

## SECTION 22 14 01

### STORM DRAINAGE

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Embedded track drainage; buried drainage pipe and fittings.
- B. Exposed and embedded drainage pipe and fittings.
- C. Drains.
- D. Cleanouts.
- E. Manhole covers and frames.
- F. Escutcheons.
- G. Valves.

##### 1.02 RELATED SECTIONS

- A. Site drainage system is specified in Section 33 40 00 - Storm Drainage Utilities. Coordinate the work of this Section with Section 33 40 00 - as required for a complete and finished installation.
- B. Sheet metal gutters and downspouts are specified in Section 07 60 00 - Flashing and Sheet Metal.

##### 1.03 MEASUREMENT AND PAYMENT

- A. Separate measurement or payment will not be made for the work required under this Section. All costs in connection with the Work specified herein will be considered to be included or incidental to the Work of this Contract.

##### 1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM A48 Specification for Gray Iron Castings
  - 2. ASTM A74 Cast Iron Soil Pipe and Fittings
  - 3. ASTM A112.21.2 Roof Drains
  - 4. ASTM C4 Clay Drain Tile
  - 5. ASTM C14 Concrete Sewer, Storm Drain, and Culvert Pipe  
(ASTM C14M-Concrete Sewer, Storm Drain, and  
Culvert Pipe [Metric])

STORM DRAINAGE

6. ASTM C425 Compression Joints for Vitrified Clay Pipe and Fittings
7. ASTM C443 Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets (ASTM C443M-Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets [Metric])
8. ASTM C564 Rubber Gaskets for Cast iron Soil Pipe and Fittings
9. ASTM C700 Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated
10. ASTM C1053 Borosilicate Glass Pipe and fittings for Drain, Waste, and Vent (DWV) Applications
11. ASTM D1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
12. ASTM D2235 Solvent Cement for Acrylonitrile – Butadiene – Styrene (ABS) Plastic Pipe and Fittings
13. ASTM D2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
14. ASTM D2609 Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe
15. ASTM D2661 Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings
16. ASTM D2662 Polybutylene (PB) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter
17. ASTM D2665 Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
18. ASTM D2666 Polybutylene (PB) Plastic Tubing
19. ASTM D2683 Socket-Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe
20. ASTM D2729 Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
21. ASTM D2751 Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
22. ASTM D3034 Type PSM Poly (Vinyl Chloride) Sewer Pipe and Fittings
23. CISPI 301 Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems

24. CISPI 310 Joints for Hubless Cast Iron Sanitary Systems

B. Manufacturer's Standardization Society of the Valve and Fitting Industry (MSS):

1. MSS SP70 Cast Iron Gate Valves, Flanged and Threaded Ends.

2. MSS SP80 Bronze Gate, Globe, Angle and Check Valves.

**1.05 SUBMITTALS**

A. General: Refer to Section 01 33 00 - Submittal Procedures, and Section 01 33 23 - Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.

B. Shop Drawings: Submit Shop Drawings showing piping layouts, sizes, types, valves, drains, and cleanouts.

C. Product Data: Submit manufacturers' product data for specified materials and equipment.

D. Operation and Maintenance Data: Submit equipment manufacturer's printed operating and maintenance instructions in accordance with Section 01 78 23 - Operation and Maintenance Data, consisting of detailed parts list, recommended spare parts list, and complete operation and maintenance procedures.

E. Test Reports: Submit certified test results and certificates of compliance as necessary to verify conformance with specified requirements.

**1.06 SITE CONDITIONS**

A. Excavations for drainage products shall be dry immediately before and after products to be buried are installed. Surfaces and structures to, and on, which drainage products will be installed shall be capable of supporting the products. Surfaces that will be concealed by drainage products shall be completed before drainage products are installed.

**PART 2 - PRODUCTS**

**2.01 EMBEDDED TRACK DRAIN; BURIED DRAINAGE PIPE AND FITTINGS**

A. General: Provide pipe and fittings of sizes and configurations indicated. Provide Class H pipe and fittings as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC, for non-pressure piping. Buried Class H pipe shall be as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.

B. Embedded Track Drain: Provide Class H pipe and fittings as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.

C. Sump pump discharge: Provide Class H pipe and fittings as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.

**2.02 EXPOSED AND EMBEDDED DRAINAGE PIPE AND FITTINGS:**

- A. Provide Class B pipe and fittings as specified in Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.

**2.03 DRAINS**

- A. Requirements: Provide the type, size, and configuration indicated, with vandal-proof strainers and strainer fasteners, as hereinafter specified.

