SECTION 33 40 00

STORM SEWERS

PART 1 - GENERAL

1.01 The work covered by this section shall consist of excavating and backfilling the trench and furnishing, laying and jointing concrete, culvert and pipe fittings. It shall not include the construction of manholes, inlets, outlets or other structures incidental to the construction of storm sewers or drains, all of which are covered elsewhere in these specifications. Excavation for storm sewers or drains shall comply with all applicable provisions of Section 31 23 16.13, Unclassified Excavation for Utilities.

1.02 The contractor shall locate all existing utilities prior to beginning work.

1.03 All storm sewer line construction shall be in accordance with standard specifications of the local review authority.

PART 2 - PRODUCTS

2.01 REINFORCED CONCRETE CULVERT PIPE

A. All concrete pipe with an internal diameter of 15 inches or more shall be reinforced concrete pipe minimum Class III (class IV or V if specified) conforming to ASTM C76, unless otherwise specified. Horizontal elliptical shall conform to C-507 Class HE-III, or HE-IV as specified on the drawings.

B. All pipe and specials shall be inspected and accepted by an approved commercial testing laboratory prior to delivery to the work site. Each joint and each special shall be stenciled or marked with the lab's mark of acceptance. Furnish the A/E with 2 certified copies of the lab's report of inspection, test and acceptance on all pipe and specials prior to its incorporation in the work.

C. When rubber gasket joints are used, the pipe shall be manufactured in strict accordance with the recommendations and requirements of the manufacturer of the particular rubber gasket selected.

D. Joints shall be watertight where located underneath building slabs, otherwise, joints shall be soil tight, unless specified otherwise.

2.02 JOINT REINFORCEMENT – CONCRETE PIPE

A. In all machine-made concrete pipe with an internal diameter of 15" or greater, the tongue shall be reinforced with circumferential reinforcement equal in area to that of a single line within the barrel of the pipe.

B. In all cast concrete pipe with an internal diameter of 15" and greater, both the tongue and groove end of the pipe shall be reinforced with circumferential reinforcement equal in area to that of a single line within the barrel of the pipe.

2.03 JOINT MATERIALS

A. Joint material shall be either a rubber gasket joint or butyl rubber sealant joint.

B. Rubber gasket joints shall be Tylox Superseal gasket, Tylox SOCL Profile Gasket or equal; the bell and spigot, tongue and groove of the pipes shall be specifically manufactured and prepared

for the use of the gasket selected. The rubber gaskets shall meet the requirements of ASTM C443. Submit the shape and design to the A/E for his approval.

C. Butyl Rubber joints shall be Kent Seal Butyl Sealant or Conseal CS-102, CS-202 or equal; The butyl rubber sealant shall meet the requirements of ASTM C990

2.04 Corrugated High-Density Polyethylene (HDPE)

A. All HDPE pipe shall meet one of the following specifications ASTM F2648, AASHTO M252, Type S with smooth interior, or AASHTO M294,Type S with smooth interior.

B. Joints shall be watertight where located underneath building slabs, otherwise, joints shall be soil tight. Joints shall meet ASTM F2648, F477 or D3212

C. Fittings shall conform to ASTM F2306, AASHTO M252 or AASHTO M294, either soil tight or water tight joints a noted in Section 2.2 B, above.

2.05 CORRUGATED STEEL PIPE (CSP) – ALUMINIZED TYPE 2 STEEL, 16 GAUGE MIN.

A. All corrugated steel pipe shall meet one of the following material specifications ASTM A929 or AASHTO M274 and be manufactured in accordance with either ASTM A760 or AASHTO M36. CSP Pipe shall be Contech HEL-COR or approved equal.

B. Joints shall be watertight where located underneath building slabs, otherwise, joints shall be soil tight, unless specified otherwise. Joints shall meet ASTM F2648, F477 or D3212

C. Fittings shall conform to ASTM F2306, AASHTO M252 or AASHTO M294, either soil tight or water tight joints a noted in Section 2.2 B, above.

D. Pipe shall be polymer coated for soil pH under 5.5, or where significant bed loads are expected.

E. Corrugated Steel Pipe (CSP) may only be used if specifically specified on the drawings.

PART 3 - EXECUTION

3.01 PIPELINE CONSTRUCTION

A. Before construction or placing joints, demonstrate to the A/E, by completing at least one sample joint, that the methods employed conform to the specifications and will provide a watertight joint, and further that the workman intended for use on this phase of the work are thoroughly familiar and experienced with the type of joint proposed.

B. Before placing sewer pipe in position in the trench, carefully prepare the bottom and sides of the trench, and install any necessary bracing and sheeting as provided in Section 312316.13, Unclassified Excavation for Utilities.

C. Wherever necessary to provide a satisfactory bearing surface, place concrete cradles as shown on the drawings or as directed by the A/E. Cradles shall be of concrete with f'=3,000 psi at 28 days, as defined by ACI standards, and shall conform to the dimensions shown on the detailed drawings.

