

Part 1 General

1.1 SECTION INCLUDES

- .1 Pipe, pipe fittings, valves, and connections for piping systems.
 - .1 Sanitary sewer.
 - .2 Domestic water.
 - .3 Storm water.
 - .4 Natural gas.

1.2 REFERENCES

- .1 ASTM E814 - Fire Tests of Through-Penetration Fire Stops.
- .2 ASME B31.9 - Building Services Piping.
- .3 ASME SEC IV - Construction of Heating Boilers.
- .4 ASME SEC IX - Welding and Brazing Qualifications.
- .5 ASME B16.3 - Malleable Iron Threaded Fittings.
- .6 MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
- .7 MSS SP69 - Pipe Hangers and Supports - Selection and Application.
- .8 MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves.
- .9 MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
- .10 MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.
- .11 NCPWB - Procedure Specifications for Pipe Welding.
- .12 UL 1479 - Fire Tests of Through-Penetration Firestops.
- .13 ASTM F708 - Design and Installation of Rigid Pipe Hangers.
- .14 AWS A5.8 - Filler Metals for Brazing and Braze Welding.
- .15 ASME B16.22-2001 (R2005) - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- .16 ASME B16.26 - Copper Alloy Bronze Fittings for Flared Copper Tubes.
- .17 ASME B16.4 - Grey Iron Threaded Fittings.
- .18 AWWA C651 - Disinfecting Water Mains.

- .19 ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
- .20 ASTM B42 - Seamless Copper Pipe, Standard Sizes.
- .21 ASTM B43 - Seamless Red Brass Pipe, Standard Sizes.
- .22 ASTM B68 - Seamless Copper Tube, Bright Annealed.
- .23 ASTM B75 - Seamless Copper Tube.
- .24 ASTM B22.18-03 - Seamless Copper Water Tube.
- .25 ASTM B251 - General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.
- .26 ASTM B302 - Threadless Copper Pipe, Standard Sizes.
- .27 ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
- .28 ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DWV.
- .29 ASME B16.32 - Cast Copper Alloy Solder Joint Fittings for Solvent Drainage Systems.
- .30 ASTM A74 - Cast Iron Soil Pipe and Fittings.
- .31 ASTM B306 - Copper Drainage Tube (DWV).
- .32 ASME B16.29 - Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
- .33 ASTM B32-04 - Solder Metal.
- .34 CISPI 301 - Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications.
- .35 CISPI 310 - Joints with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.
- .36 MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends.
- .37 MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends.
- .38 MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
- .39 MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends.
- .40 ASTM D2665 - Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
- .41 ASTM D2564 - Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

- .42 ASTM D2855-96 (2002) - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
- .43 ASTM D2729 - Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- .44 ASTM D2241 - Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
- .45 ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- .46 ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- .47 AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 inch - 48 inch (350 mm - 1200mm).
- .48 ASME B31.1 - Power Piping.
- .49 CAN/CSA B149.1 – Natural Gas and Propane Installation Code.
- .50 AGA Z21.22 - Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.
- .51 ASME B31.2 - Fuel Gas Piping.
- .52 NFPA 54 - National Fuel Gas Code.
- .53 ASTM D2513 - Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
- .54 ASTM A47/A47M - Ferritic Malleable Iron Castings.
- .55 ASTM A53/A53M - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- .56 ASTM A234/A234M - Piping Fittings of Wrought-Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
- .57 AWWA C105 - Polyethylene Encasement for Ductile-Iron Piping Systems.

1.3 SUBMITTALS FOR REVIEW

- .1 Section 21 05 00: Submission procedures.
- .2 Product Data: Provide data on all valves larger than 50mm (2”), and all backflow prevention devices and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.

1.4 CLOSEOUT SUBMITTALS

- .1 Section 21 05 00: Submission procedures.
- .2 Record Documentation: Record actual locations of valves on record drawings.

1.5 QUALITY ASSURANCE

- .1 Perform Work to the standards of the Province and Municipality of Jurisdiction.
- .2 Valves: Manufacturer's name and pressure rating marked on valve body.
- .3 Welding Materials and Procedures: Conform to ASME SEC IX and applicable Provincial labour regulations.
- .4 Welder's Certification: To Manitoba Department of Labour standards.
- .5 Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.
- .6 All carbon steel pipe and fittings shall be manufactured in Canada or the United States of America. This does not include stainless steel.

1.6 REGULATORY REQUIREMENTS

- .1 Perform Work to the latest version of the Manitoba Plumbing Code and local Municipal requirements.
- .2 Conform to applicable code for installation of backflow prevention devices.
- .3 Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.7 DELIVERY, STORAGE, AND PROTECTION

- .1 Refer to specification section Product Requirements: Transport, handle, store, and protect products.
- .2 Accept valves on site in shipping containers with labelling in place. Inspect for damage.
- .3 Provide temporary protective coating on cast iron and steel valves.
- .4 Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- .5 Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.8 ENVIRONMENTAL REQUIREMENTS

- .1 Refer to specification section Environmental Protection: Environmental conditions affecting products on site.
- .2 Do not install underground piping when bedding is wet or frozen.

Part 2 Products

2.1 SANITARY SEWER PIPING, BURIED WITHIN 1500 MM (5 FEET) OF BUILDING

- .1 PVC Pipe: CSA B181.2
 - .1 Fittings: PVC.
 - .2 Joints: ASTM D2855, solvent weld to ASTM D2565.

2.2 SANITARY SEWER PIPING, ABOVE GRADE

- .1 PVC Pipe with FSR25: CSA B181.2
 - .1 Fittings: PVC.
 - .2 Joints: ASTM D2855, solvent weld to ASTM D2565.
- .2 PVC Pipe with FSR25/SDC50: CSA B181.2. Piping shall be tested and listed in accordance with CAN/ULC-S102.2 and clearly marked with the certification logo indicating a flame spread rating (FSR) not exceeding 25 and a smoke developed classification (SDC) not exceeding 50.
 - .1 Fittings: PVC.
 - .2 Joints: ASTM D2855, solvent weld to ASTM D2565.
 - .3 Manufacturer: IPEX System XFR or equal.

2.3 SEWAGE AND SUMP PUMP DISCHARGE PIPING, ABOVE GRADE

- .1 Copper Tubing: ASTM B88, Type L hard drawn.
 - .1 Fittings: 50-50 solder

2.4 SEWAGE AND SUMP PUMP DISCHARGE PIPING, BELOW GRADE

- .1 PVC Pipe: CSA B181.2
 - .1 Fittings: PVC.
 - .2 Joints: ASTM D2855, solvent weld to ASTM D2565.

2.5 WATER PIPING, ABOVE GRADE

- .1 Copper Tubing 50mm (2") and under: ASTM B88, Type L hard drawn.
 - .1 Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - .2 Joints ASTM B32, solder, Grade 95TA.
- .2 Copper Tubing over 50mm (2"): ASTM B88, Type L hard drawn.
 - .1 Fittings: Silver brazed fittings.

2.6 STORM WATER PIPING, BURIED WITHIN 1500 MM (5 FEET) OF BUILDING

- .1 Cast-iron mechanical joint or pipe and fittings to CSA B70. Class 4000
 - .1 Fittings: Cast iron.
 - .2 Joints: Neoprene gasket and stainless steel clamp and shield assemblies.

