CITY OF LIVERMORE

TECHNICAL SPECIFICATIONS

DIVISION 5 – METALS

SECTION 055000 - MISCELLANEOUS METALWORK

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide, all materials, labor, and equipment necessary to furnish and install miscellaneous metalwork and appurtenances to make a complete installation as shown on the Drawings and as specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A.	Section 331219	Fire Hydrants.
B.	Section 333900	Precast Concrete Maintenance Holes.
C.	Section 022100	Monuments.
D.	Section 034800	Precast Concrete Vaults, Utility Boxes, and Storm Water Field Drop Inlets.
E.	Section 099000	Protective Coating.
F.	Section 331200	Miscellaneous Piping, Valve Fittings, and Appurtenances.
G.	Section 330526	Piping Identification Systems.
H.	Division 1	General Requirements.

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. **Federal Specifications:**

QQ-F-461 C (1)	Floor Plate, Steel, Rolled.

B. **Commercial Standards:**

AASHTO	Standard Specifications for Highway Bridges.
AISC	American Institute of Steel Construction - Specifications, Manuals, Technical and Fabricator Publications, Design Guides.
AISI	American Iron and Steel Institute - Documents.
ASTM A 36	Specification for Structural Steel.
ASTM A 48	Specification for Gray Iron Castings.
ASTM A 53	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
ASTM A 123	Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
ASTM A 153	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

ASTM A 307	Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
ASTM A 563	Specification for Carbon and Alloy Steel Nuts.
ASTM A 575	Specifications for Steel Bars, Carbon, Merchant Quality, M-Grades.
ASTM B 98	Specification for Copper-Silicon Alloy Rod, Bar, and Shapes.
ASTM B 438	Specification for Sintered Bronze Bearings (Oil-Impregnated).
ANSI/AWS D1.1	Structural Welding Code - Steel.
NFPA 101	Life Safety Code.
AWS	American Welding Society Handbook.

1.4 CONTRACTOR SUBMITTALS

A. **Certificates of Compliance:** Certificates of Compliance shall be provided for all products and materials proposed to be used under this Section.

B. Manufacturer's product data sheets shall be submitted for all products and materials proposed to be used under this section.

C. **Anchors:** Wherever power-driven pins will be utilized for anchorage or support, complete information describing pin capacity, connections, and proposed use locations shall be furnished to the ENGINEER for review.

PART 2 -- PRODUCTS

2.1 GENERAL REQUIREMENTS

A. **Standard:** All structural steel shapes, plates, bars, and their products shall conform to the requirements of ASTM A 36.

B. **Corrosion Protection:** Unless otherwise shown, miscellaneous metalwork of fabricated steel, which will be used in a corrosive environment and/or will be submerged in water/wastewater shall be coated in accordance with Section 099000, "Protective Coating" and shall not be galvanized prior to coating. All other miscellaneous steel metalwork shall be hot-dip galvanized after fabrication as specified herein.

2.2 STORM WATER INLET FRAME AND GRATE

A. Frames and grates for street curb storm water inlets shall be in conformance with Caltrans Standard Plans D77A and D77B, and shall be Type 600-13 Welded Steel Grate. Frames shall be heavy duty, boltable, HS-20 traffic loading, designed for bicycle use, and hot dip galvanized after fabrication.

B. Frames and grates for field storm water inlets shall be heavy duty in vehicle traffic areas and light duty for non-traffic areas. Grate shall be boltable to frame and shall be HS-20 traffic loading for heavy duty grates, designed for bicycle use and hot-dip galvanized after fabrication. Frame and grate shall be **Santa Rosa Model 1L, Welded Steel; Christy, U32-71RLD or U32-71RHD; Riveted steel, or equal.**

C. Frames and grates or cover plates for side opening field storm water inlets shall be steel checker plate, light duty, grate or cover plate shall be bolted to frame, hot dipped galvanized after fabrication, and shall fit Santa Rosa Type C inlet.

