SECTION 22 13 00
DRAINAGE SYSTEMS

PART 1 – GENERAL

1.01 WORK INCLUDED

A. General: Provide complete and operable drainage systems within the intent of the Contract Documents, including, but not limited to, all materials and labor for complete installation and testing, in compliance with applicable provisions and recommendations of the Reference Standards.

B. Drainage and vent systems, including, but not limited to, the following:

1. Drainage and vent piping systems
2. Pump discharge piping systems
3. Drainage specialties
4. Sand oil interceptor
5. Grease interceptors.
6. Grease removal devices.
7. Oil interceptors.
8. Sand interceptors.
9. Solids interceptors.
10. Water level controls

C. House drains and sewers contract limit line shall be five feet from building wall, or as indicated on the Drawings.

1.02 RELATED DOCUMENTS

A. Section 22 05 01 – Plumbing General Provisions

B. Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment

C. Section 22 05 48 – Vibration Isolation and Seismic Restraints for Plumbing

D. Section 22 11 00 – Domestic Water Systems

E. Section 22 11 10 – Plumbing Piping and Accessories

F. Section 22 11 23 – Plumbing Pumps

1.03 REFERENCE STANDARDS

A. Regulatory compliance: All work performed under this Division shall comply with the latest currently adopted editions of all codes and regulations and all requirements of all Authorities Having Jurisdiction. The following references and standards are hereby made a part of this Section and work shall conform to applicable requirements herein except as otherwise specified herein or shown on the Drawings.

B. Codes and Standards: Conform to all applicable codes and standards as stated herein and as described in Division 1 of the Specifications, including the following:

1. ANSI – American National Standards Institute
2. ASME – American Society of Mechanical Engineers
3. ASTM – American Society for Testing and Materials
4. AWS – American Welding Society
5. CISPI – Cast Iron Soil Pipe Institute
6. MSS – Manufacturers Standardization Society of the Valve and Fittings Industry
7. NFPA – National Fire Protection Association
8. NSF – National Sanitation Foundation
9. International Plumbing Code –

1.04 DEFINITIONS

A. FRP: Fiberglass-reinforced plastic.

B. HDPE: High density polyethylene.

C. PP: Polypropylene plastic.

1.05 QUALITY ASSURANCE

A. Comply with the applicable provisions and recommendations of the standards and codes listed in Paragraph 1.03 Reference Standards and the requirements of the listed related documents in Paragraph 1.02 Related Documents.

B. Valves construction shall be suitable for the pressure, temperature, and fluid quality of the service in which they are to be used.

C. All valves shall be manufactured in accordance with ANSI, AWWA, ASTM, MSS (Manufacturers Standardization Society of the Valve and Fittings Industry), standards and specifications.

D. ANSI/ASME B31.1 for power piping valves and ASME B31.9 for building services piping valves.

E. ASME 16.10 and ASME 16.34 for dimension and design criteria.

F. Minimum test pressure for all valves shall be 1½ times maximum system working pressure unless noted otherwise.

1.06 SUBMITTALS

A. For each type of valve indicated, submit body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; pressure differential range, shipping, installed, and operating weights; furnished specialties; and accessories.

B. Product Data: Submit manufacturer’s latest information on construction details, rated capacity data, operating characteristics and installation data.

C. Submit, for all equipment provided under this Section, dimensions, accessories, required clearances, electrical requirements and wiring diagrams specific to this project that clearly differentiates between manufacturer-installed and field-installed wiring and location and

size of all required field connections.

D. Submit manufacturer's installation instructions, operation data, start-up instructions, maintenance data, parts list and controls specific to this project, accessories, and maintenance data.

E. Submit report indicating the required rod clean of each roof drain, each roof overflow drain, each area drain and each leader. Submit test report of each drain tested with appropriate water flow for drain type in the presence of the Owner's Representative.

F. Product Data: For each type of [metal] [and] [plastic] interceptor. Include materials of fabrication, dimensions, rated capacities, retention capacities, operating characteristics, size and location of each pipe connection, furnished specialties, and accessories.

G. Shop Drawings: For each type and size of precast concrete interceptor indicated.

1. Include materials of construction, dimensions, rated capacities, retention capacities, location and size of each pipe connection, furnished specialties, and accessories.

H. Submit all test reports witnessed by Plumbing Inspectors and Owner's Representative.

I. Submit Operational and Maintenance (O&M) manuals.

1.07 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Interceptors, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Piping connections. Include size, location, and elevation of each.
2. Interface with underground structures and utility services.

B. Warranty Documentation.

1.08 FIELD CONDITIONS

A. Interruption of Existing Sewer Services: Do not interrupt services to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sewer services in accordance with requirements indicated:

1. Notify [**Architect**] [**Construction Manager**] [**Owner**] no fewer than [**seven**] <**Insert number**> days in advance of proposed interruption of service.
2. Do not proceed with interruption of sewer services without [**Architect's**] [**Construction Manager's**] [**Owner's**] written permission.

1.09 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of HDPE interceptors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures.

b. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: Lifetime.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS.

A. Following is a list of manufacturers whose products may be submitted for review. All items submitted as being equivalent, shall have same quality, finish, free area, material construction, etc., as those specified under base Specification.

1. Cast Iron Piping: **AB&I Foundry**, **Charlotte Pipe**, or **Tyler Pipe**
2. Cast Iron Drainage Products: Josam, J.R. Smith, Wade, or Zurn Industries.
3. Copper Piping: Anaconda, Cambridge-Lee, Cerro, Howell Metal, Wolverine, or approved equivalent.
4. Copper Fittings: NIBCO, Elkhart, or approved equivalent.
5. Low Torque No Hub Couplings: Anaco, Mission, Tyler Pipe
6. High Torque No Hub Couplings: Clamp-All Corporation, Husky by Anaco
7. Polypropylene Pipe and Fittings: Fuseal II by George Fisher, Inc., Orion, Zurn, or approved equivalent.
8. High Silicon Iron Pipe and Fittings: Durion Pipe System by Flowserve Corporation, or approved equivalent.
9. Polyvinylidene Fluoride (PVDF) Resin Piping and Fittings: George Fisher, Inc., Zurn Industries, or approved equivalent.
10. Plenum Wrap: 3M Fire Master, or approved equivalent.
11. Polypropylene Pipe System: Fuseal II by George Fisher, Inc., Zurn Industries, or approved equivalent.
12. Buried Pipe and Fittings Inside of Foundation Walls: X-Tru Coat Steel Pipe by Republic.
13. Cleanouts: Josam, J.R. Smith, Wade, or Zurn Industries
14. Floor Drains: Josam, J.R. Smith, Wade, or Zurn Industries
15. Floor Drains – Polypropylene: R & G Sloane Manufacturing Co., or approved equivalent.
16. Floor Sinks: Josam, J.R. Smith, Wade, or Zurn Industries.
17. Area Drains: Josam, J.R. Smith, Wade, or Zurn Industries
18. Trench Drains: Josam, J.R. Smith, Wade, or Zurn Industries.
19. Downspout Nozzles: Josam, J.R. Smith, Wade, or Zurn Industries
20. Air Gap Fittings: Josam, J.R. Smith, Wade, or Zurn Industries
21. Traps: AB&I Foundry, Charlotte Pipe, Tyler.
22. Auxiliary Inlet Fittings: J.R. Smith, Wade, or Zurn Industries
23. Pre-Cast Sand and Oil Interceptor: Jensen Precast, Zurn Green Turtle, or approved equivalent.
24. Steel Oil Interceptors: Mifab, JR Smith, Zurn, Josam or approved equivalent
25. Steel Sand Interceptors: Mifab, JR Smith, Zurn, Josam or approved equivalent
26. Plastic Sand Interceptors: Mifab, JR Smith, Zurn, Josam or approved equivalent
27. Plastic Hydro-Mechanical Grease Interceptors: Mifab, Ashland Polytrap, Canplas or approved equivalent
28. Plastic Gravity Grease Interceptors: Mifab, Green Turtle, Schier Products or approved equivalent

29. Grease Removal Devices: Mifab, Highland Tank, GK&L, Inc. or approved equivalent
30. Plastic Solids Interceptors: Mifab, JR Smith, Zurn, Josam or approved equivalent
31. Steel Solids Interceptors: Mifab, JR Smith, Zurn, Josam or approved equivalent
32. Fiberglass Reinforced Fiberglass Holding Tanks: Topp Industries, or approved equivalent.

