1. GENERAL

1.1 **Action and Informational Submittals**

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for all mechanical equipment and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Territory of Nunavut, Canada where specified.
- .2 Indicate on drawings:
  - .1 Mounting arrangements.
  - .2 Operating and maintenance clearances.
- .3 Shop drawings and product data accompanied by:
  - .1 Detailed drawings of bases, supports, and anchor bolts.
  - .2 Acoustical sound power data, where applicable.
  - .3 Points of operation on performance curves.
  - .4 Manufacturer to certify current model production.
  - .5 Certification of compliance to applicable codes.
  - .6 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.
- .4 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use SNC-Lavalin's "Shop Drawing Submittal Title Sheet". Identify section and paragraph number. Each drawing is to be submitted individually, in electronic (portable document file) format, with the Shop Drawing Submittal Title Sheet included in the electronic document. Refer to Appendix A for Submittal Identification Sheet.

1.2 **Closeout Submittals**

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for mechanical equipment for incorporation into manual.
- .1 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.
- .2 Operation data to include:
  - .1 Control schematics for systems including environmental controls.
  - .2 Description of systems and their controls.
  - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
  - .4 Operation instruction for systems and component.
  - .5 Description of actions to be taken in event of equipment failure.
  - .6 Valves schedule and flow diagram.

REGISTERED PROFESSIONAL ENGINEER
M. BEAUDOIN
LICENSEE
NT/NU

.7 Colour coding chart.

.3 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.4 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified.

.4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

.5 Approvals:

.1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.

.2 Make changes as required and re-submit as directed by Departmental Representative.

.6 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.7 Site records:

.1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection.

.8 As-built drawings:

.1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.3 Submit to Departmental Representative for approval and make corrections as directed.

.4 Perform testing, adjusting and balancing for HVAC using as-built drawings.

.5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.9 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 Maintenance Material Submittals

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Furnish spare parts as follows:
- .1 One set of packing for each pump.
- .2 One casing joint gasket for each size pump.
- .3 One glass for each gauge glass.

.3 Provide one set of special tools required to service equipment as recommended by manufacturers.

.4 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.4 **Delivery, Storage and Handling**

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
- .1 Store materials off ground, indoors and in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect all equipment from nicks, scratches and blemishes.
- .3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this section.

1 .5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan and Waste Reduction Work Plan, in accordance with ~~Section 01 74 21~~ ***Section 01 74 19*** - ~~Construction/Demolition~~ Waste Management and Disposal.

2. PRODUCTS

2.1 **Product Description**

.1 Not used.

3. EXECUTION

3.1 **Examination**

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for the equipment installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 **Painting Repairs and Restoration**

.1 Do painting in accordance with Section 09 91 00 - Interior Painting.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

3.3 **System Cleaning**

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.4 **Field Quality Control**

.1 Site Tests: conduct following tests in accordance with:
  .1 Section 01 91 13 – General Commissioning Requirements and Section 01 91 31 – Commissioning Plan and execute tests as described in all relevant technical sections.

3.5 **Demonstration**

.1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:
  .1 As defined by the Departmental Representative.

.3 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.4 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.

.5 Instruction duration time requirements as specified in appropriate sections.

.6 Departmental Representative will record these demonstrations on video tape for future reference.

3.6 **Commissioning requirements**

.1 For general commissioning requirements refer to sections 01 91 13, 01 91 31, 01 91 33, 01 91 41, 01 91 51.

.2 Contractor must provide a Commissioning schedule to include verification of component(s) and system(s) specific to static and dynamic functional performance. Include also period for tests of integrated system(s).

.3 In addition, for start-up and operational verifications, refer to technical sections and manufacturers' specifications

.4 In addition, provide a supplementary 5 days support during testing of integrated systems.

.5 Coordinate with Contractor Commissioning Agent to determine schedule for test of integrated systems according with other disciplines.

3.7 **Cleaning**

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

1

.3 Waste Management: separate waste materials recycling in accordance with Section ~~01 74 21~~ ***01 74 19*** - ~~Construction/Demolition~~ Waste Management and disposal.
  .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.8 **Protection**

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

End of Section

APPENDIX A
SUBMITTAL IDENTIFICATION SHEET

SUBMITTALS IDENTIFICATION SHEET

PROJECT: New Daycare, Iqaluit, Nunavut	DEPT. REP.: **PWGSC**
	Construction Manager:
	O/REF.: **R.082769.001** Package:
CONTRACTOR:	ARCHITECT: **EVOQ Architecture**
Project Manager:	
Telephone:	ENGINEER: **SNC-LAVALIN Inc.**
E-mail:	Project no: 648139
SUBCONTRACTOR:	DISCIPLINE:
Address:	
	PRODUCT SUBMITTED:
Person responsible:	☐ As Specified
Telephone: ( ) E-mail:	☐ Alternate
SUPPLIER or MANUFACTURER:	REVIEW AND COMMENTS (for use by Consultants):
Address:	
Person responsible:	
Telephone: ( ) E-mail:	
DESCRIPTION OF SUBMITTAL:	
# of pages:	
Reference to drawings:	
Reference to specs:	
Division: _____ Section: _____	
Article: _____ Page: _____	
Product abbreviation: _____	
REMARKS:	

SNC·LAVALIN

Verification of conformity

Nature and scope of the examination

Verification of conformity according to the specifications and drawings.

This verification is by no way a complete and detailed audit of the design.

- ☐ No correction noted
- ☐ Perform indicated corrections
- ☐ Correct and resubmit
- ☐ Refused

Signature ☐ Engineer ☐ Other Date

Name Member No.

The review of this paper is limited to the nature and scope indicated. The person or company who prepared it cannot be relieved of their obligations in any cases, of any nature whatsoever.

Review of this submission is for compliance with general intent of the contract. This review does not relieve the Sub-Contractor, Supplier or Manufacturer of responsibility for error or omissions in the submission or the responsibility of meeting all requirements of the contract documents. Any deviation from the contract documents initiated by the Sub-Contractor, Supplier or Manufacturer shall be at their sole risk. QUANTITIES AND DETAIL DIMENSIONS ARE THE SUB-CONTRACTORS OR SUPPLIERS RESPONSIBILITY. VERIFY DATA WITH FIELD DIMENSIONS.

SUBMITTAL TRACKING No.:	Date: Rev.:

1. GENERAL

1.1 **References**

.1 ASTM International
- .1 ASTM A126-04(2009), Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
- .2 ASTM B62-09, Standard Specification for Composition Bronze or Ounce Metal Castings.

.2 American Water Works Association (AWWA)
- .1 ANSI/AWWA C700-09, Standard for Cold Water Meters-Displacement Type, Bronze Main Case.
- .2 ANSI/AWWA C702-10, Standard for Cold Water Meters-Compound Type.

