

PART 1 - GENERAL	PART 2 - PRODUCTS	2.18 Ventilation	2.19 Radiant Heating System	2.20 HVAC Water Treatment	2.21 Hydronic Valves	2.22 Access Doors	2.23 Hangers	2.24 Plumbing-Water	2.25 Plumbing - Drainage	2.26 Plumbing - Specialties	2.27 Plumbing - Hydrant	2.28 Plumbing - Fire	2.29 Plumbing - Gas	2.30 Plumbing - Sewer	2.31 Plumbing - Storm	2.32 Plumbing - Vent	2.33 Plumbing - Other	2.34 Plumbing - Miscellaneous	2.35 Plumbing - Other	2.36 Plumbing - Other	2.37 Plumbing - Other	2.38 Plumbing - Other	2.39 Plumbing - Other	2.40 Plumbing - Other	2.41 Plumbing - Other	2.42 Plumbing - Other	2.43 Plumbing - Other	2.44 Plumbing - Other	2.45 Plumbing - Other	2.46 Plumbing - Other	2.47 Plumbing - Other	2.48 Plumbing - Other	2.49 Plumbing - Other	2.50 Plumbing - Other	2.51 Plumbing - Other	2.52 Plumbing - Other	2.53 Plumbing - Other	2.54 Plumbing - Other	2.55 Plumbing - Other	2.56 Plumbing - Other	2.57 Plumbing - Other	2.58 Plumbing - Other	2.59 Plumbing - Other	2.60 Plumbing - Other	2.61 Plumbing - Other	2.62 Plumbing - Other	2.63 Plumbing - Other	2.64 Plumbing - Other	2.65 Plumbing - Other	2.66 Plumbing - Other	2.67 Plumbing - Other	2.68 Plumbing - Other	2.69 Plumbing - Other	2.70 Plumbing - Other	2.71 Plumbing - Other	2.72 Plumbing - Other	2.73 Plumbing - Other	2.74 Plumbing - Other	2.75 Plumbing - Other	2.76 Plumbing - Other	2.77 Plumbing - Other	2.78 Plumbing - Other	2.79 Plumbing - Other	2.80 Plumbing - Other	2.81 Plumbing - Other	2.82 Plumbing - Other	2.83 Plumbing - Other	2.84 Plumbing - Other	2.85 Plumbing - Other	2.86 Plumbing - Other	2.87 Plumbing - Other	2.88 Plumbing - Other	2.89 Plumbing - Other	2.90 Plumbing - Other	2.91 Plumbing - Other	2.92 Plumbing - Other	2.93 Plumbing - Other	2.94 Plumbing - Other	2.95 Plumbing - Other	2.96 Plumbing - Other	2.97 Plumbing - Other	2.98 Plumbing - Other	2.99 Plumbing - Other	3.00 Plumbing - Other
<p>1.1 References</p> <ol style="list-style-type: none"> National Building Code Latest Edition. National Plumbing Code Latest Edition. Canadian Registration Numbers (CRNs), Province of Nova Scotia. <p>1.2 Inspections</p> <ol style="list-style-type: none"> New piping to be inspected prior to hydrostatic test by Design Engineer and by authority having jurisdiction. Contractor to contact Department of Labour Boiler Inspector for requirements for inspection and testing. Costs for inspection to be covered by Contractor. <p>1.3 Equipment List</p> <ol style="list-style-type: none"> Complete list of equipment and materials to be used on this project and forming part of tender documents by adding manufacturer's name, model number and details of materials, and submit for approval. Submit for approval within 48 hr after closing of tenders. <p>1.4 Equipment Installation</p> <ol style="list-style-type: none"> Unions or flanges: provide for ease of maintenance and disassembly. Space for servicing, disassembly and removal of equipment and components; provide as recommended by manufacturer or as indicated. Equipment drains: pipe to floor drains. Install equipment, rectangular cleanouts and similar items parallel to or perpendicular to building lines. <p>1.5 Protection of Openings</p> <ol style="list-style-type: none"> Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system. Seal all ductwork openings with 6 mil plastic to protect from dirt, dust and foreign materials during the course of the day's installation. Further ensure that at the end of the day, all open joints are closed off. Tape all plastic with duct tape. Cover and protect all un-installed ductwork before it is installed. Protect all existing ductwork to be re-used, closing off openings with 6 mil plastic. At completion of work, advise Engineer that work is ready for inspection of Interior duct Surfaces. Ductwork must be clean and/or cleaned if found to be unacceptably dirty. <p>1.6 Equipment Supports</p> <ol style="list-style-type: none"> Equipment supports supplied by equipment manufacturer; specified elsewhere in Division 01. Equipment supports not supplied by equipment manufacturer; fabricate from structural grade steel. Submit structural calculations with shop drawings. Mount base mounted equipment on chartered edge housekeeping pads, minimum of 4 in. high and 2 in. larger than equipment dimensions all around. <p>1.7 Dielectric Couplings</p> <ol style="list-style-type: none"> General: <ol style="list-style-type: none"> To be compatible