2.02 DRAINAGE AND VENT PIPING SYSTEMS

A. Underground (buried) – Sanitary Vent, Sanitary Sewer and Storm Sewer Pipe – Application: All underground sanitary, storm and vent piping systems under building and within 5 feet-0 inches of the building's exterior foundation, unless otherwise noted on the Drawings.

1. Hub and Spigot Type Pipe and Fittings: Service weight cast iron soil pipe with weight per foot and maker's name clearly stamped or cast on each length, in conformance with ASTM A74 and CISPI HSN, and push-on rubber gasketed joint to effect a water-tight seal, in conformance with ASTM C564.
2. No hub, service weight, cast iron soil pipe labeled with the CI mark of quality and permanence as illustrated in latest standards of Cast Iron Soil Pipe Institute (CISPI) Standard 301, ASTM A888 or ASTM A74, and no hub drainage pattern fittings.

a. Couplings:

1) Heavy Duty No Hub Couplings: No-hub couplings shall comply with ASTM C 1540 and all requirements of Factory Mutual 1680 Class I. No-Hub couplings shall be constructed of Type 304 stainless steel with 305 stainless steel worm drive screws. The worm drive clamps shall have a hexagon head to accept a ⅜ inch socketed torque wrench. The clamps shall be tightened to a minimum of 80 inch pounds. (Single corrugated shield, 4 band 80 inch pound torque or 2 band 125 inch pound torque minimum). The gasket material shall be neoprene rubber meeting the requirements of ASTM C564. Submittal to include copy of compliance to the requirements of FM 1680 Class I by certified independent third party testing laboratory. No-Hub couplings shall be Husky SD4000 or Clamp-All High Torq 125.

B. Above Grade – Sanitary Vent, Sanitary Sewer and Storm Sewer:

1. No hub, service weight, cast iron soil pipe labeled with the CI mark of quality and permanence as illustrated in latest standards of Cast Iron Soil Pipe Institute (CISPI) Standard 301, ASTM A888 or ASTM A74, and no hub drainage pattern fittings.

a. Couplings:

2) Standard No Hub Couplings: No-hub couplings shall comply with CISPI 310, ASTM C 1277. No-Hub couplings shall be constructed of Type 301 stainless steel with 305 stainless steel worm drive screws. The worm drive clamps shall have a hexagon head to accept a $^{5}/_{16}$ inch socketed torque wrench. The clamps shall be tightened to60 inch pound torque. The gasket material shall be neoprene rubber meeting the requirements of ASTM C564 and housed inside a Type 301 stainless steel corrugated shield. No-Hub couplings shall be by "Anaco No Hub" by Anaco, Mission, or "Tyler No Hub" by Tyler Pipe.

3) Medium Duty No Hub Couplings: No-hub couplings shall comply with ASTM C 1540 and all requirements of Factory Mutual 1680 Class I. No-Hub couplings shall be constructed of Type 304 stainless steel with 305 stainless steel worm drive screws. The worm drive clamps shall have a hexagon head to accept a 5/16 inch socketed torque wrench. The clamps shall be tightened to 80 inch pounds. The gasket material shall be neoprene rubber meeting the requirements of ASTM C564. Submittal to include copy of compliance to the requirements of FM 1680 Class I by certified independent third party testing laboratory. No-Hub couplings shall be Husky HD2000, Mission Heavyweight, or Clamp-All High Torq 80.

4) Heavy Duty No Hub Couplings: No-hub couplings shall comply with ASTM C 1540 and all requirements of Factory Mutual 1680 Class I. No-Hub couplings shall be constructed of Type 304 stainless steel with 305 stainless steel worm drive screws. The worm drive clamps shall have a hexagon head to accept a ⅜ inch socketed torque wrench. The clamps shall be tightened to a minimum of 80 inch pounds. (Single corrugated shield, 4 band 80 inch pound torque or 2 band 125 inch pound torque minimum). The gasket material shall be neoprene rubber meeting the requirements of ASTM C564 and housed inside a Type 304 stainless steel corrugated shield. Submittal to include copy of compliance to the requirements of FM 1680 Class I by certified independent third party testing laboratory. No-Hub couplings shall be Husky SD4000 or Clamp-All High Torq 125.

2. Standard Weight Galvanized Steel Pipe, Schedule 40:

   a. Fittings: Galvanized malleable iron with flat band, steam pattern (vent piping) and cast iron drainage pattern (waste piping).
   b. Joints: Teflon tape applied to male threads only, with no tape or loose ends extending into pipe or past the first thread of the male end. Approved grooved couplings and fittings may be used.

3. Type DWV copper tube with solder-fitting drainage type, cast copper couplings. DWV copper drainage piping and fittings are not allowed on urinal waste piping.

C. Indirect Waste Piping:

1. Unfinished Spaces: Type DWV copper tube with solder-fitting drainage type, cast copper couplings.
2. Finished Spaces: Chrome plated brass piping with chrome plated brass threaded drainage pattern fittings.

D. Laboratory Waste and Vent Piping:

1. Above Slab:

   a. Polyvinylidene fluoride (PVDF) resin piping system joined using electric fusion, conforming to ASTM E84 25/50 (UL 723) and UL94-VO. Flame spread and smoke generation, ASTM F-1673, UPC,USA. “SCHEDULE 40 Fuseal 25/50” by Georg Fischer, Orion or equal.

2. Below Slab:

a. Non-Flame retardant, schedule 40 polypropylene (black color) waste pipe and Flame Retardant schedule 40 fittings (blue color) with electric resistance coil fusion joints using integral electrical resistance coil with duplex connector within fittings, conforming to ASTM Standard, D4101,D3311, D1599,D2122,F1290 and F1412. Specifications for polypropylene pipe and fittings for corrosive waste drainage systems, and dimensional requirements of ASTM D-1785; “Manufactured by Georg Fischer Fuseal II, Orion or equal.

3. Plenum Space/High Temperature Discharge:

a. Polyvinylidene (PVDF) System:

5) Polyvinylidene (PVDF) UL E84 25/50, Schedule 40 polypropylene (blue color) waste pipe and fitting joined by means of electric fusion method. Conforming to ASTM F1673, E-84, UPC, USA.. Manufactured by Georg Fischer, Orion or equal.

4. Below Slab/Buried:

a. Polypropylene Pipe System: Non-Flame retardant, schedule 40 polypropylene (blue color) waste pipe and Flame Retardant schedule 40 fittings (blue color) with electric resistance coil fusion joints using integral electrical resistance coil with duplex connector within fittings, conforming to ASTM Standard, D4101,D3311, D1599,D2122,F1290 and F1412. Specifications for polypropylene pipe and fittings for corrosive waste drainage systems, and dimensional requirements of ASTM D-1785; “Manufactured by Georg Fischer Fuseal II, Orion or equal.

