

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 above grade drainage pipe and fittings.
- C. Drains.
- D. Cleanouts.
- E. Manhole covers and frames.
- F. Escutcheons.
- G. Valves.
- H. Storm drain markers.

1.02 RELATED SECTIONS

- A. Section 05 50 00, Metal Fabrications.
- B. Section 09 91 00, Painting.
- C. Section 20 10 13, Common Materials and Method for Facility Services – Fire Suppression, Plumbing, and HVAC.
- D. Section 20 20 13, Pipe Sleeves, Supports, and Anchors for Facility Services.
- E. Section 20 40 13, Identification for Facility Services.
- F. Section 33 05 16, Utility Structures.
- G. Section 33 05 28, Trenching and Backfilling for Utilities.
- H. Section 33 40 00, Storm Drainage Utilities.

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/A48M Standard Specifications for Gray Iron Castings
 2. ASTM A74 Standard Specifications for Cast Iron Soil Pipe and Fittings
 3. ASTM C4 Standard Specifications for Clay Drain Tile and Perforated Clay Drain Tile
 4. ASTM C564 Standard Specifications for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
 5. ASTM D2564 Standard Specifications for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
 6. ASTM D2609 Standard Specifications for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe
 7. ASTM D2683 Standard Specifications for Socket-Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing
 8. CISPI 301 Standard Specifications for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications
 9. CISPI 310 Standard Specifications for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications
 10. ASME A112.6.3 Floor and Trench Drains
 11. ASME A112.6.4 Roof, Deck, and Balcony Drains
- B. Manufacturer's Standardization Society of the Valve and Fitting Industry (MSS):
1. MSS SP70 Gray Cast Iron Gate Valves, Flanged and Threaded Ends
 2. MSS SP80 Bronze Gate, Globe, Angle and Check Valves
- C. California Code of Regulations (CCR), Title 24:
1. CBC Part 2, California Building Code
 2. CPC Part 5, California Plumbing Code

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 and Material Safety Data Sheet (MSDS) 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 and stabilized 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.
- B. Prior to trenching and excavation, the Contractor shall have an OSHA designated Trenching and Excavation Competent Person survey the site and assess the conditions and soil types (Type A, B, or C soil) to determine trenching and excavation operations, methods, and procedures, and site areas and activities that may be affected by such excavations. Excavations shall proceed with the Engineer's approval.

PART 2 – PRODUCTS**2.01 EMBEDDED TRACK DRAINAGE, BURIED DRAINAGE PIPE AND FITTINGS**

- A. For drainage and vent piping, except as noted here in: provide pipe and fittings of sizes and configurations as indicated in the Contract Documents. Provide Class D 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.
- B. For 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. For buried applications 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 ABOVE GRADE DRAINAGE PIPE AND FITTINGS

- A. For drainage and vent piping: Provide Class B drainage and vent pipe and fittings as specified in Section 20 10 13, Common Materials and Methods for Facility Services – Fire Suppression, Plumbing and HVAC.
- B. For sump pump discharge: Provide Class C drainage and vent 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 as indicated in the Contract Documents, with vandal-proof strainers and strainer fasteners, as hereinafter specified.

- B. Roof Drain:

- 1. Assembly: ASME A112.6.4.
- 2. Body: Cast iron body, flashing clamp with seepage openings, and square hole grade as indicated in the Contract Documents.
- 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 in the Contract Documents.

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 and 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: ASME A112.6.3 with round nickel-bronze strainer and accessories: Membrane flange and membrane clamp with integral grave stop, with adjustable under deck clamp and roof sump receiver (where indicated in the Contract Documents), waterproofing flange.
 - a. Area Drain (Outdoor): Cast iron body, with cast iron bar grate, sediment bucket, and flashing collar. Provide Caltrans grate No. D77B when applicable for bicycle traffic.
 - 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 in the Contract Documents, 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 in the Contract Documents.
 - 1. Refer to Section 05 50 00, Metal Fabrications, for trench drain requirements.
- I. Implement hydrocarbon and polychlorinated biphenyls (PCB) absorbing drain inserts when applicable for inlets near fueling and maintenance areas.

2.04 CLEANOUTS

- A. Cleanouts shall be provided on all floors and throughout each facility. Cleanouts shall be of the sizes as indicated in the Contract Documents, and shall be of cast iron conforming to ASTM A48/A48M, Class 25B. Cleanout maximum distance shall comply with CPC.
- B. Floor cleanouts for parking structures shall be cast iron construction with bronze plug, vandal proof screws and with scoriated cover and membrane clamping device. For all other facilities the top, frame and cover shall be nickel alloy.
- 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.
- F. Two-way cleanouts shall be provided at locations where track drainage drains underground.

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 as indicated in the Contract Documents.
- 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.

2.08 STORM DRAIN MARKERS

- A. Provide a storm drain marker for each street or parking lot storm drain inlet with the following features:
 - 1. Material: 304 annealed stainless steel
 - 2. Thickness: 0.062 inches
 - 3. Weight: 0.218 pounds
 - 4. Size: 4 inch diameter
 - 5. Symbol: Fish with wave
 - 6. Text: No Dumping Drains to Bay
 - 7. Color: Blue inner and outer circle
 - 8. Hole: square 0.25 inch by 0.25 inch hole at center of marker
 - 9. Mounting: Per manufacturer's specifications including theft proof rivet subsurface mount.

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 six inches of bedding material as specified by the Contract Documents to support the bottom quadrant of the pipe and fittings. Should rock, buried manmade objects, or equivalent, be encountered or should bedding material be unsuitable to support

the products at the elevation indicated in the Contract Documents, excavation shall be continued to an elevation at least eight inches below the elevation and shall be backfilled with clean material to the elevation indicated in the Contract Documents.

- 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 six inches above the bottom of footings and foundations.
- D. Excavations over 4 feet in depth shall be performed in the presence of an OSHA designated Certified Trenching and Excavation Competent person at all times.

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 in the Contract Documents. Remove and re-install products disturbed after installation at no cost to the District. Ends of products to which future connections will be made shall be either valved, plugged, or capped, and anchored when left unattended or completed. 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 deflection indicated in the Contract Documents. 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 in accordance with manufacturer’s specifications.
- D. Slope horizontal drainage pipes as a minimum two percent downward in direction of flow for all pipes. 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 eccentric or concentric reducing fittings as applicable. Changes in direction shall be with either 45 degree wyes, long-sweep 1/4, 1/6, 1/8 or 1/16 bends, or elbows. Short sweep bends shall not be allowed unless required due to space limitations and approved by the Engineer.
- F. Joints in no-hub cast-iron pipe and fittings shall use double-seal, compression-type molded neoprene gaskets with 316 grade stainless steel or equal tightening bands 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. Roof drainage shall be separately run from track drains and shall not share a common outlet to the main storm drain.
- L. Implement di-electric union fittings when applicable, such as when connecting copper and steel piping systems together.

3.03 PIPE CLEANOUTS

- A. Cleanouts shall be the same size as the pipe up to and including six inch pipe. Cleanouts for drainage pipe shall consist of a two-way long sweep 1/4 bend or one or two 1/8 bends extended to the location indicated in the Contract Documents. Wall or accessible piping cleanouts shall be tri-Y-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 not be less than 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 cost to the District.
 4. Drainage lines shall be inspected via video camera and videos shall be submitted to the Engineer prior to Acceptance.

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 in the Contract Document, piping systems shall not be painted. Where pipes are indicated in the Contract Documents 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