

Part 1 General

1.1 SECTION INCLUDES

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

1.2 RELATED SECTIONS

- .1 Section 08 31 13 - Access Doors and Frames.
- .2 Section 09 91 10 - Painting.
- .3 Section 23 05 48 - Vibration Isolation.
- .4 Section 23 05 53 - Mechanical Identification.
- .5 Section 23 07 19 - Piping Insulation.
- .6 Section 23 05 16 – Piping Expansion Compensation.
- .7 Section 23 05 29 – Supports and Anchors.

1.3 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.

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- .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 ASTM D2665 - Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
 - .28 ASTM D2564 - Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
 - .29 ASTM D2855-96 (2002) - Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
 - .30 ASTM D2729 - Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - .31 ASTM D2241 - Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).
 - .32 ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
 - .33 ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

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- .34 AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 inch - 48 inch (350 mm - 1200mm).
 - .35 ASME B31.1 - Power Piping.
 - .36 CAN/CSA B149.1 – Natural Gas and Propane Installation Code.
 - .37 AGA Z21.22 - Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.
 - .38 ASME B31.2 - Fuel Gas Piping.
 - .39 NFPA 54 - National Fuel Gas Code.
 - .40 NFPA 58 - Liquefied Petroleum Gas Code.
 - .41 ASTM D2513 - Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
 - .42 ASTM A47/A47M - Ferritic Malleable Iron Castings.
 - .43 ASTM A53/A53M - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - .44 ASTM A234/A234M - Piping Fittings of Wrought-Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
 - .45 AWWA C105 - Polyethylene Encasement for Ductile-Iron Piping Systems.

1.4 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.

1.5 CLOSEOUT SUBMITTALS

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

1.6 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.

1.7 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.

1.8 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.

1.9 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 equivalent in accordance with B7.

2.3 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.

2.4 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.

2.5 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 Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.6 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.

2.7 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.

2.8 PLUG VALVES

- .1 Manufacturers:
 - .1 Nordstrom Valves, Inc. MSS SP-78, Type II.
 - .2 Substitutions: Refer to Section 21 05 00.
- .2 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.

2.9 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).

2.10 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.

2.11 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.

2.12 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.

2.13 STRAINERS

- .1 Construction: Size 50 mm (2 inch) and under:
 - .1 Manufacturers:
 - .1 Spirax-Sarco
 - .2 Substitutions: Refer to Section 21 05 00.
 - .2 Threaded bronze body Y pattern 2070 kPa (300 psi) CWP, Y pattern with 0.8 mm 1/32 inch stainless steel perforated screen.
- .2 Construction: Size 40 mm (1-1/2 inch) to 100 mm (4 inch):
 - .1 Manufacturers:
 - .1 Spirax-Sarco
 - .2 Substitutions: Refer to Section 21 05 00.
 - .2 Class 125, bronze body, Y pattern, flanged ends, with 1.6 mm (1/16 inch) stainless steel perforated screen.

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. Refer to Section 23 05 16.
- .7 Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 23 07 19.
- .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 00.
- .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. Followed by 150mm (6") void form under slab, a layer of clean fill, sand around the pipe with a minimum of 300mm (12") sand above pipe, 150mm (6") void form, and finally 150mm (6") sand under the void form. (Refer to detail)
- .15 Excavate to Division 31 requirements for work of this Section.
- .16 Backfill to Division 31 requirements for work of this Section.
- .17 Install bell and spigot pipe with bell end upstream.
- .18 Install valves with stems upright or horizontal, not inverted.
- .19 Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
- .20 Install water piping to ASME B31.9.
- .21 Install fuel oil piping to ASME B31.9 and CSA B139.

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- .22 Sleeve pipes passing through partitions, walls and floors. Set sleeves in concrete forms for all pipes passing through concrete walls, beams and slabs.
 - .23 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).
 - .24 Caulk sleeves to provide watertight installation.
 - .25 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.
 - .26 Install galvanized, oversize pipe sleeves on passing through walls or partitions, for building into wall construction, by other trades.
 - .27 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.
 - .28 Prior to installing sleeves in concrete beams, receive final jobsite approval by Structural Contract Administrator.