5. Laboratory Casework and Fume Hoods Piping and Fittings:

6) Flame retardant polypropylene pipe or polyvinylidene fluoride, Schedule 40, with mechanical joint fittings consisting of fitting, flexible seal ring, rigid grabber ring and a union nut warranted by manufacturer for 25 years against corrosion failure; “Fuseal MJ” by Georg Fischer, Orion or equal. Where the use of mechanical joints is not acceptable, then electric resistance fusion joints shall be used. Provide mechanical transition fittings where connecting polypropylene to polyvinylidene fluoride piping.

2.03 DRAINAGE PUMP DISCHARGE PIPING SYSTEMS

A. Above Grade and Internal of Sump:

1. Pipe: ASTM A53/A 53M and A 106/A 106M Schedule 40 hot-dipped galvanized carbon steel pipe.
2. Couplings and Fittings:

a. Threaded: ASME B1.20.1, ASME B16.3, and ASTM A153/A 153M hot-dipped galvanized.
b. Mechanical:

7) Coupling: ASTM A536 cast ductile iron, Grade 65-45-12 or ASTM A47/A 47M malleable iron Grade 32510, “Style 07 (Zero-Flex)” by Victaulic.

8) Bolts: Zinc plated to ASTM B633, heat-treated carbon steel track head conforming to physical properties of ASTM A183, minimum tensile strength 110,000 psi.
9) Gasket: C-Shaped, EPDM compound, conforming to ASTM D2000 designation 2CA615A25B24F17Z. Temperature operating range 30 degrees F to 230 degrees F; "Grade 'E' EPDM compound (green color coded)" by Victaulic.

c. Flanged Ductile Fittings: ASTM A395/A 395M ductile iron, ASME B16.1 and ASME B16.5 Class 150, ASTM A153/A 153M hot-dipped galvanized.

B. Buried Piping and Fittings:

1. Inside Building Foundation Walls: Schedule 40 steel pipe with welded joints and welded fittings, continuously mill-coated PVC with minimum PVC coat thickness of 0.035 inch (.89 mm); "X-Tru Coat Steel Pipe" by Republic, or approved equivalent.
2. Cold-applied PVC tape field-wrapped coatings of steel pipe and fittings at welded joint, elbows, offsets, sleeves, damaged factory-applied coatings on pipe.

C. Pump Discharge Valves:

1. Gate Valve – 3-inch and larger valve size: Iron body, resilient wedge, outside screw and yoke, 175 psi minimum working pressure, FDA approved epoxy coating inside and out, flanged pattern, meeting AWWA C509 standard; "Fig. F-619-RW" by NIBCO, or approved equivalent.

2.04 CLEANOUTS

A. Floor Type (FCO):

1. Carpeted Areas: Cast iron cleanout with round adjustable scoriated nickel bronze top, vandal-proof screws, plastic plug or bronze gasketed plug, carpet marker, spigot outlet; "No. 4021-U-Y Series" by J.R. Smith, "No. ZN1400-CM-VP Series" by Zurn Industries Inc, or approved equivalent.
2. Ceramic and Porcelain Tile Areas: Cast iron cleanout with square adjustable scoriated nickel bronze top with tile recess, vandal-proof screws, plastic plug or bronze gasketed plug, spigot outlet; "No. 4161-U Series" by J.R. Smith, "No. ZN1400-TX-VP Series" by Zurn Industries, or approved equivalent.
3. Terrazzo and Similar Poured Floor Material Areas: Cast iron cleanout with square adjustable scoriated nickel bronze top with recess, vandal-proof screws, plastic plug or bronze gasketed plug, spigot outlet; "No. 4201-U Series" by J.R. Smith, "No. ZN1400-Z-VP Series" by Zurn Industries, Inc., or approved equivalent.
4. Boiler Room and Mechanical Rooms: Extra heavy-duty cast iron cleanout with round adjustable galvanized cast iron top, vandal-proof screws, plastic plug or bronze gasketed plug, spigot outlet; "No. 4220-G Series" by J.R. Smith, "No. Z1400-G-VP Series" by Zurn Industries, Inc., or approved equivalent.

B. Wall Type (WCO) – Cleanout Wall Plate: Cast iron cleanout tee with round stainless steel cover, vandal-proof screws, plastic or gasket sealed bronze plug and spigot outlet; "No. 4531-U Series" by J.R. Smith, "No. Z1446-VP Series" by Zurn Industries, Inc., or approved equivalent.

C. Exposed Type (CO):

1. Vertical:

   a. 6-inch pipe size and smaller: Cleanout tee with gasket seal cast bronze plug; “4512S Series” by J.R. Smith, “Z1445-BP Series” by Zurn Industries, Inc., or approved equivalent.
   b. 8-inch pipe size and larger: Cast bronze tapered plug with tapped test tee cast iron fitting.

2. Horizontal – all pipe sizes: Cast iron tee “Y” fitting with tapped spigot ferrule and cast bronze taper thread plug.

D. Exterior Grade Cleanout (GCO): Cast iron cleanout and double flanged housing with heavy-duty scoriated cover secured with vandal-proof screws, plastic or gasket sealed bronze plug and spigot outlet; “No. 4251-U Series” by J.R. Smith, “No. Z1474-IN-VP Series” by Zurn Industries, Inc., or approved equivalent.

E. Ferrules:

1. Provide ferrules of “Extra Heavy” cast brass, and of weight and size as follows:

Size	**Minimum Length (in Inches)**	**Weight (in Pounds)**
2 inches	4½	1
3 inches	4½	1¾
4 inches & larger	6	2½

2.05 DRAINAGE SPECIALTIES

A. General:

1. Drains:

   a. Provide all required extension collars, flashing devices, etc., to suit roof, floor and deck construction in addition to features described for drains.
   b. All drains in public areas shall include vandal-proof features. All floor drains, roof drains and overflow drains shall have integral no-hub outlets when connecting to above-grade sanitary piping.
   c. Floor drain outlets connecting to buried piping shall be as style as required to comply with piping manufacturer recommendations and jurisdictional plumbing code.
   d. Refer to Drawings for make and model of drains. Size of drain outlets shall be same as connecting pipe as indicated on the Drawings.

B. Floor and Area Drains: Shall be constructed to meet ASME A112.6.3. Product materials, loading requirements, and accessories as specified on Drawings; provide with seepage flange; Zurn Industries or approved equivalent.

C. Floor Sinks: Shall be constructed to meet ASME A112.6.7. Product materials, requirements, and accessories as specified on Drawings; Zurn Industries or approved equivalent.

D. Roof Receptors: Cast iron receptor with solid water dam and cast iron dome bottom strainer secured with stainless steel vandal-proof screws, extension, deck clamp, roof sump

receptor, deck plate, outlet style as required to connect to specified piping system material and size.; Zurn Industries, Inc., or approved equivalent.

E. Roof and Overflow Drains: 15-inch diameter, cast iron drain body with cast iron vandal-proof dome, adjustable extension, deck plate or sump receiver with underdeck clamp, and combined flashing clamp and gravel stop, fasteners and gaskets; Zurn Industries, Inc., or approved equivalent.

F. Trench Drains: Shall be constructed to meet ASME A112.6.3 for trench drains. Product materials, requirements, and accessories as specified on Drawings; grating shall be selected to withstand intended loading; Zurn Industries or approved equivalent.

G. Stainless Steel Channel Drainage: Shall be constructed to meet ASME A112.6.3. Product materials, loading requirements, and accessories as specified on Drawings; grating shall be selected to withstand intended loading; Zurn Industries or approved equivalent.

H. Channel Drainage (non-stainless): Product materials, loading requirements, and accessories as specified on Drawings; grating shall be selected to withstand intended loading; Zurn Industries or approved equivalent.

I. Downspout Nozzle (DSN): Cast nickel bronze body and flange, threaded inlet same size as connecting overflow storm pipe; where installed in walkways, nozzle shall protrude from wall less than 4"; "Series ZANB199" by Zurn Industries, Inc., or approved equivalent.

