SECTION 22 13 00 - FACILITY SANITARY SEWERAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sanitary sewer piping buried beyond 5 feet of building.
2. Sanitary sewer piping buried within 5 feet of building.
3. Sanitary sewer piping above grade.
4. Chemical resistant sewer piping.
5. Unions and flanges.
6. Floor drains.
7. Floor sinks.
8. Cleanouts.
9. Backwater valves.
10. Sumps.
11. Interceptors.
12. Maintenance Holes.
13. Sewage ejectors.
14. Bedding and cover materials.

1.2 REFERENCES

A. General: Comply with appropriate standards.

1. Plumbing and Drainage Institute: PDI.

1.3 SUBMITTALS

A. Submit data on all materials, fittings, accessories and equipment.

B. Manufacturer's Installation Instructions: Submit installation instructions for material and equipment.

C. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes for sewage-ejectors and Maintenance Holes.

D. Product Data:

1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.
2. Sanitary Drainage Specialties: Submit manufacturers catalog information, component sizes, rough-in requirements, service sizes, and finishes.

3. Pumps: Submit pump type, capacity, certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements.

E. Manufacturer's Installation Instructions: Submit installation instructions for material and equipment.

F. Product Data: For grease interceptor indicated. 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 interceptor indicated.

1. Include materials of construction, dimensions, rated capacities, retention capacities, location and size of each pipe connection, furnished specialties, and accessories.
2. Include calculations for aircraft loading.
3. See LAWA Airport Structural Design Standards for additional requirements.

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

1. Interceptors.
2. Piping connections. Include size, location, and elevation of each.
3. Interface with underground structures and utility services.
4. Coordinate installation with site utility and site paving contractor to prevent interceptor damage.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of equipment and clean-outs.

B. Operation and Maintenance Data: Submit frequency of treatment required for interceptors. Include, spare parts lists, exploded assembly views for pumps and equipment.

1.5 WARRANTY

A. Furnish one-year minimum warranty.

PART 2 - PRODUCTS

2.1 SANITARY SEWER PIPING, BURIED BEYOND 5 FEET OF BUILDING

A. Coordinate with Civil Engineer.

B. Ductile-Iron Pipe and Fittings

1. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end, unless grooved or flanged ends are indicated.
    a. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
    b. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
2. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end, unless grooved or flanged ends are indicated.
    a. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
    b. Gaskets: AWWA C111, rubber.
3. Flanges: ASME 16.1, Class 125, cast iron.

C. Vitrified Clay Pipe: Pipe and fittings shall be extra strength or high strength manufactured in accordance with ASTM C700.

D. ABS Pipe: Pipe, fittings and joints shall comply with codes and standards in effect at time of installation.

E. Drainage Fittings: ASME B16.12, galvanized, threaded, cast-iron drainage pattern.

F. Pressure Fittings:
1. Steel Pipe Nipples: ASTM A733, made of ASTM A53/A53M or ASTM A106, Schedule 40, galvanized, seamless steel pipe. Include ends matching joining method.
2. Malleable-Iron Unions: ASME B16.39; Class 150; hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface; and female threaded ends.
3. Gray-Iron, Threaded Fittings: ASME B16.4, Class 125, galvanized, standard pattern.
4. Cast-Iron Flanges: ASME B16.1, Class 125.
5. Cast-Iron, Flanged Fittings: ASME B16.1, Class 125, galvanized.

2.2 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Soil Pipe: CISPI, ASTM A888 service weight, hubless, aboveground.
1. Fittings: Cast iron, ASTM A888 and CISPI – with stainless steel clamp and shield assembly.
2. Joints: CISPI ASTM C564, rubber gasket joint devices.
3. Manufacturers – Heavy Duty Stainless Steel Couplings
    a. **Husky / Anaco / McWane Inc.:** Husky SD 4000.
    b. Clamp-All Products / NORMA Group
    c. Ideal-Tridon / Ideal Clamp Products, Inc.

