

## **SECTION 22 13 00 – FACILITY SANITARY SEWERAGE**

### **PART 1        GENERAL**

#### **1.01    SUMMARY**

**A.        Section Includes:**

1.        Sanitary sewer and vent piping buried below grade.
2.        Sanitary sewer and vent piping above grade.
3.        Cleanouts.

**B.        Related Sections:**

1.        Section 07 84 00 – Firestopping: Product requirements for firestopping for placement by this section.
2.        Section 08 32 13 – Access Doors and Frames: Product requirements for access doors for placement by this section.
3.        Section 09 90 00 – Painting and Coating: Product and execution requirements for painting specified by this section.
4.        Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment: Product requirements for pipe hangers and supports and firestopping for placement by this section.
5.        Section 22 05 53 – Identification for Plumbing Piping and Equipment: Product requirements for pipe identification for placement by this section.
6.        Section 22 07 00 – Plumbing Insulation: Product and execution requirements for pipe insulation.
7.        Section 26 05 03 – Equipment Wiring Connections: Execution requirements for electric connections to equipment specified by this section.
8.        Division 31 sections for excavation, trench and backfill required by this section.
9.        Section 33 41 00 – Storm Utility Drainage Piping: Catch basins and manholes.

#### **1.02    REFERENCES**

**A.        American Society of Mechanical Engineers:**

1.        ASME B16.1 – Cast Iron Pipe Flanges and Flanged Fittings.
2.        ASME B16.3 – Malleable Iron Threaded Fittings.
3.        ASME B16.4 – Gray Iron Threaded Fittings.

4. ASME B31.9 – Building Services Piping.

B. ASTM International:

1. ASTM A47/A47M – Standard Specification for Ferritic Malleable Iron Castings.
2. ASTM A74 – Standard Specification for Cast Iron Soil Pipe and Fittings..
3. ASTM C564 – Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
4. ASTM D1784 – Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
5. ASTM D1785 – Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
6. ASTM D2241 – Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
7. ASTM D2464 – Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
8. ASTM D2466 – Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
9. ASTM D2467 – Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
10. ASTM D2564 – Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
11. ASTM D2855 – Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
12. ASTM D3311 – Standard Specification for Drain, Waste and Vent (DWV) Plastic Fitting Patterns.

C. Cast Iron Soil Pipe Institute:

1. CISPI 301 – Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications.
2. CISPI 310 – Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

D. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP 58 – Pipe Hangers and Supports – Materials, Design and Manufacturer.

2. MSS SP 69 – Pipe Hangers and Supports - Selection and Application.
3. MSS SP 89 – Pipe Hangers and Supports – Fabrication and Installation Practices.

#### 1.03 SUBMITTALS

- A. Section 01 33 00 – Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes for sewage-ejectors, and manholes.
- C. Product Data:
  1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
  2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.
  3. Hangers and Supports: Submit manufacturers catalog information including load capacity.
  4. Sanitary Drainage Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.
- D. Manufacturer's Installation Instructions: Submit installation instructions for material and equipment.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

#### 1.04 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 – Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of equipment and clean-outs.
- C. Operation and Maintenance Data: Submit frequency of treatment required for interceptors. Include, spare parts lists, exploded assembly views for pumps and equipment.

#### 1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

#### 1.06 DELIVERY, STORAGE AND HANDLING

- A. Section 01 60 00 – Product Requirements: Product storage and handling requirements.

- B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

#### 1.07 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 – Product Requirements.
- B. Do not install underground piping when bedding is wet or frozen.

#### 1.08 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

#### 1.09 WARRANTY

- A. Section 01 70 00 – Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish 1-year manufacturer warranty for material.

#### 1.10 EXTRA MATERIALS

- A. Section 01 70 00 – Execution and Closeout Requirements: Spare parts and maintenance products.

