MECHANICAL SPECIFICATION:

MECHANICAL SUBCONTRACTOR SHALL SUBMIT PRICE BASED ON SUPPLY AND INSTALLATION OF EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE AND FULLY FUNCTIONAL MECHANICAL PACKAGE. MECHANICAL PACKAGE TO CONSIST OF EQUIPMENT AND MATERIALS AS DESCRIBED IN THE DRAWINGS AND SPECIFICATIONS.

DO NOT SCALE DRAWINGS.

SECTION 15010

GENERAL CONDITIONS

- PROVIDE ALL LABOR, MATERIALS, AND EQUIPMENT NECESSARY TO COMPLETE AND FULLY FUNCTIONAL MECHANICAL SYSTEM AS SHOWN ON THE DRAWINGS AND DESCRIBED IN THESE SPECIFICATIONS.
- 2. CONTRACT DOCUMENTS
- a. IN THE EVENT THAT AN ITEM IS SHOWN ON THE DRAWINGS BUT NOT SPECIFIED OR SPECIFIED AND NOT SHOWN ON THE DRAWING THE ITEM SHALL BE INCLUDED AS IF IT WERE SHOWN IN BOTH LOCATIONS.
- 3. ALL NECESSARY PERMITS SHALL BE OBTAINED AND ALL FEES SHALL BE PAID TO CARRY OUT THE SPECIFIED WORK.
- ALL WORK SHALL BE GUARANTEED FOR ONE YEAR FROM DATE OF COMPLETED WORK ACCEPTANCE BY THE CONTRACT ADMINISTRATOR. SUBMIT DOCUMENTATION IDENTIFYING ADDITIONAL EQUIPMENT WARRANTY COVERAGE AND TIME FRAMES.
- ALL WORK SHALL COMPLY IN EVERY RESPECT WITH ALL NATIONAL, PROVINCIAL, AND LOCAL BY-LAWS AND CODES, WHICH SHALL BE CONSIDERED PART OF THIS SPECIFICATION.
- ALL CUTTING, PATCHING, FLASHING FOR WORK AS REQUIRED HEREIN SHALL BE BY THE GENERAL CONTRACTOR.
- THE MECHANICAL SUBCONTRACTOR SHALL INSTALL THE SYSTEM IN COMPLETE ACCORDANCE WITH THE RECOMMENDATIONS OF THE ASHRAE, AND SMACNA-LATEST EDITION DUCT STANDARDS, TIAC BEST PRACTICES MANUAL AND LOCAL CODES.
- 3. CO-ORDINATE WORK WITH THE WORK OF OTHER TRADES TO AVOID CONFLICTS.
- ALTER THE LOCATION OF DUCTS OR PIPES AT THE DIRECTION OF THE CONTRACT ADMINISTRATOR WITHOUT CHARGE TO THE CITY, PROVIDED THE CHANGE IS MADE BEFORE INSTALLATION AND DOES NOT NECESSITATE ADDITIONAL MATERIALS.
- 10. BID SHALL BE BASED ON THE USE OF SPECIFIED MANUFACTURERS.
- 11. FURNISH TO CONTRACT ADMINISTRATOR ONE (1) HARD-COVERED 3-RING BINDER CONTAINING THEREIN ONE (1) COMPLETE SET OF MANUFACTURERS' OPERATING AND MAINTENANCE INSTRUCTIONS SHOWING ALL MAJOR EQUIPMENT, AND APPARATUS REQUIRING MAINTENANCE. INSTRUCTIONS SHALL BE COMPLETE FOR INSTALLATION, OPERATION, AND MAINTENANCE AND SHALL INCLUDE PERTINENT INFORMATION SUCH AS DETAILED DRAWINGS AND OPERATION CURVES. SUPPLIER PARTS, SUPPLIER LISTS AND ADDRESSES SHALL BE PROVIDED. INSTRUCTIONS SHALL BE PROVIDED FOR THE CITY REPRESENTATIVE TO ENSURE A THOROUGH UNDERSTANDING OF THE EQUIPMENT AND ITS OPERATION.
- 12. ALL WIRING, SUPPLY AND INSTALLATION OF DISCONNECT SWITCHES FOR EQUIPMENT SPECIFIED HEREIN SHALL BE PERFORMED BY THE ELECTRICAL SUBCONTRACTOR, UNLESS OTHERWISE NOTED.
- 13. ALL CONTROL WIRING SHALL BE BY THE MECHANICAL SUBCONTRACTOR.
- PRIOR TO SUBMITTING BID, BIDDERS SHALL EXAMINE THE SITE AND CONDITIONS AFFECTING WORK, METHODS OF CONNECTION AND LOCATION OF ALL SERVICES INVOLVED UNDER THIS CONTRACT. FAILURE TO MAKE THIS VISIT IN NO WAY ALLEVIATES THE MECHANICAL SUBCONTRACTOR FROM RESPONSIBILITY FOR COMPLETING THE MECHANICAL WORK OF THIS CONTRACT IN A WORKMANLIKE MANNER. NO ALLOWANCE WILL BE MADE AFTER CONTRACT AWARD FOR ANY EXPENSE INCURRED THROUGH A FAILURE TO MAKE THIS EXAMINATION AND INVESTIGATION.