2.7 STORM WATER PIPING, ABOVE GRADE

- .1 Cast Iron Pipe: ASTM A74 extra heavy weight. Class 4000
 - .1 Fittings: Cast iron.
 - .2 Joints: ASTM C564, neoprene gasket system or lead and oakum.
- .2 Cast Iron Pipe: CISPI 301, hubless, service weight. Class 4000
 - .1 Fittings: Cast iron.
 - .2 Joints: ASTM C564 and CISPI Standard 310, neoprene gasket system and stainless steel clamp-and-shield assemblies.

2.8 STORM WATER PIPING, WITHIN CRAWLSPACE ONLY

- .1 PVC Pipe: CSA B181.2
 - .1 Fittings: PVC.
 - .2 Joints: ASTM D2855, solvent weld to ASTM D2565.
- .2 Non-combustible PVC Pipe: piping shall be tested and listed in accordance with CAN/ULC-S102.2 and clearly marked with the certification logo indicating a flame spread rating of 25 and a smoke developed classification not exceeding 50.
 - .1 Fittings: PVC.
 - .2 Joints: ASTM D2855, solvent weld to ASTM D2565.
 - .3 Manufacturer: IPEX System XFR or equal

2.9 NATURAL GAS PIPING, BURIED BEYOND 1500 MM (5 FEET) OF BUILDING

- .1 Polyethylene Pipe: ASTM D2513, SDR 11.5.
 - .1 Fittings: ASTM D2683 or ASTM D2513 socket type.
 - .2 Joints: Fusion welded.

2.10 NATURAL GAS PIPING, BURIED WITHIN 1500 MM (5 FEET) OF BUILDING

- .1 Steel Pipe: ASTM A53 Schedule 40 black.
 - .1 Fittings: ASTM A234/A234M, forged steel welding type.
 - .2 Joints: ASME B31.9, welded.
 - .3 Jacket: AWWA C105 polyethylene jacket or double layer, half-lapped 0.25 mm (10 mil) polyethylene tape.

2.11 NATURAL GAS PIPING, ABOVE GRADE

- .1 Steel Pipe: ASTM A53 Schedule 40 Black.
 - .1 Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, forged steel welding type.
 - .2 Joints: NFPA 54, threaded or welded to ANSI B31.9.

2.12 FLANGES, UNIONS, AND COUPLINGS

- .1 Pipe Size 80 mm (3 inches) and under:

- .1 Ferrous pipe: Class 150 malleable iron threaded unions.
- .2 Copper tube and pipe: Class 150 bronze unions with soldered joints.
- .2 Pipe Size Over 25 mm (1 inch):
 - .1 Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
 - .2 Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- .3 Grooved and Shouldered Pipe End Couplings:
 - .1 Housing: Malleable iron clamps to engage and lock, designed to permit some angular deflection, contraction, and expansion; steel bolts, nuts, and washers; galvanized for galvanized pipe.
 - .2 Sealing gasket: "C" shape composition sealing gasket.
- .4 Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.13 GLOBE VALVES

- .1 Construction Up To and Including 80 mm (3 inches), bronze disc:
 - .1 Manufacturers:
 - .1 Red-White/Toyo
 - .2 Kitz
 - .3 Crane
 - .4 Substitutions: Refer to Section 21 05 00.
 - .2 MSS SP-80, Class 150, bronze body, bronze trim, handwheel, bronze, solder ends.
- .2 Construction Up To and Including 80 mm (3 inches), teflon disc:
 - .1 Manufacturers:
 - .1 Kitz
 - .2 Crane
 - .3 Substitutions: Refer to Section 21 05 00.
 - .2 MSS SP-80, Class 150, bronze body, bronze trim, handwheel, teflon disc, solder ends.
- .3 Construction: 50 mm (2 inches) and Larger:
 - .1 Manufacturers:
 - .1 Red-White/Toyo
 - .2 Kitz
 - .3 Crane
 - .4 Substitutions: Refer to Section 21 05 00.
 - .2 MSS SP-85, Class 150, iron body, bronze trim, handwheel, outside screw and yoke, renewable bronze plug-type disc, renewable seat, flanged ends.

2.14 BALL VALVES

- .1 Manufacturers:
 - .1 MAS
 - .2 Kitz
 - .3 Crane.
 - .4 Substitutions: Refer to Section 21 05 00.
- .2 Construction, 100 mm (4 inches) and smaller: MSS SP-110, Class 150, 2760 kPa (400 psi) brass, two piece body, 316 stainless ball and trim, full port, teflon seats and stuffing box ring, blow-out proof stem, lever handle, solder ends.

2.15 PLUG VALVES

- .1 Manufacturers:
 - .1 Nordstrom Valves, Inc. MSS SP-78, Type II.
 - .2 Substitutions: Refer to Section 21 05 00.
- .2 Construction 50 mm (2 inches) and smaller: Figure 114, MSS SP-78, 2700 kPa (400 psi), cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged or threaded ends. Provide lever operator with set screw.
- .3 Construction 65 mm (2-1/2 inches) and larger: MSS SP-78, 1200 kPa (175 psi), cast iron body and plug, pressure lubricated, teflon or Buna N packing, flanged ends. Provide lever operator with set screw.

2.16 FLOW CONTROLS

- .1 Manufacturers:
 - .1 Watts.
 - .2 Conbraco.
 - .3 Substitutions: Refer to Section 21 05 00.
- .2 Construction: Class 150, brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- .3 Calibration: Control flow within 5 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum pressure 24 kPa (3.5 psi).

2.17 SWING CHECK VALVES

- .1 Construction: Up to and including 80 mm (3 inches):
 - .1 Manufacturers:
 - .1 Kitz.
 - .2 Substitutions: Refer to Section 21 05 00.
 - .2 MSS SP-80, Class 150, bronze body and cap, bronze swing disc with rubber seat, solder ends.
- .2 Construction: 50 mm (2 inches) and Larger:

- .1 Manufacturers:
 - .1 American Valve, Inc.
 - .2 Kitz Corporation.
 - .3 Watts Regulator ;
 - .4 Zy-Tech Global Industries, Inc.
 - .5 Substitutions: Refer to Section 21 05 00.
- .2 MSS SP-71, Class 125, iron body, bronze swing disc, renewable disc seal and seat, flanged ends.

2.18 SPRING LOADED CHECK VALVES

- .1 Manufacturers:
 - .1 Class 150: Mueller 72-IHB-3-H (Ductile Iron Body) Moygro &-I515WM5B (SS Disc, Viton Seat)
 - .2 Substitutions: Refer to Section 21 05 00.
- .2 Class 150, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

2.19 RELIEF VALVES

- .1 Pressure Relief:
 - .1 Manufacturers:
 - .1 Watts
 - .2 Substitutions: Refer to Section 21 05 00.
 - .2 AGA Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.
- .2 Temperature and Pressure Relief:
 - .1 Manufacturers:
 - .1 Watts
 - .2 Conbraco
 - .3 Substitutions: Refer to Section 21 05 00
 - .2 AGA Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 98.9 degrees C (210 degrees F), capacity ASME SEC IV certified and labelled.

2.20 FIRE STOP SYSTEMS

- .1 General Purpose Fire Stopping Sealant:
 - .1 Manufacturers:
 - .1 Dow Corning Silicone Elastomer Fire Stop Penetration Seal and/or Dow-Corning liquid silicone elastomer Fire Stop Foam of density, width and depth to maintain assembly fire resistive rating.
 - .2 Hilti.
 - .3 Substitutions: Refer to Section 21 05 00.

