PART 1 - GENERAL

1.1 Reference Standards

.1 Perform the work in accordance with Ontario Building Code and local authorities having jurisdiction.

1.2 Shop Drawings

.1 Submit shop drawings in accordance with Division 1.

1.3 Maintenance Data

.1 Provide maintenance data for incorporation into manual in accordance with Division 1.

1.4 Fixtures and Fittings

.1 In case of discrepancy between architectural and mechanical drawings as to number and location of fixtures, the architectural drawings shall govern.

.2 Fixtures, closet seats, and fittings, pipes and pipe fittings must bear CSA mark of approval, and be new and free of imperfections.

1.5 Site Services Connections

.1 Sanitary, storm and water connections, shall commence at a point one meter outside the foundation wall.

.2 Coordinate with the site services contractor to ensure correct elevations and locations.

PART 2 - PRODUCTS

2.1 Soil, Storm, Waste and Vent Pipe and Fittings

.1 Piping:

.1 Below Grade:

Sanitary drainage, Storm drainage, and Vent lines inside building: Cast Iron or PVC. Drainage piping from urinals up to the connection to a sanitary main serving other plumbing fixtures shall be PVC.

.2 Above Grade:
Shall be DWV copper or cast iron, unless otherwise noted.

Drainage piping from urinals up to the connection to a sanitary main serving other plumbing fixtures shall be PVC with solvent weld joints.

Condensate drainage piping from high efficiency condensing heating water boilers, condensing domestic hot water heaters, and condensing gas fired rooftop units, shall be CPVC with solvent welded joints from the unit to the condensate neutralization tank. Condensate piping on the discharge of the condensate neutralization tank shall be CPVC up to the floor or hub drain where installed in service spaces (mechanical rooms,…), and copper with solder joints when routed through the ceiling space.

ABS piping is not permitted above grade in any application.

.2 Fittings:
- .1 Fittings for buried cast iron pipe: cast iron.
- .2 Fittings for above ground cast iron: cast iron, to CSA B70-M1978, and with factory applied corrosion resistant coating inside and out approved by Engineer.
- .3 Fittings for copper drainage tube: recessed solder joints, drainage pattern fittings of wrought copper or cast brass, with 50-50 solder (lead - tin alloy).

.3 Joints:
- .1 Cast iron hub and spigot pipe joints: packed with oakum and tightly caulked with cast lead to CSA B67-1972.
- .2 Cast iron MJ pipe joints: neoprene rubber gasket with stainless steel cover and rings, equal to Fernco.
- .3 DWV copper pipe joints: solder joint.
- .4 Threaded pipe joints: make with teflon tape or pulverized lead paste. Apply to male threads only.
- .5 Copper to cast iron joints: male brass adaptors to tapped fitting or caulk ferrule to hub fitting, or MJ pipe joint.

.4 Fire Stopping: Submit shop drawings of fire stopping system proposal prior to construction. Refer to Section 20 00 10 for details.

2.2 Domestic Water Pipe, Valves and Fittings

.1 Piping:

.1 Above ground: NPS 3/4 and under use copper tube type M, NPS 1 through NPS 4 use copper tube type L, over NPS 4 use ductile iron Class 52 to AWWA C-151 with standard thickness cement lining to AWWA C-104.

.2 Buried Service: Type K to NPS 2, Over NPS 2 ductile iron Class 52 to AWWA C-151 with standard thickness cement lining.

.2 Fittings:

.1 Fittings for copper tube: wrought copper and bronze to ANSI B16.22-1980 or cast bronze to ANSI B16.18-1984.

.2 Fittings for ductile iron: mechanical joint ductile iron to ANSI A21.10-1982.

.3 T-drill branch connections for type 'L' copper tube with Silfos 5 joints are acceptable.

.3 Joints:

.1 Copper Tube: 95:5 tin antimony solder up to NPS 2-1/2, 5% silver solder type Silfoss 5 above NPS 2-1/2.

.2 Ductile Iron: rubber gasket to ANSI A21-11-1980, bolts to ASTM A307-83a heavy series.

2.3 Wall/Floor Penetrations

.1 All pipes penetrating below grades, wall or floor slabs shall use Link-Seal modular seals.

.2 Provide a Schedule 40 steel sleeve with welded puddle flange cast in the wall or floor, sized to suit the pipe penetration and install appropriate Link-Seal modular seal between the pipe and sleeve.

2.4 Valves - General

.1 All valves shall be industrial quality, manufactured to the specifications indicated. Wherever possible, valves shall be by one manufacturer.

.2 Shutoff valves up to NPS 2 for uninsulated systems only may be either ball valves or gate valves unless shown otherwise.

.3 Shut off valves over NPS 2 for uninsulated systems only, may be butterfly valves or gate valves, unless shown otherwise.

.4 Shut off valves on insulated systems must be gate valves for all sizes.