4. Manufacturers – Heavy Duty Cast or Ductile Iron Couplings
   - **a. MG Coupling / MG Piping Products Company.**
   - **b. Victaulic Company.**
   - **c. OR Approved Equal.**

B. Ductile-Iron Pipe and Fittings

1. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end, unless grooved or flanged ends are indicated.
   a. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
   b. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
2. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end, unless grooved or flanged ends are indicated.
   a. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
   b. Gaskets: AWWA C111, rubber.
3. Flanges: ASME 16.1, Class 125, cast iron.

C. ABS Pipe: Pipe, fittings and joints shall comply with codes and standards in effect at time of installation.

2.3 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: CISPI, ASTM A888, hub-less, service weight, hubless.

1. Fittings: Cast iron, CISPI, ASTM A888.
2. Joints: CISPI, ASTM C564, rubber gaskets and stainless steel clamp-and-shield assemblies.

2.4 CHEMICAL RESISTANT SEWER PIPING

A. ABS Pipe: ASTM D2751 or ASTM F628, Acrylonitrile-Butadiene-Styrene (ABS) material.

1. Fittings: ABS, ASTM D2661.
2. Joints: ASTM D2235, solvent weld.

B. Glass Pipe: ASTM C1053, borosilicate glass material.

1. Fittings: ASTM C1053, borosilicate glass.
2. Joints: Stainless steel compression couplings with tetra-fluoroethylene seal ring.

C. PP / PPFR Pipe: Polypropylene Pipe / Polypropylene Flame Retardant Pipe.

1. Fittings: Polypropylene.
2. Joints: Electrical resistance fusion.

2.5 SPECIAL PIPE FITTINGS

A. Expansion Joints: Two or three-piece, ductile-iron assembly consisting of telescoping sleeve(s) with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

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

a. EBAA Iron, Inc.

b. Romac Industries, Inc.

c. Star Pipe Products.

B. Wall-Penetration Fittings: Compound, ductile-iron coupling fitting with sleeve and flexing sections for up to 20-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

1. Manufacturers:

a. SIGMA Corporation.

b. Or Approved Equal.

2.6 ENCASEMENT FOR UNDERGROUND METAL PIPING

A. Description: ASTM A674 or AWWA C105, LLDPE film of 0.008-inch minimum thickness.

B. Form: Tube.

C. Color: Black.

2.7 UNIONS AND FLANGES

A. Unions for Pipe 2 inches and Smaller:

1. Copper Piping: Class 150, bronze unions with soldered brazed joints.
2. Brass Ball Valve and a 6” Nipple: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

B. Flanges for Pipe 2-1/2 inches and Larger:

1. Copper Piping: Class 150, slip-on bronze flanges.
2. Gaskets: 1/16 inch thick preformed neoprene gaskets.

2.8 FLOOR DRAINS

A. Manufacturers:

1. Jay R. Smith Mfg. Co. / Morris Group International.

2. Zurn Industries, LLC / Rexnord Corporation.

3. MIFAB, Inc.

B. Floor Drain: Shall be ductile, cast or grey iron body with double drainage flange, weep holes, anchor flange, round or square, adjustable nickel-bronze strainer, trap primer inlet, white acid resistant interior-size as required.

C. Provide heavy-duty traffic weight grate, sediment bucket, or stainless steel type where required.

D. Furnish materials in accordance with Sate of California Codes and City of Los Angeles Department of Building and Safety Standards.

E. Cast-Iron Floor Drains:

1. Manufacturers:

a. Jay R. Smith Mfg. Co. / Morris Group International

b. MIFAB, Inc.

c. Zurn Industries, LLC / Rexnord Corporation

2. Standard: ASME A112.6.3.

3. Pattern: Floor drain.

4. Body Material: Gray iron.

5. Outlet: Bottom.

6. Backwater Valve: Integral, ASME A112.14.1, swing-check type.

7. Coating on Interior and Exposed Exterior Surfaces: Acid-resistant enamel.

8. Top or Strainer Material: Nickel bronze.

9. Top of Body and Strainer Finish: Nickel bronze.

10. Top Shape: Round.

11. Top Loading Classification: Heavy Duty.

12. Trap Material: Cast iron.

13. Trap Pattern: Deep-seal P-trap.

14. Trap Features: Trap-seal primer valve drain connection.

F. General:

1. In accordance with ANSI A112.21.1 and where required for the following construction types. For built up membrane, provide a flashing clamp. For liquid membrane, provide a four inch wide flange. For elastomeric type floor, provide a four inch wide top flange at required height. Provide strainers with a nickel bronze finish except as noted.