- 15. PROVIDE ONE SET OF SPECIAL TOOLS REQUIRED TO SERVICE EQUIPMENT AS RECOMMENDED BY MANUFACTURERS.
- 16. PROVIDE DIELECTRIC COUPLINGS WHEREVER PIPES OF DISSIMILAR METALS ARE JOINED.
- 17. THE MECHANICAL SUBCONTRACTOR SHALL SUBMIT SHOP DRAWINGS VIA E-MAIL IN PDF FORMAT. HARD COPIES WILL NOT BE ACCEPTED. FOR ALL EQUIPMENT FOR REVIEW BY THE CONTRACT ADMINISTRATOR. NOT WITHSTANDING ANY COMMENTS CONTAINED WITHIN THE CONTRACT ADMINISTRATORS REVIEW OF THE SHOP DRAWINGS. THE MECHANICAL SUBCONTRACTOR AND/OR EQUIPMENT SUPPLIER REMAIN FULLY RESPONSIBLE FOR THE SUPPLY AND INSTALLATION OF ALL MATERIALS EQUIPMENT IN COMPLIANCE WITH THE DRAWINGS AND SPECIFICATIONS. THE MECHANICAL SUBCONTRACTOR AND/OR EQUIPMENT SUPPLIER SHALL BE FULLY RESPONSIBLE FOR ANY CHANGES TO EQUIPMENT DELIVERED TO THE JOB SITE INCLUDING BUT NOT LIMITED TO COMPLETE REPLACEMENT OF MATERIALS AND EQUIPMENT AFTER THE FACT IF EQUIPMENT DELIVERED IS FOUND NOT TO COMPLY WITH THE DRAWINGS AND SPECIFICATIONS IN EVERY RESPECT AT A LATER DATE EVEN IF THE MATERIALS AND EQUIPMENT DELIVERED TO THE JOB SITE ARE IDENTICAL TO THAT SHOWN ON THE REVIEWED SHOP DRAWINGS. IT SHALL BE MUTUALLY UNDERSTOOD THAT THE CONTRACT ADMINISTRATORS REVIEW OF THE SHOP DRAWINGS IS A GENERAL REVIEW OF THE EQUIPMENT SUPPLIED BY THE CONTRACTOR WITH RESPECT TO GENERAL DESIGN CONCEPTS ONLY. THE CONTRACT ADMINISTRATORS REVIEW IN NO WAY RELIEVES THE MECHANICAL SUBCONTRACTOR OF THE RESPONSIBILITY OF VERIFYING THAT THE EQUIPMENT MEETS ALL SPECIFIED REQUIREMENTS. THE MECHANICAL SUBCONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY COSTS ASSOCIATED WITH ERRORS OR OMISSIONS IN THE SHOP DRAWINGS.
- 8. MECHANICAL SUBCONTRACTOR TO CONFIRM ALL DIMENSIONS AND LOCATIONS OF ALL EQUIPMENT. LAYOUTS. AND SERVICES ETC. PRIOR TO COMMENCEMENT OF WORK.
- 19. HOISTING OF ALL MECHANICAL EQUIPMENT SHALL BE BY THE MECHANICAL SUBCONTRACTOR.
- 20. ASSUME FULL RESPONSIBILITY FOR LAYING OUT ALL WORK AND ENSURING THAT NO DAMAGE IS CAUSED TO THE EXISTING EQUIPMENT AND PREMISES DUE TO IMPROPER LOCATION AND EXECUTION OF WORK UNTIL WORK HAS BEEN COMPLETED AND ACCEPTED BY THE CITY. STORE ALL MATERIALS AS REQUIRED FOR PROTECTION AND CLEAN UP REFUSE CAUSED BY ALL WORK.
- 21. APPLY EXISTING PIPE IDENTIFICATION SYSTEMS TO ALL NEW PIPING IN THIS CONTRACT, SHOWING SERVICE, PIPE SIZE, AND FLOW DIRECTION.
- 22. PROVIDE, AT COMPLETION OF CONSTRUCTION, ALL NECESSARY CERTIFICATIONS, REPORTS, ETC. REQUIRED TO CONFIRM CONSTRUCTION HAS BEEN INSPECTED AND INSTALLATIONS PERFORMED IN ACCORDANCE WITH DRAWINGS AND SPECIFICATIONS, CODES AND REGULATIONS, AND REQUIREMENTS OF ALL AUTHORITIES HAVING JURISDICTION ARE MET.
- 23. COORDINATE ALL WORK WITH THE CITY. SHUTDOWN OF EXISTING SERVICES IS NOT ACCEPTABLE WITHOUT PERMISSION.
- 24. PIPE SLEEVES AND FLOOR PLATES 24.1. SUPPLY GALVANIZED IRON PIPE SLEEVES OF 18 GAUGE GALVANIZED IRON FOR ALL FLOORS. WHERE PIPES PASS THROUGH THE WALLS, PIPE SLEEVES MADE OF STANDARD WEIGHT STEEL PIPE SHALL BE USED. AT FIRE WALL OR FLOOR SEPARATION, CONTRACTOR TO FILL VOID WITH ASBESTOS ROPE.