.3 CSA International
- .1 CSA-B64 Series-11, Backflow Preventers and Vacuum Breakers.
- .2 CSA B79-08, Commercial and Residential Drains and Cleanouts.
- .3 CAN/CSA-B356-10, Water Pressure Reducing Valves for Domestic Water Supply Systems.

2 ~~.4 Efficiency Valuation Organization (EVO)~~
- ~~.1 International Performance Measurement and Verification Protocol (IPMVP).~~
  - ~~.1 IPMVP 2007 Version.~~

.5 Plumbing and Drainage Institute (PDI)
- ~~.1 PDI-G101-R2010, Testing and Rating Procedure for Grease Interceptors with Appendix of Installation and Maintenance.~~
- .2 PDI-WH201-R2010, Water Hammer Arresters Standard.

2 1.2 **Administrative Requirements**

.1 Pre-installation Meetings:
- .1 Convene pre-installation meeting 1 week prior to beginning work of this Section, with Departmental Representative in accordance with Section ***01 11 00 General requirements*** ~~01 31 19 - Project Meetings~~ to:
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordination with other building construction subtrades.
  - .4 Review manufacturer's written installation instructions and warranty requirements.

2 1.3 **Action and Informational Submittals**

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for plumbing products and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS MSDS in accordance with Section ***01 35 30*** ~~01 35 29.06~~ - Health and Safety Requirements ~~and 01 35 43 - Environmental Procedures.~~ Indicate VOC's:

.3 Shop Drawings:

.1 Indicate on drawings to indicate materials, finishes, method of anchorage, number of anchors, dimensions, construction and assembly details, accessories for all mechanical equipment.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Instructions: submit manufacturer's installation instructions.

~~.6 Manufacturers' Field Reports: manufacturers' field reports specified.~~

1.4 **Closeout Submittals**

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for plumbing specialties and accessories for incorporation into manual.

.1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.

.2 Details of operation, servicing and maintenance.

.3 Recommended spare parts list.

1.5 **Delivery, Storage and Handling**

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground, indoors, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect plumbing materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

2. PRODUCTS

2.1 **Floor Drains**

.1 Floor Drains: to CSA B79.

.2 Type 1: general duty; cast iron body or as indicated, adjustable head, sediment basket, nickel bronze strainer, integral seepage pan, trap seal primer tapping, and clamping collar.

.3 Type 2: heavy duty; cast iron body, heavy duty non-tilting or hinged lacquered cast iron grate, integral seepage pan, trap seal primer tapping and clamping collar.

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.

.2 Access Covers:
- .1 Wall Access: face or wall type, polished nickel bronze or stainless steel, square or round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.
- .2 Floor Access: rectangular or round, cast iron body and frame with adjustable secured nickel bronze top or cast box with anchor lugs and:
  - .1 Plugs: bolted bronze with neoprene gasket.
  - .2 Cover for Unfinished Concrete Floors: cast iron, nickel bronze, round or square, gasket, vandal-proof screws.
  - .3 Cover for Terrazzo Finish: polished nickel bronze or 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.

2.3 **Trap Seal Primers**

.1 Brass, with integral vacuum breaker, NPS 1/2 solder ends, NPS 1/2 drip line connection.

2.4 **Water Hammer Arrestors**

.1 Stainless steel construction, bellows type: to PDI-WH201.

2.5 **Back Flow Preventers BFP-1 (water entry), BFP-2 (Fire water) and BFP-3 (hot domestic water)**

.1 Preventers: to CSA-B64 Series, application as indicated, reduced pressure principle type double check valve assembly back flow preventer with intermediate vacuum breaker.

2.6 **Vacuum Breakers**

.1 Breakers: to CSA-B64 Series, vacuum breaker atmospheric, hose connection and laboratory faucet intermediate.

1 2.7 **Pressure Regulator (*PR-1*)**

.1 Capacity: as indicated.
- .1 Inlet pressure: 1034 kPa.
- .2 Outlet pressure: 413 kPa.

.2 Up to NPS 1-1/2 bronze bodies, screwed: to ASTM B62.

.3 NPS 2 and over, semi-steel bodies, Class 125, flanged: to ASTM A126, Class B.

.4 Semi-steel spring chambers with bronze trim.

2.8 **Backwater Valves**

.1 Coated extra heavy cast iron body with bronze seat, revolving bronze flapper and threaded cover.

.2 Access:
- .1 Surface access.
- .2 Access pipe with cover: maximum 300 mm depth.
- .3 Steel housing with gasketted steel cover.
- .4 Concrete access pit with cover, as indicated.

2.9 **Water Make-up Assembly**

.1 Complete with backflow preventer pressure gauge on inlet and outlet, pressure reducing valve to CAN/CSA-B356, pressure relief valve on low pressure side and gate valves on inlet and outlet.

2.10 **Water Meters**

.1 Displacement type to ANSI/AWWA C700,

.2 Compound type to ANSI/AWWA C702.

.3 Capacity: as indicated.

.4 Accessories: remote readout device compatible with EMCS network

2.11 **Strainers**

.1 860 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.

.3 NPS 2 1/2 and over, cast iron body, flanged ends, with bolted cap.

2.12 **Thermostatic Mixing Valve**

.1 Type MXV-1
- .1 Bronze thermostatic mixing valve.
- .2 Stainless steel recessed cabinet
- .3 Compensating for temperature and pressure variations.
- .4 Ajustable temperature.
- .5 Locking temperature regulator to prevent accidental movement set for 29°C.
- .6 Cold water by-pass capable of 15 l/min @ 2.1 Bar upon failure of hot water.
- .7 Valve close down on failure of cold water.
- .8 High temperature limit stop.
- .9 Dial thermometer
- .10 Hot water temperature supply : 60°C.

.11 Capacity : 1.9 to 38 L/min.
.12 In accordance with ANSI Z358.1 requirements.

3. EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for plumbing specialities and accessories installation in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate in presence of Departmental Representative.
  .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Manufacturer's Instructions

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.3 Installation

.1 Install in accordance with National Plumbing Code of Canada, and local authority having jurisdiction.

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

3.4 Cleanouts

.1 Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required code, and as 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.

3.5 Trap Seal Primers

.1 Install on all floor drains and emergency showers.

.2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space, to approval of Departmental Representative.

2 ~~.3 Do not install on emergency cold water (ECW).~~

.4 Install soft copper, tubing to floor drain.

3.6 **Water Hammer Arrestors**

.1 Install on branch supplies to fixtures or group of fixtures or where indicated.

