

MECHANICAL NOTES AND SPECIFICATIONS

GENERAL REQUIREMENTS FOR MECHANICAL WORK

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. 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.
3. 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 contractor.
4. 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 the 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 contractor'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.
- (e) All newly installed piping, ductwork, or equipment must have a minimum clearance of 3" from underside of roof decking.
5. SUBMITTAL / 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 electronic copies of submittal/shop drawings for each piece of equipment to be used in construction, including pumps, AC and Air Handling units, Fixtures, etc., to the Engineer for review. The contractor shall verify that the submittal/shop drawings correctly identify the equipment that will be supplied, that the equipment will fit the space allotted, and perform the service intended.
- (c) Before submission, all submittal/shop drawings must be checked for accuracy and the inclusion of all necessary details such as: project identification, item labels (tags), clear indication of which item is being submitted (e.g. Model) and all associated accessories or features associated with the submission. Shop drawings/submittals without this information and that are confusing, unclear, or ambiguous will be rejected and returned as not approved.
- (d) 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.
6. 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 be 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.
- (d) Any changes or alterations required by inspectors shall be rectified at the contractor's cost.
7. 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.
8. GUARANTEE
- (a) Guarantee all material and workmanship for one full year from the date of certified substantial completion by the Owner, or his authorized agent. This shall not supersede 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 8(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.
9. DRAWINGS
- (a) The drawings produced by the Engineer are generally schematic and diagrammatic 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) rests with the Contractor. Anything not shown on the plans, within the specified scope of work and which is currently existing, shall be removed and demolished.
- (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 be required to approve of these proposals.
- (c) The contractor shall refer to the architectural edge of slab drawings for the exact location of equipment, fixtures and penetrations. Engineering drawings provide the general design intent and are therefore not dimensioned. Refer to architectural drawings for dimensions.
- (d) It is the contractor's responsibility to record red lines on the construction drawings and plans. The contractor shall convert the record drawings to electronic AutoCAD (latest version) drawing format and provide a copy to the Engineer and Owner.
10. RESPONSIBILITY AND LIABILITY
- (a) 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 sub-trades 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.
- (c) This contractor shall correct any deficiencies noted by the owner or engineer of record at the contractor's cost.
11. 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.
12. 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.
- (c) Consult the Engineer when preparing this instruction sheet, to ensure that the system will be operated as intended.
- (d) Provide a Balancing Report for all air and hydronic systems, which has been prepared by an INDEPENDENT Testing company approved by the Engineer.
- (e) Touch up or repaint as necessary, all scratches or other finish defects, that have occurred on any devices supplied under this contract.
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. 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.
2. WORK NOT INCLUDED
- (a) Electrical wiring
3. 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.
4. DRAINAGE SYSTEMS
- (a) Provide complete drainage systems as shown on the drawings and/or modified as required, all as noted.
5. 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", CPVC certified to CAN/CSA-B137.6 for CPVC Pipe and Fittings for Hot and Cold Water Distribution Systems (IPEX AquaRise or equal alternate), or PEX-A certified as a system by CSA conforming to CAN/CSA B137.5 (Upon or equal alternate) piping can also be used where permitted by local codes. Drain, waste and vent piping shall be IPEX System 15 or IPEX System XFR (or equal alternate), see specifications below. Where piping runs in return air plenum or penetrating through fire rated wall, piping shall be copper, Uponor PEX-A, 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 water lines after installation.

6. 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 130mm 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 otherwise noted, and each shall be primed and vented to Code requirements through the use of a proper trap seal primer device. Certified trap guards acceptable in place of trap seal primer. All traps for floor drains to be protected with trap primers. Suggested make P.P.P Inc., model # PO-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.

"RD" ROOF DRAIN

Refer to drawings for roof drain specifications

"FD" FLOOR DRAIN

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

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)

"CO" CLEAN OUT

Watts Series CO-200-R epoxy coated cast iron floor cleanout with 5" round adjustable gasketed nickel bronze top and removable gas tight gasketed brass cleanout plug. Finished floor cleanouts with adjustable tops to suit floor finishes.