2. Provide a coated cast iron body, except as noted, with integral double drainage flange and weep holes, inside caulked outlet or hub outlet for compression gasket connection, or hubless outlet except as noted.

3. Type, General, Shown Round: An adjustable extension neck and 6-inch diameter cast strainer, flashing clamp for membrane, equal to MIFAB 1100C, Smith No. 2010-A or Zurn ZN-415-6B. Floor drains with back water valves, equal to MIFAB 1100C-B, Smith No. 2010-AV or Zurn ZN415-6B-V. 6-inch x 6-inch strainers in kitchens equal to Smith No. 2010-B or Zurn ZN-415-6S, MIFAB F1100C-X.

4. Type, Showers: 6-inch diameter strainers for 3-inch outlet size and five-inch diameter strainers for 2-inch outlet size.

5. Type, In machinery rooms and unfinished areas shown round, adjustable cast iron extension neck and tractor type top grate, equal to MIFAB F1320C, Smith No. 2320 or Zurn Z520.

6. Type, In machinery rooms and unfinished areas shown square, adjustable cast iron extension neck and maximum diameter bottom bar strainer on short legs, equal to MIFAB F1320C, Smith No. 2320 or Zurn Z520 for 3-inch outlet and MIFAB 1340, Smith 2340 for 4 inch and 6-inch outlet modified without top grate.

7. Type, Shown square in kitchens and where noted. As noted above for floor drains in kitchens shown round or square, plus funnel where required.

    a. For drains receiving single indirect waste, provide strainer with matching 4-inch diameter x 3-1/4 inch high secured funnel, equal to MIFAB F4, Smith No. 3580 or Zurn Z-328-4.

    b. For drains receiving multiple indirect wastes, provide with matching 83 inch x 33 inch x 3 inch high secured funnel, equal to MIFAB G, Smith No. 3591 or Zurn Z-329-9.

    c. Where indirect waste is too low for standard funnel, provide strainer with matching 6 inch x 2½ inch x 1 inch high secured funnel, equal to MIFAB-J, Smith No. 3590 or Zurn-Z329-7.

8. Type, Vegetable Peeler Drain: An adjustable cast iron extension neck and deep removable bucket, equal to MIFAB F1340-14-5, Smith No. 2360 or Zurn Z526-Y.

9. Type, Can Wash Area: An adjustable cast iron extension neck and deep removable bucket, equal to MIFAB F1480-5, Smith No. 2630 (less top grate) or Zurn Z566-6T-Y-L6.

10. Type, Pit Wall Drain: Side outlet body and brass flap type backwater valve and bronze wall grate, equal to MIFAB BV1210, Smith No. 7000 or Zurn Z-629.

11. Type, Walk in Areaway Drain: Bottom outlet and flat strainer, equal to MIFAB F1320-Y-14, Smith No. 2110 or Zurn Z550 and with side outlet and flat strainer, equal to MIFAB F-1320C-90-Y-14, Smith No. 2115 or Zurn Z550-90.

12. Type, For Other Areaways: Bottom outlet and dome strainer, equal to MIFAB F1320C-Y-14-18, Smith No. 2110 D or Zurn 2550-D and with side outlet and dome strainer, equal to MIFAB F1320C-Y-14-18, Smith No. 2115-D or Zurn Z550-D-90.

13. Type, for Elastomeric Type Floors: Four-inch wide top flange at required depth. Shown round provide drain equal to MIFAB F1320-Y-14-5-2, Smith No. DX 2565 or Zurn Z-531 less bucket. Shown square Type, provide with maximum diameter bottom bar strainer, MIFAB F1340-Y-2-5-14, equal to Smith No. DX-2566 or Zurn Z532-LG modified without top grate.

