

MECHANICAL SPECIFICATION

CONTRACTOR SHALL SUBMIT PRICE FOR THE COST OF SUPPLY AND INSTALLATION OF EQUIPMENT AND MATERIAL NECESSARY TO PROVIDE A COMPLETE AND OPERATING MECHANICAL PACKAGE. MECHANICAL PACKAGE TO CONSIST OF EQUIPMENT AND MATERIALS AS DESCRIBED IN THIS OUTLINE SPECIFICATION. REFER TO MECHANICAL PLANS FOR ACTUAL REQUIREMENTS OF EQUIPMENT.

SECTION 15005 MECHANICAL SCOPE OF WORK

1. INCLUDE IN MECHANICAL SECTION, PROVISION OF LABOUR, NEW MATERIALS, TOOLS, TRANSPORTATION, SERVICES AND FACILITIES FOR A COMPLETE MECHANICAL INSTALLATION. THE INSTALLATION SHALL BE LEFT COMPLETE IN ALL RESPECTS AND READY FOR OPERATION. FINAL INSTALLATION SHALL BE INSTALLED TO COMPLETE SATISFACTION OF THE RESPONSIBLE CONTRACT ADMINISTRATOR.

2. THE MECHANICAL SCOPE OF WORK INCLUDES, BUT IS NOT NECESSARILY LIMITED TO THE FOLLOWING PROVISION:

1. PROVISION OF ALL PIPING, VALVES, FLUSH VALVES, PIPE SLEEVES, LABOUR AND MISCELLANEOUS MATERIALS AS REQUIRED TO COMPLETE THE PROJECT.

2. FAMILIARIZE CREW WITH SITE IN ORDER TO DETERMINE APPROPRIATE LOCATIONS, SITE CONDITIONS, ETC. THAT MAY AFFECT WORK.

3. WORK MAY NEED TO BE PERFORMED AT NON-STANDARD HOURS. DETERMINE SCHEDULE WITH CONTRACT ADMINISTRATOR.

SECTION 15010 GENERAL CONDITIONS

1. PROVIDE ALL LABOUR, MATERIALS, AND EQUIPMENT NECESSARY TO COMPLETE THE WORK SHOWN ON DRAWINGS AND AS SPECIFIED HEREIN.

2. ALL NECESSARY PERMITS SHALL BE OBTAINED AND ALL FEES SHALL BE PAID TO CARRY OUT THE SPECIFIED WORK.

3. ALL WORK SHALL BE GUARANTEED FOR ONE YEAR FROM DATE OF COMPLETED WORK ACCEPTANCE BY THE CONTRACT ADMINISTRATOR. SUBMIT CONTRACT AND ADDITIONAL EQUIPMENT WARRANTY COVERAGE AND TIME FRAMES.

4. ALL WORK SHALL COMPLY IN EVERY RESPECT WITH ALL NATIONAL, PROVINCIAL AND LOCAL CODES AND BY-LAWS, WHICH SHALL BE CONSIDERED PART OF THIS SPECIFICATION. IN THE CASE OF CONFLICTING REQUIREMENTS, BE COVERED BY THE MOST STRINGENT REGULATIONS.

5. ALL CUTTING, PATCHING, FLASHING FOR WORK AS REQUIRED HEREIN SHALL BE BY THE CONTRACTOR.

6. THE CONTRACTOR SHALL INSTALL PLUMBING, HEATING, VENTILATION AND AIR CONDITIONING SYSTEMS IN COMPLETE ACCORDANCE WITH THE RECOMMENDATIONS OF THE NATIONAL/PROVINCIAL BUILDING CODE, ASHRAE, SMACNA LATEST EDITION DUCT STANDARDS, AND LOCAL PLUMBING CODES.

7. COORDINATE WORK WITH WORK OF OTHER TRADES TO AVOID CONFLICT.

8. ALTER THE LOCATION OF DUCTS OR PIPES AT THE DIRECTION OF THE CONTRACT ADMINISTRATOR WITHOUT CHARGE TO THE CONTRACT ADMINISTRATOR, PROVIDED THE CHANGE IS MADE BEFORE INSTALLATION AND DOES NOT NECESSITATE ADDITIONAL MATERIALS.

9. QUOTATIONS SHALL BE BASED ON THE USE OF SPECIFIED MANUFACTURERS OR APPROVED EQUAL IN ACCORDANCE WITH B6. THE USE OF AN EQUAL OR ALTERNATE MANUFACTURERS (APPROVED IN ACCORDANCE WITH B6) SHALL IN NO WAY RELIEVE THE CONTRACTOR FROM THE RESPONSIBILITY OF PROVIDING ALL WORK THAT MAY BE REQUIRED BY WORK OF DIFFERENT SPACE, WEIGHT, ELECTRICAL, OR OTHER REQUIREMENT FROM THAT OF THE SPECIFIED MANUFACTURER. ALTERNATES SHALL BE APPROVED PRIOR TO THE CLOSE OF TENDERS IN ACCORDANCE WITH B6. NO SUBMITTALS RECEIVED AFTER BID CLOSING WILL BE ACCEPTED.

