

APPENDIX "D"

STORM DRAINAGE SYSTEMS, EROSION CONTROL

STORM SEWERS SCOPE OF WORK

ITEM 1.0 WORK INCLUDED

- 1.1 The contractor shall furnish all material, equipment, tools, and labor necessary to do the work as shown on the contract drawings, and unload, haul and distribute all pipe, and accessories. The contractor shall excavate the trenches and pits to the required dimensions; sheet, brace, and support the adjoining ground or structures where necessary; handle all drainage or ground water; provide barricades, guards, and warning lights, lay the pipe; backfill and consolidate the trenches and pits; remove surplus excavated material; clean the site work, and maintain other surfaces over the trenches as specified.

ITEM 2.0 MATERIALS

2.1 Pipe

- A. Reinforced Concrete Pipe (RCP AASTO M 170, ASTM C76 and AAASHTO M 198)
KYTC Type 1 installation
- (1) 12"-18"; Class V Max. Cover 57+ feet
 - (2) 21"-24"; Class IV Max. Cover 36 feet
 - (3) 27" & Larger; Class III Max Cover 25 feet
- B. Aluminized Type 2 Corrugated (2-2/3" X 1/2") Pipe (AASHTO M36 Type 1, AASHTO M274)
- (1) 12" - 36" 16 Gauge
 - (2) 42" - 54" 14 Gauge
 - (3) 60" - 12 Gauge
 - (4) 66" - 72" 10 Gauge
- C. Aluminized type 2 Spiral Rib (3/4" X 3/4" X 7- 1/2") Pipe (AASHTO M36 Type 1, AASHTO M274)
- (1) 18" - 36" 16 Gauge
 - (2) 42" - 54" 14 Gauge
 - (3) 60" - 72" 12 Gauge
- D. Aluminum Spiral Rib (3/4" X 3/4" X 7-1/2") Pipe (AASHTO M196 and M197)
- (1) 18" 30" Gauge 14 Max. Cover 30 feet
 - (2) 36" - 48" Gauge 12 Max. Cover 30 feet
 - (3) 54" - 66" Gauge 10 Max. Cover 30 feet

- E. Polyvinyl Chloride (PVC) Pipe
- (1) Smooth Wall:
 - (a) Pipe/Fittings: ASTM D 3034; ASTM F679; AASHTO M 278
 - Material: ASTM D 1784
 - Joint: ASTM D 3212
 - Sizes 12" - 27" or other size available
 - Minimum Pipe Stiffness: 46 @ 5% deflection
 - Installation: ASTM D 2321.
 - (2) Ribbed:
 - (a) Pipe/Fittings: ASTM F794; ASTM F949; AASHTO M304
 - Material: ASTM D 1784
 - Joint: ASTM D 3212
 - Sizes: 12" - 48" or other size available
 - Minimum Pip Stiffness: 46 @ 5% deflection
 - Installation: ASTM D 2321
 - (b) Pipe/Fittings: AASHTO M 304
 - Material: ASTM D 1784
 - Joint: ASTM D 3212
 - Sizes: 18" - 48" or other size available
 - Installation: ASTM D 2321.
- F. Polyethylene (HDPE) Pipe
- (1) Corrugated:
 - (A) Pipe/Fittings: AASHTO M294 Type S
 - Material: ASTM D 3350
 - Joint: Minimum silt tight including: (a) thermally molded; (b) integral bell; or (c) bell and spigot with built-in gasket coupler assemblies only.
 - Sizes: 12" - 36" only
 - Minimum Pipe Stiffness: Variable @ 5% deflection
 - Installation: ASTM D 2321.
- 2.2 Bedding: Pipe bedding shall be clean natural or washed sand and gravel, crushed gravel or crushed stone, free from cementitious substances and flat or flaky particles in an amount to cause caking, packing, yielding or uneven support for the pipe. All material shall be of such sized that one-hundred percent (100%) passes the one and one half (1 1/2) inch screen, 40% or less passes the No. 40 sieve, and ten (10) percent or less passes the No. 200 sieve. Bedding material shall not consist of any organic soil or stone larger than 1 1/2-inch in any dimension.
- 2.3 Select Fill: Select fill shall be well graded sand and gravel, free from organic matter. Not more than 70 percent by weight shall pass through a No 40 sieve; not more than 10 percent by weight shall pass through a No. 200 sieve; and 100 percent shall pass through a 3-inch square sieve. See SD1 technical specification 02220 for further requirements of Select Fill.
- 2.4 General Backfill: General backfill shall be soil materials that are free of rock thicker than 6 inches or larger than 24 inches maximum in any dimension, debris, waste, frozen materials, vegetation and other organic matter and other deleterious materials. Previously excavated materials meeting these requirements may be used for backfill. All rock shall be excluded from fill within 24 inches of the pipe. If the excavated trench material does not meet these

requirements, this material shall be wasted and suitable imported material shall be used for backfill.

