

17.0 CONSTRUCTION OF OPEN DRAINAGE SYSTEMS

17.1 Description

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

17.2 Plans, Permits and Codes

17.2.1 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 plans, drawings, and these specifications and with all applicable codes, permits and regulations as amended by any waivers.

17.2.2 Contract Drawings

- A. Standard drawings and plans indicated the extent and specific arrangement of the work. Swales and ditches in additional locations may be required by the County Engineer.
- B. If any departures from the indicated line, grade or locations 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 by the Stormwater Dept. No work shall be accepted by the Stormwater Department with any unapproved departures or deviations from the contract drawings, standard drawings or plans.

17.3 Material

17.3.1 General

All materials shall be new, first quality, undamaged material meeting these specifications.

17.3.2 Concrete

- A. All concrete shall be in accordance with Section 8 of these specifications except as herein specified.
- B. Concrete shall have a compressive strength at 28 days of 3000 psi.
- C. The maximum size of coarse aggregate shall be 1 inch and not less than 1 inch. Concrete shall have a slump of not more than 3 inches.

17.3.3 Reinforcing Wire

Reinforcing wire shall be 6" X 6" #10 wires.

17.3.4 Expansion Joint Material

Expansion joint material shall conform to ASTM Standard D-1751 or

D- 1752 or latest edition or shall be resin impregnated fiber board conforming to the physical requirements of D-1752.

17.4 Construction of Ditches and Swales

17.4.1 Line and Grade

All ditches and swales shall be constructed true to plan line and grade.

17.4.2 Cross Section

The ditch or swale shall be constructed as indicated on the plan drawings.

17.4.3 Ditch Checks

- A. Ditch checks shall be constructed at intervals conforming to recommendations in the Manual for Erosion and Sediment Control in Georgia.
- B. Ditch checks shall be constructed of stone rip-rap or sand cement bags placed by hand. Placement shall be in accordance with Standard Drawing 17.1.

17.5 Construction of Concrete Ditches

17.5.1 Excavation

The sub-base shall be excavated true to line and grade by appropriate equipment.

17.5.2 Preparation of Sub-Base

- A. Prior to forming or pouring concrete, the sub-base shall be of a smooth and uniform texture and compacted to 100% maximum dry density, standard proctor.
- B. The centerline shall conform to the established elevations with an acceptable tolerance of plus/minus 1/ 2 ". The acceptable tolerance under a template shall be plus/minus 1/4".

17.5.3 Forms

- A. Forms shall be of wood or steel, straight and true without any defects which may adversely affect the work.
- B. Forms shall be held rigidly in place by the use of stakes placed no more than four (4) feet apart.
- C. Rigid forms shall be used in all circumstances except that benders and thin wall planks may be used with the prior approval of the county personnel.
- D. Forms shall not be removed for six (6) hours or in any case while the concrete is sufficiently plastic to slump in any direction.
- E. Forms shall be thoroughly cleaned and oiled prior to each use.

17.5.4 Joints

- A. Pre-molded expansion joint filler strips shall be resilient, compressive bituminous and fiber material saturated with at least

- 35%, but not over 50%, by weight of asphalt.
- B. Expansion joints shall be cut to the full depth of the cross section of the ditch and shall extend no further than 1/4" below the level surface of the ditch.
 - C. Expansion joints at least 1/4" in width shall be provided in the ditch at intervals not to exceed 50 feet and an expansion joint of at least 1/2" in width where ditches abut structures.
 - D. Contraction joints of 1/8" in width shall be spaced at 10' intervals.
 - E. The depth of the contraction joint shall be no less than 1/5" or more than 1/4" the depth of the concrete and joints shall have rounded edges.
 - F. Separators shall be removed as soon as possible after the concrete has set sufficiently to preserve the width and shape of the joint.

17.6 Concrete

- A. No concrete shall be placed until the sub-base has been approved by the County Personnel.
- B. No concrete shall be placed when the ambient air temperature is below 40 degrees F. (4 degrees C).
- C. Concrete shall be placed in forms to the required depth and thoroughly consolidated by tamping and spading so that there are no rock and air pockets at forms and mortar entirely covers the surfaces. Concrete shall not be free dropped from a height so as to cause segregation.
- D. The concrete ditch shall be constructed in accordance with Standard 17.02.
- E. Visible surfaces and edges of the finished ditch shall be free of blemishes, form and tool marks.
- F. Concrete ditches shall be finished in accordance with Section 11.054 of these specifications.

17.7 Unsuitable Sub-Base

In areas where the sub-base is otherwise unsuitable the contractor shall place reinforcing wire and additional thickness of concrete as required and/or replace the unsuitable material in accordance with Section 11.5.4 of these specifications, at the discretion of the County Personnel.

17.8 Finishing and Protection

17.8.1 Backfill

After the concrete has cured for at least seven days, all debris shall be removed, and backfill shall be placed in accordance with Section 8.5.7 of these specifications. The contractor shall secure compaction of backfill so as to ensure the prevention of surface water infiltration beneath the ditch.

17.8.2 Protection of Structure

- A. The contractor shall protect the completed concrete ditch from all damage until accepted. Ditch sections which have settled or been displaced due to sub-base settlement or surface water infiltration or any other reason, shall be removed and re-poured in accordance with these specifications
- B. Any ditch section which has settled or been displaced will not be accepted by County Personnel nor ditch sections which have settled or been displaced and been returned to its original position.

17.9 Repair

- A. The contractor shall either replace or repair by clipping and scarifying any defective areas and treating it with an approved bonding agent, tending that all such areas are patched, not plastered, with grout consisting of one part Portland cement and one part washed sand. Hi-bond, a multipurpose bonding agent conforming to ASTM C-190, latest revision, is acceptable in lieu of grouting.
- B. Concrete ditch sections damaged whereby County Personnel requires their removal, shall be removed and reconstructed for the entire length between regularly scheduled joints.

17.10 Clean up and Finish Grading

17.10.1 Clean up

The contractor shall remove all debris, trash or objectionable material from the easement, right of way or limits of construction.

17.10.2 Grading

The contractor shall ensure the area of the easement or any areas disturbed by his operations are finished uniformly smooth and free from abrupt changes in grade and are in conformity with the plans and in accordance with Section 11.16 of these specifications.

17.11 Field Tests

17.11.1 Testing and Sampling

- A. Testing and sampling shall be done in accordance with Section 8.07 of these specifications.
- B. The contractor will provide and pay for all required testing.

17.11.2 Tolerances

- A. The finished surfaces, except plan grade, changes or curves, shall not vary from plan line and grade by more than 1/8" per 10'.
- B. The cross section shall vary no more than ¼" from the specified cross section.

17.12 Protection of Service Lines and Utilities

Protection of service lines and utilities shall be in accordance with Section 4.0 of these specifications.

17.13 Restoration of Property

Restoration of property shall be in accordance with Section 4.6 of these specifications.

17.14 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.

17.15 Grassing

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

17.16 Measurement and Payment

Measurement and payment for ditches, swales and concrete ditches shall be made by the linear foot for each type of ditch and cross section listed in the Summary of Quantities, complete in place and accepted by the county personnel. Said payment shall 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.