14. Type, Flushing Rim Floor Drain: Acid resistant porcelain enamel inside and flushing connection and brass flushing rim top with.

2.9 FLOOR SINKS

A. Manufacturers:

1. Jay R. Smith Mfg. Co. / Morris Group International

2. Zurn Industries, LLC / Rexnord Corporation.

3. MIFAB, Inc.

B. Floor Sink: Shall be ductile, cast or gray iron body with double drainage flange, weep holes, anchor flange, round or square, or ½ or ¾ nickel-bronze grate, trap primer inlet, white acid resistant enamel interior-size as required.

C. Provide heavy-duty traffic weight grate, sediment bucket, or stainless steel type where required.

D. Cast-Iron Floor Sinks Except as Noted:

1. Manufacturers:

a. Jay R. Smith Mfg. Co. / Morris Group International

b. MIFAB, Inc.

c. Zurn Industries, LLC / Rexnord Corporation

2. Standard: ASME A112.6.3.

3. Pattern: Indirect waste receptors.

4. Body Material: Gray iron.

5. Outlet: Bottom.

6. Backwater Valve: Integral, ASME A112.14.1, swing-check type.

7. Coating on Interior and Exposed Exterior Surfaces: Acid-resistant enamel.

8. Top or Strainer Material: Cast iron.

9. Top of Body and Strainer Finish: Cast iron.

10. Top Shape: Round, square.

11. Top Loading Classification: Heavy Duty.

12. Trap Material: Cast iron.

13. Trap Pattern: P-trap.

14. Trap Features: Trap-seal primer valve drain connection.

E. General:

1. In accordance with ANSI A112.21.1 and where required for the following construction types. For built up membrane, provide a flashing clamp. For liquid membrane, provide a four inch wide flange. For elastomeric type floor, provide a four inch wide

top flange at required height. Provide strainers with a nickel bronze finish except as noted.

2. Provide a coated cast iron body, except as noted, with integral double drainage flange and weep holes, inside caulked outlet or hub outlet for compression gasket connection, or hubless outlet except as noted.

3. Type FS-1, General, Shown Square: An adjustable extension neck and 6-inch diameter cast strainer, flashing clamp for membrane, adjustable cast iron extension neck and tractor type top grate, equal to MIFAB FS-1730-FL-150, Smith No. 3150-Y-C-12 or Zurn Z520,

4. Type FS-2, In plumbing chases shown round, adjustable cast iron extension neck, bottom dome strainer, equal to MIFAB FS-1750-FL or Smith No. 3040-Y.

   a. For floor sinks receiving indirect waste, provide ½ grate strainer and frame.

   b. For round floor sinks, provide full round strainer and grate.

2.10 CLEANOUTS

A. Manufacturers:

   1. Jay R. Smith Mfg. Co. / Morris Group International

   2. Zurn Industries, LLC / Rexnord Corporation

   3. MIFAB, Inc.

B. Exterior Surfaced Areas: Round or Square lacquered cast iron body with anchor flange, neoprene gasket, adjustable access cover and plug top assembly.

C. Exterior Unsurfaced Areas: Line type with lacquered cast iron body and round epoxy coated cover with gasket.

D. Interior Finished Floor Areas: Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round scored cover with gasket in service areas and round square depressed cover with gasket to accept floor finish in finished floor areas.

E. Interior Finished Wall Areas: Cast bronze or cast iron body raised head plug, gasket, round or square stainless steel access cover secured with machine screw.

F. Interior Unfinished Accessible Areas: Threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

2.11 BACK WATER VALVES

A. Manufacturers:

   1. Jay R. Smith Mfg. Co. / Morris Group International

   2. Zurn Industries, LLC / Rexnord Corporation

   3. MIFAB, Inc.

B. Cast Iron: ASME A112.14.1; cast iron body and cover, removable bronze swing valve, extension sleeve as required, Bolted access cover, horizontal or vertical type, threaded or hubless ends.

2.12 SUMPS

A. Manufacturers:

1. Pro-Cast Product Inc.

2. Jensen Precast.

3. Zoeller Company.

B. Water-tight, factory fabricated; reinforced fiberglass or concrete; sleeved inlet, outlet and vent openings. Provide sidewall openings for pipe and vent connections.