2.3 VAULT ACCESS DOORS AND COVERS

A. **Vault Access Covers:** Vault covers shall be steel checkered plate, 1/4-inch minimum thickness reinforced with steel members for the design load specified. Reinforcing shall be stagger welded to the cover, and the entire assembly shall be hot dip galvanized after fabrication. The top of the cover plate shall be flush with the vault wall. Steel reinforcing members shall be mitered at each end in conformance with the Drawings. Covers and steel reinforcing members shall be designed to fit a preformed recess in the vault casting. Steel checker plate covers shall have lifting holes.

2.4 IRON CASTINGS

A. Iron castings shall conform to the requirements of ASTM A 48 unless otherwise shown.

B. Maintenance hole frame and covers shall be in conformance with Section 333900, “Precast Concrete Maintenance Holes.”

C. Monument frames and covers shall be in conformance with Section 022100, “Monuments.”

D. Water frames and valve covers shall be in conformance with Section 034800, “Precast Concrete Vaults, Utility Boxes, and Storm Water Field Drop Inlets.”

E. New frames and covers for utility structures owned by other agencies shall be in conformance with the appropriate agency’s requirements.

2.5 SEAT ANGLES, SUPPORTS, AND GUIDES

A. Seat angle supports, guides, and accessories shall be steel and of a size as shown, and hot-dip galvanized after fabrication.

2.6 BOLTS AND ANCHORS

A. **Bolts and Nuts**

Standard Service Bolts and Nuts: Except where otherwise shown or specified, all bolts, anchor bolts, nuts and washers, and cap screws shall be steel, galvanized after fabrication as specified herein. Threads on galvanized bolts and nuts shall be formed with suitable taps and dies such that they retain their normal clearance after hot-dip galvanizing. Except as otherwise specified herein, steel for bolts, anchor bolts, nuts and washers, and cap screws shall be in accordance with the requirements of ASTM A 307 Grade A or B, or threaded parts in conformance with the requirements of ASTM A 36.

1. Where required on the Drawings, stainless steel bolts, nuts, and washers shall be provided. Stainless steel bolts, and washers shall be Type 316 stainless steel, ungalvanized.

2. Fire Hydrant bolts and nuts shall be in conformance with Section 331219, “Fire Hydrants.”

B. **Buried Tie Rods:** Buried tie rods and anchor bolts, and bolts for valve anchor blocks and pipeline thrust restraints shall be of Type 304 stainless steel.

C. **Bolt Requirements:**

1. The bolt and nut material shall be free-cutting steel.

2. The nuts shall be capable of developing the full strength of the bolts. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads. All bolts and cap screws shall have hexagon heads and nuts shall be Heavy Hexagon Series.

3. The length of all bolts shall be such that after joints are made up, each bolt shall extend through the entire nut, but in no case more than 1/2 inch beyond the nut.

D. **Expanding-Type Anchors:** Expanding-type anchors if shown or permitted, shall be steel expansion type **Phillips Drill Company "Red Head" anchors, McCullock Industries "Kwick-Bolt," or equal.** Lead calking anchors will not be allowed. Size shall be as shown. Expansion type anchors shall be galvanized steel. Submerged anchors shall be stainless steel, Type 316.

PART 3 -- EXECUTION

3.1 FABRICATION AND INSTALLATION REQUIREMENTS

A. **Fabrication and Erection:** Except as otherwise shown, the fabrication and erection of structural steel shall conform to the requirements of the American Institute of Steel Construction "Manual of Steel Construction."

C. **Welding:**

1. **Method:** All welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards governing same.

2. **Quality:** In assembly and during welding, the component parts shall be adequately clamped, supported and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as specified by the AWS Code. Upon completion of welding, all weld splatter, flux, slag, and burrs left by attachments shall be removed. Welds shall be repaired to produce a workmanlike appearance, with uniform weld contours and dimensions. All sharp corners of material which is to be painted or coated shall be ground to a minimum of 1/32 inch on the flat.

3.2 GALVANIZING

A. All structural steel plates shapes, bars and fabricated assemblies required to be galvanized shall, after the steel has been thoroughly cleaned of rust and scale, be galvanized in accordance with the requirements of ASTM A 123. Any galvanized part that becomes warped during the galvanizing operation shall be straightened. Bolts, anchor bolts, nuts and similar threaded fasteners, after being properly cleaned, shall be galvanized in accordance with the requirements of ASTM A 153. Field repairs to galvanizing shall be made using **"Galvinox," "Galvo-Weld," or equal.**

3.3 EXPANDING-TYPE ANCHORS

A. Drilled anchors shall be installed in strict accordance with the manufacturer's printed instructions. Holes shall be roughened with a brush on a power drill, cleaned and dry. Drilled anchors shall not be installed until the concrete has reached the specified 28-day compressive strength.