### **PART 2 PRODUCTS**

#### 2.01 SANITARY SEWER AND VENT PIPING – BELOW GRADE

- A. All cast iron soil, waste and vent pipe and fittings shall conform to the requirements of CISPI Standard 301, ASTM A888 or ASTM A74. All cast iron pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and shall be listed by NSF International. Acceptable manufacturers of cast iron soil pipe and fittings are AB&I, Charlotte Pipe and Tyler Pipe.
- B. Cast Iron Soil Pipe: ASTM A74, service weight, bell and spigot ends.
  - 1. Fittings: Cast iron, ASTM A74.
  - 2. Joints: Hub-and-spigot with compression gaskets conforming to the requirements of ASTM C-564 and ASTM C-1563.
- C. Cast Iron Pipe: CISPI 301, hub-less, service weight.
  - 1. Fittings: Cast iron, CISPI 301.
  - 2. Joints: Hubless pipe and fittings shall be joined by No-Hub couplings conforming to CISPI Standard 310 and listed by NSF International.
  - 3. Below grade piping shall be joined by heavy-duty shielded stainless steel couplings with rubber sleeves and stainless steel bands and tightening devices,

conforming to ASTM C564; equivalent to Clamp-All 125 or Husky SD 4000.

- D. PVC Pipe: ASTM D1785, Schedule 40, polyvinyl chloride (PVC) material, bell and spigot style solvent sealed joints.
  - 1. Fittings: PVC, ASTM D2665, Schedule 40.
  - 2. Joints: ASTM D2855; solvent weld with ASTM D2564 solvent cement.

## 2.02 SANITARY SEWER AND VENT PIPING – ABOVE GRADE

- A. All cast iron soil, waste and vent pipe and fittings shall conform to the requirements of CISPI Standard 301, ASTM A888 or ASTM A74. All cast iron pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and shall be listed by NSF International. Acceptable manufacturers of cast iron soil pipe and fittings are AB&I, Charlotte Pipe and Tyler Pipe.
- B. Cast Iron Pipe: ASTM A74, service weight.
  - 1. Fittings: Cast iron, ASTM A74.
  - 2. Joints: Hub-and-spigot with compression gaskets conforming to the requirements of ASTM C-564 and ASTM C-1563.
- C. Cast Iron Pipe: CISPI 301, hub-less, service weight.
  - 1. Fittings: Cast iron, CISPI 301.
  - 2. Joints: Hubless pipe and fittings shall be joined by No-Hub couplings conforming to CISPI Standard 310 and listed by NSF International.
    - a. Above grade waste piping shall be joined by mid-duty shielded stainless steel couplings with rubber sleeves and stainless steel bands and tightening devices, conforming to ASTM C564; equivalent to Tyler Wide Body, Mission Heavyweight or Husky HD 2000.
    - b. Above grade vent piping shall be joined by standard duty shielded stainless steel couplings with rubber sleeves and stainless steel bands and tightening devices, conforming to ASTM C564; as manufactured by Tyler Pipe, Mission Rubber Co. or ANACO.
- D. PVC Pipe: ASTM D1785, Schedule 40, polyvinyl chloride (PVC) material, bell and spigot style solvent sealed joints.
  - 1. Fittings: PVC, ASTM D2665, Schedule 40.
  - 2. Joints: ASTM D2855; solvent weld with ASTM D2564 solvent cement.

## 2.03 CLEANOUTS

- A. Refer to Plumbing Equipment Schedule on Drawings.

- B. Exterior Surfaced Areas: Round cast nickel bronze access frame and non-skid cover.
- C. Exterior Unsurfaced Areas: Line type with lacquered cast iron body and round epoxy coated cover with gasket.
- D. Interior Finished Floor Areas: Galvanized cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round scored cover with gasket in service areas and round depressed cover with gasket to accept floor finish in finished floor areas.
- E. Interior Finished Wall Areas: Line type with lacquered cast iron body and round epoxy coated cover with gasket, and round stainless steel access cover secured with machine screw.
- F. Interior Unfinished Accessible Areas: Calked or threaded type.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Section 01 30 00 – Administrative Requirements: Coordination and project conditions.
- B. Verify excavations are to required grade, dry, and not over-excavated.

#### **3.02 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

#### **3.03 INSTALLATION – HANGERS AND SUPPORTS**

- A. Inserts:
  - 1. Provide inserts for placement in concrete forms.
  - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
  - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe 4 inches and larger.
  - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
  - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

B. Pipe Hangers and Supports:

1. Install in accordance with MSS SP 89.
2. Support horizontal piping as scheduled.
3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
6. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
7. Where installing several pipes in parallel and at same elevation, provide multiple pipe hangers or trapeze hangers.
8. Prime coat exposed steel hangers and supports. Refer to Section 09 90 00. Hangers and supports located in crawl spaces, pipe shafts and suspended ceiling spaces are not considered exposed.