- .2 Water based, non-slumping, premixed sealant with intumescent properties, rated for 3 hours per ASTM E814 and UL 1479.
- .2 DWV Plastic Pipe Systems Fire Stopping Sealant:
 - .1 Manufacturers:
 - .1 Hilti FS-ONE Intumescent Firestop Sealant
 - .2 Substitutions: Refer to Section 21 05 00.
 - .2 Silicone based, premixed sealant with intumescent properties, vibration and moisture resistant, rated for 3 hours per ASTM E814 and UL 1479 with metal collars.

Part 3 Execution

3.1 EXAMINATION

- .1 Section 21 05 00: Verify existing conditions before starting work.
- .2 Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

- .1 Ream pipe and tube ends. Remove burrs.
- .2 Remove scale and dirt, on inside and outside, before assembly.
- .3 Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

- .1 Install to manufacturer's written instructions.
- .2 Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- .3 Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- .4 Install piping to maintain headroom, conserve space, and not interfere with use of space.
- .5 Group piping whenever practical at common elevations.
- .6 Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- .7 Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- .8 Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08 31 13.
- .9 Establish elevations of buried piping outside the building to ensure not less than 2.4 m (8 ft) of cover.

- .10 Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
- .11 Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- .12 Provide support for utility meters to requirements of utility companies.
- .13 Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09 91 10.
- .14 Support for buried pipe under a new slabs or existing shall be hung from the slab using epoxy coated or stainless steel hanger rod secured to the rebar. Refer to the drawings for hanging, bedding, and void form installation details.
- .15 Install bell and spigot pipe with bell end upstream.
- .16 Install valves with stems upright or horizontal, not inverted.
- .17 Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
- .18 Install water piping to ASME B31.9.
- .19 Install fuel oil piping to ASME B31.9 and CSA B139.
- .20 Sleeve pipes passing through partitions, walls and floors. Set sleeves in concrete forms for all pipes passing through concrete walls, beams and slabs.
- .21 Install 100 mm (4 inch) concrete curbs around all pipe penetrations in mechanical rooms.
- .22 Pipe sleeves to extend above floor line as follows:
 - .1 Unfinished areas – 25 mm (1 inches).
 - .2 Finished areas (copper sleeves) – 7 mm (1/4 inches).
 - .3 Mechanical rooms, kitchens and washrooms – 100 mm (4 inches).
- .23 Caulk sleeves to provide watertight installation.
- .24 Where pipes pass through floors and walls in finished areas and where exposed to view, provide Crane #10 B.C. chrome-plated, pressed steel floor plates.
- .25 Install galvanized, oversize pipe sleeves on passing through walls or partitions, for building into wall construction, by other trades.
- .26 Sleeves and holes for piping on cold water systems shall be large enough to accommodate pipe insulation. Insulation on piping for hot water systems may stop at walls or floors.
- .27 Prior to installing sleeves in concrete beams, receive final jobsite approval by Structural Contract Administrator.
- .28 Storm water piping: Install clamps across all no-hub MJ couplings on piping 125 mm (5”) and larger for all horizontal piping, including elbows at the base of a vertical pipe. Refer to 23 05 29 for supports and anchors on storm water piping.

3.4 PIPE PRESSURE TESTING

- .1 Do not insulate pipe prior to pressure testing. Pressure test in sections if necessary before concealing or insulating pipe.
- .2 Do not introduce water for testing where freezing conditions exist or where piping systems being tested are located above sensitive areas or equipment that may be damaged or contaminated by water leakage.
- .3 Hydraulically test all pipe. Pneumatic testing not permitted without prior approval from the Contract Administrator and the Authority Having Jurisdiction.
- .4 Should leaks develop in any part of the piping system, remove and replace defective sections, fittings and equipment. Pipe dope, caulking, tape, lead wool, dresser couplings, etc. shall not be used to correct deficiencies. The mechanical subcontractor shall be responsible for all cleanup related to leakage during flushing, testing, and chemical treatment of piping, including original building piping if included in the testing.
- .5 Subject piping to a hydrostatic pressure of at least that 1-½ times the operating pressure of the system for a period of at least 12 hours. If leaks are detected, such leaks shall be repaired and the test started over. Record results and submit witnessed (by Contract Administrator or The City's representative) reports to the Contract Administrator.
- .6 Cast iron piping systems: water-test each portion of the system for 15 minutes at a head pressure of 10' of water. Test procedure shall be in accordance with CISPI and the manufacturer's recommendations. Compressed air shall not be used for testing.
- .7 Register pressures at the highest system point.
- .8 Provide at least 48 hours (during working days) notice to Contract Administrator or The City's Representative prior to testing to allow the tests to be witnessed.

3.5 APPLICATION

- .1 Use grooved mechanical couplings and fasteners only in accessible locations.
- .2 Install unions downstream of valves and at equipment or apparatus connections.
- .3 Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- .4 Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- .5 Install globe or ball valves for throttling, bypass, or manual flow control services.
- .6 Provide spring loaded check valves on discharge of water pumps.
- .7 Provide plug valves in natural and propane gas systems for shut-off service.
- .8 Provide flow controls in water recirculating systems where indicated.
- .9 PVC DWV piping installed in non-combustible buildings shall comply with the restrictions in the following table.

3.6 ERECTION TOLERANCES

- .1 Section 01 73 00: Tolerances.
- .2 Establish invert elevations, slopes for drainage to one percent (1/8 inch per foot) minimum, except pipe sized 75 mm (3 inches) or less shall have a slope no less than two percent (1/4 inch per foot). Maintain gradients.
- .3 Slope water piping minimum 0.25 percent and arrange to drain at low points.

3.7 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- .1 Prior to starting work, verify system is complete, flushed and clean.
- .2 Ensure pH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- .3 Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- .4 Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- .5 Maintain disinfectant in system for 24 hours.
- .6 If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- .7 Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- .8 Take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and analyze to AWWA C651.

3.8 SERVICE CONNECTIONS

- .1 Provide new sanitary and storm sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- .2 Provide new water service off existing service complete with approved reduced pressure double check backflow preventer within the new mechanical room.
- .3 Provide new gas service take off from the existing building service to serve the addition.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Flexible Pipe Connections
- .2 Roof and floor drains.
- .3 Downspouts nozzles
- .4 Trap seal primers.
- .5 Cleanouts.
- .6 Hose bibs.
- .7 Hydrants.
- .8 Washing Machine Box
- .9 Backflow preventers.
- .10 Water hammer arrestors.
- .11 Interceptors.
- .12 Thermostatic mixing valves.

1.2 REFERENCES

- .1 ASME - SEC 8D - Boilers and Pressure Vessels Code - Rules for Construction of Pressure Vessels.
- .2 ASME A112.21.1 - Floor Drains.
- .3 ASME A112.21.2 - Roof Drains.
- .4 ASME A112.26.1 - Water Hammer Arrestors.
- .5 ASSE 1011 - Hose Connection Vacuum Breakers.
- .6 ASSE 1012 - Backflow Preventers with Immediate Atmospheric Vent.
- .7 ASSE 1013 - Backflow Preventers, Reduced Pressure Principle.
- .8 ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.
- .9 ASTM C478 - Precast Reinforced Concrete Manhole Sections.
- .10 AWWA C506 - Backflow Prevention Devices - Reduced Pressure Principle and Double Check Valve Types.

