

SECTION 02720

STORM DRAINAGE

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Storm drainage system includes, but is not limited to, construction of storm sewers, drainage structures, drainage appurtenances, ditching, backfilling, shoring, and dewatering of trenches for storm sewers as required for safe and workmanlike construction.
- B. Pipe bedding in accordance with the details shown on the drawings is included. In wet trench conditions, stabilization stone is to be installed.
- C. Miscellaneous storm drainage includes subsurface drains and roof and drain collection systems.

1.02 RELATED WORK

- A. Section 02225 - Earthwork for Utilities
- B. Section 02272 - Rip Rap
- C. Section 03300 - Concrete
- D. Section 03200 - Reinforcement

1.03 QUALITY ASSURANCE

- A. Storm drainage systems serving public streets shall be constructed under the inspection of the owning governmental agency. Final acceptance of the governmental agency is required.
- B. Storm drain pipe may be inspected at the manufacturing source as well as at the jobsite by the ENGINEER.
- C. The CONTRACTOR shall notify the TOWN for inspection of pipe and drainage structure installation prior to backfilling trenches.

1.04 JOB CONDITIONS

- A. Construction of new sewers and drainage systems shall proceed as early in the construction program as possible. Maintain adequate drainage of the project area at all times. Prevent flooding of adjacent roads and private properties.
- B. Temporary Drainage: Wherever possible, new sewers and inlets to serve the various drainage areas shall be constructed and immediately placed into service. Where this is not possible, temporary drainage facilities shall be provided as required. These may include temporary ditches, slope drains, temporary connections into completed storm sewers, or such other means as the circumstances may require.

PART 2 PRODUCTS

2.01 BEDDING MATERIAL

See Section 02225 (Earthwork for Utilities)

2.02 RIP RAP

See Section 02272 (Rip Rap)

2.03 CORRUGATED METAL PIPE (CMP)

- A. Unless specified otherwise on the plans: Circular pipe, arch pipe and end sections shall be made of 16 gauge (0.064 inches) aluminized steel with 2-2/3" x 1/2" corrugations with full bituminous coating and asphalt paved inverts conforming to the requirements of AASHTO M190, as specified, unless otherwise labeled on the drawings. Pipe shall have either annular or helical corrugation with re-rolled annular ends.
- B. Circular pipe, arch pipe and end sections shall be made of 16 gauge (0.064 inches) aluminized steel with full bituminous coating and asphalt paved inverts conforming to the requirements of AASHTO M190, as specified.
- C. Pipe clamp shall be made of (.052 inches) aluminized steel with bituminous coating and shall have an annular corrugation to fit the end of pipes and/or end section.

2.04 SLOTTED DRAIN

- A. The Corrugated Steel Pipe used in the Slotted Drain shall meet the requirements of AASHTO M36/ASTM A760. The CMP shall be aluminized steel Type 2. The diameter and gage shall be as specified above.
- B. Connections
 - 1. The Corrugated Steel Pipe shall have a minimum of two rerolled annular ends.
 - 2. The Slotted Drain pipe clamps shall be modified to secure the pipe and prevent infiltration of the backfill.
 - 3. When the Slotted Drain is banded together, the adjacent grates shall have a maximum 3" gap.
- C. Grates
 - 1. The grates shall be manufactured from ASTM A570, Grade 36 steel. The spacers and bearing bars (sides) shall be 3/16" material ± 0.0075 ".
 - 2. The spacers shall be on 6" centers and welded on both sides to each bearing bar (sides) with four (4) 1-1/4" long 3/16" fillet welds on each side of the bearing bar.
 - 3. The engineer may call for tensile strength tests on the grate. If tensile strength tests

are called for, minimum results for an in-place spacer pulled perpendicular to the bearing bar shall be:

$$T = 15,000 \text{ pounds for } 6" \text{ grate}$$

4. The grates shall be trapezoidal with a 1-3/4" opening in the top and 30° slanted spacers unless shown otherwise on the plans. The grate shall be 6" high as shown on the plans.
- D. Galvanizing: The grate shall be galvanized in accordance with ASTM A 123 except with a 2 oz. galvanized coating.
- E. Grate Attached to CSP: The grate shall be fillet welded with a minimum weld 1" long to the CSP on each side of the grate at every other corrugation.
- F. Tolerances - Finished Slotted Drain - 20' Lengths
1. Vertical Bow - $\pm 3/8"$
 2. Horizontal Bow - $\pm 5/8"$
 3. Twist - $\pm 1/2"$

