

PART 1 - GENERAL REQUIREMENTS

1.01 SUMMARY

- A. This Section includes building storm drainage piping systems, including drains and drainage specialties.
- B. Related Sections: The following sections contain requirements that relate to this Section:
 - 1. Division 22 Section "General Plumbing Requirements," for trenching and backfilling materials and methods for underground piping installations.
 - 2. Division 33 Section "Storm Systems," for storm drainage piping beginning from 5'-0" outside the building.
 - 3. Division 33 Section "Foundation Drainage," for foundation drainage piping.
 - 4. Division 7 Section "Joint Sealers," for materials and methods for sealing pipe penetrations through basement and foundation walls, and fire and smoke barriers.
 - 5. Division 22 Section "Identification for Plumbing Piping and Equipment," for labeling and identification of drainage piping.
 - 6. Division 22 Section "Common Work Results for Plumbing," for materials and methods for fire barrier penetrations, wall and floor penetrations and equipment pads
 - 7. Division 22 Section "Basic Piping Material and Methods," for materials and methods for mechanical sleeve seals.
 - 8. Division 22 Section "Hangers and Supports for Plumbing Piping," for materials and methods for hanging and supporting drainage piping.
 - 9. Division 22 Section "Plumbing Insulation," for materials and methods for insulating drainage piping.

1.02 DEFINITIONS

- A. Storm Building Drain: That part of the lowest piping of a drainage system which receives the discharge from storm drainage pipes inside the walls of the building and conveys it to the building sewer.
- B. Storm Building Sewer: That part of the drainage system which extends from the end of the building drain and conveys its discharge to a public sewer or private sewer or other point of disposal.
- C. Drainage System: Includes all the piping within a public or private premises which conveys storm 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.

1.03 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specifications Sections.
- B. Product data for the following products:
 - 1. Drainage piping
 - 2. Drainage piping specialties
 - 3. Area drains
 - 4. Roof drains
 - 5. Hubless fitting restraints
 - 6. Interceptors
- C. Test reports specified in Part 3 of this Section.

1.04 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the provisions of the following codes:
 - 1. 2018 Arkansas Building Code

PART 2 - PRODUCTS AND MATERIALS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Drainage Piping Specialties, including backwater valves, cleanouts, area/roof drains, and downspout nozzles:
 - a) Josam Mfg. Co.
 - b) Sioux Chief Manufacturing Co. Inc.
 - c) Smith (Jay R) Mfg. Co.
 - d) Tyler Pipe/Wade Div.; Subs. of Tyler Corp.
 - e) Watts Industries, Inc.
 - f) Zurn Industries, Inc.; Hydromechanics Div.
 - 2. Heavy Duty Hubless Couplings
 - a) Anaco Husky HD-2000
 - b) Clamp-All 80in. lb.
 - c) Ideal Tridon "HD"
 - d) Mission Rubber Company "Heavyweight"
 - e) ProFlo "HD"
 - 3. Downspout Boots
 - a) Construction Castings Company
 - b) Flockart

- c) Higgins Foundry
 - d) Neenah Foundry Company
- 4. Cast Iron Soil Pipe and Fittings
 - a) AB & I Foundry
 - b) Charlotte Pipe and Foundry Company
 - c) Tyler Pipe / Soil Pipe Division
- 5. Shielded Transition Couplings
 - a) FERNCO, "Proflex 3000 Series"
 - b) Mission Rubber Company, "Band Seal Specialty Couplings"
- 6. Underground Shielded Adapter Couplings
 - a) FERNCO, "1056 Series with SR73 Shear Ring"
 - b) Mission Rubber Company, "MR56 Series"
- 7. Hubless Fitting Restraints
 - a) Holdrite
- 8. Plastic Gravity Sand/Oil Separators
 - a) Green Turtle, Inc.
 - b) Mifab Manufacturing, Inc.
 - c) Striem
 - d) Xerxes Corp.
- 9. Backwater Valves
 - a) Cleancheck
 - b) Mainline Backflow Products
 - c) Sioux Chief
 - d) Spears
- 10. Heavy Duty Hubless Couplings for Below Slab
 - a) Anaco Husky HD-4000
 - b) Clamp-All 125in. lb.

2.02 ABOVE GROUND DRAINAGE PIPE AND FITTINGS

- A. Cast-Iron Soil Pipe: CISPI 301 and ASTM A888, hubless pipe and fittings, and bearing the trademark of CISPI and NSF.
 - 1. Heavy duty couplings and compression gaskets: ASTM C564, ASTM C1540 and meeting FM 1680.
- B. PVC DWV Pipe and Fittings: Schedule 40 pipe meeting ASTM D1785 and ASTM D2665 with "solid wall" PVC meeting ASTM D1784 with cell class 12454-B.
 - 1. Fittings: DWV pattern meeting ASTM D2665 with solvent cement socket joints. Fittings 16" and larger shall be fabricated type.
 - 2. Solvent: ASTM D2564.