3.7 **Back Flow Preventers**

.1 Install in accordance with CSA-B64 Series, where indicated and elsewhere as required by code.
- .1 Drains.
- .2 Backwater Valves.
- .3 Water Make-up Assembly.
- .4 Grease Interceptors.

.2 Pipe discharge to terminate over nearest floor drain.

3.8 **Backwater Valves**

.1 Install in main sewer lines where indicated and at weeping tile connection in pit provided at building cleanout.

.2 Install in access pit as indicated.

3.9 **Hose Bibbs and Sediment Faucets**

.1 Install at bottom of risers, at low points to drain systems, and as indicated.

3.10 **Strainers**

.1 Install with sufficient room to remove basket for maintenance.

3.11 **Water Meters**

.1 Install water meter provided by local water authority.

.2 Install water meters as indicated.

3.12 **Water Make-up Assembly**

.1 Install on valved bypass.

.2 Pipe discharge from relief valve to nearest floor drain.

3.13 **Start-up**

.1 General:
- .1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: General Requirements, supplemented as specified herein.

.2 Timing: start-up only 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.

.3 Provide continuous supervision during start-up.

3.14 Testing and Adjusting

.1 General:
.1 Test and adjust plumbing specialties and accessories in accordance with Section 01 91 13- General Commissioning (Cx) Requirements: General Requirements, supplemented as specified.

.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.
.2 Make adjustments while flow rate or withdrawal is (1) maximum and (2) 25% of maximum and while pressure is (1) maximum and (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 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 that flow and pressure meet design criteria.
- .2 Check for leaks, replace compression washer if required.

.14 Hydronic system water Make-up Assembly:
- .1 Verify flow, pressure, and connection.

.15 Water meters:
- .1 Verify location and accessibility.
- .2 Test meter reading accuracy.

3.15 Closeout Activities

.1 Commissioning Reports: in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: reports, supplemented as specified.

.2 Training: provide training in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: Training of O&M Personnel, supplemented as specified.

3.16 Cleaning

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
- .1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.17 Protection

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by plumbing specialties and accessories installation.

End of Section

1. GENERAL

1.1 **Summary**

.1 Section Includes:
- .1 Materials and installation for plumbing pumps
- .2 Related requirements
  - .1 All related plumbing systems

1.2 **References**

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

1 1.3 **Action and Informational Submittals**

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures

~~.2 Coordinate submittal requirements and provide submittals required by Section 01 47 15 - Sustainable Requirements: Construction.~~

.3 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and data sheet for fixtures and equipment.
- .2 ~~Submit WHMIS MSDS in accordance with Section 01 47 15 - Sustainable Requirements: Construction. Indicate VOC's for adhesive and solvents during application and curing.~~

.4 Shop Drawings.
- .1 Submit shop drawings to indicate:
  - .1 Equipment, including connections, fittings, control assemblies and ancillaries. Identify whether factory or field assembled.
  - .2 Wiring and schematic diagrams.
  - .3 Dimensions and recommended installation.
  - .4 Pump performance and efficiency curves.

.5 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.6 Instructions: submit manufacturer's installation instructions.

~~.7 Manufacturers' Field Reports: manufacturers' field reports specified.~~

.8 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals, include:
- .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.

1

1.4 **Quality Assurance**

.1 Pre-Installation Meeting:
- .1 Convene pre-installation meeting one week prior to beginning work of this Section ~~in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.~~
  - .1 Verify project requirements.
  - .2 Review installation conditions.
  - .3 Co-ordination with other building subtrades.
  - .4 Review manufacturer's installation instructions and warranty requirements.

.2 Health and Safety:
- .1 Do construction occupational health and safety in accordance with Section ***01 35 30*** ~~01 35 29.06~~ - Health and Safety Requirements.

1.5 **Delivery, Storage and Handling**

.1 Waste Management and Disposal:
- .1 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.
- .3 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .4 Unused sealant materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.
- .5 Fold up metal, plastic banding, flatten and place in designated area for recycling.

2. PRODUCTS

2.1 **Domestic Hot Water Circulating Pumps (HWC-1)**

.1 Capacity: as indicated.

.2 Construction: in-line centrifugal, built-in electronic power control for constant/variable/ differential pressure, stainless steel volute, stainless steel shaft. Design for 860 kPa and 110 degrees C continuous service.

.3 Insulation: Standard-equipped thermal insulation shells

.4 Motor:
- .1 With thermal overload protection
- .2 Power and voltage as indicated, drip-proof

.5 Supports: provide as recommended by manufacturer.

2.2 **Freeze Protection Circulating Pumps (FPC-1)**

.1 Capacity: as indicated.

.2 Construction: in-line centrifugal, built-in electronic power control for constant/variable/ differential pressure, stainless steel volute, stainless steel shaft. Design for 860 kPa and 110 degrees C continuous service.

.3 Insulation: Standard-equipped thermal insulation shells

.4 Motor:
- .1 With thermal overload protection
- .2 Power and voltage as indicated, drip-proof

.5 Supports: provide as recommended by manufacturer.

3. EXECUTION

3.1 Manufacturer's Instructions

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

1

3.2 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 Align vertical pit mounted pump assembly after mounting and securing cover plate.

~~.4 Place 150 mm sand under sump pit tank.~~

3.3 Field Quality Control

.1 Site Tests/Inspection:
- .1 Check power supply.
- .2 Check starter protective devices.

.2 Start-up, check for proper and safe operation.

.3 Check settings and operation of hand-off-auto selector switch, operating, safety and limit controls, audible and visual alarms, over-temperature and other protective devices.

.4 Adjust flow from water-cooled bearings.

.5 Adjust impeller shaft stuffing boxes, packing glands.

3.4 **Start-Up**

.1 General:
- .1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and Section 01 91 31 – Commissioning Plan: General Requirements, supplemented as specified herein.
- .2 Procedures:
  - .1 Check power supply.
  - .2 Check starter O/L heater sizes.
  - .3 Start pumps, check impeller rotation.
  - .4 Check for safe and proper operation.
  - .5 Check settings, operation of operating, limit, safety controls, over-temperature, audible/visual alarms, other protective devices.
  - .6 Test operation of hands-on-auto switch.
  - .7 Test operation of alternator.
  - .8 Adjust leakage through water-cooled bearings.
  - .9 Adjust shaft stuffing boxes.
  - .10 Adjust leakage flow rate from pump shaft stuffing boxes to manufacturer's recommendations.
  - .11 Check base for free-floating, no obstructions under base.
  - .12 Run-in pumps for 12 continuous hours.
  - .13 Check installation, operation of mechanical seals, packing gland type seals. Adjust as necessary.
  - .14 Adjust alignment of piping and conduit to ensure full flexibility.
  - .15 Eliminate causes of cavitation, flashing, air entrainment.
  - .16 Measure pressure drop across strainer when clean and with flow rates as finally set.
  - .17 Replace seals if pump used to degrease system or if pump used for temporary heat.
  - .18 Verify lubricating oil levels.

