PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standard Association (CSA).
.1 CSA B137.5, Crosslinked Polyethylene (PEX) Tubing Systems for Pressure Applications.
.2 CSA B137.6, CPVC Pipe, Tubing and Fittings for Both Hot and Cold Water Distribution Systems.

.2 National Sanitation Foundation (NSF).
.1 NSF61 Potable Water Listing.

.3 Underwriters Listing of Canada (ULC).
.1 CAN/ULC S101, Fire Endurance Tests of Buildings Construction and Materials.
.2 CAN/ULC S102.2, Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.
.3 CAN/ULC S115, Standard Method of Fire Tests of Firestop Systems.

.4 American Society for Testing and Materials International, (ASTM).
.1 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
.2 ASTM B88M, Standard Specification for Seamless Copper Water Tube (Metric).
.3 ASTM D1784 Standard Specification for Rigid Poly (Vinyl Chloride) PVC Compounds and Chlorinated Poly (Vinyl Chloride) CPVC compounds.
.4 ASTM D2467, Standard Specification for Poly (Vinyl Chloride) PVC Plastic Pipe Fittings, Schedule 80.
.5 ASTM F437 Standard Specification for Threaded Chlorinated Poly (Vinyl Chloride) CPVC Plastic Pipe Fittings Schedule 80.
.6 ASTM F439 Standard Specification for Chlorinated Poly (Vinyl Chloride) CPVC Plastic Pipe Fittings Schedule 80.
.7 ASTM F441/441M Standard Specification for Chlorinated Poly (Vinyl Chloride) CPVC Plastic Pipe Schedules 40 and 80.
.8 ASTM F876 Standard Specification for Crosslinked Polyethyline (PEX) Tubing.

1.1 REFERENCES (Cont'd)

.4 (Cont'd)
.9 ASTM F877 Standard Specification for Crosslinked Polyethyline (PEX) Hot and Cold Water Distribution System.

.5 Department of Justice Canada (Jus).
.1 Canadian Environmental Protection Act (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-80, Bronze Gate, Globe, Angle and Check Valves.
.2 MSS-SP-110 Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

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

.9 Transport Canada (TC)
.1 Transportation of Dangerous Goods Act (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 Sustainable Design Submittals:
.1 LEED - NC-2009. Submittals: in accordance with Section 01 35 21 - LEED Requirements.

.4 Closeout Submittals:

1.2 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.4 Closeout Submittals:(Cont'd)
.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Store and manage hazardous materials in accordance with Section 01 35 21 - LEED Requirements.

.2 Packaging Waste Management: remove for reuse or return of pallets, crates, padding and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

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

.5 Materials and Resources Credit MRc2.1 Construction Waste Management: and MRc2.2 Construction Waste Management: Divert 75% From Landfill: prepare Construction Waste Management plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.4 SUSTAINABLE REQUIREMENTS

.1 Construction:
.1 Construction requirements detailed in Section 01 35 21 - LEED Requirements form Section 01 35 21 - LEED Requirements form integral part of this project including materials and products of this Section. Sustainable construction requirements include:
.1 Specific construction requirements for project.
.2 Specification text to ensure that project will comply with PWGSC green design process and sustainability requirements.
.3 Administrative, temporary and procedural requirements for the use of materials and methods of construction.

PART 2 - PRODUCTS

2.1 SUSTAINABLE REQUIREMENTS

.1 Materials and products in accordance with Section 01 35 21 - LEED Requirements.

2.2 PIPING

.1 Domestic hot, cold and recirculation systems, within building.
.1 Above ground: NPS ½ to 4 CPVC to SDR11 with IPS outside dimensions: CSA B 137.6, ASTM D1784 cell class of 24448 and NSF 61. NPS ½ to 3 PEX to SDR9: CSA B137.5, ASTM F876 and ASTM F877.
.2 Buried or embedded.
.1 Up to NPS 3: PEX Tubing to ASTM F876 and F877 and certified to NSF61 rated at 93o at 551kPa, 82oC at 690 kPa, 23oC at 1100 kPa, certified to be used for hot or cold water service.
.2 Refer to Section 33 11 16 - Site Water Utility Distribution Piping.

2.3 FITTINGS

.1 CPVC Fittings: to CSA B137.6, ASTM D1784 Cell Class of 23447 and NSF 61.

.2 CPVC Flanges: to ASTM F1970 and ASTM D2467.
.1 Flanged CPVC: 1034 kPa at 230C, 517 kPa at 600C not to be used above 600C.
.2 Bolt hole patterns to ANSI B16.1 class 125, threads to be tapered iron pipe size threads to ANSI B2.1.

.3 Transition points: as recommended by manufacturer.

.4 PEX fittings certified to CSA B137.5, ASTM F876 and ASTM F877, and certified to be used with PEX tubing.

2.4 JOINTS

.1 Rubber gaskets, elastomeric, latex free, , full face, hardness of 50 to 70 durometer.

2.4 JOINTS (Cont'd)

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

.3 Solder: 95/5 tin copper alloy lead free for copper pipe.

.4 Teflon tape: for threaded joints.

.5 Solvent weld with primer to ASTM F493.
.1 Pressure rating 690 kPa at 820°C, 2760 kPa at 230°C.

2.5 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.

2.6 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.

2.6 SWING CHECK VALVES (Cont'd)

.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, regrind 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:
.1 Class 150 as specified Section 23 05 23.01 - Valves - Bronze.
.2 CPVC to ASTM D 1784 Cell Class of 23447 and NSF 61.
.1 Rating 1599 kPa at 23° C and 717 kPa at 60° C.
.2 O-rings: EPDM.
.3 ENDS: socket, flanged, threaded.
.4 Seats: Teflon PTFE.
.5 Seals: EPDM.
.6 Full port, downstream union nut for full blocking.
.7 Ball: CPVC.

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

PART 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 NPC and local authority having jurisdiction.

.2 Install pipe work in accordance with Section 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 HWR 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.

3.4 PRESSURE TESTS

.1 Conform to requirements of Section 21 05 01 - Common Work Results for Mechanical.

.2 Test pressure: greater of 1 1/2 times 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 Provincial potable water guidelines. Let system flush for additional 2 hours, then draw off another sample for testing.

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 Coordinate with Section 33 11 16 - Site Water Utility Distribution Piping.

.3 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.

3.8 START-UP (Cont'd)

.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 HWS and HWR 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.

3.9 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 HWR 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 HWR 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.

3.9 PERFORMANCE VERIFICATION (Cont'd)

.2 Procedures: (Cont'd)

.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 13 - General Commissioning (Cx) Requirements: Report Forms and Schematics.

.2 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

3.10 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 21 - Construction/Demolition Waste Management and Disposal and Section 01 35 21 - LEED Requirements.

END