with and to suit pressure rating of piping system. Where pipes of dissimilar metals are joined on open systems. Pipes NPS 2 and under: installing unions. Pipes NPS 2-1/2 and over: isolating flanges. <p>1.8 Drain Valves</p> <ol style="list-style-type: none"> Locate at low points and at section isolating valves unless otherwise specified. Minimum NPS 3/4 unless otherwise specified; bronze, with hose end male threads and complete with cap and chain. <p>1.9 Demonstration and Operation & Maintenance Instructions</p> <ol style="list-style-type: none"> Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operation, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance. Where deemed necessary, Owner may record these demonstrations on video tape for future reference. <p>1.10 Operation and Maintenance Manual</p> <ol style="list-style-type: none"> Operation and maintenance manual. Operation data to include: <ol style="list-style-type: none"> Control schematics for each system including environmental controls. Description of each system and its controls. Operation instructions for each system and each component. Description of actions to be taken in event of equipment failure. Valves schedule and flow diagram. Colour coding chart. Maintenance data shall include: <ol style="list-style-type: none"> Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment. Performance data to include: <ol style="list-style-type: none"> Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete. Testing, adjusting and balancing reports. Approvals: <ol style="list-style-type: none"> Submit 3 copies of draft Operation and Maintenance Manual. <p>1.11 Cleaning</p> <ol style="list-style-type: none"> Clean mechanical systems in accordance with Division 15. Clean interior and exterior of all systems including strainers. In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition including replacement of all filters in air and piping systems. Interior of duct must be clean, ensure all openings are sealed and delay any start-ups until building is ready. Arrange for Engineer to inspect ductwork before start-up of air handling and removal of closures. <p>1.12 As-Built Drawings</p> <ol style="list-style-type: none"> Site Records: <ol style="list-style-type: none"> Engineer will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of the work. Mark there-on all changes as work progresses and as changes occur. <p>1.13 Identification</p> <ol style="list-style-type: none"> Location of Nameplates: <ol style="list-style-type: none"> In conspicuous location to facilitate easy reading from operating floor and to properly identify equipment and/or system. Location of Identification on Piping & Ductwork Systems <ol style="list-style-type: none"> On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at more than 20 ft intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles. Adjacent to all changes in direction. At least once in each small room through which piping or ductwork passes. On both sides of visual obstruction or where run is difficult to follow. On both sides of separations such as walls, floors and partitions. Where piping is installed in pipe chases, ceiling spaces, galleries or other confined spaces, at entry and exit points at each access opening. At beginning and end points of each run and at each place of equipment in run. At point immediately upstream of major manually operated or automatically controlled valves, dampers, etc. Identification to be easy and accurately readable. Valves and Controllers <ol style="list-style-type: none"> Valves and operating controllers. Provide identification tags, 3/4" dia., two color to match pipe identification on h-bar below valve. Spare Parts <ol style="list-style-type: none"> One (1) spare thermometer. One (1) spare control valve. 	