J. Air Gap Fitting: Dura-coated cast iron fixed air gap with slip joint inlet, no hub outlet, inlet size to match connecting pipe size; "Series Z1025" by Zurn Industries, Inc., or approved equivalent.

K. Traps:

1. General:

   a. No hub cast iron "P" trap; "Fig No. NH43" or "NH42" and provide cast iron tailpiece with ½-inch tapping by Charlotte Pipe, or approved equivalent by AB&I Foundry or Tyler Pipe. Material same as piping system. Type of trap shall be approved by local code(s).
   b. Service weight cast iron "P" trap; "Fig No. SV 169" by Charlotte Pipe, or approved equivalent by AB&I Foundry or Tyler Pipe. Material same as piping system. Type of trap shall be approved by local code(s).
   c. Provide trap with trap primer connection where required for trap primer discharge piping connection to be at tailpiece of trap instead of body of drain.

2. Deep Seal "P" Trap:

   a. No hub cast iron cast iron deep seal "P" trap; "Fig No. NH44A" by Charlotte Pipe, or approved equivalent. Hub service weight cast iron cast iron deep seal "P" trap; "Fig No. NH44" by Charlotte Pipe, or approved equivalent by AB&I Foundry or Tyler Pipe.
   b. Hub and spigot or service weight cast iron deep seal "P" trap.
   c. Provide trap with trap primer connection where required for trap primer discharge piping connection to be at tailpiece of trap instead of body of drain.

L. Auxiliary Inlet Fittings:

1. No hub cast iron with ½-inch trap primer connection; “No. 2695” by J.R. Smith, “No. Z1023” by Zurn Industries, Inc., or approved equivalent.
2. Hub and spigot cast iron with ½-inch trap primer connection; “No. 2697C” by J.R. Smith, or approved equivalent.

2.06 LABORATORY WASTE SAMPLING PORT

a. Provide laboratory waste sampling port in the form of a combination wye pipe branch fitting with ⅛-inch bend, pipe extension, and vandal resistant cover marked “Laboratory Waste Sampling Port”.

2.07 INTERCEPTORS

A. GREASE INTERCEPTOR

1. Precast Concrete Grease Interceptors: Comply with [**ASTM C913**] <**Insert authorities having jurisdiction**>.

2. Include rubber-gasketed joints, [**vent connections,**] manholes, compartments or baffles, and piping or openings to retain grease and to permit wastewater flow.
3. Structural Design Loads:

a. Light-Traffic Load: Comply with ASTM C890, A-8.
b. Medium-Traffic Load: Comply with ASTM C890, A-12.
c. Heavy-Traffic Load: Comply with ASTM C890, A-16.
d. Walkway Load: Comply with ASTM C890, A-03.

4. Resilient Pipe Connectors: ASTM C923 (ASTM C923M), cast or fitted into interceptor walls, for each pipe connection.
5. Steps: [**Individual FRP steps or FRP ladder**] [**Individual FRP steps, FRP ladder, or ASTM A615/A615M, deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D4101, PP**] [**ASTM A615/A615M, deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D4101, PP**] <**Insert material**>, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of interceptor to finished grade is less than [**60 inches (1500 mm)**] <**Insert dimension**>.
6. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover.
7. Manhole Frames and Covers: Ferrous; 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch- (100-mm-) minimum width flange and 26-inch- (660-mm-) diameter cover.

a. Ductile Iron: ASTM A536, Grade 60-40-18, unless otherwise indicated.
b. Gray Iron: ASTM A48/A48M, Class 35, unless otherwise indicated.

c. Include indented top design with lettering cast into cover, using wording equivalent to "[**INTERCEPTOR**] [**GREASE INTERCEPTOR**] [**SANITARY SEWER**] <**Insert lettering**>."

B. Steel Grease Interceptors <**Insert drawing designation if any**>:

1. Basis-of-Design Product: Subject to compliance with requirements, provide MIFAB, Inc.; [**MI-G**] [**XL-MI-G**] or comparable product by one of the following:

   a. Jay R. Smith Mfg. Co.
   b. Josam Company.
   c. <**Insert manufacturer's name**>.

2. Standard: ASME A112.14.3, CSA B481, and PDI-G101, for intercepting and retaining fats, oils, and greases from food[**-preparation**] [**or**] [**-processing**] wastewater.
3. Plumbing and Drainage Institute Seal: Required.
4. Body Material: Steel.
5. Interior Lining: Acid-resistant epoxy.
6. Exterior Coating: Acid-resistant epoxy.
7. Body Dimensions: <**Insert dimensions**>.
8. Body Extension: [**Not required**] [**Required**].

C. Plastic Grease Interceptors, Hydro-Mechanical:

1. Basis-of-Design Product: Subject to compliance with requirements, provide MIFAB, Inc.; [**Lil Max**] [**Big Max**] or comparable product by one of the following:

   a. Ashland PolyTrap.
   b. Canplas LLC.
   c. <**Insert manufacturer's name**>.

2. Standard: ASME A112.14.3, CSA B481, and PDI-G101, for intercepting and retaining fats, oils, and greases from food[**-preparation**] [**or**] [**-processing**] wastewater.
3. Plumbing and Drainage Institute Seal: Required.
4. Body Material: HDPE.

   75 GPM - https://www.mifab.com/Catalog/Library/BIG_Specification-Sheet.pdf

   100 GPM - https://www.mifab.com/Catalog/Library/BIG_Specification-Sheet.pdf.
5. Body Dimensions: <**Insert dimensions**>.
6. Body Extension: [**Not required**] [**Required**].

D. Plastic Grease Interceptors, Gravity:

1. Basis-of-Design Product: Subject to compliance with requirements, provide MIFAB, Inc.; SuperMax, [**SUPER-500**] [**SUPER-750**] [**SUPER-1000**] [**SUPER-1250**] [**SUPER-1300**] [**SUPER-1500**] [**SUPER-2000**] or comparable product by one of the following:

   a. Green Turtle Zurn.
   b. Schier Products Company.
   c. <**Insert manufacturer's name**>.

2. Standard: ASME A112.14.3, CSA B481, and ANSI Z 1001, for intercepting and retaining fats, oils, and greases from food[**-preparation**] [**or**] [**-processing**] wastewater.
3. ASME A112.14.3, CSA B481, and ANSI Z 1001 certification: Required.
4. Body Material: HDPE.

5. Body Dimensions: <**Insert dimensions**>.
6. Body Extension: [**Not required**] [**Required**].

E. Capacities and Characteristics:

1. Length by Width by Depth: <**Insert inches (mm)**>.
2. Number of Compartments: [**One**] [**Two**] [**Three**].
3. Flow rate of MIFAB's SuperMax gravity grease interceptors is standard at 250 gpm (15.8 L/s) with a 4-inch (100-mm) inlet connection. Flow rates of 700 gpm (44.2 L/s) with a 6-inch (150-mm) connection, and 1200 gpm (75.7 L/s) with an 8-inch (200-mm) connection, are available as options.Flow Rate: [**250 gpm (15.8 L/s)**] [**700 gpm (44.2 L/s)**] [**1200 gpm (75.7 L/s)**].
4. Retention Capacity: <**Insert gal. or lb (L or kg)**>.
5. Inlet and Outlet Pipe Size: [**4 inch (100 mm)**] [**6 inch (150 mm)**] [**8 inch (200 mm)**] no hub connection..

    a. Centerline of Inlet to Floor: <**Insert inches (mm)**>.
    b. Centerline of Outlet to Floor: <**Insert inches (mm)**>.