- .11 NSF/ANSI 61 – Drinking Water System Components – Health Effects
- .12 PDI G-101 - Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.
- .13 PDI WH-201 - Water Hammer Arrestors.
- .14 CSA B125.3 – Plumbing Fittings
- .15 ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices

1.3 SUBMITTALS FOR REVIEW

- .1 Section 21 05 00: Submission procedures.
- .2 Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- .3 Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.

1.4 CLOSEOUT SUBMITTALS

- .1 Section 21 05 00: Submission procedures.
- .2 Operation Data: Indicate frequency of treatment required for interceptors.
- .3 Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- .4 Record Documentation: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors, trap seal primers.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- .1 Section 01 78 40: Maintenance and extra material requirements.
- .2 Extra Stock Materials: Supply two (2) loose keys for outside hose bibs.

1.6 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

1.7 DELIVERY, STORAGE, AND PROTECTION

- .1 Section 21 05 00: Transport, handle, store, and protect products.
- .2 Accept specialties on site in original factory packaging. Inspect for damage.

Part 2 Products

2.1 FLEXIBLE PIPE CONNECTORS

- .1 Manufacturers:
 - .1 Flextrol
 - .2 Flex Tech Industries
 - .3 Hydro-flex
 - .4 Substitutions: Refer to Section 21 05 00
- .2 Supply and install where shown on the drawings as in details, flexible pipe connectors as manufactured by Flex Tech Industries, selected to meet operating and test pressures of systems served.
- .3 Minimum 450 mm (18") in length unless otherwise noted.

2.2 ROOF DRAINS

- .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn
 - .3 Watts.
 - .4 Substitutions: Refer to Section 21 05 00.
- .2 Standard Roof Drain (RD-1):
 - .1 Assembly: ANSI A112.21.2.
 - .2 Body: Lacquered cast iron with sump.
 - .3 Strainer: Removable cast metal dome with vandal proof screws.
 - .4 Accessories: Coordinate with roofing type, refer to Roofing Section:
 - .1 Membrane flange and membrane clamp with integral gravel stop.
 - .2 Adjustable under deck clamp.
 - .3 Roof sump receiver.
 - .4 Waterproofing flange.
 - .5 Parabolic controlled flow weir.
 - .6 Levelling frame.
 - .7 Adjustable extension sleeve for roof insulation.
 - .8 Strainer free area of 43 square inches.

2.3 FLOOR DRAINS

- .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn.
 - .3 Watts.
 - .4 Substitutions: Refer to Section 21 05 00.
- .2 Floor Drain – (FD-1):

- .1 ANSI A112.21.1,
 - .1 Lacquered cast iron two piece body with double drainage flange,
 - .2 Weep holes,
 - .3 Reversible clamping collar, and round, adjustable nickel-bronze strainer.
 - .4 Complete with 1/2" trap primer connection.
- .1 Floor Drain – (FD-2):
 - .1 ANSI A112.21.1,
 - .1 Lacquered cast iron two piece body with double drainage flange,
 - .2 Weep holes,
 - .3 Round, adjustable nickel-bronze strainer with polished bronze funnel.
 - .4 Complete with 1/2" trap primer connection.

Floor Drain Schedule

Tag	Type	Inlet	Body Material	Vandal Proof	Sediment Bucket	Trap Seal Primer
FD-1	Reversible Membrane Clamp	Heavy Duty Strainer	Cast Iron	No	No	Yes
FD-2	Less Reversible Membrane Clamp	4"x9" Funnel	Cast Iron	No	No	Yes

2.4 TRAP SEAL PRIMER

- .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn.
 - .3 Watts.
 - .4 Precision Plumbing Products.
 - .5 Substitutions: Refer to Section 21 05 00.
- .2 Pressure drop activated brass trap seal primer
 - .1 Inlet opening of 1/2" (13mm) male N.P.T. and outlet opening of female 1/2" (13mm) N.P.T.
 - .2 Complete with four view holes and removable filter screen.
 - .3 Requires no site adjustments and no air pre-charge.
 - .4 Each trap seal primer shall be installed with brass trap seal primer air gap fitting,
 - .5 Where multiple floor drains are being served install a trap seal primer distribution unit.
 - .6 Primers shall be installed with union directly upstream, and shut off valve.
 - .7 Supply line to primer shall have a reverse bend in it to reduce the change of sediment collecting in primer, refer to manufacturer's installation instructions.

2.5 CLEANOUT COVERS

- .1 Exterior Surfaced Areas:
 - .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn.
 - .3 Watts.
 - .4 Substitutions: Refer to Section 21 05 00.
 - .2 Round cast nickel bronze access frame and non-skid cover.
- .2 Exterior Unsurfaced Areas:
 - .1 Line type with lacquered cast iron body and round epoxy coated gasketed cover.
- .3 Interior Finished Floor Areas:
 - .1 Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.
- .4 Interior Finished Wall Areas:
 - .1 Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.
- .5 Interior Unfinished Accessible Areas:
 - .1 Caulked or threaded type.
 - .2 Bolted stack cleanouts on vertical rainwater leaders.

2.6 HOSE BIBS

- .1 Interior:
 - .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn.
 - .3 Watts.
 - .4 Substitutions: Refer to Section 21 05 00.
 - .2 Exposed-type anti-contamination wall faucet with 3/4" (19mm) male hose connection and anti-siphon vacuum breaker.
 - .3 Exterior finish to be brass, operating handle to be cast-iron, coloured blue or red (for cold or hot), and inlet connection shall be 1/2" (13mm) F.P.T.
 - .4 Vacuum breaker to be certified to A.S.S.E. Standard 1011 and listed by I.A.P.M.O.

2.7 HYDRANTS

- .1 Wall Hydrant:
 - .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn.

- .3 Watts.
- .4 Substitutions: Refer to Section 21 05 00.
- .2 Certified exposed type, self draining, non freeze wall hydrant
- .3 With ANSI/ASSE 1019 approved anti-siphon and vandal resistant integral vacuum breaker, 3/4" (19) male hose connection.
- .4 Hydrant assembly complete with neoprene plunger to control both the flow and drain functions, hardened bronze operating stem, drain port under the hexagon nut, heavy duty brass casing, 360 degree swivel inlet connection, heavy duty chrome plated bronze head casting, polished chrome plated face plate and satin finished nickel bronze box with hinged locking cover.
- .5 Operating key to be furnished with each hydrant.

2.8 BACK WATER VALVES

- .1 Cast Iron:
 - .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn.
 - .3 Watts.
 - .4 Substitutions: Refer to Section 21 05 00.
 - .2 ANSI A112.21.2; lacquered cast iron body and cover, brass valve, 150 mm (6 inch) extension sleeve, and access cover.
- .2 PVC
 - .1 Manufacturers:
 - .1 IPEX
 - .2 Canplus
 - .3 Substitutions: Refer to Section 21 05 00.
 - .2 CAN/CSA-B181.2, "Polyvinylchloride (PVC) and Chlorinated Polyvinylchloride (CPVC) Drain, Waste Vent Pipe and Pipe Fittings
 - .3 Size to match drain pipe, extension sleeve, and access cover.

