SECTION 22 1413 - STORM DRAINAGE PIPING

ALL LIBRARIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following storm drainage piping inside the building and indicated on the plans to a point 5'-0" beyond exterior wall or as noted on plans.

1. Pipe, tube, and fittings.
2. Special pipe fittings.

B. Related Sections include the following:

1. Division 22 Section "Storm Drainage Piping Specialties" for roof and overflow drains, downspout nozzles and boots.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. LLDPE: Linear, low-density polyethylene plastic.

C. PE: Polyethylene plastic.

D. PVC: Polyvinyl chloride plastic.

E. TPE: Thermoplastic elastomer.

1.4 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working-pressure, unless otherwise indicated:

1. Storm Drainage Piping: 10-foot head of water.

B. Seismic Performance: Storm and overflow storm piping and support and installation shall be capable of withstanding the effects of seismic events determined according to 22 0548 "Seismic Protection."

1.5 SUBMITTALS

A. Product Data: For pipe, tube, fittings, and couplings.

B. Shop Drawings:

1. Design Calculations: Signed and sealed by a qualified professional engineer for selecting seismic restraints.

C. Field quality-control inspection and test reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. All cast-iron pipe and fittings shall be manufactured in the **U.S.A.** and marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and listed by NSF International. All cast-iron pipe and fittings shall be by the same manufacturer.

C. No foreign manufactured pipe or fittings will be allowed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

a. Charlotte Pipe and Foundry.
b. AB&I Foundry.
c. Tyler Pipe.

2.2 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS (Interior Below Slab Only)

A. Pipe and Fittings: ASTM A 74, Service class.

B. Gaskets: ASTM C 564, rubber.

2.4 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS (Interior above Slab Only)

A. Pipe and Fittings: ASTM A 888 or CISPI 301.

B. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.

1. Mid/Heavy Duty, Shielded, 304 Stainless-Steel Couplings: With 304 corrugated stainless-steel shield, minimum of 4-304 stainless-steel bands with slotted tightening devices, and ASTM C 564, rubber sleeve.

a. Manufacturers:

1) ANACO.
2) Ideal Div.; Stant Corp.
3) Mission Rubber Co.
4) Tyler Pipe; Soil Pipe Div.

C. Note: Standard Shielded 2-band couplings **will not** be allowed for Storm Sewer or Overflow Storm piping.

2.5 EXECUTION

2.5 EXCAVATION

A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

2.6 PIPING APPLICATIONS

A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.

Dissimilar Pipe-Material Couplings: Flexible, non-pressure pipe couplings for joining dissimilar pipe materials with small difference in OD.

B. Underground storm drainage piping NPS 3 and larger shall be the following:

1. Service class, hub and spigot cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Solid wall Schedule 40 PVC pipe and fittings, primered and solvent-welded.
3. No-hub cast-iron **will not** be allowed for below slab installation.

C. Aboveground, storm and overflow piping NPS 10 and smaller shall be the following:

1. Solid wall schedule 40 PVC pipe and fittings, primered and solvent-welded.
2. Service class, no-hub cast-iron soil pipe and fittings with mid-duty shielded, stainless steel couplings.

D. Aboveground storm drainage force mains NPS 1-1/2 through NPS 6 shall be any of the following:

1. Hard copper tube, Type L (Type B); copper pressure fittings; and soldered joints.
2. Steel pipe, pressure fittings, and threaded joints.
3. Grooved-end steel pipe, grooved-joint system fittings and couplings, and grooved joints.

2.7 PIPING INSTALLATION

A. Storm sewer and drainage piping outside the building are specified in Division 33 Section "Storm Utility Drainage Piping."

B. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."

C. Install seismic restraints on piping. Seismic-restraint devices are specified in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment."

D. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers. Cleanouts are specified in Division 22 Section "Storm Drainage Piping Specialties."

E. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping.

F. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Division 22 Section "Common Work Results for Plumbing."

G. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

H. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

I. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

J. Install storm drainage piping at the following minimum slopes, unless otherwise indicated:

1. Building Storm and Overflow Drain: 1 percent downward in direction of flow for piping NPS 3 and larger.

K. Install force mains at elevations indicated.

L. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.

M. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

2.8 JOINT CONSTRUCTION

A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."

B. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

C. Hubless Cast-Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.

D. Grooved Joints: Cut groove ends of pipe and assemble grooved ends of pipes, grooved-end fittings, and grooved-end-piping couplings according to AWWA C606.

E. Solvent Joints: PVC DWV shall be made with purple primer and medium body, medium set solvent per ASTM F 656.

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.
3. Remove all burrs and bevel ends prior to joining.

2.9 VALVE INSTALLATION

A. General valve installation requirements are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."

B. Shutoff Valves: Install shutoff valve on each sump pump discharge.

1. Install full-port ball valve for piping NPS 2 and smaller.
2. Install butterfly valve for piping NPS 2-1/2 and larger.

C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sump pump discharge.

2.10 HANGER AND SUPPORT INSTALLATION

A. Seismic-restraint devices are specified in Division 22 Section "Seismic Protection."

B. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:

1. Vertical Piping: MSS Type 8 or Type 42 clamps.
2. Individual, Straight, Horizontal Piping Runs: According to the following:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
b. Longer than 100 Feet: MSS Type 43, adjustable roller hangers.
c. Longer than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

D. Support vertical piping and tubing at base and at each floor.

E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

F. Install hangers for cast-iron soil and force main piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.

4. NPS 6: 60 inches with 3/4-inch rod.
5. NPS 8 to NPS 12: 60 inches with 7/8-inch rod.

G. Install supports for vertical cast-iron soil piping every 15 feet.

H. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2: 48 inches with 3/8-inch rod.
2. NPS 3: 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
4. NPS 6 to NPS 8: 48 inches with 3/4-inch rod.
5. NPS 10 to NPS 12: 48 inches with 7/8-inch rod.

I. Install supports for vertical PVC piping every 48 inches.

J. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

2.11 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.

C. Connect storm drainage piping to roof drains and storm drainage specialties.

D. Connect force-main piping to the following:

1. Storm Sewer: As indicated on plans.
2. Sump Pumps: To sump pump discharge.

2.12 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
3. Test Procedure: Test storm drainage piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
4. Hydrostatically test PVC-DWV system. **Do Not** use gas or compressed air. Plug or cap all openings of area to be tested, slowly fill system with water to allow trapped air to escape, to a point of overflow but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect all joints for leaks. Repair leaks and retest. Continue until system test passes.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

2.13 CLEANING

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed PVC Piping: Protect storm and soil piping, exposed to sunlight, with two coats of water-based latex paint.

END OF SECTION 22 1413