MECHANICAL NOTES AND SPECIFICATIONS

GENERAL REQUIREMENTS FOR MECHANICAL WORK

1. SCOPE OF WORK

(a) Conform to the applicable provisions of the General conditions of the Contract.

(b) This General Specification shall apply to and form a part of each of the sections covering Mechanical and Electrical Trades work.

2. EXAMINATION OF SITE AND INFORMATION

(a) Each Contractor before tendering, shall examine the site, the Architectural, Structural, Mechanical, Electrical and any other relevant documents, and fully familiarize himself with the designer's intent, so that the tender price will include everything necessary for the proper completion of the work in accordance with the intent of the documents. Obtain the approval of the Engineer, Architect and Project Manager before any alterations to the work indicated.

(b) Ensure that all products and materials necessary for the execution of the contract can be brought into the spaces where they are to be located, either through specified openings or partially assembled. Any cutting or restoration work required, due to failure to accomplish this, will be the responsibility of this subcontractor.

3. RELATIONSHIP TO OTHER TRADES

(a) The Contractor shall confer with other trades working in the area, to ensure that his installation will be the result of co-operation between all parties. All devices must be accessible for service, and the recommendations of the equipment suppliers shall govern.

(b) Ensure that all work will be installed within the prescribed limited of the building, such as ceiling heights, and notify and General trade of any requirements for inserts, sleeves, openings, curbs and bases in sufficient time to have the items completed in the normal course of construction.

(c) Confirm with the Electrical trade, the available electrical power supply characteristics, before finalizing equipment orders. No compensation will be allowed to change any device due to this subcontractor's failure to verify the supply.

(d) Any cutting or patching required, for whatever reason, shall be done by qualified trades people in the required trade.

4. SHOP DRAWINGS AND ALTERNATIVE EQUIPMENT

(a) This review is for General conformity only and does not relieve the supplier and/or subcontractor from providing the necessary product (s) to meet the design intent.

(b) Provide eight (8) copies of submittal drawings for each piece of equipment, including pumps, AC and Air Handling units, Fixtures, etc., to the Engineer for review. Certify to the Engineer that the drawings correctly identify the equipment that will be supplied, that the equipment will fit the space allotted, and perform the service intended.

(c) Equipment described either generically or by brand name is to establish the minimum standard required for the installation. Alternative equipment may be suggested by the bidder, but the equivalence shall be determined by the Engineer. Bidders must tender on the basis of the specified equipment, an if alternatives are proposed, they will be considered on their own merits, after the close of tenders. Any lowering of the price based on alternative suppliers will be permitted with the savings being passed to the Owner.

5. REQUIREMENTS OF INSPECTION DEPARTMENTS

(a) All work shall comply with the governing Codes and local requirements. Any items required to accomplish this, whether explicitly noted or not, shall be provided.

(b) Where the Inspecting person requests items not deemed to included, the matter shall be immediately referred to the Engineer for a ruling. No extra will be considered if the work done by the Contractor to satisfy such a request, could have been avoided by discussion between the Inspector and the Engineer.

(c) Provide notice to Inspectors as required for the progress of the project, and ensure that such inspections are carried out, before work is covered.

6. CERTIFICATES, PERMITS AND FEES

(a) Obtain all required permits, and pay all inspections fees, except where specifically noted to the contrary.

(b) Furnish to the Owner any certificates that may be necessary as evidence that the work as installed conforms to all the laws and regulations of those authorities having jurisdiction. Before final certificates are issued, make these alterations that are required by the authority having jurisdiction, and accepted by the Engineer as a law, or regulation that should have been followed by the contractor.

7. GUARANTEE

(a) Guarantee all material and workmanship for two full years from the date of certified substantial completion by the Owner, or his authorized agent. This shall not supercede any warranties for specific items of equipment, which may be for a longer term.

(b) The cost of repair of damage to any other work, caused by the failure of either material or workmanship within the period covered by the guarantee noted in (a), shall be included in this warranty.

(c) Where equipment is put into operation prior to completion of the work the period of guarantee covering such equipment shall still commence as noted in item 7(a) above. The putting into operation of any equipment prior to completion of the work shall only be with written approval of the Engineer and Owner. No equipment shall be started up without first ascertaining that all systems and services associated with its operation are functioning and that responsibilities for equipment maintenance have been arranged.

8. DRAWINGS

(a) The drawings produced by the Engineer are generally schematic in nature and are issued for the express purpose of obtaining tenders for the work and for the erection of the systems described in the scope of work to be done. Unless specifically shown, the responsibility for the installation and workability of the system (s) rest with the Contractor.

(b) Where necessary, the Contractor shall prepare interference drawings to ensure that the installation will be coordinated with all services to be installed in the area. The Engineer and other Professionals of Record may have to approve of these proposals.

9. RESPONSIBILITY AND LIABILITY

(a) This Contractor is responsible for the laying-out of his work, and it shall be done in cooperation with all other trades working in the area. The work of these other subtrades shall be protected from damage by this sub's forces, or restitution made for any damage.

(b) Notify the Engineer of any discrepancies for inconsistencies and abide by the decision of the Engineer. Failure to notify the Engineer will not relieve this Contractor of the responsibility to provide a fully working system.

10. CLEAN-UP AND PROTECTION

(a) Maintain a clean working area to minimize danger to others on site, and protect all work in progress from damage due to construction work, weather, or from undue dirt entry.

11. OPERATOR TRAINING AND INSTRUCTIONS

(a) Provide complete operating and Maintenance instructions for all equipment supplied, complete with parts lists and the names of the suppliers.

(b) Provide a written description of the systems and the operating characteristics, for use by the system operators/maintenance personnel, and to instruct the users how to set thermostats, fan control switches, etc. Consult the Engineer when preparing this instruction sheet, to ensure that the system will be operated as intended.

(c) Provide a Balancing Report for all air and hydronic systems, which has been prepared by an INDEPENDENT Testing company approved by the Engineer.

(d) Touch up or repaint as necessary, all scratches or other finish defects, that have occurred on any devices supplied under this contract.

12. EXTRAS AND CREDITS

(a) Where extra or deleted work is requested, contractor shall be permitted a mark-up applied to both overhead and profit as outlined in the contractual agreement with the client. Where extras and credits occur simultaneously, the credit shall be deducted from the extra, prior to the application of these mark-ups. Credits for deleted work will not be subject to any mark-up as it is assumed that the overhead, labour and profit on these deleted materials was included at the time the work was bid.

(b) The contractor shall negotiate any changes including additions and deletions ensuring credits are issued for work deleted from scope.

13. ELECTRICAL WIRING AND CONTROLS

(a) All power wiring for all mechanical equipment shall be done by Division 26 - Electrical, except where specifically noted otherwise.

(b) The Mechanical division shall provide all starters, relays, control devices, and any built-in safety switches. The Electrical will provide all field-mounted safety disconnects.