2.9 BACKFLOW PREVENTERS

- .1 Reduced Pressure Backflow Preventers:
 - .1 Manufacturers:
 - .1 Beeco.
 - .2 Zurn.
 - .3 Watts.
 - .4 Substitutions: Refer to Section 21 05 00.
 - .2 ANSI/ASSE 1013 / CSA B64.4,
 - .3 Bronze body with bronze internal parts and stainless steel springs,
 - .4 Two independently operating, spring loaded check valves,
 - .5 Diaphragm type differential pressure relief valve located between check valves,

- .6 Third check valve that opens under back pressure in case of diaphragm failure,
 - .7 Non-threaded vent outlet,
 - .8 Assembled with two gate valves, strainer, and four test cocks.\
- .2 Double Check Valve Assemblies:
- .1 Manufacturers:
 - .1 Beeco.
 - .2 Zurn.
 - .3 Watts.
 - .4 Substitutions: Refer to Section 21 05 00.
 - .2 ANSI/ASSE 1024 / CSA B64.4
 - .3 Bronze body with corrosion resistant internal parts and stainless steel springs,
 - .4 Two independently operating check valves with intermediate atmospheric vent.

2.10 WATER HAMMER ARRESTORS

- .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn.
 - .3 Watts.
 - .4 Substitutions: Refer to Section 21 05 00.
- .2 ANSI A112.26.1,
 - .1 Stainless steel construction,
 - .2 Bellows type sized to PDI WH-201,
 - .3 Pre-charged suitable for operation in temperature range -73 to 149 degrees C (-100 to 300 degrees F) and maximum 1700 kPa (250 psi) working pressure.

2.11 INSTALLATION

- .1 Install to manufacturer instructions.
- .2 Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- .3 Install wall cleanouts serving urinals above the flood plane of the fixture but below the top of the fixture it serves not including the flush valve.
- .4 Encase exterior cleanouts in concrete flush with grade.
- .5 Install floor cleanouts at elevation to accommodate finished floor.
- .6 Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibs.

- .7 All water cross connection and backflow prevention shall comply with City of Winnipeg By-Law 2289 and CSA B64.10. Note that where severe hazards exist, an approved control device must be installed both on service pipe as well as on pipe at source of potential contamination.
- .8 Expenses for material, installation, testing and approval of cross connection and backflow prevention shall be paid by Section 22 40 10.
- .9 Provide minimum 1-1/4" (32mm) clearance between backflow preventer body and adjacent structure (wall, ceiling, etc.) and equipment. Clearance space to be sufficient to facilitate easy removal for servicing. The BFP shall be located no higher on wall than 48" (1200mm) above the finished floor.
- .10 Backflow preventers shall be sized for the maximum rated flow of the equipment it is serving.
- .11 All testable backflow prevention devices shall be installed in accessible locations as defined by CSA-B64.10-01. If this cannot be accomplished, provide access platforms, etc. at no extra cost to the The City.
- .12 Pipe relief from backflow preventer to nearest drain.
- .13 Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to washing machine outlets, banks of flush valve fixtures (eg. Water closets, urinals).
- .14 Install air chambers on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or 20 mm (3/4 inch) minimum, and minimum 450 mm (18 inches) long.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Water closets.
- .2 Lavatories.
- .3 Sinks.
- .4 Service sinks.
- .5 Drinking fountains.

1.2 REFERENCES

- .1 CSA B651 – Barrier-free Design.
- .2 ANSI Z124.1 - Gel-Coated Glass-Fibre Reinforced Polyester Resin Bathtub Units.
- .3 ANSI Z124.2 - Gel-Coated Glass-Fibre Reinforced Polyester Resin Shower Receptor and Shower Stall Units.
- .4 ANSI Z358.1 - Emergency Eye Wash and Shower Equipment.
- .5 ARI 1010 - Self-Contained Mechanically Refrigerated Drinking Water Coolers.
- .6 ASME A112.6.1 - (Floor Affixed) Supports for Off-the-Floor Plumbing Fixtures for Public Use.
- .7 ASME A112.18.1 / CSA-B125.1-05- Plumbing Fixture Fittings.
- .8 ASME A112.19.1 / CSA B45.2-08 - Enamelled Cast Iron Plumbing Fixtures.
- .9 ASME A112.19.2 / CSA B45.1-08 - Vitreous China Plumbing Fixtures.
- .10 ASME A112.19.3 / CSA B45.4-08- Stainless Steel Plumbing Fixtures (Designed for Residential Use).
- .11 ASME A112.19.4 - Porcelain Enamelled Formed Steel Plumbing Fixtures.
- .12 ASME A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals.
- .13 NFPA 70 - National Electrical Code.
- .14 NBCC 2010 - National Building Code of Canada
- .15 NPCC 2010 – National Plumbing Code of Canada
- .16 NFCC 2010 – National Fire Code of Canada

1.3 SUBMITTALS FOR REVIEW

- .1 Section 21 05 00: Submission procedures.
- .2 Product Data: Provide catalogue illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

1.4 CLOSEOUT SUBMITTALS

- .1 Section 21 05 00: Submission procedures.
- .2 Maintenance Data: Include fixture trim exploded view and replacement parts lists.
- .3 Warranty Documentation: Submit manufacturer warranty and ensure forms have been completed in The City's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

1.6 REGULATORY REQUIREMENTS

- .1 Products Requiring Electrical Connection: Listed and classified by CSA as suitable for the purpose specified and indicated.

1.7 DELIVERY, STORAGE, AND PROTECTION

- .1 Section 21 05 00: Transport, handle, store, and protect products.
- .2 Accept fixtures on site in factory packaging. Inspect for damage.
- .3 Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

Part 2 Products

2.1 FLUSH VALVE WATER CLOSETS – FLOOR-MOUNTED

- .1 WC-1:
 - .1 Manufacturer: Kohler Model K-4406.
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 American Standard.
 - .2 Crane.
 - .3 Contrac
 - .4 Substitutions: Refer to Section 21 05 00.
 - .3 ASME A112.19.2 / CSA B45.1:
 - .1 Floor mounted, vitreous china closet bowl, with elongated rim,

- .2 (1-1/2 inch) 38 mm top spud,
- .3 China bolt caps.
- .1 Delta Model 81T201BTA cut sheet
 - .1 Manufacturer: Delta Model 81T201HW.
 - .1 Substitutions: Refer to Section 21 05 00.
 - .2 ASME A112.19.2 / CSA B45.1:
 - .1 Exposed chrome plated,
 - .2 Electronic hard wired operated diaphragm flush valve with infrared sensor,
 - .3 Integral screwdriver stop and vacuum breaker,
 - .4 Metal “non hold down” ADA compliant over-ride button,
 - .5 Pressure loss check angle stop with cap,
 - .6 Valve outlet tube 292 mm (11-1/2 inches) height
 - .7 Factory-set to 4.8L (1.28 gal) flush volume.
 - .8 Complete with junction box and stainless steel cover plate.
 - .9 120V to 24V transformer required.
 - .3 Transformer Schedule:
 - .1 For up to 10 Electronic Valves Provide:
 - .1 110 to 24VAC Class II 20VA ()
 - .2 Manufacturer: Delta Model 060704A
 - .2 For up to 20 Electronic Valves Provide:
 - .1 110 to 24VAC Class II 40VA
 - .2 Manufacturer: Delta Model 060771A
 - .3 For up to 50 Electronic Valves Provide:
 - .1 110 to 24VAC Class II 100VA
 - .2 Manufacturer: Delta Model 060772A
- .2 Seat:
 - .1 Manufacturer: Kohler K-4731-SC.
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 Bemis 1155SSC.
 - .2 Substitutions: Refer to Section 21 05 00.
 - .3 Solid white plastic, open front less cover, extended back,
 - .4 Self-sustaining hinge, brass bolts.
 - .5 Sized for elongated bowl.
- .3 Back Rest:
 - .1 Manufacturer: Franke CM-16104.
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 Substitutions: Refer to Section 21 05 00.
 - .3 Stainless steel bar uses #4 gloss with flanges and covers.
 - .4 Antique white solid core plastic laminate 10”x4” panel back.