2.5 Gate Valves

.1 NPS 2 and under shall be soldered ends bronze body, union bonnet solid wedge disc, rising stem, Class 125, 860 kPa to MSS-SP-80. Acceptable Materials: Jenkins 813J, Crane 1334, Toyo 299, Nibco S-134, Kitz #44, Milwaukee 1169, Hattersley 608.

.2 Over NPS 2 shall be cast iron body, OS&Y rising stem, bronze trim, Class 125, 860 kPa FF flanges, to MSS-SP-70. Acceptable Materials: Jenkins 454J, Crane 465-1/2, Toyo 421JA, Nibco F-617-0, Kitz #72, Milwaukee F2885M, Hattersley T504.

2.6 Ball Valves

.1 For use up to NPS 2 shall be 2 piece rated 600 WOG of bronze body, soldered ends, TFE seat, plated bronze ball and shaft. Acceptable Materials: Watts B6001, Toyo 5049A, Nibco T-585-70, Crane F9222, Jenkins 202J, Kitz #59, Milwaukee BA150, Hattersley 1979, MAS-B-4, Apollo 70-200.

2.7 Check Valves

.1 NPS 2 and under shall be soldered ends bronze body Y pattern, Class 125, 860 kPa, screw in cap, swing disc to MSS-SP-80. Acceptable Materials: Crane 37, Jenkins 4092, Toyo 237, Kitz #23, Milwaukee 1509, 1509T, Hattersley 48.

.2 Over NPS 2 shall be of the wafer design 200 WOG with twin flappers, cast iron body for clamping between flanges. Flappers to be Type 304 stainless steel with stainless spring, and EPDM resilient seat to ASTM B62-82a. Acceptable Materials: Proquip, Duo-Check 2 (Mission), Gulf, Top Flow (Watts), Mueller.

2.8 Hydrants

.1 Shall be encased non freeze single outlet wall hydrants, 20 mm connection, complete with vacuum breaker, and polished nickel bronze box. Provide one extra key.

.2 Install 1.0 m above finished grade unless otherwise noted and with inside shut-off valve.

.3 Acceptable Material: Watts HY-725, or equal by Zurn, Ancon, or Smith.

2.9 Water Hammer Arrestors (Shock Absorbers)

.1 Provide arrestors to Plumbing and Drainage Institute Standard PDI-WH 201 on branch supplies to each fixture or group of fixtures. Size of arrestors to PDI-WH 201.

.2 Acceptable Material: Watts SG series, Zurn Z1500, Ancon S6 Series, Smith 5000 Series.

.3 Where approved by the Engineer a fabricated air chamber, 450 mm long of one size larger than the pipe to which it connects may be used as an acceptable alternate to the above.

2.10 Back Flow Preventer

.1 Protect entire water distribution system against contamination due to backflow from non-potable sources in accordance with CSA B64. Provide on all incoming domestic water services to new and existing buildings. Backflow preventers on domestic water service to be low pressure drop double check valve type with isolation valves on inlet and outlet with top mounted ball valve test cocks, equal to Watts 757. Backflow preventers to be ULC or CSA approved, AWWA approved and suitable for potable water installations.

.2 Provide backflow preventers on all vending machine water supply lines to protect water supply system. Backflow preventers to lines serving vending machines to be low pressure drop double check valve type with isolation valves on inlet and outlet with top mounted ball valve test cocks. Backflow preventers to be ULC or CSA approved, AWWA approved and suitable for potable water installations.

.3 Provide backflow preventers on all supply mains to irrigation systems. Backflow preventers on services to irrigation systems to be low pressure drop double check valve reduced pressure type with isolation valves on inlet and outlet with top mounted ball valve test cocks. Backflow preventers to be ULC or CSA approved.

.4 Acceptable Material: Watts, Clayval, Hersey, Conbraco.

2.11 Hose Bibbs

.1 Bronze construction complete with integral back-flow preventer, hose threaded spout, replaceable composition disk chrome plated in finished areas. Acceptable Materials: Crane C-5046, Emco 3741, Waltec 27W833.

2.12 Pressure Reducing Cold Water Assembly

.1 Provide pressure reducing valve complete with integral strainer and gate valve and union where shown. Valve shall have built in thermal bypass feature. Install pressure gauges each side of all pressure reducing valves. Acceptable Material: Watts U5B, Honeywell.

2.13 Vacuum Relief

.1 Install at each domestic hot water tank a 12 mm vacuum relief valve, equal to Watts No.36A.

2.14 Water Meters

.1 Install water meter furnished by municipal utility, in accordance with their requirements. Provide galvanized steel wiring conduit to remote readout as required to satisfy municipal requirements.

.2 Provide 150 mm diameter pressure gauge 0-1100 kPa scale to CGSB 91-GP-1, Type A, Grade A, on downstream side of meter.

2.15 Trap Seal Primers

.1 Provide trap primers in areas according to plumbing Code and where noted on drawings.

.2 Provide priming device piped to nearest suitable water closet or water supply pipe, so that device will introduce regulated amount of water into trap whenever fixture is used. Flush valve water closet water supply pipe, or other suitable varying pressure water supply pipe, shall be fitted with a trap seal primer connected to each drain (one per drain), equal to Watts LFTP 300. For flush tank water closets, the trap seal primer shall be equal to Watts series MS810. Trap seal primers shall be with integral vacuum breaker.