(c) The Mechanical division shall provide all connections and wiring for controls, and interlocks.

(d) All electrical devices shall be Canadian where possible and all motors up to 1/3 HP shall be single phase, larger motors 3 phase, except as noted. CONFIRM ALL ELECTRICAL CHARACTERISTICS ON SITE.

14. COMPLETION, TESTING, BALANCING AND ADJUSTMENTS

(a) Certify to the Engineer that all systems have been completely installed per the documents, set in operation, and adjusted to the requirements of the project.

(b) Replace all filters, and any indicator lights that have burned out, and lubricate all rotating devices immediately prior to turn over to the Owner or his agent.

(c) Contractor to provide an electronic copies of as built drawings upon the project completion

15. ACCESS DOORS AND FIRE STOPPING

(a) Provide adequately sized access doors to permit servicing of any mechanical device, cleanout, check valve, etc. The doors will be installed by the Trade providing the surface where the door is to be located. This Contractor shall be fully responsible for accurately locating the door, considering all obstructions.

(b) Provide sleeves for pipes passing through walls and floors where pipe movement is possible. Use Schedule 40 pipe sections for masonry walls, large enough to accommodate pipe insulation. Floor sleeves through drainable floors shall extend up above the finished floor
level.

(c) Fire stop all sleeves passing through fire separations with an approved fire stopping material, and make waterproof. Provide escutcheons for all exposed penetrations through walls, and floors as directed.

16. WORKMANSHIP

(a) Only first class workmanship will be accepted, not only with regards to safety, efficiency, durability, etc., but also with regards to the neatness of detail. All pipe work shall be lined up parallel, or at right angles to the building walls where possible. Equipment must be accurately set, plumb and level, and all hangers must be in true vertical alignment. In general, the entire work shall be first class and workman like and present a neat clean appearance upon completion.

PLUMBING AND DRAINAGE

1. GENERAL CONDITIONS

(a) The General Requirements of the Contract Documents, and the Supplementary Requirements for Mechanical Work, shall form an integral part of this Specification.

2. WORK INCLUDED

(a) This Contractor shall do all plumbing, drainage, and fire protection work, including all underground services within the building lines, except where specifically noted otherwise. Remove all obsolete piping from the site, and cap all unused services.

(b) This contractor to cut new trench on existing floor for all new buried sanitary drain and provide wall opening to accommodate new mechanical equipment and piping. exact location shall be coordinated with the Architect.

(c) This contractor to patch up and make good on any floor and wall opening where mechanical equipment and piping being removed.

3. WORK NOT INCLUDED

(a) Electrical wiring

4. SERVICE CONNECTIONS

(a) Provide all work from the existing service connection points and coordinate on site exact locations of any existing service points with Site Engineer as to the exact location. Start all drain work at the connection point to ensure that connection provided by the existing service will be at an elevation equal to or lower than the design.

5. DRAINAGE SYSTEMS

(a) Provide complete drainage systems as shown on the drawings and/or modified as required, all as noted.

6. PIPE AND FITTINGS FOR PLUMBING AND DRAINAGE

(a) Unless otherwise noted, all buried drainage pipes shall be SDR-35 or acceptable alternative piping as noted below. When located on unstable soil special bedding in reinforced concrete shall be used.

(b) All above ground domestic water piping shall be Certified copper type "L" or PEX-A piping can also be used where permitted by local codes, waste and vent piping shall be System 15 or System XFR DWV (or equal alternate), see specifications below. Where piping runs in return air plenum or penetrating through fire rated wall, piping shall be copper, cast iron hubless (MJ) depending on size, or System XFR, see specifications below. All rain water leaders shall be hub & spigot cast iron with caulked joints and hub support at each floor, or System 15 or System XFR (or equal alternate), see specifications below

"Sanitary Drainage System"
Pipe and Fitting Requirements:
(O.B.C. 3.1.5.16 Combustible Piping Materials)
In compliance with the Ontario Building Code 7.2.5.12, this pipe and fitting system shall be Tested and Certified to CAN/CSA-B181.2 for Drain, Waste and Vent applications. In addition, in compliance with the requirements outlined in the O.B.C. 3.1.5.16, when installed in buildings Classified as Low-rise non-combustible, this pipe and fitting system shall be Tested and Listed to CAN/ULC-S102.2-M and have a "flame-spread rating" not more than 25 (IPEX System 15 or equal alternate). Further, when installed in plenums as noted by O.B.C. 3.6.4.3 (1a) or buildings Classified as High Building as noted by O.B.C. 3.2.6 or parking garages, this pipe and fitting system shall also have a smoke developed classification not more than 50 (IPEX System XFR or equal alternate).

"Storm Drainage System"
Pipe and Fitting Requirements:
(O.B.C. 3.1.5.16 Combustible Piping Materials)
In compliance with the Ontario Building Code 7.2.5.12, this pipe and fitting system shall be Tested and Certified to CAN/CSA-B181.2 for Drain, Waste and Vent applications. In addition, in compliance with the requirements outlined in the O.B.C. 3.1.5.16, when installed in buildings Classified as Low-rise non-combustible, this pipe and fitting system shall be Tested and Listed to CAN/ULC-S102.2-M and have a "flame-spread rating" not more than 25 (IPEX System 15 or equal alternate). Further, when installed in plenums as noted by O.B.C. 3.6.4.3 (1a) or buildings Classified as High Building as noted by O.B.C. 3.2.6 or parking garages, this pipe and fitting system shall also have a smoke developed classification not more than 50 (IPEX System XFR or equal alternate).

(c) All sewer lines shall be graded as shown on the drawings and inside the building drains shall be sloped at not less and 1%, except where noted. Flush all lines after installation, and chlorinate all water piping.

7. ROOF AND FLOOR DRAINS

(a) All floor drains shall be cast iron floor drains complete with sump, adjust-to-level strainer, and double drainage flange with weeper holes and primer connection. Strainers shall be polished bronze 150mm diameter in all areas. Floor drains for wet areas with membrane floor finish such as "Altro" shall have membrane clamp integral with the drain and strainer as above.

(b) All floor drains shall be 4" except where noted otherwise, and each shall be primed and vented to Code requirements through the use of a proper trap seal primer device.

"RD" ROOF DRAIN
Refer to drawings for roof drain specifications

"FD" FLOOR DRAIN
Ancon Watts Series FD-200-A epoxy coated and cast iron floor drain with serrate anchor flange, weepholes, seepage collection sump (100mm outlet size) nickel bronze strainer and c/w extension to suit floor level.

"FFD" FUNNEL FLOOR DRAIN
Ancon Watts Series FD-200-EF epoxy coated and cast iron floor drain with anchor flange, weepholes, seepage collection sump (100mm diameter funnel) nickel bronze strainer and c/w extension to suit floor level. (Applicable when shown on plans)

"TP" TRAP PRIMER
P.P.P. Inc. Model # PD-500 automatic trap seal primer valve, serving individual or remote area drains with 1/2" (12.7mm) NPT connections with strainer and integral backflow preventer and vacuum breaker. All traps for floor drains to be protected with trap primers.

