SECTION 15142
OPEN TRENCH PIPE CASING, PIPE SLEEVES, SUPPORTS, GUIDES, AND ANCHORAGE

PART 1 - GENERAL

1.1 DESCRIPTION

The Work specified in this Section consists of furnishing and installing jacked pipe casing, open trench pipe casing, pipe sleeves, pipe supports, pipe hangers, pipe guides and anchorage devices for piping systems as indicated, including guidelines for selection and sizing items and preparation of fully dimensioned Shop Drawings showing locations.

1.2 QUALITY CONTROL

A. Comply with Section 01432, Project Quality Program Requirements - Design/Bid/Build.

B. Perform installation and testing of Work as specified, in accordance with instructions provided by equipment suppliers. Perform testing under supervision of Metro. Notify Metro at least three days in advance of tests.

C. This section includes materials for and installation of open trench pipe casings. Jacked casings or specially-installed pipe casings shall be installed as detailed in Specifications and the Drawings.

D. This section includes materials and installation of jacked pipe casings. Where the Contractor proposes to install pipelines using directional drilling or boring, a complete submittal of the methods and materials shall be made to Metro prior to the initiation of the work.

E. Criteria for Selection of Pipe Sleeves

1. Sleeves through interior walls, floors and ceilings - Galvanized steel pipe sleeves with welded steel plate anchors.

2. Sleeves through exterior below-grade walls, floors and ceilings with an exterior sealing membrane.
   a. Sleeves more than 15 feet below grade - Cast iron sleeves with compression seals.
   b. Sleeves 15 feet or less below grade - Steel sleeve with modular link seals.

3. Sleeves through exterior below-grade walls, floors and ceilings without any exterior sealing membrane - Steel sleeve with modular link seals.

F. Qualify welding procedures and welding operators in accordance with requirements specified in Section 05055, Basic Welding Requirements. Do not weld before review and approval of welding procedures and welding operator qualifications by Metro.

G. Perform welding operations in accordance with requirements specified in Section 05055, Basic Welding Requirements.

1.3 REFERENCE STANDARDS

A. American National Standards Institute (ANSI)
ANSI B31.1 Power Piping

B. American Society for Testing and Materials (ASTM)

ASTM A36/A 36M Structural Steel

ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

ASTM A74 Cast Iron Soil Pipe and Fittings

ASTM A283/A, 283M, 568/A, 568M

C. Federal Specifications (FS)

FS FF-S-325 Shield, Expansion; Nail, Expansion; and Nail, Drive Screw (Devices, Anchoring, Masonry)

FS WW-H-171 Hangers and Supports, Pipe

1.4 SUBMITTALS

Refer to Section 01300, Submittals, for submittal procedures.

A. Shop Drawings showing exact locations of pipe sleeves and pipe support and anchorage devices.

B. Shop Drawings or manufacturer’s data of pipe sleeves and pipe support and anchorage devices. Show detailed dimensions and description of materials and parts on drawings or cuts.

C. Manufacturer's product data.

D. Welder certifications and qualified welding procedures for review and approval, and records to Metro.

E. Certification and necessary documentation as required in Section 05055, Basic Welding Requirements.

1.5 WORKSITE CONDITIONS

Do not drill, cut, burn or weld structural members in connection with installation of pipe supports, bracing and anchorage devices, unless approved by a structural engineer licensed by State of California and reviewed and approved by Metro.

PART 2 - PRODUCTS

2.1 OPEN TRENCH PIPE CASING - Pipe casing materials shall be as indicated on the plans and shall be selected from the Approved Materials Listed.

A. Steel Pipe casings shall be as follows:

1. Steel pipe casings, shall be butt-welded sheets (spiral welding of pipe not allowed) conforming to ASTM A 36/A 36M, ASTM A 283/ A 283M, Grade D, or ASTM A 568/A 568M, Grade 33. Steel casings size shall be as shown on the submittal plans.
2. Steel pipe casings shall not be lined or coated with any material unless otherwise directed by the Engineer.

If required, steel pipe casing shall be lined and coated with liquid epoxy paint per AWWA C210. Liquid epoxy shall be applied in three coats to a minimum thickness of 0.012”. The final coat of the liquid epoxy shall be blue for potable water and purple for recycled water steel casing pipe.

3. Steel pipe casings shall include the installation of an anode in accordance with the Standard Drawings, unless otherwise directed by the Engineer.

B. Casing Spacers - Casing spacers shall be stainless steel, centered-position type with PVC liner and non-metallic anti-friction runners selected from the Approved Materials List.

C. Casing End Seals - Casing end seals, selected from the Approved Materials List, shall wrap around the casing and carrier pipe to provide a barrier to backfill material and seepage. The casing end seal shall be a minimum ¼” thick styrene butadiene rubber sheet attached to the carrier pipe and casing with 1” wide stainless steel bands. Zippered casing end seals with stainless steel bands may also be used.

2.2 PIPE SLEEVES - Use sealants, for sealing and packing materials and installation, except as otherwise indicated.

A. Sleeves Through Interior Walls, Floors and Ceilings
   1. Sleeves - Provide pipe conforming to ASTM A53. Weld steel plate anchor conforming to ASTM A36 to pipe as indicated. Hot-dip galvanize assembly after fabrication.
   2. Packing - Where pipes pass through fire-rated walls, floors or ceilings, provide firestop material to seal opening between pipe and sleeve. For other penetrations, provide sealing material.
   3. Escutcheons - As specified for piping system penetrating sleeve.

B. Sleeves Through Exterior Below-Grade Walls, Floors and Ceilings with an exterior sealing membrane.
   1. Sleeves more than 15 feet below grade (Type H) - Cast iron, ASTM A74, pressure sealing with membrane clamp; cast iron body with external fins, internal steel compression rings and nitrile rubber grommets, and pressure clamp with 18-8 stainless steel bolts; nonconductive pipe sleeve between cast iron body sections; oversize steel sleeve with neoprene sealing rings and coating as indicated. Sealing members - Provide electrical isolation between carrier pipe and metallic components of sleeve including membrane and pressure clamps.
   2. Sleeves 15 feet or less below grade (Type L) - Steel pipe sleeve, ASTM A53, pressure sealing with membrane clamp ring, gasket, waterstop ring, external rings, internal dielectric compression plates, nitrile rubber link seals and coating on metal parts as indicated.
      a. Seals - Modular mechanical type seals, consisting of interlocking nitrile rubber links shaped to continuously fill annular space between pipe and sleeve and electrically isolate carrier pipe from the steel sleeve.
      b. Sealing element - Nitrile rubber material compounded to resist aging, ozone, sunlight, hydrocarbon gases, water and chemical action.
c. Hardware - Type 18-8 stainless steel fasteners. Threads rolled to produce smooth uniform threads and unbroken flow lines.

d. Compression plates - Plastic, injection molded for high physical properties, dielectric strength and non-cold flow creep characteristics, with high resistance to acidic and alkaline soils.

C. Sleeves Through Exterior Above-Grade Walls, Floors and Ceilings without an exterior sealing membrane.

   1. Sleeves - Steel pipe sleeves, ASTM A53.
   2. Seals - Modular mechanical type seals, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between carrier pipe and metallic sleeve and electrically isolate carrier pipe from sleeve and glass reinforced nylon pressure plates.

2.3 PIPE HANGERS, SUPPORTS AND GUIDES

A. Provide pipe hangers, pipe supports and pipe guides as indicated, hot-dip galvanized unless otherwise indicated. Provide copper-plated hangers for uninsulated copper pipes.

B. Anchors for Pipe Hangers and Supports:
   1. Metal inserts cast into concrete at time of placing concrete.
   2. Anchor bolts placed in drilled holes and set in place with high strength cement grout.
   3. Expansion bolts, FS FF-S-325, set in drilled holes. Follow manufacturer’s instructions.

2.4 FIRESTOPPING MATERIALS

A. As listed in UL Fire Resistance Directory for firestop systems, throughout –penetration and joint systems.

PART 3 - EXECUTION

3.1 GENERAL

A. Install pipe casing, pipe sleeves, pipe supports, guides and anchorage devices where indicated on reviewed and approved Shop Drawings.

B. Rigidly secure pipe sleeves, pipe supports, guides and anchorage devices against displacement by concrete placement operations.

3.2 PIPE CASING INSTALLATION - Installation of pipe casing and carrier pipe shall be as described below and in accordance with the Standard Drawings.

A. Pipe casing shall be installed in an open trench type excavation.

B. Pipe casings shall be lowered onto the bedding of the proper lines and grades called for on the Drawings.

C. Pipe casings shall have firm bearing along their full length.

D. Pipe casing sections shall be bell and spigot joint connection for PVC. PVC casing sections shall be restrained by mechanical means or by the use of splined gaskets. Steel casing sections
shall be joined by full-circumference butt welding in the field. Steel casing shall have all areas of damaged coating repaired.

E. Carrier pipe shall be pushed into the casing incorporating the use of casing spacers as described below.

F. PVC or ductile-iron carrier pipe joints shall be restrained either by mechanical means or by use of splined gaskets.

G. Steel carrier pipe sections shall be lap joint welded.

H. Upstream and downstream elevations of the carrier pipe shall be verified prior to installing the end seals.

I. The portion of carrier pipes installed within casings shall have pressure, leakage, and infiltration testing completed prior to installation of the end seals.

J. The annular space between the carrier pipe and casing shall not be filled with any material unless otherwise noted on the Drawings.

3.3 CASING SPACERS - Casing spacers shall be used to prevent the carrier pipe bell from touching the casing and to maintain a uniform space between the carrier pipe and casing interior. A minimum of three casing spacers shall be installed, equally spaced, on each pipe section at intervals recommended by the manufacturer.

3.4 CASING END SEALS - Casing end seals shall be installed in accordance with the manufacturer’s recommendations. Carrier pipe shall pass hydrostatic or leakage tests prior to the installation of casing end seals or backfilling operations.

3.5 TRACER WIRE - Tracer wire shall be installed on the carrier pipe in accordance with the Standard Drawings and Contract Documents.

3.6 WARNING/IDENTIFICATION TAPE - Warning/Identification tape shall be installed above the casing pipe in accordance with the Standards and the Drawings.

3.7 WELD INSPECTION AND TESTING - Perform inspection and non-destructive testing in accordance with Section 05055, Basic Welding Requirements and as follows; use services of a certified laboratory:

A. Visual Inspection: 100 percent welds per ANSI B31.1.

B. Magnetic Particle Inspection: 10 percent welds per ANSI B31.1.

C. If failure occurs in first 10 percent sample select second 10 percent sample, and test. If no failure occurs in second 10 percent sample, represented welds shall be acceptable (rework failed sample in initial 10 percent sample). If failure occurs in second 10 percent sample, test 100 percent of welds.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT - The Work of this Section will not be separately measured for payment.
4.2 PAYMENT - The Work of this Section will be paid for as part of the Contract unit price for the individual piping items included in the Contract.

END OF SECTION