3.5 **Performance Verification (PV) Domestic Hot Water Circulating Pumps**

.1 General:
- .1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and Section 01 91 31 – Commissioning Plan: General Requirements, supplemented as specified.

.2 Obtain manufacturer's approval, before performing PV, to ensure warranties remain intact.

.3 Application tolerances:
- .1 Flow: +/- 10%.
- .2 Pressure: Plus 20%, minus 5%.

.4 PV procedures:
- .1 Open pump balancing valve fully.
- .2 Measure amperage, voltage and flow and compare with manufacturer's data sheets and motor nameplate data.

3.6 **Performance Verification (PV) Freeze Protection Circulating Pumps**

.1 General:
- .1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: General Requirements, supplemented as specified.

.2 Obtain manufacturer's approval, before performing PV, to ensure warranties remain intact.

.3 Application tolerances:
- .1 Flow: +/- 10%.
- .2 Pressure: Plus 20%, minus 5%.

1

.4 PV procedures:
- .1 Open pump balancing valve fully.
- .2 Measure amperage and voltage and compare with manufacturer's data sheets and motor nameplate data.
- .3 ~~If suction is different size than discharge connection, add velocity head correction factor to DP.~~
- .4 ~~Mark this DP on manufacturer's pump curve.~~
- .5 ~~If flow rate is higher than specified, slow close balancing valve until specified DP is reached.~~
- .6 ~~Repeat measurements of amps and volts. Compare with manufacturer's data sheets.~~
- .7 ~~Calculate BHP and compare with nameplate data.~~

3.7 **Reports**

.1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and Section 01 91 31 – Commissioning Plan: reports, supplemented as specified.

.2 Include:
- .1 PV results on approved PV Report Forms.
- .2 Product Information report forms.
- .3 Pump performance curves (family of curves) with final point of actual performance.

3.8 **Training**

.1 In accordance with Section 01 91 41 - Commissioning (Cx) Training : Training of O&M Personnel, supplemented as specified.

End of Section

1. GENERAL

1.1 **References**

.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)
- .1 ANSI/ASME B16.15-06, Cast Bronze Threaded Fittings, Classes 125 and 250.
- .2 ANSI/ASME B16.18-01, Cast Copper Alloy Solder Joint Pressure Fittings.
- .3 ANSI/ASME B16.22-01, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- .4 ANSI/ASME B16.24-01, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.

.2 ASTM International Inc.
- .1 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .2 ASTM A536-84(2004)e1, Standard Specification for Ductile Iron Castings.
- .3 ASTM B88M-05, Standard Specification for Seamless Copper Water Tube (Metric).

.3 American National Standards Institute/American Water Works Association (ANSI)/(AWWA)
- .1 ANSI/AWWA C111/A21.11-07, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.4 Canadian Standards Association (CSA International)
- .1 CSA B242-05, Groove and Shoulder Type Mechanical Pipe Couplings.

.5 Department of Justice Canada (Jus)
- .1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).

.6 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.7 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
- .1 MSS-SP-67-02, Butterfly Valves.
- .2 MSS-SP-70-06, Gray Iron Gate Valves, Flanged and Threaded Ends.
- .3 MSS-SP-71-05, Gray Iron Swing Check Valves, Flanged and Threaded Ends.
- .4 MSS-SP-80-03, Bronze Gate, Globe, Angle and Check Valves.

.8 National Research Council (NRC)/Institute for Research in Construction
- .1 NRCC 38728, National Plumbing Code of Canada (NPC) - [2015].

.9 Transport Canada (TC)
- .1 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).

1.2 **Action and Informational Submittals**

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.3 **Delivery, Storage and Handling**

.1 Place materials defined as hazardous or toxic in designated containers.

.2 Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.

2. PRODUCTS

2.1 **Piping**

.1 Domestic hot, cold and recirculation systems, within building.

.1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.

.2 Embedded: copper tube, soft annealed, type K: to ASTM B88M, in long lengths and with no embedded joints.

2.2 **Fittings**

.1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.

.2 Cast bronze threaded fittings, Class 125: to ANSI/ASME B16.15.

.3 Cast copper, solder type: to ANSI/ASME B16.18.

.4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.

.5 NPS 2 and larger: ANSI/ASME B16.18 or ANSI/ASME B16.22 roll grooved to CSA B242.

.6 NPS 1 and smaller : wrought copper to ANSI/ASME B16.22; with stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380 kPa.

2.3 **Joints**

.1 Rubber gaskets, latex-free 1.6 mm thick: to AWWA C111.

.2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.

.3 Solder: 95/5 tin copper alloy.

.4 Teflon tape: for threaded joints.

.5 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

2.4 **Gate Valves**

.1 NPS 2 and under, soldered:
.1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.

.2 NPS 2 and under, screwed:
.1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.

.3 NPS 2 1/2 and over, in mechanical rooms, flanged:
.1 Rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, OS Y bronze trim specified Section 23 05 23.02 - Valves - Cast Iron.

.4 NPS 2 1/2 and over, other than mechanical rooms, flanged:
.1 Non-rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, bronze trim, bolted bonnet specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check

2.5 **Globe Valves**

.1 NPS2 and under, soldered:
.1 To MSS-SP-80, Class 125, 860 kPa, bronze body, renewable composition disc, screwed over bonnet as specified Section 23 05 23.01 - Valves - Bronze.
.2 Lockshield handles: as indicated.

.2 NPS 2 and under, screwed:
.1 To MSS-SP-80, Class 150, 1 MPa, bronze body, screwed over bonnet, renewable composition disc as specified Section 23 05 23.01 - Valves - Bronze.
.2 Lockshield handles: as indicated.

2.6 **Swing Check Valves**

.1 NPS 2 and under, soldered:
.1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 23.01 - Valves - Bronze.

.2 NPS 2 and under, screwed:
.1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 23.01 - Valves - Bronze.

.3 NPS 2 1/2 and over, flanged:
.1 To MSS-SP-71, Class 125, 860 kPa, cast iron body, flat flange faces, renewable seat, bronze disc, bolted cap specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.

2.7 **Ball Valves**

.1 NPS 2 and under, screwed:
.1 Class 150.

.2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and PTFEseat, steel lever handle as specified Section 23 05 23.01 - Valves - Bronze.

.2 NPS 2 and under, soldered:
.1 To ANSI/ASME B16.18, Class 150.
.2 Bronze body, stainless steel] ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01 - Valves - Bronze.