3.4 PIPING IDENTIFICATION

A. All water system items shall be identified in conformance with Section 330526, "Piping Identification Systems."

- END OF SECTION -

SECTION 055900 - DUCTILE IRON PIPE

PART 1 -- GENERAL

1.1 THE REQUIREMENT

A. The CONTRACTOR shall provide all material, equipment and labor necessary to furnish and install ductile iron pipe and all appurtenant work, complete and operable, including all connections as shown on the Drawings and as specified herein.

B. All sanitary sewer lines in industrial areas shall be vitrified clay pipe as specified in Section 333106, "Vitrified Clay Pipe."

1.2 RELATED WORK SPECIFIED ELSEWHERE

A.	Section 312300	Utility Earthwork.
B.	Section 331300	Pressure Pipeline Testing and Disinfection.
C.	Section 330130	Sanitary Sewer and Storm Drain System Leakage Testing.
D.	Section 333106	Vitrified Clay Pipe.
E.	Section 099000	Protective Coating
F.	Section 331100	Piping, General.
G.	Section 331200	Miscellaneous Piping, Valves, Fittings, and Appurtenances.
H.	Section 331218	Check Valves.
I.	Division 1	General Requirements.

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. **Commercial Standards:**

AASHTO	Specifications for Highway Bridges.
ANSI/AWWA C104	Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
ANSI/AWWA C105	Standard for Polyethylene Encasement for Ductile Iron Piping for Water and Other Liquids.
ANSI/AWWA C110	Standard for Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In., for Water and Other Liquids.
ANSI/AWWA C111	Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
ANSI/AWWA C115	Standard for Flanged Ductile-Iron Pipe With Threaded Flanges.
ANSI/AWWA C150	Standard for the Thickness Design of Ductile-Iron Pipe.
ANSI/AWWA C151	Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids.

ANSI/AWWA C153	Standard for Ductile-Iron Compact Fittings, 3 In. Through 16 In., for Water and Other Liquids.
AWWA C600	Installation of Ductile Iron Water Mains and Their Appurtenances.
ASTM C 150	Specification for Portland Cement.
SSPC	Steel Structures Painting Council.

1.4 CONTRACTOR SUBMITTALS

A. **Shop Drawings:** The CONTRACTOR shall submit shop drawings of pipe and fittings in accordance with the requirements of the referenced standards and the following supplemental requirements as applicable:

1. Certified dimensional drawings of all valves, fittings, and appurtenances.

2. For pipe 18 inches in diameter and larger, line layout and marking diagrams which indicate the specific number of each fitting and the location and the direction of each fitting in the completed line. In addition, the line layouts shall include: the pipe station and invert elevation at all changes in grade or horizontal alignment; all elements of deflected joints and fittings, both in horizontal and vertical alignment; and the limits of each reach of restrained joints, or of concrete encasement.

B. **Certificates of Compliance:** Certificates of Compliance shall be provided for all products and materials proposed to be used under this Section, and the following supplemental requirements:

1. Physical and chemical properties.

2. Hydrostatic test reports.

C. All expenses incurred in making samples for certification of tests shall be borne by the CONTRACTOR.

1.5 QUALITY ASSURANCE

A. **Inspection:** All pipe will be subject to inspection at the place of manufacture in accordance with the provisions of the referenced standards, as supplemented by the requirements herein. The CONTRACTOR shall notify the ENGINEER, in writing, of the manufacturing starting date not less than 14 calendar days prior to the start of any phase of the pipe manufacture.

B. During the manufacture of the pipe, the ENGINEER shall be given access to all areas where manufacturing is in process and shall be permitted to make all inspections necessary to confirm compliance with the Specifications.