25. PIPE HANGERS

25.1. ALL PIPE HANGERS USED ON THE JOB SHALL BE SUBSTANTIAL HANGERS DRILLED FOR HANGING FROM THE CEILING OR WALLS. NO PERFORATED IRON HANGERS WILL BE ACCEPTED. THEY SHALL BE SPACED NOT OVER THREE METERS APART AND SHALL BE OF SUCH CONSTRUCTION AS TO ALLOW FOR MOVEMENT OF PIPING DUE TO EXPANSION. HANGERS FOR PIPE 100 MILLIMETRES AND UNDER SHALL BE EQUAL TO CRANE #55-M AND 24-M FOR PIPES ABOVE 100 MILLIMETRES. FOR COVERED PIPES, USE PIPE COVERING PROTECTION SADDLES EQUAL TO CRANE #46-M COPPER PLATE FINISH FOR ALL COPPER PIPES. PROVIDE EQUIVALENT JOIST CLAMPS AND HANGERS AS REQUIRED BY SITE CONDITIONS. ALL HANGERS TO BE PRIME COATED.

- 26. MAINTENANCE AND OPERATING MANUALS
- 26.1. PREPARE AND ASSEMBLE THREE (3) COPIES OF HARD COVER MANUALS ENTITLED "CARE AND OPERATION OF THE MECHANICAL SYSTEMS", CONTAINING THE FOLLOWING SECTIONS:
 - DESCRIPTION OF ALL SYSTEMS AND EQUIPMENT
 - DESCRIPTION OF CONTROL SYSTEM. 26.1.2.
 - A DETAILED MAINTENANCE AND LUBRICATION SCHEDULE FOR ALL EQUIPMENT.
 - A COMPLETE SET OF MANUFACTURER'S OPERATING AND MAINTENANCE INSTRUCTIONS.
 - PARTS LIST OF EACH PIECE OF EQUIPMENT.
 - TEST DATA ON ALL MOTORS GIVING MOTOR H.P., CURRENT DATA, MOTOR R.M.P., VOLTAGE AND PHASE.
- 26.2. THIS CONTRACTOR SHALL BE PRESENT, TOGETHER WITH APPLICABLE SUB-CONTRACTORS 10. FOR SYSTEMS OPERATING BELOW 345 KPg (50 PSIG), COPPER PIPING MAY BE USED UP TO AND MANUFACTURERS WHEN THE INSTRUCTIONS ARE GIVEN TO THE OWNERS.
- 26.3. ALL OF THE ABOVE DOCUMENTS SHALL BE SUBMITTED TO THE CONTRACT ADMINISTRATOR FOR APPROVAL PRIOR TO BEING TURNED OVER TO THE CITY.

27. CUTTING AND PATCHING

27.1. ALL CUTTING, DRILLING AND PATCHING REQUIRED TO INSTALL PLUMBING PIPING. SHALL BE THE RESPONSIBILITY OF THE MECHANICAL SUBCONTRACTOR. ALL PATCHING SHALL MATCH EXISTING FINISHES. THE PAINTING FINISH SHALL BE THE RESPONSIBILITY OF THE PAINTING SUBCONTRACTOR. THE MECHANICAL SUBCONTRACTOR SHALL ACCURATELY LOCATE OPENINGS REQUIRED FOR HIS WORK AND OBTAIN APPROVAL PRIOR TO CUTTING OR DRILLING. ALL OPENINGS THROUGH FIRE WALLS SHALL BE FILLED WITH APPROVED FIRE RESISTANT MATERIALS.