<p>2.1 Insulation</p> <ol style="list-style-type: none"> Fire and Smoke Rating <ol style="list-style-type: none"> In accordance with CANULC-S102. <ol style="list-style-type: none"> Maximum flame spread rating: 25. Maximum smoke developed rating: 50. Formed Mineral Fiber to 400F <ol style="list-style-type: none"> Application: for piping valves and fittings on: <ol style="list-style-type: none"> Hot water heating, temperature 200°F. Domestic hot water, temperature 140°F. Domestic cold water, temperature 50 deg F w/ vapor barrier. Material <ol style="list-style-type: none"> CGSB 51-GP-0M, rigid mineral fiber sleeving for piping. Manufacturer: Fiberglas evolution. Jackets: Evolution. Thermal Conductivity "k" shall not exceed .236 BTU/hq.ft.F at 75°F mean temperature when tested in accordance with ASTM C335. Thickness: 1/2" for NPS 1/2 to 2, 3/4" for NPS 2-1/2 to 4, 1" for NPS 4 & over. <table border="1"> <thead> <tr> <th>Fluid Temperature (°F)</th> <th>1 and under</th> <th>1-1/4 to 2</th> <th>2-1/2 to 4</th> <th>4 & over</th> </tr> </thead> <tbody> <tr> <td>128-200</td> <td>1</td> <td>1</td> <td>1 1/2</td> <td>1 1/2</td> </tr> <tr> <td>185-215</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> </tr> <tr> <td>40-34</td> <td>1/2</td> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table> Fasteners <ol style="list-style-type: none"> Pipework: <ol style="list-style-type: none"> Tape: self adhesive, aluminum, UL labeled for less than 25 frame spread and less than 50 smoke developed. <ol style="list-style-type: none"> Acceptable material: Fattal Insulape, by S. Fattal Canves Inc. Lap seal adhesive: quick-setting for joints and lap sealing of vapour barriers. <ol style="list-style-type: none"> Acceptable material: Sikor 230-05; Chlores CP-30; Foster 87-75 asbestos free at 240 sq. ft/gal. Legging Adhesive: Fire Retardant Coating: <ol style="list-style-type: none"> Acceptable material: Bakor 120-09, Chlores CP-50A-HV-2, Foster 30-38 asbestos free at 50 sq.ft/gal. Access Doors <ol style="list-style-type: none"> Supply and install as necessary to gain access to all concealed mechanical equipment for operating, inspecting, adjusting, servicing. Sizes: Except as indicated otherwise, to be minimum sizes as follows: <ol style="list-style-type: none"> For body entry: 800 x 600 mm (24 x 24 in). For hand entry: 300 x 300 mm (12 x 12 in). Construction: rounded square corners, concealed hinges, screwdriver latch, anchor straps, able to open 180°. Materials: <ol style="list-style-type: none"> Tiled or marble surfaces and other special areas: Stainless steel with brushed satin or polished finish as directed by Consultant. All other areas: Prime coated steel. <p>2.2 Attachments</p> <ol style="list-style-type: none"> Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS-SP-58. Upper Attachments <ol style="list-style-type: none"> Concete: <ol style="list-style-type: none"> Inserts for cast-in-place concrete: galvanized steel wedge for pipe NPS 3/4 through NPS 8. Grinnell Fig. 281. Carbon steel plate with ductile surface mount: malleable iron socket and expansion case and bolt. Minimum two expansion cases and bolts for each hanging. Grinnell, Plate Fig. 49, Eye Nut Fig. 290, Expansion Case Fig. 117. Steel beam bottom flange: <ol style="list-style-type: none"> Cold piping NPS 2-1/2 and under: malleable iron clamp; Grinnell Fig. 61, Myatt Fig. 568. Cold piping NPS 2-1/2 and larger and all hot piping: malleable iron beam clamp; Grinnell Fig. 226, Myatt Fig. 510. Steel beam top: <ol style="list-style-type: none"> Cold piping NPS 2 and under: malleable iron top of beam clamp; Grinnell Fig. 61, Myatt Fig. 568. Cold piping NPS 2-1/2 and larger and all hot piping: hook rod with nut, spring washer and plain washer; Grinnell Fig. 227, Myatt Fig. 505. Steel plate: <ol style="list-style-type: none"> Cold piping NPS 2 and under: steel washer plate with double locking nuts; Grinnell Fig. 60, Myatt Fig. 565. Cold piping NPS 2-1/2 and larger and all hot piping: steel washer plates with double locking nut, carbon steel clevis and malleable iron socket; Grinnell washer plate, Fig. 50, clevis, Fig. 55; eye nut, Fig. 290, Myatt washer plate Fig. 545; clevis, Fig. 530; eye nut, Fig. 480. Steel channel or angle (bottom): <ol style="list-style-type: none"> Cold piping NPS 2-1/2 and under: malleable iron C clamp; Grinnell Fig. 86, Myatt Fig. 508. Cold piping NPS 2-1/2 and larger and all hot piping: universal channel clamp; Grinnell Fig. 226, Myatt Fig. 503. Steel channel or angle (top): <ol style="list-style-type: none"> Cold piping NPS 2 and under: malleable iron top of beam clamp; Grinnell Fig. 61, Myatt Fig. 568. Cold piping NPS 2-1/2 and larger and all hot piping: steel jaw hook rod with nut, spring washer and plain washer; Grinnell Fig. 227, Myatt Fig. 506. Middle Attachment (rod): <ol style="list-style-type: none"> Cast iron steel threaded rod cadmium plated finish; Grinnell Fig. 146, Myatt Fig. 434. Pipe Attachment: <ol style="list-style-type: none"> Suspended hot piping, steel and copper, with horizontal movement in excess of 1 in; hot steel piping with middle attachment (rod) 1/2 in. or less; pipe holder; Grinnell Fig. 174, Myatt Fig. 258. Bottom supported hot piping, steel and copper; pipe roller stand; Grinnell Fig. 271, Myatt Fig. 265. Riser Clamps: <ol style="list-style-type: none"> Steel cast iron top pipe: black carbon steel; Grinnell Fig. 261, Myatt Fig. 182. 