2.8 **Butterfly Valves**

.1 NPS 2-1/2 and over, lug:
.1 To MSS-SP-67, Class 200.
.2 Cast iron body, ductile iron chrome plated disc, stainless steel stem, EPT liner.
.3 Lever operated, NPS8 and over, gear operated.

.2 NPS 2-1/2 and over, grooved ends:
.1 Class 300 psig CWP, bubble tight shut-off, bronze body EPDM coated ductile iron disc with integrally cast stem.
.2 Operator:
.1 NPS 4 and under: lever handle.
.2 NPS 6 and over: gear operated.

3. EXECUTION

3.1 **Application**

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

1

3.2 **Installation**

.1 Install in accordance with NPC 2015.

.2 Install pipe work in accordance with Section ***23 05 06*** ~~23 05 05~~ - Installation of Pipework, supplemented as specified herein.

.3 Assemble piping using fittings manufactured to ANSI standards.

.4 Install CWS piping below and away from HWS and HWC and other hot piping so as to maintain temperature of cold water as low as possible.

.5 Connect to fixtures and equipment in accordance with manufacturer's written 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.~~

3.3 **Valves**

.1 Isolate equipment, fixtures and branches with ball valves.

.2 Balance recirculation system using lockshield globe valves. Mark settings and record on as-built drawings on completion.

1

3.4 **Pressure Tests**

.1 Conform to requirements of Section ***22 05 00*** ~~21 05 01~~ - Common Work Results for ***Plumbing*** ~~Mechanical~~.

.2 Test pressure: greater of 1 time maximum system operating pressure or 860 kPa.

3.5 **Flushing and Cleaning**

.1 Flush entire system for 8 h. Ensure outlets flushed for 2 hours. Let stand for 24 hours, then draw one sample off longest run. Submit to testing laboratory to verify that system is clean to Federal potable water guidelines. Let system flush for additional 2 hours, then draw off another sample for testing.

1

3.6 **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 pressure booster systems are operating properly.~~

.4 Ensure that air chambers, expansion compensators are installed properly.

3.7 **Disinfection**

.1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction and approval of Departmental Representative.

.2 Upon completion, provide laboratory test reports on water quality for Departmental Representative approval.

3.8 **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 Commission water conditioning specified.
.4 Bring HWS storage tank up to design temperature slowly.
.5 Monitor piping HWS and HWC piping systems for freedom of movement, pipe expansion as designed.
.6 Check control, limit, safety devices for normal and safe operation.

.4 Rectify start-up deficiencies.

3.9 Performance Verification

.1 Scheduling:
.1 Verify system performance after pressure and leakage tests and disinfection are 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 TAB HWC in accordance with Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
.3 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.
.4 Sterilize HWS and HWC systems for Legionella control.
.5 Verify performance of temperature controls.
.6 Verify compliance with safety and health requirements.
.7 Check for proper operation of water hammer arrestors. Run one 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.
.8 Confirm water quality consistent with supply standards, and ensure no residuals remain as result of flushing or cleaning.

.3 Reports:
.1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: Reports, using report forms as specified in Section 01 91 31 – Commissioning (Cx) Plan : Report Forms and Schematics.
.2 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

1

3.10 Operation Requirements

.1 Co-ordinate operation and maintenance requirements including, cleaning and maintenance of specified materials and products with Section ***23 05 06*** ~~23 05 05~~ - Installation of Pipework.

3.11 Cleaning

.1 Clean in accordance with Section 01 74 11 - Cleaning.

End of Section

1. GENERAL

1 1.1 **References**

.1 ASTM International Inc.
- .1 ASTM B32-8, Standard Specification for Solder Metal.
- .2 ASTM B306-02, Standard Specification for Copper Drainage Tube (DWV).
- .3 ASTM C564-03a, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.2 Canadian Standards Association (CSA International).
- .1 CSA B67-1972(R1996), Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.
- .2 CAN/CSA-B70-06, Cast Iron Soil Pipe, Fittings and Means of Joining.
- .3 CAN/CSA-B125.3-05, Plumbing Fittings.

~~.3 Green Seal Environmental Standards (GSES)~~
- ~~.1 Standard GS-36-00, Commercial Adhesives.~~

~~.4 South Coast Air Quality Management District (SCAQMD), California State~~
- ~~.1 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.~~

1.2 **Action and Informational Submittals**

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Provide manufacturer's printed product literature and datasheets for adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

1 1.3 **Delivery, Storage And Handling**

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding and packaging materials in accordance with Section ***01 74 19*** ~~01 74 21~~ - Construction/Demolition Waste Management and Disposal.

2. PRODUCTS

2.1 **Copper Tube and Fittings**

.1 Above ground sanitary, storm and vent Type DWV to: ASTM B306.
- .1 Fittings.
  - .1 Cast brass: to CAN/CSA-B125.3.
  - .2 Wrought copper: to CAN/CSA-B125.3.
- .2 Solder: lead free, tin-antimony 95:5 to ASTM B32.

1

2.2 **Cast Iron Piping and Fittings**

~~.1 Buried sanitary, storm and vent minimum NPS 3, to: CAN/CSA-B70, with one layer of protective coating.~~
~~.1 Joints:~~
~~.1 Mechanical joints:~~
~~.1 Neoprene or butyl rubber compression gaskets: to CAN/CSA-B70.~~
~~.2 Hub and spigot:~~
~~.1 Caulking lead: to CSA B67.~~
~~.2 Cold caulking compounds.~~

.2 Above ground sanitary, storm and vent: to CAN/CSA-B70.
.1 Joints:
.1 Hub and spigot:
.1 Caulking lead: to CSA B67.
.2 Mechanical joints:
.1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

3. EXECUTION

3.1 **Application**

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

1

3.2 **Installation**

.1 In accordance with Section ***23 05 06*** ~~23 05 05~~ - Installation of Pipework.

.2 Install in accordance with National Plumbing Code.

3.3 **Testing**

.1 Pressure test buried systems before backfilling.

.2 Hydraulically test to verify grades and freedom from obstructions.

3.4 **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 Ensure that fixtures are properly anchored, connected to system and effectively vented.

.4 Affix applicable label (storm, sanitary, vent, pump discharge etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

1

3.5 **Cleaning**

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section ***01 74 19*** ~~01 74 21~~ - Construction/Demolition Waste Management and Disposal.

End of Section

1. GENERAL

1 1.1 **REFERENCE STANDARDS**

.1 ASTM International (ASTM)
- .1 ASTM D2235-04, Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
- .2 ASTM D2564-04e1, Standard Specification for Solvent Cements for PolyVinyl-Chloride (PVC) Plastic Piping Systems.

.2 CSA Group (CSA)
- .1 CAN/CSA-Series B1800-06, Thermoplastic Non-pressure Pipe Compendium - B1800 Series.