6. End Connections: [**Flanged**] [**No-Hub**] [**Threaded**].
7. Cleanout: Field installed on outlet.
8. Trapped Outlet Required: Yes.
9. Vent Pipe Size: [**Not required**] <**Insert NPS (DN)**>.
10. Mounting: [**Above floor**] [**Recessed in acid-resistant, coated steel frame and cradle**] [**Recessed, flush with floor**] <**Insert mounting**>.
11. Flow-Control Fitting: Not required.
12. Operation: Manual cleaning.

F. Accessories:

1. Provide [**Pump-out**] [**Sampling**] Ports for field installation.
2. High-water Anchor Kit.
3. High-level Alarm.
4. Enzyme Dosing Pump.

1.2 GREASE REMOVAL DEVICES

A. Grease Removal Devices <Insert drawing designation if any>:

1. Basis-of-Design Product: Subject to compliance with requirements, provide MIFAB, Inc.; MI-G-AD or comparable product by one of the following:

    a. G K & L, Inc.
    b. International Grease Recovery Device.
    c. <**Insert manufacturer's name**>.

2. Standard: ASME A112.14.4 and with PDI-G102 for flow tests, for automatic intercepting and removal of fats, oils, and greases from food[**-preparation**] [**or**] [**-processing**] <**Insert application**> wastewater.
3. Body Material: Stainless steel.
4. Interior Separation Device: Baffles and screens.
5. Heater: Required.
6. Interior Lining: Not required.
7. Exterior Coating: Not required.
8. Unit Dimensions: <**Insert dimensions**>.
9. Flow Rate: 15 to 100 gpm (0.9 to 6.3 L/s).
10. Basket Material: Stainless steel.
11. Inlet and Outlet Size: <**Insert size**>.
12. End Connections: [**Flanged**] [**No-Hub**] [**Threaded**].
13. Cleanout: Integral.
14. Mounting: [**Above floor**] <**Insert mounting**>.
15. Flow-Control Fitting: Required.
16. Operation: Automatic recovery.
17. Power Requirement: 120-V ac.
18. Full-Load Amperes: 4 A.
19. Minimum Circuit Ampacity: 5 A.
20. Maximum Overcurrent Protection: <**Insert value**> A.
21. Waste Grease Receptacle: Furnished by Owner.

1.3 OIL INTERCEPTORS

A. Precast Concrete Oil Interceptors: Comply with [**ASTM C913**] <**Insert authorities having jurisdiction**>.

1. Include rubber-gasketed joints, vent connections, manholes, compartments or baffles, and piping or openings to retain grease and to permit wastewater flow.
2. Structural Design Loads:

    a. Light-Traffic Load: Comply with ASTM C890, A-8.
    b. Medium-Traffic Load: Comply with ASTM C890, A-12.

c. Heavy-Traffic Load: Comply with ASTM C890, A-16.
d. Walkway Load: Comply with ASTM C890, A-03.

3. Resilient Pipe Connectors: ASTM C923 (ASTM C923M), cast or fitted into interceptor walls, for each pipe connection.
4. Steps: [**Individual FRP steps or FRP ladder**] [**Individual FRP steps, FRP ladder, or ASTM A615/A615M, deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D4101, PP**] [**ASTM A615/A615M, deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D4101, PP**] <**Insert material**>, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of interceptor to finished grade is less than [**60 inches (1500 mm)**] <**Insert dimension**>.
5. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, to match diameter of manhole frame and cover.
6. Manhole Frames and Covers: Ferrous; 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch- (100-mm-) minimum width flange and 26-inch- (660-mm-) diameter cover.

   a. Ductile Iron: ASTM A536, Grade 60-40-18, unless otherwise indicated.
   b. Gray Iron: ASTM A48/A48M, Class 35, unless otherwise indicated.
   c. Include indented top design with lettering cast into cover, using wording equivalent to "[**INTERCEPTOR**] [**OIL INTERCEPTOR**] [**SANITARY SEWER**] <**Insert lettering**>."

7. Waste-oil storage tank and piping are specified in Section 231113 "Facility Fuel-Oil Piping."

B. Steel Oil Interceptors: Factory-fabricated; with removable sediment bucket or strainer, baffles, vents, and flow-control fitting on inlet.

1. Basis-of-Design Product: Subject to compliance with requirements, provide MIFAB, Inc.; MI-O or comparable product by one of the following:

   a. Jay R. Smith Mfg. Co.
   b. Josam Company.
   c. <**Insert manufacturer's name**>.

2. Inlet, Outlet, Vent, and Waste-Oil Outlet Piping Connections: No-Hub, unless otherwise indicated.
3. Extension: Steel shroud, full size of interceptor, extending from top of interceptor to grade.
4. Cover: Steel, with steel reinforcement to provide ASTM C890, [**A-03, walkway**] <**Insert loading type**> load.
5. Comply with requirements in Section 231113 "Facility Fuel-Oil Piping" for waste-oil storage tank and piping.

C. Plastic Oil Interceptors: Removable sediment bucket or strainer, baffles, vents, and flow-control fitting on inlet.

1. Basis-of-Design Product: Subject to compliance with requirements, provide MIFAB, Inc.; [**Lil Max, Model O**] [**Big Max, Model O**] [**SuperMax, Model O**] or comparable product by one of the following:

   a. Green Turtle Zurn.

b. Town & Country Plastics, Inc.
c. <**Insert manufacturer's name**>.

2. Inlet, Outlet, Vent, and Waste-Oil Outlet Piping Connections: No-Hub, unless otherwise indicated.
3. Extension: [**Plastic shroud extension**] [**18-inch (450-mm) diameter ADS corrugated pipe**] [**24-inch (600-mm) diameter ADS corrugated pipe extension**], extending from top of interceptor to grade.
4. Cover: Plastic[**with steel reinforcement to provide ASTM C890,**] [**A-03, walkway**] <**Insert loading type**> load.
5. Waste-oil storage tank and piping are specified in Section 231113 "Facility Fuel-Oil Piping."

D. Capacities and Characteristics:

1. Capacity: <**Insert gal. (L)**>.

2. Overall Dimensions: <**Insert inches (mm)**>.
3. Flow Rate: <**Insert interceptor design rate**>.
4. Inlet and Outlet Pipe Size: [**4 inch (100 mm)**] [**6 inch (150 mm)**] [**8 inch (200 mm)**].

a. Centerline of Inlet to Floor: <**Insert inches (mm)**>.
b. Centerline of Outlet to Floor: <**Insert inches (mm)**>.

5. End Connections: [**Flanged**] [No-**Hub**] [**Threaded**].
6. Waste-Oil-Outlet Pipe Size: <**Insert NPS (DN)**>.

a. Centerline of Outlet to Floor: <**Insert inches (mm)**>.

7. Trapped Outlet Required: Yes.
8. Cleanout: Integral **or field installed on outlet**.
9. Vent Pipe Size: [4 inch (100 mm)] <**Insert NPS (DN)**>.
10. Mounting: [**Above floor**] [**Recessed in acid-resistant, coated steel frame and cradle**] [**Recessed, flush with floor**] <**Insert mounting**>.
11. Flow-Control Fitting: Not required.

1.4 SAND INTERCEPTORS, STEEL

A. Description: Factory-fabricated, steel body [**and ductile iron inlet grate**]; with settlement chamber and removable basket or strainer.

