SECTION 15420 - DRAINAGE AND VENT SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

A. This Section specifies building sanitary drainage, storm drainage and vent piping systems, including drains and drainage specialties.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Refer to Division 15 sections for trenching and backfilling materials and methods for underground piping installations; not work of this section.

2. Refer to Division 15 Section for storm water drainage piping beginning from 5feet-0inches outside the building; sanitary drainage piping beginning from 5feet-0inches outside the building; foundation drain piping; not work of this section.

3. Refer to other Division 15 sections for piping materials and methods, sealing pipe penetrations through basement and foundation walls, and fire and smoke barriers; mechanical identification.

1.2 DEFINITIONS:

A. Building Drain: That part of the lowest piping of a drainage system which receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building sewer to a point 5feet-0inches outside the building wall.

B. Building Sewer: That part of the horizontal piping of a drainage system which extends from the end of the building drain and conveys its discharge to a public sewer, private sewer, individual sewage disposal system, or other point of disposal.

C. Drainage System: Includes all the piping within a public or private premises which conveys sewage, rain water or other liquid wastes to a point of disposal. It does not include the mains of public sewer systems or a private or public sewage treatment or disposal plant.

D. Vent System: A pipe or pipes installed to provide a flow of air to or from a drainage system, or to provide a circulation of air within such system to protect trap seals from siphonage and back pressure.

E. See legend on drawings for additional information.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's technical product data for all plumbing items including model clearly indicated; operating weights; furnished specialties and accessories; and installation instructions.

B. Shop Drawings: Submit manufacturer's assembly type shop drawings indicating dimensions, required clearances, and methods of assembly of components.

C. Record Drawings: At project closeout, submit record drawings of installed systems products; in accordance with requirements of Division 15.

D. Maintenance Data: Submit maintenance data and parts lists for each type of drain, and accessory; including "trouble-shooting" maintenance guide. Include this data, product data and shop drawings in maintenance manual; in accordance with requirements of Division 15.

1.4 QUALITY ASSURANCE:

A. Regulatory Requirements: Comply with the provisions of the following:

1. Plumbing Code Compliance: Comply with applicable portions of Local Plumbing Code.

2. ANSI Compliance: Comply with applicable ANSI standards pertaining to materials, products, and installation of soil and waste systems.

3. ASSE Compliance: Comply with applicable ASSE standards pertaining to materials, products, and installation of soil and waste systems.

4. PDI Compliance: Comply with applicable PDI standards pertaining to products and installation of soil and waste systems.

5. PVC, PP and ABS Pipe: Only Contractor's personnel which have received training in the installation of this material and meet the manufacturer's qualifications shall do the assembly of such material.

1.5 SEQUENCING AND SCHEDULING:

A. Coordinate the installation of roof drains, flashing, and roof penetrations.

B. Coordinate flashing materials installation of roofing, waterproofing, and adjoining substrate work.

C. Coordinate the installation of drains in poured-in-place concrete slabs, to include proper drain elevations, installation of flashing, and slope of slab to drains.

D. Coordinate with installation of sanitary and storm sewer systems as necessary to interface building drains with drainage piping systems.

E. Coordinate all penetrations with Structural Engineer.

F. Coordinate all installations with other trades.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturer: Subject to compliance with requirements, provide drainage and vent systems from one of the following:

1. Drainage Piping Specialties, including backwater valves, expansion joints, drains, cleanouts, trap primers, flashing flange and vent flashing sleeve:

a. Josam Mfg. Co.
b. Smith (Jay R) Mfg. Co.
c. Tyler Pipe; Subs. of Tyler Corp.
d. Zurn Industries Inc; Hydromechanics Div.
e. Wade

f. Woodford
g. Precision Plumbing Products

2. Non-Metallic Trench Drains:

a. ACO Drain Inc.
b. Quazite Corp.