C. Cover shall have integral seals, gaskets and bushings, sized for sump access.

D. Exterior locations shall have hinged and lockable traffic weight covers.

2.13 GREASE INTERCEPTORS

A. Manufacturers:

1. Pro-Cast Product Inc.

2. Jensen Precast.

3. Proceptor / Green Turtle Technologies Ltd. / Zurn Industries, LLC / Rexnord.

B. Comply with LAC – industrial waste division requirements.

C. Construction:

1. Material: Per equipment schedule and details.
2. Rough in: Below grade.

D. Accessories: Integral baffle, deep seal trap, sample box.

E. Cover: Heavy duty steel with gasket, liquid tight, bolt-down frame.

2.14 OIL INTERCEPTORS

A. Manufacturers:

1. Zurn Industries, LLC / Rexnord Corporation.

2. Pro-Cast Product Inc.

3. Jensen Precast.

B. Construction:

1. Material: Epoxy coated fabricated steel, or pre-cast concrete.

2. Rough in: Flush with floor (suspended) installation with anchor flange.

C. Accessories: Integral deep seal trap, removable, adjustable draw-off assembly, sediment bucket.

D. Cover: Steel, epoxy coated, non-skid with gasket, securing handle.

E. Cover shall have integral seals, gaskets and bushings, sized for sump access.

F. Exterior locations shall have hinged and lockable traffic weight covers.

2.15 SEDIMENT INTERCEPTORS

A. Manufacturers:

1. Zurn Industries, LLC / Rexnord Corporation.

2. Pro-Cast Product Inc.

3. Jensen Precast.

B. Construction:

1. Material: Epoxy coated fabricated steel, or pre-cast concrete.

2. Rough in: Flush with floor (suspended) installation with anchor flange.

C. Accessories: Integral deep seal trap, removable, adjustable draw-off assembly, sediment bucket.

D. Cover: Steel, epoxy coated, non-skid with gasket, securing handle.

E. Cover shall have integral seals, gaskets and bushings, sized for sump access.

F. Exterior locations shall have hinged and lockable traffic weight covers.

2.16 MAINTENANCE HOLES

A. Coordinate with Civil Engineer.

2.17 PRECAST CONCRETE MAINTENANCE HOLE RISERS

A. Extra-Heavy Duty Precast Concrete Maintenance Hole Risers: ASTM C478, with rubber-gasket joints.

1. Structural Design Loads:

a. Extra-Heavy Duty -Traffic Load, Aircraft Rated.

2. Length: From top of underground concrete structure to grade.

3. Riser Sections: 3-inch minimum thickness and 36-inch diameter.

4. Top Section: Eccentric cone, unless otherwise indicated. Include top of cone to match grade ring size.
5. Gaskets: ASTM C443, rubber.

B. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of Maintenance Hole frame and cover.

C. Extra-Heavy Duty Maintenance Hole Frames and Covers: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch- minimum width flange and 26-inch- diameter cover.

1. Ductile Iron: ASTM A536-80, Grade 100-70-03, or stronger, rated at 100,000 pounds.
2. Include indented top design with lettering cast into cover, using wording equivalent to the following:
   a. Grease Interceptors in Sanitary Sewerage System: "GREASE INTERCEPTOR."

2.18 SEWAGE EJECTORS

A. Manufacturers:

1. PACO / Grundfos CBS Inc.

2. Zoeller Company.

3. Or approved equal.

B. Type: Vertical centrifugal, direct connected, duplex arrangement.

C. Casing: Cast iron volute with radial clearance around impeller, slide away couplings.

D. Impeller: Cast iron; open non-clog, keyed and secured to stainless steel shaft.

E. Support: Cast iron pedestal motor support on steel floor plate with gas tight gaskets.

F. Bearings: Oil lubricated bronze sleeve spaced maximum 48 inches and grease lubricated ball thrust at floor plate.

G. Drive: Flexible coupling to vertical, solid shaft ball bearing electric motor.

H. Sump: Steel cover plate with steel curb frame for grouting sump with inspection opening and cover, and alarm fittings.