B. Basis-of-Design Product: Subject to compliance with requirements, provide MIFAB, Inc.; MI-SAND or comparable product by one of the following:

1. Jay R. Smith Mfg. Co.
2. Josam Company.
3. <**Insert manufacturer's name**>.

C. Outlet Piping Connection: No-Hub, unless otherwise indicated.

D. Grate: Ductile iron with reinforcement to provide ANSI A112.21.1M Load Class, Special Duty, DIN 19580, Load Class E.

E. Capacities and Characteristics:

1. Liquid-Holding Capacity: <**Insert gal. (L)**>.
2. Overall Dimensions: <**Insert inches (mm)**>.
3. Outlet Pipe Size: [**4 inch (100 mm)**] [**6 inch (150 mm)**] [**8 inch (200 mm)**].
4. Trapped Outlet Required: Yes.
5. Vent Pipe Size: 4 inch (102 mm).
6. Installation Position: [**Top flush with grade**] [**Above ground**].

1.5 SAND INTERCEPTORS, PLASTIC

A. Description: Factory-fabricated, HDPE body and inlet grate; with settlement chamber and removable basket or strainer.

B. Basis-of-Design Product: Subject to compliance with requirements, provide MIFAB, Inc.; [**Lil-SA**] [**Lil-OS**] [**Big-SA**] [**Big-OS**] [**Super-SA**] [**Super-OS**] or comparable product by one of the following:

1. Jay R. Smith Mfg. Co.
2. Josam Company.
3. <**Insert manufacturer's name**>.

C. Outlet Piping Connection: No-Hub unless otherwise indicated.

D. Grate: Cast ductile iron with reinforcement to provide ANSI A112.21.1M Load Class, Special Duty, DIN 19580, Load Class E.

E. Capacities and Characteristics:

1. Liquid Holding Capacity: <**Insert gal. (L)**>.
2. Overall Dimensions: <**Insert inches (mm)**>.
3. Outlet Pipe Size: [**4 inch (100 mm)**] [**6 inch (150 mm)**] [**8 inch (200 mm)**].
4. Trapped Outlet Required: Yes.
5. Vent Pipe Size: 4 inch (100 mm).
6. Installation Position: [**Top flush with grade**] [**Above ground**].

1.6 SOLIDS INTERCEPTORS

A. Steel Solids Interceptors <**Insert drawing designation if any**>:

1. Basis-of-Design Product: Subject to compliance with requirements, provide MIFAB, Inc.; [**MI-SOLID-L**] [**MI-SOLID-M**] [**MI-SOLID-S**] or comparable product by one of the following:

a. Jay R. Smith Mfg. Co.
b. Josam Company.
c. <**Insert manufacturer's name**>.

2. Type: Factory-fabricated interceptor made for removing and retaining lint, sediment, and solids from wastewater.

3. Body Material: Steel.
4. Interior Separation Device: Screens.
5. Interior Lining: Acid-resistant epoxy.
6. Exterior Coating: Acid-resistant epoxy.
7. Body Dimensions: <**Insert dimensions**>.
8. Flow Rate: [**15 gpm (0.6 L/s**] [**20 gpm (1.3 L/s**] [**30 gpm (1.9 L/s)**].
9. Inlet and Outlet Size: [**2 inch (50 mm)**] [**3 inch (75 mm)**].
10. End Connections: [**Threaded**] [**No-Hub**].
11. Mounting: [**Above ground**] [**In ground**] .

B. Plastic Solids Interceptors:

1. Basis-of-Design Product: Subject to compliance with requirements, provide MIFAB, Inc. [**Mini-Max**] [**Lil Max**] [**Big Max**] or comparable product by one of the following:

   a. Ashland PolyTrap.
   b. Town & Country Plastics, Inc.
   c. <**Insert manufacturer's name**>.

2. Type: Factory-fabricated interceptor made for removing and retaining lint, sediment**,** and solids from wastewater.
3. Body Material: HDPE.
4. Interior Separation Device: Screens.
5. Body Dimensions: <**Insert dimensions**>.
6. Flow Rate: [**15 gpm (0.9 L/s)**] [**20 gpm (1.3 L/s)**] [**25 gpm (1.6 L/s)**] [**35 gpm (2.2 L/s)**] [**50 gpm (3.2 L/s)**] [**75 gpm (4.7 L/s)**] [**100 gpm (6.3 L/s)**] .
7. Inlet and Outlet Size: [**2 inch (50 mm)**] [**4 inch (100 mm)**].
8. End Connections: [**No-Hub**] [**Threaded**] <**Insert connections**>.
9. Mounting: [**Above floor**] [**Inline**] <**Insert mounting**>.

2. PRECAST CONCRETE MANHOLE RISERS

   a. Precast Concrete Manhole Risers: [**ASTM C478 (ASTM C478M)**] [**ASTM C913**], with rubber-gasket joints.

   1) Structural Design Loads:

      a) Light-Traffic Load: Comply with ASTM C890, A-8.
      b) Medium-Traffic Load: Comply with ASTM C890, A-12.
      c) Heavy-Traffic Load: Comply with ASTM C890, A-16.
      d) Walkway Load: Comply with ASTM C890, A-03.

   2) Length: From top of underground concrete structure to grade.
   3) Riser Sections: 3-inch (75-mm) minimum thickness and [**36-inch (915-mm)**] <**Insert dimension**> diameter.
   4) Top Section: Eccentric cone, unless otherwise indicated. Include top of cone to match grade ring size.
   5) Gaskets: ASTM C443 (ASTM C443M), rubber.
   6) Steps: [Individual FRP steps or FRP ladder] [Individual FRP steps, FRP ladder, or ASTM A615/A615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D4101, PP] [ASTM A615/A615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D4101, PP] <Insert material>, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into

sidewalls at 12- to 16-inch (300- to 400-mm) intervals.

b. Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, diameter matching manhole frame and cover, and height as required to adjust the manhole frame and cover to indicated elevation and slope.

c. Manhole Frames and Covers: Ferrous; 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch- (100-mm-) minimum width flange and 26-inch- (660-mm-) diameter cover.

7) Ductile Iron: ASTM A536, Grade 60-40-18, unless otherwise indicated.
8) Gray Iron: ASTM A48/A48M, Class 35, unless otherwise indicated.
9) Include indented top design with lettering cast into cover, using wording equivalent to the following:

a) Grease Interceptors in Sanitary Sewerage System: "[**INTERCEPTOR**] [**GREASE INTERCEPTOR**] [**SANITARY SEWER**] <**Insert lettering**>."
b) Oil Interceptors in Sanitary Sewerage System: "[**INTERCEPTOR**] [**OIL INTERCEPTOR**] [**SANITARY SEWER**] <**Insert lettering**>."

2.08 UV-RESISTANT PAINT

A. Silicone acrylic, high solids, heat-resistant gloss topcoat, VOC compliant, 2 coats – 2 mil to 3 mil each coat, UV resistant, colors to be selected by Architect (black, new tone white, cirrus gray, shale gray, thunder gray, or primer dark gray); “Kem HI Temp Heat – Flex II 450” by Sherwin Williams, or approved equivalent (no known equal).

2.09 PIPING SEISMIC JOINT

A. Piping seismic joints shall consist of flexible loops of stainless steel braided flexible connectors similar to Flexible Expansion Loops as specified in Section 22 05 16 – Expansion Compensation for Plumbing.

B. Required seismic movement to be compensated for by the piping seismic joint shall be as identified on the Structural Drawings or on the Seismic Joint Schedule on the Drawings.

C. Provided pipe anchors located on each side of the building seismic joint and piping seismic joint, anchored to the structure. Anchors shall be as specified in Section 22 05 16 – Expansion Compensation for Plumbing.

PART 3 – EXECUTION

3.01 APPLICATIONS

A. No Hub Couplings:

1. Provide medium duty no-hub couplings on waste and sanitary piping 4 inches and smaller above grade.

2. Provide standard no-hub couplings on above ground vent piping only.
3. Provide medium duty no-hub couplings on storm piping from area drains, roof drains and overflow drains.