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

7. VALVES
- (a) Provide isolation water valves for each fixture, group of fixtures, and 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.
8. 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 clevs 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.
9. EXPANSION COMPENSATION
- (a) Make adequate provision for pipe expansion through the use of pipe loops with anchors at the appropriate points,

- expansion joints 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.
10. 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.
11. 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.
12. SHOCK ABSORBERS
- (a) Provide "shockstops" at the top of all risers, and in the water piping, hot and cold, at each group of fixtures.
13. 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.
- (b) Recirculation System: All piping to be minimum ¾" in size, designed and operated at 21psi in velocity as well as under 140°F in temperature.
14. PLUMBING FIXTURES
- (a) Refer "Plumbing Fixture Connection Schedule" for specifications
- (b) Provide plumbing fixtures and trim and as shown on the plans. This Contractor shall also obtain a copy of the latest Architectural and Interior Design plans for exact type and quantity of plumbing fixtures. Any discrepancies between the plans are to be reported to Engineer at once.
- (c) Provide thermostatic mixing valve on all lavatory and sinks when not on main hot water supply. "Lawler" # TMH-1000 Mechanical Mixing Valve with Thermostatic Limit Stop, with temperature adjustment dial and with integral back checks. Set valve temperature at 115° F (46° C), shut-off temp. at 120° F (48.8° C). Mixer installed in H & CW supplies to provide tempered water to hot side of faucet.
- (d) 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 unless otherwise noted.
- (e) 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.
15. 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 with thermal cell insulation.
- (c) All domestic hot water piping shall be insulated as per ASHRAE 90.1-2013.
- (d) All horizontal storm piping located in ceilings to be insulated the full length of the horizontal pipe to limit potential damage due to condensation as per OBC 7.3.5.6. Protection from Condensation.
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) Installer shall provide fire-stop systems for all piping, at all penetrations through fire-rated separations tested and listed in accordance with CAN/ULC-S115.

HEATING, VENTILATING AND AIR CONDITIONING

1. 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.
2. 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.
3. 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.
4. 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) Thermostat mounting height shall be 1,200 mm above finished floor as per OBC 3.8.1.5.(a)(i).
- (c) 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.
5. 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 manual balancing dampers to ensure proper balancing of airflow through all terminals. Manual balancing dampers to come with factory mounted locking hand quadrant and shall be expanded throat type, with exception of spin-in fittings which are acceptable for diffused branches.
- (f) Flex ducts shall not exceed 3m (10 ft) in length, be supported every 5ft and shall not be used in lieu of rigid elbows or fittings. 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.
- (h) Supply duct or return ducts located in an unconditioned space or outdoors shall have all joints of the ductwork sealed to a Class A seal level in accordance with the SMACNA, "HVAC Duct Construction Standards – Metal and Flexible". (OBC 6.2.4.3.(11))
- (i) Supply duct located in a conditioned space shall be sealed to a Class C seal level in accordance with the SMACNA, "HVAC Duct Construction Standards – Metal and Flexible". (OBC 6.2.4.3.(12))
6. DUCT INSULATION
- (a) 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 length of 6'-0" (1.8m) from exterior wall or insulated the entire length when passing through unheated space. Insulation sleeve may be used in place of aforementioned insulation if approved for application. Minimum insulation thermal resistance of RSI 0.5 required (OBC 9.32.3.10(3)).
- (b) Intake ducts carrying un-tempered outdoor air shall be insulated as per values noted in O.B.C. Table 9.32.3.10A

- for associated outdoor design air temperature as per SB-1.
- (c) All ducts handling outside air shall be insulated for the entire length of duct.
- (d) Insulate all supply air and return air ductwork with 2" thick insulation c/w vapour barrier inside attic space (typical for all ductwork route throughout attic) to achieve a minimum thermal resistance of RSI 2.1 as per OBC 6.2.4.3(10)
- (e) 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 overcladding 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.
- (f) All ductwork from VVT terminal up to roof top Air conditioning unit shall be of medium pressure duct standard.
- (g) All air conditioning ductwork shall be sealed with high pressure duct sealer.
- (h) All supply ducts and return ducts located in an unconditioned space or outdoors shall be sealed to Class A seal level as per OBC 6.2.4.3(11)
- (i) All supply ducts and return ducts located in a conditioned space shall be sealed to Class C seal level as per OBC 6.2.4.3(12).
- (j) Minimum duct insulation values to comply with ASHRAE 90.1 Table 6.8.2 for associated Climate Zone for SB-10 compliance.
7. HYDRONIC SYSTEMS
- (h) Due to on-site conditions and slight changes to pipe runs, locations of air vents shown on drawings may need to be adjusted. Contractor to ensure air vent is installed on hydronic system at critical points in system as required.
8. HYDRONIC SYSTEM INSULATION
- (a) Hydronic system components including but not limited to pumps, piping, tanks, vessels, heat exchangers shall be insulated to minimize condensation by keeping surface temperature above dew point of surrounding air and to minimize unwanted heat loss/gain of the HVAC systems as per ASHRAE Fundamentals 2017 Chapter 23. Equipment such as pumps and heat exchangers etc. shall be completely insulated with thermal blankets to minimize exposure to the surrounding environment.
- (b) Insulation covering chilled-water piping, refrigerant suction piping, or cooling ducts located outside the conditioned space shall include a vapor retardant located the insulation (unless the insulation is inherently retardant), all penetrations and joints of which shall be sealed.
9. 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.
- (b) Access panels are required for each fire damper.

