

SECTION 02530
SANITARY SEWAGE

PART 1 - GENERAL

1.1 SCOPE

- A. This section includes sanitary sewers and structures appurtenant thereto. Excavating, trenching, backfilling, and density tests are specified elsewhere. Sewage collection system work includes, but is not limited to, the following.
 - 1. Sanitary sewer conduits
 - 2. Manholes, frames, and covers
 - 3. Emergency underground concrete sewage storage tank
- B. Refer to applicable Division 2 Section 02310 – Earthwork, for excavation and backfilling work related to sewer collection systems.
- C. Refer to applicable Division 3 sections for concrete work related to sewer collection systems.

1.2 QUALITY ASSURANCE

- A. Installer: A firm specializing and experienced in sewer work for not less than two (2) years.
- B. Code Compliance: Comply with applicable portions of State and local plumbing codes, the Brevard County Health Unit, and the **City of Melbourne Engineering Standards**.

PART 2 - PRODUCTS

2.1 CONDUIT MATERIALS

- A. General: Furnish ells, tees, reducing tees, wyes, couplings, increasers, crosses, transitions, and end caps of same type and class of material as conduit, or of material having equal or superior physical and chemical properties as acceptable to the Architect/Engineer.
- B. Polyvinyl Chloride (PVC) Gravity Sanitary Sewer Pipe and Fittings: ASTM D-3034, SDR35.
- C. PVC Pipe Joints: Joints for PVC sewer pipe shall be rubber gasketed type complying in all respects to the physical requirements of ASTM D-3212 and ASTM F-477. Lubricant for jointing as approved by the pipe manufacturer shall be used for connecting PVC pipes.
- D. Concrete Manholes: Precast manhole sections shall be minimum 8" thick and 48" in diameter, conforming to ASTM C-478. Cones shall have same wall thickness and reinforcement as manhole section. Top and bottom of all sections shall be parallel. Joints shall be tongue-and-groove or Keylock type. Joints shall be formed using an approved joint sealer.

- E. Prior to the delivery of any size of precast section on the job site, yard tests will be conducted at the point of manufacture. The precast sections to be tested will be selected at random from the stockpiled material which is to be supplied for the job. All test specimens will be mat tested, and shall meet the permeability test requirements of ASTM C-14.
- F. Coating System: All sanitary sewer manholes shall be provided with an interior and exterior coating. After the concrete has cured for 28 days, minimum, the precast units shall be coated by the manufacturer. The units shall be touched up in the field by the Contractor, if damaged. Interior and exterior surfaces of the manholes shall be coated in accordance with the System A or B, below.

2.1.1 UNDERGROUND CONCRETE STORAGE TANK

- A. General: Furnish cast-in-place underground concrete storage tank with appurtenances.
- B. Tank shall be provided with an interior and exterior coating. Interior and exterior surfaces of the tank shall be coated in accordance with System A or B, below.”

2.2 SYSTEM A (LINEGUARD 100) - INTERIOR

- A. Surface Preparation: SP-C2.
- B. Finish: 2 coats of Florida Linerguard 100, with the first coat being in color red and the second coat being in color white.
- C. Total Thickness (dry): 12-15 mils minimum.

2.3 SYSTEM B (KOPPERS) - EXTERIOR

- A. Surface Preparation: SP-C2.
- B. Finish: 2 coats of Koppers Bitumastic 300M Water Epoxy at 8.0-mil dry thickness (200 SFPG) per coat.
- C. Total Thickness (dry): 16-mil.
- D. Sewer Main Connection to Manholes: Manholes shall be provided with manufacturer installed rubber boots with stainless steel clamps for connection of gravity lines.
- E. Manhole Joint Seals: Preformed plastic gaskets shall meet all requirements of Fed. Spec. SS-S-00210.
- F. Manhole Frames and Covers: Traffic-bearing cast iron of size and shape detailed on the drawings. Covers shall have the word "sanitary sewer" in 2" raised letters.
- G. Castings shall be tough, close-grained gray iron, sound, smooth, clean, free from blisters, blowholes, shrinkage, cold shuts, and all defects. Plane or grind bearing surfaces to ensure flat, true surfaces. Covers shall be true and seat within ring at all points.

- H. Base Rock: Clean 3/4" gravel or crushed rock uniformly graded from coarse to fine conforming to requirements of FDOT specifications, 1977.
- I. Concrete: All concrete work shall conform to the requirements of Section 03300 - Cast-in-Place Concrete.
- J. Anchor bolts shall be galvanized in conformance with ASTM A-153.

PART 3 - EXECUTION

3.1 INSTALLATION OF CONDUIT

- A. General: All PVC sewer shall be installed in accordance with Uni-Bell, UNI-B-5.
- B. Pipe Distribution: Distribute material on the job no faster than it can be used to good advantage. Unload pipe which cannot be physically lifted by workers from the trucks, by a forklift, or other approved means. Do not drop pipe of any size from the bed of the truck to the ground.
- C. Pipe Preparation and Handling: Inspect all pipe and fittings prior to lowering into trench to ensure no cracked, broken, or otherwise defective materials are being used. Clean ends of pipe thoroughly. Remove foreign matter and dirt from inside of pipe and keep clean during and after laying.
- D. Use proper implements, tools, and facilities for the safe and proper protection of the work. Lower pipe into the trench in such a manner as to avoid any physical damage to the pipe. Remove all damaged pipe from the job site. Do not drop or dump pipe into trenches under any circumstances.