3. Precast Concrete Basins and Manholes:

a. Arco
b. Copeland
c. Amcor

2.2 SANITARY AND STORM DRAINAGE, VENT AND SUBSURFACE DRAINAGE PIPE AND FITTINGS:

A. General: Provide piping and pipe fittings complying with Division 15, Section 15055.

2.3 BASIC SUPPORTS AND ANCHORS:

A. General: Provide supports and anchors complying with Division 15, Section 15140.

2.4 DRAINAGE PIPING SPECIALTIES:

A. Backwater Valves: Valve assembly shall be bronze fitted cast-iron, with bolted cover. Flapper shall provide a maximum 1/4inch clearance between flapper and seat for air circulation. Valve ends shall suit piping.

Jay R. Smith Fig. 7012

B. Trap Primers (For equipment room floor drains and as otherwise noted): Bronze body valve with automatic vacuum breaker, with 1/2inch connections matching piping system. Complying with ASSE 1018.

1. Valves shall be easily adjusted to high or low pressure and shall be automatically activated whenever any faucet is opened in the building, causing a pressure drop.

2. Connections: Inlet 1/2inch male NPT; outlet 1/2inch female NPT.

3. Valves shall be "Prime-Rite" Trap Primer Valve as manufactured by Precision Plumbing Products, Inc., or approved equal.

4. When more than one (1) trap is to be primed, provide one or more distribution units as required by the manufacturer.

C. Expansion Joints: Cast-iron body with adjustable bronze sleeve, bronze bolts with wing nuts.

D. Flashing Flanges: Cast-iron watertight stack or wall sleeve with membrane flashing ring. Provide underdeck clamp and sleeve length as required.

E. Vent Flashing Sleeves: Cast-iron caulking type roof coupling for cast-iron stacks, cast-iron threaded type roof coupling for steel stacks, and cast-bronze stack flashing sleeve for copper tubing.

2.5 CLEANOUTS:

A. Cleanout Plugs: Cast brass, threads complying with ANSI B2.1, and local plumbing code.

B. Floor Cleanout: Round, cast iron body with recessed bronze closure plug; scoriated polished bronze frame and cover plate.

C. Wall Cleanout: Cleanout tee with raised head brass plug tapped for 1/4-20 thread; flat style chrome plated wall cover plate with holes for 1/4inch bolt; 1/4-20 threaded bolt with chrome plated flat head.

D. Surface Cleanout: Cast iron body ferrule with raised head brass plug. Medium duty cast iron manhole cover and ring 12inch diameter to be set in concrete pad, Neenah No. R-1791-A.

E. Line Cleanout: Cast iron tapped cleanout ferrule with raised head brass plug.

2.6 FLOOR DRAINS:

A. Floor drain type designations and sizes are indicated on Drawings.

1. FD- 1 Toilet Rooms and Finished Areas

Round cast iron body with flashing collar and cast iron ring, 6 inch round nickel bronze adjustable strainer head with secured square hole grate, bottom waste outlet.

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2. FD- 2 Boiler and Mechanical Rooms

Round cast iron, light duty, shallow body drain with flashing collar and cast iron ring, 8inches round tractor type non-tilt slotted grate and sediment bucket, bottom waste outlet.

Jay R. Smith Fig. 2220

3. FD- 3 Sterilizer Drain with Waste Funnel

Round cast iron body with flashing collar and cast iron ring, 6 inch round nickel bronze adjustable strainer head with secured square hole grate, 6inch x 2-1/2inch oval nickel bronze waste funnel attached to top grate, bottom waste outlet.

Jay R. Smith Fig. 2005-A-F11

4. FD- 4 Ice Maker or Drip Pan Drain

Round cast iron body with flashing collar and cast iron ring, 7inch round nickel bronze adjustable strainer head with loose set recessed square hole grate, bottom waste outlet. Top outside edge of drain to be set flush with finished floor.

Jay R. Smith Fig. 2005-A-F37

2.7 FLOOR SINKS:

A. Floor drain type designations and sizes are indicated on drawings.

1. FS- 1 Indirect Waste – Kitchen Eqipment

Square, cast iron, porcelain enameled interior, sump body drain 6inch deep x 8inch square with flashing collar and cast iron ring, 8inch square nickel bronze removable half top grate, dome button strainer, bottom waste outlet.