C. **Tests:** Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of the referenced standards as applicable.

D. The CONTRACTOR shall have said material tests performed at no additional cost to the CITY. The ENGINEER shall have the right to witness all testing provided, that the CONTRACTOR'S schedule is not delayed for the convenience of the ENGINEER.

E. In addition to those tests specifically required, the ENGINEER may request additional samples of any material including lining and coating samples for testing by the CITY. The additional samples shall be furnished at no additional cost to the CITY.

PART 2 -- PRODUCTS

2.1 GENERAL

A. Mortar, coal tar coated or polyethylene encased ductile iron pipe shall conform to ANSI/AWWA C104, and ANSI/AWWA C105, subject to the following supplemental requirements: 1) the pipe shall be of the diameter and class shown on the Drawings, 2) the pipe shall be furnished complete with rubber gaskets; and 3) all specials and fittings shall be provided as required.

B. Ductile iron lining options are as follows:

1. Potable Water - Mortar, Type II.

2. Recycled Water - Mortar, Type V.

3. Storm Drains - No liner

4. Sanitary Sewer – Mortar, Type V.

C. **Marking:** The CONTRACTOR shall legibly mark specials 18 inches in diameter and larger in accordance with the laying schedule and marking diagram. All fittings shall be marked at each end with top field centerline.

D. **Handling and Storage:** The pipe shall be handled by devices in conformance with the manufacturer's printed recommendations and acceptable to the ENGINEER, designed and constructed to prevent damage to the pipe lining and coating. The use of equipment which might injure the pipe lining and coating will not be allowed. Stockpiled pipe shall be suitably supported and shall be secured to prevent accidental rolling. All other pipe handling equipment and methods shall be in conformance with the manufacturer's printed recommendations and acceptable to the ENGINEER.

E. **Laying Lengths:** Maximum pipe laying lengths shall be 20 feet with shorter lengths provided as required.

F. **Finish:** The pipe shall have smooth dense interior surfaces and shall be free from fractures, excessive interior surface crazing and roughness.

G. **Closures and Correction Pieces:** Closures and correction pieces shall be provided as required so that closures may be made due to different headings in the pipe laying operation and so that correction may be made to adjust the pipe laying to conform to pipe stationing.

2.2 PIPE DESIGN

A. **General:** Ductile iron pipe shall be designed in accordance with the pressure class requirements of ANSI/AWWA C150 as applicable. The minimum pressure class shall be Class 350 for 4 inch through 12 inch sizes; Class 250 for 14 inch through 20 inch sizes; Class 200 for sizes larger than 20 inches, unless otherwise determined by the ENGINEER or as shown on the Drawings.

B. **Minimum Pipe Wall Thickness:** In addition to the requirements of this Section, the minimum wall thickness shall be in accordance with Table 5 of ANSI/AWWA C150.

2.3 MATERIALS

A. **Ductile Iron Pipe:** Pipe materials shall conform to the requirements of ANSI/AWWA C151.

B. **Cement Mortar Lining:** Cement for mortar lining for water and reclaimed water systems shall conform to the requirements of ANSI/AWWA C104; provided that cement for mortar lining shall be Type II for potable water systems, and Type V for reclaimed water and sanitary sewer systems. A fly ash or pozzolan shall not be used as a cement replacement.

C. **External Coating:** External coatings for buried Ductile Iron pipe using potable water shall be Polyethylene encasement or coal tar paint, in conformance to Section 099000, "Protective Coating." Fire Hydrant Laterals and Fire Service Laterals may also be coal-tar coated for potable water use.
For reclaimed water use, the Polyethylene encasement shall be purple and conform to the marking requirements of Section 330526, "Piping Identification Systems". Unless otherwise specified or shown on the Drawings coating for all uses shall be polyethylene encasement.

2.4 PIPE FITTINGS AND SPECIALS

A. Fittings for ductile iron pipe shall conform to the requirements of ANSI/AWWA C153 or ANSI/AWWA C110 flanged fittings only, for diameters 4 inch through 48 inch and shall have a minimum pressure rating of 250 psi. Ductile iron fittings larger than 48 inches shall conform to the applicable portions of the above referenced standard.

B. Connections to sanitary sewer mains shall be:

1. Existing lines - Tap-Tite method or cast iron saddle fittings which utilize neoprene gasket seals and stainless steel bands.