6 saddles and 4 shells: steam piping NPS 1 1/4 and over; protective saddle with insulation under saddle; Grinnell Fig. 150 to 168, Myatt Fig. 265. <p>2.4 Piping</p> <ol style="list-style-type: none"> Domestic hot & cold systems, within building, copper tube & fittings, hard drawn type L to ASTM B88M, branch run-outs after isolation valve Type L copper and/or pipe suitable water piping. Pex pipe joints to be of type approved by the manufacturer. <ol style="list-style-type: none"> Solder/brazing: lead free up to 2" silver solder, ten (10) feet from domestic hot water heater. Teflon tape: for threaded joints. Globe valves: NPS 2 and under: soldered, Jenkins 9011, Toyo 504H, Crane 9322, Watts B8000, NH1979, MI 5002, Kitz. Swing Check Valves: <ol style="list-style-type: none"> NPS 2 and under: soldered, Jenkins 4093, Toyo 237, Crane 1342, NH A61, MI 509, Kitz. Ball valves: NPS 2 and under: soldered, Jenkins 9029, Toyo 504H, Crane 9322, Watts B8000, NH 504, MI B616, Kitz. Plumbing - Drainage <ol style="list-style-type: none"> Copper Tube and Fittings: Above ground sanitary. Type DWV black brass or wrought copper fittings, up to 2" to ASTM B360. Lead free solder. Cast Iron Fittings and Fittings: to CANCSA-B70, Mechanical Joints, to be used in Mechanical Rooms. Piping and Fittings: PVC - DWV-XFR PE-X; mechanical joints; to CANCSA-B181.2 in exposed areas. Solvent weld for PVC to B181.2 and B182.1; to ASTM D2264, two part cleaner and cement. Plumbing - Specialties <ol style="list-style-type: none"> Floor Drains: dura-coated cast iron body with Type A adjustable strainer with nickel bronze top. Integral seepage flange, clamping collar and 1/2" seal primer tapping. Zum Z4158, Type FD in low temperature. Cleanouts: Zum ZH-140-UD-ETOC T-Cone Stopper, Smith 4020 cw ETOC T-Cone stopper, Above Grade Blob Model H4021. Water Hammer Arrestors: Zum Z-1700, Empco HT, Smith S9500 Series, MIFab. <table border="1"> <thead> <tr> <th>Type</th> <th>Size</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>1/2</td> </tr> <tr> <td>B</td> <td>3/4</td> </tr> <tr> <td>C</td> <td>1</td> </tr> <tr> <td>D</td> <td>1 1/4</td> </tr> </tbody> </table> Vacuum Breakers: Watts 288A, Febco 715A. Hose Bibbs and Sediment Faucets: Emco 3741, Crane C5648. Trap Seal Primers: All brass, with integral vacuum breaker: NPS 1/2 drip line connection, RPP florets cw DU distributor, MIFAB. 1/2" compression outlets, NPS 1/2 threaded ends, NPS 1/2 drip line connection, PT-AP1-8. Strainers <ol style="list-style-type: none"> NPS 2 and under: Armstrong F45C, Braukmann FY32, Crane 988 1/2, Lelch BE, Sittler BT, Toyo 380, Watts 777 Series. Plumbing - Hydrant <ol style="list-style-type: none"> Type KS: two (2) compartment, Franke, Kindred QDL03183, size OD 20 1/2x1 1/4x8" cw Delta #100-HDF-DST faucet, Waltec: PVC-DMV trap and union joints ballcock, copper s/w c/wops. Type JS: Jwinlor sink, equal to Stan Williams #MB-2424 precast terrace floor mounted mop sink cw T-10-V8 Faucet, 1-3/8" BS. Bracket, #P-35 Backdrop panels, TC-3 mop sink drain gasket. Type L: Urinal, equal to American Standard Washroom #6501.010 cw #18x1.0 CG QTRIMA Pkita battery power w/ override button flush valve, 2" outlet, #J Smith #647069-007A SS strainer, #SS4-1819 wall access cleanout, series 0637 urinal carrier. Type L: Lavatory, equal to American Standard Cadet Universal Access, #9484.001 cw American Standard #7345.000.022 basin faucet on 4" c. l., 1.5 gpm type LM-115 Lamrin floor, McQuire 1595CW offset ballcock & B87CZ-177 Plug, with McQuire #1595BR-LR or braided SS flexible supplies. 	Fluid Temperature (°F)	1 and under	1-1/4 to 2	2-1/2 to 4	4 & over	128-200	1	1	1 1/2	1 1/2	185-215	1	1	1	1	40-34	1/2	1	1	1	Type	Size	A	1/2	B	3/4	C	1	D	1 1/4	<p>1. Sheet metal and Air Conditioning Contractors' National Association (SMACNA).