10. 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 deflected, 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 louvers to be complete with bird screen
11. 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.
12. 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. Gas piping for Emergency Gas generators shall be protected by a 2hr. rated construction assembly or located in a service room of the same rating as per CSA 282 7.3.9.2 as required by the General Contractor
- (b) Paint all exterior gas piping to Code and identify all interior gas piping as per CSA B149.1.
- (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.
13. 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 manufacturer recommendation.

GENERAL INSULATION

MINIMUM PIPE INSULATION THICKNESS FOR HEATING SYSTEMS (Steam, Steam Condensate, Hot Water, Domestic Hot Water)							
Fluid Design Operating Temp. Range (°F) and Usage	Insulation Conductivity		Nominal Pipe or Tube Size (in)				
	Conductivity (BTU-in/hr-ft²-°F)	Mean Rating Temperature (°F)	<1	1 to <1½	1½ to <4	4 to <8	≥8
>350	0.32 to 0.34	250	4.5	5.0	5.0	5.0	5.0
251 to 350	0.29 to 0.32	200	3.0	4.0	4.5	4.5	4.5
201 to 250	0.27 to 0.30	150	2.5	2.5	2.5	3.0	3.0
141 to 200	0.25 to 0.29	125	1.5	1.5	2.0	2.0	2.0
105 to 140	0.22 to 0.28	100	1.0	1.0	1.5	1.5	1.5

Reference: ASHRAE 90.1-2013 Table 6.8.3-1

MINIMUM PIPE INSULATION THICKNESS FOR COOLING SYSTEMS (Chilled Water, Brine, Refrigerant)							
Fluid Design Operating Temp. Range (°F) and Usage	Insulation Conductivity		Nominal Pipe or Tube Size (in)				
	Conductivity (BTU-in/hr-ft²-°F)	Mean Rating Temperature (°F)	<1	1 to <1½	1½ to <4	4 to <8	≥8
Insulation Thickness (in)							
40 to 60	0.21 to 0.27	75	0.5	0.5	1.0	1.0	1.0
<40	0.20 to 0.26	50	0.5	1.0	1.0	1.0	1.5

Reference: ASHRAE 90.1-2013 Table 6.8.3-2

MINIMUM DUCT INSULATION R-VALUE, COMBINED HEATING AND COOLING SUPPLY DUCTS AND RETURN DUCTS							
Climate Zone	Duct Location						
	Exterior	Ventilated Attic	Unvented Attic Above Insulated Ceiling	Unvented Attic with Roof Insulation	Unconditioned Space <sup>a</sup>	Indirectly Conditioned Space <sup>b</sup>	Buried
SUPPLY DUCTS							
1	R-6	R-6	R-8	R-3.5	R-3.5	None	R-3.5
2 to 4	R-6	R-6	R-6	R-3.5	R-3.5	None	R-3.5
5	R-6	R-6	R-6	R-1.9	R-3.5	None	R-3.5
6 to 7	R-8	R-6	R-6	R-1.9	R-3.5	None	R-3.5
8	R-8	R-8	R-8	R-1.9	R-6	None	R-6
RETURN DUCTS							
1 to 8	R-3.5	R-3.5	R-3.5	None	None	None	None

<sup>a</sup> Includes crawl spaces, both ventilated and nonventilated.

<sup>b</sup> Includes return air plenums with or without exposed roofs above.

