
PART 1 GENERAL**1.1 RELATED DOCUMENTS**

- A. The requirements of the General Conditions, Supplementary Conditions and the following Specification sections apply to all Work herein:
1. Section 22 00 10 - General Requirements
 2. Section 22 00 20 - Plumbing Scope of Work
 3. Section 22 05 07 - Design Conditions
 4. Section 22 05 48 - Vibration Isolation
 5. Section 22 05 50 - Access Doors and Color Coded Identification in General Construction
 6. Section 22 05 93 - Testing, Balancing and Adjusting
 7. Section 22 07 00 - Thermal Insulation
 8. Section 22 10 00 - Domestic Water Systems
 9. Section 22 21 23 - Pumps
 10. Section 22 30 00 - Plumbing Equipment
 11. Section 22 40 00 - Clean-outs, Drains and Plumbing Fixtures

1.2 SUMMARY

- A. Furnish and install the house sewage and drainage system herein specified and as indicated on the Drawings.

1.3 REFERENCE STANDARDS

- A. All sewage and drainage systems shall be designed, manufactured and tested in accordance with the latest applicable industry standards including the following:
1. CISPI - Cast Iron Soil Pipe Institute Standard 301
 2. ASTM A74, C76, 126, C443, C564, C1277 and C1540
 3. AWWA C606
 4. CISMA Designation 177-85
- B. All equipment and material to be furnished and installed on this Project shall be UL listed, in accordance with the requirements of the authorities having jurisdiction, and suitable for its intended use on this Project.

1.4 SUBMITTALS

- A. The following submittal data shall be furnished according to the General Conditions and Section 22 00 10 and shall include, but not be limited to:
1. Schedule of Pipe and Fitting Materials.
 2. Below Ground and Above Ground Hanger and Restraint Details.
 3. Toilet Battery Manifold Details.
- B. All items or equipment listed above with asterisks (*) shall be certified by the manufacturer using Manufacturer Certification "MCA" as set forth in Section 22 00 10. See Section 22 00 10 for certification requirements.

1.5 WARRANTY

- A. Comply with the requirements of the General Conditions and Section 22 00 10.

PART 2 PRODUCTS**2.1 ACCEPTABLE MANUFACTURERS**

- A. If it complies with these Specifications, pipe and fittings manufactured by one of the following manufacturers will be acceptable:
1. Charlotte Pipe and Foundry Company

2. Tyler Pipe and Foundry Company
 3. U.S. Pipe and Foundry Company
- B. If it complies with these Specifications, cast iron SOVENT system fittings and pipe manufactured by the following manufacturers:
1. Conine Manufacturing Co., Inc.
- C. If it complies with these Specifications, pipe hangers and supports manufactured by one of the following manufacturers will be acceptable:
1. B-Line
 2. Anvil
 3. Michigan Hanger
 4. PHD
 5. Tolco
- D. If it complies with these Specifications, no-hub couplings manufactured by one of the following manufacturers will be acceptable:
1. Brigade
 2. Charlotte Pipe and Foundry Company
 3. Clamp-All, NORMA Group Company
 4. Husky-Anaco
 5. Ideal, Tomkins Company
 6. MIFAB
 7. Tyler Pipe and Foundry Company
- E. If it complies with these Specifications, backwater valves manufactured by one of the following manufacturers will be acceptable:
1. Hersey
 2. Josam
 3. J. R. Smith
 4. Tyler
 5. Wade

2.2 GENERAL

- A. All pipe material shall be as specified herein and shall be installed as specified. The Subcontractor shall submit to the Engineer for review a list of the proposed manufacturers of pipe and fittings. See Section 22 00 10 for additional requirements.
- B. The system of drainage and venting to be installed inside the building shall be as shown on the Drawings and/or as required by the Authorities Having Jurisdiction and/or by the local plumbing inspection department. The materials shall be as follows:
1. Sanitary, Soil, Waste and Storm (Below Ground): Service weight cast iron, hub and spigot, pipe and fittings, ASTM A74, as manufactured by Tyler Pipe and Foundry Company, U.S. Pipe and Foundry Company, Charlotte Pipe and Foundry Co. or approved equal. Joints shall be Tyler "Ty-Seal" or approved equal, neoprene positive seal elastomeric compression type gaskets. All joints using "Ty-Seal" gaskets shall be assembled using "Black Swan" adhesive-lube or approved equal lubricant and sealant.
 2. Sanitary, Soil, Waste and Storm (Above Ground): Service weight cast iron, hub and spigot, pipe and fittings, ASTM A74, as manufactured by Tyler Pipe and Foundry Company, U.S. Pipe and Foundry Company, Charlotte Pipe and Foundry Co. or approved equal. Tyler "Ty-Seal" or approved equal, neoprene positive seal elastomeric compression type gaskets shall be used. Vertical and horizontal offsets shall be restrained at each joint in an approved manner as required by code or the regulations of the authorities having jurisdiction and if each horizontal joint is adequately supported at each joint with an approved hanger assembly. Supports shall be adequate to maintain alignment and prevent sagging. Joints must be supported at each joint except that when the distance between joints is four (4) feet or less, support may be provided at every other joint. Supports shall be placed immediately adjacent to the hub or coupling. Suspended lines shall be suitably braced to prevent horizontal movement. At the Contractor's option hubless service weight cast iron soil pipe, fittings, and heavy duty "no-hub" stainless

