

PART 1 - GENERAL

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| <u>1.1 GENERAL</u> | .1 | Refer to Section 23 05 00 for the requirement for Contractor provided coordination shop drawings. Coordinate and cooperate with the production of these drawings and note that the installation of mechanical systems shall not commence until the drawings have been reviewed by the Departmental Representative. |
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| <u>1.2 RELATED WORK</u> | .1 | Waste Management and Disposal: Section 01 74 21 |
| | .2 | Mechanical General Requirements: Section 21 05 01 |
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| <u>1.3 DESCRIPTION OF SYSTEMS</u> | .1 | Provide complete plumbing system including:
.1 Sanitary waste, vent, storm, hot and cold water, trap primer water piping systems including fixtures, specialties, and accessories.
.2 The scope of work included in this contract must be coordinated with prior contract documents. |
| | .2 | Provide make up water lines to heating systems complete with backflow preventers. |
| | .3 | Provide NPS ½ priming lines to floor drain traps as indicated. |
| | .4 | Do all work in accordance with the 2010 Canadian Plumbing Code and the local authorities having jurisdiction. |
| | .5 | All underground drains to be a minimum of NPS 2. |
| | .6 | Ensure that a minimum 50 mm clearance is maintained between finished piping, including insulation. |
| | .7 | Provide piping sleeves for piping penetrating concrete floor slabs. |
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| <u>1.4 FIXTURES AND FITTINGS</u> | .1 | In case of discrepancy between Architectural and Mechanical drawings as to the number and location of fixtures, the Architectural drawings shall govern. |

<u>1.5 WASTE MANAGEMENT AND DISPOSAL</u>	.1	Collect, separate and recycle all site generated waste materials in accordance with Section 01 74 21.
	.2	Coordinate all work related to Section 01 74 21 with Contractor.

<u>1.6 OTHER GENERAL REQUIREMENTS</u>	.1	Refer to Section 21 05 01 for other general requirements relating to the plumbing systems.
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<u>PART 2 - PRODUCTS</u>	Not applicable.
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<u>PART 3 - EXECUTION</u>	Not applicable.
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PART 1 - GENERAL

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| <u>1.1 RELATED WORK</u> | .1 | Section 01 33 00 - Submittal Procedures |
| | .2 | Section 21 05 01 - Mechanical General Requirements |
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| <u>1.2 SHOP DRAWINGS AND PRODUCT DATA</u> | .1 | Submit shop drawings and product data in accordance with Section 01 33 00. |
| | .2 | Indicate: <ul style="list-style-type: none">.1 Equipment, including connections, fittings, control assemblies and ancillaries..2 Dimensions and recommended installation..3 Pump curves, head and RPM. |
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| <u>1.3 MAINTENANCE DATA</u> | .1 | Provide maintenance data for incorporation into manual specified in Section 01 78 00. |
| | .2 | Data to include: <ul style="list-style-type: none">.1 Manufacturers name, type, model year, capacity and serial number..2 Details of operation, servicing and maintenance..3 Recommended spare parts list with names and addresses. |

PART 2 - PRODUCTS

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| <u>2.1 DOMESTIC HOT WATER CIRCULATING PUMPS</u> | .1 | Capacity: see pump schedule. |
| | .2 | Construction: wet rotor, in-line circulator, all bronze or stainless steel construction, stainless steel or ceramic shaft, stainless steel or bronze shaft sleeve, carbon bearings lubricated by the circulating fluid. Design for 860 kPa wp and 105 C continuous service. |
| | .3 | Motor: drip proof, with thermal overload protection. |
| | .4 | Supports: provide as recommended by manufacturer. |
| | .5 | Acceptable Product: Bell & Gossett, Armstrong, Paco/Grundfos. |

PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Make piping and electrical connections to pump and motor assembly and controls as indicated.
 - .2 Ensure pump and motor assembly do not support piping.
 - .3 Confirm pump rotation is correct.
 - .4 Set up and adjust controls.
 - .5 Check starter protective devices.
 - .6 Check power supply.

PART 1 - GENERAL

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| <u>1.1 RELATED WORK</u> | .1 | Submittal Procedures: Section 01 33 00 |
| | .2 | Mechanical General Requirements:
Section 21 05 01 |
| <u>1.2 REFERENCES</u> | .1 | ANSI B16.18-2001, Cast Copper Alloy Solder Joint Pressure Fittings. |
| | .2 | ANSI B16.22-2001, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings. |
| | .3 | ANSI B16.24-2011, Bronze Pipe Flanges and Fittings, Class 150 and 300. |
| | .4 | ANSI/AWWA C111/A21.11-07, Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings. |
| | .5 | ASME B16.15-2011, Cast Bronze Threaded Fittings, Classes 125 and 250. |
| | .6 | ASTM A183-03 (2009), Specification for Carbon Steel Track Bolts and Nuts. |
| | .7 | ASTM A307-10, Specification for Carbon Steel Bolts and Studs, 414 MPa Tensile Strength. |
| | .8 | ASTM B32-08, Specification for Solder Metal. |
| | .9 | ASTM B75-11, Specification for Seamless Copper Tube. |
| | .10 | ASTM B88M-09, Specification for Seamless Copper Water Tube (Metric). |
| | .11 | MSS SP-70-2006, Cast Iron Gate Valves, Flanged and Threaded Ends. |
| | .12 | MSS SP-71-2005, Cast Iron Swing Check Valves, Flanged and Threaded Ends. |
| | .13 | MSS SP-80-2008, Bronze Gate, Globe, Angle and Check Valves. |
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- 1.3 SHOP DRAWINGS .1 Submit shop drawings in accordance with Section 01 33 00.
- .2 Submit data for following: valves.

- 1.4 MAINTENANCE DATA .1 Provide maintenance data for incorporation into manual specified in Section 01 33 00.

PART 2 - PRODUCTS

- 2.1 PIPING .1 Domestic Cold Water (DCW); Domestic Hot Water (DHW); Domestic Hot Water Recirculation (DHWR); Non-potable Water (NP), Trap Primer Piping (TP).
- .2 Above ground: copper tube, hard drawn, type L: to ASTM B88M.
- .3 Buried and embedded: copper tube, soft annealed, type K: to ASTM B88M, in long lengths and with no buried joints. "PEX", CSA approved potable water piping with no joints may be used under slab.