I. Controls (Duplex): Float operated mechanical alternator with float rod, stops, and corrosion resistant float to alternate operation of pumps. Cut-in second pump on rising level or lead pump failure. Furnish separate pressure switch high level alarm with transformer, alarm bell, and standpipe, and extra set of wired terminals for remote alarm circuit and emergency float switch with float rod, stops, and corrosion resistant float to operate both pumps on failure of alternator. Provide NEMA 250, Type 1 enclosure.

2.19 SUBMERSIBLE SEWAGE EJECTORS

A. Manufacturers:

1. PACO / Grundfos CBS Inc.

2. Zoeller Company.

3. Or approved equal.

B. Type: Completely submersible, vertical, centrifugal.

C. Casing: Cast iron pump body and oil filled motor chamber.

D. Impeller: Cast iron; open non-clog, stainless steel shaft.

E. Bearings: Ball bearings.

F. Sump: Fiberglass, steel or concrete with steel cover plate.

G. Accessories: Oil resistant cord and plug, with three-prong connector, for connection to electric wiring system including grounding connector.

H. Servicing: Slide-away coupling consisting of discharge elbow secure to sump floor, movable bracket, guide pipe system, lifting chain and chain hooks.

I. Controls: Integral level controls, with separate high level alarm.

J. Controls: Motor control panel containing across-the-line electric motor starters with ambient compensated quick trip overloads in each phase with manual trip button and reset button, circuit breaker, control transformer, electro-mechanical alternator, hand-off-automatic selector switches, pilot lights, high water alarm pilot light, reset button and alarm horn. Furnish mercury switch liquid level controls, steel shell switch encased in polyurethane foam with cast iron weight for pump on (each pump), pump off (common), and alarm. Provide NEMA 250, Type 1 enclosure.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

E. Field verify that connection to existing piping systems sizes, locations, and invert are as required.

F. Establish elevations of buried piping with not less than allowed per code.

G. Establish minimum separation of from other piping services in accordance with code.

3.2 PIPING APPLICATION

A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 and smaller shall be the following:

1. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
2. Steel pipe, drainage fittings, and threaded joints.
3. Stainless-steel pipe and fittings, gaskets, and gasketed joints.

C. Aboveground, soil and waste piping NPS 5 and larger shall be the following:

1. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
2. Steel pipe, drainage fittings, and threaded joints.

D. Aboveground, vent piping NPS 4 and smaller shall be the following:

1. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
2. Steel pipe, drainage fittings, and threaded joints.
3. Stainless-steel pipe and fittings gaskets and gasketed joints.

E. Aboveground, vent piping NPS 5 and larger shall be the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Steel pipe, drainage fittings, and threaded joints.
3. Stainless steel pipe and fittings gaskets, and gasketed joints

F. Underground, soil, waste, and vent piping NPS 4 and smaller shall be the following:

1. Extra-Heavy class, cast-iron soil piping; gaskets; and gasketed joints.
2. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, cast-iron couplings; and hubless-coupling joints.
3. Stainless-steel pipe and fittings, gaskets, and gasketed joints.

G. Underground, soil and waste piping NPS 5 and larger shall be the following:

1. Extra-Heavy class, cast-iron soil piping; gaskets; and gasketed joints.
2. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, cast-iron couplings; and hubless-coupling joints.

H. Aboveground sanitary-sewage force mains NPS 1-1/2 and NPS 2 shall be the following:

1. Hot dipped Galvanized Steel Pipe schedule 40, pressure fittings, and threaded joints.

I. Aboveground sanitary-sewage force mains NPS 2-1/2 to NPS 6 shall be the following:

1. Hot dipped Galvanized Steel Pipe schedule 40, pressure fittings, and threaded joints.

J. Underground sanitary-sewage force mains NPS 4 and smaller shall be the following:

1. Hot dipped Galvanized Steel Pipe schedule 40, pressure fittings, and threaded joints.

K. Above ground condensate shall be the following:

1. Hard copper ASTM B88 with pressure fittings or DWV copper ASTM B306 with drainage fittings.

3.3 PIPING INSTALLATION

A. Sanitary sewer piping beyond five feet outside the building is specified in “Civil Utility Section”.

B. Provide basic piping installation as required.

C. Install seismic restraints on piping.

D. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

E. Install cleanout fitting with closure plug inside the building in sanitary force-main piping.

F. Install underground, ductile-iron, force-main piping according to AWWA C600. Install buried piping inside the building between wall and floor penetrations and connection to sanitary sewer piping outside the building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.

