SECTION 33 31 13 – STEEL ENCASEMENT PIPE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the Work necessary to provide and install steel encasement pipe for water and sewer lines.

B. Related sections:

1. Section 31 23 16.16 – Trenching for Water and Sewer Lines
2. Section 31 23 23.19 – Trenching Bedding and Backfill for Water and Sewer Lines
3. Section 33 41 19 – Pipe Laying

1.2 SUBMITTALS

A. General: Administrative, shop drawings, samples, quality control, and contract closeout submittals shall conform to the requirements of Section 01 33 00, Submittal Procedures.

B. In addition to the requirements of Section 01 33 00, Submittal Procedures, submit the following additional specific information:

1. Quality Control Submittals:

a. Steel encasement diameter, and thickness.
b. End seal shop drawings.
c. Casing spacer shop drawings.
d. Special shipping, storage and protection, and handling instructions.
e. Test procedures.
f. Test results, reports, and certifications.

PART 2 - PRODUCTS

2.1 ENCASEMENT PIPE

A. Encasement pipe shall be used to provide a conduit for the carrier pipe passing below roadways, railroads, or other surfaces where the encasement pipe must be installed by jack and boring or at times open cut. Details for steel encasement are shown on the Plans.

B. Encasement pipe shall also be used to isolate new water lines in the proximity of existing sewer line to prevent possible sewage contamination of the water system. The locations, lengths and diameters are shown on the Plans.

C. Steel encasement pipes shall be of the lengths shown on the Drawings and meet the requirements as specified herein. The encasement pipe shall be a smooth wall, welded steel pipe conforming to the latest requirements of ASTM A139, Grade B, ASTM A211 or ASSA C202, Grade B with minimum yield strength of 35,000 psi. The encasement pipe shall be new. Used pipe shall not be allowed. The minimum diameter wall thickness for various nominal diameters of carrier pipes is shown below:

Carrier Pipe Nominal Diameter (inches)	Steel Encasement Pipe Diameter (inches)	Steel Encasement Pipe Minimum Wall Thickness (inches)
6	12	0.2500
8	16	0.3125
10	20	0.3750
12	20	0.3750
14	24	0.4375
16	24	0.4375
18	30	0.5000
20	30	0.5000
24	36	0.5625

D. In instances where encasement pipe is being used to isolate the water line, the minimum length of encasement pipe shall be 20 linear feet. The encasement pipe shall be centered on the crossing water or sewer line.

2.2 CASING SPACERS

A. Shall be stainless steel, Cascade Model CCS as manufactured by Cascade Waterworks Mfg. Co., or approved equal.

B. Restrained joints shall have restrained joint type stainless steel casing spacers, Cascade Model CCS-JR as manufactured by Cascade Waterworks Mfg. Co., or approved equal.

C. Spacers shall be designed to support the carrier within the casing and to maintain a maximum clearance of one (1) inch between the casing pipe and runner. Spacers shall be 8 inches wide for carrier pipes up to 14 inches in diameter and 12 inches wide for carrier pipes greater than 14 inches in diameter.

D. The quantity of runners shall be dependent on the carrier pipe diameter as follows, unless otherwise approved:

Carrier Pipe Nominal Diameter	Quantity of Runners
≤ 14 inches	4
16-36 inches	6
42-48 inches	8

E. Runners shall be abrasion resistant glass-filled polymer or ultra-high weight molecular polyethylene, with a minimum length of seven (7) inches and a minimum width of one (1) inch. Risers, when required, shall be stainless steel and welded to the band. Interior surfaces of the circular stainless steel band shall be lined with a minimum thickness of 0.09 inches of EPDM or PVC, or approved alternative.

2.3 RUBBER END SEALS

A. Rubber end seals shall be installed on both ends of the encasement pipe. They shall be the Pull-On type secured to the encasement pipe and the carrier pipe via T-304 stainless steel worm gear bands. The rubber end seals shall be as manufactured by CCI Piping Systems; model ESC, Cascade Waterworks Mfg. Co.; model CCES, or approved equal.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Highway Bore: Do not set up equipment or begin excavating pit on state highway right-of-way without permission of Texas Department of transportation Division Engineer or his authorized representative.