"CO" CLEAN OUT
Smith Series #4100, and line clean out Smith Series #4420. Finished floor cleanouts with adjustable tops to suit floor finishes.

Alternative manufacturers: ZURN, MIFAB, JAY R. SMITH.

8. VALVES

(a) Provide isolation water valves for each fixture, group of fixtures, each main

(b) Valves shall be certified for the use, and minimum 150 psi pressure rated, except where noted otherwise.

(c) Wall hydrants or hose bibs shall be with detachable key and with inside stop and waste valve located in common area.

(d) Wherever isolating valves are located behind wall finishes, provide suitably sized access doors in the proper location to permit access.

9. PIPE SUPPORTS

(a) Pipe supports shall be provided at maximum 8' intervals, more frequent intervals for smaller sizes. Where structural members are not spaced accordingly, provide intermediate support members as required.

(b) Hangers shall be clevis type with threaded rod supports fastened into the structure. Isolate pipe from hanger where dissimilar materials exist such as copper on steel or aluminum hanger straps. Perforated strap material shall not be accepted under any circumstances. Where hangers are supporting large diameter pipes subject to lateral movement provide spring isolation.

(c) Vertical piping shall be supported at each floor, and all elbows at the bottom of, or offset in stacks shall be independently supported to eliminate longitudinal force in the MJ clamp. Use riser clamps to fasten the pipe, and isolate the clamp from bearing on concrete with neoprene pads.

10. EXPANSION COMPENSATION

(a) Make adequate provision for pipe expansion through the use of pipe loops with anchors at the appropriate points and use swing offset take-offs at each branch.

(b) Make sure that pipes are free of structure so that they can move without noise.

(c) Provide anchors in all horizontal piping networks to constrain overall movement, and prevent branch breakage.

11. CLEANOUTS

(a) Provide cleanouts at every change in direction, ends of lines and wherever else in necessary for the proper maintenance of the drainage system. Cleanout spacing shall not exceed 50' on all pipe sizes up to 4" and 100' for larger sizes.

(b) Extend all cleanouts in buried drains up to the floor level, and provide bronze screw cap, or special cover for tile or carpet insert as directed on site. Clarify with the Architect prior to ordering.

(c) For stack cleanouts, provide Barrett style at the base of the stack, and ensure accessibility by locating cover on proper side of stack. Provide access door as required.

12. TRAPS AND VENTS

(a) Provide every fixture and drain with a proper trap and vent as required by the Code. Provide certified flashing cone fitting for each vent penetrating the roof.

13. SHOCK ABSORBERS

(a) Provide "shockstops" at the top of all risers, and in the water piping, hot and cold, at each group of fixtures.

14. DOMESTIC HOT WATER SYSTEM

(a) Provide system as shown on the drawings, complete with all required fittings, pumps, tanks, and heaters etc. Vents will be provided by Heating Contractor.

15. PLUMBING FIXTURES

(a) Provide fixtures as shown on the drawing and as listed in specification.

(b) All fixtures shall be new and be complete with all trim and support hardware specified or required.

16. PIPE INSULATION

(a) Compliance: Materials shall conform to Flame Spread and Smoke Developed requirements of the Ontario Building Code. Pipe Insulation shall be Greenguard Certified

(b) All exposed domestic water piping shall be insulated as with Fiberglass Pipe Insulation.

(c) PVC jacket and fittings shall be installed according to the manufacturer's recommendations. All longitudinal and circumferential joints shall be sealed with a clear manufacturer approved bonding compound. Taping or rivets are not acceptable closure methods. White silicon shall be applied where necessary to seal and finish where jacket and/or fittings attach or terminate.

16. PIPE SLEEVES

(a) Provide sleeves for all piping passing through walls or floors of a sufficient size to accommodate insulation.

(b) Sleeves for wet floors shall extend 6" above the floor level to prevent water damage to the insulation.

(c) Stop all sleeves with Listed firestopping applied over packing as shown on drawing.

17. SCHEDULE OF PLUMBING FIXTURES

(a) See "Plumbing Fixture Connection Schedule" for specifications

18. PLUMBING FIXTURES

(a) Provide plumbing fixtures and trim and as shown on the plans. This Contractor shall also obtain a copy of the latest Architectural plans for exact type and quantity of plumbing fixtures. Any discrepancies between the plans are to be reported to Engineer at once.

(b) Provide thermostatic mixing valve on all lavatory and sinks "Lawler" # TMM-1000 Mechanical Mixing Valve with Thermostatic Limit Stop, with temperature adj. dial and with integral back checks. Set valve temperature at 115º F (46º C), shut-off temp. at 120º F (48.8º C). Mixer installed in H & CW supplies to provide tempered water to hot side of faucet.

(c) All fixtures shall be new and free from flaws or blemishes. All finished surfaces shall be clear,smooth and bright and guaranteed not to craze, colour or scale. All visible parts of all fixtures including faucets, escutcheons, of the trimmings wastes, strainers, traps, supplies, etc., shall be chrome plated.

(d) Fixtures shall be complete with all accessories, supplies, frames, all hangers, etc. Fixtures shall be accurately installed to structure and lavatories shall be supplied with steel brackets accurately attached to masonry walls.

(e) All plumbing fixtures pre-selected by client.

HEATING, VENTILATING AND AIR CONDITIONING

1. GENERAL CONDITIONS

(a) The General Requirement of the Contract Documents and the Supplementary General Requirements for Mechanical work shall form an integral part of this Specification.

2. WORK INCLUDED

(a) This contractor shall do all heating, ventilation and air conditioning work as shown on the drawings, including flue gas vents, and provision of any gas fired equipment.

(b) Provide all gas piping, thermostatic controls, interlocking devices, damper controls and wiring for them, except as may be specifically noted.

(c) Provide all duct insulation as shown and specified, and except for acoustic lining, all insulation shall be done by a qualified sub-contractor.

3. WORK NOT INCLUDED

(a) Power wiring to all equipment and provision of safety disconnects, EXCEPT where the piece of equipment comes with a built-in disconnect provided as a part of the package.

4. TESTING, START-UP AND GUARANTEE

(a) Start up all systems in conjunction with manufacturer's representative, and log all operating conditions such as temperature rise, air volume and pressure and file three copies of the report and Balancing Report with the Engineer.

(b) Lubricate all equipment, change filters and any indicator lamps, and provide a warranty letter to the Owner recording the date of start and the duration of warranty.

(c) Warranty on all systems is one full year parts and labor, and an additional one year on all all refrigeration systems including labor.

5. HEATING & VENTILATING UNITS

(a) Provide units as shown on the drawings complete with discharge modulating thermostat with electronic modulation gas valve for smooth linear discharge temperature. As per NFPA 90A, units with air capacities of 2000 cfm or greater shall have smoke sensing device installed on the supply duct downstream of the air filters and upstream of any branch ducts, and wired to stop the system on activation. Provide factory standard high temperature cutoff limit, all to suit AGA requirements.