.3 Where suitable plumbing fixtures are not available to operate the trap seal priming device, provide a time clock and electric 2-way valve to prime traps twice a day. Time clock shall be a Tork D100 digital seven day time control, 120V input and output. Electric 2-way valve shall be Honeywell V4043A, normally closed, two-way, 20 mm valve with 120V power head. Provide 120V power supply from local branch panel as required, or low voltage wiring if applicable, to make system operational as per electrical specification installation requirements. Install in a location as directed by the Engineer.

2.16 Air Vents

.1 Provide automatic float type air vents rated minimum 1033 kPa, at high points i.e. in penthouse and where indicated. Pipe to drain.

.2 Install on the top of a full line size Tee fitting.

.3 Acceptable Material: Maid-O-Mist No.7, Watts FV4 for up to NPS 3 pipe, Spirax Sarco No. 13W for NPS 4 and over.

2.17 Strainers

.1 860 kPa gauge pressure or system pressure whichever is greater with 20 mesh removable bronze screen, Y type.

.2 NPS 2 and under, screwed with brass cap. Acceptable Material: Sarco BT, Armstrong F4SC, Crane 988-1/2, Watts 777S, Toyo 380, Kitz #15, Combraco 59 series, Mueller.

.3 NPS 2-1/2 and over, cast iron, flanged with bolted or clamped cap, NPS 1 minimum size blow down valve to NPS 6, NPS 2 minimum size blow down valve on NPS 8 size and above. Acceptable Material: Sarco BF-150, Armstrong F4FL, Crane 989-1/2, Watts 77F, Toyo 381, Kitz #80, Combraco RPC 528B12, Mueller.

.4 Provide where shown on drawings.

2.18 Deep Seal Trap

.1 Cast iron body deep seal traps, threaded, hub, or spigot on inlet and/or outlet, with minimum seal equal to 127 mm. Provide where shown on drawing.

2.19 Cleanouts

.1 Provide at all traps, base of all soil and waste stacks, and rainwater leaders and at such points shown or required installed by codes. Unless serviceable from below floor bring cleanouts up to finished floor or wall. So far as possible provide access from walls rather than floors.

.2 Type: heavy cast iron male ferrule with brass screws and straight threaded bronze tapered plug. Sealing-caulked lead seat.

.3 Size: NPS 4 and under - line size. NPS 5 and over - 100 mm.

.4 Access covers or plates:

.1 Concealed or buried work. Acceptable Material: Zurn Z-1440 Series, Ancon CO-200 Series, Smith 4400.

.2 Wall Access: face or wall type, polished nickel bronze square cover with flush head securing screws, bevelled edge frame complete with anchoring lugs. Acceptable Materials: Zurn Z-1460, Ancon CO-480S, Enpoco, Smith 4730.

.3 Floor access: square cast box with anchor lugs and:

.1 For concrete floors cast brass with hinged scoriated cover with locking screw VP. Acceptable Material: Zurn ZANB-1460-12, Wade, Ancon CO-300-S, Enpoco CO30SQ8, Smith 4940.

.2 For terrazzo finish: polished brass with recessed cover for filling with terrazzo, complete with locking screw VP. Acceptable Materials: Zurn ZN-1511, Ancon CO-300US, Enpoco CO30SQ8TR, Smith 4200.

.3 For tile and linoleum floors: polished brass with recessed cover for linoleum or tile infill, complete with locking screw VP. Acceptable Material: Zurn ZANB-1460-11, Ancon CO-300ST, Enpoco CO306S28, Smith 4930-T.

.4 Urinal cleanouts: shall be of the expandable plug type with round stainless steel cover. Acceptable Material: Ancon CO-440-RD, Zurn, Enpoco, Smith 4420.

2.20 Floor Drains

.1 Mechanical rooms and Service areas:
Epoxy coated cast iron with integral pan with clamping collar, and adjustable head with grate, and oval funnel at equipment locations, 200 mm nominal heavy duty grate. Acceptable Material: Zurn ZN507 (ZN507F), Ancon FD300 (FD100EG), Enpoco FD30 (FD30H), Smith 2120 (Smith 3750).

.2 Washrooms and Shower Areas: Epoxy coated cast iron 180mm floor drain with anchor flange, weepholes, 1/4"(6) thick (specify diameter) adjustable nickel bronze (standard) strainer with surface membrane clamp, threaded 100mm throat.
Acceptable Materials: Watts FD-200-FC or equal

2.21 Roof Drains

.1 For Standard Roof: Cast iron with vandal proof secured cast aluminum or cast iron dome, underdeck clamp, flashing clamp ring with integral gravel stop, adjustable extension and bearing pan, sump receiver flange, Acceptable Material: Watts RD-100, Zurn Z-105-5CEA, Ancon RD-100BEDK, Enpoco RD10DEPW, Smith 1085.