28. EXCAVATION AND BACKFILLING

- 28.1. THIS CONTRACTOR SHALL CAREFULLY READ THIS SECTION OF THE SPECIFICATION COVERING EXCAVATION, TRENCHING AND BACKFILLING; ALSO BE GUIDED AS FOLLOWS: DO ALL NECESSARY EXCAVATION INSIDE THE LIMITS OF THE BUILDING AND BACKFILL WITH SAND OR OTHER APPROVED MATERIAL TO A MINIMUM OF 300 MILLIMETRES OVER THE PIPE OR AS NECESSARY TO PROTECT THE MECHANICAL WORK; MECHANICAL SUBCONTRACTOR TO BACKFILL THE REMAINDER OF THE EXCAVATION. ALL EXCAVATION AND BACKFILLING OUTSIDE THE BUILDING NOT INCLUDED IN THIS CONTRACT.
- ALL EXCAVATION SHALL BE PROTECTED AND SHORED AS REQUIRED AND/OR DIRECTED BY THE CONTRACT ADMINISTRATOR; PROVIDE ADEQUATE TEMPORARY CROSS-OVERS FOR PEDESTRIAN AND VEHICULAR TRAFFIC INCLUDING GUARD RAILS, LAMPS, AND FLAGS IF NECESSARY. ALL PIPING SHALL BE TESTED, INSPECTED AND APPROVED. ALL EXCESS MATERIALS SHALL BE REMOVED FROM THE PREMISES AND LEGALLY DISPOSED OF.
- FROZEN EARTH SHALL NOT BE USED FOR BACKFILLING NOR ANY BACKFILLING BE PLACED AGAINST FROZEN EARTH.
- AFTER A PERIOD ADEQUATE TO REVEAL SETTLEMENT HAS PASSED, FILL ALL DEPRESSIONS TO RESTORE THE CORRECT GRADE. THE CONTRACTOR RESPONSIBLE FOR BACKFILLING SHALL BE RESPONSIBLE FOR MAKING GOOD ANY SUBSEQUENT SETTLEMENT OF FILL PLACED BY HIM AND SHALL PAY ALL COSTS INVOLVED IN MAKING GOOD PAVING. SURFACING LAWNS, CURBS AND ALL OTHER SURFACES DAMAGED BY THE EXCAVATION AND BACKFILLING AND BY SUBSEQUENT SETTLEMENT.
- ALL CONDUITS OR PIPING SUCH AS NATURAL GAS, SEWERS, ELECTRICAL CONDUITS, FIRE ALARM LINES, ETC., IN THE VICINITY OF OR CROSSING THE LINE OF THE TRENCH SHALL 14. CLEANOUTS AND TRAPS BE EXPOSED BY HAND EXCAVATION.
- EXCAVATE BOTTOMS OF TRENCHES SO THAT PIPES ARE SUPPORTED ON A SOLID BED OF UNDISTURBED EARTH, DO ALL PLUMBING REQUIRED TO KEEP EXCAVATION FREE OF WATER. IF THE TRENCH IS EXCAVATED BEYOND THE PROPER DEPTH IT SHALL BE FILLED WITH SAND AND WELL TAMPED TO BRING THE BOTTOM OF THE TRENCH TO THE PROPER ELEVATION; NO LOOSE SOIL WILL BE PERMITTED UNDER THE PIPES.
- IN BACKFILLING, TAMP OR FLUSH EARTH SOLIDLY IN PLACE; BACKFILL INSIDE THE BUILDING WITH SAND AND PIT RUN GRAVEL UNLESS PERMISSION IS OBTAINED TO USE STANDARD BACKFILL. UNDER DRIVEWAYS AND PAVED AREAS, BACKFILL TO BE TAMPED LEVEL MECHANICALLY OR BY HAND IN MAXIMUM 150 MILLIMETRE LIFTS TO A MINIMUM 95 PROCTOR. THE BACKFILL SHALL BE INSPECTED PRIOR TO BACKFILL PROCEDURES. CARE SHALL BE EXERCISED AND IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO SEE THAT THE PIPES ARE NOT DAMAGED BY THE LATERAL FORCE IMPOSED DURING
- SUPPORT ALL PIPING BELOW GRADE AND UNDER FLOOR SLABS IN 3.2mm (10 GAUGE) CONTINUOUS CADMIUM PLATED CHANNEL. SUPPORT CHANNEL WITH CADMIUM PLATED CLEVIS HANGERS AND RODS. EXTEND CADMIUM PLATED HANGER RODS 450mm (18") ABOVE SLAB REBAR AND BEND BACK OVER REBAR SO AS TO PROVIDE A MINIMUM OF 450mm (18") OF SUPPORT IN SLAB. DO NOT STRESS ROD WHEN BENDING. INSTALL SUPPORTS ON CENTERS AS FOLLOWS:

