

SECTION 331030

GRAVITY SANITARY SEWER SYSTEM

PART 1 - GENERAL

1.1 SCOPE

- A. Furnish all labor, equipment, materials, testing and incidentals required to install gravity sewers, complete, as indicated on the construction drawings. The gravity sewer shall meet the requirements of the Florida Department of Environmental Protection permit.

1.2 WORK INCLUDED

The Contractor shall, unless specified otherwise, furnish all labor, materials, equipment, tools and all other associated appurtenances, necessary to do the work required under the contract to include but not limited to unloading, hauling, and distributing all pipe, casting, fittings, manholes and appurtenances. The Contractor shall also remove any surfacing as required; excavate the trenches and pits to the required dimensions; construct and maintain all requirements for traffic control; sheet, brace, and support the adjoining ground or structures where necessary; handle all drainage or ground water; provide barricades, guards, and warning lights; lay and test the pipe, castings, fittings, manholes and appurtenances; backfill and consolidate the trenches and pits; maintain all surfaces over the trench until surface restoration is completed; restore the surfaces unless otherwise stipulated by NPU; remove surplus excavated material; and clean the site of the work.

The Contractor shall also furnish all labor, materials, equipment, tools and all other associated appurtenances required to rearrange sewers, conduits, ducts, pipes, or other structures encountered in the installation of the work.

1.3 COORDINATION OF WORK

The Contractor shall be responsible for the satisfactory coordination of the construction of the gravity sanitary sewer system with other construction and activities in the area. Delays in work resulting from lack of such harmony shall not in any way be a cause for extra compensation by any of the parties.

1.4 REFERENCED STANDARDS (LATEST REVISION)

AWWA: C-105, C-150, C-110, C-478, C-900, C-905, C-909, C 906-90, C-151, C-153, C111, C-651, C-652, and C-652

ASTM: A-139, C-478, B-1785, D-638, D-790, D-1869, D-1120, D-2241, D3350,

D 124868

1.5 SUBMITTALS

The Contractor shall submit in writing documentation to justify approval of these materials by NPU prior to the start of the project.

The Contractor submittals shall include the statement that the submittals have been reviewed and the materials meet the contract specifications and/or NPU Standard Details.

For materials that the Contractor is requesting deviations from this specification and/or NPU Standard Details, the Contractor shall submit in writing a minimum of 60 days prior to construction, documentation to justify approval of these materials by the Engineer and NPU.

No fabrication shall take place until the final shop drawings are reviewed by the Engineer and NPU. Final approval is at the discretion of NPU.

PART 2 - PRODUCTS

2.1 GENERAL

The materials used in this work shall be all new, and conform to the requirements for class, kind, size and material as specified below.

All pipe furnished for gravity sanitary sewer and service installations including wyes/tees shall be of the type, kind, size, and class indicated for each particular line segment as shown on the engineering drawings and/or designated in the Contract bid items.

2.2 PVC GRAVITY SEWER PIPE

- A. Polyvinyl Chloride (PVC) gravity sewer pipe and fittings, four to fifteen (4"-15") inches in diameter, shall be SDR 26, meeting the requirements of ASTM D 3034. Joining of pipe sections and fittings shall be by water-tight push-on joints using elastomeric gaskets in accordance with ASTM D 3212.
- B. Polyvinyl chloride (PVC) pipe, sixteen to forty-eight (16-48) inches in diameter, for gravity sewers, shall be DR 25, with cast-iron (CI) outside diameter, meeting the requirements of AWWA C905.
- C. At all conflict crossings using four to twelve inches (4"-12") diameter pipe substitute C900 PVC, Class 305, DR 14 and for PVC pipe 14" and larger use C900 PVC, Class 235, DR 18.