2. New lines - Wye fittings only.

C. Acceptable products for fittings are **US Pipe, Union Foundary, Trinity or equal.**

2.5 DESIGN OF PIPE

A. **General:** The pipe furnished shall be ductile iron pipe, lined and coated, as required in Section 2.3, with rubber gasketed joints.

B. The pipe shall be designed, manufactured, tested, inspected, and marked according to applicable requirements previously stated and except as hereinafter modified, shall conform to ANSI/AWWA C151.

C. **Pipe Dimensions:** The pipe shall be of the diameter and class as shown on the Drawings.

D. **Fitting Dimensions:** The fittings shall be of the diameter and class as shown on the Drawings.

E. **Joint Design:** Ductile iron pipe shall be furnished with mechanical joints, flanged joints and push-on joints as required. Ductile iron fittings shall be mechanical joints, flanged joints and push-on-joints. Push-on joints will not be allowed for fittings and valves.

1. Mechanical and push-on joints shall conform to ANSI/AWWA C111.

2. Flanged joints shall conform to ANSI/AWWA C115, or ANSI/AWWA C110.

3. When allowed by the ENGINEER, restrained joints shall be **American Cast Iron Pipe Co. "Lok-Fast" Restrained Joint, U.S. Pipe and Foundry "TR FLEX" Restrained Joint, MEG-A-LUG or equal.**

F. Shop-applied interior linings and exterior coatings shall be held back from the ends of the pipe.

2.6 LINING

A. **Cement-Mortar Lining**:

1. Cement-Mortar Lining for Shop Application: Interior surfaces of all ductile iron pipe, fittings and specials shall be cleaned and lined in the shop with cement-mortar lining applied centrifugally in conformity with ANSI/AWWA C104. During the lining operation and thereafter, the pipe shall be maintained in a round condition by suitable bracing or strutting. The lining machines shall be of a type that has been used successfully for similar work. Every precaution shall be taken to prevent damage to the lining.

2. If lining is damaged or found faulty at delivery site, the damaged or unsatisfactory portions shall be replaced with lining conforming to these Specifications and having a minimum thickness matching the factory lining.

3. Protection of Pipe Mortar Lining: All shop-applied cement mortar lining shall be given a seal coat of asphaltic material in conformance with ANSI/AWWA C104.

2.7 EXTERIOR COATING

A. **Exterior Coating of Exposed Piping:** The exterior surfaces of pipe which will be exposed to the atmosphere inside structures or above ground shall be thoroughly cleaned and then given a factory coat of rust-inhibitive primer and a field coat of rust prohibitive finish conforming to the requirements of Section 099000, "Protective Coating."

B. **Exterior Coating of Buried Piping:** Coating of buried pipe shall be as specified in PART 2 -- PRODUCTS of this Section.

2.8 CLEANOUTS

A. Sanitary Sewer cleanouts shall be as specified in Section 331200, "Miscellaneous Piping, Valves, Fittings, and Appurtenances."

PART 3 -- EXECUTION

3.1 INSTALLATION OF PIPE

A. **Handling and Storage:** All pipe, fittings, and appurtenances, shall be carefully handled and protected against damage, impact shocks and free fall. All pipe handling equipment shall be in conformance with the manufacturer's printed recommendations and acceptable to the ENGINEER. Pipe shall not be placed directly on rough ground but shall be supported in a manner which will protect the pipe against injury whenever stored at the trench site or elsewhere. No pipe shall be installed where the lining or coating show defects that may be harmful as determined by the ENGINEER. Such damaged lining or coating shall be repaired, or a new undamaged pipe shall be furnished and installed.

1. All damaged pipe shall be repaired or replaced by the CONTRACTOR.

2. The CONTRACTOR shall inspect each pipe and fitting prior to installation to insure that there are no damaged portions of the pipe or fitting.

3. Before placement of pipe in the trench, each pipe or fitting shall be thoroughly cleaned of any foreign substance, which may have collected thereon and shall be kept clean at all times thereafter. For this purpose, the openings of all pipes and fittings in the trench shall be closed during any interruption to the WORK.