NOMINAL PIPE SIZE	DISTANCE BETWEEN	SUPPORTS	HANGER ROD DIAMTEI
mm (in)	mm (in)		mm (in)
	STEEL	<u>COPPER</u>	• •
15 (1/2") TO 20 (3/4")	1800 (72")	1500 (60")	10 (3/8")
25 (1") TO 40 (1/2")	2100 (84")	1800 (72")	10 (3/8")
50 (2") TO 65 (2-1/2")	3000 (120")	2400 (96")	10 (3/8")
80 (3") TO 100 (4")	3600 (144")	3000 (120")	16 (1/2")
150 (6") TO 300 (12")	4200 (168")	4000 (160")	22 (3/4")
	• •	, ,	` ' '

SECTION 15180 INSULATION

- 1. INSTALLATION OF INSULATION SHALL COMPLY WITH TIAC BEST PRACTICES GUIDELINES.
- 2. PROVIDE 2" (50mm) THICK FLEXIBLE DUCT INSULATION C/W RFFRK REINFORCED FOIL-FACED VAPOUR SEAL DUCT INSULATION PF335 (3/4 LB./CU/FT) DENSITY ON ALL DUCTWORK PENETRATING EXTERIOR WALL OR ROOF FOR 10FT INTO BUILDING.
- 3. USE WELDED PINS TO SECURE INSULATION TO BOTTOM AND SIDES OF ALL DUCTWORK UNLESS NOTED OTHERWISE. DO NOT USE STAPLES OR ADHESIVE PINS TO SECURE INSULATION TO DUCT.

4. PLUMBING INSULATION

MATERIAL: ON PIPES 50MM (2") DIAM. AND UNDER, USE 12MM (1/2") FIBERGLAS 112 KG/M(7 LB./CU. FT.) DENSITY PIPE INSULATION WITH ASJ JACKET. 13MM (1/2") ARMSTRONG ARMAFLEX AP OR RUBATEX EQUAL MAY BE USED FOR DOMESTIC COLD WATER AND COOLING 18. SANITARY AND STORM DRAINAGE COIL CONDENSATE DRAINS PIPING ONLY; ON PIPES 62MM (2-1/2") DIAM. AND LARGER, USE 25MM (1") FIBREGLAS 88 KG/M(5-1/2 LB./CU. FT.) DENSITY PIPE INSULATION WITH ASJ JACKET, C/W VAPOR BARRIER; VENT PIPING IN COLD ATTICS SHALL BE LESS VAPOR BARRIER JACKET AND WIRED ON.

LOCATION: ALL DOMESTIC COLD WATER PIPING; ROOF HOPPERS, VERTICAL AND HORIZONTAL STORM SECTION 15600 DRAINS; VENT PIPING FOR A DEVELOPED LENGTH OF 3M FROM ROOF TERMINALS: SUMP PUMP DISCHARGE LINES THAT PASS THROUGH CEILING SPACES.

SECTION 15400

PLUMBING

COMPRESSED AIR PIPING:

- 1. PIPE TO BE SCHEDULE 40 CARBON STEEL PIPE TO ASTM A120.
- SYSTEMS OPERATING UP TO 340 kPa (49 PSIG) TO BE THREADED. SYSTEMS OPERATING AT 345 kPa (50 PSIG) AND ABOVE TO BE WELDED. SOCKET WELD UP TO 50mm (2") AND BUTT WELD 65mm (2½ ") AND ABOVE.
- 3. FITTINGS TO BE 1035 kPa (150 PSIG) MALLEABLE IRON.
 - WELDING MATERIALS, FABRICATION STANDARDS AND LABOUR QUALIFICATIONS MUST CONFORM TO ANSI/ASME B31-1, ANSI B16.25, ASME SECTION 17C, AND THE PROVINCIAL DEPARTMENT OF LABOUR REGULATIONS.