D. Tightly stretch a mason's line or wire above the ground level, parallel to and directly above the axis of the pipe to be installed; this line is to be supported at intervals of no more than 50 feet on sewers being laid on a grade of 2% or more and not exceeding 25 feet for grades of less than

2%. Determine the exact line and grade for each section of pipe by measuring down from this line to the invert of the pipe in place. Accurately place each pipe to the exact line and grade called for on the drawings. Furnish all labor and materials necessary for erecting batter boards. The use of laser beams will be allowed.

E. Do not allow water to run or stand in the trench while pipe laying is in progress, before the joint has completely set or before the trench has been backfilled. Do not at any time open up more trench than the available pumping facilities are able to dewater.

F. Correct trench bottoms found to be unsuitable for foundations after pipe laying operations have been started and bring them to exact line and grade with compacted earth as necessary.

G. Carefully inspect each piece of pipe and special fitting before it is placed and lay no defective pipe in the trench. Pipe laying shall proceed upgrade, starting at the lower end of the grade and with the bells upgrade.

H. Bell holes shall be large enough to allow ample room for the pipe joint to be properly made. Do not cut out bell holes more than 10 joints ahead of pipe laying. Carefully grade the bottom of the trench between bell holes so that each pipe barrel will rest on a solid foundation for its entire length. Lay each pipe joint so as to form a close concentric joint with adjoining pipe and to avoid sudden offsets or inequalities in the flow line.

I. Jointing operations shall follow pipe laying very closely. Failure to comply with this provision will result in the A/E stopping all operations until caught up.

3.02 JOINT CONSTRUCTION

A. Rubber Gasket and Butyl Rubber Sealant Joints

1. Rubber gaskets and butyl rubber sealants and the method of joint construction shall be in strict accordance with the manufacturer's directions and requirements. Adequately lubricate the gaskets with lubricant provided for this purpose. Pipe joints shall be adequately and thoroughly driven home or seated.

3.03 BEDDING

A. All pipe bedding shall be a minimum of 6" AASHTO M 43 #67 crushed stone.

3.04 LAYING PIPE

A. The pipe laying shall begin at the lowest point of the trench and proceed upgrade. The contractor shall verify existing tie-in elevations at the high and low point of the run prior to construction. The lower segment of the pipe shall be in contact with the bedding throughout its full length. Bell or groove ends of rigid pipes and outside circumferential laps of flexible pipes shall be placed facing upgrade.

3.05 BACKFILLING

A. Pipes shall be inspected before any backfill is placed. Any pipes found to be out of alignment, unduly settled or damaged shall be removed and re-laid or replaced at the contractor's expense.

B. Material for backfill shall be as specified in section 312316.13 Unclassified Excavation for Utilities.

C. When the top of the pipe is even with or below the top of the trench, the backfill shall be compacted in layers not exceeding 6" on both sides of the pipe and shall be brought up 1 foot above the top of the pipe or to natural ground level, whichever is greater. Care shall be exercised

to thoroughly compact the backfill material under the haunches of the pipe. Material shall be brought up evenly on both sides of the pipe.

D. When the top of the pipe is above the top of the trench, the backfill shall be compacted in layers not exceeding 6” and shall be brought up evenly on both sides of the pipe to 1 foot above the top of the pipe. The width of backfill on each side of the pipe for the portion above the top of the trench shall be equal to twice the pipe’s diameter or 12 feet, whichever is less.

E. When the pipe is located under existing or proposed pavement, the backfill shall extend to proposed subgrade.

F. Installation and backfilling shall be in accordance with the pipe manufacture’s installation guidelines.

3.06 WYES AND TEES

A. Install wyes and tee branches in the sewer line as shown on the drawings and/or at such other locations as designated by the A/E. If such branches are not to be used, immediately close them with precast clay or concrete stoppers held in place with jointing compound.

B. As the work progresses, thoroughly clean the interior of all pipe in place. On small pipe, keep a swab or drag in the pipeline and pull forward past each joint immediately after it has been made. After laying each line of pipe, carefully inspect it and remove all earth, trash, rags and other foreign matter from its interior.

C. After joints have been completed, they shall be inspected, tested and accepted by the A/E before they can be covered. The pipe shall meet test requirements for water tightness; immediately repair any leaks or defects discovered at any time after completion of work. Take up any pipe that has been disturbed after joints were formed, clean and re-make the joints, and re-lay the pipe at the contractor’s expense. Carefully protect all pipe in place from damage until backfill operations are completed.

D. Do not begin backfilling trenches until the pipe in place has been inspected and approved by the A/E. Backfilling shall be performed in the manner described in Section 31 23 16.13, Unclassified Excavation for Utilities.

3.07 EXISTING UTILITIES

A. Carefully protect all existing sewers, water and gas lines, sidewalks, curbs, gutters, pavements, electric lines and all other utilities and structures that are to remain in the vicinity of the work from damage at all times. The contractor shall repair or replace any damaged utilities or structures to remain with like materials at no additional cost to the owner.

3.08 CLEAN UP

A. After completing each section of sewer line, remove all debris, construction materials and equipment from the site of work. Grade and smooth over the surface on both sides of the line, leaving the entire right-of-way in a clean, neat and serviceable condition.

END OF SECTION