</p> <ol style="list-style-type: none"> SMACNA HVAC duct construction standards, metal and flexible, 2nd edition (1995) and addendum no. 1 (1997). SMACNA HVAC Duct Leakage Test Manual, (1995). Technical research update #2, Latest 1995. <p>2. Seal Classification:</p> <p>Class "C": Inverse joints and connection made air tight with gaskets and sealants.</p> <p>3. Sealant - water based, high pressure o/v long strand teflon - temperature range of min 90 deg F to plus 200 deg F.</p> <p>4. Duct Leakage: In accordance with SMACNA HVAC duct leakage test manual.</p> <p>5. Flanges: Fabrication to SMACNA.</p> <p>6. Galvanized steel: look for quality: to ASTM A336M, 290 zinc coating; thickness, fabrication and reinforcement to ASHRAE and SMACNA.</p> <p>7. Hangers and Supports:</p> <ol style="list-style-type: none"> Strap hangers: of same material as duct but next sheet metal thickness heavier than duct, maximum size duct supported by strap hanger; 20". Hanger Configuration: to ASHRAE and SMACNA. Hangers: Black steel angle with black steel rods to ASHRAE and SMACNA following table: <table border="1"> <thead> <tr> <th>DUCT SIZE (inches)</th> <th>ANGLE SIZE (inches)</th> <th>ROD SIZE (inches)</th> </tr> </thead> <tbody> <tr> <td>up to 30"</td> <td>1 1/2x3/16</td> <td>1/4</td> </tr> <tr> <td>up to 42"</td> <td>1 1/2x1/2x3/16"</td> <td>1/4</td> </tr> <tr> <td>43 to 60"</td> <td>1 1/2x1 1/2x3/16"</td> <td>3/8</td> </tr> <tr> <td>61 to 84"</td> <td>2x2x3/16"</td> <td>3/8</td> </tr> <tr> <td>85 to 96"</td> <td>2x2x1/4"</td> <td>3/8</td> </tr> <tr> <td>97 & over</td> <td>2x2x1/4"</td> <td>3/8</td> </tr> </tbody> </table> <p>4. Upper Hanger Attachments</p> <ol style="list-style-type: none"> For concrete: manufactured concrete inserts. <ol style="list-style-type: none"> Acceptable material: Myatt Fig. 485. For steel: manufactured pipe clamp or steel plate washer. <ol style="list-style-type: none"> Acceptable material: Grinnell Fig. 61 or 86 for joint dampers. For steel beams: manufactured beam clamps. <ol style="list-style-type: none"> Acceptable material: Grinnell Fig. 61. <p>5. Access Doors in ducts & plenums</p> <ol style="list-style-type: none"> Non-insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 1/4" thick complete with sheet metal angle frame and one (1) inch thick rigid glass fiber insulation. Insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 1/4" thick complete with sheet metal angle frame and one (1) inch thick rigid glass fiber insulation. Quartz: neoprene, all access doors. Hardware: <ol style="list-style-type: none"> Up to 12"x12" - 2 sash locks complete with safety chain. 13" to 16" - 4 sash locks complete with safety chain. Hold open devices. <p>6. Turning Vanes: factory or shop fabricated single blades and double blades with trailing edge, to recommendations of SMACNA and as indicated.</p> <p>7. Multi-leaf Dampers - extruded aluminum, interlocking blades, complete with extruded vinyl seals, spring stainless steel side seals, formed and welded galvanized steel frame, pressure fit sub-ducted bronze bearings; linkage: plated steel tie rods, brass pivots and plated steel brackets, complete with plated steel control rod; Tamco 9000 for fresh air and exhaust and 1000 for return, Nakor.</p> <p>8. Fire dampers - arrangement Type B listed and bear label of ULC, meet requirements of Provincial Fire Authority and ANSINPFA 90A. Fire damper assemblies to be fire with construction as recommended by CAN/CSA-512: Canadian Air, Fire, Ball, Nailer, Int., Farr, Advanced Air Balance.</p> <p>9. Return and Exhaust (Grilles And Registers):</p> <ol style="list-style-type: none"> Type C: Aluminum surface mounted type, Finish baked white enamel. Throat velocity not to exceed 500 FPM. Model True 505-1-25, cw combination balancing damper/stop top flaps. <table border="1"> <thead> <tr> <th>Size:</th> <th>Up to 70 CFM</th> <th>8" dia</th> </tr> </thead> <tbody> <tr> <td>70 to 100 CFM</td> <td>8" dia <td>8" x 6"</td> </td></tr> <tr> <td>100 to 150 CFM</td> <td>10" dia <td>10" x 6"</td> </td></tr> <tr> <td>150 to 200 CFM</td> <td>10" dia <td>10" x 10"</td> </td></tr> </tbody> </table> 	DUCT SIZE (inches)	ANGLE SIZE (inches)	ROD SIZE (inches)	up to 30"	1 1/2x3/16	1/4	up to 42"	1 1/2x1/2x3/16"	1/4	43 to 60"	1 1/2x1 1/2x3/16"	3/8	61 to 84"	2x2x3/16"	3/8	85 to 96"	2x2x1/4"	3/8	97 & over	2x2x1/4"	3/8	Size:	Up to 70 CFM	8" dia	70 to 100 CFM	8" dia <td>8" x 6"</td>	8" x 6"	100 to 150 CFM	10" dia <td>10" x 6"</td>	10" x 6"	150 to 200 CFM	10" dia <td>10" x 10"</td>	10" x 10"	<p>14. Connections to Equipment:</p> <ol style="list-style-type: none"> In accordance with manufacturer's instructions unless otherwise indicated. Use valves and either unions or flanges for isolation and ease of maintenance and assembly. Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement. <p>15. Clearances:</p> <ol style="list-style-type: none"> Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer. Provide space for disassembly, removal of equipment and components as recommended by manufacturer or as indicated (whichever is greater) without interrupting operation of other system, equipment, components. <p>16. Drains:</p> <ol style="list-style-type: none"> Install piping with grade in direction of flow except as indicated or specified otherwise. Install drain valve at low points in piping systems, at equipment and at section isolating valves. Pipe each drain valve discharge separately to above floor drain. Discharge to be visible. Drain valves: NPS 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain. <p>17. Air Vents:</p> <ol style="list-style-type: none"> Install manual air vents at high points in piping systems. Install isolating valve at each automatic air valve. Install drain piping to approve location and terminate where discharge is visible. <p>18. Dielectric Couplings:</p> <ol style="list-style-type: none"> General: Compatible with system, to suit pressure rating of system. Locations: Where dissimilar metals are joined. NPS 2 and under: isolating unions or bronze valves. Over NPS 2: isolating flanges. <p>19. Pipework Installation:</p> <ol style="list-style-type: none"> Soldered fittings to be jointed with Teflon tape. Protect openings against entry of foreign material. Install so that equipment can be isolated and removed without interruption to operation of any other equipment or systems. Assemble piping using fittings manufactured to ANSI standards. Sealable pipe branch fittings may be used on mains if branch line is no larger than half the size of the main. Hole saw (or drill) and ream main so as to maintain full inside diameter of branch line prior to welding saddle. Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines. Install concealed pipework so as to minimize furring space, maximize headroom, conserve space. Except where indicated otherwise, slope piping in direction of flow for positive drainage and venting. Except where indicated, install so as to permit separate thermal insulation of each pipe. Group piping wherever possible and as indicated. Ream pipes, remove scale and other foreign material before assembly. Use acoustic reducers at pipe size changes to ensure positive drainage and venting. Provide for thermal expansion as indicated and specified. Install in accessible locations. <ol style="list-style-type: none"> Install with stems above the horizontal position unless otherwise indicated. Valves to be accessible for maintenance without removing adjacent piping. Install globe valves in bypass around control valves. Use gates as branch take-offs for isolation purposes except where otherwise specified. <p>20. Check Valves:</p> <ol style="list-style-type: none"> Install silent check valves on discharge of pumps and in vertical pipes with downward flow and elsewhere as indicated. Install swing check valves in horizontal lines on discharge of pumps and elsewhere as indicated. <p>21. Stewies:</p> <ol style="list-style-type: none"> General - install where pipes pass through masonry, concrete structures, fire rated assemblies, and elsewhere as indicated. Material: Schedule 40 black steel pipe. Construction - foundation walls and where stems extend above finished floors - to have annular fire stems continuously welded on at mid-point. Sizes - #6MM minimum clearance all around between sleeve and un-insulated pipe or between sleeve and insulation. Installation: <ol style="list-style-type: none"> Concrete, Masonry walls, Concrete floor on grade: terminate flush with finished surface. Other floors - terminate 25MM above finished floor. Before installation, joint exposed exterior surfaces with heavy application of zinc-rich paint CAN/CSSB-181. <p>22. Sealing:</p> <ol style="list-style-type: none"> Foundation walls and below grade floors: Fire resistant, waterproof non-hardening mastic. Elsewhere: Provide sealant between piping and masonry, maintain fire rating integrity. Sleeves installed for future use: fill