- C. Shielded Transition Couplings: ASTM C1460 with neoprene adapter gasket with stainless steel Shield and hose clamps.

2.03 UNDERGROUND BUILDING DRAIN PIPE AND FITTINGS

- A. PVC DWV Pipe and Fittings: Schedule 40 pipe meeting ASTM D1785 and ASTM D2665 with “solid wall” PVC meeting ASTM D1784 with cell class 12454-B.
 - 1. Fittings: DWV pattern meeting ASTM D2665 with solvent cement socket joints.
 - 2. Solvent: ASTM D2564.
- B. Underground Shielded Adapter Couplings: ASTM C1173 with neoprene adapter gasket with stainless steel shield and stainless steel hose clamps.

2.04 DRAINAGE PIPING SPECIALTIES

- A. Backwater Valves: Valve assembly shall be bronze fitted cast-iron, with bolted cover. Flapper shall provide a maximum 1/4 inch clearance between flapper and seat for air circulation. Valve ends shall suit piping material.
- B. Cleanout Plugs: As specified on the drawings.
- C. Floor Cleanouts: As specified on the drawings.
- D. Wall Cleanouts: As specified on the drawings.
- E. Area drains: As specified on the drawings.
- F. Roof Drains: As specified on the drawings.

2.05 HUBLESS FITTING RESTRAINTS

- A. Pre-engineered kits of galvanized steel pipe straps with stainless steel band clamps and tee bolts, meeting requirements of the CISPI Installation Handbook.

2.06 SAND/OIL INTERCEPTORS

- A. Interceptor type designations, flow rates, and capacities are indicated on the Drawings.
- B. Sand/Oil Interceptor: As scheduled on the drawings

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Install pipe and specialties in accordance with manufacturer’s installation instructions.

3.02 PREPARATION FOUNDATION FOR UNDERGROUND BUILDING DRAINS

A. Pipe Beds:

1. PVC Pipe: Support pipe in trench with sand bags level and true to prevent sand, gravel or debris from interfering with the solvent cement process. After pressure testing is complete, gradually install bedding to maintain continuous pipe slope and prevent pipe deflection and then install subbase. Refer to Section "General Plumbing Requirements" for bedding and subbase materials, excavation, trenching, backfill and compaction requirements and refer to ASTM D2321 "Underground Installation of Thermoplastic Pipe for Sewers and Gravity-flow Applications" for additional requirements.

3.03 PIPE APPLICATIONS - ABOVE GROUND, WITHIN BUILDING

- A. Install hubless, cast-iron soil pipe and fittings 15" and smaller for storm pipe.
- B. Install Type DWV copper tube with cast bronze Type DWV fittings 15" and smaller for storm pipe where indicated on the drawings.
- C. As a contractor's option with Owner approval, Install PVC Type DWV Plastic pipe and fittings for 12 inch and smaller storm pipe.

3.04 PIPE APPLICATIONS - BELOW GROUND, WITHIN BUILDING

- A. Install PVC Type DWV Plastic pipe and fittings for 24 inch and smaller storm pipe.

3.05 PIPE AND TUBE JOINT CONSTRUCTION

- A. Cast-Iron Soil Pipe: Make hubless joints in accordance with the Cast-Iron Soil Pipe & Fittings Handbook, Chapter IV. Install Couplings as followings:
 1. Install heavy duty hubless couplings on storm drainage piping, including connections to roof drains.
 2. Install Hubless fitting restraints on joints 5" and larger at:
 - a) Changes of direction from vertical to horizontal
 - b) 4" branch connections, including tees, wyes and wye combination fittings to storm drainage piping 5" and larger
 - c) Horizontal changes of direction 22-1/2 degrees and greater
- B. PVC DWV Pipe: Joining and installation of PVC drainage pipe and fittings shall conform to ASTM D2665.
- C. Cast Iron to PVC Above Grade: Join cast iron to PVC with shielded transition couplings.
- D. Cast Iron to PVC Below Grade: Join cast iron to PVC with underground shielded adapter couplings.