2.05 REINFORCED CONCRETE PIPE

- A. Pipe shall be Class III conforming to ASTM C-76, with bell and spigot end joints.
- B. Joints shall be sealed with a preformed plastic sealing compound in rope form. Compound shall be "RAM-NEK" as manufactured by K.T. Snyder Company, Inc. or approved equal.

2.06 DUCTILE IRON PIPE (DIP)

Ductile iron pipe, four inches (4") through twelve inches (12") and fittings shall conform to the requirements of ANSI: A21.51 (centrifugally cast in metal or sand lined molds). Pipe shall be thickness Class 50.

2.07 POLYVINYL CHLORIDE PIPE (PVC)

Polyvinyl chloride pipe and fittings shall comply with ASTM D3034, SDR 35, for four inches (4") through fifteen inches (15").

2.08 HIGH DENSITY POLYETHYLENE PIPE (HDPE)

High density polyethylene pipe and fittings (4" through 15") shall be made of high density, high molecular weight polyethylene pipe material meeting the requirements of Type III, Class C, Category 5, Grade P34, as defined by ASTM D 1248 Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.

2.09 STRUCTURES

- A. Structures shall be as detailed on the drawings.
- B. Concrete for storm drainage structures shall be in accordance with Section 03300 of these Specifications. Strength shall be 4,000 psi at age 28 days.
- C. Reinforcement shall comply with Section 03200 (Concrete) of these Specifications.
- D. Precast concrete structures shall consist of precast concrete sections conforming to the details shown on the plans and manufactured and tested in accordance with the latest provisions of ASTM C478.

2.10 CASTINGS

Metal used in the manufacture of castings shall conform to ASTM A48-76 Class 35 for Gray Iron or ASTM A536-80 Grade 65-45-12 for Ductile Iron. Type of casting shall be indicated on the drawings.

2.11 BRICK

Clay or Shale Brick: Comply with ASTM C32 for sewer brick and manhole brick, grade as selected. Brick dimensions shall be 4" x 8" x 2-1/2" nominal and shall yield the wall thickness as shown in the Town of Braselton Standard details for manholes.

2.12 MORTAR

Mortar shall consist of fresh mixtures of one part portland or masonry cement to three parts of mortar sand and water. Hydrated lime may be added when portland cement is used, in amounts not exceeding 10 percent of the weight of cement. Sand shall meet the requirements of ASTM 144.

PART 3 INSTALLATION

3.01 GENERAL

- A. All pipe will be laid in an open trench of dimensions as given below. No projecting pipe conditions will be allowed.
- B. Lengths of storm drain pipe shown on the drawings are approximate distances center to center of structures. The CONTRACTOR/DEVELOPER shall install pipe based on actual field conditions. Slope of pipe specified on the drawings shall be verified by field measurement prior to trenching.
- C. Particular care shall be exercised in establishing the relationship of storm drain pipe, drainage structure bases, and final drainage top conditions. Drainage structure tops are required to be located in specific position and orientation. Subsurface construction is to be located to allow drainage structure construction as detailed on the drawings without modification. In case of misalignment of drainage structure tops and bases, the CONTRACTOR/DEVELOPER will be required to correct the construction as directed by the TOWN.

