SECTION 22 14 00
FACILITY STORM DRAINAGE

SPEC WRITER NOTES:
1. Use this section only for NCA projects.
2. Delete between //----// if not applicable to project. Also delete any other item or paragraph not applicable in the section and renumber the paragraphs.

PART 1 - GENERAL

1.1 DESCRIPTION
A. Roof drainage systems, including piping and all necessary accessories as designated in this section.

1.2 RELATED WORK
A. Penetrations in rated enclosures: Section 07 84 00, FIRESTOPPING.
B. Preparation and finish painting and identification of piping systems: Section 09 91 00, PAINTING.
C. Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING.
D. Pipe Insulation: Section 23 07 11, HVAC, PLUMBING, AND BOILER PLANT INSULATION.

1.3 SUBMITTALS
A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Manufacturer's Literature and Data:
   1. Piping.
   2. Roof Drains.
   3. Cleanouts.
   4. All items listed in Part 2 - Products.
C. Detailed shop drawing of clamping device and extensions when required in connection with the waterproofing membrane.

1.4 APPLICABLE PUBLICATIONS
A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society of Mechanical Engineers (ASME): (Copyrighted Society)
   A13.1-07 ............... Standard Markers for Pipe Identification
   B16.12-98 ............... Cast Iron Threaded Drainage Fittings ANSI/ASME
   B16.18-01 ............... Cast Copper Alloy Solder-Joint Pressure Fittings ANSI/ASME

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B16.22-01 ............ Wrought Copper and Copper Alloy Solder Joint Pressure Fittings ANSI/ASME

C. American Society for Testing and Materials (ASTM):
   A53-08 ............... Pipe, Steel, Black And Hot-Dipped, Zinc-coated Welded and Seamless
   A74-09 ............... Cast Iron Soil Pipe and Fittings
   A183-03 ............... Carbon Steel Track Bolts and Nuts
   A536-08 ............... Ductile Iron Castings
   A888-09 ............... Hubless Cast Iron Soil Pipe and Fittings
   B32-08 ............... Solder Metal
   B75-02 ............... Seamless Copper Tube
   B306-02 ............... Copper Drainage Tube (DWV)
   C564-04e1 ............... Rubber Gaskets for Cast Iron Soil Pipe and Fittings
   D4101-09 ............... Propylene Plastic Injection and Extrusion Materials
   D2447-03 ............... Polyethylene (PE) Plastic Pipe, Schedule 40 and 80, Based on Outside Diameter
   D2564-04e1 ............... Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
   D2665-08b ............... Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings

D. American Welding Society (AWS):
   A5.8 .................. Filler Metals for Brazing

E. International Code Council (ICC), International Plumbing Code

F. Cast Iron Soil Pipe Institute (CISPI):
   301-05 ................ Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications
   310-04 ................ Couplings for use in connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications

G. Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS):

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SP-72 .................. Ball Valves With Flanged or Butt Welding For General Purpose

H. Factory Mutual (FM):

SPEC WRITER NOTES: Make material requirements agree with applicable requirements specified in the referenced Applicable Publications. Update and specify only that which applies to the project.

PART 2 - PRODUCTS

2.1 STORM WATER DRAIN AND VENT PIPING

A. Cast Iron Soil Pipe and Fittings: Used for pipe buried in or in contact with earth and for extension of pipe to a distance of approximately 1500 mm (5 feet) outside of building walls and interior waste and vent piping above grade. Pipe shall be bell and spigot, modified hub, or plain end (no-hub) as required by selected jointing method:


2. Joints: Provide any one of the following types to suit pipe furnished.
   a. ASTM B29 Lead and oakum and caulked by hand.
   b. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.
      1) Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.
      2) Heavy-Duty, Shielded, Stainless-Steel Couplings: With stainless-steel shield, stainless-steel bands and tightening devices, and ASTM C 564, rubber sleeve.
   c. Adapters: Where service weight pipe is connected to extra heavy pipe and extra heavy fittings of chair carriers, provide adapters or similar system to make tight, leakproof joints.

SPEC WRITER NOTES: Do not use PVC in areas designated with return air plenums for compliance with the International
D. Polyvinyl Chloride (PVC): Schedule 40. PVC shall not be used in noise sensitive areas of the building due to higher noise than other specified material.

1. Pipe: Solid Wall, ASTM D2665 drain, waste and vent manufactured from Type I normal impact.

2. Fittings:
      1) Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
      2) Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   b. Threaded Type: Molded threads only. Use tape or lubricant specifically intended for use with PVC plastic pipe.

2.2 PUMPED DRAIN PIPING:

   A. Pipe: Copper tube, ASTM B88, Type K or L, drawn. For pipe 100 mm (4 inches) and larger, galvanized steel ASTM A53, seamless, standard weight may be used.

   B. Fittings for Copper Tube:
      1. Wrought copper or bronze castings conforming to ANSI B16.18 and B16.22. Unions shall be bronze, Mss SP-72, SP-110. Solder or braze joints.