3.06 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 consideration pipe sizing, slope, expansion, and other design considerations. So far as practical, install piping as indicated.
- B. Use fittings for all changes in direction and all branch connections.
- C. Install piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated.
- D. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.
- E. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.
- F. Install horizontal piping as high as possible allowing for proper slope and coordination with other components. Install vertical piping tight to columns or walls. Provide space to permit insulation applications, with 1-inch clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.
- G. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and sealer. Refer to Division 22 Section "Basic Piping Materials and Methods" for special sealers and materials.
- H. Underground Exterior Wall Penetrations: Seal pipe penetrations through underground exterior walls using sleeves and mechanical sleeve sealers. Refer to Division 22 Section "Basic Piping Material and Methods" for additional information.
- I. Fire Barrier Penetrations: Where pipes pass through fire rated walls, partitions, ceilings and floors, maintain the fire rated integrity. Refer to Division 22 Section "Common Work Results for Plumbing" for special sealers and materials.
- J. Elevated Floor Penetrations of Waterproof Membrane, Interior Penetrations of Non-Fire Rated Walls and Concrete Slab on Grade Penetrations: Provide sleeves and seal pipes that pass through waterproof floors, non-fire rated walls, partitions and ceilings or concrete slab on grade. Refer to Division 22 Section "Common Work Results for Plumbing" for special sealers and materials.
- K. Foundation Penetrations: Where pipes pass through foundation walls above strip footings or under strip footings, protect pipes from building load with cast iron soil pipe sleeves two pipe sizes larger than the pipe. Sleeves installed under the strip footing shall be encased in concrete.

- L. Make changes in direction for drainage piping using appropriate 45 degree wyes, combination wye and eighth bend, or long sweep, quarter, sixth, eighth, or sixteenth bends. Sanitary tees or quarter bends may be used on vertical stacks of drainage lines where the change in direction of flow is from horizontal to vertical, except use long-turn pattern combination wye and eighth bends where two fixtures are installed back to back and have a common drain. No change in direction of flow greater than 90 degrees shall be made. Where different sizes of drainage pipes and fittings are connected, use proper sized standard increasers and reducers. Reduction of the size of drainage piping in the direction of flow is prohibited.
- M. Install underground building drains to conform with the plumbing code, and in accordance with the Cast Iron Soil Pipe Institute Engineering Manual. Lay underground building drains beginning at low point of systems, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install required gaskets in accordance with manufacturer's recommendations for use of lubricants, cements, and other special installation requirements. Maintain swab or drag in line and pull past each joint as it is completed.
- N. Install drainage piping pitched down at a minimum slope of 1/4 inch per foot (2 percent) for piping 3 inch and smaller, and 1/8 inch per foot (1 percent) for piping 4 inch and larger.
- O. Extend building drain to connect to service piping, of size and in location indicated for service entrance to building. Storm service piping is specified in a separate section of Division 2.
- P. Install 1 inch thick extruded polystyrene over underground building drain piping not under building. Width of insulation shall extend minimum of 12" beyond each side of pipe. Install directly over, and center on pipe center line.

3.07 HANGERS AND SUPPORTS

- A. General: Hanger, support, insulation protection shields, and anchor components and installation procedures conforming to MSS SP-58 and SP-69 are specified in Division 22 Section "Hangers and Supports for Plumbing Piping". Conform to the table below for maximum spacing of supports.
- B. Install the following pipe attachments:
 - 1. Adjustable clevis hangers, MSS SP-69 Type 1, for individual horizontal runs.
 - 2. Riser clamps, MSS SP-69 Type 8, for individual vertical runs.
 - 3. Insulation protection shields and high density insulation at each hanger for insulated pipe as specified in Division 22 Sections "Hangers and Supports for Plumbing Piping" and "Plumbing Insulation".
 - a) Install high density insulation on insulated pipe.

4. Provide vinyl coated hangers and riser clamps for use with PVC pipe.
5. Provide roll hangers for individual horizontal runs 100 feet or longer.

C. Install hangers with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58, locally enforced codes, this specification, and authorities having jurisdiction requirements, whichever are most stringent. Install hangers for horizontal piping with the following maximum spacing and minimum rod diameters:

Nom. Pipe Size	Steel Pipe Max. Span	Copper Tube Max. Span.	Min. Rod Dia. - Inches
<u>In Inches</u>	<u>In Feet</u>	<u>In Feet</u>	
Up to 1-1/4	12	6	3/8
1-1/2 to 2	12	10	3/8
2-1/2 to 3	12	10	3/8
4	12	10	3/8
5	12	10	1/2
6	12	10	1/2
8	12	10	1/2
10 to 12	12	10	5/8
14	12	N/A	3/4
16	12	N/A	7/8

1. Support all sizes of hubless horizontal cast iron piping every five feet, except up to ten feet where ten foot sections are installed. Support all sizes of hubless horizontal cast iron piping every other joint, unless over four feet, then support each joint. Provide support adjacent to joint, not to exceed 18". Provide sway brace on horizontal piping at not more than 40' intervals to prevent horizontal movement. Provide support at each horizontal branch.
2. Support all sizes of vertical cast iron piping every ten feet.
3. Support all sizes of vertical steel piping every other floor, not to exceed twenty-five feet.
4. Support all sizes of horizontal of PVC piping every four feet.
5. Support all sizes of vertical of PVC piping every floor, but not to exceed ten feet. For sizes 2 inches and smaller, provide guide midway between required vertical supports.
6. Support piping within 12" of each elbow or tee.

