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REGULATORY

6.01 Corrosion Protection. All pipes (with metal fittings i.e. DIP or PVC w/DIP fittings) that are proposed to be installed as sewer pipe or appurtenances shall be reviewed by Colorado Springs Utilities for corrosion protection. The recommended corrosion protection shall be added to the construction plans prior to the plans being approved by Colorado Springs Utilities.

(a) **Wrapping.** Polyethylene Encasement Material. The pipe, fittings and appurtenances shall be wrapped in polyethylene with a minimum thickness of eight (8) mils with a two foot (2') minimum overlap at joints. A two-inch (2") wide, ten-mil thickness polyethylene pressure-sensitive tape shall be used to close seams, secure to pipe or hold overlaps. Damage to the polyethylene wrapped (material) pipe in the trench prior to and during backfill shall be repaired to the satisfaction of the Colorado Springs Utilities Inspector.

(b) **Bonding Joints.** All pipelines that require protection will be bonded at every joint. Bonding shall be accomplished by thermo-welding straps or two (2) -# 6 solid copper wires across each joint or coupling.

(c) **Anodes.** Installation of magnesium anodes will be required for additional protection to the pipeline.

(d) **Test Stations.** When designated on the plans, test stations shall be installed by the contractor as indicated.

All corrosion protection materials shall be provided by the contractor.

6.02 Corrosion Protection Systems. The determination of the corrosiveness of the soil, which a wastewater main passes through, and the need for protection will be made and determined by Colorado Springs Utilities. If metal pipe is required or is to be used, it must be protected against corrosion. **All required corrosion protection shall be provided by the Contractor and the material shall be made up of all or part of the following:**

(a) **Polyethylene Encasement Material**. The pipe, fittings, and appurtenances shall be wrapped in polyethylene, in accordance with construction drawing No. C 3-3 - Polyethylene material shall conform to Chapter 5 of these standards.

(b) **Coatings.** Metal pipe and other appurtenances may require protective corrosion resistant coating. The following are approved for exterior use only:

- Roskote Mastic A-51
- American Blackline Product #101 non-fibrous roof coat
- Asphaltic Base Roofing Tar

Coatings must be of a consistency that is applicable by brush and cannot contain asbestos fiber. In all cases the contractor must provide the Colorado Springs Utilities Inspector an MSDS on the product to be used prior to application.

(c) **Bonding Joints.** All pipelines that require protection will be bonded at every joint and/or coupling. Two (2) #6 coated bonded wires shall be fused to DIP pipe and fittings, this shall be accomplished by thermo-welding straps or wire across each joint or coupling. See Wastewater Construction drawing C 3- 1 and C 3-3. The contractor shall furnish all material required for bonding.

(d) **Anodes.** Installation of 9, 17, 32 and 48 lb. magnesium anodes will be required for additional protection to the DIP pipeline. All anodes shall be furnished and installed by the contractor in conformance with these standards. An anode shall be placed per detail drawing C 3-1 – Anode design table. Anodes on larger size pipes shall be determined by Colorado Springs Utilities.

All metal fittings and appurtenances used in PVC pipeline systems (bends, etc.) shall be installed with one (1) magnesium anode bonded to the metal when installing a PVC wastewater line. A minimum of one (1) anode for each individual fitting or appurtenance shall be required.

(e) **Test Stations.** Required electrolysis test stations will be provided and it shall be the contractor's responsibility to install the test stations.

(f) **Insulating Joints**. Whenever it is necessary to join pipe of dissimilar metal, or when designated by Colorado Springs Utilities, a method of insulating against the passage of electrical current shall be used. The insulation method used shall be approved by Colorado Springs Utilities, Corrosion Control Section prior to final plan approval. Special care shall be exercised during the installation of these joints to prevent electrical conductivity across the joints.

(g) **Anodes and Test Stations**. When designated on the plans, anodes and test stations shall be installed as indicated.

(h) **Insulating from Concrete.** Areas of metal pipe and appurtenances, which are to be in contact with concrete bridging blocks or encasement, shall be protected against corrosion prior to installing concrete. The following types of protection systems are acceptable:

(1) Application of a cold-applied mastic coating.

(2) Application of a cold-applied primer and corrosion resistant pipe wrap with a minimum 50% overlap, similar to the primer and pipe wrap manufactured by The Protecto Wrap Company.

Other proposed protection systems may be accepted following review and approval of the Corrosion Control Section and Colorado Springs Utilities.

