

## **SECTION 33 41 19 – PIPE LAYING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes: the Work necessary to install gravity sewer, force main pipe, water pipe and appurtenances.
- B. Related sections:
  - 1. Section 01 60 00 – Product Requirements
  - 2. Section 31 23 16.16 – Trenching for Water and Sewer Lines
  - 3. Section 31 23 23.19 – Trench Bedding and Backfill for Water and Sewer Lines
  - 4. Section 33 31 26 – Testing Water Distribution Systems
  - 5. Section 33 39 17 – Polymer Concrete Manholes
  - 6. Section 33 31 13 – Steel Encasement Pipe
  - 7. Section 33 34 13 – Ductile Iron Force Main Pipe and Fittings
  - 8. Section 41 19 – Solid Wall PVC Gravity Sewer Pipe, Water Pipe, and Fittings

#### **1.2 GENERAL**

- A. General Requirements: See Division 01, GENERAL REQUIREMENTS, which contains information and requirements that apply to the work specified herein and are mandatory for this project.

### **PART 2 - PRODUCTS**

#### **2.1 GENERAL**

- A. All pipe materials shall be as specified on the Plans and conforming to these specifications.

#### **2.2 WARNING TAPE**

- A. Non-metallic sanitary sewer marking tape shall be warning tape as manufactured by Rhino Marking and Protection Systems, Harris Industries, Inc., or approved equal.
- B. Tape shall have a minimum thickness of 4 mils and manufactured with heavy metal-free polyethylene tape that is impervious to all known alkalis, acids, chemical reagents, and solvents found in soil. The minimum overall width of the tape shall not be less than 3-inches. Standard rolls shall be 1000' length.
- C. The tape for sewer lines shall be color coded Green and imprinted with the following message: Caution Buried Sewer Line Below.
- D. The tape for water lines shall be color coded Blue and imprinted with the following message: Caution Buried Water Line Below.

## **2.3 TRACER WIRE**

- A. Tracer wire shall be 12-gauge, stranded coated copper for underground burial.
- B. Jacket color shall be GREEN, and made of High Density Polyethylene (HDPE) or High Molecular Weight Polyethylene (HMWPE) designed for direct burial.
- C. Connectors shall be used for all splices or repairs. Connectors shall be moisture displacement style as manufactured by 3M DBR, or equal.
- D. A locate or conductivity test shall be performed prior to signing off on the project.

## **2.4 PIPE BEDDING AND BACKFILL**

- A. Shall be in accordance with 31 23 23, TRENCH BACKFILL.

# **PART 3 - EXECUTION**

## **3.1 GENERAL**

- A. All pipe, fittings, bedding, backfill, and all other appurtenances shall be installed in accordance with these specifications and the Plans.

## **3.2 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. Comply with Section 01 60 00, PRODUCT REQUIREMENTS.
- B. Delivery of Materials: Products shall be delivered in original, unbroken packages, containers, or bundles bearing the name of the manufacturer.
- C. Storage: Products shall be carefully stored in a manner that will prevent damage and in an area that is protected from the elements.
- D. Pipe and accessories shall be handled in such a manner that will ensure their condition after installation to be sound and undamaged. Equipment, tools and methods used in unloading, reloading, hauling and laying pipe and fittings shall be such that they are not damaged. Under no circumstances shall loading forks, or other equipment, be inserted into the barrel of the pipe or fitting.
- E. Pipe having pre-molded joint rings shall be handled in such a manner that no weight, including the weight of the pipe itself, will bear on or be supported by the spigot rings at any time. Care shall be taken to avoid dragging the spigot ring on the ground or allowing it to come in contact with gravel, crushed stone, rocks, or other hard objects. Joint rings which have been damaged in any way will not be accepted and shall not be incorporated in the work.

## **3.3 FIELD QUALITY CONTROL**

- A. Provide skilled workmen to insure embedment of pipe.

- B. Contractor shall test for defects and leakage as specified in Section 33 31 23, TESTING SANITARY SEWER SYSTEMS and Section 33 31 26, TESTING WATER DISTRIBUTION SYSTEMS.

### **3.4 TRACE WIRE**

- A. Regardless of pipe material, a trace wire shall be laid on top of the pipe and shall be looped around the pipe at least once every 10-feet and connected to all valves and fittings. At valves, the trace wire shall be brought up into the valve box as indicated in the plans. A tracing test of trace wire will be required prior to final acceptance.

### **3.5 PIPE DETECTION TAPE**

- A. Pipe detection tape shall be provided in all trenches for force main and water line construction. Installation shall be per manufacturer's recommendations and shall be as close as practical to finished grade while maintaining a required minimum of 18 inches between the detection tape and the top of any pipe.