- B. Roof Drain:

1. Assembly: ANSI A112.21.2.
2. Body: Cast iron body, flashing clamp with seepage openings, and square hole grade as indicated.
3. Strainer: Removable cast iron dome.
4. Accessories: Coordinate with roofing type Membrane flange and membrane clamp with integral gravel stop.

Adjustable under deck clamp. (Where indicated)  
 Roof sump receiver.  
 Waterproofing flange.  
 Controlled flow weir.  
 Leveling frame.  
 Adjustable extension sleeve for roof insulation.  
 Perforated or slotted ballast guard extension for inverted roof.  
 Perforated stainless steel ballast guard extension.

- C. Parapet Drains: Cast iron body with aluminum flashing clamp collar and epoxy coated cast iron sloping grate.

- D. Canopy/Cornice Drains: Cast iron body with aluminum flashing clamp collar and epoxy coated cast iron flat strainer.

- E. Roof Overflow Drains: Cast iron body and clamp collar and bottom clamp ring; pipe extended to 2 inches flood elevation.

- F. Downspout Nozzles: Bronze round with straight offset bottom section.

- G. Area Drains: ANSI A112.21.2 with round nickel-bronze strainer and accessories: Membrane flange and membrane clamp with integral grave stop, with adjustable under deck clamp & roof sump receiver (where indicated), waterproofing flange.

- a. Area Drain (Outdoor): Cast iron body, with cast iron bar grate, sediment bucket, and flashing collar.

- b. Area Drain (Indoor): Cast iron body, with buff polished nickel alloy heel proof grate, sediment bucket, and flashing collar.

- H. Track and Trench Drain: Cast iron body, heavy-duty, bottom outlet, weep holes, inside calk, anti-tilting grate, with adjustable extending frame and round strainer, as indicated, attached to a brass threaded collar for adjustment to varying floor thickness. Provide cast iron, extra heavy traffic pattern gutter or trench drains, where indicated.

1. Refer to Section 05 50 00 - Metal Fabrications, for trench drain requirements.

**2.04 CLEANOUTS**

- A. Cleanouts shall be of the sizes indicated, and shall be of cast iron conforming to ASTM A48, Class 25B.
- B. Floor cleanouts shall be adjustable type, and shall have scoriated nickel alloy cover and membrane clamping device.
- C. Wall cleanouts shall be bolted, wedge type having a cover. Cover plate shall be mounted in a flanged frame, shall be stainless steel, and shall be secured to the plug with a vandal-proof screw.
- D. Exposed cleanouts shall have a raised brass head cleanout plug.
- E. Grade cleanouts shall have an adjustable sleeve housing, with a threaded brass plug and a countersunk slot.

**2.05 MANHOLE COVERS AND FRAMES:** Refer to Section 33 05 16 - Utility Structures, for requirements.

**2.06 ESCUTCHEONS:** Provide escutcheons in accordance with Section 20 20 13 - Pipe Sleeves, Supports, and Anchors for Facility Services

**2.07 VALVES**

- A. Provide valves of types indicated.
- B. Refer to Section 20 10 13 - Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC, for gate valves and swing check valves.

**PART 3 - EXECUTION**

**3.01 PREPARATION**

- A. Excavations shall be free from water and extraneous material immediately before drainage products are installed or placed therein. Bottoms of trenches shall have a 6 inches sand bed and be formed to support the bottom quadrant of the pipe and fittings. Should rock be encountered or should bedding material be unsuitable to support the products at the indicated elevation, excavation shall be continued to an elevation at 8 inches below the indicated elevation and shall be backfilled with clean sand to the indicated elevation.
- B. Interior of pipe, pipe fittings, valves, drains, and cleanouts shall be cleaned before installation.

- C. Install sleeves through walls, floors, roofs, and other structures before drainage lines are installed. Piping shall not be installed under walls, foundations, or footings. Invert of sleeves shall be minimum of 6 inches above the bottom of footings and foundations.

