SECTION 15121
CASING PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Specified
The Work specified shall include all labor, materials, tools, equipment, services
and incidentals necessary to furnish and install new casing pipe and incidentals as
shown, specified and required.

B. Related Work Specified Elsewhere:
   1. Section 02316 - Select Granular Materials
   2. Section 02351 - Excavation, Backfill and Trenching
   3. Section 15106 - Ductile Iron Pipe and Fittings
   4. Section 15108 - Thermoplastic Pipe
   5. Section 15109 - Prestressed Concrete Cylinder Pipe
   6. Section 15110 - Valves and Appurtenances

1.02 QUALITY ASSURANCE

A. All materials shall be new, of first quality and in first class condition. They shall
be of the type and manufacturer shown or specified, and substitutions will not be
permitted unless specified by the ENGINEER.

B. Reference Standards:
   1. ASTM A123, Zinc (Hot Galvanized) Coatings of Products Fabricated
      from Rolled, Pressed and Forged Steel Shapes, Bars, Plate Bars and Strips
   2. ASTM A139, Electric Fusion (ARC) Welding Steel Pipe
   3. ASTM A153, Zinc Coating (Hot Dip) on Iron and Steel Hardware
   4. ASTM A307, Low Carbon Steel Externally and Internally Threaded
      Standard Fasteners
   5. ASTM A252, Welded and Seamless Pipe Piles
   6. ASTM A570, Standard Specification for Steel, Sheet and Strip, Carbon,
      Hot-Rolled, Structural Quality
   7. ASTM C32, Standard Specification for Sewer and Manhole Brick (made
      from clay or shale)
   8. ASTM C207, Standard Specification for Hydrated Lime for Masonry
      Purposes

C. Steel casing pipe and all incidentals shall be furnished by one supplier.
D. Requirements of Regulatory Agencies:
1. The CONTRACTOR shall be responsible for obtaining all required permits and shall comply with all provisions thereof at his own expense.
2. The CONTRACTOR shall, in addition to #1 above, obtain all additional permits, provide insurance, bonds and guarantees, and all else required by the governing authorities at his own expense. The CONTRACTOR’S responsibility under this paragraph may include, but not be limited to the following:
   a. Constructing and removing temporary facilities or structures.
   b. Providing details of construction methods.
   c. Providing detailed construction schedules.
   d. Reimbursing the applicable authority for any and all expenses incurred by them in connection with the Work.
   e. Traffic maintenance.
   f. Coordination of scheduling with the Authority.
   g. Necessary clean-up and restoration.

E. Tolerances:
1. The casing pipe shall be installed on the lines and grades shown on the Drawings and within tolerances required to allow the carrier pipe to pass through the crossing in accordance with the lines and grades shown, specified, or directed.

F. Welding:
1. Welding shall be done in strict accordance with manufacturer’s written requirements.
2. Welding operators shall be prequalified in accordance with the standard qualification procedure of the American Welding Society, and certificates attesting thereto shall be delivered to the ENGINEER prior to beginning of any welding operations.

1.03 SUBMITTALS
A. Shop Drawings identifying the casing pipe materials and installation procedure.
B. Certifications for welding operators.
C. All permits necessary for county highway crossings.
D. The CONTRACTOR shall submit certificates of compliance with the applicable referenced standards.
1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. During delivery and handling, all materials shall be braced and protected from any distortion or damage in accordance with the manufacturer’s requirements; any such distortion or damage shall be basis for rejection of the materials.

B. Equipment used for unloading shall be covered with wood or rubber to avoid damage to the exterior of the pipe, fittings and accessories. Do not drop or roll materials off trucks.

C. The materials shall be inspected before and after unloading. Materials that are found to be cracked, chipped, gouged, dented or otherwise damaged will not be accepted.

D. Interiors of materials shall be kept free from dirt and foreign matter.

E. Store casing pipe on heavy wood blocking or platforms so they are not in contact with the ground.

F. Casing pipe shall be unloaded opposite to or as close to the place where they are to be laid as is practical to avoid unnecessary handling.

1.05 JOB CONDITIONS

A. Provide guardrails, fences, signs, lights, barricades, barrels, and all other protective items necessary in accordance with the requirements of all applicable permits, laws, regulations, and ordinances, and as necessary to prevent damage or injury to private or public property or to workmen or the general public.

