

16.0 CONSTRUCTION OF STORM DRAIN PIPE SYSTEM

16.0 Description

The work covered by this section of the specifications consists of furnishing and in performing all operations, necessary and incidental to the construction and installation of storm drain pipe. This shall include, but not be limited to all excavation, trenching, removal and replacement of unsuitable materials, grading, all pipe and fittings, as shown on the plans or drawings.

16.1 Plans, Permits and Codes

16.1.1 Permits and Codes

It is the intent of this section of this section of the specifications that the contractor's bid on this work be based upon the plan, drawings and these specifications and with all applicable codes, permits and regulations as amended by any waivers.

16.1.2 Plans

- A. The contract drawings, standard drawings and plans indicate the extent and specific arrangement of the work.
- B. If any departures from the indicated line grade or location as shown by the plans are deemed necessary by the contractor, details of such departures and the reasons therefore shall be submitted as soon as practicable for approval.
- C. No work on such departures or deviations shall begin without written approval. No work shall be accepted by the Stormwater Department with any unapproved departures or deviations from the contract drawings, standard drawings or plan.

16.2 Materials

16.2.1 General

- A. All materials furnished by the contractor shall meet the requirements and these specifications.
- B. All materials shall be new, first quality and free from any and all defects and blemishes such as cracking, splitting, spalling, damages to coatings, bending, dents and deformations of any type. Material shall be protected from damage at all times.
- C. The materials may be inspected at any time and all material deemed unsuitable or damaged, shall be removed from the right of way, easement or limits of construction.
- D. Extreme care shall be exercised in handling the material during unloading and stringing and at all times during construction. All unloading or placing of pipe in the trench shall be done carefully by hand or machine. At no time will materials be allowed to free fall or be dropped from any height.

16.2.2 Pipe Specifications

Except as otherwise approved, pipe for storm drains shall be reinforced concrete or HP (in limited applications per GADOT for all applications within the public right of way. Reinforced concrete pipe, smooth-lined corrugated polyethylene (PE) culvert pipe, or double walled high density polyethylene pipe (HDPE) may be used for all other applications.

A. Reinforced Concrete Pipe:

1. Reinforced concrete pipe shall meet the requirements of ASTM C-76, of the latest edition and the class of pipe to be determined by the Design Engineer. "O" Ring gasket pipe shall be used in the roadway while tongue and groove pipe will be allowed outside the roadway but within the right of way.
2. Minimum pipe size shall be 18 inches.

B. Smooth-lined, Corrugated Polyethylene (CPP) Culvert Pipe:

1. Polyethylene storm drainage pipe shall conform to AASHTO M294.
2. Type S for 18" to 36" sizes and AASHTO MP6-95 Type S for 42" and 48" diameters.

C. High Density Polypropylene Pipe (HDPE):

1. Smooth interior Type "S" or Type "D" in conformance with ASSHTO specifications M-252, M-294, and MP6-95. Installation of HDPE pipe must be in conformance with ASTM D 2321.

D. High Performance Polypropylene (HPP) Pipe:

1. HPP shall have smooth interior and annular exterior corrugations and meet or exceed ASTM F2881 and AASHTO M330.

16.2.3 Fittings and Bands

All fittings and bands shall be factory produced first quality and shall be designed for installation on the pipe to be used and be of the same quality and material as the pipe to be used. The fittings and couplings shall comply with the joint performance criteria of AASHTO Standard Specifications for Highway Bridges, Division II.

16.2.4 Affidavit of Compliance

The contractor shall furnish an affidavit from the manufacturer that all material conforms to the above referenced ASTM or AASHTO Specifications to the County Engineer upon request.

16.2.5 Weep Holes

Weep hole pipe shall be minimum schedule 40 PVC meeting ASTM D1785 Standard Specification for Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120 or D2665 Standard Specification for Poly Vinyl Chloride (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.

16.3 Excavation

Excavation and trenching shall be in accordance with Section 11.1 to 11.4.2.3 inclusive.