- 5. THE MECHANICAL SUBCONTRACTOR SHALL HAVE APPROVAL OF THE DEPARTMENT OF LABOUR TO 4. GAS HEAT SECTION WORK ON HIGH-PRESSURE COMPRESSED AIR SYSTEMS. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY DEPARTMENT OF LABOUR PERMITS AND APPROVAL OF THE DESIGN OF THE
- COMPRESSED AIR SYSTEM PRIOR TO CONSTRUCTION. 6. ALL WELDS SHALL HAVE 100% PENETRATION TO THE ROOT OF THE JOINTS. PROJECTION OF METAL INTO THE PIPE SHALL NOT EXCEED 1.5mm. WELDS HAVING A LACK OF PENETRATION OR
- EXCESSIVE PROJECTION SHALL BE CUT OUT AND RE-WELDED. 7. ALL BRANCH PIPING SHALL BE TAKEN FROM THE TOP OF THE MAIN PIPE. BOTTOM OR SIDE
- CONNECTIONS ARE NOT PERMITTED. 8. COMPRESSED AIR PIPING SHALL BE SLOPED DOWN IN THE DIRECTION OF FLOW A MINIMUM OF
- 1" PER 40 FEET.
- 9. PROVIDE 300mm (12") DRIP LEG AT END OF RUN AND AT ALL LOW POINTS WITH A PRESSURE RATED 20mm (34") BALL VALVE INSTALLED A MAXIMUM OF 2m (6'-0") ABOVE THE FLOOR. PROVIDE THREADED END AND CAP ON VALVE.
- 100mm (4"). LARGER SIZES MUST BE STEEL PIPE. COPPER PIPING TO BE TYPE L HARD DRAWN, ASTM B 88 WITH WROUGHT COPPER FITTINGS TO ANSI B16.22. JOINTS TO BE SOLDERED THROUGH 50mm (2") AND BRAZED FOR 65mm (21/2") THROUGH 100mm (4").
- 11. ALL PIPING IN AREAS SUBJECTED TO PHYSICAL ABUSE SHALL BE BLACK STEEL.
- 12. SITE FABRICATED WELD FITTINGS AND TAKE-OFFS ARE NOT ACCEPTABLE
- 13. PIPE AND FITTINGS ALL BURIED DRAINAGE PIPING, INCLUDING FITTINGS, INSIDE THE BUILDING SHALL BE PVC OR CAST IRON AS REQUIRED BY CODE.
- ALL UNBURIED DRAINAGE PIPING AND FITTINGS INSIDE THE BUILDING, INCLUDING MAIN VENT PIPING SHALL BE CODE COMPLIANT PVC DARIN AND WASTE PIPE.
- BRANCH VENTS MAY BE STANDARD WEIGHT GALVANIZED STEEL WITH STANDARD WEIGHT GALVANIZED MALLEABLE IRON FITTINGS OR TYPE DWV HARD DRAWN COPPER WITH CAST BRONZE OR WROUGHT COPPER SOLDER TYPE FITTINGS. ULC APPROVED PVC DRAIN, WASTE, VENT PIPING ARE ALSO APPROVED.
- 13.4. ALL WATER PIPING INCLUDING HOT AND COLD INSIDE THE BUILDING SHALL BE TYPE 'L' HARD DRAWN COPPER TUBING WITH CAST BRONZE OR WROUGHT COPPER SOLDER FITTINGS. NO COPPER PIPING SHALL CONTACT FERROUS METALS.
- 13.5. FITTINGS FOR VARIOUS PIPING TO BE AS FOLLOWS:

13.5.1. <u>PIPE</u>:

BELL & SPIGOT OR PLAIN END WITH MJ CLAMPS CAST IRON

COPPER DWV 50-50 SOLDER PLASTIC ABS-DWV OR PVC-DWV PLASTIC C/W SOLVENT WELD JOINTS-PERMITTED

BURIED BELOW GRADE ONLY. COPPER TYPE L 95-5 SOLDER

GROOVED, SCREWED, WELDED OR FLANGED JOINTS SCHEDULE 40 BLACK

(HYDRONIC SERVICE)

STEEL.