1. Install encasement on piping according to ASTM A674 or AWWA C105.

G. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Provide sleeves and mechanical sleeve seals as required.

H. Install wall-penetration fitting at each service pipe penetration through foundation wall. Make installation watertight.

I. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A674 or AWWA C105.

J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.

1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
2. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe.
3. Straight tees, elbows, and crosses may be used on vent lines.
4. Do not change direction of flow more than 90 degrees.
5. Use proper size of standard increasers and reducers if pipes of different sizes are connected.
6. Reducing size of drainage piping in direction of flow is prohibited.

K. Lay buried building drainage 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.

L. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 6 and smaller.
2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow NPS 2 (DN80) and smaller at 1/4 inch per foot minimum.
3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

M. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

N. Hubless piping shall be installed in a rigid, linear, and plumb system without any deflection at the joints either horizontally or vertically. The system shall be supported and secured to the building structure to prevent movement induced by a ten-foot head of water and its associated thrust forces.

1. When horizontal hubless CI piping is suspended in excess of 18 inch by means of non-rigid hangers, provide sway bracing to prevent horizontal movement.
2. For all horizontal hubless CI piping 5-inch and larger, provide sway bracing to prevent horizontal movement at every branch opening and change of direction by securing to building structure, or provide pipe clamps and rodding across coupling.

O. Exterior exposed vent terminations to be stainless steel at through exterior wall penetrations.

3.4 HANGER & SUPPORT INSTALLATION

A. Pipe hangers and supports - Install the following:

1. Vertical Piping: MSS Type 8 or Type 42 clamps.
2. Install individual, straight, horizontal piping runs according to the following:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

b. Longer than 100 Feet: MSS Type 43, adjustable roller hangers.

c. Longer than 100 Feet, if indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.

4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Install supports as required.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 10 feet, 0 inches with 3/8-inch rod.

2. NPS 3: 10 feet, 0 inches with 1/2-inch rod.

3. NPS 4 and NPS 5: 10 feet, 0 inches with 5/8-inch rod.

4. NPS 6: 10 feet, 0 inches with 3/4-inch rod.

5. NPS 8 to NPS 12: 10 feet, 0 inches with 7/8-inch rod.

F. Install supports for vertical cast-iron soil piping every 15 feet.

G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4: 84 inches with 3/8-inch rod.

2. NPS 1-1/2: 108 inches with 3/8-inch rod.

3. NPS 2: 10 feet with 3/8-inch rod.

4. NPS 2-1/2: 11 feet with 1/2-inch rod.

5. NPS 3: 12 feet with 1/2-inch rod.

6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.

7. NPS 6: 12 feet with 3/4-inch rod.

8. NPS 8 to NPS 12: 12 feet with 7/8-inch rod.

H. Install supports for vertical steel piping every 15 feet.

I. Install hangers for stainless-steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2: 84 inches with 3/8-inch rod.

2. NPS 3: 96 inches with 1/2-inch rod.

3. NPS 4: 108 inches with 1/2-inch rod.

4. NPS 6: 10 feet with 5/8-inch rod.

J. Install supports for vertical stainless-steel piping every 10 feet.

K. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4: 72 inches with 3/8-inch rod.
2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
3. NPS 2-1/2: 108 inches with 1/2-inch rod.
4. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
5. NPS 6: 10 feet with 5/8-inch rod.
6. NPS 8: 10 feet with 3/4-inch rod.

L. Install supports for vertical copper tubing every 10 feet.

M. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 SANITARY PIPING INSTALLATION

A. Install backwater valves in building main sewer piping as required. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.

B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.
2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.

b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.

c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.