3.04 INSTALLATION – BURIED PIPING SYSTEMS

- A. Verify connection to site utility piping system; size, location, and invert are as indicated on Drawings.
- B. Establish elevations of buried piping with not less than 1.5 ft of cover.
- C. Establish minimum separation of other services piping in accordance with Plumbing Code.
- D. Remove scale and dirt on inside of piping before assembly.
- E. Excavate pipe trench in accordance with Division 31 specifications.
- F. Install pipe to elevation as indicated on Drawings.
- G. Place bedding material at trench bottom to provide uniform bedding for piping, level bedding materials in one continuous layer not exceeding 4 inches loose depth; compact to 95 percent maximum density.
- H. Install pipe on prepared bedding.
- I. Route pipe in straight line.
- J. Install plastic ribbon tape continuous over top of pipe, 9 inches above pipe line.
- K. Install trace wire continuous over top of plastic pipe buried 9 inches above pipe line.

L. Pipe Cover and Backfilling:

1. Install underground Thermoplastic piping soil and waste drainage piping according to ASTM D 2321.
2. Backfill trench in accordance with Division 31 specifications.
3. Maintain optimum moisture content of fill material to attain required compaction density.
4. After hydrostatic test, evenly backfill entire trench width by hand placing backfill material and hand tamping in 6 inches compacted layers to 12 inches minimum cover over top of jacket. Compact to 95 percent maximum density.
5. Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.

3.05 INSTALLATION – ABOVE-GROUND PIPING

- A. Establish invert elevations, slopes for drainage to 1/8 inch per foot minimum. Maintain gradients.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Provide clearances at cleanout for snaking drainage system.
- C. Encase exterior cleanouts in concrete flush with grade.
- D. Install floor cleanouts at elevation to accommodate finished floor.
- E. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- F. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- G. Install piping to maintain headroom. Do not spread piping, conserve space.
- H. Group piping whenever practical at common elevations.
- I. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.
- J. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 07 00.
- K. Provide access where valves and fittings are not accessible. Coordinate size and location of access doors with Section 08 31 13.
- M. Install piping penetrating roofed areas to maintain integrity of roof assembly.
- N. Where pipe support members are welded to structural building framing, scrape, brush clean and apply one coat of zinc rich primer to welding.



- O. Prepare exposed, unfinished pipe, fittings, supports and accessories ready for finish painting. Refer to Section 09 90 00.
- P. Install bell and spigot pipe with bell end upstream.
- Q. Sleeve pipes passing through partitions, walls and floors.
- R. Support cast iron drainage piping at every joint.
- S. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Refer to Section 07 84 00.

### 3.06 FIELD QUALITY CONTROL

- A. Section 01 40 00 – Quality Requirements and Section 01 70 00 – Execution and Closeout Requirements: Field inspecting, testing, adjusting and balancing.
- B. Test sanitary waste and vent piping system in accordance with applicable code and local authority having jurisdiction.
- C. Testing:
  - 1. After each section of the sanitary waste, acid waste and grease waste systems have been set within project area, all outlets shall be temporarily "plugged up", except as are required for testing as described herein. Each section of piping shall be tested to a level of at least 10 feet above the pipe being tested. The pipes being tested shall be filled with water to a verifiable and visible level as described above and be allowed to remain so for a minimum of 2 hours. If after 2 hours the level of the water has been lowered by leakage, the leaks must be found and stopped, and the water level shall again be raised to the level described, and the test repeated until, after a 2 hour retention period, there shall be no perceptible lowering of the water level in the system being tested.
  - 2. Should the completion of these tests leave any reasonable question of a doubt relative to the integrity of the installation, additional tests or measures shall be performed to demonstrate the reliability of these systems to the complete satisfaction of the Owner's duly authorized representative. Such tests shall be conducted and completed before any joints in plumbing are concealed or made inaccessible.
- D. Protect piping and drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work of other trades.
- E. Place temporary caps or plugs in ends of uncompleted piping and when work stops at the end of each day.

**END OF SECTION**