~~.3 Green Seal Environmental Standards (GSES)~~
- ~~.1 Standard GS-36 [00], Commercial Adhesives.~~

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.5 National Research Council Canada (NRC)
- .1 National Plumbing Code of Canada 2015 (NPC).

~~.6 South Coast Air Quality Management District (SCAQMD), California State~~
- ~~.1 SCAQMD Rule 1168- [A2005] , Adhesive and Sealant Applications.~~

1 1.2 **ACTION AND INFORMATIONAL SUBMITTALS**

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Provide manufacturer's printed product literature and datasheets for piping and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 ~~Provide two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section [01 35 43- Environmental Procedures] [01 35 29.06- Health and Safety Requirements].~~

1.3 **DELIVERY, STORAGE AND HANDLING**

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Store at temperatures and conditions recommended by manufacturer.

.4 Packaging Waste Management: remove for reuse by manufacturer and return of pallets, padding, crate, packaging materials in accordance with Section 01 74 19 - Waste Management and Disposal.

2. PRODUCTS

1

2.1 **MATERIAL**

~~.1 Sustainable Requirements: materials and products in accordance with Section 01 47 15 Sustainable Requirements: Construction.~~

.2 Flame Spread Rating of 25 and Smoke Developed Classification of 50.

.3 Paint on coating shall not be used.

.4 Adhesives and Sealants 07 92 00 - Joint Sealants
.1 Maximum VOC limit 250 g/L GSES GS-36.

1

2.2 **PIPING AND FITTINGS**

~~.1 For buried sanitary waste and vent piping:~~
~~.1 PVC DWV schedule 40 to the requirements of CSA-B181.2.~~

.2 Above ground sanitary waste and vent piping inside the building but outside the ceiling space:
.1 IPEX system PVC DWV

.3 Above ground sanitary waste and vent piping inside the building ceiling space:
.1 IPEX system XFR 15-50 DWV

2.3 **JOINTS**

.1 Solvent weld for PVC: to ASTM D2564.

.2 Solvent weld for ABS: to ASTM D2235.

3. EXECUTION

3.1 **APPLICATION**

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 **INSTALLATION**

.1 In accordance with Section 22 05 00 - Common work results for plumbing.

.2 Install in accordance with local authority having jurisdiction and the National Plumbing Code 2015.

1

3.3 TESTING

~~.1 Pressure test buried systems before backfilling.~~

.2 Hydraulically test to verify grades and freedom from obstructions.

1

3.4 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 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 fixtures are properly anchored, connected to system and effectively vented.

.5 Affix applicable label (storm, sanitary, vent, pump discharge) c/w directional arrows every floor or 4.5 m (whichever is less).

3.5 CLEANING

.1 Clean in accordance with Section 01 74 00 - Cleaning.
- .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

1. GENERAL

1.1 **References**

.1 Canadian Standards Association (CSA International)
- .1 CSA B51-03(R2007), Boiler, Pressure Vessel, and Pressure Piping Code.
- .2 CAN/CSA-C309-M90(R2003), Performance Requirements for Glass-Lined Storage Tanks for Household Hot Water Service.

1.2 **Action and Informational Submittals**

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Provide manufacturer's printed product literature and datasheets for domestic water heater, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Indicate:
  - .1 Equipment, including connections, fittings, control assemblies and ancillaries, identifying factory and field assembled.

1.3 **Closeout Submittals**

.1 Provide maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1 1.4 **Delivery, Storage and Handling**

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates padding packaging materials in accordance with Section ***01 74 19*** ~~01 74 21~~ - Construction/Demolition Waste Management and Disposal.

1.5 **Warranty**

.1 For the Work of this Section 22 30 05 - Domestic Water Heaters, 12 months warranty period prescribed in subsection GC 32.1 of General Conditions "C" is extended to number of years specified for each product.

.2 Contractor hereby warrants domestic water heaters in accordance with CCDC2, but for number of years specified for each product.

2. PRODUCTS

2.1 **Indirect Hot Water Heater and Storage**

.1 Tank:
- .1 Capacity: As indicated;
- .2 Vertical on steel legs; stainless steel tank fabricated to CSA B51, and provincial/local regulations complete with connections;
- .3 Dimensions: 633mm dia X 1779mm H;
- .4 Working pressure: 1034 kPa at 99°C;
- .5 Fully hygienic, high-alloy stainless steel, austenitic, chrome-nickel-steel, titanium stabilized (X6CrNiMoTi17122 - SA 240 - 316 Ti);
- .6 The tank shall be equipped with a stainless steel sensor well;
- .7 Front-mounted inspection / clean-out port and equipped with a thermometer registering tank water temperature;
- .8 Tank enclosure panels shall encase the tank with a minimum of 2¼" (58mm) foamed-in-place PUR foam (HCFC-free). The tank shall be equipped with NPT threaded connections, for attachment of each threaded nipple to boiler water or domestic water piping, without the use of adaptors;
- .9 Four levelling feet shall be provided on the tank base to allow for easy adjustment;
- .10 Galvanized steel drain pan.

.2 Heat exchanger coil:
- .1 Integrated stainless steel, smooth-surfaced, non-finned, conically shaped, rectangular-coiled heat exchanger. Fully hygienic, high-alloy stainless steel, austenitic, chrome-nickel-steel, titanium stabilized (X6CrNiMoTi17122 - SA 240 - 316 Ti);
- .2 Capacity: As indicated;
- .3 The 1¼" (32mm) diameter internal tubular heat exchanger shall be designed with a large surface coil area in the lower portion of the tank to allow rapid and uniform heating of the water in the tank with a low pressure drop through the heat exchanger coil. The coil shall be designed so as to be both self-draining and self-venting, be non-finned with space between passes, and be tapered to allow full output from all passes of the coil.
- .4 Heat exchanger coil operating conditions: maximum hot water operating pressure 1500 kPa at 200°C;

.3 Accessories: heater bundle vacuum breaker.

.4 Control valve:
- .1 Self actuating, modulating valve, cast iron body bronze body, 860 kPa, two-ply thermostatic bellows and copper capillary tubing with bulb in well, tight shut-off, removable composition disc, temperature adjustment setting.

2.2 **Trim and Instrumentation**

.1 Drain valve: NPS 1 with hose end;

.2 Thermometer: 100 mm dial type with red pointer and thermowell filled with conductive paste;

.3 Pressure gauge: 75 mm dial type with red pointer, P-trap, and shut-off cock;

.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 control valve, having discharge terminating over floor drain and visible to operators;

.6 Magnesium anodes adequate for 20 years of operation and located for easy replacement;

.7 20mm pressure and temperature relief valve shall be factory supplied and field installed to meet local Canadian (CSA ratings shall be followed). The maximum pressure relief setting shall be 860 kPa at 99°C.