Jay R. Smith 3100-12

2. FS- 2 Dish Machine - Kitchen

Square cast iron, porcelain enameled interior, sump body drain, 16inch square x 12inch deep with 16inch square nickel bronze removable half top grate, bottom waste outlet.

Jay R. Smith 3200-12

2.8 AREA DRAINS:

A. AD- 1 Stairwells, Walkways and Areaways

Round cast iron shallow body drain with square cast iron apron, 7-1/2inches diameter hinged cast iron grate, sediment bucket, bottom drain outlet.

Jay R. Smith Fig. 2280

B. AD- 2 Heavy Duty Drives and Parking Lots

Rectangular, heavy duty cast iron drain designed for truck or automobile traffic, 20-1/2inches x 12-1/2inches x 12inches deep with heavy duty cast iron loose set grate, dome bottom strainer, bottom drain outlet.

Jay R. Smith Fig. 2570

C. AD- 3 medium Capacity Drives and Parking Lots

Square, precast reinforced concrete basin with solid bottom, heavy duty cast iron removable grate, 32" x 32" x 28" deep outside; 24" x 24" x 20" deep inside dimensions; see mechanical plans for outlet pipe size and elevation of outlet and top of grate.

D. AD- 4 Large Capacity Drives and Parking Lots

Rectangular, precast reinforced concrete basin with solid bottom, extra heavy duty cast iron removable grate, top of grate to be flush with top of basin, 56" x 36" x 43" high outside,; 40" x 20" x 35" deep inside dimensions; see mechanical plans for outlet pipe size and elevation of outlet and top of grate.

2.9 CATCH BASIN:

A. Heavy Duty Basin with Grate:

Round, precast, one piece, reinforced concrete basin with solid bottom, [ ]" inside diameter with 24" heavy duty cast iron grate; top of grate to be flush with top of basin; bottom of basin

to be 12inches below invert of outlet pipe; provide hole in basin wall for outlet pipe; see mechanical plans for outlet pipe size and elevation of outlet and top of grate.

B. Light or Medium Duty Basin with Grate:

Round, reinforced, one piece, precast concrete with solid bottom and top opening for grate; [ ]" inside diameter with medium duty [ ]" cast iron grate, top of grate to be flush with top of basin; bottom of basin to be 12inches below invert of outlet pipe; provide hole in basin wall for outlet pipe; see mechanical plans for outlet pipe size and elevation of outlet and top of grate.

2.10 SANITARY SEWER MANHOLES:

A. Manholes shall be constructed from pre-cast concrete sections as shown with heavy duty cast iron traffic cover and rim. See mechanical plans for invert elevations of inlet and outlet piping; see detail on mechanical plans.

B. The manhole base shall be constructed from heavy density concrete poured at least 48 hours prior to setting the precast sections.

C. Flow channels that provide smooth flow and maintain the sewer grade shall be formed in cement mortar on the base. The channels shall be troweled smooth.

D. The bottom manhole section shall be set in a full mortar base (21inches thick) while the base is still moist. All succeeding sections shall be joined in a similar manner, and all holes and imperfections shall be filled with cement mortar.

E. The manhole cover shall be installed with cast iron receiving frame and adjustable rings so that it is flush with pavement or grade. The cover shall be suitable for A.A.S.H.O. H-20 wheel loading.

F. See detail on mechanical plans.

2.11 TRENCH DRAINS:

A. Trench drain type designations and sizes are indicated on Drawings.

B. Cast-Iron Trench Drains: Cast-iron shallow hub body and grate with end plates and gaskets, assembled in standard lengths for total length and width as indicated, with the following features:

1. Sediment bucket;
2. Flashing device;
3. Heel-proof grate;
4. Vandal-proof grate;
5. Backwater valve;
6. Convex grate;
7. Dome bottom strainer;
8. Bottom outlet, inside calk.

C. Non-Metallic Trench Drains: Polyester resin and quartz aggregate, precast, interlocking design, with bottom radius and 0.6 percent slope.