- 2.2 FITTINGS .1 Bronze pipe flanges and flanged fittings, Class 150 and 300: to ANSI B16.24.
- .2 Cast bronze threaded fittings, Class 125 and 250: to ANSI/ASME B16.15.
- .3 Cast copper, solder type: to ANSI B16.18. (Lead-free).
- .4 Wrought copper and copper alloy, solder type: to ANSI B16.22.
- .5 Piping NPS 2-1/2 and over: roll groove copper fittings to ASTM B75, alloy C12200. Victaulic "No-Sweat".
- .6 Mechanically formed Tee connections may be used on 1" and above water pipe and where the branch line connection to the branch main is at least one pipe size smaller than the branch main.
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- 2.3 JOINTS
- .1 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
 - .2 Solder/brazing: tin-antimony 95- 5: to ASTM B32, or tin-silver 94-6. (Lead free.)
 - .3 Teflon tape: for threaded joints.
 - .4 Piping NPS 2-1/2 and over: roll groove couplings with ductile or malleable iron housings, grade E EPDM flush seal gaskets and heat treated carbon steel bolts/nuts to ASTM A183. Victaulic "No- Sweat".
 - .5 Dielectric unions between dissimilar metals, complete with thermoplastic liner.
- 2.4 GATE VALVES
- .1 NPS 2-1/2 and over, flanged:
 - .1 Non-rising stem: to MSS SP- 70, Class 125, 125 psig, full faced, flanged ends, cast-iron body, bronze trim, bolted bonnet.
 - .2 Acceptable Material: Crane 461, Jenkins 452; Kitz 72; Hattersley 501; Toyo 421A; Milwaukee Valve Company.
- 2.5 GLOBE VALVES
- .1 NPS 2 and under, soldered:
 - .1 To MSS SP-80, Class 125, 862 kPa, bronze body, renewable composition disc, screwed over bonnet.
 - .2 Lockshield handles: as indicated.
 - .3 Acceptable Material: Crane 1310; Jenkins 106 BPJ; Kitz 10; Hattersley A51M; Toyo; Milwaukee Valve Company.
 - .2 NPS 2 and under, screwed:
 - .1 To MSS SP-80, Class 125, 862 kPa, bronze body, screwed over bonnet, renewable composition disc.
 - .2 Lockshield handles: as indicated.
 - .3 Acceptable Material: Crane 14½ P; Jenkins; Kitz; Hattersley; Toyo; Milwaukee Valve Company.
- 2.6 SWING CHECK VALVES
- .1 NPS 2 and under, soldered:
 - .1 To MSS SP-80, Class 125, 862 kPa, bronze body, bronze swing disc, screw in cap, regrindable
 - .2 Acceptable Material: Crane 1342; Jenkins 4093; Hattersley A61SE; Toyo 237; Milwaukee Valve Company.
 - .2 NPS 2 and under, screwed:
 - .1 To MSS SP-80, Class 125, 862 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat.
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- 2.6 SWING CHECK VALVES (Cont'd)
- .2 NPS 2 and under, screwed:(Cont'd)
 - .2 Acceptable Material: Crane 37; Jenkins 4092; Hattersley A60AT; Toyo 236; Milwaukee Valve Company.
 - .3 NPS 2-1/2 and over; flanged:
 - .1 To MSS SP-71, class 125, 862 kPa, cast iron body, flat flanges faces, renewable seat, bronze disc, bolted cap.
 - .2 Acceptable Material: Crane 373; Jenkins 587J; Hattersley A60AT; Toyo 236; Milwaukee Valve Company.
- 2.7 BALL VALVES
- .1 NPS 2 and under, screwed:
 - .1 To ANSI B16.18, Class 150, 1034 kPa.
 - .2 Bronze body, stainless steel ball, PTFE Teflon adjustable packing, brass gland and PTFE Teflon Buna N seat, steel lever handle.
 - .3 Acceptable Material: Crane Capri, Jenkins 901FJ Toyo 5044A, Kitz; Milwaukee Valve Company.
 - .2 NPS 2 and under, soldered:
 - .1 To ANSI B16.18, Class 150, 1034 kPa.
 - .2 Bronze body, chrome plated brass stainless steel ball, PTFE Teflon adjustable packing, brass gland and PTFE Teflon Buna N seat, steel lever handle, with NPT to copper adaptors.
 - .3 Acceptable Material: Crane Capri, Jenkins 902FJ, Toyo 5049A, Milwaukee Valve Company; Kitz.
 - .3 NPS 2-1/2 and over, roll groove:
 - .1 Bronze body, Class 150, 1034 kPa, with bronze trim, grade E EPDM coating bonded to ductile iron disc, enameled two position detent handle.
 - .2 Acceptable Material: Victaulic series 608.

PART 3 - EXECUTION

- 3.1 INSTALLATION
- .1 Install in accordance with the 2010 Canadian Plumbing Code and the local authority having jurisdiction.
 - .2 Cut square, ream and clean tubing and tube ends, clean recesses of fittings and assemble without binding.
 - .3 Assemble all piping using fittings manufactured to ANSI standards.
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- 3.1 INSTALLATION (Cont'd)
- .4 Install tubing close to building structure to minimize furring, conserve headroom and space. Group exposed piping and run parallel to walls.
 - .5 Connect to fixtures and equipment in accordance with manufacturers instructions unless otherwise indicated.
 - .6 Buried tubing:
 - .1 Lay in well compacted washed sand in accordance with AWWA Class B bedding.
 - .2 Bend tubing without crimping or constriction. Minimize use of fittings.
 - .7 Provide union nuts at all faucets. Do not directly solder faucets to supplies.
 - .8 Test piping systems in accordance with Section 21 05 01.
- 3.2 VALVES
- .1 Isolate equipment, fixtures and branches with ball valves and as indicated. Ball valves shall be used for shut-off applications on piping up to and including NPS 2.
- 3.3 DISINFECTION
- .1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction. After testing, provide acceptable water quality test report to the Departmental Representative for approval.
- 3.4 PRESSURE TESTS
- .1 Conform to requirements of Section 23 05 05.
 - .2 Test pressure: greater of 1.5 times maximum system operating pressure or 860 kPa.
- 3.5 PRE-START-UP INSPECTIONS
- .1 Systems to be complete, prior to flushing, testing and start-up.
 - .2 Verify that system can be completely drained.
 - .3 Ensure that air chambers, expansion compensators are installed properly.
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3.6 START-UP

- .1 Timing: Start up after:
 - .1 Pressure tests have been completed.
 - .2 Disinfection procedures have been completed.
 - .3 Certificate of static completion has been issued.
 - .4 Water treatment systems operational.
- .2 Provide continuous supervision during start-up.
- .3 Start-up procedures:
 - .1 Establish circulation and ensure that air is eliminated.
 - .2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.
 - .3 Bring HWS storage tank up to design temperature slowly.
 - .4 Monitor piping DHWS piping systems for freedom of movement, pipe expansion as designed.
 - .5 Check control, limit, safety devices for normal and safe operation.
- .4 Rectify start-up deficiencies.