- D. All PVC sewer pipe bell ends shall be field inspected for out-of-roundness and spigot ends shall be field inspected for out-of-roundness and for squareness of the pipe end. Any materials not in conformance with the tolerances of ASTM D 3212 or AWWA C905 shall be removed from the work site.
- E. All PVC sewer pipe sections shall also be field inspected for excessive cross-section deflection. Any pipe section visually found to have a pipe deflection, before installation, of two (2%) percent of the base inside diameter or greater shall be removed from the work site. After installation and backfill, pipe deflection shall not be allowed to be five (5%) percent or greater of the base inside diameter. Any length of pipe found installed having excessive deflection shall be dug up and either reinstalled or removed from the work site.
- F. Six-inch (6") PVC fittings for sewer laterals shall also be SDR 26, molded in one piece, with elastomeric joints in accordance with ASTM D-3034. Fittings not currently available in molded form may be fabricated in accordance with ASTM D-3034 with manufacturer's standard pipe bells and gaskets.
- G. Approved Gravity Sewer Pipe SDR 26
 - 1. Certainteed/North American Pipe Company
 - 2. J-M Manufacturing
 - 3. Diamond
 - 4. National Pipe & Plastics

2.3 DUCTILE IRON PIPE

- A. The ductile iron pipe covered by this specification shall be the push-on joint type, centrifugally cast to conform to all requirements of AWWA Specification C-151, latest revision. All pipes shall have an epoxy bonded lining in accordance with AWWA Specifications, latest revision. The maximum allowable deflection of the pipe shall not exceed two percent (2%) of the pipe diameter. Ductile iron pipe shall be fully encased in an eight (8) mil polyethylene sleeve in accordance with AWWA Specification C-150, Method A. Polyethylene material shall conform to ASTM standard Specification D-1248-68. All ductile iron pipe shall be marked "DUCTILE IRON" in large letters. The nominal wall thickness shall be plainly marked on each piece of pipe. The pipe and the polyethylene sleeve shall be color coded green by a means acceptable to the Engineer and NPU. Use of ductile iron pipe in gravity sewers must be explicitly approved by the Engineer and NPU during the

shop drawing process.

- B. Ductile iron pipe joints shall be of the push-on type with rubber gasket which complies with the latest revision of AWWA Specification C-111.

2.4 MANHOLES

See Section 336040 - Manholes, Rings and Covers

2.5 GRAVITY SEWER FITTINGS

1. Harco
2. Tigre, USA
3. Multi fittings, see Section 336040 - Manholes, Rings and Covers

PART 3 – EXECUTION

3.1 CLEANING PIPE

- A. All foreign matter or dirt shall be removed from the inside of the pipe before it is lowered into its position in the trench, and the pipe shall be kept clean by approved means during and after laying. The outside of the tongue or spigot end of the pipe shall be wire brushed and wiped clean, dry, and free from oil and grease before the pipe is laid.

3.2 LAYING PIPE

- A. The pipe shall be laid proceeding upgrade with the tongue or spigot ends pointed in the direction of flow. Pipe shall not be laid in water or when the trench conditions are unsuitable for such work except by written permission of Engineer and NPU. The excavation of trenches shall be fully completed a sufficient distance in advance of the pipe laying and the exposed ends of all pipe shall be fully protected with a board or approved stopper to prevent earth or other substances from entering the pipe. The interior of the sewer piping shall be continually cleaned of all dirt, cement, or superfluous material as the work progresses. If necessary and/or required at the completion of the installation, the pipe shall be thoroughly flushed by an Engineer and NPU approved method at the expense of the Contractor prior to testing.
- B. A continuous run of gravity sanitary sewer piping between manholes and/or between a manhole and a wet well shall be from the same manufacturer. A continuous run of gravity sanitary sewer piping shall be either PVC, or DI if approved as noted in Section 2.3 A. above, and no mixing of type of piping is allowed.

3.3 JOINING PVC GRAVITY SEWER PIPE AND FITTINGS

- A. The PVC joints shall be of the push-on type with a single rubber gasket conforming to ASTM F 477.
- B. Wyes and riser fittings shall be gasketed connections. Rubber doughnuts are not to be used.
- C. Metal piping shall not be threaded into plastic fittings, valves, or couplings, nor shall plastic piping be threaded into metal valves, fittings, or couplings.