1. Precast Material: Load pressure of 14,500 psi, bending pressure of 2,900 psi, frost-proof, salt-proof, inert under dilute acid and alkali conditions, and less than 1.0 percent water absorption rate.

2. Grates: Cast iron or steel as indicated, for heavy-duty truck traffic, with openings designed to prevent entry of bicycle or wheelchair tires.

2.12 ROOF DRAINS:

A. Roof drain type designations and sizes are indicated on Drawings.

1. RD- 1

Cast iron body with sump, removable cast iron vandal-proof dome strainer, cast iron flashing flange and cast iron ring with integral gravel stop, underdeck clamp.

Jay R. Smith Fig. 1010

2. RD- 2 Control Flow Roof Drain

Cast iron body with sump, removable cast iron/vandal-proof/polyethylene dome strainer, flashing flange and clamp with integral gravel stop, cast iron underdeck clamp and cast iron ring, flow control assembly with [ ] weir openings, each weir to have a flow of [ ] gpm.

Jay R. Smith Fig. 1083

3. PD- 1 Parapet Drain

Cast iron body, vandal-proof cast iron sloping grate, cast iron flashing clamp and cast iron ring, horizontal/45 degree outlet connection.

Jay R. Smith Fig. 152OT/154OT

4. OFD-1 Overflow Drain

Cast iron body with sump, removable cast iron vandal-proof dome strainer, cast iron flashing flange and cast iron clamp with integral gravel stop, cast iron underdeck clamp, standpipe with inlet flow line two (2) inches above the low point of the roof under dome strainer.

Jay R. Smith Fig. 1070

PART 3 - EXECUTION

3.1 EXAMINATION:

A. General: Install piping in accordance with governing authorities having jurisdiction, except where more stringent requirements are indicated.

B. Inspect piping before installation to detect apparent defects. Mark defective materials with white paint and promptly remove from site.

C. Verify all dimensions by field measurements. Verify that all drainage and vent piping and specialties may be installed in accordance with pertinent codes and regulations, the original design, and the referenced standards.

D. Verify all existing grades, inverts, utilities, obstacles, and topographical conditions prior to installations.

E. Examine rough-in requirements for plumbing fixtures and other equipment having drain connections to verify actual locations of piping connections prior to installation.

F. Examine walls, floors, roof, and plumbing chases for suitable conditions where piping and specialties are to be installed.

G. Do not proceed until unsatisfactory conditions have been corrected.

3.2 FOUNDATION PREPARATION FOR UNDERGROUND BUILDING DRAINS:

A. Refer to Division 15, Section 15010 for trenching and backfill requirements.

3.3 INSTALLATION:

A. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of the piping systems. Location and arrangement of piping layout take into account many design considerations. So far as practical, install piping as indicated.

B. Install overflow roof drains with the inlet flow line located a maximum 2 inches above the lowest point of roof.

C. All floor drains are to be provided with P-trap the same size as the floor drain unless otherwise noted on mechanical drawings.

D. Provide flashing membrane for all floor drains in structure above slab on grade level; see flashing detail on mechanical drawings.

E. Lubricate cleanout plugs with mixture of graphite and linseed oil. Prior to building turnover remove cleanout plugs, relubricate and reinstall using only enough force to ensure permanent leakproof joint.

F. Provide flashing for all floor drains, floor cleanouts in wet areas and shower drains above grade. Make watertight with Chloraloy 240 underslab moisture vapor barrier as manufactured by the Nobel Co. of Grand Haven, Michigan. Flashing shall extend at least 24 inches from drain rim into floor membrane or on structural floor. Fasten flashing to drain clamp device and make watertight, durable joint. Provide flashing collar extension with all drains and cleanouts installed above grade.

3.4 HANGERS AND SUPPORTS:

A. General: Refer to Section 15140 for supports and anchors.

3.5 INSTALLATION OF PIPING SPECIALTIES:

A. Install backwater valves in sanitary building drain piping as indicated, and as required by the plumbing code. For interior installation, provide minimum 13inches dia. cleanout cover flush to floor centered over backwater valve cover and of adequate size to remove valve cover for service.