(b) Make sure that unit will not draw in air from exhaust fans or gas or plumbing vents. If this is a possibility, extend the vents to maintain 10 feet above the unit.

(c) Provide manufacturer's standard high velocity filter system and make sure that filter scan be easily removed from the unit. Provide 2 spare sets of filters.

6. DUCTWORK

(a) Provide ductwork as shown and required. All metal shall be prime coat galvanized cold rolled steel with gauges and construction per SMACNA and ASHRAE standards.

Longest Side	USG
12" or less	26
13 to 30"	24
31 to 54"	22
55 and up	20

(b) Where ducts are acoustically lined, duct sizes shown are net.

(c) Ducts shall be supported using angle iron trapeze hangers with threaded rod supports. 18ga. Strips are acceptable for ducts less than 18" longest side.

(d) Elbows shall be round throat where possible with one duct width radius. Square throat or back elbows shall only be used where space does not permit standard elbows and turning vanes shall be installed.

(e) All take-offs shall be fitted with dampers and shall be expanded throat type, except spin-in fittings are acceptable for diffused branches.

(f) Flex ducts shall not exceed 10' in length and where flex ducts connect to a diffuser, a metal elbow shall be mounted on the diffuser and connected to the duct, to provide equal flow out of the diffuser.

(g) Provide flex connections to all pieces of equipment, and where the unit is outside, provide a rain shield over the top of the connection. For exterior ducts, break the duct on top to provide positive rain shedding, and brace from inside if necessary.

7. DUCT INSULATION

(a) All supply ducts shall be insulated with 1" foil faced fiberglass duct insulation for the first 10' from the unit, and for the entire length in non-conditioned space and in bulkheads. All ducts handling outside air shall be insulated as for non-conditioned space.

(b) Mold proof acoustic duct liner (25mm) 1" thick shall be applied to supply duct to a distance of 4.5m (15'-0") duct run from the supply fan discharge unless indicated otherwise, complete with metal retainer strips on the leading edge on each section of duct.

(c) Completely line the return air duct to the unit with (12mm) 1/2" thick mold proof acoustic liner applied as above, from plenum pick up or 4.5m (15'-0") whichever is shorter, unless indicated otherwise.

(d) All exhaust ductwork (with the exception of kitchen exhaust ductwork) shall be externally wrap with 25mm (1") thick fiber glass vinyl jacket insulation for a minimum of 6'-0" (1.8m) from exterior wall or with insulation sleeve approved for application.

(e) Insulate supply air, return air and exhaust air ductwork with 2" thick insulation c/w vapour barrier inside attic space (typical for all ductwork route throughout attic)

(f) All exterior ductwork shall have 1" (25mm) mold proof acoustic insulation inside duct and shall be covered with 2" thick rigid thermal insulation c/w vapor barrier and covered with an overcalling of 26 ga. Galvanized steel, 22 ga. Aluminum or Aluma-Clad along the top and sides of the duct, and extending below the insulation but clear of water ponding on the roof. Tie the sections together to ensure stability of the final cladding. Provide all necessary supports for exterior ductwork before thermal covering is installed.

(g) All ductwork from VVT terminal up to roof top Air conditioning unit shall be of medium pressure duct standard.

(h) All air conditioning ductwork shall be sealed with high pressure duct sealer.

8. FIRE DAMPERS

(a) Fire dampers shall be provided at each duct opening in a fire separation and the dampers shall be Listed types and installed in accordance with the Manufacturer's instructions.

9. LOUVRES, GRILLES, DIFFUSERS AND REGISTERS

(a) Provide units as shown on the plans and listed in the schedule.

(b) Ceiling diffusers shall be adjustable pattern, lay-in style in off-white color to match ceiling grid. Each unit shall have a volume damper and where close to a wall provide additional blank-off baffles to prevent downdraft.

(c) Registers shall be double deflection, with front bars to suit throw pattern as listed on drawings, and be complete with OB damper. All ceiling registers shall have curved blades,except where noted otherwise, and all wall registers for corridor supplies shall be curved blade style.

(d) Return grilles shall be ½" aluminum grid for ceilings and steel, framed units with fixed 35 deg. bars for wall or ceiling installation with ducted return, complete with OB damper. Exhaust grilles same.

(e) Door grilles shall be single vane with frame on both sides.

(f) All wall grilles and louvres to be complete with bird screen

10. EXHAUST FAN

(a) Provide exhaust fans as shown on the drawings complete with back draft damper and control as listed.

(b) Roof mounted fans shall be provided with integral disconnect switch, and shall be mounted on a prefabricated curb with a neoprene insulation strip on top of curb, under the fan. For direct drive fans provide integral electronic speed control mounted under the cover.

11. GAS PIPING

(a) Provide all gas piping as shown on the drawings to the requirements of the National Fuel Code, most recent edition. Piping shall be welded for 2½" and larger sizes and where located in plenums or concealed spaces.

(b) Paint all exposed gas piping to Code and identify all gas piping in other area with colored banding.

(c) Where higher gas pressures are used, provide pounds to inches gas regulators with internal relief, for each appliance or group and vent the relief to the exterior in a safe manner.

12. GAS FIRED HEATING APPLIANCES

(a) Provide gas fired furnaces, or other heating appliances as shown on the drawings, complete with approved venting system, controls and gas piping.

(b) Condensing units to be mounted on concrete slab pad. Refrigeration piping sized as per equipment manufacture recommendation.

DATE	NO.	DESCRIPTION	BY
AUG 10/20	1	REVISED AS PER MARK-UP	MB
JUL 26/20	—	ISSUED FOR PERMIT	MB

MARK VOID ALL PRINTS DATED
PREVIOUS TO FINAL DATE ABOVE

REVISIONS

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DRAWING TITLE:
MECHANICAL SPECIFICATIONS

DRAWN BY:	CHECKED BY:	SCALE:
MB	CL	NTS
DATE:	PROJECT NUMBER:	DRAWING NUMBER:
JUL/2020	20-5870	M-001

HVAC UNIT SCHEDULE

SYMBOL	DUTY	MANUFACTURER	MODEL	TONS (NOM.)	CFM	ESP (IN)	HEATING		COOLING		MOTOR HP (NOM.)	RPM	MOCP	MCA	V/PH/C	UNIT SIZE (LxWxH)	WEIGHT (LBS)	SUPPLY AIR	RETURN AIR	REMARKS
							INPUT (BTU/HR)	OUTPUT (BTU/HR)	TOTAL (BTU/HR)	SENSIBLE (BTU/HR)										
RTU-1	NEW ADDITION (DENTAL OFFICE)	JOHNSON CONTROLS	ZYG05D5C1AB1B121A3	4.0	1,600	0.5	70,000	56,000	56,300	41,100	2.9	1,438	15	9.4	575/3/60	74"x49"x41"	683	20" X 14"	32" X 14"	DISCHARGE DOWN C/W ECONOMIZER WITH BAROMETRIC RELIEF, 18" ROOF CURB (MODEL: IRC0456), 2" MERV 8 FILTER, DISCONNECT SWITCH, PROGRAMMABLE THERMOSTAT, PHASE MONITOR, BACNET CARD WITH BATTERY BACKUP. REQUIRED FRESH AIR IS 22.5%, 18" ROOF CURB (MODEL: IRC0456).