- .5 Concealed snap flanges and mounting hardware included.
- .6 Provide adequate backing in wall for support and comply to local codes for barrier free requirements.

2.2 WALL HUNG URINALS

- .1 UR-1:
 - .1 Manufacturer: Kohler Model K-4904-ET.
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 American Standard.
 - .2 Crane.
 - .3 Conrac.
 - .4 Substitutions: Refer to Section 21 05 00.
 - .3 ASME A112.19.2 / CSA B45.1:
 - .1 Vitreous china,
 - .2 Wall hung washout urinal with shields,
 - .3 Integral trap,
 - .4 19 mm (3/4 inch) top spud,
 - .5 Steel supporting hanger.
 - .4 ADA / CSA B651:
 - .1 Barrier-free compliant when installed at proper height. Refer to drawings.
- .2 Exposed Sensor Operated Flush Valve:
 - .1 Manufacturer: Delta Model 81T231BTA.
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 Powers.
 - .2 Substitutions: Refer to Section 21 05 00.
 - .3 ASME A112.18.1:
 - .1 Exposed chrome plated, battery-operated diaphragm type with infrared sensor for 19mm (3/4 inch) top-inlet urinal fixture,
 - .2 Four AA batteries, factory-installed, low battery indicator,
 - .3 Vandal-resistant cover screw,
 - .4 Metal “non hold open” handle,
 - .5 Integral screwdriver stop,
 - .6 Vacuum breaker,
 - .7 Cover tube and SS wall flange, spud flange and spud nut.
- .3 Wall Mounted Carrier:
 - .1 Manufacturer: Mifab.
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 Zurn.
 - .2 Substitutions: Refer to Section 21 05 00.
 - .3 ASME A112.6.1:
 - .1 Cast iron and steel frame with two structural steel legs,

- .2 Lugs for floor and wall attachment,
- .3 Threaded fixture studs for fixture hanger to bearing studs.

2.3 LAVATORIES

- .1 (LAV-1)Steel Counter Top Basin:
 - .1 Manufacturer: Franke Model OV1317U/5.
 - .1 Substitutions: Refer to Section 21 05 00.
 - .2 ASME A112.19.3:
 - .1 Construction: 18-10 Stainless steel, type 304, 18 gauge,
 - .2 Undermount Vanity
 - .3 Mirror-finished rim, satin-finished bowl, undercoated.
 - .4 1-1/4" waste fitting.
 - .5 290 x 460 x 130 mm (11-7/16 x 18 x 5 inches)
 - .6 Integral back overflow,
 - .7 Seal of putty, caulking, or concealed vinyl gasket.
 - .3 ADA / CSA B651:
 - .1 Barrier-free compliant when installed in a 533mm (21 inch) minimum depth countertop.
- .2 (LAV-2) Vitreous China Wall Hung Basin:
 - .1 Manufacturer: Kohler Model K-1728.
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 American Standard.
 - .2 Crane.
 - .3 Contrac.
 - .4 Substitutions: Refer to Section 21 05 00.
 - .3 ASME A112.19.2 / CSA B45.1:
 - .1 Vitreous china wall hung lavatory,
 - .2 48.9 x 43.8 mm (19-1/4 x 17-1/4 inch),
 - .3 Ledge back,
 - .4 Drillings on 100 mm (4 inch) centres,
 - .5 Rectangular basin and splash lip,
 - .6 Integral front overflow.
 - .7 Angle valve screwdriver stop,
 - .8 Chrome-plated copper supplies.
 - .4 ADA / CSA B651:
 - .1 Barrier-free compliant.
- .3 Lavatory Faucet - Manual:
 - .1 Manufacturer: Delta Model 22C151.
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 Substitutions: Refer to Section 21 05 00.

- .3 ASME A112.18.1:
 - .1 Single Handle Lavatory Faucet,
 - .2 Ceramic cartridge with high temperature rotational limit stop,
 - .3 Cast centerset with less Pop-Up,
 - .4 3 hole installation, 146mm (5.75") long reach on spout,
 - .5 Metal hold-down package,
 - .6 Washerless, Colour coded plug button on handle for hot/cold identification,
 - .7 Integrated volume and temperature control,
 - .8 Chrome Finish.
 - .9 Outlet: 0.5 GPM (1.9 L/min) - vandal resistant.
 - .10 Handle#: 1 – Vandal-resistant 89mm (3 1/2") lever handle - ADA compliant-colour indexed - vandal resistant (VR) screw.
- .4 Accessories:
 - .1 Chrome plated 1.3 mm (17 gauge) brass P-trap with clean-out plug and arm with escutcheon.
 - .2 Offset waste with perforated open strainer.
 - .3 Angle valve screwdriver stop,
 - .4 Chrome-plated copper supplies.
- .5 Wall Mounted Carrier:
 - .1 Manufacturer: Mifab Model MC-41
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 Zurn.
 - .2 Substitutions: Refer to Section 21 05 00.
 - .3 ASME A112.6.1:
 - .1 Cast iron and steel frame with two structural steel legs,
 - .2 Lugs for floor and wall attachment,
 - .3 Concealed arm supports,
 - .4 Bearing plate and studs.

2.4 SINKS (SK-1)

- .1 Single Compartment Bowl:
 - .1 Manufacturer: Kindred Commercial UCS4608/316P-1
 - .1 Substitutions: Refer to Section 21 05 00.
 - .2 ASME A112.19.3:
 - .1 18-8 stainless steel sink, 18 gauge, satin finished bowl,
 - .2 Type 316 stainless steel,
 - .3 Undermount
 - .4 Fully undercoated sink,
 - .5 3-1/2" (89mm) Type 316 basket Center waste location,
 - .6 3 1/2" (89mm) type 316 stainless steel crumb cup strainer with 1 1/2" type 316 stainless steel tailpiece.

- .2 Trim:
 - .1 Manufacturer: Delta Model 100LF-HDF.
 - .1 Substitutions: Refer to Section 21 05 00.
 - .2 ASME A112.18.1:
 - .1 Single-control brass deckmount faucet,
 - .2 3-hole 203mm (8"),
 - .3 cast brass body, 221mm (8 11/16") tubular swing spout with 180 degree rotation,
 - .4 1.5 gpm (5.7L/min) aerator.
 - .3 NSF 61
 - .1 Lead Free compliant
 - .4 Manufacturer: Delta Model 26C3154.
 - .1 Substitutions: Refer to Division 01.
 - .5 ASME A112.18.1:
 - .1 Two handle brass deckmount faucet,
 - .2 3-hole 203mm (8"),
 - .3 Heavy Duty cast brass body, 203mm (8") swing spout with 360 degree rotation,
 - .4 1.9L/min (0.5gpm) aerator.
- .3 Accessories:
 - .1 Chrome plated 1.3 mm (17 gauge) brass P-trap with clean-out plug and arm with escutcheon,
 - .2 Angle valve screwdriver stop,
 - .3 Chrome-plated copper supplies.