B. Install expansion joints on vertical risers as indicated, and as required by the installation and plumbing code. See plans for detail.

C. Above Ground Cleanouts: Install in above ground piping and building drain piping as indicated, and extend cleanouts to floor or wall above. Line cleanouts not acceptable.

1. As required by plumbing code;
2. At each change in direction of piping greater than 45 degrees below slab;
3. At minimum intervals of 50 feet;
4. At base of each vertical soil or waste stack;
5. At sinks and urinals on grade;
6. At egress of building (surface cleanout).
7. At each water closet or toilet group.

D. Cleanouts Covers: Install floor and wall cleanout covers, types as indicated, and in accessible locations.

E. Flashing Flanges: Install flashing flange and clamping device with each stack and cleanout passing through waterproof membranes.

F. Vent Flashing Sleeves: Install on stacks passing through roof, secure over stack flashing in accordance with manufacturer's instructions.

3.6 PIPE AND TUBE JOINT CONSTRUCTION:

A. Install pipes and pipe joints in accordance with section 15055.

3.7 INSTALLATION OF FLOOR DRAINS:

A. Install floor drains in accordance with manufacturer's written instructions and in locations indicated.

B. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.

C. Trap all drains connected to the sanitary sewer with minimum trap size that of drain connected.

D. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.

E. Position drains so that they are accessible and easy to maintain.

3.8 INSTALLATION OF TRAP PRIMERS:

A. Install trap primers with piping pitched towards drain trap, minimum of 1/8 inch per foot (1 percent). Adjust trap primer for proper flow.

3.9 INSTALLATION OF ROOF DRAINS:

A. Install roof drains at low points of roof areas, in accordance with the roof membrane manufacturer's installation instructions.

B. Install drain flashing collar or flange so that no leakage occurs between roof drain and adjoining roofing. Maintain integrity of waterproof membranes, where penetrated.

C. Position roof drains so that they are accessible and easy to maintain.

3.10 SERVICE CONNECTIONS:

A. Provide new sanitary/storm sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

B. Provide all necessary piping and connections from building drain/storm drain system to connection with city sewer systems in location shown on mechanical site plan.

3.11 CONNECTIONS:

A. Piping Runouts to Fixtures: Provide drainage and vent piping runouts to plumbing fixtures and drains, with approved trap, of sizes indicated; but in no case smaller than required by the plumbing code.

B. Locate piping runouts as close as possible to bottom of floor slab supporting fixtures or drains.

3.12 FIELD QUALITY CONTROL:

A. Inspections:

1. Do not enclose, cover, or put into operation drainage and vent piping system until it has been inspected and approved by the authority having jurisdiction.

2. During the progress of the installation, notify the plumbing official having jurisdiction, at least 48 hours prior to the time such inspection must be made. Perform tests specified in Section 15055 in the presence of the plumbing official.

a. Rough-in Inspection: Arrange for inspection of the piping system before concealed or closed-in after system is roughed-in, and prior to setting fixtures.

b. Final Inspection: Arrange for a final inspection to observe the tests specified and to insure compliance with the requirements of the plumbing code.

3. Reinspections: Whenever the piping system fails to pass the test or inspection, make the required corrections, and arrange for reinspection.

4. Reports: Prepare inspection reports, signed by the plumbing official.

B. Piping System Test: Test drainage and vent system in accordance with the procedures of the authority having jurisdiction, or in the absence of a published procedure, as follows, and as described in Section 15055.

3.13 ADJUSTING AND CLEANING:

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

B. Clean drain strainers, domes, and traps. Remove dirt and debris.

3.14 PROTECTION:

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

B. Place plugs in ends of uncompleted piping at end of day or whenever work stops. Piping shall not be left open ended during construction.

C. Exposed ABS or PVC Piping: Protect plumbing vents exposed to sunlight with 2 coats of water based latex paint. Color selection shall be by Architect.

END OF SECTION 15420