   C. Adapters: Provide adapters for joining screwed pipe to copper tubing.

   D. Solder: ASTM B32 Composition Sb5. Provide non-corrosive flux.

   E. Steel Pipe and Fittings: May be used for pumped storm water piping above grade.
      2. Fittings:
         a. Drain Piping: Cast iron, ANSI B16.12, threaded, galvanized.

   F. Unions: Tucker connection or equivalent type throughout.

2.3 CLEANOUTS

   A. Same size as the pipe, up to 100 mm (4 inches); not less than 100 mm (4 inches) for larger pipe. Cleanouts shall be easily accessible and shall
be gastight and watertight. Provide a minimum clearance of 610 mm (24 inches) for the rodding.

B. In Floors: Floor cleanouts shall have cast iron body and frame with square adjustable scoriated secured nickel bronze top. Unit shall be vertically adjustable for a minimum of 50 mm (2 inches). When a waterproof membrane is used in the floor system, provide clamping collars on the cleanouts. Cleanouts shall consist of "Y" fittings and 3 mm (1/8 inch) bends with brass or bronze screw plugs. Cleanouts in the resilient tile floors, quarry tile and ceramic tile floors shall be provided with square top covers recessed for tile insertion. In the carpeted areas, provide carpet cleanout markers. Provide two way cleanouts where indicated on drawings.

C. Provide cleanouts at or near the base of the vertical stacks with the cleanout plug located approximately 610 mm (24 inches) above the floor. Extend the cleanouts to the wall access cover. Furnish nickel-bronze square frame and stainless steel cover with minimum opening of 150 by 150 mm (6 by 6 inches) at each wall cleanout. Where the piping is concealed, a fixture trap or a fixture with integral trap, readily removable without disturbing concealed roughing work, shall be accepted as a cleanout equivalent providing the opening to be used as a cleanout opening is the size required by the ICC International Plumbing Code.

D. In horizontal runs above grade, cleanouts shall consist of cast brass tapered screw plug in fitting or caulked/no hub cast iron ferrule. Plain end (no-hub) piping in interstitial space or above ceiling may use plain end (no-hub) blind plug and clamp.

2.4 ROOF DRAINS AND CONNECTIONS

A. Roof Drains: Cast iron with clamping device for making watertight connection. Free openings through strainer shall be twice area of drain outlet. For roof drains not installed in connection with a waterproof membrane, provide a soft copper membrane 300 mm (12 inches) in diameter greater than outside diameter of drain collar. Provide an integral gravel stop for drains installed on roofs having built-up roofing covered with gravel or slag. Provide integral no-hub, soil pipe gasket or threaded outlet connection.

1. Flat Roofs: Beehive or dome shaped strainer with integral flange not less than 300 mm (12 inches) in diameter. For insulated roofs, provide a roof drain with an adjustable drainage collar, which can be raised or lowered to meet required insulation heights, sump
receiver and deck clamp. Bottom section shall serve as roof drain during construction before insulation is installed.

2. Canopy Roofs: Beehive or dome shaped strainer with the integral flange not larger than 200 mm (8 inches) in diameter. For insulated roof provide a roof drain with an adjustable drainage collar, which can be raised or lowered to meet the required insulation heights, sump receiver and deck clamp. Bottom section shall serve as roof drain during construction before insulation is installed.

3. Promenade Decks: Same as for canopy roofs, except decks shall have flat, round, loose, non-slip, bronze grate set in square, non-slip, bronze frame.

4. Portico Roofs and Gutters: Horizontal angle type drain with flat bottom and horizontal outlet at the same elevation as the pipe to which it is connected. Strainer shall be removable angle grate type.

5. Protective Roof Membrane Insulation Assembly: Perforated stainless steel extension filter, non-puncturing clamp ring, large sump with extra wide roof flange and deck clamp.
   a. Non-pedestrian Roofs: Large polypropylene or aluminum locking dome.
   b. Pedestrian Roof: Bronze promenade top 350 mm (14 inches) square, set in square secured frame support collar.

B. Expansion Joints: Heavy cast iron with cast brass or copper expansion sleeve having smooth bearing surface working freely against a packing ring held in place and under pressure of a bolted gland ring, forming a water and air tight flexible joint. Asbestos packing is prohibited.

C. Interior Downspouts: Provide an expansion joint, specified above, at top of run on straight, vertical runs of downspout piping 12 m (40 feet) long or more.

D. Downspout Nozzle: The nozzle fitting shall be of brass, //unfinished//, //with finish to compliment the architectural features of the building as directed by the architect// with internal pipe thread for connection to downspout.