NOTE:
1. ENERGY EFFICIENCY RATINGS TO CONFORM TO ASHRAE 90.1-2013 STANDARD FOR ENERGY CONSERVATION.
2. OUTDOOR UNITS TO BE COMPLETE WITH INLET HOOD W/ BIRDSCREEN, WEATHER PROOF ENCLOSURE AND WEATHER PROOF CONTROL PANEL.
3. CONTRACTOR TO HIRE STRUCTURAL ENGINEER TO CONFIRM THE EXISTING BUILDING STRUCTURE FOR INSTALLATION OF NEW HVAC UNITS.
4. UNIT VOLTAGE TO BE CONFIRMED ON SITE BY CONTRACTOR BEFORE ORDERING.
5. REMOVE THE FILTER DURING THE WINTER OPERATION.

MINIMUM REQUIRED VENTILATION FOR HEALTH CARE FACILITIES

REFERENCE: CSA Z317.2-15: Table 1

ROOM LABEL	ROOM AREA [ft2]	ROOM HEIGHT [ft]	REFERENCE	FUNCTION	MIN. OUTDOOR ACH	MIN. TOTAL ACH	MIN. OUTDOOR AIR REQUIRED [cfm]	MIN. TOTAL AIR REQUIRED [cfm]	EXHAUST	RELATIVE PRESSURIZATION
OP. Room 8	120	9	10.2	Dental suite Minor Procedures Room	3	9	**54**	**162**	-	Pos
OP. Room 9	120	9	10.2	Dental suite Minor Procedures Room	3	9	**54**	**162**	-	Pos
OP. Room 10	120	9	10.2	Dental suite Minor Procedures Room	3	9	**54**	**162**	-	Pos
OP. Room 11	160	9	10.2	Dental suite Minor Procedures Room	3	9	**72**	**216**	-	Pos
Sterilization Center	110	9	24.6	Medical Device reprocessing areas: Sterlizer equipment room	0	10	**0**	**165**	Req	Neg
Staff Room	100	9	17.4	General: Locker room for staff	1	3	**15**	**45**	-	Neg
Administration Office	100	9	17.5	General: Offices	1	3	**15**	**45**	-	Eq
Corridor	160	9	8	Corridors	1	3	**24**	**72**	-	Eq
Reception	240	9	17.6	General: Admitting	2	6	**72**	**216**		Neg
						TOTALS	**360**	**1245**		
TOTALS	**1230**									

EXHAUST EQUIPMENT SCHEDULE

SYMBOL	DUTY	MANUFACTURER	MODEL	CFM	ESP (IN)	RPM	AMPS / W - HP	V/PH/C	CONTROL	REMARKS
EF 1	STERILIZATION ROOM EXHAUST	CARNES	VCDD020C	165	0.350	740	1.8 AMP	120/1/60	TIMER	C/W MOUNTING BRACKET, BACKDRAFT DAMPER AND WHITE POLYMERIC GRILLE. TIMER SET TO ON DURING HOURS OF OPERATION.
EF 2	UTILITY ROOM EXHAUST	CARNES	VCDD015C	130	0.350	710	1.4 AMP	120/1/60	REVERSE ACTING THERMOSTAT	C/W MOUNTING BRACKET, BACKDRAFT DAMPER AND WHITE POLYMERIC GRILLE.
EF 3	WASH ROOM EXHAUST	CARNES	VCDD010C	80	0.350	640	1.1 AMP	120/1/60	SWITCH	C/W MOUNTING BRACKET, BACKDRAFT DAMPER AND WHITE POLYMERIC GRILLE. CONNECT TO LIGHT SWITCH.

GENERAL NOTES:
- ALL EXHAUST DUCTWORK SHALL BE INSULATED FOR A MINIMUM OF 6'-0" (1.8M) FROM EXTERIOR WALL AS PER MECHANICAL SPECIFICATIONS.

GRILLE AND DIFFUSER SCHEDULE

SYMBOL	MANUFACTURER	MODEL	CFM	SIZE	REMARKS
A	EH PRICE	SPD	AS NOTED ON PLAN	AS NOTED ON PLAN	24" X 24" PANEL TO SUIT CEILING FINISH
	EH PRICE	80	0-500	24" X 12"	NON-DUCTED RETURN AIR GRILLE TO SUIT CEILING FINISH

PLUMBING FIXTURE CONNECTION SCHEDULE

SYMBOL	DESCRIPTION	HW	CW	WASTE	VENT	REMARKS
"L"	LAVATORY (COUNTER TOP)	12MM (1/2")	12MM (1/2")	32MM (1-1/4")	32MM (1-1/4")	
"W"	WATER CLOSET (FLUSH TANK)	-	12MM (1/2")	75MM (3")	40MM (1-1/2")	
"HS"	HAND SINK	12MM (1/2")	12MM (1/2")	32MM (1-1/4")	32MM (1-1/4")	
"DS"	DENTAL SINK	12MM (1/2")	12MM (1/2")	32MM (1-1/4")	32MM (1-1/4")	
"DC"	DENTAL CUSPIDOR	-	12MM (1/2")	32MM (1-1/4")	32MM (1-1/4")	
"FD"	FLOOR DRAIN	-	-	75MM (3")	40MM (1-1/2")	

GENERAL NOTES:
- PROVIDE ISOLATING VALVES ON HOT AND COLD WATER LINES TO EACH PLUMBING FIXTURE (TYPICAL UNLESS OTHERWISE NOTED)
- WRAP ALL EXPOSED HOT WATER AND DRAIN PIPING AT BARRIER FREE LAVATORY WITH INSULATION
- INCLUDE FIXTURES WITH BUILT-IN CHECK VALVES AT SPRAY ARM / FAUCET TO PREVENT WATER FLOW THROUGH WATER PIPES WHILE SPRAY NOT IN USE.
- SIZES NOTED ABOVE ARE MINIMUM SIZES AS NOTED IN OBC TABLE 7.6.3.2.A. PLEASE REFER TO FIXTURE SPECIFICATIONS FOR ACTUAL SIZES REQUIRED IF NOT SHOWN ON DRAWINGS.