4. Provide medium duty no-hub couplings on sanitary piping 4 inches and smaller.
5. Provide heavy duty no-hub couplings on sanitary piping 5 inches and larger.
6. Provide heavy duty no-hub couplings on sanitary and storm piping below grade.
7. Provide heavy duty 316 stainless steel no-hub couplings on sanitary and storm piping below grade where there is exposure to corrosive soils.

B. Pump Discharge Piping:

1. Pump discharge pipe size shall be sized for fluid velocity greater than 2 feet per second and not greater than 6 feet per second. Piping size shall not be less than indicated on the Drawings:
2. Provide gate or ball valve and check valve in each pump discharge piping, as specified in Section 22 11 23 – Plumbing Pumps.

C. Auxiliary Tailpiece with Tapped Inlet: Provide auxiliary tailpiece with tapped inlet for installation on drain body outlet piping, where trap primer is required and drain body and “P” trap is provided without trap primer connection.

D. UV-Resistant Paint: Provide coating on exterior of plastic pipe exposed to sun, including vents through roof.

3.02 INSTALLATION

A. Piping:

1. Make threaded joints with Teflon sealing tape and with a minimum of three screw threads left visible.
2. Nipples: Provide nipples of weight corresponding to piping. Use only shoulder nipples unless otherwise directed.

3. All Sanitary and Storm Drainage piping shall slope at 2 percent. Piping 4” and larger may slope at 1 percent provided approval from the AHJ has been obtained first.

4. All Sanitary and Storm Drainage piping 2 inch and smaller shall slope at 2 percent. All Sanitary and Storm Drainage piping 3 inch to 6 inch shall slope at 1 percent. All Sanitary and Storm Drainage piping 8” and larger shall slope at 0.5 percent.

5. All Grease Waste piping shall slope at 2 percent. Piping 4” and larger may slope at 1% provided approval from the AHJ has been obtained first.

6. Provide capped and/or plugged connections in soil, waste and vent piping as required and where indicated on the Drawings (e.g., tenant spaces]) for future extension to equipment and fixtures provided under other sections of the work.
7. Connections and Change in Direction:

a. Make changes in direction with long sweep or bends or with ⅛ and/or 1/16 bends at cleanouts, combination “Y” and ⅛ bend branches at base of roof leader and drainage stacks and vertical piping rising to fixture waste rough-ins.
b. Make connections of branches to mains with “Y” fittings and ⅛ or 1/16 bends.
c. Double sanitary tees may be used when barrel of the fitting is at least two

pipe sizes larger than the largest inlet.

d. Do not change direction of flow more than 90 degrees.

e. Use proper size of standard increasers and reducers if pipes of different sizes are connected.

f. Reducing size of drainage piping in direction of flow is prohibited.

8. Buried Piping: Lay buried building drain piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

B. Trap Primers: Refer to Section 22 11 00 – Domestic Water Systems, for additional related trap primer product selection, installation and coordination required for trap primer installations.

C. Trap Primer Discharge Piping:

1. Provide trap primers discharge piping appropriate for trap primers installed for trapped plumbing drainage installations indicated on the Drawings and where required by local jurisdictional codes.
2. Provide ½-inch Type "L" annealed copper tubing for trap primer discharge piping routing to auxiliary tailpiece with tapped inlets or tapped drain body with positive drainage slope towards connection.
3. Coordinate discharge piping routing and method of connection to inlet side of floor drain to tailpiece and insure discharge piping has positive drainage towards connection point at floor drain with no low points. Bury piping within floor slab where approved by Architect.
4. Select appropriate type of connection at drainage system and provide floor drain trap primer connection within body of floor drain or provide auxiliary tailpiece with tapped connection as needed for proper installation.
5. Provide flexible unicellular insulation or flexible sealant and floor sleeve where piping passes through slab on grade.
6. Refer to Section 22 11 00 – Domestic Water Systems, for additional related trap primer product selection coordination required for trap primers installations.

D. Supports:

1. All horizontal cast iron no-hub pipe shall be supported every 10 feet maximum, and within 6 inches at each side of each joint. When a concentration of fittings occurs, additional support shall be installed, consistent with good trade practices. All horizontal cast iron soil piping shall be supported at each horizontal branch connection.
2. All horizontal plastic pipe 2 inches and smaller shall be supported in accordance with manufacturer support data based on temperature of 140 degrees F and on each side of each joint. When a concentration of fittings occurs, additional support shall be installed, consistent with good trade practices. All horizontal piping shall be supported at each horizontal branch connection.
3. Supports for vertical piping shall be double bolt riser clamps, with each end having equal bearing on the building structure. Supports to be provided as follows:

a. Cast iron pipe/plastic pipe at every floor and at its base.

b. Threaded pipe at every other story height.
c. All auxiliary steel and supports required for pipe supports shall be provided under this Section.
d. Make piping rigid in piping chases using support systems to resist push or pull movement at fixture waste rough-ins.
e. Make piping rigid in piping chases using supports system directly attached to piping to resist push or pull movement at fixture waste rough-ins.

E. No-Hub Cast Iron Soil Pipe:

1. Where components are suspended in excess of 18 inches by means of non-rigid hangers, brace against horizontal movement (sway brace).
2. 6 inches and larger: Brace to prevent horizontal movement at every branch opening and change of direction by securing to building structure.
3. In seismic zones 3 and 4, provide support on both sides of the no-hub coupling on piping 5-inch and larger routing over public, high-traffic areas, lobbies, and egress pathways.

F. Flashing Fittings: Provide vents and all other pipes passing through roofs with a flashing fitting set at a suitable level above the roof to terminate the flashing. Arrange piping passing through roofs to be a minimum of 12 inches from walls or other obstructions so as to permit proper flashing.

G. Drains:

1. Provide floor drains and floor sinks with trap primer connections on body drain or by providing auxiliary tailpiece with tapped inlet.

2. Trap primers are not required for floor sink installations in food preparation areas unless otherwise noted.
3. Reset drain rims to suit final construction elevations.
4. Floor Drains:

a. Set drain rims flush and level with finished floor in areas subject to foot traffic.
b. Set drain rims minus ⅛ inch to ¼ inch from finish floor elevation, so as to provide positive drainage, where drain is not subject to foot traffic.

5. Floor Sinks: Floor sinks installed for food prep area and for indirect waste only shall be installed with rim set flush with finish floor unless otherwise required by the Authorities Having Jurisdiction.
6. Make installations water-tight.

H. Traps:

1. Refer to Section 22 11 00 – Domestic Water Systems, for plumbing fixture traps.
2. Provide deep seal “P” traps for all floor drain and floor sink installation with trap primers. Should building conditions prevent use of a deep seal “P” trap, notify Architect (on a case-by-case basis) for direction.
3. Set traps level with regard to their water line.
4. Traps shall be same size as connecting drain outlets.
5. Provide adaptor coupling where required to connect dissimilar waste piping materials as recommended by waste piping manufacturers.

I. Cleanouts:

1. Provide cleanouts in drainage systems in accordance with the Reference Standards and where indicated.

2. Provide cleanouts in indirect waste lines at every change in direction.

a. Buried Piping:

10) Provide cleanouts at ends of horizontal branches and mains, at base of riser conductor lines, at changes in direction greater than 45 degrees, in main drains where mains leave building, and where necessary to remove obstructions.

11) Locate cleanouts so that developed length is not more than 50 feet apart on lines 4 inches and smaller and not more than 100 feet apart on lines 5 inches through 15 inches.