2.5 WATERPROOFING

A. Provide at points where pipes pass through membrane waterproofed floors or walls in contact with earth.

B. Floors: Provide cast iron stack sleeve with flashing device and an underdeck clamp. After stack is passed through sleeve, provide a waterproofed caulked joint at top hub.
2.6 EXPOSED WASTE PIPING

A. Unfinished Rooms and Mechanical Rooms: Paint piping systems as specified in Section 09 91 00, PAINTING.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General: Comply with the ICC International Plumbing Code and the following:

1. Install branch piping from the piping system and connect to all fixtures, valves, cocks, outlets, casework, cabinets and equipment, including those furnished by the Government or specified in other sections.

2. Pipe shall be round and straight. Cutting shall be done with proper tools. Pipe, except for plastic and glass, shall be reamed to full size after cutting.

3. All pipe runs shall be laid out to avoid interference with other work.

4. Install union and shut-off valve on pressure piping at connections to equipment.

5. All gravity waste drain lines inside the building with vertical drops over 6 m (20 feet) shall be provided with joint restraint on the vertical drop and horizontal offset or branch below the vertical drop. Joint restraint shall be accomplished by threaded, soldered, lead and oakum or a combination of pipe clamps and tie-rods as detailed in NFPA 24. Vertical joint restraint shall be provided from the fitting at the bottom of the vertical drop through every joint up to the riser clamp at the floor penetration of the floor above. Horizontal joint restraint shall be provided from the same fitting at the bottom of the vertical drop through every joint on the horizontal offset or branch for a minimum of 1525 mm (60 feet) or to anchoring point from the building structure. Joint restraint below ground shall be accomplished by thrust blocks detailed in NFPA 24.

6. Pipe Hangers, Supports and Accessories:
   a. All piping shall be supported with minimum spacing as required by the ICC International Plumbing Code Section 308.
   b. Shop Painting and Plating: Hangers, supports, rods, inserts and accessories used for Pipe supports shall be shop coated with red
lead or zinc Chromate primer paint. Electroplated copper hanger rods, hangers and accessories may be used with copper tubing.

c. Floor, Wall and Ceiling Plates, Supports, Hangers:
1) Solid or split unplated cast iron.
2) All plates shall be provided with set screws.
3) Pipe Hangers: Height adjustable clevis type.
4) Adjustable Floor Rests and Base Flanges: Steel.
5) Concrete Inserts: "Universal" or continuous slotted type.
6) Hanger Rods: Mild, low carbon steel, fully threaded or Threaded at each end with two removable nuts at each end for positioning rod and hanger and locking each in place.
7) Riser Clamps: Malleable iron or steel.
8) Rollers: Cast iron.
9) Self-drilling type expansion shields shall be "Phillips" type, with case hardened steel expander plugs.
10) Hangers and supports utilized with insulated pipe and tubing shall have 180 degree (min.) metal protection shield Centered on and welded to the hanger and support. The shield shall be 4 inches in length and be 16 gauge steel. The shield shall be sized for the insulation.
11) Miscellaneous Materials: As specified, required, directed or as noted on the drawings for proper installation of hangers, supports and accessories. If the vertical distance exceeds 6 m (20 feet) for cast iron pipe additional support shall be provided in the center of that span. Provide all necessary auxiliary steel to provide that support.

7. Install cast escutcheon with set screw at each wall, floor and ceiling penetration in exposed finished locations and within cabinets and millwork.

8. Penetrations:
a. Fire Stopping: Where pipes pass through fire partitions, fire walls, smoke partitions, or floors, install a fire stop that provides an effective barrier against the spread of fire, smoke and gases as specified in Section 07 84 00, FIRESTOPPING. Completely fill and seal clearances between raceways and openings with the fire stopping materials.
b. Waterproofing: At floor penetrations, completely seal clearances around the pipe and make watertight with sealant as specified in Section 07 92 00, JOINT SEALANTS.

B. Horizontal Pipe slopes shall be based upon the minimum slopes allowed by the ICC International Plumbing Code for specific roof areas.

3.2 TESTS

A. General: Test system either in its entirety or in sections.

B. Storm Water Drain: Conduct before trenches are backfilled or fixtures are connected. Conduct water test or air test, as directed.

1. Water Test: If entire system is tested, tightly close all openings in pipes except highest opening, and fill system with water to point of overflow. If system is tested in sections, tightly plug each opening except highest opening of section under test, fill each section with water and test with at least a 3 m (10 foot) head of water. In testing successive sections, test at least upper 3 m (10 feet) of next preceding section so that each joint or pipe except upper most 3 m (10 foot) of system has been submitted to a test of at least a 3 m (10 foot) head of water. Keep water in system, or in portion under test, for at least 15 minutes before inspection starts. System shall then be tight at all joints.

2. Air Test: Maintain air pressure of 35 kPa (5 psi) gage for at least 15 minutes without leakage. Use force pump and mercury column gage.

3. Final Tests: Either one of the following tests may be used.

a. Smoke Test: After fixtures are permanently connected and traps are filled with water, fill entire drainage and vent systems with smoke under pressure of 1.3 kPa (one inch of water) with a smoke machine. Chemical smoke is prohibited.

b. Peppermint Test: Introduce (two ounces) of peppermint into each line or stack.

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