3.7 PERFORMANCE VERIFICATION

- .1 Timing:
 - .1 After pressure and leakage tests and disinfection completed, and certificate of completion has been issued by authority having jurisdiction.
- .2 Procedures:
 - .1 Verify that flow rate and pressure meet Design Criteria.
 - .2 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.
 - .3 Sterilize DHWS systems for Legionella control.
 - .4 Verify performance of temperature controls.
 - .5 Verify compliance with safety and health requirements.
 - .6 Check for proper operation of water hammer arrestors. Run one (1) outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.
 - .7 Confirm water quality consistent with supply standards, verifying that no residuals remain as a result of flushing and/or cleaning.
- .3 Reports:
 - .1 In accordance with Section 01 33 00.
 - .2 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

PWGSC	DRAINAGE WASTE AND VENT	Section 22 13 17
Solid Waste Management Facility	PIPING CAST IRON AND	Page 1
Springhill Institution	COPPER	
Project No. R.043944.002		2014-08-01

PART 1 - GENERAL

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| <u>1.1 RELATED WORK</u> | .1 | Section 23 05 05 - Installation of Pipework. |
| | .2 | Section 31 23 10 - Excavating, Trenching and Backfilling. |
|
<u>1.2 REFERENCES</u> |
.1 |
American Society for Testing and Materials (ASTM) |
| | .1 | ASTM B32-08, Specification for Solder Metal. |
| | .2 | ASTM B306-09, Specification for Copper Drainage Tube (DWV). |
| | .3 | ASTM C564-11, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings. |
| |
.2 |
Canadian Standards Association (CSA) |
| | .1 | CAN/CSA B70-06, Cast Iron Soil Pipe, Fittings and Means of Joining. |
| | .2 | CAN/CSA B125.3-11, Plumbing Fittings. |
| |
.3 |
Underwriters Laboratory Canada |
| | .1 | CAN/ULC S115-05, Method of Test for Firestop Systems. |
| | .2 | CAN/ULC S102.2M-10, Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies. |

PART 2 - PRODUCTS

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| <u>2.1 COPPER TUBE AND FITTINGS</u> | .1 | Above ground sanitary storm and vent Type DWV to: ASTM B306. |
| | .2 | Fittings. |
| | .1 | Cast brass: to CAN/CSA B125. |
| | .2 | Wrought copper: to CAN/CSA B125. |
| | .3 | Solder: type 50A lead free, tin- 95:5, type TA, to ASTM B32. All solder used in this building shall be lead free. |
|
<u>2.2 CAST IRON PIPING AND FITTINGS</u> |
.1 |
Buried sanitary, storm and vent minimum NPS 2, to: CAN/CSA B70, with one layer of protective coating of bitumous. |
| | .1 | Joints. |
| | .1 | Mechanical joints. |
| | .1 | Neoprene or butyl rubber compression gaskets: to ASTM C 564 or CAN/CSA B70. |

- 2.2 CAST IRON .1 (Cont'd)
- PIPING AND .1 (Cont'd)
- FITTINGS .2 Stainless steel clamps.
- (Cont'd) .1 ANACO/Husky 4000 series with minimum four (4) band clamps or equivalent.
- .2 Hub and spigot.
- .2 Above ground sanitary storm and vent: to CAN/CSA B70.
- .1 Joints.
- .1 Mechanical joints.
- .1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

PART 3 - EXECUTION

- 3.1 INSTALLATION .1 In accordance with Section 23 05 05.
- .2 Install in accordance with Canadian Plumbing Code and local authority having jurisdiction.
- .3 Install piping parallel and close to walls to conserve headroom and space, and grade as indicated.
- .4 Wherever possible coordinate the exact location of underground drain pipes to avoid structural footings. Where drain pipes pass perpendicular to footings coordinate, prior to tender award, with the concrete and excavation contractor to ensure that the footings are stepped down to accommodate the pipes. Sleeve the pipes through the wall or grade beam just above the footing with a minimum of 25mm clear space around the pipe. Fill the clear space with soft insulation prior to back-fill.
- .5 Install buried pipe on 150 mm bed of clean washed freshwater sand, or crusher dust, shaped to accommodate fittings to line and grade (slope) as indicated. Backfill with minimum 150 mm of clean washed freshwater sand, or crusher dust, and upper 300 mm of rock free soil backfill, or Type 1 gravel. Materials as specified in Section 31 23 10.
- .6 Provide pipe firestop barriers and/or collars on the underside of fire- rated floors and both sides of fire-rated partitions that are penetrated.
- .7 Acceptable material: 3M Firestop.
- .8 Install cast iron to CSA B70 for sanitary serving boiler and mechanical rooms.

- 3.1 INSTALLATION (Cont'd) .9 Make provision for Rain Water Leader thermal expansion.
- 3.2 TESTING .1 Pressure test buried systems before backfilling. Submit test results to the Departmental Representative including photographs showing method of the test.
- .2 Hydraulically test to verify grades and freedom from obstructions.
- .3 Provide ball test on underground piping and submit DVD movie showing no low spots.
- .4 Also conform to Section 23 05 05.
- 3.3 PERFORMANCE VERIFICATION .1 Cleanouts:
- .1 Ensure accessible and that access doors are correctly located.
- .2 Open, cover with linseed oil and re-seal.
- .3 Verify that cleanout rods can probe as far as the next cleanout, at least.
- .2 Test to ensure traps are fully and permanently primed.
- .3 Storm water drainage:
- .1 Verify domes are secure.
- .2 Ensure weirs are correctly sized and installed correctly.
- .3 Verify provisions for movement of roof system.
- .4 Ensure that fixtures are properly anchored, connected to system and effectively vented.
- .5 Affix applicable label (storm, sanitary, vent, pump discharge etc.) complete with directional arrows every floor or 4.5 m (whichever is less).