(i) **Tracer Wire:** Tracer wire shall be used in trenches installed along side of PVC and HDPE water lines. A #12 copper clad steel (boring (hard) and direct bury (soft) applications) insulated tracer wire shall be used to locate the pipe, being taped to the top of the pipe on all main and service lines. A one (1 lb) pound anode shall be attached to the end of the tracer wire for all new dead end mains and stubs. For long runs of plastic pipe, a one (1 lb) pound anode will be attached to the tracer wire every one thousand (1000') feet.

6.03 Industrial Waste Control

(a) **Industrial Waste Control Manhole - General.** To monitor industrial waste sources, a control manhole shall be installed in accordance with Wastewater Detail Sheet C 6-3. A permit must be obtained from Contract Administration, the utility permits and new construction. The Industrial Waste Administrator may alter these standards as needed to fit individual applications.

(b) **Industrial Waste Control Manhole - Manhole Size.** The manhole size required shall be a minimum I.D. of five feet (5') or larger as determined by the service size on which it will be installed and the size needed to construct and maintain the equipment to be located inside the manhole.

(c) **Industrial Waste Control Manhole - Installation.** The manhole shall be installed in accordance with these standards. The installation shall be inspected by Colorado Springs Utilities to insure compliance with standards and standard details. The Industrial Waste Administrator shall determine and approve the preferred location of this control manhole.

(d) **Flume-General.** To facilitate metering flows from industrial waste sources, a Palmer-Bowlus flume shall be installed in the control manhole according to the standard details and these specifications. The Industrial Waste Administrator may alter these standards or require additional items as necessary to assure appropriate sampling and flow measurement capabilities and to achieve the purposes of the city wastewater treatment code as amended. Metering pits for the purpose of metering wastewater flows shall be prepared and submitted to the Colorado Springs Utilities for its review and approval. All metering pits shall include, but not necessarily be limited to, the following:

1. Flume or approved equal.
2. Concrete vault or minimum 6' ID manhole.
3. Flow measurement, totalizing and recording devices.
4. The metering pit shall have a suitable and safe means of access.

(e) **Flume-Installation**. The flume size shall be determined by the engineer and approved by Colorado Springs Utilities. The user shall also supply the flume manufactures rate curve; or the rate curve developed by the engineer sizing the flume, if it is custom made for the specific site. The following recommendations are made to insure the proper sizing of the flume.

(1) The flume shall act as the hydraulic control in which critical flow is developed.

(2) Subcritical flow shall be developed in the pipe upstream of the flume. The flow shall be free of aeration or prominent surface waves.

(3) The depth of flow upstream shall not exceed 90% of the pipe diameter and should not be less than 40% of the pipe diameter to insure accurate measurement.

(4) Supercritical flow shall be obtained downstream of the flume and the pipe shall be free of obstructions.

(5) Care must be taken to use a flume size needed to match actual flows rather than a flume size equal to the nominal pipe size.

(f) **Flume - Sizing.** The Palmer-Bowlus flume or approved equal shall be installed as per the manufacturer's recommendations with the following criteria and Wastewater Detail C 6-3 as minimum guidelines to insure the proper functioning of the flume.

(1) Upstream pipe sections equal to a minimum of twenty (25) five pipe diameters, shall have a slope not less than that required by Chapter 3 of these standards without bends, drops or flow junctions, to ensure sub-critical flow.

(2) The downstream pipe sections shall have slope greater than the upstream pipe to ensure supercritical flow.

(3) The flume itself shall be grouted into the block out at 0.0% slope as shown on the standard detail.

(4) The point of measurement for the depth sensor shall be 0.5 of the pipe diameters upstream of the flume.

(5) The installation shall be inspected by the Colorado Springs Utilities to ensure compliance with standards and shop drawings.

(g) **Metering Elements.**

(1) **Flume:** The flume shall be made of corrosion resistant materials and supplied with a manufacturer's rate curve. Shop drawings shall be submitted to the Colorado Springs Utilities for review and approval prior to installation.

(2) **Flow Level Sensor and Transmitter if Required:** The flow level sensor shall be of a non-intrusive type and shop drawings for the level sensor and transmitter shall be submitted to the Colorado Springs Utilities for review and approval prior to installation.

(3) **Manhole Ventilation:** The Industrial Waste Administrator may require that the control manhole be vented if it is determined that it is needed to protect the monitoring equipment and ensure proper function.

(h) **Instruction, Equipment Operation and Maintenance.** Colorado Springs Utilities shall be supplied with a complete set of equipment operation and maintenance instructions, including emergency procedures, maintenance procedures, tools and spare parts as may be considered necessary. All emergency power generation equipment shall also be provided with operation and maintenance instructions requiring routine starting and running of such units at full load.