2.3 **Anchor Bolts and Templates**

.1 Supply anchor bolts and templates for installation in concrete support pad structural steel support in accordance with Section 03 30 00 - Cast-in-Place Concrete 05 50 00 - Metal fabrications.

.2 Size anchor bolts to withstand seismic zone 4 acceleration and velocity forces.

3. EXECUTION

3.1 **Application**

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 **Installation**

.1 Install in accordance with manufacturer's recommendations and authority having jurisdiction.

.2 Provide structural steel for horizontal mounted tanks for instantaneous heaters.

.3 Provide insulation between tank and supports.

3.3 **Field Quality Control**

.1 Manufacturer's factory trained specialist to verify installation as per Manufacturer's requirements and to certify efficiency.

3.4 **Cleaning**

.1 Clean in accordance with Section 01 74 11 - Cleaning.
.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse recycling in accordance with Section ***01 74 19*** ~~01 74 21~~ - Construction/Demolition Waste Management.

1

3.5 **Start-Up and Commissioning**

.1 For general commissioning requirements refer to sections 01 91 13, 01 91 31, 01 91 33, 01 91 41 and 01 91 51.

~~.2 Have manufacturer certify installation.~~

~~.3 Have manufacturer present during start-up tests and start up units and certify performance.~~

.4 Submit written start-up and commissioning reports to Departmental Representative.

End of Section

1. GENERAL

1.1 **References**

.1 American Society for Mechanical Engineers (ASME International)

.2 Canadian Standards Association (CSA International)
.1 CSA B51-03, Boiler, Pressure Vessel, and Pressure Piping Code.
.2 CSA B51-05, Boiler, Pressure Vessel, and Pressure Piping Code, Amendment.

1.2 **Action and Informational Submittals**

.1 Provide Submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
.1 Provide manufacturer's printed product literature and datasheets and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Provide drawings stamped and signed by professional engineer registered or licensed in the Territory of Nunavut, Canada.

.4 Samples:
.1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

1.3 **Closeout Submittals**

.1 Provide maintenance data for equipment for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1 1.4 **Delivery, Storage and Handling**

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates padding packaging materials in accordance with Section ***01 74 19*** ~~01 74 21 - Construction/Demolition~~ Waste Management and Disposal.

1.5 **Extra Materials**

.1 Provide spare parts in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide system consumables for one year.

.3 Provide testing material and documentation for one year.

.4 Deliver to Departmental Representative, upon completion of Work of this Section.

.5 Store where directed by Departmental Representative.

2. PRODUCTS

1

2.1 **Water Treatment System**

.1 Basis of Design
- .1 Daily volume: 2000 L
- .2 Instantaneous treatment flow rate: 1.9 L/s.
- .3 Total Organic Carbon: 5.3 mg/L
- .4 Turbidity: <1 NTU
- .5 Iron: < 0.3 mg/L
- .6 Manganese: < 0.05 mg/L
- .7 Total coliform: 165 CFU/100 mL.
- .8 E. Coli: 9.7 CFU/100 mL.
- .9 Aluminium: 202 µg/L
- .10 Hardness: ***60 to 145 mg/L***

~~.2 Design criteria:~~
~~The water treatment system must operate in sequence.~~
- ~~.1 Water softening to reduce hardness at a level of 60 to 145 mg/L.~~

.3 Construction
- .1 ***Pre assembled in Factory, mounted on a steel base 300mm X 1750mm (total length for UV + filter section) for free standing installation.***, disassemble as necessary for shipment with connecting components clearly identified.

.4 Equipment:
- .1 Filtration system (Cartridge filters in SS316 housing maximum dimensions 275mm dia X 762mm H) ***Pressure differential switch adjustable to 15 psi for cartridge replacement with sound and visual alarm***;
- .2 UV sterilization lamp ***10,000 hours*** (UV-1) (dimensions 100mm dia X 1000mm H), solenoid valve closing upon UV depletion efficiency (below 50%) with manual override in case of emergency water need, c/w solenoid module, ***premounted on a pvc wall board***;
- .3 Electronic controller module providing user interface with full diagnostics and warnings including QR codes, ***provide dry contacts as showed on control division drawings for transmission of alarms***;
- .4 c/w 254 nm Teflon based UV sensor giving lamp % level;
- .5 NSF 55 class B certified.

3. EXECUTION

3.1 **Application**

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

1

3.2 **Installation**

~~.1 Provide certificate, signed by manufacturer, stating that pipe system has been installed in accordance with manufacturer's recommendations.~~

.2 System to be completely accessible for removal, modification and cleaning.

1

3.3 **Start-Up and Commissioning**

~~.1 Have manufacturer certify installation.~~

~~.2 Have manufacturer present during start-up tests and start up units and certify performance.~~

.3 Submit written start-up and commissioning reports to Departmental Representative.

3.4 **Training**

.1 Provide training for operation and maintenance of equipments to Departmental Representative.

1

3.5 **Cleaning**

.1 Clean in accordance with Section 01 74 11 - Cleaning.
.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section ***01 74 19*** ~~01 74 21~~ - Construction/Demolition Waste Management.

End of Section

1. GENERAL

1.1 **References**

.1 Canadian Standards Association (CSA International)
- .1 CAN/CSA-B45 Series-02(R2008), Plumbing Fixtures.
- .2 CAN/CSA-B125.3-05, Plumbing Fittings.
- .3 CAN/CSA-B651-12, Accessible Design for the Built Environment.

~~.2 Green Seal Environmental Standards (GSES)~~
- ~~.1 Standard GS-36-00, Commercial Adhesives.~~

~~.3 South Coast Air Quality Management District (SCAQMD), California State~~
- ~~.1 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.~~

1.2 **Action and Informational Submittals**

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Provide manufacturer's printed product literature and datasheets for washroom fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Indicate fixtures and trim:
- .1 Dimensions, construction details, roughing-in dimensions.
- .2 Factory-set water consumption per flush at recommended pressure.
- .3 For water closets, urinals: minimum pressure required for flushing.

1.3 **Closeout Submittals**

.1 Provide operation and maintenance data for washroom fixtures, for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

.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.

1.4 **Delivery, Storage and Handling**

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labeled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding packaging materials in accordance with Section ***01 74 19*** ~~01 74 21~~ - Construction/Demolition Waste Management and Disposal.

2. PRODUCTS

1

2.1 ~~**Sustainable Material**~~

~~.1 Sustainable Requirements:~~

~~.1 Materials and resources in accordance with Section 01 47 15 Sustainable Requirements: Construction.~~

2.2 **Manufactured Units**

.1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.

.2 Barrier-free fixtures: in accordance with CAN/CSA-B651.