2.1 **ELECTRIC WATER COOLERS**

- .1 Combination Bi-Level Drinking Fountain & Bottle Filler:
 - .1 Manufacturer: Elkay Model LZSTL8WSLK.
 - .1 Substitutions: Refer to Section 21 05 00.
 - .2 Bi-Level Filtered Cooler with Bottle Filling Station
 - .3 Unit shall provide 8.0 gph of 50°F water at 90°F ambient and 80°F inlet water.
 - .4 Bottle filling unit shall include an electronic sensor for no-touch activation with an automatic 30-second shut-off timer.
 - .5 Shall provide 1.1-1.5 gpm flow rate with laminar flow to minimize splashing.
 - .6 Shall include antimicrobial protected plastic components to prevent mold and mildew.
 - .7 Cooler unit shall have pushbar activation and water-efficient Stream-Saver™ bubbler.
 - .8 Shall include the WaterSentry® Plus filter, certified to NSF/ANSI 42 and 53 for lead reduction, with visual monitor to indicate when replacement is necessary.
 - .9 Bottle Filling unit shall meet ADA guidelines for parallel approach.
 - .10 Cooler shall meet ADA guidelines for frontal or parallel approach.

- .11 Complete with 3 pack replacement filter, and vandal resistant streamSaver bubbler.
- .12 1-1/4" P-trap, SS braided supply with stops.
- .13 Electrical: Hermetically sealed, reciprocating type 115V, 60Hz single phase compressor.
- .14 2 m (6 foot) cord and plug for connection to electric wiring system including grounding connector.

2.2 SERVICE SINKS

- .1 Mop Sink:
 - .1 Manufacturer: American Standard PFMB2424S 24" x 24" x 10" (610 x 610 x 254 mm)
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 Zurn.
 - .3 Configuration:
 - .1 Size: 600 x 600 x 250 mm (24 x 24 x 10 inch) high,
 - .2 Floor mounted molded stone mop service basin, with 832 hose and holder, 889 cc. mop hanger, and PFBG24V (24") vinyl bumper guard.
 - .3 Stainless steel strainer.
- .2 Trim:
 - .1 Manufacturer: Delta Model 28T2383.
 - .1 Not permitted.
 - .2 ASME A112.18.1
 - .1 Polished chrome wallmount service faucet with rigid spout, 8" centres, cast brass construction, chrome-plated.
 - .2 Two handle with integral check stops, polished chrome plated finish, lever-blade handles.
 - .3 Long rigid spout with pail hook and adjustable top wall brace, pail hook and 3/4" hose thread on spout.
 - .4 Body mounted angle vacuum breaker, garden hose end outlet on spout.
 - .5 Vacuum breaker, integral stops.
- .3 Accessories:
 - .1 Stainless Steel Wall Guard Set
 - .2 1.5 m (5 feet) of 13 mm (1/2 inch) diameter plain end reinforced rubber hose,
 - .3 Hose clamp hanger,
 - .4 Mop hanger.

Part 3 Execution

3.1 EXAMINATION

- .1 Section 01 70 00: Verify existing conditions before starting work.

- .2 Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- .3 Verify that electric power is available and of the correct characteristics.
- .4 Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.2 PREPARATION

- .1 Rough-in fixture piping connections to minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.3 INSTALLATION

- .1 Install to manufacturer's instructions.
- .2 Install each fixture with trap, easily removable for servicing and cleaning.
- .3 Provide chrome plated rigid supplies to fixtures with screwdriver stops, reducers, and escutcheons. Install all exposed piping and valves neatly and close to the wall. Supplies should be run as plumb as possible.
- .4 Install components level and plumb.
- .5 All mixing valves serving multiple fixtures shall be installed in recessed cabinets.
- .6 Sanitary pipe serving lavatories shall run fully concealed within plumbing chase and only penetrate wall directly inline with each basin. No lateral offset will be permitted. There shall be one penetration per basin. All exposed sanitary pipe shall be chrome plated complete with echeloned plates at wall. Echeloned plate shall be secured to wall with silicone.
- .7 Install lavatory mixing valves neatly and out of site under millwork unless specified as installed in recessed cabinet. Secure with proper fasteners – galvanized strapping is not acceptable. Where provided on the drawings, refer to mixing valve installation details.
- .8 The temperature of water discharging into a bathtub or shower shall be set and tested by the mechanical subcontractor to not exceed 120°F (49°C).
- .9 Install and secure fixtures in place with wall supports or wall carriers (as specified in Part 2 Products) and bolt, washer, nut fasteners.
- .10 Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 92 00, colour to match fixture.
- .11 Seal sinks and lavatories to the millwork. Install gasket where supplied or recommended by sink or lavatory manufacturer.
- .12 Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

- .13 Thermally insulate and jacket all exposed drain pipe extensions, traps, and trap arms below barrier-free wall-hung lavatories.
- .14 Transformers serving electronic plumbing fixtures shall be supplied by this section. Coordinate installation with electrical trades. Low voltage wiring by this section. Mechanical subcontractor is responsible for coordinating quantity of transformers required. Transformers shall be installed in nearest fully accessible ceiling space unless noted otherwise on drawings. Coordinate exact location with The City.

3.4 INTERFACE WITH OTHER PRODUCTS

- .1 Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.5 ADJUSTING

- .1 Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.
- .2 Adjust stops or valves to comply with specified flow rates.
- .3 Adjust sensor ranges to allow consistent operation of fixtures.

3.6 CLEANING

- .1 Section 01 74 00: Cleaning installed work.
- .2 Clean plumbing fixtures and equipment.

3.7 PROTECTION OF FINISHED WORK

- .1 Section 01 78 40: Protecting installed work.
- .2 Do not permit use of fixtures.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Water heaters.
- .2 Potable Water Expansion Tank
- .3 Water Softener
- .4 Pumps.
 - .1 Circulators.
 - .2 Sump Pumps.

1.2 REFERENCES

- .1 ASHRAE 90A - Energy Conservation in New Building Design.
- .2 ASME Section 8D - Boilers and Pressure Vessel Codes - Rules for Construction of Pressure Vessels.
- .3 CSA B51-03 - Boiler, Pressure Vessel, and Pressure Piping Code.
- .4 NFPA 30 - Flammable and Combustible Liquids Code, 2008 Edition.
- .5 NFPA 54 - National Fuel Gas Code, 2006 Edition.
- .6 NFPA 58 - Liquefied Petroleum Gas Code, 2008 Edition.
- .7 UL 1453 - Electric Booster and Commercial Storage Tank Water Heaters.
- .8 UL 174 - Household Electric Storage Tank Water Heaters.
- .9 CAN/CSA-C191 - Performance of Electric Storage Tank Water Heaters for Domestic Hot Water Service.
- .10 ANSI Z21.10.3/CSA 4.3 - Gas water heaters - Volume III, Storage water heaters with input ratings above 75,000 Btu per hour, circulating and instantaneous

1.3 SUBMITTALS FOR REVIEW

- .1 Section 21 05 00: Submission procedures.
- .2 Product Data:
 - .1 Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - .2 Indicate pump type, capacity, power requirements.
 - .3 Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.