3.4

APPLICATION

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

Product	NON-COMBUSTIBLE BUILDING				
	General Usage	Air Plenum ¹	Vertical Services Spaces ²	High-Rise Building	Underground
Combustible Pipe FSR25: (eg. IPEX System 15)	P	N ³	N	N	P
Combustible Pipe FSR25/SDC50: (eg. IPEX XFR, CPVC)	P	P	N	P	P
MJ Grey Coupling	P	P	N	P	N
1. Restrictions for air plenums also apply to combustible buildings as well. 2. Certified firestopping devices are required whenever the system penetrates a vertical or horizontal separation, and shall be certified to CAN4-S115 and tested with a pressure differential of 50 Pa. 3. Sizes 20" and 24" are N					

3.5 ERECTION TOLERANCES

- .1 Section 01 73 00: Tolerances.
- .2 Establish invert elevations, slopes for drainage to one percent (1/8 inch per foot) minimum. Maintain gradients.
- .3 Slope water piping minimum 0.25 percent and arrange to drain at low points.

3.6 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.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Flexible Pipe Connections
- .2 Floor drains.
- .3 Trap seal primers.
- .4 Cleanouts.
- .5 Hydrants.
- .6 Backflow preventers.
- .7 Water hammer arrestors.
- .8 Sump Pit

1.2 RELATED SECTIONS

- .1 Section 01 10 00 - Summary of Work
- .2 Roofing Section.
- .3 Section 22 10 00 - Plumbing Piping.
- .4 Section 22 42 02 - Plumbing Fixtures.
- .5 Section 22 47 00 - Plumbing Equipment.

1.3 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 A112.26.1 - Water Hammer Arrestors.
- .4 ASSE 1011 - Hose Connection Vacuum Breakers.
- .5 ASSE 1012 - Backflow Preventers with Immediate Atmospheric Vent.
- .6 ASSE 1013 - Backflow Preventers, Reduced Pressure Principle.
- .7 ASSE 1019 - Wall Hydrants, Frost Proof Automatic Draining Anti-Backflow Types.
- .8 AWWA C506 - Backflow Prevention Devices - Reduced Pressure Principle and Double Check Valve Types.

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- .9 NSF/ANSI 61 – Drinking Water System Components – Health Effects
 - .10 PDI G-101 - Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data.
 - .11 PDI WH-201 - Water Hammer Arrestors.
 - .12 CSA B125.3 – Plumbing Fittings

1.4 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.

1.5 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.

1.6 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.

1.7 QUALITY ASSURANCE

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

1.8 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 FLOOR DRAINS

- .1 Manufacturers:
 - .1 Mifab
 - .2 Zurn.
 - .3 Watts.
 - .4 Substitutions: Refer to Section 21 05 00.
- .2 Floor Drain – Membrane :
 - .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 ½" trap primer connection.
- .3 Floor Drain – Surface Membrane Floors:
 - .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.
 - .4 Complete with ½" trap primer connection.
- .4 Floor Drain :
 - .1 ANSI A112.21.1,
 - .1 Lacquered cast iron two piece body
 - .2 Double drainage flange, weep-seepage holes,
 - .3 Reversible clamping collar,
 - .4 Round, adjustable nickel-bronze strainer with removable perforated sediment bucket.
 - .5 Complete with ½" trap primer connection.

- .5 Floor Drain – funnel:
 - .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 Round, adjustable nickel-bronze strainer with polished bronze funnel.
 - .5 Complete with ½” 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	No
FD-2	Less Reversible Membrane Clamp	4”x9” Funnel	Cast Iron	No	No	No
FD-3	Surface Membrane Clamp	Heavy Duty Strainer	Cast Iron	No	Yes	No

2.3 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.

2.4 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.

2.5 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.

2.6 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.