3.4 IDENTIFICATION AND DETECTION

- A. PVC gravity sewer pipe shall bear identification markings in accordance with ASTM D 3034 or AWWA C905.
- B. PVC gravity sewer pipe shall be color coded green using a solid pipe color pigment.
- C. 3M Electronic Marker Balls and Metallic Marker Tape: Contractor shall provide and install metallic marker tape for all installed trenched pipe. The Contractor shall and provide, program, and install 3M electronic marker balls at each wye. Metallic marker tape is not required on trenchless pipe installations. The tape shall be marked green for sewer. The metallic tape shall be laid twelve (12) to eighteen (18) inches above the pipe and the electronic marker balls placed directly on top of the wye.
- D. Programming: The contractor shall program all balls and provide a copy of the programmed data in each marker ball in either Microsoft EXCEL electronic format to NPU. The Contractor's as-built drawings shall show the location of all marker balls.

3.5 SERVICE CONNECTIONS, WYES, TEES

A. General

The appropriate size service connections, wyes, tees shall be installed for service connections in accordance with the engineering drawings, standard details and/or at locations as determined by NPU. The tops of all risers and openings to wyes and/or tee branches shall be capped by a slip joint plug to prevent any water from entering the service until the connection is placed in service. A clean out shall be installed at the end of all service connections which is either at the right-of-way or property line.

B. Pre-Installation and Post-Installation Television Inspection of Existing Sewer Main

When the new sewer services are being connected to the existing sewer main, the Contractor shall video (CCTV) inspect the existing sewer main immediately before and after the new sewer services installation to verify the existing pipe conditions, refer to NPU Standard Specification 336060 Television Inspection. The audio, video, and written records shall be provided to the Engineer and NPU in electronic format acceptable to NPU.

C. Records and Location of service connections

The Contractor shall keep written records of service connection, wye, tee locations, depth to top of riser, type of connection for completion of as-built drawings. A locate ball shall be placed at the wye.

3.6 GRAVITY SEWER MAIN AIR TEST

A. Gravity sewer system testing (inclusive of sewer mains, sewer services, and manholes) shall only be conducted after the placement and compaction of backfill and base materials are have been completed and the compaction has been tested and approved.

B. All services shall be installed prior to testing the gravity sewer main.

C. All gravity sewer pipe shall be air tested as follows:

1. The sewer main shall be flushed and cleaned prior to the air test.
2. The installed system shall be low pressure tested at five (5) psi for five (5) minutes with the allowable loss to pass the test of one half ($\frac{1}{2}$) psi.

3.7 GRAVITY SEWER MAIN TELEVISION INSPECTION

A. Television inspection shall be performed on all PVC gravity sanitary sewer pipes. The test shall be conducted after the sewer trench has been backfilled to the desired finished grade and has been in place for thirty (30) days.

B. The test shall be performed prior to final project acceptance. The television inspections shall be performed in accordance with The National Association of Sewer Service Companies "Recommended Specifications for Sewer Collection System Rehabilitation" NPU Standard Specification 336060 Television Inspection. Electronic video and inspection logs shall be provided to the Engineer and NPU for

review. If inspection reveals cracked, broken, or defective pipe or pipe misalignment resulting in vertical sags in excess of one half (1/2") inch, the Contractor shall be required to repair or replace the pipeline. Prior to the replacement of failed sanitary sewer pipe, the method of repair or replacement shall be submitted to the Engineer and for approval. Pressure grouting shall not be considered as an acceptable method of repair. Repair clamps are not allowed for gravity sewer pipe.

- C. All testing shall be performed by the Contractor at its expense without any direct compensation being made therefore, and they shall furnish all necessary equipment and materials required.
- D. Test Failure and Remedy: In the event of test failure on any test section, the section shall be replaced, with all repair work subject to approval of Engineer and NPU. The replaced section shall be retested for leakage and deflection in conformance with the specifications contained herein. All repairs, replacement, and retesting shall be at the Contractor's expense.

END OF SECTION