PART 1 - GENERAL

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| <u>1.1 RELATED WORK</u> | .1 | Excavating, Trenching and Backfilling:
Section 31 23 10 |
| <u>1.2 REFERENCES</u> | .1 | ASTM D2235-04(R2011), Specification for Solvent
Cement for Acrylonitrile-Butadiene-Styrene (ABS)
Plastic Pipe and Fittings. |
| | .2 | ASTM D2564-04(2009)e1, Specification for Solvent
Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping
Systems. |
| | .3 | CSA B70-06, Cast Iron Soil Pipe, Fittings and Means
of Joining. |
| | .4 | CSA B1800-11, Plastic Non- pressure Piping
Compendium. |
| <u>1.3 HANDLING AND
STORAGE</u> | .1 | Handle and store pipe and fittings in such a manner
as to avoid shock and damage. Do not use chains or
cables passed through pipe bore. |
| <u>1.4 APPLICATION</u> | .1 | Buried sanitary and storm piping:
.1 PVC DWV with cast iron to CSA B70 on sanitary
serving boiler rooms. |
| | .2 | ABS shall not be permitted. |

PART 2 - PRODUCTS

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| <u>2.1 POLYVINYL
CHLORIDE (PVC)
PIPE AND FITTINGS
(DWV)</u> | .1 | Pipe, fittings and solvent cement: Polyvinyl
chloride to CSA B1800. |
| | .2 | Solvent Weld to ASTM D2564. |
| | .3 | Storm piping below grade: PVC-SDR 35. |
| | .4 | Sanitary piping below grade: PVC- DWV. |
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PART 3 - EXECUTION

3.1 PREPARATION

- .1 Carefully inspect products for defects and remove defective products from site.
- .2 Ensure that pipe and fittings are clean before installation.
- .3 Install buried pipe on 150 mm bed of clean washed sand, shaped to accommodate fittings to line and grade (slope) as indicated. Backfill with minimum 150 mm of clean washed sand and upper 150 mm of rock free soil backfill. Materials as specified in Section 31 23 10.

3.2 INSTALLATION

- .1 Lay and join pipe and fittings as specified in this section and according to manufacturer's published instructions.
- .2 Start laying at outlet and proceed in upstream direction with bell ends of pipe facing upgrade.
- .3 Prevent entry of foreign material, water or other foreign matter into pipe. Use temporary watertight bulkheads when pipe laying is not in progress.
- .4 Align pipe carefully before joining. Do not use excessive force to join pipe sections.
- .5 Support pipes as required to assure concentricity until joint is properly completed.
- .6 Keep pipe joints free from mud, silt, gravel or other foreign matter.
- .7 Where deflection at joint is permitted, deflect only after joint is completed. Do not exceed maximum joint deflection recommended by manufacturer.
- .8 Complete each joint before laying next length of pipe.
- .9 Apply sufficient pressure in making joints to ensure that joint is completed to manufacturer's recommendations. Minimize deflection after joint has been made to avoid damage.

PART 1 - GENERAL

- 1.1 RELATED WORK .1 Submittal Procedures: Section 01 33 00
- .2 Contract Closeout: Section 01 78 00
- .3 Thermometers and Pressure Gauges:
Section 23 05 20
- 1.2 REFERENCES .1 Canadian Gas Association (CGA).
- .2 Canadian Standards Association (CSA International)
- .1 CSA B51-09 Boiler, Pressure Vessel, and
Pressure Piping Code.
- .2 CAN/CSA C30-M90(R2009), Performance
Requirements for Glass-Lined Storage Tanks for
Household Hot Water Service.
- .3 Provincial Boiler, Pressure Vessel and Compressed
Gas Regulations.
- 1.3 SHOP DRAWINGS .1 Submit shop drawings in accordance with Section 01
33 00.
- .2 Indicate:
- .1 Equipment, including connections, fittings,
control assemblies and ancillaries, identifying
factory and field assembled, installation procedures.
- 1.4 CLOSEOUT
SUBMITTALS .1 Provide maintenance and engineering data for
incorporation into manual specified in Section 01 78
00.
- .2 For the Work of this Section, warranty for five (5)
years from date of Substantial Completion.
- 1.5 WARRANTY .1 Provide five (5) year parts and labour warranty from
the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 HOT WATER
STORAGE - HOT
WATER HEAT SOURCE

- .1 High density fiberglass insulation.
- .2 Factory installed 3/4" NPT di-electric nipples to provide corrosion protection.
- .3 High quality magnesium anode for protection against the corrosive effects of water.
- .4 Immersion tube bundle type: to CSA B51 and Provincial Regulations. Unit designed for 1030 kPa working pressure for both tube and shell circuits.
- .5 Bundle: U-tube type with cast iron heads, steel or cast iron support saddles.
- .6 Tubes: removable, double walled design NPS 3/4" seamless hard drawn copper tube.
- .7 Glass lined inner tank:
 - .1 Blue cobalt glass enriched with zircon shall be fused to specially treated steel at 1,600°F (871°C) to provide coating for corrosion protection. The tank shall be certified at a test pressure of 300 PSI (2,068 kPa) and a working pressure of 150 PSI (1,034 kPa).
- .8 Automatic temperature control:
 - .1 Provide adjustable thermostat to set the desired water temperature and a safety cut-off for abnormal conditions.
- .9 Factory installed T&P relief valve:
 - .1 Shall be provided to protect the tank from the damaging effects of excessive temperature and pressure.
- .10 Warranty:
 - .1 Provide six (6) year limited warranty against inner tank leakage from the date of installation and two (2) year limited warranty on component parts.
- .11 Acceptable materials: Giant, GE.

2.2 TRIM AND
INSTRUMENTATION

- .1 Drain valve: NPS 1 with hose end.
- .2 Thermometer: to Section 23 05 20.
- .3 Pressure gauge: to Section 23 05 20.

2.2 TRIM AND
INSTRUMENTATION
(Cont'd)

- .4 Thermowell filled with conductive paste for control valve temperature sensor.
- .5 ASME rated temperature and pressure relief valve sized for full capacity of heater, having discharge terminating over floor drain and visible to operators.
- .6 Magnesium anodes adequate for 20 years of operation and located for easy replacement.