GAS FIRED UNIT HEATER SCHEDULE

SYMBOL	MANUFACTURER	MODEL	GAS INPUT (CFH)	OUTPUT CAPACITY (MBH)	WATT	V/PH/C	FLUE SIZE	APPROX. WEIGHT (LBS)	REMARKS
UH A	REZNOR	UDAP-30	30	24.6	109	120/1/60	4"ø	61	C/W NIGHT SET BACK T'STAT AND SUMMER SWITCH

NOTE:
1. GAS FIRED UNIT HEATERS SHALL BE SUPPLIED WITH DISCHARGE GRILLE, LOW VOLTAGE THERMOSTAT AND CONTROLS.
2. MOTOR STARTER AND CONTROL WIRINGS SHALL BE PROVIDED BY H.V.A.C. CONTRACTOR.
3. INSTALL HEATER A MINIMUM 10'-0" ABOVE FINISHED FLOOR UNLESS NOTED OTHERWISE
4. EXTEND FLUE ABOVE FINISHED ROOF C/W APPROVED RAIN CAP AND ROOF FLASHING. FLUE SHALL BE U.L.C. APPROVED TYPE "B" VENT.
5. PROVIDE ISOLATING GAS COCK, PIPE UNIONS, AND DIRT POCKET AT HEATER
6. UNIT HEATER SHALL BE A MINIMUM 5 YEAR WARRANTY AGAINST ALL DEFECTS.
7. UNIT HEATER TO BE COMPLETE WITH ELECTRONIC IGNITION.

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REVISIONS

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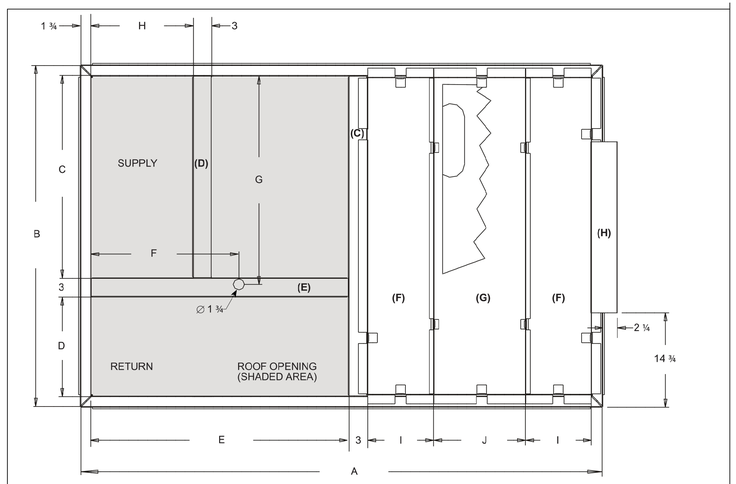
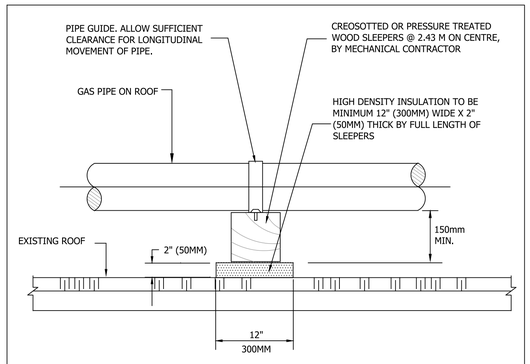
DRAWING TITLE:
MECHANICAL SCHEDULES

DRAWN BY:	CHECKED BY:	SCALE:
MB	CL	NTS
DATE:	PROJECT NUMBER:	DRAWING NUMBER:
JUL/2020	20-5870	M-002

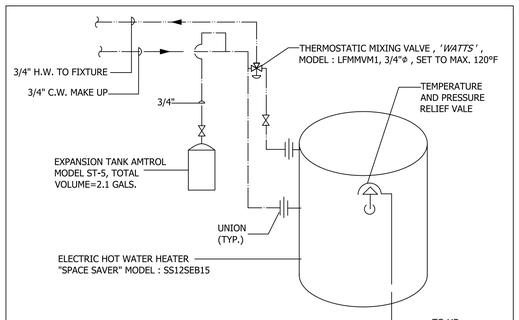


DIMENSIONS													
MODEL#	A	B	C	D	E	F	G	H	I	J	RETURN DUCT	SUPPLY DUCT	ROOF OPENING
1RC0456 1RC0458	70 ⅝	40 ¹⁵⁄₁₆	20 ⅞	13 ¾	32 ⅛	16	21 ⅞	14	9	13 ¹³⁄₁₆	31 ¼ x 13 ¼	13 ½ x 20	33 x 37 ⅜
1RC0457 1RC0459	81 ¾	53 ½	31 ½	15 ⅞	40 ⅜	23 ⅛	32 ⅝	15 ¹³⁄₁₆	10 ¼	14 ⅝	39 ¼ x 15	15 ¼ x 31	41 x 51

DETAIL OF ROOF TOP UNIT CURB
N.T.S.



DETAIL OF GAS LINE ON THE ROOF
N.T.S.



DETAIL OF ELECTRIC HOT WATER HEATER
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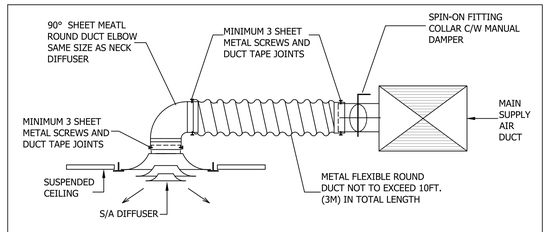
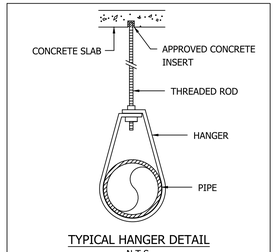
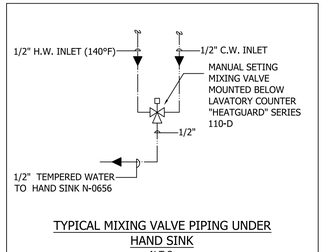


TYPICAL DETAIL OF FLEXIBLE / RIGID DUCT CONNECTION TO DIFFUSER SUSPENDED CEILING
N.T.S.



TYPICAL HANGER DETAIL
N.T.S.



TYPICAL MIXING VALVE PIPING UNDER HAND SINK
N.T.S.

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DRAWINGS ARE PREPARED FOR PRINTING ON ARCH D PAPER (24"X36"). DRAWINGS ARE NOT TO BE SCALED.