- 14.1. PROVIDE AND SET CLEANOUTS FOR DRAINS AT 15 M APART FOR PIPE SIZES BELOW 150 DIA., AND AT 30 M FOR PIPE SIZES IN EXCESS OF 100 DIA.; IN ALL STRAIGHT RUNS OF SEWERS. AT LOCATIONS AS DIRECTED BY THE CONSULTANT, AT THE END OF ALL BRANCHES, AT THE BASE OF ALL RISERS, ON ALL EXPOSED OR ACCESSIBLE TRAPS, AND FURTHER, AT ALL POINTS ON THE SYSTEM WHEN SO INDICATED OR CALLED FOR, OR WHERE NECESSARY BECAUSE OF INTERRUPTION OF GENERAL LINE OF FLOW
- 14.2. THE SCREW CAPS FOR ALL CLEANOUTS SHALL BE APPROVED TYPE. THE CLEANOUTS SHALL BE THE FULL SIZE OF THE PIPE UP TO 100 DIA. FOR CLEANOUTS ON HOUSE DRAINS AND THEIR BRANCHES.
- ALL CLEANOUTS SHALL BE MADE ACCESSIBLE AND WHENEVER NECESSARY BRANCH CONNECTION SHALL EXTEND TO FINISHED SURFACES OF FLOORS, WALLS, ETC. WITH CAST BRASS FLOOR PLATES AND FRAME FOR EACH SET FLUSH WITH FINISHED SURFACE.

15. VALVES

- ALL VALVES SHALL BE SUITABLE FOR 860 KPA WATER PRESSURE AND UP TO AND INCLUDING 65 DIA. SHALL BE ALL BRASS. LARGER SIZES SHALL HAVE IRON BODIES AND BRASS TRIM.
- ALL GATE AND GLOBE VALVES SHALL HAVE DEEP STUFFING BOXES WITH BRONZE FOLLOWING RING. GLOBE VALVES SHALL HAVE RENEWABLE COMPOSITION DISCS. ALL VALVES SHALL BE GATE VALVES WITH RISING STEM UNLESS OTHERWISE NOTED OR
- 15.3. ALL CHECK VALVES SHALL BE 15' SWING TYPE WITH BRASS DISC.
- VALVES SHALL BE CRANE, JENKINS OR APPROVED EQUAL

16. PLUMBING FIXTURES

- 16.1. SUPPLY AND INSTALL ALL PLUMBING FIXTURES AS SHOWN ON THE DRAWINGS. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR THEIR PROTECTION UNTIL THE BUILDING IS ACCEPTED BY THE ENGINEER.
- ALL FIXTURES SHALL BE FREE OF FLAWS OR BLEMISHES WITH FINISHED SURFACES CLEAR, SMOOTH AND BRIGHT.
- ALL FINISHED PARTS OF TRIMMINGS OF THE FIXTURES INCLUDING FAUCETS. WASTES. TRAPS, ETC. SHALL BE CHROME PLATED.
- 16.4. COLD WATER SUPPLIES TO EACH FIXTURE SHALL BE EQUIPPED WITH SHUTOFF VALVES.

17. TESTING

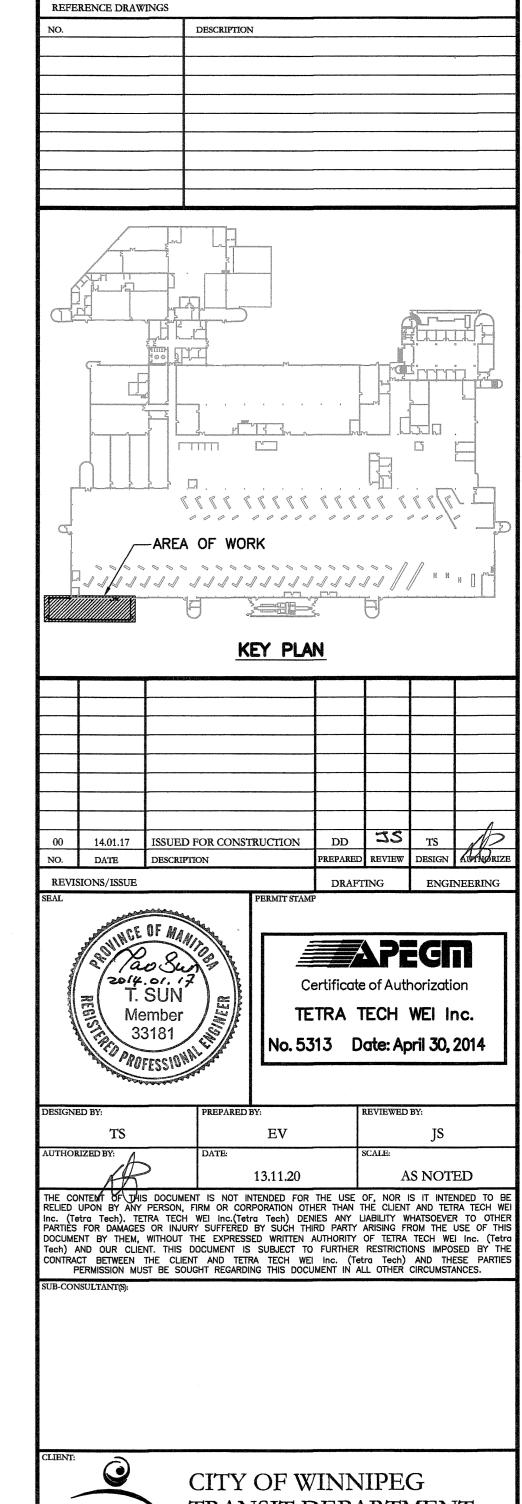
- 17.1. ALL WATER PIPING SHALL BE TESTED AT A HYDRAULIC PRESSURE OF 860 KPA FOR A PERIOD OF EIGHT (8) HOURS.
- 17.2. ALL DRAINS SHALL BE TESTED FOR TIGHTNESS AND GRADE IN THE PRESENCE OF THE LOCAL PLUMBING INSPECTOR.
- 17.3. TEST ALL VALVES FOR SHUT-OFF AND OPERATION AND CHECK PARKING FOR LEAKAGE.
- 18.1. SUPPLY AND INSTALL A NEW SEWAGE SYSTEM FROM THE BUILDING AS INDICATED ON THE PLANS. CHECK ALL INVERTS WITH THE CITY ENGINEER AND PAY ALL COSTS INVOLVED TO CONNECT TO THE CITY SERVICES. SUPPLY AND INSTALL A CLEANOUT ON THE SANITARY MAIN AT THE BUILDING EXIT.