2.7 SUMP PIT – SANITARY c/w PUMP

- .1 Sump pit, complete with pumps and sealed lid.
 - .1 Manufacturers:
 - .1 Goulds/xylem
 - .2 Substitutions: Refer to Section 21 05 00.
 - .2 Roll top polyethylene basin complete with vent connection, pump and factory set mechanical float switch. Basin assembly designed and sealed for handling of sewage waste.
 - .3 System to be complete with high level alarm with remote alarm.
 - .4 Sewage Pump:
 - .1 Corrosion resistant construction
 - .2 Cast iron body
 - .3 Thermoplastic impeller and cover
 - .4 Upper sleeve and lower heavy duty ball bearing construction
 - .5 Motor is permanently lubricated
 - .6 Vortex impeller is recessed
 - .7 All ratings are within the working limits of the motor.
 - .8 Mechanical seal is carbon, ceramic, BUNA and stainless steel
 - .9 Stainless steel fasteners

2.8 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.

Part 3 INSTALLATION

- .1 Install to manufacturer instructions.
- .2 Prior to the installation of floor drains, confirm the membrane construction. Install floor drain with membrane as per floor drain and floor membrane requirements.
- .3 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.
- .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 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).
- .8 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 Service sinks.
- .4 Drinking fountains.
- .5 Showers.

1.2 RELATED SECTIONS

- .1 Section 21 05 00 – Common Work for Mechanical
 - .1 Submittal Procedures.
 - .2 Product Requirements.
 - .3 Closeout Submittals.
- .2 Section 06 20 00 – Finish Carpentry:
- .3 Section 07 92 00 - Joint Sealants: Seal fixtures to walls and floors.
- .4 Section 23 05 29 - Supports And Anchors.
- .5 Section 22 10 00 - Plumbing Piping.
- .6 Section 22 42 01 - Plumbing Specialties.
- .7 Section 22 47 00 - Plumbing Equipment.

1.3 REFERENCES

- .1 CSA B651 – Barrier-free Design.
- .2 ANSI Z124.2 - Gel-Coated Glass-Fibre Reinforced Polyester Resin Shower Receptor and Shower Stall Units.
- .3 ASME A112.18.1 / CSA-B125.1-05- Plumbing Fixture Fittings.
- .4 ASME A112.19.2 / CSA B45.1-08 - Vitreous China Plumbing Fixtures.
- .5 ASME A112.19.4 - Porcelain Enamelled Formed Steel Plumbing Fixtures.
- .6 ASME A112.19.5 - Trim for Water-Closet Bowls, Tanks, and Urinals.

- .7 NFPA 70 - National Electrical Code.
- .8 NBCC 2010 - National Building Code of Canada
- .9 NPCC 2010 – National Plumbing Code of Canada
- .10 NFCC 2010 – National Fire Code of Canada

1.4 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.

1.5 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 City's name and registered with manufacturer.

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 REGULATORY REQUIREMENTS

- .1 Products Requiring Electrical Connection: Listed and classified by CSA 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 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 TANK TYPE WATER CLOSETS

- .1 WC-1:
 - .1 Manufacturer: Kohler Model K-3609-T-U

- .2 Other acceptable manufacturers offering equivalent products.
 - .1 Crane.
 - .2 American Standard
 - .3 Contrac.
 - .4 Substitutions: Refer to Section 21 05 00.
- .3 ASME A112.19.2 / CSA B45.1:
 - .1 Free-standing combination tank-style,
 - .2 Elongated bowl,
 - .3 "Comfort Height" (ADA compliant)
 - .4 Vitreous china, 54 mm (2-1/8 inch) glazed trapway,
 - .5 AquaPiston (or equivalent in accordance with B7) flapperless flushing system,
 - .6 4.8 L (1.29 gal.) per flush,
 - .7 Insulated vitreous china closet tank,
 - .8 Fittings and lever flushing valve,
 - .9 Tank lock,
 - .10 Chrome plated bolt caps.
 - .11 Angle valve screwdriver stop,
 - .12 Chrome-plated copper supplies.
- .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 Self-sustaining hinge, brass bolts,
 - .6 Sized for elongated bowl.

2.2 LAVATORIES

- .1 Vitreous China Wall Hung Basin LAV-1:
 - .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.
 - .1 Lavatory Faucet - Manual:
 - .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.
 - .2 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.
 - .3 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.
 - .4 Vitreous China Wall Hung Basin LAV-2:

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- .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.
 - .5 Lavatory Faucet - Manual:
 - .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.
 - .6 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 Insulated P-trap. LAV Guard2 or equivalent in accordance with B7.
 - .7 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.

2.3 SHOWERS SH-1:

- .1 Shower Trim:
 - .1 Manufacturer: Delta Model T13H162.
 - .1 Substitutions: Refer to Section 21 05 00.
 - .2 ASME A112.18.1 / CSA-B125.1-05;
 - .1 Pressure-balanced shower valve,
 - .2 Pressure Balancing Cartridge with integral spool and sleeve assembly;
 - .3 Adjustable hot water limit stop.
 - .4 Cartridge shall contain all the movable parts and shall be accessible from the front of the unit.
 - .5 The escutcheon will have a hot and cold coded index.
 - .6 The valve shall have a lever handle.
 - .7 Shower head to be 30° Vandal resistant cast wallmount, 1.5 gpm (5.7 lpm).

2.4 SHOWER ENCLOSURES SH-2:

- .1 Barrier-Free Shower Cabinet:
 - .1 Manufacturer: Fiat Model A 6637.01F.
 - .1 Substitutions: Refer to Section 21 05 00.
 - .2 ANSI Z124.2:
 - .1 Unit size 1676 mm x 914 mm x 2159(66 inch x 36 x 85 inch)
 - .2 The unit is molded with a shampoo/soap shelf centered on the back wall.
 - .3 All units have an anti-skid floor treatment.
 - .4 The unit shall be installed in a pit, 13/4" (44) deep so that the finished floor will be level with the top of the threshold.
 - .5 Units must be set in a mortar base leveled and any clearances between the pit opening and the unit be filled with mortar. Shimming is necessary.
 - .6 One stainless steel wrap around grab bar, two stainless steel vertical grab bars, a fold-up seat, and a stainless steel curtain rod.
 - .7 The unit is thermoformed from a continuous cast acrylic sheet into a one piece, seamless unit.

- .8 The unit is reinforced with a composite matrix. The unit has a backside fire rating of "A" and a flame spread of 25.
- .9 Pit Roughing-In size to be confirmed with supplier.
- .10 Complete with: hinged seat and 3 grab bars in barrier-free showers (min 900mm long horizontal bar mounted between 700-800mm above floor on wall opposite entrance, and min 900mm long vertical bars at each side wall, starting between 700 - 800mm from floor) - horizontal bar must overlap folding shower seat min 300mm.
- .11 White shower curtain with hooks. (C4)
- .2 Shower Trim – Barrier-Free with Hand-Held Shower:
 - .1 Manufacturer: Delta Model 13220.
 - .1 Substitutions: Refer to Section 21 05 00.
 - .2 ASME A112.18.1 / CSA-B125.1-05;
 - .1 Pressure-balanced shower valve,
 - .2 Pressure Balancing Cartridge with integral spool and sleeve assembly;
 - .3 Adjustable hot water limit stop.
 - .4 Cartridge shall contain all the movable parts and shall be accessible from the front of the unit.
 - .5 The escutcheon will have a hot and cold coded index.
 - .6 The valve shall have a lever handle.
 - .3 Handshower Package
 - .1 Manufacturer: Delta/Teck Commercial Model 060127A.
 - .1 Substitutions: Refer to Section 21 05 00.
 - .2 ASME A112.18.1 / CSA-B125.1-05;
 - .1 Handshower with Shut-off Button and Integral Backflow Protection,
 - .2 2.5 U.S.Gpm (9.5 L/min.) Flow Control
 - .3 1778 mm (70") Long White Vinyl Handshower Hose with Nylon Reinforcement
 - .4 610mm (24") CP Sliding Handshower Bar w/Vertical Mounting Pin and Screws
 - .5 CP Brass & Plastic Swivel Handshower Elbow for Vertical Mounting Pin
 - .6 Wall Mounted ASSE Approved Vacuum Breaker
 - .3 ADA / CSA B651:
 - .1 Barrier-free compliant when installed in conjunction with other requirements.
- .4 Shower Drain:
 - .1 Manufacturer: Mifab Model SD7102.
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 Zurn.
 - .2 Watts.