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DRAWING TITLE:

MECHANICAL DETAILS

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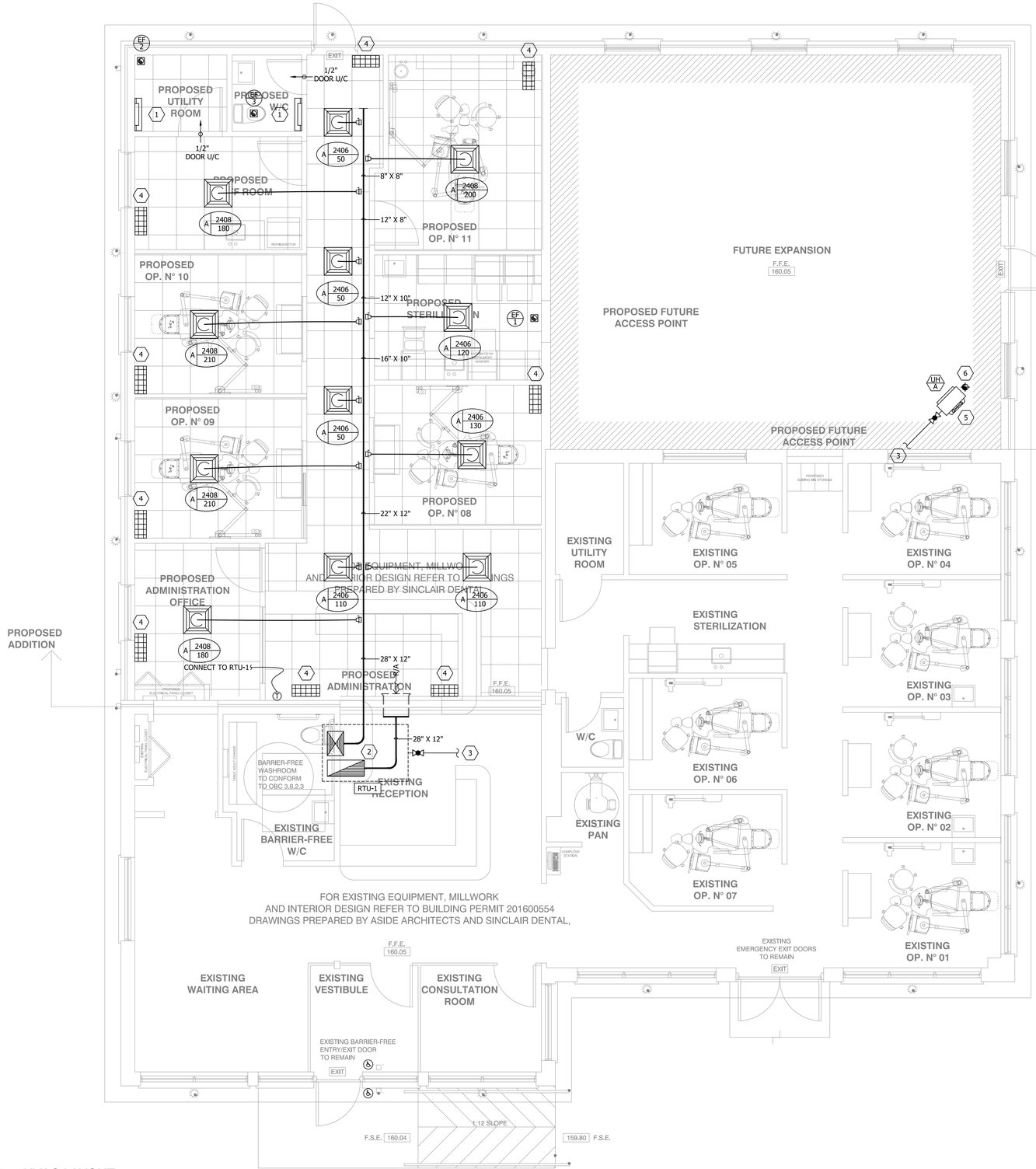

1 HVAC LAYOUT
Scale: 1/4" = 1'0"

HVAC SYMBOL LEGEND

SYMBOL	DESCRIPTION
	SUPPLY DUCT
	SUPPLY DUCT - SPIRAL WITH HOLES
	RETURN DUCT
	EXHAUST FAN
	SUPPLY DIFFUSER - CEILING
	SUPPLY DIFFUSER - GRILLE
	SPIN COLLAR WITH MANUAL DAMPER
	EXHAUST AND RETURN AIR GRILLE - CEILING
	EXHAUST AND RETURN AIR GRILLE - WALL
	SUPPLY AIR DUCT UP - THROUGH SLAB
	SUPPLY AIR DUCT UP
	SUPPLY AIR DUCT DOWN
	RETURN AIR DUCT UP - THROUGH SLAB
	RETURN AIR DUCT UP
	RETURN AIR DUCT DOWN
GAS	GAS LINE
	THERMALLY INSULATED DUCT
MD	MANUAL DAMPER
SD	SPLIT DAMPER
S	OCCUPANCY SENSOR
T	THERMOSTAT

A 2408 / 245 — DENOTES: (24"X24") DIFF. FRAME SIZE; (08) DIFF. NECK SIZE; AIR QUANTITY (CFM); SUPPLY DIFFUSER TYPE

A 12X6 / R/A — DENOTES: RETURN GRILLE SIZE; RETURN GRILLE TYPE

HVAC KEYNOTES

1	ELECTRIC BASEBOARD HEATER EQUAL TO "OUELLET" MODEL OPR0502. 500W. 120/1/60. C/W PEDESTAL KIT.
2	NEW 4 TON ROOF TOP UNIT, INSTALL AS PER MANUFACTURER INSTRUCTIONS, REFER TO EQUIPMENT SCHEDULE. CONTRACTOR TO HIRE STRUCTURAL ENGINEER TO CONFIRM THE EXISTING BUILDING STRUCTURE FOR INSTALLATION.
3	CONNECT TO EXISTING GAS PIPE LINE, CONTRACTOR TO VERIFY THE CAPACITY OF THE EXISTING GAS PIPE LINE.
4	NON-DUCTED RETURN AIR GRILLE TO SUIT CEILING FINISH.
5	GAS FIRED UNIT HEATER, INSTALL AS PER MANUFACTURER INSTRUCTIONS, REFER TO EQUIPMENT SCHEDULE.
6	UNIT HEATER FLUE VENT TO BE TERMINATED MINIMUM 36" ABOVE FINISHED ROOF WITH TYPE B VENT AND RAIN CAP. INSTALL AS PER UNIT HEATER MANUFACTURER INSTRUCTIONS.

