect shaft/pit excavations daily to check safety of excavation and structural integrity of support system. Open excavations shall conform to all federal, state, and local requirements. Once initiated jacking operations shall continue without interruption, to prevent pipe from becoming firmly set in the embankment.

817-6.2 Lubrication of Exterior of Pipe and/or Casing: Bentonite slurry may be used to lubricate exterior of pipe and/or casing during installation. Use of water to facilitate removal of spoil is permitted; however, water jetting is not allowed.

817-6.3 Boring: The boring shall be accomplished by means of auguring to the size, line and grade shown on the Contract Documents or as directed by Engineer. The diameter of the bore shall be minimal to complete the jack and boring operations. Re-drill pilot hole when bore does not meet specifications.

817-6.4 Jacked and/or Bored Pipe and/or Casing: Bore hole diameter shall not exceed outside diameter of casing by more than one (1) inch. When unstable soil conditions are found to exist, conduct boring operations in a manner that will not be detrimental to facility being crossed. Horizontal line tolerance is two (2) inches, maximum. Vertical line tolerance is two (2) inches maximum. A means of steering the pipe or casing must be provided to ensure allowable tolerance can be achieved. The Contractor must measure and record progress at all times to confirm that these tolerances are achieved. For casing: Weld sections of casing pipe together to provide watertight joints by operators qualified in accordance with the American Welding Society Standard Procedures. These welds shall be continuous, complete joint penetration butt joint wields as required for rigid and watertight connections. If the removal of casing pipe is permitted, make proper provisions to prevent caving in of the earth surrounding the casing. If it is necessary to abandon a bored hole, remedial measures shall be taken by the Contractor, subject to review by the Engineer of facility being crossed. If required grade tolerance has not been achieved, correct grade using casing spacers of varying height per manufacturer's recommendations.

817-6.5 Monitoring of Surface Movement: Perform a preconstruction survey of road surface or railroad tracks. Contractor shall record horizontal coordinates and elevations. Mark location of where measurements were taken. Monitor movement of road surface or railroad tracks on a daily basis and provide results to the Engineer. Stop operations if movement exceeds ¼ inch and

immediately notify the Engineer.

817-6.6 Grouting Jacked and/or Bored Casings: Overcutting in excess of one (1) inch shall be remedied by pressure grouting the entire length of the installation. Should appreciable loss of ground occur during jacking or boring operations, Contractor shall backpack all voids promptly. Fill all remaining voids upon completion of operations: such filling or backpacking shall be with grout unless otherwise approved.

817-6.7 Installation of Carrier Pipe within Casing: Entire length of casing shall be installed complete and inspected and approved by Engineer before any carrier pipe is placed therein. Repair defects in casing pipe or leakage at joints. Install a minimum of three casing spacers to each length of carrier pipe in such a manner that electrical continuity will not occur between casing pipe and carrier pipe. Spacers shall be placed on each side of each joint and at 8-foot maximum spacing between joints. Check each joint makeup and pipe segment prior to pushing carrier pipe segments into casing. When the carrier pipe is a ductile iron or PVC pressure pipe install restrained joint pipe or mechanical joint with restrainers within limits of casing and jacking/receiving pit excavations on both ends, unless otherwise directed by the Engineer. Casing end seals shall be provided at the end of the casing pipe after installation of the carrier pipe.

817-6.8 Casing Pipe and Carrier Pipe Annular Space: The annular space shall be left empty, unless otherwise directed by the Engineer.

817-6.9 Removal of Jacking/Receiving Pit Support System: Remove support elements, except those required by Engineer to remain in place, from excavation. In addition, remove support elements as needed to install the pipeline. Removal of support system shall be performed in a manner that will not disturb or harm adjacent construction or facilities. Fill voids created by removal of support system with clean sand, flowable fill, or a similar fill material approved by Engineer.

817-6.10 Backfilling of Jacking/Receiving Pit: Seal jacking/receiving pit opening and backfill at shafts when no longer required.

817-6.11 Installation of Casing by Open Cut: In specific cases, as specified in the Contract Documents or as approved by the Engineer, it may be acceptable to install a casing by open cut trenching methods. Installation of the casing shall be in accordance with Section 802. Carrier pipe installation shall be in accordance with Section 817-6.7.

817-7 MEASUREMENT:

a. **Jacked and/or Bored Casing:** Measurement for the installation of jacked and bored casing shall be made horizontally, on a linear foot basis, for various sizes listed in the Bid Form.

b. **Jacked and/or Bored Pipe:** Measurement for the installation of jacked and bored pipe shall be made horizontally, on a linear foot basis, for various sizes listed in the Bid Form.

c. **Trenched Casing:** Measurement for the installation of casing by open cut trenching methods shall be made horizontally, on a linear foot basis, for various sizes listed in the Bid Form.

817-10 PAYMENT:

a. **Jacked and/or Bored Casing:** Payment for this item shall be full compensation for all labor, materials, submittals, equipment, casing, carrier pipe, restrained joints, spacers, end seals, excavation of the jacking/receiving pits (complete in place), bedding, backfill and compaction, traffic control, disposal of excess materials,

surface restoration (including sawcutting, pavement removal and replacement), and surveying information required in this specification.

b. **Jacked and/or Bored Pipe:** Payment for this Item shall be full compensation for all labor, materials, submittals, equipment, pipe, restrained joints, excavation of the jacking/receiving pits (complete in place), bedding, backfill and compaction, traffic control, disposal of excess materials, surface restoration (including sawcutting, pavement removal and replacement), and surveying information required in this specification.

c. **Trenched Casing:** Payment for this item shall be full compensation for all labor, materials, submittals, equipment, casing, carrier pipe, restrained joints, spacers, end seals, excavation, bedding, backfill and compaction, traffic control, disposal of excess materials, and surveying information required in this specification.

817-11 PAY ITEMS:

Pipe or Casing Diameter Schedule

A	=	4" Pipe	N	=	27" Pipe
B	=	6" Pipe	O	=	30" Pipe
C	=	8" Pipe	P	=	32" Pipe
D	=	10" Pipe	Q	=	36" Pipe
E	=	12" Pipe	R	=	42" Pipe
F	=	14" Pipe	S	=	48" Pipe
G	=	15" Pipe	T	=	54" Pipe
H	=	16" Pipe	U	=	60" Pipe
I	=	18" Pipe	V	=	64" Pipe
J	=	20" Pipe	W	=	66” Pipe
K	=	21" Pipe	X	=	72” Pipe
L	=	24" Pipe	Y	=	76” Pipe
M	=	26" Pipe	Z	=	80” Pipe

Item No.	Description	Units
817001_	_ _” Jacked and Bored Casing including Carrier Pipe	Linear Foot
817002_	_ _” Jacked and Bored Carrier Pipe	Linear Foot
817003_	_ _” Trenched Casing including Carrier Pipe	Linear Foot