with fire plaster or other easily removable filler. Ensure no contact between copper pipe or tube and sleeve. <p>23. Firestopping</p> <ol style="list-style-type: none"> Material and installation with annular space between pipes, ducts, insulation and adjacent fire separation, including floor drains and shower drains. Uninsulated unheated pipes not subject to movement: no special preparation. Uninsulated heated pipes subject to movement: wrap with non-combustible smooth material to permit pipe movement without damaging firestopping material or installation. Insulated pipes and ducts: Ensure integrity of insulation and vapor retardation. <p>3.1 Pipe Supports</p> <ol style="list-style-type: none"> Install to manufacturer's recommendations. <p>3.6 Valves</p> <ol style="list-style-type: none"> Install isolating valves at branch take-offs, at pieces of equipment and elsewhere as indicated. Install in accordance with manufacturer's recommendations. Install silent check valves on pump discharge and in vertical pipes with upward flow and elsewhere as indicated. Install in accessible locations. Depending upon piping configuration and ease of operation, on horizontal pipes install with stem horizontal or above. Valves to be accessible for maintenance without removing adjacent piping. <p>3.7 Strainers</p> <ol style="list-style-type: none"> Install in locations to allow easy access for removal of screen. <p>3.8 Hanger Spacing and Installation</p> <ol style="list-style-type: none"> Spacing and middle attachment (rod) diameter as specified in paragraphs below or as in table below, whichever is more stringent. Plumbing piping: most stringent requirements of Canadian Plumbing Code, Provincial Code, or authority having jurisdiction. Copper piping: up to NPS 1/2, every 6 ft. Within 12 in. of each horizontal elbow. <table border="1"> <thead> <tr> <th>Pipe Size: NPS</th> <th>Rod Diameter</th> <th>Maximum Spacing</th> <th>Maximum Spacing</th> </tr> </thead> <tbody> <tr> <td>up to 1-1/4"</td> <td>3/8 in</td> <td>7'</td> <td>6'</td> </tr> <tr> <td>1-1/2"</td> <td>3/8 in</td> <td>7'</td> <td>6'</td> </tr> <tr> <td>2"</td> <td>3/8 in</td> <td>10'</td> <td>9'</td> </tr> </tbody> </table> <p>3.9 HVAC Water Treatment</p> <ol style="list-style-type: none"> Cleaning of System <ol style="list-style-type: none"> Thoroughly flush heating & glycol system piping with approved cleaning chemicals designed to remove deposition from construction such as pipe dope, oils, mill scale and other extraneous materials. Chemicals to inhibit corrosion of various system materials and be safe to handle and use. During circulation of cleaning solution, periodically examine and clean filters and screens and monitor changes in pressure drop across equipment. Drain and flush systems until alkalinity of fresh water is equal to make-up water, refill with clean water treated to prevent scale and corrosion during system operation. Provide a complete report on the cleaning, installation of inhibitors and analysis of each test sample. 	Pipe Size: NPS	Rod Diameter	Maximum Spacing	Maximum Spacing	up to 1-1/4"	3/8 in	7'	6'	1-1/2"	3/8 in	7'	6'	2"	3/8 in	10'	9'	<p>3.1 Preparation</p> <ol style="list-style-type: none"> Lay out work in accordance with lines and grades as indicated. Verify lines, levels, dimensions as indicated against benchmarks. Report discrepancies to Engineer and obtain written instruction. When required by Engineer, provide drawings showing relative locations of various services. <p>3.2 Welding</p> <ol style="list-style-type: none"> Welding to be in accordance with ANSISMAE B31.1M. Welding to be executed by certified pipe welders. Pipe fitting to be executed by certified pipe fitters. <p>3.3 Installation - Hydronic</p> <ol style="list-style-type: none"> Installation to be performed by certified fitters. <p>3.2 Clearances:</p> <ol style="list-style-type: none"> Maintain clearance around systems, equipment, components and between pipes and structures for O&M as indicated, as directed & to manufacturer's recommendations, for greater of: <ol style="list-style-type: none"> Clearance of operation, inspection, servicing, maintenance. Disassembly, removal of equipment and components without interrupting operation of other system, equipment, components. Except where indicated, install to permit separate thermal insulation of pipes. <p>3. Provide dirt pockets as specified.