4. Coatings shall be provided in accordance with Section 099000, "Protective Coating."

B. **Pipe Laying:** The pipe shall be installed in accordance with AWWA C600.

1. Pipe shall be laid directly on the imported bedding material. No blocking will be permitted, and the bedding shall be such that it forms a continuous, solid bearing for the full length of the pipe. Excavations shall be made as needed to facilitate removal of handling devices after the pipe is laid. Bell holes shall be formed at the ends of the pipe to prevent point loading at the bells or couplings. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access to the joints for field connection operations and for application of coating on field joints.

2. Each section of pipe 18 inches in diameter and larger shall be laid in the order and position shown on the laying schedule. In laying pipe, it shall be laid to the set line and grade.

3. On pressurized main pipelines, where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the ENGINEER may change the alignment and/or the grades. Such change shall be made by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. Changes in alignment using additional fittings shall be in conformance with the Drawings. However, in no case shall the deflection in the joint exceed the maximum deflection recommended by the pipe manufacturer. No joint shall be misfit any amount which will be detrimental to the strength and water tightness of the finished joint.

4. All gravity lines shall be laid uphill starting at the lowest point with the spigot end pointing in the direction of flow. Pressurized lines laid on a downhill grade shall be blocked and held in place until sufficient support is furnished by the following pipe to prevent movement. All bends shall be properly installed as shown on the Drawings. Water lines shall be laid uphill on grades exceeding 10 percent.

5. Trenches shall be in a reasonably dry condition when the pipe is laid. The CONTRACTOR shall take all necessary precautions to prevent the pipe from floating, due to water entering the trench from any source, shall assume full responsibility for any damage due to this cause, and shall at its own expense restore and replace the pipe to its specified condition and grade if it is displaced due to floating.

C. **Cold Weather Protection:** No pipe shall be installed upon a foundation into which frost has penetrated or at any time that there is a danger of the formation of ice or penetration of frost at the bottom of the excavation. No pipe shall be laid unless it can be established that the trench will be backfilled before the formation of ice and frost occurs.

D. **Pipe and Specials Protection:** The openings of all pipe and specials shall be protected with suitable bulkheads to prevent unauthorized access by persons, animals, water or any undesirable substance.

E. **Pipe Cleanup:** As pipe laying progresses, the CONTRACTOR shall keep the pipe interior free of all debris. The CONTRACTOR shall completely clean the interior of the pipe of all sand, dirt, mortar splatter and any other debris following completion of pipe laying, and any necessary interior repairs prior to testing the completed pipeline.

3.2 RUBBER GASKETED JOINTS

A. **Rubber Gasketed Joints:** The rubber gasket joint shall be made by properly lubricating the rubber gasket with a suitable vegetable compound soap before it is placed in the groove at the spigot end. The gasket shall be stretched over the spigot end of the pipe and carefully seated in the groove, with care taken to equalize the stress in the gasket around the circumference of the joint. The gasket shall not be twisted, rolled, cut, crimped, or otherwise injured or forced out of position during the closure of the joint. A feeler gage shall be used to check the position of the rubber gasket after the

joint has been assembled. Where joint placement is found to be improper, the tested pipe section shall be removed, the gasket checked for damage, a new gasket installed if necessary, the pipe relaid, and the gasket placement rechecked.

3.3 JOINT PROTECTION

A. **Joint and Fitting Protection:** Fittings and joints between pipe sections shall be field coated with the same products as adjacent pipe sections.

B. Polyethylene encasement and coal tar paint shall be applied in conformance with the coating manufacturer's printed recommendations, and in accordance with the requirements of Section 099000, "Protective Coating."

3.4 SANITARY SEWER CLEANOUTS

A. Sanitary Sewer clean-outs shall be installed in conformance with Section 331200, "Miscellaneous Piping, Valves, Fittings, and Appurtenances."

3.5 TESTING

A. Testing shall be in accordance with Sections 331300, "Pressure Pipeline Testing and Disinfection," and 330130, "Sanitary Sewer and Storm Drain System Leakage Testing."

3.6 WARNING TAPE

A. Installation of warning tape and identification shall conform to Section 330526, "Piping Identification Systems."

- END OF SECTION -