B. Railroad Bore: Do not set up equipment or begin excavating pit on or near railroad property without permission of the respective railroad company.

C. Highway and railroad permits will be obtained by the Owner. Contractor shall coordinate with Engineer on obtaining Right-of-Way permit from railroad and shall conform to all requirements there in.

3.2 INSTALLATION, ENCASEMENT PIPE

A. General

1. Install encasement pipe at grade and alignment shown on Plans. Allow for height of casement spacers when establishing grade for gravity line encasement pipe. Refer to Standard Details.

B. Bores

1. Excavate pits and trenches required at each side of crossing to minimum width and length necessary for boring and jacking operation and carrier pipe installation.
2. Carefully set steel guide rails in pit to attain specified grade and alignment.
3. Keep pit pumped free of standing water. Maintain pit bottom to provide stable base for rails and equipment and firm footing for workmen. Granular material used in bottom of pit will not be paid for as extra work, it is subsidiary to encasement pipe.
4. Provide temporary sheeting and bracing as necessary to prevent earth slides.
5. Bore tunnel and simultaneously jack encasement pipe forward one section at a time. Connect sections by full penetration butt welding performed in accordance with AWS D1.1.
6. Remove excavated soil from boring operation as it enters pit and dispose of it offsite.
7. All bored encasement pipe shall be installed by the dry boring and jacking method. Wet boring shall not be allowed.
8. Installation of the encasement shall be carried out in such manner that there will be no settlement of the ground surface above the encasement. The Contractor shall take all precautions to prevent caving of the soils ahead of the pipe. During encasement installation, the Contractor shall use all care to minimize annular space (voids) between the outside of the encasement pipe and the surrounding ground. Therefore, the outside of encasement pipe installed by boring and jacking shall be pressure grouted to eliminate voids as specified below, unless excepted therein. Only the dry bore method shall be used. Water jetting or similar methods using water are strictly prohibited.
9. The Contractor shall inspect the locations where the encasement pipe and bore pits are to be installed and familiarize himself with the conditions under which the work will be performed and with all necessary details for the orderly prosecution of the work. The omission of any details in the Plans and/or herein for installation of the encasement and carrier pipe shall not relieve the Contractor of full responsibility for the proper execution and integrity of the work.
10. The Contractor shall satisfy himself of soils condition by any means he deems necessary, i.e., exploratory boring or exploratory pit excavations at bore ends. Any such exploratory work shall be done in such manner as to not jeopardize railroad or highway roadbeds and rights-of-way and shall be backfilled and cleaned up to the satisfaction of the right-of-way

owner. The Contractor shall be responsible to obtain his own permission and to furnish bonds, etc. as may be required by private landowners or the public authority having jurisdiction at the site of any such exploratory work unless otherwise indicated on the Plans or by the Owner/Engineer.

11. The Contractor shall perform all excavation required to complete the work regardless of the material encountered. Excavation from the access shafts (bore pits) in excess of that required to backfill the access shafts and open cut portion of the line shall be disposed of by the Contractor outside the limits of the construction site and at an approved location. Pits and trenches shall be properly shored, sheeted, and braced according to Section 31 50 00, Excavation Support Systems, of these Specifications.
12. Any damage to the encasement pipe coating during shipment or handling shall be repaired by the Contractor. Boring and installation of smooth wall pipe shall be by competent supervisors and workmen specializing in this type of work.
13. In order to maintain the designed slope of the sewer gradient, the horizontal and vertical alignment at all points on the encasement pipe shall be held to a tolerance of one-tenth (0.10) of a foot of the designed line and grade. Encasement pipes not meeting this tolerance shall be subject to removal and replacement at the contractor's expense.