3.02 EXCAVATION

Excavation shall be done in accordance with Section 02225 (Earthwork for Utilities)

3.03 PIPE LAYING

- A. Pipe laying shall proceed upgrade where practicable. Pipe shall be laid true to line and grade with a straight and uniform invert. Pipe shall not be laid in a wet or muddy trench. Trenches shall be dewatered as required and the pipe bed shall be firm, smooth, and properly shaped as specified.
- B. Joints for reinforced concrete pipe shall be made up with preformed plastic joints installed in accordance with the manufacturer's recommendations.
- C. Joints for corrugated steel pipe shall be corrugated bands installed in accordance with the pipe manufacturer's instructions using equipment recommended by the manufacturer.
- D. Joints between DIP - Ductile iron pipe shall be of the bell and spigot type with push-on joints, conforming to ANSI Specification A21.11 or mechanical joints.
- E. Joints between PVC - PVC pipe shall be jointed with a rubber or PVC ring or gasket designed to prevent inflow or exflow. Mechanical Compression Joint or molded plastic or similar material (with or without the use of rubber or elastic plastic compression rings) as described in ASTM Specifications C-425 for Polyvinyl Chloride (Slip Joint). Precast joints or rubber pushtype gaskets for compression joint sealing (ASTM D 3312 or F 477) are all acceptable. (PVC pipe shall not be joined by a solvent cement joint in which the pipe spigot wedges into the tapered socket and the surfaces fuse together).
- F. Joints between HDPE - HDPE pipe shall be joined by bell and spigot gasket style or thermal weld type connections in accordance with manufacturer's recommendations and shall show no sign of leakage. In the case of gasket type, all surfaces of the joint upon which the gasket may bear shall be smooth and free of such imperfections, ridges, fractures or cracks that could adversely affect sealability.
- G. Joints between pipes of different materials - Transition joints between sewer pipes of different materials shall be accomplished by the use of adapters made especially for that purpose.

3.04 BACKFILLING

Backfilling shall be done in accordance with Section 02225 (Earthwork for Utilities).

3.05 APPURTENANCES

All drainage structures are to be constructed as shown on the drawings. Refer to site plans for location and size.

1. The CONTRACTOR/DEVELOPER shall furnish and install drainage structures as shown in detail on the drawings.
2. In drainage structures with flow (i.e., inlet pipe and outlet pipe) shaped inverts are required.
3. All mortar joints shall be filled full. Joints shall be struck flush inside and out.
4. Joints shall not be less than 1/4" and not more than 1/2" in thickness. No spalls or bats shall be used except for shaping around irregular openings or when unavoidable at corners.
5. All pipe entering drainage structures shall be cut and ground smooth with the face of the wall.
6. All joints around pipe and structure walls at the face of the wall shall be packed full with mortar.
7. The bottom of drainage structures shall be clean of all debris and walls shall be wiped clean of mortar as work progresses.
8. Catch basin tops and throats shall be cast-in-place to line and grade and shall slope continuous with gutter.
9. All structures over 4 feet deep shall have cast iron steps installed 15 inches on center in a vertical direction.
10. Masonry construction is required to be solid. All joints and spaces shall be filled full of mortar as units are laid. Structural masonry construction practice is required. Outside joints are to be filled full of mortar and struck flush. Walls are to be constructed to line and plumb.
11. No backfill shall be placed against any masonry until it is at least 7 days old. During cold weather, the restricted period may be extended as directed by the ENGINEER.
12. Pipe shall not be broken by impact methods. Cutting of pipe with pipe saw is required.

3.06 PROTECTION

The CONTRACTOR/DEVELOPER will be responsible for protecting finished installation of the storm sewer system. Any structures or piping will be repaired and/or replaced as directed by the ENGINEER.

3.07 INSTALLATION - CATCH BASINS, DROP INLETS, MANHOLES & CLEANOUTS

- A. Form bottom of excavation clean and smooth to correct elevation. Particular care shall be given to bottom elevations of pre-cast structures.
- B. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe end sections.
- C. Establish elevations and pipe inverts for inlets and outlets as indicated.
- D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.08 CLEANUP

Sewers and structures shall be left clean and free from mud or debris of any kind. When looked through, each line between structures shall show a full circle of light. Otherwise, the CONTRACTOR/DEVELOPER shall be required to remove and replace the defective portion of the work.

END OF SECTION