### **3.6 LAYING PIPE**

- A. Proper means and equipment shall be used for lowering pipe into the trenches.
- B. The Contractor shall have full responsibility for any diversion of drainage and for dewatering trenches.
- C. Recesses for the pipe bells are mandatory and shall be hand excavated so that the entire pipe barrel is uniformly supported by the bedding material.
- D. Pipe shall be protected from lateral displacement by means of pipe embedment material installed as provided in this specification. Under no circumstances shall pipe be laid in water and no pipe shall be laid under unsuitable weather or trench conditions.
- E. When jointed in the trench, the pipe shall form a true and smooth line. Pipe shall not be trimmed except for closures, and pipe not making a good fit shall be removed.
- F. Unless otherwise approved by the Engineer, the laying of pipe shall begin at the lowest point, and the pipe shall be installed so that the spigot ends point in the direction of flow.
- G. Pipe which is a part of a gravity sewer line shall be aligned and constructed to grades as shown on the plans. Lines not conforming to these grades shall be subject to removal and replacement at the Contractor's expense. Force main pipe shall match the horizontal alignment and shall closely match the grades shown on the plans.
- H. Pipe lines or runs intended to be straight shall be laid straight.
- I. During installation, each pipe and fitting shall be inspected for defects. All defective, damaged, or unsound pipe and fittings shall be rejected and removed from the site of the work.
- J. Dependent on type of application, gravity or pressure, place thrust blocking at all pipe fittings, including bends and reducers, as shown on the Plans.

- K. Prior to joining the pipe, the plain ends of the pipe and the bells of the pipe shall be thoroughly cleaned using a soapy water and cloth, removing all foreign materials from the bells, especially the gasket seats. Any burrs or imperfections in that part of the plain end or bell which will be in contact with the gasket shall be removed.
- L. The clean gasket shall be inserted in the bell and a thin film of lubricant shall be applied to the inside surface of the gasket.
- M. The cleaned plain end shall initially be entered in the bell straight. The plain end shall be forced inside the gasket and bell until the limit mark is just visible. The pipe may then be deflected as allowed by the manufacturer.
- N. Lubricants shall be supplied by the pipe manufacturer in sufficient quantities. No substitutes shall be made.
- O. The Contractor shall furnish such jacks, or other devices as are necessary for forcing the pipe into the bell and gasket. Care shall be exercised to avoid damage to the pipe where the pushing device or machine part contacts the pipe. A wood block or suitable pad shall be placed between the pipe and that part of the pushing device which contacts the pipe.
- P. All plain ends that enter a push on bell shall be beveled at 30° for at least one eighth (1/8) inch. All cut pieces or ends of pipe of other classifications shall be so beveled.

### **3.7 PIPE BEDDING NON-FERROUS PIPE**

- A. Non-ferrous pipe includes PVC, Polyethylene and FRP.
- B. Bedding material shall be as specified in Section 31 23 23.19, TRENCH BEDDING AND BACKFILL FOR WATER AND SEWER LINES.
- C. Place 6-inches, minimum, of bedding between excavated trench bottom or stabilized trench bottom and bottom of pipe or fitting. Provide depression in bedding for joints so that barrel of pipe or fitting rests on bedding. Place bedding in 6-inch maximum layers, compacted to 95% standard maximum density, to 6-inches over the top of pipe and fittings.
- D. Bedding is considered to be an integral part of the pipe installation. Therefore particular care shall be given to insure that bedding is in intimate contact with the pipe in all directions and that no portion of the bedding shall be compacted to less than the specified density, particularly the area below the springline of the pipe.
- E. Place bedding a minimum of 6-inches over the top of pipe and fittings. Bedding shall be compacted to 95% maximum density.
- F. For areas undercut, whether by Contractor's negligence or by direction of Engineer, provide and place crushed aggregate, compacted to 95% standard maximum density, to bottom elevation of pipe bedding.
- G. When used, the bottom of trench boxes will be above the level of pipe bedding before bedding is compacted. In no case will pipe bedding be compacted against the trench box or before the trench box is raised to allow compaction of bedding.

### **3.8 PIPE BEDDING DUCTILE IRON PIPE**

- A. Bedding material shall be as specified in Section 31 23 23.19, TRENCH BEDDING AND BACKFILL FOR WATER AND SEWER LINES.
- B. Place 6-inches, minimum, of bedding between excavated trench bottom or stabilized trench bottom and bottom of pipe or fitting. Provide depression in bedding for joints so that barrel of pipe or fitting rests on bedding. Place bedding in 6-inch maximum layers, compacted to 95% standard maximum density, to a minimum total depth of  $\frac{3}{4}$  (75%) of the outside diameter of the pipe as indicated on the drawings.
- C. Bedding is considered to be an integral part of the pipe installation. Therefore particular care shall be given to insure that bedding is in intimate contact with the pipe in all directions and that no portion of the bedding shall be compacted to less than the specified density, particularly the area below the springline of the pipe.
- D. For areas undercut, whether by Contractor's negligence or by direction of Engineer, provide and place crushed aggregate, compacted to 95% standard maximum density, to bottom elevation of pipe bedding.
- E. When used, the bottom of trench boxes will be above the level of pipe bedding before bedding is compacted. In no case will pipe bedding be compacted against the trench box or before the trench box is raised to allow compaction of bedding.