GENERAL NOTES:
- LOCATION OF DIFFUSER TO BE COORDINATED WITH DIVISION 16.
- THE CONTRACTOR SHALL BALANCE THE AIRFLOW RATES FOR ALL DIFFUSERS AND PROVIDE AIR BALANCING REPORT.
- VENT ALL GAS APPLIANCES AS PER OBC AND CSA-B149

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DRAWING TITLE:
GROUND FLOOR PLAN
HVAC LAYOUT

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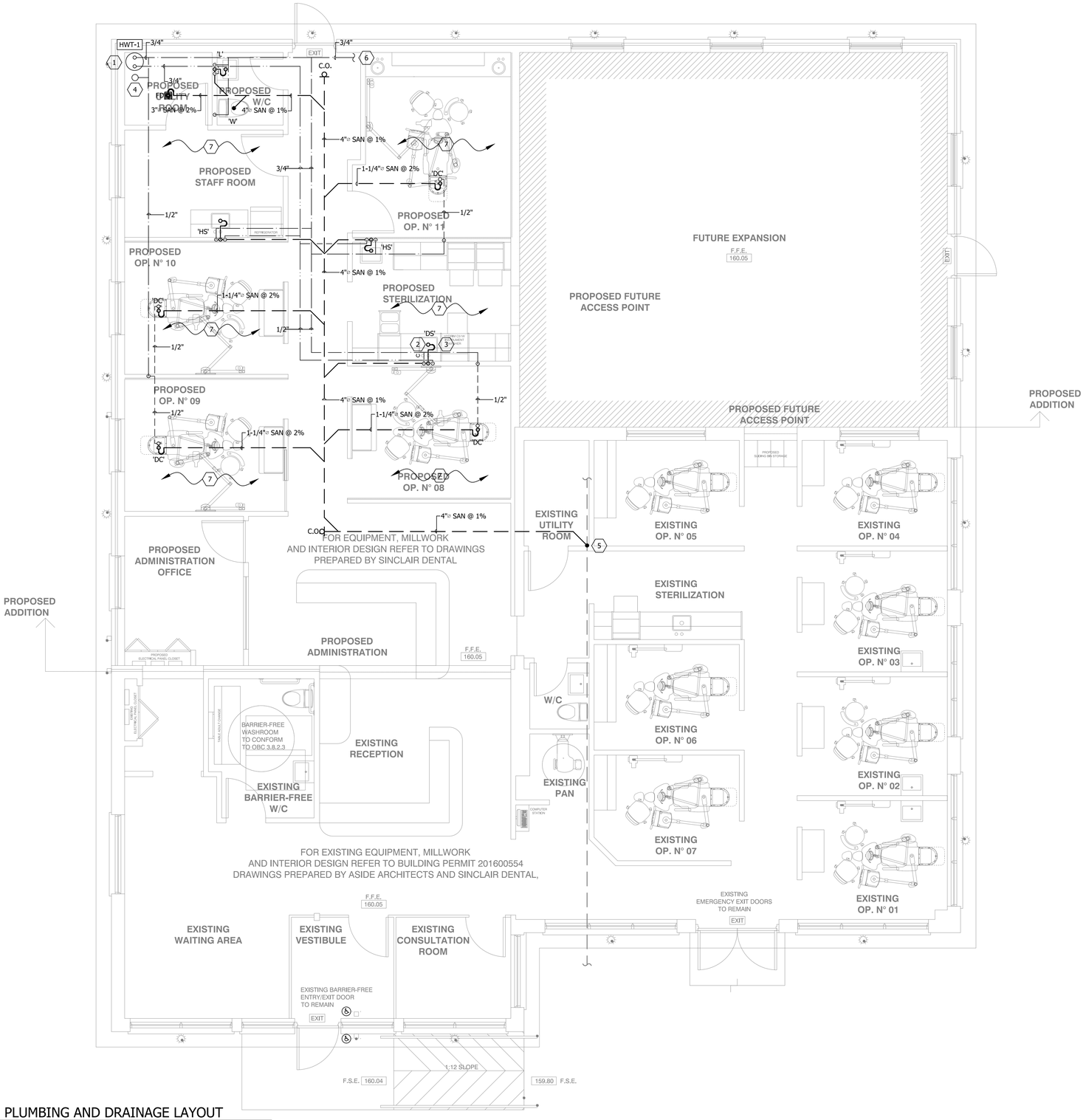

1 PLUMBING AND DRAINAGE LAYOUT

Scale: 1/4" = 1'0"

PLUMBING & DRAINAGE SYMBOL LEGEND

SYMBOL	DESCRIPTION
	SANITARY BELOW GRADE
	SANITARY ABOVE GRADE
	DRAIN LINE
	DOMESTIC COLD WATER ABOVE GRADE
	DOMESTIC HOT WATER ABOVE GRADE
	DOMESTIC COLD WATER BELOW GRADE
	DOMESTIC HOT WATER BELOW GRADE
	PRESSURE REDUCING VALVE (PRV)
	MIXING VALVE
	BALL VALVE
	CHECK VALVE
FD	FLOOR DRAIN
	TRAP
C.O.C.	FLOOR CLEAN OUT
C.O.C.	WALL CLEAN OUT
	ELBOW UP
	ELBOW DOWN
M	WATER METER
	BACKFLOW PREVENTER
C.T.E.	CONNECT TO EXISTING

PLUMBING AND DRAINAGE KEYNOTES

1	ELECTRIC HOT WATER HEATER: "SPACE SAVER" MODEL: SS12SEB15, 12 GALLON CAPACITY, 3.0 KW, 240/1/60. INSTALL AS PER MANUFACTURERS INSTRUCTIONS.
2	PROVIDE EYE WASH STATION. CONNECT TO RIGHT SIZED LINE AS SHOWN.
3	PROVIDE PLASTER TRAP FOR SINK. TO BE SUPPLIED BY DENTAL SUPPLIER. PROVIDE SHUT OFF VALVE FOR DENTAL MODEL TRIMMER ON DCW LINE AND INSTALL A ¾" DUAL CHECK VALVE- WATTS 'LFN9'.
4	THERMAL EXPANSION TANK: "AMTROL" MODEL : ST-5, 2 GALLON CAPACITY. INSTALL AS PER MANUFACTURERS INSTRUCTIONS.
5	CONNECT TO EXISTING SANITARY DRAINAGE LINE. CONTRACTOR TO CONFIRM EXACT LOCATION AND SIZE. MODIFY TO SUIT.
6	CONNECT TO EXISTING COLD WATER PIPE. CONTRACTOR TO CONFIRM EXACT LOCATION AND SIZE. MODIFY TO SUIT.
7	REFER TO DENTAL SUPPLIER DRAWINGS FOR COMPRESSOR AIR AND VACUUM LINES SIZING AND SPECIFICATIONS.

GENERAL NOTES:
- REFER TO "PLUMBING FIXTURE CONNECTION SCHEDULE" FOR CONNECTION SIZES.
- VENT ALL PLUMBING FIXTURES AS PER PROVINCIAL CODE. PROVIDE MIN 3"ø VENT SIZE AT ROOF TERMINATION.
- PROVIDE BACKFLOW PREVENTER FOR DENTAL CHAIRS, DENTAL VACUUM PUMP AND ALL APPLICABLE FIXTURES.
- PROVIDE CLEANOUTS AND TRAP PRIMING FOR SANITARY DRAINAGE SYSTEM AS REQUIRED BY PROVINCIAL CODE.
- EXACT LOCATION OF EXISTING SERVICES TO BE VERIFIED ON SITE BY CONTRACTOR.

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DRAWING TITLE:

GROUND FLOOR PLAN
PLUMBING AND DRAINAGE LAYOUT

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