4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

F. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface, unless otherwise indicated.

G. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.

H. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.

I. Install through-penetration firestop assemblies in plastic at floor penetrations.

J. Assemble open drain fittings and install with top of hub 2 inches above floor.

K. Install deep-seal traps on floor drains and other waste outlets, if indicated.

L. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.

2. Size: Same as floor drain inlet.

M. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

N. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.

O. Install vent caps on each vent pipe passing through roof.

P. Do not install vent caps at wall penetrations.

Q. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.

R. Install grease interceptors, including trapping, venting, and sampling box, according to authorities having jurisdiction and with clear space for servicing.

S. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

T. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

U. Install electric self-regulating temperature maintenance cable (Heat Trace cable) on all grease waste piping.

3.6 FLASHING INSTALLATION

A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:

1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft., 0.0938-inch thickness or thicker. Solder joints of lead sheets 4.0-lb/sq. ft., 0.0625-inch thickness or thinner.

2. Copper Sheets: Solder joints of copper sheets.

B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.

1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.

2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.

3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches around specialty.

C. Set flashing on floors and roofs in solid coating of bituminous cement.

D. Secure flashing into sleeve and specialty clamping ring or device.

E. Install flashing for piping passing through roofs with counterflashing or commercially made flashing fittings as required.

F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.

G. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.7 SANITARY INTERCEPTORS INSTALLATION

A. Install interceptor inlets and outlets at elevations indicated.

B. Place concrete for cast-in-place interceptors according to ACI 318/318R and ACI 350R.

C. Install precast concrete interceptors according to ASTM C891. Set level and plumb.

D. Install maintenance risers from top of underground concrete interceptors to Maintenance Holes and gratings at finished grade.

E. Set tops of maintenance frames and covers coordinated with site paving contractor and LAWA requirements.

F. Clean and prepare concrete surfaces to be field painted. Remove loose efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen surface as required to remove glaze. Paint the following concrete surfaces as recommended by paint manufacturer:

1. Precast Concrete Interceptors: All exterior and interior.

3.8 SEWERAGE PUMPS INSTALLATION

A. Provide excavating, trenching, and backfilling as required.

B. Install sewage pumps according to applicable requirements in ANSI/HI 1.4.

C. Install pumps and arrange to provide access for maintenance including removal of motors, impellers, couplings, and accessories.

D. Set submersible sewage pumps on basin floors. Make direct connections to sanitary drainage piping.

1. Anchor guide-rail supports to basin bottoms and sidewalls or covers. Install pumps so pump and discharge pipe disconnecting flanges make positive seals when pumps are lowered into place.

E. Install sewage pump basins and connect to drainage and vent piping. Brace interior of basins according to manufacturer's written instructions to prevent distortion or collapse during concrete placement. Set basin cover and fasten to basin top flange. Install cover so top surface is flush with finished floor.

F. Construct sewage pump pits and connect to drainage and vent piping. Set pit curb frame recessed in and anchored to concrete. Fasten pit cover to pit curb flange. Install cover so top surface is flush with finished floor.

G. Install packaged, submersible sewage pump units and make direct connections to drainage and vent piping.

H. Install packaged, wastewater pump unit basins on floor or concrete base unless recessed installation is indicated. Make direct connections to drainage and vent piping.

I. Support piping so weight of piping is not supported by pumps.

3.9 START UP SERVICE

A. Engage a factory –authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer’s written instructions.

2. Verify sewage basin is clear and no large debris before sewage pump start up.

B. Start sewage pumps ejectors without exceeding safe motor power.

C. Test and adjust sewage pumps controls and safeties.

D. Remove and replace damaged and malfunctioning components.

E. Occupancy Adjustments: When requested within 12 months from date of LAWA acceptance, provide on-site assistance in adjusting sewage pumps system to suit actual occupied conditions. Provide up to two visits to Projects outside normal occupancy hours for this purpose.

3.10 TRAINING

A. Provide minimum of 12 hours (3 shifts total) classroom and hands on training to LAWA Maintenance personnel. Notify LAWA 72 hours in advance.

END OF SECTION 22 13 00