PART 2 - PRODUCTS

2.01 PROPERTIES OF STEEL CASING PIPE

A. Design Criteria: Steel Casing Pipe
   1. Minimum Tensile Strength - 60,000 PSI
   2. Minimum Yield Strength - 35,000 PSI
   3. Minimum Wall Thickness as Follows:
<table>
<thead>
<tr>
<th>Carrier Pipe</th>
<th>Casing Diameter</th>
<th>Minimum Wall Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot;</td>
<td>12&quot;</td>
<td>0.313</td>
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<tr>
<td>42&quot;</td>
<td>66&quot;</td>
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</tr>
</tbody>
</table>

B. Casing pipe diameter shall be nominal outside diameter.

C. Steel casing pipe shall be in accordance with ASTM A139, Grade B or ASTM A252, Grade 2.

2.02 MATERIALS

A. Steel Casing Pipe
1. Steel casing pipe shall be fabricated in accordance with the above listed specifications to the lengths and diameters shown on the Contract Drawings.
2. For casing pipes 30-inches in diameter and smaller, grout holes will not be required. For casing pipes larger than 30-inches in diameter, provide an adequate number of 1-1/2 inch holes, furnished three feet on center alternating 30 degrees with the top of the casing pipe. This shall be provided before installation to check for voids in the space between the ground and the outside of the casing pipe after the casing pipe is installed.
3. The 1-1/2 inch holes in steel casing pipe shall be tapped to receive 1-1/2" pipe plugs.
4. Grouting or other methods approved by the ENGINEER shall be used to fill such voids as uncovered.
5. All steel casing pipe must be new in first-class condition. Used or recycled casing pipe will not be allowed, regardless of condition.

B. Brick Bulkheads
1. Brick shall meet the requirements of ASTM C32, Grade MS.
2. Mortar shall be composed of Portland Cement, hydrated lime and sand in which the volume of sand shall not exceed three times the sum of the volumes of cement and lime.
   a. Cement shall be type II Portland Cement.
   b. Hydrated lime shall be types conforming to ASTM C207.
C. Cathodic Protection
1. One (1) seventeen pound magnesium anode shall be provided and installed for each end of each casing for cathodic protection.
2. Follow manufacturer’s recommendations for attaching to casing pipe and proper burial procedures.

D. Casing Spacers
1. Stainless Steel
   a. All casing spacers shall be made of 14 gauge Type 304 stainless steel with \( \frac{5}{16} \)" Type 304 stainless steel fasteners.
   b. Runners shall be high molecular weight polyethylene.
   c. Spacers shall electrically insulate watermain from casing pipe to provide proper cathodic protection.
   d. Acceptable manufacturers:
      1) Smith-Blair,
      2) Approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General
1. Installation of the casing pipes shall include installation of the steel casing pipe by either the boring and/or jacking method in both earth and/or rock wherever it is encountered.
2. Bulkheads shall be installed at each end of the casing pipe of sufficient strength and quality to support the filling operation and to support annular fill. Vents shall be provided as required to assure complete filling of annular space as required by applicable authorities.
3. When a carrier pipe is installed inside a casing pipe, the entire annular space around the carrier pipe shall be filled with sand or pea gravel.
4. Recovery pits shall be excavated at each bore or jack location to determine possible conflicts in alignment with existing utilities not shown on the plans.
5. The CONTRACTOR is responsible for proper line and grade at each crossing. Misalignment or improper grade, as compared to the Contract Drawings, will require extra work to be performed at no additional cost to the OWNER.
6. Tight vertical sheeting shall be driven before excavating for bore and receiving pits as required. Sheetin shall be for the full length, width, and depth of the excavation. Sheetin shall conform to the applicable requirements of Section 02351, Excavation, Backfill, and Trenching.
7. Sheetin details shall be submitted by the CONTRACTOR to any affected agency for approval in advance of performing the Work.
B. Boring
1. The boring method shall consist of pushing the casing pipe into the fill with a boring auger rotating inside the pipe to remove the spoil.
2. The front of the casing pipe shall be provided with suitable mechanical arrangements or devices that will positively prevent the auger and cutting head from leading the pipe so that there will be no unsupported excavation ahead of the pipe.
3. The equipment and mechanical arrangements or devices used to bore and remove the earth and/or rock shall be removable from within the casing pipe in the event an obstruction is encountered.
4. The face of the cutting edge shall be arranged to provide reasonable obstruction to the free flow of soft or poor soil.
5. Water or other liquids shall not be used to facilitate casing emplacement or spoil removal.
6. The diameter of the boring hole shall be essentially the same as the outside diameter of the casing pipe.
7. If voids develop around the casing pipe as it is bored, cement grout will be pumped to fill all such voids; or fill by other means acceptable to the ENGINEER. All voids shall be filled as soon as possible after completion of the boring operation.

C. Jacking
1. The steel casing pipe installed by the jacking method shall be weldable steel pipe.
2. No type of auger, boring or drilling equipment shall be used.
3. Bracing and backstops shall be designed of sufficient rating such that jacking can be accomplished in a continuous manner until the leading edge of the pipe reaches the final position shown on the Contract Drawings.
4. The diameter of the boring hole shall be essentially the same as the outside diameter of the pipe.
5. If voids develop around the casing pipe as it is jacked, cement grout will be pumped to fill all such voids; or fill by other means acceptable to the ENGINEER. All voids shall be filled as soon as possible after completion of the jacking operation.
6. Jacking operations shall be in accordance with the American Railway Engineering Association Specifications, Chapter 1, Part 4, “Jacking Culvert Pipe Through Fills”.

D. Obstruction
If an obstruction is encountered during installation by jacking or boring and it is impossible to advance the casing pipe, the CONTRACTOR shall choose one of the following:
1. Abandon the casing pipe in place and fill completely with grout. Provide whatever bulkheading is necessary to accomplish the grouting operation.
The crossing will be moved to another location acceptable to the ENGINEER and the crossing rebored at the CONTRACTOR’S expense.

2. As acceptable to the ENGINEER and authority having jurisdiction, the CONTRACTOR may continue the casing pipe by tunneling and installation of liner plates. This continuation by the tunneling method shall be at the CONTRACTOR’S expense.

E. Welding
1. Welding shall be done in accordance with the manufacturer’s written requirements.
2. Welding operators shall be prequalified in accordance with the standard qualification procedure of the American Welding Society, and certification attesting thereto shall be delivered to the ENGINEER prior to beginning of any welding operation.

F. Inspection
1. All casing pipe will be inspected by the ENGINEER prior to installation.
2. Prior to the work in this section, the CONTRACTOR shall inspect the installation area to determine if the work of other trades has progressed to the point where the installation may properly commence.
3. The CONTRACTOR shall verify that the installation can proceed in accordance with all pertinent codes and regulations, the original design and the referenced standards.

G. Installation of Carrier Pipe in Steel Casing.
1. Verify that casing is installed to the proper lines and grades.
2. Joints for all carrier pipes 24-inches and larger in diameter shall be made within the casing pipe unless otherwise permitted by the ENGINEER.
3. Push or pull each length of pipe into casing, adjust line and grade as necessary without disturbing adjacent joints.
4. All carrier pipe joints falling within the steel casing pipe shall be restrained whether or not the pipe section falls within a restrained section of pipe as shown on the Drawings.

H. Discrepancies
1. If the above referenced inspection reveals discrepancies, the CONTRACTOR shall notify the ENGINEER immediately.
2. The CONTRACTOR shall not proceed with the installation in areas of discrepancy until said discrepancy is resolved.

I. Blasting
1. Blasting is not allowed.

J. Annular Fill and Bulkhead
1. Provide vents as required to assure complete filling of annular space and as required by the applicable authorities.

Casing Pipe,
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2. Prior to the filling of the annular space, carrier pipe shall be properly and sufficiently secured against flotation and against all movement which would disturb joints.
   a. The CONTRACTOR shall be responsible for all improper joints including all joints disturbed by placing annular fill.
   b. The CONTRACTOR shall repair, replace or take whatever action is necessary to properly install casing pipe at no additional expense to the OWNER.

3. After the carrier pipe is installed in casing, fill annular space with pea gravel between carrier pipe and casing and construct brick and mortar bulkheads as specified herein.

4. Fill annular space in three (3) stages in the presence of the ENGINEER to his/her satisfaction.

5. The volume of pea gravel used shall be compared to the annular space volume to ensure complete filling. Incomplete filling of annular space will not be considered acceptable. CONTRACTOR will remove pea gravel and reinstall, at his expense, if so ordered by the ENGINEER.

6. Install bulkheads at pipe joints at each end of the casing of sufficient strength and quality to support the filling operation, and to support annular fill.

END OF SECTION