2.22 Hot Water Heaters

.1 Commercial Water Heaters (Gas):

.1 Commercial gas fired domestic water heaters, condensing with 96% efficiency, to CAN 1-4.1-M85 and CAN 1-4.3-M85. Glass lined with 3 years minimum warranty and to comply with ASHRAE 90.1b latest edition. Units shall be supplied with sealed combustion package.

Insulate with 50 mm minimum fibreglass insulation with outer casing of sheet metal with baked enamel finish. Provide all safety controls and adjustable thermostat control with 16 to 60°C range and electronic intermittent spark ignition. Glass lined construction, combination temperature and pressure relief valve, built to withstand a test pressure of 2 MPa, a working pressure of 1000 kPa, valved drain and automatic draft damper if required for ASHRAE 90.1b compliance. Refer to schedule for capacity. Unit shall be supplied with a neutralization tank for the condensate to pass through before being dumped to drain.

Outdoor air intake and vent to outdoors shall be through the rooft, with IPEX system 636 CPVC or equal for operation up to 90 deg. C.

.2 Acceptable Material: Lochinvar Shield, A. O. Smith Cyclone, Bradford White equal.

2.23 Natural Gas System

.1 Provide piping to ASTM A53 Schedule 40 with approved shut-off valves, pressure regulators, reducing valves, isolation cocks, drip dirt pocket connections, hardware and supports.

.2 Connect to fuel handling systems in accordance with pertinent installation code. CAN/CGA B149.1-10 (gas, natural) and governing Provincial regulations under Provincial Energy Acts, using licensed mechanics holding current certificates of competency. Electrical work in accordance to the electrical specifications.

.3 See drawings for gas piping layout, gas loads and meter locations.

.4 Arrange with the Gas Company for this connection and pay fees and apply for permit for this connection.

.5 Pressure downstream of regulator shall be 2 PSI.

.6 Shut-off Valves:

.1 Shut-off valves shall be supplied for all appliances and where shown on drawings, and must be approved CGA.

.2 Except where otherwise shown, gas valves shall be lubricated plug type with cast iron body, 100% pipe area, 150 psi SWP. Provide a single lever for each valve of 75 mm or larger. Acceptable Material:
DeZurik Fig.435, Homestead Fig.601, Rockwell Fig.141, Newman-Milliken 170M/200M.

.3 Shutoff valves for indoor appliances up to 50 mm shall be bronze ball valves rated to CGA 3.16, where approved by the local gas code/authority.
Acceptable Materials:
Crane 9302, Kitz 68, Toyo 5044A, Newman Hattersby.

.7 Pressure Reducing Valves:

.1 Up to 5000 CFH (at 2 psi inlet) shall be a self contained pressure regulator, ULC approved, with built in relief valve. Acceptable Material: Fisher Fig. HSR or CS 800, Rockwell, Gould.

.2 Over 5000 CFH (at 2 psi inlet) shall be pilot operated ULC approved pressure regulator with separate relief valve. Acceptable Materials: Fisher Fig.298TK with Fig. 289 relief valve, Rockwell, Gould.

.3 The relief connection shall be piped to outdoors as required by Code.

.8 Testing:

.1 Test at a minimum of 680 kPa or as required by Gas Company.

.2 Provide a copy of the test chart for insertion into the Operating and Maintenance Manual.

.3 Painting: Paint all gas lines whether exposed or concealed. Colour shall be yellow except where exposed on exterior walls where the colour shall match the wall colour.

2.24 Plumbing Fixtures and Trim

.1 Plumbing fixtures shall be product of one manufacturer.

.2 Materials:

.1 Plumbing fixtures to CSA B45-1981.

.2 Plumbing fittings to CSA B125-1985.

.3 Exposed plumbing brass and metal work shall be heavy triple chromium plated.

2.25 WC-1 Commercial Pressure-Assist Tank Type Water Closets

.1 Vitreous china for 6 litre flush, elongated syphon jet action bowl and lined tank complete with pressure assist operating system, concealed trapway with flange bolts, bolt caps, floor flange and gasket. Bowl height 15 ¼" (381mm) to rim. Chrome plated rigid supplies with angle stop, escutcheon and flexible riser.
Elongated heavy duty solid plastic open front seat less cover with check hinges and chromated steel posts, washers and nuts, for public use, and open front with cover for private use.

.2 Acceptable Manufacturers:
China: American Standard Cadet Pressure-Assisted Elongated #2462.016.020 low consumption toilet, Crane, Eljer, Kohler K-3505 or Toto equivalent
Trim: Integral with the specified china toilet above.

2.26 WC-2 Commercial Pressure-Assist Tank Type Barrier Free Water Closets

.1 Vitreous china 6 litre flush elongated syphon jet action bowl and lined tank complete with pressure assist operating system, concealed trapway and with flange bolts, bolt caps, floor flange and gasket. Bowl height 16" (410mm) to rim. Chrome plated rigid supplies with angle stop, escutcheon and flexible riser. Elongated heavy duty solid plastic open front with cover, check hinges and chromated steel posts, washers and nuts.