ITEM 3.0 CONSTRUCTION

- 3.1 No pipe shall be laid until the location has been staked by the engineer.
- 3.2 A trench shall be excavated and shall be equal to the outside width of the pipe plus 3/10 of the outside width of the pipe on each side or 12 inches on each side, whichever is greater. The wall of the trench shall be as nearly vertical as possible. In case unstable foundation is encountered at the established grade, the unstable material shall be removed and replaced with a suitable material to a width and depth and in a manner that will provide a uniform and firm foundation. Storm sewers shall not be less than the diameter specified in Article 3 of the Subdivision Regulations. Manholes or junction boxes may be precast concrete or masonry. Boxes shall be sized to provide the space of a standard precast manhole and on concrete footing slab 6 inches thick and walls shall not be less than 6 inches thick.
- 3.3 In all operations such as placing the pipe, jointing, bedding, and backfilling, care shall be exercised and it shall be the contractor's responsibility to see that the pipes are not damaged during the unloading or placement on the bed, or during compaction of the backfill. Any pipe culvert which is not in true alignment and grade or which shows undue settlement after laying or is otherwise damaged, shall be taken up and replaced.
- 3.4 Storm sewer clean-outs shall be provided at a maximum of 500 foot intervals for pipes which have less than a thirty (30) inch diameter, and at a maximum of 600 foot intervals for pipes having a larger diameter. Clean-outs may be catch basins, junction boxes or headwalls.
- 3.5 Curb drainage inlets and/or catch basins shall be provided at intervals along roadways. Maximum intervals shall meet the existing Design Standards in the current Subdivision Regulations.

ITEM 4.0 BACKFILL AND COMPACTION

- 4.1 Backfill Placement: Backfill shall be placed in horizontal loose lifts not exceeding 8-12 inches in thickness and shall be mixed and spread in a manner assuring uniform lift thickness.
- 4.2 Compaction requirements are as follows:
 - A. Select Fill and Pipe Bedding: For fill and bedding beneath structures and foundations, compact granular materials that exhibit a well-defined moisture density curve to at least 98 percent of the standard proctor maximum dry density (ASTM D698). For all other fill and bedding, compact granular materials that exhibit a well-defined moisture-density curve to at least 95 percent (ASTM D698). Moisture-condition fill materials to within a range of two (2) percent below to three (3) percent above optimum moisture content (ASTM D698). Compact granular materials that do not exhibit a well-defined moisture-density curve to at least 85 percent relative density (ASTM D4253 and D4254) beneath structures and foundations, and to at least

75 percent relative density (ASTM D4253 and D4254) for all other areas.

B. General Backfill: Compact materials that exhibit a well-defined moisture density curve to at least 98 percent of the standard proctor maximum dry density (ASTM D698) beneath structures, foundations and the top one (1) foot below pavements, and at least 95 percent (ASTM D698) in all other areas. Moisture-condition fill materials to within a range of two (2) percent below to three (3) percent above optimum moisture content (ASTM D698). Compact granular or rock materials that do not exhibit a well-defined moisture-density curve to at least 85 percent relative density (ASTM D4253 and D4254) beneath structures and foundations, and to at least 75 percent relative density (ASTM D4253 and D4254) for all other areas.

(1) After the pipe sections have been embedded up to a point 12-inches or more above the top of the pipe, the pipe sections have been encased in concrete, or the structures or appurtenances have been constructed, as specified on the drawings, in non-ROW areas, the remainder of the trench or excavated area shall be back-filled using trench or structure excavated material if it meets the requirements as previously described. If the material does not meet these requirements, the trench or structure excavated material shall be wasted and suitable imported material shall be used for backfill.

(2) Backfill shall be placed in horizontal loose lifts not exceeding 8-12 inches in thickness and shall be mixed and spread in a manner assuring uniform lift thickness after placing. Backfill shall then be compacted as previously described to existing ground level or finished grade level if same has been established.

4.3 All trenches within the Public Right of Way shall be, backfilled with controlled low strength material (CLSM)(flowable fill).

4.4 Copies of all testing reports shall be submitted to the appropriate accepting agency.

CATCH BASINS, HEADWALLS & JUNCTION BOX

1.0 SCOPE OF WORK

1.1 The contractor shall furnish all materials, equipment and labor necessary to construct or install all drainage structures as shown on the attached detailed drawings.

2.0 MATERIALS

2.1 Concrete shall comply with the Street Paving Specifications. Precast or cast in place structures shall be a minimum of five (5) days old, prior to paving operation.

CITY OF FLORENCE STORMWATER PROGRAM

1.0 FLORENCE STORMWATER PROGRAM

- 1.1 The City of Florence has a comprehensive storm water program for properties within the City limits. In order to meet applicable storm water requirements, each applicant is advised to contact the Florence Public Services Department.

SANITATION DISTRICT NO. 1 STORMWATER PROGRAM

1.0 SANITATION DISTRICT NO. 1 STORMWATER PROGRAM

- 1.1 Sanitation District No. 1 has a comprehensive storm water program for properties within its' jurisdictional boundary. In order to meet applicable storm water requirements, each applicant is advised to contact the District.