2.3 ANCHOR BOLTS
AND TEMPLATES

- .1 Supply for installation by other Divisions.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Install in accordance with manufacturer's recommendations and authority having jurisdiction.
- .2 Provide structural steel for horizontal mounted tanks and for instantaneous heaters.
- .3 Provide insulation between tank and supports.

3.2 FIELD QUALITY
CONTROL

- .1 Start up and commission DHW heaters, in accordance with Contractor's Commissioning Plan.

PART 1 - GENERAL

- 1.1 RELATED WORK
- .1 Submittal Procedures: Section 01 33 00
 - .2 Construction/Demolition Waste Management and Disposal: Section 01 74 21
 - .3 Health and Safety Requirements: Section 01 35 29
 - .4 Closeout Submittals: Section 01 78 00
 - .5 Commissioning: Section 01 91 13
- 1.2 REFERENCES
- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA-B45 Series- 02(R2008), Plumbing Fixtures.
 - .2 CAN/CSA-B125.3-11, Plumbing Fittings.
 - .3 CAN/CSA-B651-04(R2010), Barrier-Free Design.
- 1.3 SUBMITTALS
- .1 Submittals in accordance with Section 01 33 00.
 - .2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets.
 - .3 Submit shop drawings and product data in accordance with Section 01 33 00.
 - .1 Indicate, for all fixtures and trim:
 - .1 Dimensions, construction details, roughing-in dimensions.
 - .2 Factory set water consumption at recommended pressure.
 - .3 Minimum pressure required.
 - .4 Closeout Submittals:
 - .1 Submit maintenance data in accordance with Section 01 78 00.
 - .2 Include:
 - .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
 - .2 Details of operation, servicing maintenance.
 - .3 List of recommended spare parts.
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| 1.4 QUALITY
ASSURANCE | .1 | Health and Safety:
.1 Do construction occupational health and safety
in accordance with Section 01 35 29. |
| 1.5 DELIVERY
STORAGE AND
DISPOSAL | .1 | Waste Management and Disposal:
.1 Separate waste materials for reuse and
recycling in accordance with Waste Management and
Disposal.
.2 Collect and separate for disposal paper,
plastic, polystyrene, corrugated cardboard, packaging
material in appropriate on-site bins for recycling in
accordance with Waste Management Plan.
.3 Fold up metal and plastic banding, flatten and
place in designated area for recycling. |
| 1.6 ACCEPTABLE
PRODUCT | .1 | Fixtures:
.1 American Standard
.2 Kohler
.3 Toto
.4 Sloan
.5 Kindred
.6 Fiat
.7 Architectural Metal Industries
.8 ELKAY
.9 Zurn
.10 All listed in Plumbing Schedule

.2 Trim:
.1 Cambridge Brass
.2 Chicago Faucet
.3 Powers Crane
.4 Sloan
.5 Zurn
.6 Delta
.7 All listed in Plumbing Schedule |
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PART 2 - PRODUCTS

<u>2.1 MANUFACTURED UNITS</u>	.1	Fixtures: manufacture in accordance with CAN/CSA-B45 series.
	.2	Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.
	.3	Exposed plumbing brass to be chrome plated.
	.4	Number, locations: Architectural drawings to govern.
	.5	Fixtures in any one location to be product of one manufacturer and of same type.
	.6	Trim in any one location to be product of one manufacturer and of same type.
<u>2.2 EQUIPMENT SCHEDULE</u>	.1	Refer to plumbing fixture Schedule on the Drawings.
<u>2.3 FIXTURE PIPING</u>	.1	Hot and cold water supplies to each fixture: .1 Chrome plated flexible supply pipes each with screwdriver stop, reducers, escutcheon for exposed supplies.
	.2	Waste: .1 Brass P trap with cleanout on each fixture not having integral trap. .2 Chrome plated in all exposed places.
<u>2.4 CHAIR CARRIERS</u>	.1	Factory manufactured floor- mounted carrier systems for all wall- mounted fixtures

PART 3 - EXECUTION

- 3.1 INSTALLATION .1 Mounting heights:
- .1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.
 - .2 Wall-hung fixtures: as indicated, measured from finished floor.
 - .3 Physically handicapped: to comply with most stringent of either NBCC or CAN/CSA B651, or Provincial Buildings Accessibility Act and Regulations.
- 3.2 ADJUSTING .1 Conform to water conservation requirements specified this section.
- .2 Do adjustments prior to pre- commissioning.
- .3 Adjustments:
- .1 Adjust water flow rate to design flow rates.
 - .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
- .4 Checks:
- .1 Aerators: operation, cleanliness.
 - .2 Vacuum breakers, backflow preventers: operation under all conditions.
- .5 Thermostatic controls:
- .1 Verify temperature settings, operation of control, limit and safety controls.

PART 1 - GENERAL

- 1.1 RELATED WORK
- .1 Submittal Procedures: Section 01 33 00
 - .2 Health and Safety Requirements:
Section 01 35 29
 - .3 Quality Control: Section 01 45 00
 - .4 Construction/Demolition Waste
Management and Disposal: Section 01 74 21
 - .5 Closeout Submittals: Section 01 78 00
- 1.2 REFERENCES
- .1 American Society for Testing and Materials
International (ASTM)
 - .1 ASTM A126-04(2009), Specification for Gray Iron
Castings for Valves, Flanges and Pipe Fittings.
 - .2 ASTM B62-09, Specification for Composition
Bronze or Ounce Metal Castings.
 - .2 American Water Works Association (AWWA)
 - .1 AWWA C700-09, Cold Water Meters- Displacement
Type, Bronze Main Case.
 - .2 AWWA C701-07, Cold Water Meters- Turbine Type
for Customer Service.
 - .3 AWWA C702-10, Cold Water Meters- Compound Type.
 - .3 American National Standards Institute (ANSI)
 - .1 ANSI Z358.1-04 Emergency eyewash and shower
equipment.
 - .4 Canadian Standards Association (CSA)
 - .1 CSA-B64 Series-07, Backflow Preventers and
Vacuum Breakers.
 - .2 CSA-B356-00(R2010), Water Pressure Reducing
Valves for Domestic Water Supply Systems.
 - .5 Health Canada/Workplace Hazardous Materials
Information Systems (WHMIS).
 - .1 Material Safety Data Sheets (MSDS).
 - .6 Plumbing and Drainage Institute (PDI)
 - .1 PDI-G101, Testing and Rating Procedure for
Grease Interceptors with Appendix of Sizing and
Installation Data.
 - .2 PDI-WH201, Water Hammer Arresters Standard.
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- 1.3 SUBMITTALS
- .1 Submittals in accordance with Section 01 33 00.
 - .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet for fixtures and equipment.
 - .2 Indicate dimensions, construction details and materials for specified items.
 - .3 Submit WHMIS MSDS in accordance with Section 01 35 29. Indicate VOC's for adhesive and solvents during application and curing.
 - .3 Shop Drawings:
 - .1 Submit shop drawings to indicate materials, finishes, method of anchorage, number of anchors, dimensions, construction and assembly details and accessories.
 - .2 Instructions: submit manufacturer's installation instructions.
 - .3 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00. Include:
 - .1 Description of plumbing specialties and accessories, giving manufacturer's name, type, model, year and capacity.
 - .2 Details of operation, servicing and maintenance.
 - .3 Recommended spare parts list.
- 1.4 QUALITY ASSURANCE
- .1 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.
- 1.5 DELIVERY, STORAGE AND HANDLING
- .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
 - .3 Collect and separate for disposal, paper, plastic, polystyrene, corrugated cardboard packaging materials in appropriate on-site bins for recycling in accordance with Waste Management Plan.
 - .4 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
 - .5 Fold up metal and plastic banding flatten and place in designated area for recycling.
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PART 2 - PRODUCTS