3. Cleanouts at the base of all drainage stacks with tapped tees capable of receiving a rough brass countersunk head.
4. Provide brass cleanout plugs and thoroughly coat threads on removable parts with graphite.
5. Provide a full size “Y” branch cleanout in sanitary house drains within 2 feet of the foundation wall.
6. Provide cleanouts and related covers full size for pipes up to 4 inches inclusive, not less than 4 inches for pipes up to 6 inches, not less than 6 inches for pipes up to 8 inches and 10 inches, and not less than 8 inches for pipes up to 12 inches and 15 inches.
7. Install cleanouts on 3-inch or larger pipes at location to maintain minimum clearance of 18 inches.
8. Install cleanouts on 1½-inch and 2-inch pipes at location to maintain minimum clearance of 12 inches.
9. Provide 18-inch by 18-inch by 6-inch thick concrete pad for exterior grade cleanout installed in asphalt and non-paved areas. Center exterior grade cleanout in concrete pad.

J. Vent Piping:

1. Provide vents shown on the Drawings, as required by Plumbing Code, and as necessary to prevent siphonage or back-pressure on trap seals and to maintain air circulation and atmospheric pressure throughout drainage system.

2. Do not locate outlets of vent piping through the roof less than 25-feet, 0-inches from any air intake duct and vent shaft louver.

3. Do not terminate vent outlet less than ten (10) feet from any openable window, or on Residential Buildings at least three (3) feet from any openable window, door opening, air intake vent shaft, nor less than three (3) feet in every direction from any lot line; alley and street excepted.
4. Vent lines shall be extended separately or combined, of full required size, not less than six (6) inches above the roof or fire wall.
5. Flag poling of vents is prohibited, except where roof is used for purposes other than weather protection.

a. All vents within ten (10) feet of any part of the roof that is used for such other purposes shall extend not less than seven (7) feet above such roof

and shall be securely stayed.

6. Vent pipes installed at grade level shall be extended ten (10) feet above the surrounding ground and shall be securely stayed.
7. Grade vents to discharge water of condensation, where possible and do not allow reverse grade to trap water.
8. Make offsets at 45-degree angle wherever possible. Connect upper ends of drainage lines to vent system or extend through roof without decreasing size of vent stacks.
9. Arrange vents and related connections, except wet vent, to not carry drainage.
10. Connect bottom of vent risers to drains in an arrangement where the drainage will wash out rust and scale from the vent riser.
11. Extend portions of vents above floor line upwards to points not less than six (6) inches above flood rim of highest fixture before running horizontally.
12. Run portions below floor line vertically wherever possible.
13. Do not connect main vents into soil or waste stacks lower than six (6) inches above flood rim of highest fixture on stack.

K. Roof and Overflow Drains:

1. Provide style of drains compatible with the roof structure and roofing materials.
2. Provide roof drains with outlets size same as roof drain leader pipes indicated on the Drawings.
3. Provide water-proof caulking and gasket between reversible collar and body.
4. Install drain body, sump receiver, under-deck clamps, before installation of roof membrane system. Set drain flange tight to roof deck. Secure drain to roof deck with approved under-deck clamp bolted to underside of drain body. Protect roofing ballast from entering drain body or leader pipe during roofing installation. Rod-clean each roof drain, each roof overflow drain, each area drain and each leader removing all soil, refuse, and other foreign material.
5. Test flow of each drain with appropriate water flow in the presence of the Owner's Representative.

L. Interceptor Equipment Mounting:

12) Install [**grease interceptors**] [**grease removal devices**] [**and**] [**solids interceptors**] on cast-in-place concrete equipment base(s).
13) Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

a. Install precast concrete interceptors in accordance with ASTM C891.

b. Set interceptors level and plumb.
c. Install manhole risers from top of underground concrete interceptors to manholes and gratings at finished grade.
d. Set tops of manhole frames and covers flush with finished surface in pavements.

14) Set tops [**3 inches (75 mm)**] <**Insert dimension**> above finish surface elsewhere unless otherwise indicated.

e. Set tops of grating frames and grates flush with finished surface.
f. Set [**metal**] [**and**] [**plastic**] interceptors level and plumb.
g. Set tops of metal interceptor covers flush with finished surface in pavements.

15) Set tops [**3 inches (75 mm)**] <**Insert dimension**> above finish surface

elsewhere unless otherwise indicated.

h. Install piping and oil storage tanks in accordance with Section 231113 "Facility Fuel-Oil Piping."

i. Install grease interceptors, including trapping, venting, and flow-control fitting, in accordance with authorities having jurisdiction and with clear space for servicing.

16) Above-Floor Installation: Set unit with bottom resting on floor unless otherwise indicated.
17) Flush with Floor Installation: Set unit and extension, if required, with cover flush with finished floor.
18) Recessed Floor Installation: Set unit in receiver housing having bottom or cradle supports, with receiver housing cover flush with finished floor.
19) Install cleanout immediately downstream from interceptors not having integral cleanout on outlet.

j. Install grease removal devices on floor. Install trap, vent, and flow-control fitting in accordance with authorities having jurisdiction.

20) Install control panel adjacent to unit unless otherwise indicated.

k. Install oil interceptors, including trapping, venting, and flow-control fitting, in accordance with authorities having jurisdiction and with clear space for servicing.

21) Coordinate oil-interceptor storage tank and gravity drain with Section 231113 "Facility Fuel-Oil Piping."

l. Install solids interceptors with cleanout immediately downstream from interceptors that do not have integral cleanout on outlet.

22) Install trap on interceptors that do not have integral trap and are connected to sanitary drainage and vent systems.

M. CONNECTIONS

a. Piping installation requirements are specified in Section 221316 "Sanitary Waste and Vent Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
b. Make piping connections between interceptors and piping systems.

3.03 TESTING AND ADJUSTMENTS

A. Provide testing of all installed drainage and vent systems during the progress of the work, including sanitary, laboratory, storm drainage and vent systems, and fixture roughing-in sections, as directed to permit general construction and building-in of rough work to proceed. Such tests shall be made in the presence of the Owner’s Representative, Building Department Inspectors and all other Authorities Having Jurisdiction. A minimum of 48-hours’ notice shall be given to all parties prior to any testing.

B. Take all due precautions to prevent damage to the building or its contents that may be incurred by such tests as the Contractor will be required to repair and make good, at own expense, any damage caused.

C. Any defects or deficiencies discovered as a result of tests shall be immediately repaired and tests shall be repeated until all test requirements are fully met.

D. No caulking of pipe joints to remedy leaks will be permitted except for hub and spigot joints where lead and oakum joints are used.

E. Each section of drainage and vent rough-in piping tested shall have all openings tightly closed with screw plugs, or equal device, and stand without loss of level for a period of 4 hours when filled with water which produces at least a 10-foot head at the highest point of the section tested.

F. Each section of roof and overflow drainage piping shall be tested corresponding to the full head of water attainable in each portion of the system.

G. The drainage and vent systems shall again be tested and made tight after all plumbing fixtures are connected in place and with water seals in traps by means of standard smoke or chemical test as required by the Plumbing Inspector.

H. Submit to the Architect copies of all test reports witnessed by Plumbing Inspector(s) and Owner's Representative.

I. Chemical Waste Piping:

1. Inspect piping (fittings and connections) as recommended by pipe system manufacturer.

J.

3.04 IDENTIFICATION

A. Identification materials and installation are specified in Section 312000 "Earth Moving."

1. Arrange for installation of green warning tapes directly over piping and at outside edges of underground interceptors.
2. Use warning tapes or detectable warning tape over ferrous piping.
3. Use detectable warning tape over nonferrous piping and over edges of underground structures.

B. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. Grease interceptors.
2. Grease removal devices.
3. Oil interceptors.
4. Solids interceptors.

3.05 PROTECTION

A. Protect sanitary waste interceptors from damage during construction period.

B. Repair damage to adjacent materials caused by sanitary waste interceptor installation.

C.

END OF SECTION 22 13 00