steel connectors may be used. Couplings shall be Charlotte Hubless Heavy Duty Couplings, Husky series 2000, or Tyler Wide-Body Couplings, and manufactured to ASTM C-1540. All joints using "no-hub" connectors shall be assembled without the use of adhesives, lubricants, sealants, etc., or the addition of any substance between the pipe and the coupling. Restraints and supports for hubless joints are to be as specified for "Ty-Seal" except for hubless pipe each horizontal joint shall be adequately supported on each side of each joint. Fitting and joint support and restraining assembly details for hub and spigot pipe and hubless pipe shall be submitted to the Engineer for re-view. Fixture manifolds shall be anchored with 3/8" diameter 2-1/2" long bolts/inserts to the floor utilizing "Power Strut" or "Holdrite" support systems or a similar structural bracing system in a manner that forms a stable fixture support without dependence on the enclosing wall. The Subcontractor shall furnish complete details of manifold structure for review and build a typical toilet room battery as a mock-up Sample for review by the Engineer and Owner at the Project Site. Fixture carriers shall be permanently and securely anchored to the floor with at least 2-1/2" long 3/8" diameter anchor bolts/shields.

3. 15" and Larger Storm Water System (Underground): Where shown on the Drawings, pipe 15" or larger inside diameter may be reinforced concrete drain pipe, fittings and specials conform to the requirements of ASTM C76, Class III wall thickness "B" or "C". Rubber-type gaskets for concrete non-pressure pipe shall conform to the requirements of ASTM C443.
4. Storm Water System (Above Ground): Same as Sanitary, Soil, Waste and Storm specified in Subsection 2.02 B.2. above. In addition, where approved by the local authorities having jurisdiction, roof drain downspout line may be Schedule 40 galvanized steel pipe with ductile iron Victaulic Style 07 "Zero-Flex" or Anvil Fig. 7401 couplings as specified for "Domestic Water Piping" in Section 22 10 00 titled "Domestic Water Systems".
5. Vent Piping: Vent stacks shall be service weight cast iron. Branch vents, re-vents or circuit vents shall be service weight cast iron, galvanized steel, or copper pipe and fittings. Vents 2" and smaller may be installed with Schedule 40 ASTM A 53 galvanized steel and malleable iron fittings or Type L copper with wrought copper fittings where permitted by local codes. Cast iron pipe joints shall either be "no-hub" stainless connectors manufactured to ASTM C-1277 and CISP 310, or "Ty-Seal" gaskets for cast iron piping as specified hereinbefore. All joints using "Ty-Seal" gaskets connectors shall be assembled using "Black Swan" or Tyler Pipe Lubri/Fast adhesive-lubricant, or approved equal lubricant and sealant. All joints using "no-hub" connectors shall be assembled without the use of adhesives, lubricants, sealants, etc., or the addition of any substance between the pipe and the coupling.
6. Pipe Flashing: All vent piping and other pipes passing through the roof shall be flashed with an approved flashing fitting set at a suitable level above the roof to terminate the flashing. All flashing shall be done in cooperation with the roofing Subcontractor and the Architectural details. Install pipe flashing so that no leakage occurs through the penetrated waterproof membranes.
7. No-Hub Couplings - (Sanitary, Soil, Waste and Storm): All coupling assemblies shall be the "heavy-duty" pattern and shall conform to ASTM C-1540 and ASTM C-564, Cast Iron Soil Pipe Institute Standard 301, and shall bear the Cast Iron Soil Pipe Institute CI label. No-hub couplings may be used on piping up to 10" in size. Bands, screw housings and worm screws, and shields shall be constructed of Type 304 stainless steel. Each worm screw shall have a 3/8" hex head drive designed to apply a full load of 80 in.-lbs. of torque to the band/shield assembly. No-hub couplings shall be installed using a pre-set torque wrench calibrated to 80 in.-lbs. of torque by the no-hub coupling manufacturer. **Exception: At the contractor's option, no-hub couplings used for horizontal waste and vent piping within typical floor toilet batteries may be "standard" pattern couplings requiring 60 in.-lbs of torque.**
8. No-Hub Couplings - (Vent Piping): All coupling assemblies shall conform to ASTM C-1277 and ASTM C-564, Cast Iron Soil Pipe Institute Standard 301, and shall bear the Cast Iron Soil Pipe Institute CI label. No-hub couplings may be used on piping up to 10" in size. Bands, screw housings and worm screws, and shields shall be constructed of Type 301 stainless steel. Each worm screw shall have a 3/8" hex head drive designed to apply a full load of 60 in.-lbs. of torque to the band/shield assembly. No-hub couplings shall be installed using a pre-set torque wrench calibrated to 60 in.-lbs. of torque by the no-hub coupling manufacturer.
9. Sewage Ejector and Sump Pump Piping: For sewage ejector and sump pumps, all pump discharge from the pumps to the horizontal gravity main shall be galvanized steel or ductile iron pipe with flush seal gasket, similar to Victaulic Style 31 ductile iron couplings and ductile iron Victaulic type drainage fittings. Victaulic flanges and reducing couplings may be used. A Victaulic cut groove depth control tool shall be used for field and shop grooving. Bolts shall be cadmium plated and all other elements shall be bitumastic coated. All components shall comply with AWWA C606 and specifically Table 5. If they comply with these Specifications, couplings and drainage fittings manufactured by Victaulic Company of America or Tyler Pipe Industries (Gustin-Bacon) will be acceptable. Each pump discharge shall be carried separately to and shall discharge into the top of the horizontal gravity main.