Reference: ASHRAE 90.1-2013 Table 6.8.2-2

SEP 01/22	△	REVISED AS PER CITY COMMENTS	JC
JUN 17/22	△	REISSUED AS PER CITY COMMENTS	EG
APR 26/22	—	ISSUED FOR PERMIT	MB
DATE	NO.	DESCRIPTION	BY

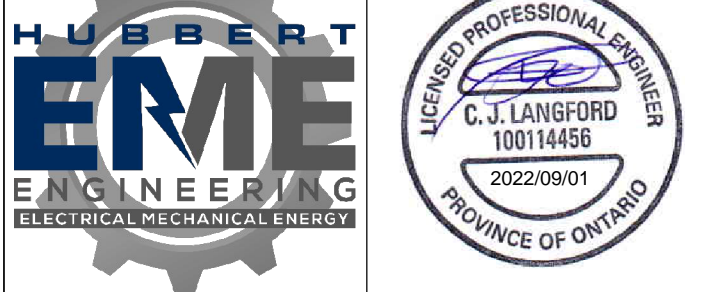
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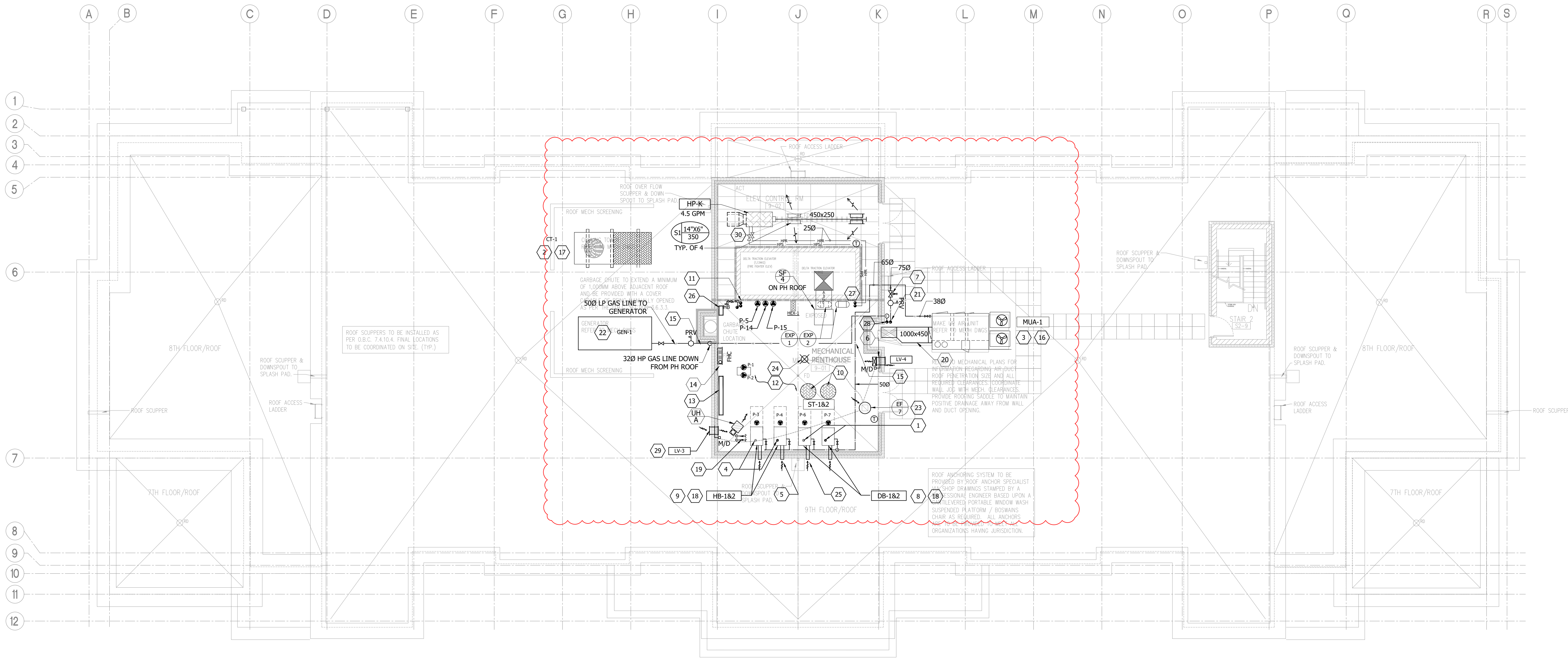
info@EMEng.com