- .4 Provide electrical characteristics and connection requirements.
- .3 Shop Drawings:
 - .1 Indicate heat exchanger dimensions, size of tappings, and performance data.
 - .2 Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.
- 1.4 CLOSEOUT SUBMITTALS**
 - .1 Section 21 05 00: Submission procedures.
 - .2 Record Documentation: Record actual locations of components and electrical power supply.
 - .3 Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
 - .4 Warranty Documentation: Submit manufacturer warranty and ensure forms have been completed in The City's name and registered with manufacturer.
- 1.5 MAINTENANCE MATERIAL SUBMITTALS**
 - .1 Section 01 78 40: Maintenance and extra material requirements.
- 1.6 QUALITY ASSURANCE**
 - .1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years experience.
 - .2 Provide pumps with manufacturer's name, model number, and rating/capacity identified.
 - .3 Ensure products and installation of specified products are to recommendations and requirements of the following organizations:
 - .1 American Gas Association (AGA).
 - .2 National Sanitation Foundation (NSF).
 - .3 American Society of Mechanical Engineers (ASME).
 - .4 National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).
 - .5 National Electrical Manufacturers' Association (NEMA).
 - .6 Underwriters Laboratories (UL).
 - .4 Ensure pumps operate at specified system fluid temperatures without vapour binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.
- 1.7 REGULATORY REQUIREMENTS**
 - .1 Conform to CGA / AGS requirements for water heaters.
 - .2 Conform to ASME Section 8D for manufacture of pressure vessels for heat exchangers.

- .3 Conform to ASME Section 8D for tanks.
- .4 Products Requiring Electrical Connection: Listed and classified by testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND PROTECTION

- .1 Section 21 05 00: Transport, handle, store, and protect products.
- .2 Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.9 WARRANTY

- .1 Section 21 05 00: Warranties.
- .2 Provide a five (5) year warranty to include coverage for failure to meet specified requirements, for domestic water heaters, water storage tanks, and packaged water heating systems.

Part 2 Products

2.1 COMMERCIAL GAS FIRED TANKLESS WATER HEATERS

- .1 Manufacturer: Rheem/Ruud. Model RTGH-95DVLN
- .2 Other acceptable manufacturers offering equivalent products.
 - .1 Rinnai RU98i
 - .2 Substitutions: Refer to Section 21 05 20.
- .3 Type: Automatic, natural gas-fired, tankless.
- .4 Performance:
 - .1 Refer to schedules.
 - .2 Minimum/Maximum Input: 4.4/58.2 kW (15200/199000 Btuh).
 - .3 Minimum/ Maximum Flow 0.98/37.0 L/m (0.26/9.8 gpm)
 - .4 Energy Factor: .94 or greater
- .5 Venting: Polypropylene Concentric vent system CSA or ULc Approved.
- .6 Accessories: Condensate neutralizer Kit.
- .7 Controls: Automatic water temperature control adjustable from 37 to 49 degrees C(98 to 120 degrees F),

2.2 POTABLE WATER EXPANSION TANKS – DIAPHRAM TYPE

- .1 Manufacturers:
 - .1 ITT/B & G.

- .2 Taco.
- .3 Armstrong.
- .4 Armtrol
- .5 Expansflex
- .6 Substitutions: Refer to Section 21 05 00.

- .2 Construction: Welded steel, tested and stamped to Section 8D of ASME Code; supplied with National Board Form U-1, rated for working pressure of 860 kPa (125 psig), with flexible butyl diaphragm sealed into tank, and steel legs or saddles.
- .1 Construction: Welded steel, with flexible butyl diaphragm sealed into tank
- .2 Factory pre-charged to 55 psi.
- .3 Accessories: Pressure gauge and air-charging fitting, tank drain;
- .4 Performance:
 - .1 Refer to schedules.

2.3 WATER SOFTENERS

- .1 Manufacturer: Culligan.
- .2 Other acceptable manufacturers offering equivalent products.
 - .1 GE.
 - .2 Novo ECO Smart
 - .3 Substitutions: Refer to Section 21 05 00.
- .3 Performance:
 - .1 Refer to schedule
- .4 Softener Tank: Glass fibre reinforced plastic tank.
- .5 Brine Tank: Glass fibre reinforced plastic tank.
- .6 Control: Brass control valve, microprocessor demand control, backwash controller.
- .7 Hydrostatic test pressure 20.69 bar (300 psi).
- .8 Water temperature maximum: 120°F
- .9 Working pressure 1.38 – 8.76 bar (20 – 120 psi).
- .10 Electrical: 120 volt, 60 Hz

2.4 IN-LINE CIRCULATOR PUMPS

- .1 Manufacturers:
 - .1 ITT / B & G.

- .2 Taco.
- .3 Armstrong.
- .4 Substitutions: Refer to Section 21 05 00.
- .2 Casing: Lead Free Bronze, rated for 860 kPa (125 psig) working pressure, with stainless steel rotor assembly.
- .3 Impeller: 304 Stainless Steel
- .4 Shaft: 304 Stainless Steel with integral thrust collar and two oil lubricated bronze sleeve bearings.
- .5 Seal: Carbon rotating against a stationary ceramic seat.
- .6 Performance:
 - .1 Refer to schedule.

2.5 SUBMERSIBLE SUMP PUMPS

- .1 Manufacturers:
 - .1 Little Giant ESP33 Series.
 - .2 ITT / Goulds.
 - .3 Barnes.
 - .4 Substitutions: Refer to Section 21 05 00.
- .2 Type: Completely submersible, vertical, centrifugal.
- .3 Motor: thermal overload protected, stainless-steel heat-treated shaft, continuous duty oil-free motor, permanently lubricated lip seal.
- .4 Casing: Cast iron pump body.
- .5 Impeller: Glass-reinforced thermoplastic, stainless-steel heat-treated shaft.
- .6 Solids handling capability: 1/2".
- .7 Bearings: Ball bearings.
- .8 Sump: Refer to detail along with architectural and structural requirements. Coordinate to complete the installation.
- .9 Accessories: Oil resistant 3 m (10 foot) cord and plug with three-prong connector for connection to electric wiring system.
- .10 Controls:
 - .1 Duplex Alarm System & Pump Control – (Little Giant)
 - .2 Controls the pump and warns of high liquid levels
 - .3 NEMA 4X ultraviolet stabilized thermoplastic enclosure
 - .4 HOA switch allows for “Hand” (manual) “Off” or “Automatic” operation

- .5 Control/Alarm ON/OFF switch controls power to the control float and circuitry; this and the pump HOA switch provide an additional safety feature when servicing
- .6 Entire unit UL listed and tested by UL to CSA standards
- .7 Two sensor floats and an alarm float included
- .8 Designed to operate with or without optional fourth
- .9 83-85db audible alarm buzzer
- .10 Alarm output to the DDC system.
- .11 Performance:
 - .1 Refer to schedules.

Part 3 Execution

3.1 INSTALLATION

- .1 Install water heaters to manufacturer's instructions and to local regulations and requirements.
- .2 Coordinate with plumbing piping and related fuel piping, gas venting, and electrical work to achieve operating system.
- .3 Pumps:
 - .1 Ensure shaft length allows sump pumps to be located minimum 600 mm (24 inches) below lowest invert into sump pit and minimum (150 mm 6 inches) clearance from bottom of sump pit.
 - .2 Provide air cock and drain connection on horizontal pump casings.
 - .3 Provide line sized isolating valve and strainer on suction and line sized soft seated check valve and balancing valve on discharge.
 - .4 Decrease from line size with long radius reducing elbows or reducers.
 - .5 Support piping adjacent to pump such that no weight is carried on pump casings.
 - .6 Provide supports under elbows on pump suction and discharge line sizes 100 mm (4 inches) and over.
 - .7 Ensure pumps operate at specified system fluid temperatures without vapour binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
 - .8 Align and verify alignment of base mounted pumps prior to start-up.

END OF SECTION