C. Open-Cut

1. Steel encasement shall be installed in an open-cut trench as specified in Section 31 23 16.16, Trenching For Water And Sewer Lines and shall be backfilled as specified in Section 31 23 23.19, Trench Bedding And Backfill For Water And Sewer Lines.
2. Steel encasement installed by open-cut shall conform to this specification.
3. When practical, the carrier pipe, the end seals, the casing spacers, and the encasement pipe shall be assembled outside of the trench and shall be installed as a single unit.
4. Extreme care shall be used by the Contractor to assure that the rubber end caps are not damaged during installation and backfilling. It is essential that a water-tight seal exist where the rubber end seals contact the carrier pipe and the encasement pipe.

3.3 INSTALLATION, CARRIER PIPE

A. Installation of the carrier pipe in the encasement shall be accomplished in such manner that neither the pipe nor the encasement is damaged. Care must be exercised to assure that the joints of the pipe are not over-deflected or pulled out during the process. The pipe shall be jointed and pushed or jacked through the encasement. Cables, chains, jacks or other equipment or devices used shall not be in direct contact with the pipe unless thoroughly padded.

B. The carrier pipe barrel, regardless of its diameter, shall be centered diametrically in the encasement pipe by the use of casing spacers compatible with the material of the carrier pipe. Also, all carrier pipe bell/spigot joints inside the encasement shall be restrained from movement in the axial direction by the use restrained casing spacers. There shall be a restrained casing spacer installed at each carrier pipe joint and another casing spacer without axial restraint (non-restrained) installed at the midpoint of each carrier pipe barrel or at a maximum interval of 10'. All casing spacers, whether restrained or non-restrained, shall also function as hold-down jacks to prevent the carrier pipe from floating.

C. If, after installation of the carrier pipe, adequate stability has not been provided, in the opinion of the Owner, the annular space between the carrier pipe and the inside of the encasement pipe shall be filled with sand or other material approved by the Owner.

D. After the carrier pipe has been installed in the encasement pipe, both ends of the encasement pipe shall be sealed with end seals.

3.4 PRESSURE GROUTING

A. During installation of bored encasement pipe, care shall be exercised to prevent voids between the encasement and the surrounding ground.

B. On encasement pipes of 12” and larger nominal diameter, the annular space between the encasement pipe and the ground shall be pressure grouted to eliminate all voids. Encasement pipes smaller than 12” shall also be grouted if so directed by the owner depending on soil conditions at the bore site identified at the time of encasement installation.

C. When grouting encasement pipes of such diameter that entry by a worker is possible, the grout shall be injected through the encasement pipe wall through 1.5” diameter holes from the inside at one location for each 5.0-foot linear interval over the entire length of the encasement pipe. The sequence for grout injection locations shall be as follows:

*Locations (5’ Spaces)	“Clock” Positions
1st	12:00
2nd	3:00
3rd	12:00
4th	9:00
5th	12:00

*Repeat 2nd through 5th locations at 5-foot intervals for each location to the end of the encasement pipe.

Note: the contractor shall be responsible to see that all requirements of OSHA concerning entry of workers into confined spaces are followed as well as any other requirements for this type of work.

D. For encasement pipes too small to be entered for grouting as addressed above, the annular space may be pressure grouted by means of an external grout pipe attached to the outside of the encasement pipe. After the encasement pipe and the grout pipe are in place, the grout pipe shall be withdrawn as the grout is introduced into the annular space.

3.5 BORE PITS

A. Excavation and backfill shall be as specified in Sections 31 23 16.16, Trenching For Water And Sewer Lines and 31 23 23.19, Trench Bedding And Backfill For Water And Sewer Lines.

B. The bore pits or access shafts for encasement installation shall be rectangular in plain view, approximately 20'x10', with the longer dimension being in the direction of the encasement pipe. The bore pits shall be sheeted, shored, and braced on all sides as addressed herein. Sheeting shall be timber or steel piling of ample strength to safely withstand all structural loading of whatever nature due to site and soil condition. The top of the sheeting shall be at a minimum elevation equal to the natural ground line as it existed prior to construction.

PART 4 - MEASUREMENT AND PAYMENT

Not Used.

END OF SECTION