SECTION 02730 - SANITARY SEWERAGE SYSTEM TESTING

City of San Diego, CWP Guidelines

PART 1 -- GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes testing of sanitary sewerage systems.

1.2 RELATED SECTIONS

A. The WORK of the following Sections applies to the WORK of this Section. Other Sections of the specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 02611 Cast Iron Soil Pipe
2. Section 02617 Reinforced Concrete Pipe
3. Section 02618 Reinforced Concrete Pressure Pipe
4. Section 02620 Reinforced Concrete Pressure Pipe, Steel Cylinder Type

1.3 STANDARD SPECIFICATIONS

A. Except as otherwise indicated in this Section of the Specifications, the CONTRACTOR shall comply with the Standard Specifications for Public Works Construction (SSPWC), as specified in Section 01090 - REFERENCE STANDARDS.

1.4 CODES

A. The WORK of this Section shall comply with the current editions, with revisions, of the following codes and City of San Diego Supplements:

1. Uniform Plumbing Code

1.5 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section:

1. ANSI/ASTM C 828 Low-Pressure Air Test of Vitrified Clay Pipe Lines.

1.6 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Proposed plans for testing, and for water conveyance, control, and disposal, design and manufacture data for the mandrel (if proposed) and minimum 48-hour advance written notice of proposed testing schedule, for review by the CONSTRUCTION MANAGER.

PART 2 -- PRODUCTS

2.1 MATERIALS

A. The WORK of this Section includes temporary valves, plugs, bulkheads, and other air pressure testing and water control equipment and materials. No materials shall be used which would be injurious to piping systems and future function. Air test gages shall be laboratory-calibrated prior to the leakage test.

PART 3 -- EXECUTION

3.1 GENERAL

A. Except as otherwise indicated, water for testing will be furnished by the CONTRACTOR and the OWNER is not responsible for conveying the water to the points of use.

B. Release of water from pipelines, after testing has been completed, shall be performed in the presence of the CONSTRUCTION MANAGER.

C. Testing shall be performed in the presence of the CONSTRUCTION MANAGER.

3.2 TESTING OF PIPE FOR LEAKAGE

A. **General:** Sewer pipes shall be tested for leakage in compliance with SSPWC Subsection 306-1.4 except as modified herein. Testing shall be completed prior to resurfacing. When leakage exceeds the indicated limits, piping shall be repaired or replaced and leakage shall be reduced to the indicated limits.

B. **Water Exfiltration Test:** The water exfiltration test shall comply with SSPWC Subsection 306-1.4.2 except that the measurements of water level and head shall be from the centerline of the pipe instead of the invert, and allowable leakage shall be determined as follows:

$$E = 0.000012\ LD(H)^{1/2}$$

Where:

E = Allowable leakage in gallons per minute of sewer tested.

L = Length of sewer and lateral connections tested, in feet.

D = Internal diameter of the pipe in inches.

H = Difference in elevation in feet between the water surface in the upper manhole and the centerline of the pipe at the lower manhole; or if ground water is present above the centerline of the pipe in the lower manhole, the difference in elevation between the water surface in the upper manhole and the ground water at the lower manhole.

C. **Water Infiltration Test:** The water infiltration test shall comply with SSPWC Subsection 306-1.4.3 except that the measurements of water level and head shall be from the centerline of the pipe instead of the invert, and allowable leakage shall be determined as follows:

$$E = 0.000012\ LD(H)^{1/2}$$

D. **Air Pressure Test**: The air test shall comply with SSPWC Subsection 306-1.4.4. Joints may be air tested individually with the use of specialized equipment provided the joint testing procedure is submitted for the CONSTRUCTION MANAGER's review prior to testing. Prior to each test, the pipe at the joint shall be wetted with water. The maximum test pressure shall be 3.0 psi. The maximum allowable pressure drop shall be 1.0 psi over a 30-second test period.

E. **Hydrostatic Testing of Sewage Forcemains:**

1. Prior to hydrostatic testing, all pipelines shall be flushed or blown out as appropriate. The CONTRACTOR shall test all pipelines either in sections or as a unit. No section of the pipeline shall be tested until all field-placed concrete or mortar has attained an age of 14 days. The test shall be made by closing valves when available, or by placing temporary bulkheads in the pipe and filling the line slowly with water. The CONTRACTOR shall be responsible for ascertaining that all test bulkheads are suitably restrained to resist the thrust of the test pressure without damage to, or movement of, the adjacent pipe. Any unharnessed sleeve-type couplings, expansion joints, or other sliding joints shall be restrained or suitably anchored prior to the test, to avoid movement and damage to piping and equipment. The CONTRACTOR shall provide sufficient temporary air tappings in the pipelines to allow for evacuation of all entrapped air in each pipe segment to be tested. After completion of the test, such taps shall be permanently plugged. Care shall be taken to see that all air vents are open during filling.