PROJECT: PROPOSED CONDOMINIUM  
SAVERINO INVESTMENTS INC.  
556-560 ESSA ROAD  
BARRIE, ON

MECHANICAL SPECIFICATIONS

DRAWN BY:	CHECKED BY:	SCALE:
MB	CL	NONE
DATE:	PROJECT NUMBER:	DRAWING NUMBER:
APR/2022	22-6229	M-001





1 ROOF PLAN HVAC LAYOUT  
Scale: 1:100

EQUIPMENT KEYNOTES	
1	BOILERS: TO BE MOUNTED ON 'ISOMAT' OR EQUAL APPROVED AND THE CONCRETE PAD WILL BE WRAPPED CONCRETE. ANY SUPPORT POINTS TO THE FLOOR OR CEILING FOR FORCE DRAFT BLOWERS SHOULD BE MOUNTED ON STEEL SPRING AND NEOPRENE ISOLATORS GIVING AT LEAST 1" STATIC DEFLECTION. THE BOILER FIRING FREQUENCY SHOULD BE REVIEWED PRIOR TO SELECTION OF NOISE CONTROL. ASSOCIATED PIPING AND BREACHING SHOULD BE INCORPORATE VIBRATION ISOLATOR HANGERS AND/OS SPRINGS.
2	PUMPS: SHOULD BE MOUNTED ON DOUBLE DEFLECTION NEOPRENE ISOLATORS PROVIDING MINIMUM OF 0.4" STATIC DEFLECTION.
3	FANS: SHOULD BE MOUNTED ON STEEL SPRINGS AND NEOPRENE HANGERS WITH 1" STATIC DEFLECTION.
4	PIPES AND PIPE RISERS: ALL PIPES WITH A DIAMETER GREATER THAN 75mm (3 INCHES) SHOULD BE VIBRATION FROM THE BUILDING STRUCTURE. THESE PIPES SHOULD BE SUPPORTED ON A VIBRATION ISOLATORS SYSTEM HAVING A STATIC DEFLECTION OF AT LEAST 12mm (1/2 INCHES). ALL PIPES THAT PENETRATE THROUGH FLOORS SHOULD DO SO THROUGH ENLARGE SLEEVE PENETRATION. THERE SHOULD BE NO MECHANICAL CONTACT BETWEEN THE TWO, THUS AVOIDING THE TRANSFER OF VIBRATION TO THE STRUCTURE.

ROOF HVAC KEYNOTES		12	FOR PIPING CONNECTIONS AND ARRANGEMENT REFER TO SCHEMATIC DWG. M-113.	23	250X250 EXHAUST DUCT DOWN FROM FAN AND TERMINATE BELOW ROOF DECK WITH WIRE MESH SCREEN AT INLET
1	1000 FLUE VENT UP THRU ROOF WITH APPROVED VENT CAP TERMINATING MINIMUM 1.0M ABOVE FINISHED ROOF	13	CHEMICAL TREATMENT STATION.	24	CARBON MONOXIDE DETECTOR
2	ROOF OUTDOOR MOUNTED COOLING TOWER CT-1 UNIT. COOLING TOWER APPROX. DIM. AND WEIGHT: 5'-1" w x 15'-3" L x 11'-9" H (APPROX. 12,530 lbs)	14	FIRE STANDPIPE LINE FROM FLOOR BELOW. REFER TO FIRE PROTECTION FLOW DIAGRAM FOR DETAILS.	25	1000 INTAKE VENT WITH "RBI" WALL VENT TERMINAL TERMINATING AT EXTERIOR WALL APPROXIMATELY 0.6M ABOVE THE SNOW LINE
3	ROOF MOUNTED INDIRECT GAS FIRED, HEATING AND COOLING MAKE-UP AIR UNIT MUA-1 APPROX. DIM AND WEIGHT: 8'-0" w x 13'-5" L x 4'-0" H (APPROX. 4,300 lbs)	15	GAS LINE ROUTING ON ROOF SHALL BE SUPPORTED AT 2.5M INTERVALS AND AT ALL CHANGE OF DIRECTIONS. REFER TO DETAIL ON THIS DRAWING.	26	CONTROL PANELS
4	1500 FLUE VENT UP THRU ROOF WITH APPROVED VENT CAP TERMINATING MINIMUM 1.0M ABOVE FINISHED ROOF	16	REFER TO MAKE UP AIR UNIT CURB DETAIL ON DWG. M-116.	27	1500 HPS AND HPR RISERS.
5	1500 INTAKE VENT WITH "RBI" WALL VENT TERMINAL TERMINATING AT EXTERIOR WALL APPROXIMATELY 0.6M ABOVE THE SNOW LINE	17	REFER TO COOLING TOWER UNIT CURB DETAIL ON DWG. M-116.	28	320 GAS LINE UP TO HIGH ROOF.
6	500x350 COMBUSTION AIR DUCT DN. TO 450MM A.F.F. WITH 45° ANGLE CUT AND WIRE MESH SCREEN AT INLET.	18	REFER TO BOILER UNITS AND PUMPS CURB DETAIL ON DWG. M-116.	29	INTAKE AIR LOUVER MOUNTED AT LOW LEVEL 2'-0" AFF.
7	EMERGENCY GAS SHUT-OFF VALVE	19	200 HWS AND HWR LINES TO SYSTEM LOOP.	30	CONNECT 250 HPS /HPR LINES TO HEAT PUMP SYSTEM IN MECH. ROOM AND RUN 380 CONDENSATE DRAIN LINE TO FLOOR NEAREST HUB/FLOOR DRAIN.
8	DOMESTIC HOT WATER BOILERS DB-1 AND DB-2 APPROX. DIM AND WEIGHT 600mm L x855mm Wx1160mm H, WEIGHT: 340 lbs	20	EXPOSED DUCTWORK RUNNING ON ROOF SHALL BE INSULATED WITH 50MM RIGID FOIL FACED GLASS FIBRE ON THE EXTERIOR. WATER PROOFING AND OVER CLADDING OF 28 GA. GALVANIZED SHEET METAL. 1000X400 ARE INSIDE DIMENSIONS OF DUCTWORK AND DOES NOT INCLUDE THE INSULATION. WITH INSULATION, OPENING SIZE REQUIRED IS 1100X500	GENERAL NOTES: - LOCATION OF DIFFUSER TO BE COORDINATED WITH DIVISION 26. - LOCATION OF THERMOSTAT TO BE COORDINATED WITH DIVISION 26 AND BE PLACED CLOSE TO END OF WALL, NEVER IN THE MIDDLE OF THE WALL. - 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	
9	HEATING BOILERS HB-1 AND HB-2 APPROX. DIM. AND WEIGHT: 900mm L x600mm W x1815mm H (WEIGHT: 650 lbs)	21	320 HIGH PRESSURE GAS LINE FOR GEN-1 AND 320 HIGH PRESSURE GAS LINE FOR MECH EQUIPMENT DN. REFER TO GAS RISER DETAIL ON DWG. M-116.		
10	STORAGE ST-1 APPROX. 200 GAL. (APPROX. 15lbs)	22	ROOF MOUNTED GENERATOR GAS FIRED UNIT GEN-1. REGULATE GAS PRESSURE DOWN TO OPERATING PRESSURE OF GENERATOR.		
11	500 DHW, DCW AND 400 HOT WATER RECIRC. LINES DN.				