.3 Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.

.4 Exposed plumbing brass to be chrome plated.

.5 Barrier-free exposed piping to be insulated.

.6 Number, locations: as indicated.

.7 Fixtures in any one location to be product of one manufacturer and of same type.

.8 Trim in any one location to be product of one manufacturer and of same type.

.9 Water closets:

.1 WC-1 : floor-mounted, flush valve
- .1 Bowl: vitreous china, syphon jet, elongated rim, close-coupled combination, bowl and bolt caps.
- .2 Factory set to 4.8 litres/flush.

.2 WC-2 (universal access) : barrier-free, floor-mounted, flush valve
- .1 Bowl: vitreous china, syphon jet, elongated rim, close-coupled combination, bowl and bolt caps.
- .2 Top of seat to be between 400 mm and 460 mm from finished floor.
- .3 Factory set to 4.8 litres/flush.

.3 WC-3 (children) : floor-mounted, flush valve
- .1 Bowl: vitreous china, syphon jet, elongated rim, close-coupled combination, bowl and bolt caps.
- .2 Top of seat to be between 260 and 300mm from finished floor.
- .3 Factory set to 4.8 litres/flush.

.10 Water Closet Seats.
- .1 Seat: white, open front, moulded solid plastic cover, stainless steel check hinges, solid brass insert post.

.11 Washroom Lavatories:
- .1 L-1 : wall-hung:
  - .1 Vitreous china, rear overflow, recessed self-draining faucet ledge, for carrier with concealed arms and mounting brackets. Bowl dimensions: 394 x 343 x 127.
- .2 L-2: wall-hung (universal access).
  - .1 Vitreous china, rear overflow, recessed self-draining faucet ledge, for carrier with concealed arms and mounting brackets. Bowl dimensions: 394 x 343 x 127.
  - .2 Max supply temperature: 49°C. Thermostatically controlled.

.12 Washroom Lavatory Electronic Trim:
- .1 Barrier-free electronic faucet:
  - .1 Dual infrared motion sensor activated by hand motion in lavatory.
  - .2 Sensor: waterproof, incorporated in body of unit, with impact-resistant plastic lens and anti-scratch coating, sensitivity adjustable from 100 mm to 450 mm.
  - .3 Controls: vandal-proof, interchangeable receptacles for stainless steel sheathed sensor and modular plug-type solenoid connections, double 24 VAC slow-closing commercial solenoid for 860 kPa, 85 degrees C.
  - .4 Transformer: 120/ 24Class 2, UL and CSA listed, hard wire or box type, sized for up to 8 solenoids.
  - .5 Spout: Chrome plated, with integral flow control aerator rated at 1.9 l/minute at 413 kPa maximum.
  - .6 Controls in body of unit.

.13 Fixture piping:
- .1 Hot and cold water supplies to fixtures:
  - .1 Chrome plated flexible supply pipes with handwheel stop, reducers, escutcheon.
- .2 Waste:
  - .1 Brass P-trap with clean out on fixtures not having integral trap.
  - .2 Chrome plated in exposed places.

.14 Chair carriers:
- .1 Factory manufactured floor-mounted carrier systems for wall-mounted fixtures.

3. EXECUTION

3.1 Application

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 Installation

.1 Mounting heights:
- .1 Standard: to manufacturer's recommendations or as indicated, measured from finished floor.
- .2 Wall-hung fixtures: as indicated, measured from finished floor.
- .3 Barrier free: to most stringent NBCC, 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 Adjust flush valves to suit actual site conditions.
- .4 Adjust urinal flush timing mechanisms.
- .5 Set controls of automatic flush valves for WCs and urinals to prevent unnecessary flush cycles.

.3 Checks:
- .1 Water closets: flushing action.
- .2 Aerators: operation, cleanliness.
- .3 Vacuum breakers, backflow preventers: operation under all conditions.

.4 Thermostatic controls:
- .1 Verify temperature settings, operation of control, limit and safety controls.

3.4 **Cleaning**

.1 Clean in accordance with Section 01 74 11 - Cleaning.
- .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

End of Section

1. GENERAL

1.1 **References**

.1 Canadian Standards Association (CSA International)
- .1 CAN/CSA-B45 Series-02(R2008), Plumbing Fixtures.
- .2 CAN/CSA-B125.3-05, Plumbing Fittings.
- .3 CAN/CSA-B651-12, Accessible Design for the Built Environment.

1.2 **Action and Informational Submittals**

.1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:
- .1 Provide manufacturer's printed product literature and datasheets for fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 **Closeout Submittals**

.1 Provide maintenance data in accordance with Section 01 78 00 - Closeout Submittals.

.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.

1 1.4 **Delivery, Storage and Handling**

.1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

.2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates padding packaging materials in accordance with Section ***01 74 19*** ~~01 74 21~~ - Construction/Demolition Waste Management and Disposal.

2. PRODUCTS

1 2.1 ~~**Sustainable Material**~~

~~.1 Materials and products in accordance with Section 01 47 15 Sustainable Requirements: Construction.~~

2.2 **Manufactured Units**

.1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.

.2 Barrier-free fixtures: in accordance with CAN/CSA-B651.Trim, fittings: manufacture in accordance with CAN/CSA-B125.

.3 Exposed plumbing brass to be chrome plated.

.4 Barrier-free: exposed piping to be insulated.

.5 Number, locations: architectural drawings to govern.

.6 Fixtures to be product of one manufacturer.

.7 Trim to be product of one manufacturer.

.8 Bath Sinks (S-1): Specifications on plan

.9 Classroom sinks (S-2): Specifications on plan

.10 Service sinks (SS-1): Specifications on plan

.11 Mop sinks (MS-1): Specifications on plan

.12 Triple Bowl Sink (S-3): Specifications on plan

.13 Bar Sinks (S-4): Specifications on plan

.14 Fixture piping:
- .1 Hot and cold water supplies to each fixture:
  - .1 Chrome plated flexible supply pipes each with handwheel stop, reducers, escutcheon.
- .2 Waste:
  - .1 Brass P trap with clean out on each fixture not having integral trap.
  - .2 Chrome plated in all exposed places.

.15 Chair carriers:
- .1 Factory manufactured floor-mounted carrier systems for all wall-mounted fixtures.

3. EXECUTION

3.1 Application

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 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.

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.
- .3 Wash fountains: operation of flow-actuating devices.

.4 Thermostatic controls:
- .1 Verify temperature settings, operation of control, limit and safety controls.

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3.4 **Cleaning**

.1 Clean in accordance with Section 01 74 11 - Cleaning.
- .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse recycling in accordance with Section ***01 74 19*** ~~01 74 21~~ - Construction/Demolition Waste Management.

End of Section