</p> <p>4. Hangers: use suitable graphite lubricant on bolts and nuts.</p> <p>5. Drain Valves:</p> <ol style="list-style-type: none"> Install at low points in piping systems, at equipment, as section isolating valves and elsewhere as required. Pipe drain valves discharge separately to above floor drain, discharge to be visible. Weld couplings for drains into piping to ANSISMAE B31.1M. <p>6. Make provision for sealing piping passing through walls with approved firestopping compatible with surface temperature of pipe or insulation by others.</p> <p>7. Provide for pipe movement.</p> <p>8. Branch take-offs:</p> <ol style="list-style-type: none"> Use welding tee. Where reducing tees of proper size are unavailable, use available tees with reducers. Tees with increases not acceptable to ASHRAE. Weld tees may be used at drip legs only provided ratio of outlet size to pipe size is 0.5 or smaller. <p>9. Cap open ends of piping during installation. Remove foreign material from inside piping.</p> <p>10. Grade normally horizontal piping in direction of flow at 0.4% slope to high point for air removal and to low point for condensate drainage.</p> <p>11. Flanges: Tighten bolts evenly with torque wrench.</p> <p>12. Revisions to location of piping require written approval of Engineer.</p> <p>13. Connections to equipment:</p> <ol style="list-style-type: none"> Use flanged valves for isolation and ease of maintenance and assembly. Use double swing joints and swing joints when equipment mounted on vibration isolation and when piping subject to movement. 	
Fluid Temperature (°F)	1 and under	1-1/4 to 2	2-1/2 to 4	4 & over																																																																																
128-200	1	1	1 1/2	1 1/2																																																																																
185-215	1	1	1	1																																																																																
40-34	1/2	1	1	1																																																																																
Type	Size																																																																																			
A	1/2																																																																																			
B	3/4																																																																																			
C	1																																																																																			
D	1 1/4																																																																																			
DUCT SIZE (inches)	ANGLE SIZE (inches)	ROD SIZE (inches)																																																																																		
up to 30"	1 1/2x3/16	1/4																																																																																		
up to 42"	1 1/2x1/2x3/16"	1/4																																																																																		
43 to 60"	1 1/2x1 1/2x3/16"	3/8																																																																																		
61 to 84"	2x2x3/16"	3/8																																																																																		
85 to 96"	2x2x1/4"	3/8																																																																																		
97 & over	2x2x1/4"	3/8																																																																																		
Size:	Up to 70 CFM	8" dia																																																																																		
70 to 100 CFM	8" dia <td>8" x 6"</td>	8" x 6"																																																																																		
100 to 150 CFM	10" dia <td>10" x 6"</td>	10" x 6"																																																																																		
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**Fortress of Louisbourg
National Historic Site of Canada**

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Site Historique National du Canada**

revisions	date
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APPROVED AS REFLECTING STRUCTURAL DESIGN TEAM DECISIONS

RESTORATION ARCHITECT

PROJECT MANAGER

HEAD OF HISTORICAL RESOURCES

MANAGER, ASSET MANAGEMENT

FIELD UNIT SUPERINTENDENT

A	B	C
A	B	C

date: MAR 2015 scale/échelle: 1/4" = 1'-0"

designed by/conçu par: V.J. BELLIVEAU

drawn by/dessiné par: M. MORELL

project title / titre du projet: REPURPOSING OF SANTIERS-VALLEE MAGASIN HOUSES

drawing title / titre du dessin: MECHANICAL

SPECIFICATIONS SHEET No.1

reference no. n° de référence	dwg. no. dessin n°
-	731