

## **SECTION 33 31 13**

### **SITE SANITARY SEWERAGE**

#### **GRAVITY MAIN PIPING**

#### **PART 1: GENERAL**

##### **1.1 SCOPE**

- A. Installation of gravity sanitary sewers and appurtenances.

##### **1.2 SUBMITTALS**

- A. Conform to requirements of Section 01 00 04 Submittals.
- B. Submit proposed methods, equipment, materials and sequence of operations for sewer construction. Plan operations to minimize disruption of utilities to occupied facilities or adjacent property.
- C. Test Reports: Submit test reports and inspection videos as specified in Part 3 of this Section. Videos become property of Owner.

##### **1.3 QUALITY ASSURANCE**

- A. Qualifications. Install sanitary sewer that is watertight both in pipe-to-pipe joints and in pipe-to-manhole connections. Perform testing in accordance with Section 33 01 30.13 - Acceptance Testing for Sanitary Sewers (General).
- B. Regulatory Requirements.
  - 1. Install sewer lines to meet minimum State mandated separation distance from potable water lines. Separation distance is defined as distance between outside of water pipe and outside of sewer pipe. Install new sanitary sewers no closer to water lines than 10 feet in all horizontal directions. Where water and sanitary sewer lines cross, a minimum vertical separation in accordance with State and/or local standards, but no less than 18" is required. Where separation distance cannot be achieved, sanitary sewers shall be constructed of ductile iron sanitary sewer piping or encased in reinforced concrete (as detailed on the Drawings) for a minimum distance of 10 feet either side of the crossing.
  - 2. Notify Owner immediately when water lines are uncovered during sanitary sewer installation where minimum separation distance cannot be maintained.
  - 3. Lay gravity sewer lines in straight alignment and grade.

#### 1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Inspect pipe and fittings upon arrival of materials at job site.
- B. Handle and store pipe materials and fittings to protect them from damage due to impact, shock, shear or free fall. Do not drag pipe and fittings along ground. Do not roll pipe unrestrained from delivery trucks.
- C. Use mechanical means to move or handle pipe. Employ acceptable clamps, rope or slings around outside barrel of pipe and fittings. Do not use hooks, bars, or other devices in contact with interior surface of pipe to lift or move lined pipe.

### PART 2: PRODUCTS

#### 2.1 PIPE

- A. Provide piping materials for gravity sanitary sewers of sizes and types indicated on Drawings or as specified.
- B. Unlined reinforced concrete pipe is not acceptable.

#### 2.2 PIPE MATERIAL SCHEDULE

- A. Unless otherwise shown on Drawings, use pipe materials that conform to requirements specified in one or more of following Sections:
  - 1. Section 33 05 19.02 – Ductile-Iron Utility Pipe Water (Contractor Furnished).
  - 2. Section 33 05 31.11 – Polyvinyl Chloride (PVC) Gravity Sewer Pipe.
  - 3. Section 33 05 33.13 – Polyethylene Utility Pipe (Wastewater).
- B. Where shown on Drawings, provide pipe meeting minimum class, dimension ratio, or other criteria indicated.
- C. Pipe materials other than those listed above shall not be used for gravity sanitary sewers.

#### 2.3 APPURTENANCES

- A. Laterals. Conform to requirements of Section 33 31 16 – Site Sanitary Sewerage Gravity Service Laterals.
- B. Service Connections. Conform to requirements of Section 33 31 16 – Site Sanitary Sewerage Gravity Service Laterals.
- C. Roof, street or other type of surface water drains shall not be connected or reconnected into sanitary sewer lines.

## 2.4 BEDDING AND BACKFILL MATERIAL

- A. Bedding and Backfill: Conform to requirements of Section 31 23 33 - Excavation and Backfill for Utilities and Section 31 23 23 - Utility Backfill Materials.

## PART 3: EXECUTION

### 3.1 PREPARATION

- A. Prepare traffic control plans and set up street detours and barricades in preparation for excavation when construction will affect traffic. Conform to requirements of MUTCD, and/or local standards where applicable.
- B. Provide barricades, flashing warning lights, and warning signs for excavations. Conform to requirements MUTCD and/or local standards where applicable. Maintain barricades and warning lights where work is in progress or where traffic is affected.
- C. Perform work in accordance with OSHA standards. Employ trench safety system for excavations over 5 feet deep.
- D. Immediately notify agency or company owning utility line which is damaged, broken or disturbed. Obtain approval from Owner and agency or utility company for repairs or relocations, either temporary or permanent.
- E. Remove old pavements and structures including sidewalks and driveways in accordance with installation and local Department of Public Works requirements.
- F. Install and operate dewatering and surface water control measures in accordance with Contract Document requirements.
- G. Do not allow sand, debris or runoff to enter sewer system.