.2 Acceptable Manufacturers:
China: American Standard Cadet Pressure Assisted #2467.016.020 low consumption toilet, Eljer, Crane equivalent, Kohler K-3544 or Toto equivalent.
Trim: Integral with the specified china toilet above.

2.27 Flush Valve Urinals(UR-1)

.1 Vitreous china washdown flush action for 0.5 litre to 1.9 litre per flush, integral flush spreader, open trap, removable stainless steel strainer, 3/4" (19 mm) top spud, and outlet, 2" (50 mm) connecting flange with gasket and bolts. Chrome plated quiet action diaphragm or piston type flush valve with vacuum breaker, angle stop, pressure loss check and non-hold open feature.
Wall access cleanout with round stainless steel face and v.p. stainless steel screw. Carrier with steel pipe legs, block base feet supports and bearing plates. Provide fixture carrier and sanitary connection accessories equal to Watts #CA-321 Series suitable to fixture.

.2 Acceptable Manufacturers:
China: Kohler K-4960-ET, Crane, American Standard Washbrook Flowise #6590.001, Eljer, or Toto equivalent.
Trim: Delta Commercial 81T231 or equal

2.28 Laundry Faucet FA-2

.1 Trim shall be fully recessed in plastic box with copper liner. Outlets to be ½" with hose end outlets and 2" hub drain connection.

.2 Acceptable material: Oatey or equal.

2.29 Wall Hung Lavatories(LAV-2)

.1 Vitreous china wall hung, integral contoured back splash lip, supply openings on 100 mm centres, rear overflow, concealed arms, NPS 1-1/4 chrome plated adjustable P-trap, offset style with open grid type strainer, chrome finish polished brass, faucet supplies with commercial duty ¼ turn ball valves (equal to Dahl "mini-ball" valve) angle stop, horizontal extension tubes, combination v.p. loose key handle, escutcheon and flexible copper riser. Supply steel and cast iron wall carrier suitable to fixture and handicapped requirements. For drywall partition installations, carrier shall be supplied with support legs extending down to the floor. Install in accordance to barrier free requirements where fixture is located in a barrier free washroom. Lavatory to be complete with china knee shroud.

.2 Acceptable Materials:
Lavatory: American Standard Murro #0954.000, Crane, Eljer, Kohler K-2035.

.3 Single lever chrome plated faucet shall be cast brass body, ceramic ¼ turn cartridge, 5.7 LPM (1.5 GPM) non-aerating laminar flow outlet, long cast spout, lever handle adjustable volume control, and adjustable hot limit stop.

Acceptable Materials:
Trim: Delta 500, Moen 8425, Kohler K-P15199-F-CP, Chicago Faucets #420-X, Eljer, Crane,

2.30 Lavatory Insulation Kits

.1 Supply and install insulation kits on all barrier free sinks and lavatories. Supply and install insulation on the complete exposed drain, hot water, and cold water, piping under the lavatory.

.2 Insulation kits shall be an integral skin white antibacterial/fungal polyurethane foam product equal to Skal Gard by TCI Products, Prowrap by McGuire, or "Pro-Extreme" by Plumberex.

2.31 Slop Sinks

.1 Shall be 600 x 600 mm moulded stone with 250 mm high walls, with cadmium plated brass drain assembly, dome strainer and lint basket. Trim shall be chrome plated with vacuum breaker, integral stops, adjustable wall brace, pail hook and hose spout. Also supply 30" long hose, and hose holder, mop hanger, and vinyl bumper guard.

.2 Acceptable Materials: Fiat MSB-2424 with Fiat 830AA trim.

2.32 Stainless Steel Sinks

.1 LAV-1: Shall be single compartment ledge back Type 302 stainless steel 20 gauge, self rimming, with clamps, undercoated, size o.d. 520 x 510 x 203 mm (520 x 510 x 127 mm for barrier free dimensions), complete with integral stainless steel basket strainer/stopper, tail piece and all brass chrome plated single lever washerless faucet with swing spout and aerator.

Acceptable Materials:
Sink: Franke ALBS 6808-1/1 (ALBS 6805-1/1 for barrier free model), Novanni Commercial, Moen equal

Two handle top-mount faucet shall feature cast brass construction with all brass coupling nuts. Shall feature brass, field-convertible rigid/swivel spout with 5" reach. Shall also feature 1/4 turn wrist blade handles with washerless ceramic disc valve cartridges.

Trim: American Standard “Monterrey” 6405.170 or equal.

.2 KS-1: Shall be double compartment ledge back, Type 302 stainless steel 20 gauge, self rimming with clamps, undercoated, size o.d. 794 x 521 x 203 mm (794 x 521 x 127 mm for barrier free dimensions) complete with integral stainless steel basket strainer/stopper, tailpiece, and all brass chrome plated single lever washerless faucet with swing spout and aerator.