- 2.1 FLOOR DRAINS .1 Floor drains and trench drains.
- .1 Refer to Schedule on Drawings, minimum size for all floor drains shall be 75mm, including for shower drains.
 - .2 Trap primers shall be provided for all floor drains.
 - .3 Acceptable material: Zurn ZN- 415, Jay R. Smith, MIFAB.
- 2.2 CLEANOUTS .1 Cleanout plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.
- .1 Acceptable Product: Zurn ZN- 1400, Jay R. Smith, MIFAB.
- .2 Access covers:
- .1 Wall access: face or wall type, or stainless steel square cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.
 - .2 Floor access: round cast iron body and frame with adjustable secured nickel bronze top.
 - .1 Plugs: bronze with neoprene gasket.
 - .2 Cover for unfinished concrete floors: cast iron round, gasket, vandal-proof screws.
 - .3 Cover for terrazzo finish: polished nickel bronze brass with recessed cover for filling with terrazzo, vandal-proof locking screws.
 - .4 Cover for tile and linoleum floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws.
 - .5 Cover for carpeted floors: polished nickel bronze with deep flange cover for carpet infill, complete with carpet retainer vandal- proof locking screws.
 - .6 Cover for finished concrete floors: polished bronze, flush to finished floor, vandal-proof locking screws.
- .3 Acceptable materials: Zurn ZANB- 1460, Jay R. Smith, MIFAB.
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- 2.3 NON FREEZE WALL HYDRANTS
- .1 Recessed with integral vacuum breaker, integral backflow preventer NPS hose outlet, removable operating key, polished bronze finish, encased, non-freeze, anti-siphon, automatic draining, wall clamp, replaceable bronze seat and washer.
 - .2 Acceptable Product: Zurn ZN-1300, Jay R. Smith, MIFAB.
- 2.4 WATER HAMMER ARRESTORS
- .1 Stainless steel or copper construction, bellows or piston type: to PDI-WH201.
 - .2 Acceptable Product: Zurn Z-1700, Jay R. Smith, MIFAB, Precision Plumbing Products.
- 2.5 BACK FLOW PREVENTERS
- .1 To CSA-B64 Series.
 - .2 Application: domestic service entrance and fire protection system service entrance.
 - .1 Domestic water:
 - .1 Reduced pressure principle type consisting of a pressure differential relief valve located between two independently operated spring-loaded centre guided check valves.
 - .2 Ductile iron construction with FDA approved fusion epoxy coat inside and out.
 - .3 Compound check.
 - .4 Single access cover.
 - .5 Maximum temperature range: 0.5°C to 60°C.
 - .6 Maximum pressure: 1205 kPa.
 - .7 CSA certified.
 - .8 Acceptable Product: Wilkins Model 375L, Watts, Zurn.
 - .2 Fire protection water:
 - .1 Same as above except without compound check and with FM and ULC approval for fire protection service.
 - .2 Acceptable Product: Wilkins Model 975L, Watts, Zurn.
- 2.6 VACUUM BREAKERS
- .1 To CSA-B64 Series.
 - .2 Atmospheric vacuum breaker (inlet to domestic hot water tanks):
 - .1 Plain brass body with silicone disc.
 - .2 Suitable for temperatures up to 82°C.
 - .3 Maximum operating pressure: 860 kPa.
 - .4 Size: NPS ½.
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- 2.6 VACUUM BREAKERS .2 (Cont'd)
(Cont'd)
- .5 Acceptable Product: Watts Series 288a, Wilkins, Jay R. Smith, MIFAB.
 - .3 Pressure vacuum breaker: Watts N36, FEBCO, Wilkins, Jay R Smith, Complete with shutoff Zau valve.
 - .4 Hose connection vacuum breaker:
 - .1 NPS female hose thread inlet, NPS ½ male hose threat outlet, brass finish.
 - .2 Acceptable Product: Watts 8, FEBCO, Wilkins, Jay R. Smith.
- 2.7 PRESSURE REGULATORS
- .1 Capacity: as indicated.
 - .1 Inlet pressure: 1034 kPa.
 - .2 Outlet pressure: 413 kPa.
 - .2 Up to NPS1-1/2 bronze bodies, screwed: to ASTM B62, strainer and stainless steel strainer screen.
 - .3 NPS2 and over, semi-steel bodies, Class 125, flanged: to ASTM A126, Class B, strainer.
 - .4 Semi-steel spring chambers with bronze trim.
- 2.8 BACKWATER VALVES
- .1 Coated extra heavy cast iron body with bronze seat, bronze flapper and threaded cover.
 - .2 Access:
 - .1 Surface access.
 - .2 Concrete access pit with steel cover, as indicated.
- 2.9 HOSE BIBBS AND SEDIMENT FAUCETS
- .1 Bronze construction complete with integral back flow preventer, hose thread spout, replaceable composition disc, chrome plated in finished areas, and caps on chains.
- 2.10 WATER MAKE-UP ASSEMBLY
- .1 Complete with backflow preventer, pressure gauge on inlet and outlet, pressure reducing valve to CSA B356, pressure relief valve on low pressure side and gate valves on inlet and outlet, strainer (no "homemade" primer manifolds are permitted).
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- 2.11 WATER METERS .1 Technical Data:
- .1 Register
 - .1 Magnetic drive, low torque registration ensures accuracy.
 - .2 Impact-resistant register.
 - .3 High resolution, low flow leak detection.
 - .4 Bayonet style register mount allows in-line serviceability.
 - .5 Tamperproof seal pin deters theft.
 - .6 Date of manufacture, size and model stamped on dial face.
 - .2 No-Lead Maincase
 - .1 Made from no-lead high copper alloy.
 - .2 ANSI/NSF 61 Certified.
 - .3 Lifetime guarantee.
 - .4 Resists internal pressure stresses and external damage.
 - .5 Handles in-line pipe in variations and stresses.
 - .6 No-lead high copper alloy provides residual value vs. plastic.
 - .7 Electrical grounding continuity.
 - .3 Nutating Disc Measuring Chamber
 - .1 Positive displacement.
 - .2 Widest effective flow range from maximum revenue.
 - .3 Proprietary polymer materials maximize long term accuracy.
 - .4 Floating chamber design is unaffected by meter position of in- line piping stresses.
- .2 Acceptable Material: Neptune, Watts.
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- 2.12 TRAP SEAL PRIMERS .1 Up to 12 floor drains: Electronic trap priming manifold with:
- .1 Vacuum breaker
 - .2 Two-way ball valve controlled by the building control system complete with manual override switch.
 - .3 Inlet strainer.
 - .4 NPS inlet connection.
 - .5 Calibrated manifold.
 - .6 Water hammer arrestor
 - .7 Mounted in steel cabinet
 - .8 Compression outlet fittings
 - .9 Inlet shut off valve
 - .10 Supplies minimum 59 ml @ 138 kPa.
 - .11 Twenty-four (24) hour timer.
 - .12 Acceptable Product: Mifab, PPP PT
- .2 Provide wall access panels/doors to conceal trap primer valves.
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2.13 STRAINERS