16.3.1 Trenching

- A. All construction must meet or exceed OSHA Standards. The installation of suitable sheeting protect adjoining poles, roadways, utilities, and private property when, in the opinion of the county personnel, trench excavation may damage these structures. Such orders or lack thereof shall in no way relieve the contractor from the responsibility of protecting these structures.
- B. Trench excavation shall not advance more than 200 feet ahead of pipe installation without prior approval. The bottom of all trenches shall be smooth and flat and with backfill material affording full bearing of the pipe barrel. The depth and width required shall be as specified in the design documents.
- C. Bell holes shall be excavated in a manner that relieves pipe bells of all loads and ensures support throughout the length of the pipe barrel.
- D. Excavation in excess of the depths required for manholes and other structures shall be corrected by placing a sub foundation of #57 stone, surge stone or some combination thereof.
- E. No trench shall be left open overnight. Backfilled trenches shall be stabilized with seed and mulch by the end of each day

16.3.2 Subgrade Stabilization

Where, in the opinion of the county personnel, subgrade is too soft and/or excessively wet for proper pipe installation, the county personnel may order the contractor to undercut the ditch and backfill with #57 stone to grade.

16.3.3 Bedding

- A. Trenches shall have been excavated accurately to plan grade to provide a uniform and stable foundation.
- B. A maximum overcut of 6 inch shall be allowed.
- C. Materials of poor or non-uniform bearing capacity shall be removed and replaced with suitable material.
- D. Rock shall be excavated to a depth of 6 inches below plan grade and suitable bedding placed.
- E. For PE, HDPE and HP, a uniform blanket of loose material shall cover the bedding to a depth sufficient to allow the corrugations to become filled with material.
- F. Bedding or shaping shall be wide enough to permit efficient compaction of the remaining backfill under the haunches of the structure, but not so wide as to interfere with bolting procedures.

16.3.4 Backfill

- A. After pipe is laid in the prepared trench bottom, bedding as previously specified shall be placed and compacted under the pipe haunches to the center of the pipe and carefully compacted by hand.

- B. Only sufficient material to backfill to the centerline of the pipe shall be placed in the ditch and compacted until satisfactory compaction has been attained.
- C. When haunch compaction is attained, the contractor shall begin backfill of the trench, placing material symmetrically so as to prevent eccentric loading or wedge action against the pipe.
 - 1. On RCP placed within the right of way, Class I, II or III backfill shall be placed in lifts of no more than 8 inches loose and compacted by mechanical tampers to 100% maximum dry density, standard proctor.
 - 2. On HPP and HDPE placed outside of the right of way, the contractor shall backfill with class I or II material in such a manner as to secure the integrity of the pipe structure and to achieve compaction of 90% maximum dry density, standard proctor.
 - 3. HPP may be installed inside the right of way and shall be installed according to the following limitations:
 - a) For longitudinal applications with fill heights up to 10 feet, Class I, II, or III backfill is permitted;
 - b) For longitudinal applications with fill heights greater than 10 feet, Class I backfill is required; and,
 - c) For cross drain applications, ADT shall be less than 15,000 VPD and pipe material shall be backfilled using Class I backfill.
- D. No material which has previously disapproved or found unsuitable, or is wet or frozen or contains mulch or other organic perishable material of any description, large stones, blasted rock, broken concrete or pavement, or other hard materials having any dimensions greater than 2 inches; Clods of earth or dirt larger in any dimension greater than 2 inches, debris or earth with an exceptionally high void or clay content shall be placed as backfill in any trench.

16.4 Construction

16.4.1 Pipe Laying

- A. Only such pipe as has been previously inspected and approved, is free of dents, spalls, cracks and is free from any damage which may, be detrimental to the proper functioning of the storm drain system, shall be laid in the trench.
- B. The contractor shall remove from the site all damaged material.
- C. Pipe shall be carefully lowered into the trench; no pipe shall be free dropped into the trench.
- D. The pipe laying shall precede upgrade with the spigot end of bell and spigot pipe pointing in the direction of the flow.
- E. Each pipe shall be laid true to line and grade in such manner as to

form a close concentric joint with the adjacent pipe and to prevent offsets in the flow line.