### 3.02 INSTALLATION

- A. Excavating and backfilling, including bedding and compacting requirements, shall conform with Section 33 05 28 - Trenching and Backfilling for Utilities.
- B. Install products as indicated. Remove and re-install products disturbed after installation. Ends of products to which future connections will be made shall be either valved, plugged, or capped, and anchored. Connections to existing facilities shall be made with fittings and short bends to suit the actual conditions. Connect products in accordance with the product manufacturer's installation instructions and recommendations.
- C. Pipe and fittings shall be set to line and grade before joints are made up. Angular deflections of joints shall not exceed the recommendations of the pipe and fitting manufacturer. Should the alignment require deflection of joints to be in excess of those recommended, use special bends to achieve the indicated deflection. Pipe ends and joints shall be prepared in accordance with the manufacturer's recommendations. As a minimum pipe ends shall be sanded and cleaned, fittings shall be cleaned, and solvent shall be applied to both pipe and fittings.
- D. Slope horizontal pipes as a minimum 2% downward in direction of flow for pipes less than 4 inches in diameter. Support all above grade piping in accordance with Section 20 20 13 - Pipe Sleeves, Supports, and Anchors for Facility Services
- E. Make changes in pipe size with reducing fittings. Changes in direction shall be with either 45 degree wyes, long or short-sweep 1/4, 1/6, 1/8 or 1/16 bends, or elbows.
- F. Joints in no-hub cast-iron pipe and fittings shall use double-seal, compression-type molded neoprene gaskets that shall provide a positive seal.
- G. Tighten band and screw assemblies, used in conjunction with hubless type cast-iron pipe, to 60 inch-pounds torque on each band screw with a torque wrench specifically designed for the purpose. Re-torque each screw after not less than 24 hours.
- H. Provide escutcheons at finished surfaces where exposed piping, bare or insulated, passes through floors, walls, and ceilings. Fasten escutcheons to floors, walls, and ceilings in accordance with manufacturer's instructions.
- I. Install wall sleeves and seals in accordance with Section 20 20 13 - Pipe Sleeves, Supports, and Anchors for Facility Services. Sealing members shall be installed so as to provide electrical isolation between the metallic carrier pipe and all metallic components of the sleeve and seal.
- J. Provide electrical isolation with no metal-to-metal contact between metallic discharge lines and reinforcing steel at penetrations of reinforced concrete structures.
- K. Drains:

1. Area drain rim elevation shall be located such that uniform slope of 1-1/2 percent is maintained from the furthest distance at the perimeter of slab to rim. There shall be no local depression.
2. Maintain integrity of waterproof membranes where penetrated by installing flashing collar or flange so that no leakage occurs between drain and adjoining materials.

**3.03 PIPE CLEANOUTS**

- A. Cleanouts shall be the same size as the pipe up to and including 4 inches, 6 inches and larger pipe. Cleanouts shall be 4 inches minimum in diameter. Cleanouts for drainage pipe shall consist of a long sweep 1/4 bend or one or two 1/8 bends extended to the location indicated. Wall or accessible piping cleanouts shall be T-pattern, 90-degree branch drainage fittings having screw plugs.

**3.04 IDENTIFICATION**

- A. Identification of storm drainage components shall be as specified in Section 20 40 13 - Identification for Facility Services

**3.05 FIELD QUALITY CONTROL**

- A. Do not cover products to be buried and do not paint products or line segments to be painted until inspecting, testing, and acceptance of those products have occurred.
- B. Test installed drainage lines and equipment, with the Engineer in attendance, as follows:
  1. Fill drainage lines with water and allow to stand for not less than 30 minutes without leaking; low and intermediate branches shall have been temporarily sealed. Provide test tees having cast iron screwed plugs in the vertical stacks if the drainage lines are to be tested in sections. Accomplish testing of interior lines before lines are concealed. Repair leaks and retest systems until the system exhibits no leaks. Head of water shall be not less than 5 feet, and shall not exceed 10 feet.
  2. Disconnect force mains from equipment, seal open ends, and fill mains with water, and hydrostatically test to a pressure of 50 psi greater than the normal pumping pressure. Maintain test pressure until the force main system has been examined for leaks. Repair leaks and retest system until no leaks are exhibited. Use testing instruments calibrated by a qualified laboratory in accordance with Section 01 45 00 - Quality Control.
  3. Test equipment by operation and adjustment of controls. Faulty equipment or controls shall be either repaired or replaced at no additional cost to the District.

**3.06 CLEANING**

- A. Cleaning of installed products shall consist of removing foreign material from the surfaces of products and wiping such products clean. Manufacturer's labels shall remain intact.

**3.07 PAINTING**

- A. Except where indicated, piping systems shall not be painted. Where pipes are indicated to be painted, as exposed pipe in finished rooms, prepare and paint pipe in accordance with Section 09 91 00 - Painting.

**END OF SECTION 22 14 01**