MAY 24/23	-	ISSUED FOR CONSTRUCTION	PD
APR 17/23	6	RFI-52 PARKING HEATING PLENUM REMOVED	NN
APR 03/23	5	REVISED AS PER CITY COMMENTS	NN
MAR 24/23	4	REVISED AS PER CITY COMMENTS	EG
FEB 09/23	3	REVISED AS PER RFI#6	EG
SEP 01/22	2	REVISED AS PER CITY COMMENTS	JC
JUN 17/22	1	REISSUED AS PER CITY COMMENTS	EG
APR 26/22	-	ISSUED FOR PERMIT	MB
DATE	NO.	DESCRIPTION	BY

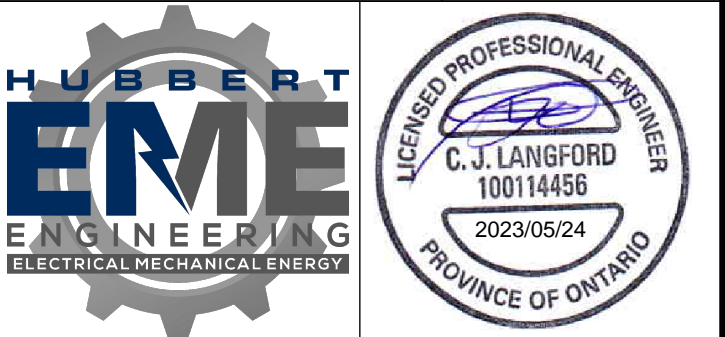
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PROJECT: PROPOSED CONDOMINIUM  
SAVERINO INVESTMENTS INC.  
556-560 ESSA ROAD  
BARRIE, ON

DRAWING TITLE		
ROOF PLAN HVAC LAYOUT		
DRAWN BY: MB	CHECKED BY: CL	SCALE: 1:100
DATE: APR/2022	PROJECT NUMBER: 22-6229	DRAWING NUMBER: M-106