Acceptable Materials:
Sink: Franke ALBD 6408-1/1 (ALBD 6405-1 for barrier free model), Novanni Commercial, Moen equal.
Trim: American Standard “Reliant” 4205.001.F15, Chigago Faucet Marathon #2300-CP single lever faucet, Moen, Delta equal.

2.33 Laundry Tub (LT-1)

.1 Stain resisting, porcelain on steel, single compartment, laundry tub with baked enamel steel stand with front apron, waste plugs with rubber stopper, 38 mm o.d. tailpiece and P-trap.
Acceptable Material: Crane 6-296 Stratford, Fiat, American Standard, Kohler, Eljer equivalent.

.2 Trim: Rough brass supply fitting with mounting bracket. Hose end swinging spout at least 125 mm long, 13 mm IPS male and solder joint inlets, indexed metal handles. Acceptable Material: Crane C5040 Citadel, Emco 4093 complete with 4095, Waltec 29W813

2.34 Drinking Fountains

.1 Drinking fountain shall be two-level wall mounted drinking fountain constructed of #18 gauge, type 304, stainless steel polished to a lustrous satin finish. Contoured basin minimizes splashing and has exclusive Flexi-Guard® safety bubbler to prevent accidental mouth injuries. Fully functional push-buttons are to be vandal-resistant. Unit to be complete with Vandal-resistant bottom cover plates. The drinking fountain is to comply with barrier free requirements and is to be lead free.

.2 Acceptable Material: Elkay EDFP217C or equivalent.

2.35 Domestic Water Recirculating Pump

.1 Shall be hermetic non-ferrous glandless construction suitable for 100 deg.C operating temperature, 850 kPa pressure. Connections shall be 3/4 NPT.

.2 Capacity: 0.6 L/sec at 4.32 m head.

.3 Acceptable Materials: Armstrong Astro, Taco 008B, Bell & Gossett CR-15B.

2.36 Gas Fired Humidifiers

.1 Provide self-contained, microprocessor controlled, gas-fired evaporative humidifier. Unit shall be CSA, CGA approved and ULC listed.

.2 Evaporation chamber, cover, and fittings shall be fabricated of welded stainless steel. Cover shall be secured with easily removable threaded knobs, with continuous channel sealing gasket to ensure leak free operation.

.3 Heat exchanger shall be fabricated of stainless steel with welded joints to allow continuous shedding of scale.

.4 An electronic water level control system shall provide for automatic refill, low water cut-off, and skimmer bleed-off functions.

.5 The factory mounted control cabinet shall be ULC listed, CSA approved JIC enclosure. Control devices shall be mounted on a sub-panel within the enclosure. All interconnecting wiring between the control panel and humidifier shall be completed at the factory s\for single point power connection.

.6 Control shall be fully modulating over 0% to 100% of maximum capacity, using 4 - 40mA signal from the BAS. Supply and install a diaphragm operated air flow proving switch to prevent unit operation unless air flow is established and duct high limit control to protect against saturation of air stream.

.7 Modulating continuous control package with duct mounting sensors to control output to match VAV system requirements.

.8 A factory mounted digital display module shall enable viewing of the following:

.1 Actual room/Duct RH
.2 Humidistat setpoint RH
.3 Supply duct RH
.4 High limit setpoint RH
.5 Total demand %
.6 Total system output lbs/hr
.7 Fill and drain operations
.8 High limit and air flow proving circuit conditions

The user shall be able to reset or adjust the following from the keypad:

.1 Humidistat RH setpoint
.2 Humidistat RH high limit setpoint
.3 Auto/drain flush frequency interval
.4 Auto drain duration
.5 Auto flush duration

.6 PI loop

.9 Unit shall be complete with Dristeem “Drane - Kooler” constructed of stainless steel with all joints welded. The unit shall be capable of being mounted from the wall, floor, or suspension mount. The unit shall be space efficient with horizontal orientation side drain outlet capability. The temperature actuated valve on the cold water inlet shall be non-electric and the sensor on the outlet shall provide for tempered water temperatures leaving the cooler at 140°F or less. Cooler connections shall be 1"φ for the hot water (i.e. from the humidifier), 2"φ for the tempered water (i.e. leaving water), and 3/8" φ cold water supply (i.e. domestic cold water supply).

.10 Unit to be suitable for sealed combustible. Product to be provided factory certified venting system to suit site installation.

.11 Capacity shall be as indicated on drawings.

.12 Humidifier dispersion shall be located in Air Handling Unit as provided by this manufacturer. Coordinate dimensions and absorption distances with air handling unit manufacturer.

.13 Acceptable Materials: Dristeem GTS Series, Nortec or as approved by the Engineer in accordance with the General Instructions.

2.37 Water & Gas Safety Valve

.1 Water and gas safety valve (WAGS) shall be designed to shut off the water supply (plus gas supply for gas fired heaters) in the event of a water leak from a domestic hot water heater. The valve shall be fully mechanical and require no external power supply. The valve shall be located in a drain pan under the water heater and activate when leaking water accumulates in the drain pan. Once activated, the valve shall shut off the water and gas supply. The valve assembly can either be a single use device or multiple use device.

.2 The complete package shall include the WAGS valve, drain pan (manufactured pan, or custom made stainless steel with 3” lip), wire harness, gas valve adapter, self adhering mounting pad, and wire tile. Provide installation instructions, warranty card and product stickers.

.3 The valve ratings shall be 100 deg. F and a pressure of 125 psi.

.4 Acceptable materials: Taco “wags”

2.38 Shower (SH-1) .1 Shower stall shall be high gloss acrylic figreglass reinforced backing with full textured bottom pattern, soap ledge, full wood bottom supports and stainless drain with strainer. Shower stall to American Standard Colony **34” wide x36” deep** x 87” high. Trim shall be an institutional pressure balancing mixing valve, all bronze and stainless steel internal parts, integral volume control, maximum temperature limit stop, service stops, escutcheon plate, single control metal lever handle. Shower head to be adjustable spray arm and flange. Unit to be all copper alloy with polished chrome finish. Mount to wall using anchor plate and back plate. Unit to contain integral 1.5 USGPM flow control.

Acceptable Trim: Symmoms Temptrol Model S-96-1-X-L-4-141-1.5, or equivalent unit from Powers

PART 3 - EXECUTION

3.1 Fixture Installation .1 Connect fixtures complete with supplies and drains separately trapped, supported level and square. Each fixture must have shutoff valves. Hot water faucets shall be on left. Mixing faucets opposite action and thermostatic controlled mixing valves to have check valves on supplies. Fixtures on outside walls to have supplies from floor; other fixtures to be served from wall.

.2 Provide chrome plated rigid supplies to fixtures with stops, reducers and escutcheon plates.

.3 All wall mounted water closets, urinals, lavatories, and any other wall mounted plumbing fixtures shall be supplied with a fixture carrier suitable for the selected plumbing fixture, wall construction, and available pipe chase. The plumbing fixture carrier shall be suspended independently of the wall structure, secured to the floor. Set fixtures level and square. Mount water closets so that a 230 kg mass at the end of the fixture will not loosen or distort mounting, damage the piping, or damage the wall finishes, and similarly a 90 kg mass will not impact other types of wall mounted fixtures.

.4 Fixtures mounted on glazed tile surfaces shall have ground faces to finished surface.

.5 Where future fixtures are shown to be "roughed in" on drawings, plug or cap outlet branches for same, gas tight and water tight. Cap openings in walls with stainless steel cover plates, secured with knock-off head screws.

.6 Mounting heights for wall hung fixtures and showers from finished floor:

.1 Standard: to comply with manufacturer's roughing in details unless otherwise indicated or specified.

.2 Physically handicapped: to comply with NBCC and OBC.

.3 Install drinking fountains in accordance with ARI 1020-84.

.7 The fire protection contractor shall be responsible to coordinate the location and quantity of floor drains within the water entry room and sprinkler rooms with the plumbing contractor to accommodate their installation requirements. The plumbing contractor shall be responsible to supply and install all required drains and connect to a suitable sanitary drain service, even if not specifically indicated on the drawings. Drains within the water entry room and sprinkler rooms shall be a minimum of 100 mm diameter, unless indicated otherwise.

.8 The plumbing contractor shall retain the services of an appropriate trade to supply and install the low voltage wiring for automatic plumbing fixtures between the transformers and the plumbing fixtures, as well as provide the 120V connection between the junction boxes (boxes provided by the electrical contractor) and the transformers. Coordinate location of transformers with the electrical contractor. All electrical installation shall be performed as per the electrical code and electrical specification.

3.2 Piping Installation

.1 General:

.1 Install straight, parallel and close to walls and ceilings with specified pitch. Use standard fittings for direct changes.

.2 Install groups of piping parallel to each other; spaced to permit application of insulation, identification, and service access, on trapeze hangers.

.3 Where pipe sizes differ from connection sizes of equipment, install reducing fittings close to equipment. Reducing bushings are not permitted.

.4 Brass and copper pipe and tubing shall be free from surface damage. Replace damaged pipe or tubing.

.5 Ream ends of pipes and tubes before installation.

.6 Lay copper tubing so that it is not in contact with dissimilar metal and will not be kinked or collapsed.

.7 Use non-corrosive lubricant or teflon tape applied to male thread.

.8 Grooved pipe ends: cut square, seating surface clean and free from indent and score marks.

.9 Install swing or swivel joints to connect risers from one floor outlet to next.

.10 Install flanges or unions to permit removal of equipment without disturbing piping systems.

.11 Clean ends of pipes or tubing and recesses of fittings to be brazed or soldered. Assemble joints without binding.

.2 Equipment drainage:

.1 Install drain valves at low points in accessible location.

.2 Extend equipment drain piping to discharge into floor or hub drain.

.3 Install drain piping from drain pan of air handling units, full size of outlet connection with trap seal equal to fan total pressure, unless otherwise instructed by Engineer.