- .1 860 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.
- .2 Under NPS1, bronze body, screwed ends, with brass cap, tapped blowoff and plug.
- .3 NPS1 to NPS2, bronze body, screwed ends, with brass cap, tapped blowoff connection with capped bronze ball valve.
- .4 NPS2½ and over, cast iron body, flanged ends, with bolted cap, tapped blowoff connection with capped bronze ball valve.

2.14 PIPE WALL
AND FLOOR
PENETRATION SEAL

- .1 Application:
 - .1 Pipes penetrating exterior concrete walls below grade and concrete floors on grade.
 - .2 Seal material to be EPDM.
 - .3 Pressure plates to be glass-reinforced plastic.
 - .4 Bolts and nuts to be stainless steel 18-8.
 - .5 Suitable temperature range to be -40°C to 121°C.
 - .6 Wall sleeves to be Schedule 40 black iron pipe. Sleeves in exterior walls to be galvanized.
 - .7 Floor sleeves to be Schedule 40 black iron pipe.
 - .8 Wall and floor sleeves to be sufficiently long to mount flush with interior and exterior walls and flush with finished floor of slab-on-grade floors.
 - .9 Acceptable Product: Metraseal MS Series, Link Seal.

2.15 STRAINERS

- .1 862 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.
- .2 NPS 2 and under, bronze body, screwed ends, with brass cap.
 - .1 Acceptable material: Armstrong F4SC; Braukmann FY32; Crane 988- 1/2; Leitch BE; Spirax BT; Toyo 380; Watts 777 Series.
- .3 NPS 2 1/2 and over, cast iron body, flanged ends, with bolted cap.
 - .1 Acceptable material: Armstrong F4FL; Braukmann FY33, Crane 989- 1/2; Leitch 528 pipeline basket type; Spirax Fig 3; Toyo 381A; Watts 77F Series.

2.16 DOMESTIC HOT WATER EXPANSION TANKS/BACKFLOW ACCOMMODATORS .1 Compliance: Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation.

.1 Diaphragm type charged. Designed in accordance with the ASME code; for use on potable domestic hot water systems up to 862kPa and 83 C max.

.2 Refer to schedule on drawing.

.3 Provide s.s. system connection, air valve, butyl rubber diaphragm, acrylic primer finish.

.1 Install in accordance with Canadian Plumbing Code and local authority having jurisdiction.

.4 Tanks shall be insulated.

.5 Acceptable material: Amtrol, Bell & Gossett, Wessells, HG Specialties.

2.17 THERMOSTATIC MIXING VALVE .1 Thermostatic cartridge with strainer, thermal motor with bellows element mounted out of water.

.2 Install in accordance with manufacturer's instructions and as specified.

.3 See drawings for inlet and outlet connection sizes.

.4 Adjustable setting from 30°C to 70°C, set at 60°C.

.5 Acceptable materials: Watts, Armstrong, Bell & Gossett, Zurn, Wilkins.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS .1 Bring cleanouts to wall or finished floor unless serviceable from below floor.

.2 Building drain cleanout and stack base cleanouts: line size to maximum NPS4.