### **3.9 TRENCH BACKFILL**

- A. Shall be as specified in Section 31 23 23.19, Trench Bedding and Backfill for Water and Sewer Lines.

### **3.10 ALIGNMENT AND GRADE**

- A. All pipe shall be laid straight between changes in alignment, except as shown on the Plans, and at a uniform grade between changes in grade. All lines shall be laid so that each section between manholes will lamp.

### **3.11 JOINTING**

- A. Boltless gasketed joints: All instructions and recommendations of the pipe manufacturer, relative to gasket installation and other jointing operations, shall be observed and followed by the Contractor. All joint surfaces shall be lubricated as recommended by the manufacturer immediately before the joint is completed.
- B. Mechanical joints: Mechanical joints shall be carefully assembled in accordance with the manufacturer's recommendations. If effective sealing is not obtained, the joint shall be disassembled, thoroughly cleaned and reassembled. Overtightening bolts to compensate for poor installation practice will not be permitted.

### **3.12 CUTTING PIPE**

- A. Cutting of pipe shall be done in a neat manner, without damage to the pipe or to the lining therein. Pipe cuts shall be smooth, straight and at right angles to the pipe axis. All cutting of

pipe shall be done with mechanical pipe cutters of an approved type except that in locations where the use of mechanical cutters would be difficult or impracticable, existing pipe may be cut with diamond point chisels, saws, or other tools which will cut the pipe without damaging impact or shock.

### **3.13 CLEANING**

- A. The interior of all pipe shall be cleaned of all foreign matter before being installed and shall be kept clean until the work has been accepted. All lumps, blisters and excess coating shall be removed from exterior spigot and interior bell surfaces. Such surfaces shall be wire brushed and wiped clean, dry, and free from oil and grease before placing the spigot in the bell. All joint contact surfaces shall be kept clean until the jointing is completed.
- B. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being installed. No debris, tools, clothing, or other materials shall be placed in the pipe.
- C. Whenever pipe laying is stopped, the open end of the line shall be sealed with a watertight plug.

### **3.14 WATER AND SEWER LINE CROSSINGS**

- A. Water and sewer lines crossing one another shall have a minimum 18-inch vertical separation.
- B. In general water lines shall be above sewer lines, however if water line cannot be above sewer line because of cover limitations or other obstructions. The water line may be below the sewer line but either the water or sewer line shall be encased 10 feet either side of the crossing line in steel encasement as specified in Section 33 31 13, STEEL ENCASEMENT PIPE.
- C. Water lines shall not pass through manholes.

### **3.15 PARALLEL WATER AND SEWER LINES**

- A. Water and sewer line shall have a minimum 10 feet horizontal separation.
- B. Water and sewer lines shall not be installed within the same trench.

### **3.16 TESTING**

- A. Acceptance testing for gravity lines and force mains shall conform to Section 33 31 23, TESTING SANITARY SEWER SYSTEMS.
- B. Acceptance Testing for water mains shall conform to the relevant portions of Section 33 31 26, TESTING WATER DISTRIBUTION SYSTEMS..

### **3.17 CONNECTION OF NEW SEWER PIPELINES TO EXISTING SANITARY SEWERS**

- A. Construct, clean, test, and obtain Engineer's approval for pipelines and manholes before connecting new pipeline to the existing sewer.
- B. If, in the opinion of the Engineer, conditions exist which require connection prior to final line acceptance, plug all lines entering the manhole connecting to the existing system until the new

system is accepted. In addition, plug the line leaving the first manhole upstream. Never allow water being used to flush the new lines to enter the existing system.

- C. All new pipelines must connect to the existing system at a new or existing manhole. If a new manhole is built over an existing sewer line, do not break out the top of the existing pipe until the new line is accepted.
- D. If a new pipeline is to discharge into an existing manhole, divert the sewage flow around the existing manhole while the tie-in is under construction. Intercept the sewage flow at the existing manhole first upstream from the tie-in construction. Provide suitable pumping equipment and re-routing conduit to pump the sewage around the tie-in construction. Discharge into an appropriate manhole downstream from the construction.
- E. Connection to an existing manhole shall be made by core drilling. A concrete manhole adapter, A-LOK G3 boot system or equal, shall be installed on the sewer pipe, and the annular space grouted.
- F. Connect new pipelines to existing manholes in a neat, workmanlike manner, to ensure a watertight connection.

### **3.18 TRENCHING**

- A. Pipe trenching shall be as specified in Section 31 23 23, TRENCH BACKFILL.

### **3.19 CONNECTIONS TO MANHOLES**

- A. Pipe connections to concrete manholes and other concrete structures shall be as specified in Section 33 39 13, CONCRETE MANHOLES

### **3.20 STEEL ENCASEMENT**

- A. Pipe installed within steel encasement shall conform to Section 33 31 13, STEEL ENCASEMENT PIPE.

## **PART 4 - MEASUREMENT AND PAYMENT**

- 4.1 No separate payment will be made for pipe laying. Include payment for pipe laying in pipe item.

## **END OF SECTION**