3.2 LINE AND GRADE

- A. Gravity Sewer Pipe: All sewer lines between manholes shall be absolutely straight and true. No curvature shall be tolerated. Do not deviate from line or grade, as established by the Engineer, more than 1/2" for line and 1/4" for grade, provided that such variation does not result in a level or reverse sloping invert.
- B. Establish line and grade for pipe by the use of lasers or by transferring the cut from offset stakes to batter boards set in the trench at maximum intervals of 25'. Maintain a minimum of three sets of batter boards with string line ahead of the pipe laying at all times.
- C. Laying and Jointing Pipe: Pipe laying shall proceed upgrade with spigot ends pointing in direction of flow. After a section of pipe has been lowered into the prepared trench, clean the end of the pipe to be joined, the inside of the joint, and the rubber ring immediately before joining the pipe. Make assembly of the joint in accordance with the recommendations of the manufacturer of the type of joint used. Provide all special tools and appliances required for the jointing assembly.

- D. After the joint has been made, check pipe for alignment and grade. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between joints. Apply sufficient pressure in making the joint to assure that the joint is "home" as defined in the standard installation instructions provided by the pipe manufacturer. To assure proper pipe alignment and joint makeup, place sufficient pipe zone material to secure the pipe from movement before the next joint is installed.
- E. When pipe is laid within a movable trench shield, take all necessary precautions to prevent pipe joints from pulling apart when moving the shield ahead.
- F. Take the necessary precautions required to prevent excavated or other foreign material from getting into the pipe during the laying operation. At all times, when laying operations are not in progress, at the close of the day's work, or whenever the workers are absent from the job, close and block the open end of the last laid section of pipe to prevent entry of foreign material or creep of the gasketed joints.
- G. Plug or close off pipes which are stubbed off for manhole construction or for construction by others, with temporary plugs.
- H. Take all precautions necessary to prevent the "uplift" or floating of the line prior to the completion of the backfilling operation.
- I. Where nonreinforced pipe is connected to manholes or concrete structures, make connection so that the standard pipe joint is located not more than 3' from the outside edge of the structure.
- J. When cutting and/or machining the pipe is necessary, use only tools and methods recommended by the pipe manufacturer.

3.3 UNDERGROUND STRUCTURES

- A. **Rock Base:** Prior to setting precast concrete base section, remove water from the excavation. Place a minimum of 6" of rock base and thoroughly compact with a mechanical vibrating or power tamper.
- B. **Manhole Joint Seals:** Carefully inspect precast manhole sections to be joined. Sections with chips or cracks in the tongue shall not be used. Joint seals shall be installed in strict conformance with the manufacturer's recommendations. Only pipe primer furnished by the joint seal manufacturer will be approved.
- C. **Precast Concrete Manholes:** Place precast concrete sections as shown on the drawings. Where manholes occur in pavements, set tops of frames and covers flush with finish surface. Elsewhere, set tops 3" above finish surface, unless otherwise indicated.
- D. **Manhole Invert:** Construct manhole inverts in conformance with details shown on the drawings, and with smooth transitions to ensure an unobstructed flow through manhole. Remove all sharp edges or rough sections which tend to obstruct flow. Where a full section of pipe is laid through a manhole, break out the top section as indicated and cover exposed edge of pipe completely with mortar. Trowel all mortar surfaces smooth.

- E. Provide rubber joint gasket complying with ASTM C-443.
- F. Apply bituminous mastic coating at joints of sections.
- G. Manhole Frames and Covers: Install frames and covers on top of manholes to positively prevent all infiltration of surface or groundwater into manholes. Frames shall be set in a bed of mortar with the mortar carried over the flange of the ring as shown in the Manhole Details on the drawings. Set frames so tops of covers are flush with surface of adjoining pavement or ground surface, unless otherwise shown or directed.

3.4 BACKFILLING

- A. General: Conduct backfill operations of open-cut trenches closely following laying, jointing and bedding of pipe, and after initial inspection and testing are completed.
- B. Place backfill and compact in accordance with provisions of Section 02200 - Earthwork.

3.5 CLEANING AND TESTING

- A. Prior to final acceptance, the sewer collection system shall be thoroughly cleaned and visually inspected in the presence of the Engineer and local authorities. Visual inspection shall include closed circuit television inspection.
- B. Following visual inspection, the sewer system including service lines shall be tested in the presence of the Engineer and local authorities.
- C. Acceptable methods of testing shall be low-pressure air exfiltration or water exfiltration in accordance with the local authority requirements.
- D. The Contractor shall furnish all necessary tools, supplies, labor and equipment for testing.
- E. Closed circuit television inspection shall be in conformance with Section V, "Recommended Specifications for Sewer Collection System Rehabilitation" published by the National Association of Sewer Service Companies.
- F. Low pressure air exfiltration testing shall be in accordance with Uni-Bell, UNI-B-6.
- G. Water exfiltration testing shall be in accordance with Uni-Bell, UNI-B-5.
- H. Visual inspection and testing shall be performed on the same day. Notify Engineer one week in advance.

END OF SECTION 02530