3.2 NON FREEZE WALL HYDRANTS .1 Install 600 mm above finished grade unless otherwise indicated.

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| <u>3.3 WATER HAMMER
ARRESTORS</u> | .1 | Install on branch supplies to fixtures or group of fixtures, and where indicated. |
| <u>3.4 CLEANOUTS</u> | .1 | In addition to those required by code, and as indicated, install at base of all soil and waste stacks, and rainwater leaders and where indicated. |
| | .2 | Bring cleanouts to wall or finished floor unless serviceable from below floor. |
| | .3 | Building drain cleanout and stack base cleanouts: line size to maximum NPS 4. |
| | .4 | For sinks and lavatory basins, provide cleanout in branch waste/stack or provide removable trap dip - no cleanout plug in bottom of dip. |
| | .5 | Provide common cleanout in stack which serves two sinks or lavatory basins by using a double sanitary tee. |
| <u>3.5 BACK FLOW
PREVENTORS</u> | .1 | Install in accordance with CSA- B64 Series, where indicated and elsewhere as required by code. |
| | .2 | Reduced pressure type where backflow would constitute a health hazard. |
| | .3 | Double check type where backflow would constitute a nuisance or be aesthetically objectionable or material which would not constitute a health hazard. |
| | .4 | Pipe discharge to terminate over nearest drain and or service sink. |
| <u>3.6 BACKWATER
VALVES</u> | .1 | Install in main sewer lines where indicated. |
| | .2 | Install in access pit as indicated. |
| <u>3.7 HOSE BIBBS AND
SEDIMENT FAUCETS</u> | .1 | Install at bottom of risers, at low points to drain systems, and as indicated. |
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| <u>3.8 TRAP SEAL PRIMERS</u> | .1 | Install for floor drains and elsewhere, as indicated. |
| | .2 | Install on cold water supply in concealed space, to approval of Departmental Representative. |
| <u>3.9 STRAINERS</u> | .1 | Install with sufficient room to remove basket. |
| <u>3.10 WATER METERS</u> | .1 | Install water meter provided by local water authority. |
| | .2 | Install water meter as indicated. |
| <u>3.11 WATER MAKE-UP ASSEMBLY</u> | .1 | Install valved bypass. |
| | .2 | Pipe discharge from relief valve to nearest floor drain. |
| <u>3.12 START-UP AND COMMISSIONING</u> | .1 | General:
.1 In accordance with Contractors Commissioning Plan and supplemented as specified herein. |
| | .2 | Timing: Start-up only after:
.1 Pressure tests have been completed.
.2 Disinfection procedures have been completed. |
| | .3 | Provide continuous supervision during start-up. |
| <u>3.13 TESTING AND ADJUSTING</u> | .1 | General:
.1 In accordance with Contractors Commissioning Plan and supplemented as specified herein. |
| | .2 | Timing:
.1 After start-up deficiencies rectified.
.2 After certificate of completion has been issued by authority having jurisdiction. |
| | .3 | Application tolerances:
.1 Pressure at fixtures: +/- 70 kPa.
.2 Flow rate at fixtures: +/- 20%. |
| | .4 | Adjustments:
.1 Verify that flow rate and pressure meet design criteria. |
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3.13 TESTING
AND ADJUSTING
(Cont'd)

- .4 Adjustments:(Cont'd)
 - .2 Make adjustments while flow rate or withdrawal is one (1) maximum and (2) 25% of maximum and while pressure is one (1) maximum and two (2) minimum.
 - .5 Floor drains:
 - .1 Verify operation of trap seal primer.
 - .2 Prime, using trap primer. Adjust flow rate to suit site conditions.
 - .3 Check operations of flushing features.
 - .4 Check security, accessibility, removability of strainer.
 - .5 Clean out baskets.
 - .6 Vacuum breakers, backflow preventers, backwater valves:
 - .1 Test tightness, accessibility for O&M of cover and of valve.
 - .2 Simulate reverse flow and back-pressure conditions to test operation of vacuum breakers, backflow preventers.
 - .3 Verify visibility of discharge from open ports.
 - .7 Access doors:
 - .1 Verify size and location relative to items to be accessed.
 - .8 Cleanouts:
 - .1 Verify covers are gas-tight, secure, yet readily removable.
 - .9 Water hammer arrestors:
 - .1 Verify proper installation of correct type of water hammer arrester.
 - .10 Wall, Ground hydrants:
 - .1 Verify complete drainage, freeze protection.
 - .2 Verify operation of vacuum breakers.
 - .11 Pressure regulators, PRV assemblies:
 - .1 Adjust settings to suit locations, flow rates, pressure conditions.
 - .12 Strainers:
 - .1 Clean out repeatedly until clear.
 - .2 Verify accessibility of cleanout plug and basket.
 - .3 Verify that cleanout plug does not leak.
 - .13 Hose bibbs, sediment faucets:
 - .1 Verify operation and at all low points.
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3.13 TESTING
AND ADJUSTING
(Cont'd)

- .14 Hydronic system water Make-up Assembly:
 - .1 Verify operation.
- .15 Water meters:
 - .1 Verify calibration certificate.
- .16 Backflow preventers:
 - .1 Provide formal commissioning by licensed technician.
 - .2 Provide written report and certification.
- .17 Commissioning:
 - .1 In accordance with Contractors Commissioning Plan and supplemented as specified herein.
- .18 Training:
 - .1 In accordance with Contractors Commissioning Plan and supplemented as specified herein.
 - .2 Demonstrate full compliance with Design Criteria.

PART 1 - GENERAL

- 1.2 REFERENCES .1 Canadian Standards Association (CSA)
- .1 CAN/CSA-B45 Series-02(R2008), Plumbing Fixtures.
 - .2 CSA B125.3-2011, Plumbing Fittings.
 - .3 CAN/CSA-B651-2012, Barrier-Free Design.
 - .4 ANSI Standard Z358.1-98, Emergency Eye Wash and Show Equipment.
- 1.3 SHOP DRAWINGS .1 Submit shop drawings and product data in accordance with Section 01 33 00.
- .2 Indicate, for all fixtures and trim:
 - .1 Dimensions, construction details, roughing-in dimensions.
- 1.4 OPERATIONS AND MAINTENANCE DATA .1 Provide maintenance data including monitoring requirements for incorporation into manuals specified in Section 01 33 00.
- .2 Include:
 - .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
 - .2 Details of operation, servicing, maintenance.
 - .3 List of recommended spare parts.

PART 2 - PRODUCTS

- 2.1 MANUFACTURED UNITS .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
- .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.
 - .3 Exposed plumbing brass to be chrome plated.
 - .4 Number, locations: as indicated on the drawings.
 - .5 Fixtures in any one location to be product of one manufacturer and of same type.
 - .6 Trim in any one location to be product of one manufacturer and of same type.
-

PART 3 - EXECUTION

- 3.1 APPLICATION .1 Plumbed emergency eyewash, complete with thermal mixing valves.
- 3.2 INSTALLATION .1 Mounting heights:
.1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.
.2 Physically handicapped: to comply with most stringent of either NBCC or CAN/CSA B651.
- 3.3 ADJUSTING .1 Conform to water conservation requirements specified this section.
.2 Adjustments.
.1 Adjust water flow rate to design flow rates.
.2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
.3 Checks.
.1 Aerators: operation, cleanliness.
.2 Vacuum breakers, backflow preventers: operation under all conditions.
.4 Thermostatic controls.
.1 Verify temperature settings, operation of control, limit and safety controls.