- .3 50mm (2") with lacquered cast iron body, membrane clamp, adjustable strainer with stainless steel grate.

2.5 DRINKING FOUNTAINS

- .1 Drinking Fountain:
 - .1 Manufacturer: Kohler Model K-5264.
 - .1 Substitutions: Refer to Section 21 05 00.
 - .2 ASME A112.19.2 / CSA B45.1:
 - .1 Vitreous china,
 - .2 Wall-mounted
 - .3 32mm (1-1/4 inch) tailpiece and trap.
 - .4 Includes supply fitting.
 - .5 Hooded elevated anti-squirt bubbler with stream guard,
 - .6 Automatic stream regulator,
 - .7 Screwdriver stop.

2.6 SERVICE SINKS

- .1 Mop Sink:
 - .1 Manufacturer: Fiat MSB 24" x 24" x 10" (610 x 610 x 254 mm)
 - .2 Other acceptable manufacturers offering equivalent products.
 - .1 Not permitted.
 - .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 E-77-AA 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 1.5 m (5 feet) of 13 mm (1/2 inch) diameter plain end reinforced rubber hose,
 - .2 Hose clamp hanger,

.3 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 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.
- .7 The temperature of water discharging into a bathtub or shower shall be set and tested by the contractor to not exceed 120°F (49°C).
- .8 Install and secure fixtures in place with wall supports or wall carriers (as specified in Part 2 Products) and bolt, washer, nut fasteners.
- .9 Seal fixtures to wall and floor surfaces with sealant as specified in Section 07 92 00, colour to match fixture.
- .10 Seal sinks and lavatories to the millwork. Install gasket where supplied or recommended by sink or lavatory manufacturer.
- .11 Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

- .12 Thermally insulate and jacket all exposed drain pipe extensions, traps, and trap arms below barrier-free wall-hung lavatories.
- .13 Transformers serving electronic plumbing fixtures shall be supplied by this section. Coordinate installation with electrical trades. Low voltage wiring by this section. Contractor 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 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.

3.6 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.

1.2 RELATED SECTIONS

- .1 Section 21 05 00 – Common Work for Mechanical
 - .1 Submittal Procedures.
 - .2 Product Requirements.
 - .3 Closeout Submittals.

1.3 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

1.4 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.

1.5 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 City's name and registered with manufacturer.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- .1 Section 01 78 40: Maintenance and extra material requirements.

1.7 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.

1.8 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.

1.9 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.

1.10 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 Manufacturers:
- .1 A.O. Smith.
 - .2 Rheem/Ruud.
 - .3 Bradford White.
 - .4 Aerco.
 - .5 Substitutions: Refer to Section 21 05 00.
- .2 Type: Automatic, natural gas-fired, vertical storage.
- .3 Performance:
- .1 Refer to schedules.
- .4 Indoor style, condensing hot water heater, minimum listed 94% efficiency.
- .5 Accessories: direct vent connection kits and condensate collector.
- .6 Approval: By CGA as automatic storage water heater for operation at 82 degrees C (180 degrees F) operation on combustible floors.
- .7 Controls: Automatic water thermostat with temperature range adjustable from 49 to 82 degrees C (120 to 180 degrees F), automatic reset high temperature limiting thermostat factory set at 90 degrees C (195 degrees F), gas pressure regulator, 100 percent safety shut-off pilot and thermocouple. Controls shall enable vent fan.

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.

END OF SECTION