D. Sway bracing:

1. Provide rigid sway bracing for pipe 4" and larger at changes of direction greater than 45 degrees.

E. Bracing for above floor base of stacks 4" and larger and higher than three stories:

1. Secure horizontal base of stack to structure with riser clamp within at the fitting changing direction of flow from vertical to horizontal. Provide rods of size equal to cast iron pipe size scheduled above in pipe hanger schedule.

3.08 INSTALLATION OF PIPING SPECIALTIES

- A. Install backwater valves in storm building drain piping as indicated, and as required by the plumbing code. For interior installation, provide cleanout cover flush to floor centered over backwater valve cover and of adequate size to remove valve cover for service.
- B. Above Ground Cleanouts: Install in above ground piping and building drain piping as indicated, and:
 - 1. as required by plumbing code;
 - 2. at each change in direction of piping greater than 45 degrees;
 - 3. at minimum intervals of 50' for piping 4" and smaller and 100' for larger piping;
 - 4. at base of each vertical soil, waste, or storm water stack.
- C. Cleanout Covers: Install floor and wall cleanout covers for concealed piping, types as indicated.
- D. Floor Cleanouts: Install in below floor building drain piping as indicated and:.
 - 1. as required by plumbing code;
 - 2. at each change in direction of piping greater than 45 degrees;
 - 3. Install in below floor building drain piping at minimum intervals of 50' for piping 4" and smaller and 75' for larger piping;
 - 4. Install floor cleanouts in waterproof floors with waterproof membrane securely flashed with cleanout body flashing clamp so that no leakage occurs between cleanout body and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.
- E. Exterior Cleanouts: Install exterior cleanouts embedded in a 18" x 18" x 8" block of concrete, flush with finished grade.

3.09 INSTALLATION OF AREA DRAINS

- A. Install area drains in locations indicated.
- B. Install area drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.
- C. Refer to architectural documents for floor slope requirements and set area drain elevation to match.
- D. Install area drains in waterproof floors with waterproof membrane securely flashed with drain flashing clamp so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.
- E. Position drains so that they are level, accessible and easy to maintain.

3.010 INSTALLATION OF ROOF DRAINS

- A. Install roof drains at low points of roof areas with the roof membrane securely flashed with drain flashing clamp so that no leakage occurs between drain and roof membrane.
- 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.

3.011 FIELD QUALITY CONTROL

- A. Inspections
 - 1. Do not enclose, cover, or put into operation the storm drainage 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 24 hours prior to the time such inspection must be made. Perform tests specified below in the presence of the plumbing official.
 - a) Rough-in Inspection: Arrange for inspection of the storm drainage piping system before concealed or closed-in after system is roughed-in.
 - b) Final Inspection: Arrange for a final inspection by the plumbing official to observe the tests specified below and to ensure compliance with the requirements of the plumbing code.
 - c) Reinspections: Whenever the piping system fails to pass the test or inspection, make the required corrections, and arrange for reinspected by the plumbing official.
 - d) Reports: Prepare inspection reports, signed by the plumbing official.
- B. Piping System Test: Test storm drainage system in accordance with the procedures of the authority having jurisdiction, or in the absence of a published procedure, as follows:
 - 1. Test for leaks and defects all new storm drainage piping systems and parts of existing systems, which have been altered, extended or repaired. If testing is performed in segments, submit a separate report for each test, complete with a diagram of the portion of the system tested.
 - 2. Leave uncovered and unconcealed all new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose all such work for testing, that has been covered or concealed before it has been tested and approved.
 - 3. Rough Plumbing Test Procedure: Except for outside leaders and perforated or open jointed drain tile, test the piping of storm drainage piping systems

upon completion of the rough piping installation. Tightly close all openings in the piping system, and fill with water to the point of overflow, but not less than 10 feet head of water. Water level shall not drop during the period from 15 minutes before the inspection starts, through completion of the inspection. Inspect all joints for leaks.

4. Repair all leaks and defects using new materials and retest system or portion thereof until satisfactory results are obtained.
5. Reports: Prepare inspection reports and required corrective action signed by the plumbing official and turn over to the Architect upon completion of the project.

3.012 ADJUSTING AND CLEANING

- A. Clean interior of piping system. Remove dirt and debris as work progresses.
- B. Clean drain strainers and domes. Remove dirt and debris.

3.013 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.
- C. Exposed PVC Piping: Protect storm drainage piping exposed to sunlight with 2 coats of a water based latex paint.

END OF SECTION

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