.3 Expansion and Contraction:

.1 Install expansion joints and compensators, flexible connections, pipe loops and off-sets as indicated.

.2 Support piping to prevent any stress or strain.

.3 Install guides for expansion joints, to manufacturer's instructions, otherwise, for minimum 3 m on each side of expansion joint for sizes 85 mm nominal, minimum 4.8 m on each side for larger pipe sizes.

.4 Sanitary and Storm Drainage:

.1 Run piping to main sewers with uniform grade. Trap and vent fixtures as required.

.2 Where inverts are not given, pipes shall have uniform grade of 1:100 for pipe sizes of NPS 4 or larger, 1:50 for smaller sizes.

.3 Plug or cap pipe and fittings to keep out debris during construction.

.4 Jointing of pipe: compatible with type of pipe used.

.5 Install thrust restraining tie rods on elbow fittings on storm piping as described in Part 2.

.5 Interior Buried Piping:

.1 Lay pipe on 150 mm bed of clean sand, shaped to accommodate hubs and fittings to line and grade as indicated. Backfill with clean sand. Clean sand shall be course sand, free from clay, snow or ice, organic matter or stones. Excavation, backfill and compaction to be provided by this contractor.

.2 Do not lay pipe in water or when in opinion of Engineer conditions are unsuitable.

.3 Run buried drains minimum 200 mm clear below bottom of concrete slab.

.6 Water Piping:

.1 Run water piping from service connection to fixtures, equipment, outlets.

.2 Connect pressure gauge graduated from 0 to a gauge pressure of 1100 kPa on water service main on building side of water meter. Install gauge cock between service main and gauge.

.3 Provide washroom groups and branch take-offs from mains with isolating gate valves. Install stop valve in each fixture supply.

.4 Where two or more branch recirculating hot water lines are connected to main recirculating line, provide lockshield globe valve and check valve in each branch line for balancing water flow and for prevention of back flow in one branch.
Adjust balancing valves to provide recirculation through each circuit. Turn over lock-shield valve key to Engineer after balancing at interim take-over.

.5 Provide hose bibb or sediment faucet for complete system drainage.

.6 Flushing and cleaning procedure for piping systems:

.1 Flush and clean out after pressure tests.

.2 Fill with solution of water and non-foaming phosphate-free detergent.

.3 Flush and drain. Clean strainers.

.4 Refill water system with clean water.

.7 Disinfection: disinfect potable water system to requirements of authority having jurisdiction. Provide necessary chemicals and flushing required.

.7 Vent piping shall be sized and installed in accordance with the Ontario Building Code.

3.3 Cleanouts

.1 In addition to those required by code, install at base of all soil and waste stacks, and rainwater leaders where indicated.

.2 Bring cleanouts to wall or finished floor unless serviceable from below floor.

.3 Building drain cleanout and stack base cleanouts: line size to maximum NPS 4.

3.4 Non-Freeze Wall Hydrants

.1 Install 600 mm above finished grade unless otherwise indicated.

3.5 Back Flow Preventers

.1 Install in accordance with CSA B64.10-M1981, where indicated and elsewhere as required by code.

.2 Pipe discharge to over nearest drain or to service sink.

3.6 Backwater Valves

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

3.7 Hot Water Heaters

.1 Install in accordance with manufacturer's recommendations.

.2 Provide structural steel for heater tank mounting.

.3 Provide insulation between tank and supports.

.4 Pipe relief valve to nearest floor drain.

.5 Provide stainless steel drain pan under the domestic hot water heater. Mount water and gas safety valve within the pan and install in accordance with the manufacturers installation instructions.

.6 Install condensate neutralization tank and pipe condensate from the hot water tank to the neutralization tank, and then the neutralization tank to the floor drain. All piping to be CPVC.

3.8 Testing

.1 Test piping in accordance with procedures outlined in Section 20 00 10, and as specified.

.2 Testing: ensure that insulated piping and equipment installed in concealed spaces is tested and inspected prior to permanent concealment. Give forty-eight (48) hour notice to Engineer in writing.

3.9 Commissioning

.1 Equipment: make tests to demonstrate capabilities and general operating characteristics of equipment, as instructed by Engineer. Modify equipment as required to achieve design performance of equipment and systems.

3.10 Cleanup

.1 Leave systems operating with work areas clean to satisfaction of Engineer.

3.11 Humidifier Installation

.1 Install in accordance with manufacturers' instructions, provide factory support legs, supply and install all steam and condensate lines between the humidifier and distributor, insulate steam supply lines with 40 mm thick fibreglass insulation (Refer to insulation specification). Provide 12 mm cold water supply and 50 mm hub drain for indirect connections.

.2 The drain cooler shall be installed in accordance with the manufacturers installation instructions. Multiple humidifiers connected to one cooler shall not be accepted, rather one cooler per humidifier shall be provided. No more than 10' of vertical dimension shall be provided between the drain cooler and humidifier. Install drain cooler below the humidifier from the floor, wall, or suspended in order to keep the vertical distance between the humidifier and cooler under 10'.

END OF SECTION