### 3.2 DIVERSION PUMPING

- A. All diversion and bypass pumping shall be performed in accordance with Section 33 01 50.01 – Pumping and Bypassing.

### 3.3 EXCAVATION

- A. Earthwork. Conform to requirements of Section 31 23 33 - Excavation and Backfill for Utilities. Use bedding as indicated on Drawings.
- B. Line and Grade. Establish required uniform line and grade in trench from benchmarks identified by Owner. Maintain this control for minimum of 100 feet behind and ahead of pipe-laying operation. Use laser beam equipment to establish and maintain proper line and grade of work. Use of appropriately sized grade boards which are substantially supported is also acceptable. Protect boards and location stakes from damage or dislocation.
- C. Trench Excavation. Excavate pipe trenches to depths shown on Drawings and as specified in Section 31 23 33 - Excavation and Backfill for Utilities.

- D. Generally, pipe slopes should be between 2-10% slope. In no circumstance shall pipe slope be less than 1% without prior approval from Owner. Pipe slopes greater than 15% will require approval from Owner and concrete anchoring at the following maximum spacing:
  - 15-35%: 36 feet on center
  - 35-50%: 24 feet on center
  - 50% and above: 16 feet on center
- E. Depth from top of pipe to finish grade should not be less than three (3') feet within prior approval from Owner.

### 3.4 PIPE INSTALLATION BY OPEN CUT

- A. Install pipe in accordance with pipe manufacturer's recommendations and as specified in following paragraphs.
- B. Install pipe only after excavation is completed, bottom of trench fine graded, bedding material is installed, and trench has been approved by Owner.
- C. Install pipe to line and grade indicated. Place pipe so that it has continuous bearing of barrel on bedding material and is laid in trench so interior surfaces of pipe follow grades and alignment indicated. Provide bell holes where necessary.
- D. Install pipe with spigot ends toward downstream end of flow such that water flows into bell and out the spigot.
- E. Form concentric joint with each section of adjoining pipe so as to prevent offsets.
- F. Keep interior of pipe clean as installation progresses. Remove foreign material and debris from pipe
- G. Provide lubricant, place and drive home newly laid sections with come-a-long winches so as to eliminate damage to sections. Install pipe to "home" mark where provided. Use of back hoes or similar powered equipment will not be allowed unless protective measures are provided and approved in advance by Owner.
- H. Keep excavations free of water during construction and until final inspection.
- I. When work is not in progress, cover exposed ends of pipes with approved plug to prevent foreign material and ground water from entering pipe.
- J. Where gravity sanitary sewer is to be installed under existing water line with separation distance of less than 2 feet, construct new sewer pipe so that 20 feet of ductile iron pipe is centered on water line crossing or encase the sewer line with reinforced concrete encasement as detailed on the plans. If gravity sanitary sewer is to be installed above existing water line, construct new sewer pipe so that 20 feet of ductile iron pipe is centered on water line crossing or encase the sewer line with reinforced concrete encasement.
- K. Where gravity sanitary sewer is to be installed under existing water line, install new sewer using ductile iron or encased in reinforced concrete encasement as shown on Drawings. Maintain minimum 2-foot separation distance.
- L. Where the length of the stub is not indicated, install the stub to the right-of-way line and seal the free end with an approved plug.

### 3.5 PIPE INSTALLATION OTHER THAN OPEN CUT

- A. For installation of pipe by directional drilling, conform to requirements of specification Sections on 33 05 07.13 – Utility Directional Drilling as appropriate.
- B. For installation of pipe by pipe bursting, conform to requirements of specification Sections 33 01 30.23 - Pipe Bursting as appropriate.

### 3.6 INSTALLATION OF APPURTENANCES

- A. Service Connections. Install service connections to conform to requirements of Section 33 31 16 – Site Sanitary Sewerage Gravity Service Laterals.
- B. Construct manholes to conform to requirements of Section 03 40 01 - Precast Concrete Manholes.

### 3.7 INSPECTION AND TESTING

- A. Visual Inspection: Check pipe alignment in accordance with Section 33 01 30.13 - Acceptance Testing for Sanitary Sewers.
- B. Mandrel Testing. Use Mandrel Test to test flexible pipe for deflection. Refer to Section 33 01 30.13 - Acceptance Testing for Sanitary Sewers.
- C. Pipe Leakage Test. After backfilling line segment and prior to tie-in of service connections, visually inspect gravity sanitary sewers where feasible, and test for leakage in accordance with Section 33 01 30.13 - Acceptance Testing for Sanitary Sewers.

### 3.8 BACKFILL AND SITE CLEANUP

- A. Backfill and compact soil in accordance with Section 31 23 33 - Excavation and Backfill for Utilities.
- B. Backfill trench in specified lifts only after pipe installation is approved by Owner.
- C. Repair and replace removed or damaged pavement, curbs, gutters, and sidewalks as specified by local regulations.

**END OF SECTION 33 31 13**