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PART 3 EXECUTION**3.1 GENERAL**

- A. Fixtures shall be vented as indicated on the Drawings and/or as required by Local Codes.
- B. In each change of direction of soils and wastes, provide a clean out plug connected to same with Y fittings and 45° ell made flush with floor or wall. In all horizontal straight runs more than 50' length provide at least one (1) clean out for each 75' length brought up flush with floor or grade unless otherwise shown on the Drawings. The locations of all clean outs shall be verified with the Architect. All clean outs shall be of the same size as the pipe up to and including pipe 4" in diameter. 4" clean outs shall be used for all pipe larger than four inches unless otherwise noted on the Drawings. See Section 22 40 00 titled "Clean outs, Drains and Plumbing Fixtures" for clean out specifications. Provide access doors in general construction for clean outs installed in concealed locations.
- C. Fixture connections between traps and soil pipes shall be as follows:
 - 1. Water Closets: Plastic adjustable nipples. Uniroyal or approved equal.
 - 2. Urinals: Plastic (Uniroyal), copper, or malleable iron nipples with suitable adapters. Malleable iron nipples shall have galvanized threads.
 - 3. Lavatories: Plastic (Uniroyal), copper, or malleable iron nipples with suitable adapters.
 - 4. Service Sinks: Brass or malleable iron nipples with suitable adapters.
 - 5. Drinking Fountains: Copper or malleable iron nipples with suitable adapters.
- D. Vent stacks shall be connected into the main stack at its base and at horizontal offsets, and carried up through roof or connected back to the main stack vent. Vent connections for main vertical risers shall be located on the main horizontal line at a point beyond where the hydraulic jump is formed within the pipe at the elbow.
- E. All back vents shall be taken off as near traps as possible. Vent stacks shall be carried up adjoining soils and wastes and shall be connected into main stack top and bottom.
- F. All drainage lines shall have at least the minimum slope toward the main sewer as required by the local plumbing code. Pipe must be so laid that the slope will be continuous. Permission shall be secured from the Engineer before proceeding with any Work where existing conditions prevent the installation at the minimum grade specified.
- G. The sewage and drainage Work shall be complete and ready for use including all reducers, increases, special flanges and fittings, etc., where required between the piping and fixtures.
- H. All horizontal pipes throughout the building, including that in pipe spaces and attics, shall be thoroughly and substantially supported from the building construction by means of approved expansion ring hangers or clevis hangers at each joint. Hangers shall be spaced no more than 5' apart, center to center, on cast iron waste and vents. All pipes shall be straight and have uniform fall. Clevis hangers shall be Anvil Figure 260 and Figure 261 below 4" or approved equal. Expansion ring hangers shall be Anvil or approved equal.
- I. All vertical pipes shall be substantially supported at each floor line with approved steel or iron riser clamps. Riser clamps for pipe 12" in diameter and smaller shall be Anvil Figure 261 or approved equal. Riser clamps for 14" through 16" diameter pipes shall be four bolt Anvil or approved equal riser clamps designed for the load.
- J. Perforated extension bar hangers will not be accepted. On large pipe or groups of pipe, use structural iron for support members. Concrete inserts for hanger rods shall be Anvil Figure 281 or approved equal for pipe sizes up to 8". For 8" pipe and larger reinforce the insert with steel anchor bars or suitable steel plates. The Subcontractor shall submit pipe hanger and support details to the Base Building Structural Engineer for review and approval prior to submission to the Engineer. Refer to Section 22 00 10 Subsection titled "Coordination Drawings" for additional requirements. Hanger rods, inserts, etc., shall be sized and installed as recommended by the hanger manufacturer for the service intended. All hanger rods shall be cadmium plated.

3.2 EXCAVATION AND BACKFILL

- A. Refer to Section 22 00 30 titled "Connections to Utilities" for excavation and backfill requirements.

3.3 FACTORY TESTING

- A. All sewage and drainage systems shall be tested in accordance with the latest applicable industry standards.

3.4 FIELD TESTING

- A. Refer to Section 22 05 93 for additional testing requirements for sewage and drainage systems.

END OF SECTION