GAS FIRED HEATING MAKE UP AIR UNIT (MAU-1)

- 1. THE UNIT SHALL SERVE AS A 100% O/A MAKEUP AIR UNIT, AND WILL BE REVISED TO A MIXING AIR UNIT IS THE FUTURE (NOT IN CONTRACT).
- 2. UNIT CASING SHALL BE OF MINIMUM 18 (1.3mm) GAUGE SATIN COAT GALVANIZED SHEET METAL. ALL UNITS SHALL BE INTERNALLY INSULATED WITH 2" (50mm) THICK 1 1/2 LB./CU.FT. (24 KG./CU.M.) DENSITY, NEOPRENE COATED FIBRE GLASS THERMAL INSULATION AND 22 GAUGE SATIN COAT SOLID LINERS. PROVIDE HINGED ACCESS DOORS WITH A MINIMUM OF TWO LEVERLOK FASTENERS. COOLING COIL CAVITY DRAIN PANS SHALL BE STAINLESS STEEL WITH A 1" (25mm) M.P.T. DRAIN CONNECTION (TRAPS BY OTHERS). PROVIDE FULL PERIMETER ROOF MOUNTING CURB MINIMUM OF 12 INCHES HIGH.

- a. FORWARD CURVED FANS SHALL BE EQUIPPED WITH GREASEABLE PILLOW BLOCK BEARINGS. SUPPORTED ON A RIGID STRUCTURAL STEEL FRAME. FAN-MOTOR ASSEMBLIES SHALL BE PROVIDED WITH VIBRATION ISOLATORS.
- b. AMCA 'A' SPARK RESISTANT CONSTRUCTION.

- a. HEATING UNITS SHALL HAVE AN INDIRECT NATURAL GAS FIRED HEATING SECTION THAT IS C-ETL APPROVED FOR BOTH SEA LEVEL AND HIGH ALTITUDE
- b. HEAT EXCHANGER SHALL BE A PRIMARY DRUM AND MULTI-TUBE SECONDARY ASSEMBLY CONSTRUCTED OF TITANIUM STAINLESS STEEL WITH MULTI-PLANE METAL TURBULATORS. AND SHALL BE OF A FLOATING STRESS RELIEVED DESIGN. CLAM-SHELL TYPE HEAT EXCHANGERS NOT ACCEPTABLE. HEAT EXCHANGER SHALL BE PROVIDED WITH CONDENSATE DRAIN CONNECTION.



TRANSIT DEPARTMENT

TETRA TECH

CITY OF WINNIPEG TRANSIT - FORT ROUGE GARAGE **BUS MAINTENANCE ADDITION** RAWING DESCRIPTION:

MECHANICAL SPECIFICATIONS SHEET 1

1329720500-DWG-M0007

3D MODEL REF No: