18.0 CONSTRUCTION OF STORM DRAINAGE STRUCTURES AND FACILITIES

18.1 General

The work covered by this section of the specifications consists of furnishing all labor, equipment, materials and appliances and in performing all operations necessary and incidental to the construction of storm sewer structures. This will include but not be limited to all excavation, trenching, removal and replacement of unsuitable materials and grading as shown on the plans or drawings.

18.2 Plans, Permits and Codes

18.2.1 Permits and Codes

It is the intent 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.

18.2.2 Changes in Plan

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 will be submitted as soon as practicable for approval.

C. No work on such departures or deviations will begin without written approval by the Stormwater Dept. No work will be accepted by the Stormwater Department with any unapproved departures or deviations from the contract drawings, standard drawings or plans.

18.3 Excavation

18.3.1 Excavation for Structures

A. All excavation will be in strict accordance with Section 8 and 11 of these specifications.

B. The contractor will especially note Sections 11.5, 11.6, 11.7 and 8.5.7.

C. No work on such departures or deviations will begin without written approval by the Stormwater Dept. No work will be accepted by the Stormwater Department with any unapproved departures or deviations from the contract drawings, standard drawings or plans.

18.3.2 Excavation for Facilities

A. Areas designated for borrow areas, embankment, and structural works shall be cleared, grubbed and stripped of topsoil. All

trees, vegetation, roots and other objectionable material shall be removed. Channel banks and sharp breaks shall be sloped to no steeper than 1:1. All trees shall be cleared and grubbed within 15 feet of the toe of the embankment;

B. Areas to be covered by the facility will be cleared of all trees, brush, logs, fences, rubbish and other objectionable material unless otherwise designated on the plans. Trees, brush, and stumps shall be removed. For dry stormwater management ponds, a minimum of a 25-foot radius around the inlet structure shall be cleared or as shown on the plans; and,

C. All cleared and grubbed material shall be disposed of outside and below the limits of the earthen dam/berm and facility. When specified, a sufficient quantity of topsoil will be stockpiled in a suitable location for use on the embankment and other designated areas.

18.3.3 Backfill for Structures

Backfill will be in strict accordance with Section 8 and 11 of these specifications.

18.3.4 Earth Fill for Facilities

A. The fill material shall be taken from approved designated borrow areas. It shall be free of roots, stumps, wood, rubbish, and stones greater than 6", frozen or other objectionable materials.

B. Fill material for the center of the embankment, and cut off trench shall conform to Unified Soil Classification GC, SC, CH, or CL and must have at least 30% passing the #200 sieve.

C. Consideration may be given to the use of other materials in the embankment if designed by a geotechnical engineer. Such special designs must have construction supervised by a Geotechnical Engineer;

D. Materials used in the outer shell of the embankment must have the capability to support vegetation of the quality required to prevent erosion of the embankment;

E. Areas on which fill is to be placed shall be scarified prior to placement of fill. Fill materials shall be placed in maximum 8 inch thick (before compaction) layers which are to be continuous over the entire length of the fill. The most permeable borrow material shall be placed in the downstream portions of the embankment. The principal spillway must be installed concurrently with fill placement and not excavated into the embankment;

F. The movement of the hauling and spreading equipment over the fill shall be controlled so that the entire surface of each lift shall be traversed by not less than one tread track of heavy equipment or compaction shall be achieved by a minimum of

four complete passes of a sheepsfoot, rubber tired or vibratory roller. Fill material shall contain sufficient moisture such that the required degree of compaction will be obtained with the equipment used;

G. The minimum required density shall not be less than 95% of maximum dry density with a moisture content within 2% of the optimum. Each layer of fill shall be compacted as necessary to obtain that density, and is to be certified by the Engineer of Record or Geotechnical Engineer at the time of construction. All compaction is to be determined by AASHTO Method T-99 (Standard Proctor);

H. The cutoff trench shall be excavated into impervious material along or parallel to the centerline of the embankment as shown on the plans. The bottom width of the trench shall be governed by the equipment used for excavation, with the minimum width being four (4) feet. The depth shall be at least four (4) feet below existing grade or as shown on the plans. The side slopes of the trench shall be 1:1 or flatter. The backfill shall be compacted with construction equipment, rollers, or hand tampers to assure maximum density and minimum permeability; and,

I. The core shall be parallel to the centerline of the embankment as shown on the plans. The top width of the core shall be a minimum of four (4) feet. The height shall extend up to at least the 10-year water elevation or as shown on the plans. The side slopes shall be 1:1 or flatter. The core shall be compacted with construction equipment, rollers, or hand tampers to assure maximum density and minimum permeability. In addition, the core shall be placed concurrently with the outer shell of the embankment.

18.3.5 Structural Fill for Facilities

A. Structure backfill may be flowable fill per GDOT specifications. The mixture shall have a 100-200 psi; 28 day unconfined compressive strength. The flowable fill shall have a minimum pH of 4.0 and a minimum resistivity of 2,000 ohm-cm.

B. Material shall be placed such that a minimum of six (6) inches (measured perpendicular to the outside of the pipe) of flowable fill shall be under (bedding), over and, on the sides of the pipe. It only needs to extend up to the spring line for rigid conduits. Average slump of the fill shall be seven (7) inches to assure flowability of the material. Adequate measures shall be taken (sand bags, etc.) to prevent floating the pipe.

C. Any adjoining soil fill shall be placed in horizontal layers not to exceed four (4) inches in thickness and compacted by hand tampers or other manually directed compaction equipment. The

material shall completely fill all voids adjacent to the flowable fill zone.

D. At no time during the backfilling operation shall drivable equipment be allowed to operate closer than four (4) feet, measured horizontally, to any part of a structure.
E. Under no circumstances shall equipment be driven over any part of a structure or pipe unless there is a compacted fill of twenty (24) inches or greater over the structure or pipe.
F. Backfill material outside the structural backfill (flowable fill) zone shall be of the type and quality conforming to that specified for the core of the embankment or other embankment materials.

18.3.6 Drainpipe through Facilities

A. Reinforced Concrete Pipe (RCP) shall be used in earthen dams/berms;
B. RCP shall have bell and spigot joints with rubber gaskets and shall equal or exceed ASTM C-361;
C. RCP shall be laid in a concrete bedding/cradle for their entire length. This bedding/cradle shall consist of high slump concrete placed under the pipe and up the sides of the pipe at least 50% of its outside diameter with a minimum thickness of 6 inches. Where a concrete cradle is not needed for structural reasons, flowable fill may be used as described in the "Structure Backfill" section of this standard. Gravel bedding is not permitted;
D. Bell and spigot pipe shall be placed with the bell end upstream. Joints shall be made in accordance with recommendations of the manufacturer. After the joints are sealed for the entire line, the bedding shall be placed so that all spaces under the pipe are filled. Care shall be exercised to prevent any deviation from the original line and grade of the pipe. The first joint must be located within 4 feet from the riser;
E. Backfilling shall conform to 18.3;
F. Other details (anti-seep collars, valves, etc.) shall be as shown on the approved drawings; and,
G. When a drainage diaphragm is used, the Engineer of Record or Geotechnical Engineer will supervise the design and construction inspection.

18.4 Construction of Boxes and Traps

18.4.1 Brick Winged Traps

A. Bricked traps will be constructed in accordance with Ga. D.O.T. Standard Catch Basins Number 1033-D for Single Wing Traps and Number 1034-D for Double Wing Traps.
B. All materials and construction will conform to the above referenced Standard and all applicable specifications in the GA.

D.O.T. Standard Specifications Construction of Roads and Bridges of latest edition.

18.4.2 Precast Winged Traps

A. Precast traps will be constructed in accordance with Ga. D.O.T. Standard Catch Basins Number 1033-D Precast for Single Wing Traps and Number 1034-D Precast for Double Wing Traps.

B. All materials and construction will conform to the above referenced Standard and all applicable specifications in the Ga. D.O.T. Standard Specifications Constructions of Roads and Bridges of latest edition.

18.4.3 Brick Junction Boxes and Weir Traps

A. Brick junction boxes will be constructed in accordance with Standard Drawing 18.01-B.

B. Brick weir traps will be constructed in accordance with Standard Drawing 18.01-A.

C. All materials and construction will conform to the above referenced Standard and all applicable specifications in the Ga. D.O.T. Standard Specifications Construction of Roads and Bridges of latest edition.

18.4.4 Precast Junction Boxes and Weir Traps

A. All sections will conform to ASTM C-478 of the latest revision.

B. Reinforcing will be #4 at 12" O.C. each side and bottom.

C. Concrete strength requirements will be 4000 psi, and have cured at least 7 days. Sections will be inspected in accordance with Section 13.042-C.

D. Pipe openings, angles and elevations as required.

E. Flexible joint sealant, Type I, rope form, also known as "Ram Neck" will be applied between the joint sections.

F. Precast Sections will be aligned in accordance with Section 13.042- D. No Round manholes sections allowed.

G. All lift holes will be grouted in accordance with Section 13.041-E, inside and out.

H. Any cutting of holes in precast structures will be performed in accordance with Section 13.042-G, (Second Paragraph).

18.4.5 Inverts

A. All junction boxes, manholes, traps, etc. shall have formed inverts, regardless of pipe size or box type.

B. The flow line of the invert shall be of uniform grade from the invert of the inlet pipe to the invert of the outlet pipe.

C. Inverts shall be constructed of block, brick and mortar with a brushed finish.

D. Invert forming is to be performed after the pipe penetrations have been made with all voids around the pipe grouted and the

pipe cut flush with the interior face of the structure.

E. No pipe will protrude past the inner wall of the box and will be free from ragged edges.

18.4.6 Weep Holes

A. All junction boxes, manholes, catch basins etc. shall have 2-inch diameter weep holes, approximately 7 inches off bottom, on each wall or as directed by the County Personnel.

B. Protect weep holes with screen wire or fabric outside the structure to prevent clogging.

18.4.7 Steps

All boxes and traps over four feet deep will have steps installed in accordance with Section 13.6.3

18.4.8 Frame and Covers

Box and rap covers will be in accordance with Standard 14.4.

18.4.9 Tops

A. Junction box and weir trap tops will conform to the specifications shown in the standard drawings.

B. Tops will be finished in accordance with Section 8.6.4.

C. Tops will be aligned with the steps in the storm structure to allow for access to box.

18.5 Construction of Headwalls

18.5.1 Brick Headwalls

Headwalls of brick construction will not be accepted.

18.5.2 Flared End Section

A. Flared End Sections will be constructed in accordance with GA D.O.T. Standard Flared End Section For Pipes Number 1120

B. All materials and construction will conform to the above referenced Standard and all applicable specifications in the Ga. D.O.T. Standard Specifications Construction of Roads and Bridges of latest edition.

C. Number 1120 sections will be used with all size pipes, metal or concrete, up to and including 42" in diameter.

D. Outfall flared end sections will have a minimum of 10 S.Y. of Grouted rip- rap as specified in Section 19 and in accordance with STD. Drawing No. 18.05A.

18.5.3 Reinforced Concrete Headwalls

A. Reinforced Concrete Headwalls will be constructed in accordance with GA. D.O.T. Standard Pipe Culvert Concrete Headwall Number 1001-B.

B. All materials and construction will conform to the above referenced Standard and all applicable specifications in the GA.

D.O.T. Standard Specifications Construction of Roads and Bridges of latest edition.

C. Where specified on the plans and drawings or for pipes 48" in diameter and larger, the contractor will install a concrete headwall in accordance with Ga. D.O.T. Standard Pipe Culvert Concrete Headwall Number 1001-B.

18.5.4 Concrete

A. No concrete for headwalls, trap bottoms or tops will be poured unless a representative of the County Engineer is present.

B. Any concrete poured without approval of the County Engineer will be rejected.

18.5.5 Structures

All structures will be visually inspected prior to acceptance for conformity with these specifications.

18.6 Finishing, Protection and Repairs

Finishing, protection and repair will be performed in accordance with Section 17.6 of these specifications.

18.7 Clean up and Finish Grading

Clean up and finish grading will be performed in accordance with Section 5.4 of these specifications.

18.8 Protection of Service Lines and Utilities

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

18.9 Restoration of Property

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

18.10 Removal and Replacement of Existing Pipes and Equipment

Removal and replacement of existing pies and equipment will be performed in accordance with Section 11.14 of these specifications.

18.11 Grassing

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

18.12 Safety

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

18.13 Measurement and Payment

Measurement and payment for storm sewer structures will be per each type of structure listed in the Summary of quantities, complete, in place and accepted by the County Engineer. Said Payment will be considered full and just compensation 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.