2. The pipeline shall be filled at a rate which will not cause any surges or exceed the rate at which the air can be released through the air valves at a reasonable velocity and all the air within the pipeline shall be properly purged. After the pipeline or section thereof has been filled, it shall be allowed to stand under a slight pressure for at least 24 hours to allow the concrete or mortar lining, as applicable, to absorb water and to allow the escape of air from any air pockets. During this period, bulkheads, valves, and connections shall be examined for leaks. If leaks are found, corrective measures satisfactory to the CONSTRUCTION MANAGER shall be taken.

3. The hydrostatic test shall consist of holding the test pressure on the pipeline for a period of 4 hours. The test pressure for sewage forcemains shall be 133 percent of the pipe pressure class shown or specified measured at the lowest point of the pipeline section being tested. The test pressure for yard piping shall be as shown or specified on the Piping Schedule measured at the lowest point of the pipeline section being tested. All visible leaks shall be repaired in a manner acceptable to the CONSTRUCTION MANAGER.

4. The maximum allowable leakage for sewage forcemains shall be [10] U.S. gallons per inch of diameter per mile of pipe per 24 hours for pipe with 40-ft or greater lengths between joints and with rubber-gasketed joints and [20] U.S. gallons per inch of

diameter per mile of pipe per 24 hours for pipe with 20-ft or less lengths between joints and with rubber-gasketed joints. The maximum leakage for yard piping shall be as shown on the Piping Schedule. Pipe with welded joints shall have no leakage. In the case of pipelines that fail to pass the prescribed leakage test, the CONTRACTOR shall determine the cause of the leakage, shall take corrective measures necessary to repair the leaks, and shall again test the pipelines.

3.3 TELEVISING SEWER MAINS

A. New sewer mains less than 36 inches in diameter shall be inspected by closed circuit televising in compliance with Subsection 306-1.4.8 of the Regional and City of San Diego Supplement Amendments to SSPWC.

B. All defects as determined by CONSTRUCTION MANAGER shall be reconstructed prior to placing pavement or permanent trench resurfacing.

3.4 DEFLECTION TEST

A. Flexible and semi-rigid main line pipe shall be tested for deflection, joint displacement, and other obstructions by mandrel test in compliance with Subsection 306-1.4.8 of City of San Diego Supplement Amendments to SSPWC.

B. The test shall be performed not less than 30 days after completion of the trench backfill, but prior to permanent resurfacing. The mandrel shall be a full circle, solid cylinder, or a rigid, non-adjustable, odd-numbered leg (9 leg minimum) steel cylinder which has been approved by the CONSTRUCTION MANAGER as to design and manufacture and shall comply with SSPWC Subsection 306-1.4.8, referenced hereinbefore.

C. Obstructions and deflections, greater than 5 percent, encountered by the mandrel shall be corrected by the CONTRACTOR.

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NTS: The following paragraph 3.5 should be used only when watertight manholes are specified as in areas with high groundwater table.

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3.5 TESTING OF MANHOLES

A. Manholes shall be hydrostatically tested for leakage after installation, but prior to being backfilled. Prior to hydrostatic testing, manholes shall be visually inspected for leaks. Leaks or cracks shall be repaired prior to hydrostatic testing. Pipes entering the manhole shall be sealed at a point outside the manhole walls so as to include testing of the pipe/manhole joints. The manhole shall be filled with water to a level 2 inches below the top of the frame. Safety lines shall be secured to all plugs. After a period of at least one hour and when the water level has stabilized, the manhole shall be refilled and the water level shall be checked. The water level shall again be checked after a period of 4 hours. If the water level is reduced by more than [1/4-inch], the leakage shall be considered excessive, and the manhole shall be repaired and retested. The exterior of the manhole shall be inspected during this period for visible evidence of leakage. Moisture, sweating, or beads of water on the exterior of the manhole shall not be considered leakage, but any water running across the surface will be considered leakage and the manhole shall be repaired.

** END OF SECTION **