F. The pipe shall be kept clean and free of debris at all times.

16.4.2 Jointing

- A. Reinforced concrete pipe sections may be joined by mortar joints, bituminous plastic cement joints, rubber type gasket joints, O-Ringed gasket joints or preformed plastic gasket joints. In mortar and bituminous plastic cement joints the annular space shall be filled with the joint material and the inside of the joint wiped smooth. Mortar joints shall be made in the same manner except that the annular space shall be thoroughly wetted before filling with joint material. After the initial wet, the mortar on the outside shall be protected from the air and sun with thoroughly wet cover.
- B. HDPE shall be watertight according to the requirements of ASTM D3212. Gaskets shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly. Joints diameters shall have an exterior bell wrap installed by the manufacturer.
- C. HPP shall be joined with a gasket, integral bell and spigot joint, meeting the requirements of ASTM F2881. Joints shall be watertight according to the requirements of ASTM D3212. Spigots shall have gaskets meeting the requirements of ASTM F477. Gasket shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during joint assembly. Joints shall have an exterior bell wrap installed by the manufacturer.

16.4.3 Dewatering

- A. All grading in the vicinity of trench excavations shall be controlled to prevent surface ground water from flowing into the trenches.
- B. When water seepage within the trench or ground water level creates unstable foundation conditions or prevents the proper makeup of joints, the water shall be removed by well pointing, pumping or other suitable means.
- C. Water so removed shall be discharged in a manner and location so as not to cause injury or damage to public or private property, work in progress or completed work.

16.4.4 Blasting

Blasting shall be performed in accordance with Section 11.9 of these specifications.

16.5 Tie-in to Existing Storm Drains

16.5.1 Authorization

- A. At no time shall the contractor make any unauthorized tie-ins of storm drains of any type under construction to existing storm drains of any type.
- B. The contractor shall not make any authorized tie-ins (e.g. called for on the plans or previously approved changes) unless the County Engineer is present.

16.5.2 Construction

- A. The contractor shall make any such tie-ins in close accordance with the plans.
- B. The contractor shall take whatever measures are necessary to prevent the introduction of mud, silt, debris or excess surface water runoff into the existing storm drain system.
- C. Expediting Work-The contractor shall excavate, lay the pipe, and backfill as closely together as possible. Unjointed pipe shall not be left in the trench overnight. The contractor shall backfill and compact the trench as soon as possible after laying and jointing is completed. The exposed end of the installed pipe shall be covered with plywood or filter fabric each day at the close of work and at all other times when work is not in progress. If necessary to backfill over the end of an uncompleted pipe, the end shall be closed with a mechanical joint plug, however, backfilling shall commence only after inspection.

16.6 Field Tests

- A. Pipe and Fittings:
Each piece of pipe and fitting shall be visually inspected by county personnel immediately before being placed in the trench and all pieces which are damaged and cannot be repaired after installation shall be rejected.
- B. Joints Alignment and Grade:
 - 1. After the pipe has been installed in the trench and prior to backfill, the joints alignment and grade shall be carefully checked for conformance with the plans.
 - 2. Any deposit or protruding joint material shall be removed and the joint remade.
- C. Visual Inspection:
All storm drains shall be visually checked for alignment between structures and any deviations from the plan line and grade or offsets of any type shall cause that portion of the storm drain system to be rejected if said defects will adversely affect the designed performance of the system and shall be re-laid correctly by the

contractor at the contractor's expense.

16.7 Protection of Service Lines and Utilities

Protection of service lines and utilities shall be in accordance with Section 1.11 of these specifications.

16.8 Restoration of Property

Restoration of property shall be in accordance with Section 1.12 of these specifications.

16.9 Removal and Replacement of Existing Pipes and Equipment

Removal and replacement of existing pipes and equipment shall be in accordance with Section 11.14 of these specifications.

16.10 Pavement Removal and Replacement

Pavement removal and replacement shall be in accordance with Section 11.15 of these specifications.

16.11 Clean Up and Finishing

16.11.1 Clean Up

All pipes shall be clean and free from silt, mud, debris or anything which may block the free flow of water prior to acceptance.

16.11.2 Finishing

Finishing shall be in accordance with Section 11.16 of these specifications.

16.12 Grassing

Grassing shall be performed in accordance with Section 20 of these specifications.

16.13 Safety

Safety procedures shall be in accordance with Section 12.16 of these specifications.

16.14 Measurement and Payment

Measurement and payment for storm drain pipe shall be by the linear foot for each type and size listed in the Summary of Quantities complete in place and accepted by the County Engineer. Said payment shall be considered full and just recompense for all materials, equipment, labor, excavation, backfill and anything required of any description for the satisfactory completion of the work described or called for by this section of the specifications not specifically noted as a pay item in the Summary of Quantities.