10. THE CONTRACTOR SHALL PROVIDE SIX (6) SETS OF SHOP DRAWINGS FOR ALL EQUIPMENT FOR REVIEW AND APPROVAL BY CONTRACT ADMINISTRATOR. CONTRACTOR SHALL STAMP SHOP DRAWINGS REVIEWED BY CONTRACTOR PRIOR TO SUBMISSION. FAILURE TO COMPLY WILL RESULT IN SHOP DRAWINGS BEING RETURNED "UNREVIEWED" BY CONTRACT ADMINISTRATOR.

11. FURNISH TO THE CONTRACT ADMINISTRATOR THREE (3) HARD-COVERED LOOSE-LEAF BINDERS CONTAINING THE FOLLOWING: (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. SPARE PARTS, SUPPLIER LISTS AND ADDRESSES SHALL BE SUPPLIED. INSTRUCTION SHALL BE REQUIRED WITH THE CONTRACT ADMINISTRATORS' 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 CONTRACTOR, UNLESS OTHERWISE NOTED.

13. CONTRACTOR 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 CONTRACTOR 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.

14. SCHEDULING OF ALL WORK SHALL BE ARRANGED WITH THE CONTRACT ADMINISTRATOR, AND THEY SHALL BE NOTIFIED AND APPROVAL OBTAINED PRIOR TO SHUTTING OFF EXISTING SERVICES FOR PURPOSES OF CONNECTING NEW WORK. WORK WITHIN THE BUILDING MAY HAVE TO BE PERFORMED DURING NON-REGULAR WORKING HOURS AND MUST CONFORM TO WORK RULES OF THE BUILDING AS DIRECTED BY THE CONTRACT ADMINISTRATOR.

15. AS-BUILT DRAWINGS: 1. OBTAIN SETS OF WHITE PRINTS (ONE FOR EACH SYSTEM IE. PLUMBING, HVAC, FIRE PROTECTION) AND KEEP AT JOB SITE AT ALL TIMES. 2. RECORD ALL ADDITIONS OR DEVIATIONS FROM THE CONTRACT DOCUMENTS INCLUDING ALL CHANGES INCURRED BY ADDENDA, CHANGE ORDERS, FIELD CHANGES, JOB CONDITIONS, ETC. CONTRACTORS SHALL BE RESPONSIBLE FOR THE PRODUCTION OF AS-BUILT RECORD DRAWINGS WHICH SHALL PROVIDE A COMPLETE AND ACCURATE RECORD OF THE ACTUAL MECHANICAL INSTALLATION. ALL PRINCIPLE BELOW GRADE OR UNACCESSIBLE PIPING OR DUCT SYSTEMS, ETC. SHALL BE DIMENSIONED AT EACH CHANGE IN DIRECTION, INCLUDE ALL ROUTING OF SERVICES NOT INDICATED ON ORIGINAL DRAWINGS.

4. PROJECT RECORD DRAWINGS SHALL BE TRANSFERRED BY CONTRACTOR TO REPRODUCIBLE BOND DRAWINGS AND LABELLED "AS-BUILT".

5. SUBMIT REPRODUCIBLE BOND DRAWINGS TO CONTRACT ADMINISTRATOR FOR REVIEW UPON COMPLETION IF CORRECTIVE MEASURES ARE REQUIRED. AFTER THE SECOND CONTRACT ADMINISTRATOR REVIEW (DUE TO MISSING INFORMATION AND/OR IMPROPER DRAFTING STANDARDS), THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTRACT ADMINISTRATORS TIME COSTS FOR CORRECTIVE MEASURES, COURIER AND PRINTING COSTS.

6. CONTRACTOR SHALL EMPLOY CONTRACT ADMINISTRATOR(COR CAD DRAFTING SERVICE) TO PRODUCE ELECTRONIC COPY AS-BUILT DRAWINGS. CONTRACTOR SHALL BEAR ALL COSTS OF PRODUCTION.

7. COPY OF FINAL "AS-BUILT" DRAWING SHALL BE SUBMITTED TO CONTRACT ADMINISTRATOR.

8. ALL COSTS OF "AS-BUILT" DRAWINGS PRODUCTION SHALL BE BORNE BY THE CONTRACTOR.

16. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, PROVIDE TEMPORARY HEATING AND HOARDING AS REQUIRED FOR THE PROPER PROGRESS OF THE WORK.

17. VERIFY SIZES, INVERTS AND LOCATIONS OF ALL SERVICES PRIOR TO COMMENCEMENT OF WORK. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO SANITARY SEWER, STORM SEWER, DOMESTIC WATER MAINS, FORCE MAINS, ETC.

18. HOISTING OF ALL MECHANICAL EQUIPMENT SHALL BE BY THE CONTRACTOR.

19. ASSUME FULL RESPONSIBILITY FOR LAYING OUT ALL WORK AND ENSURING THAT NO DAMAGE IS CAUSED TO THE CONTRACT ADMINISTRATORS EQUIPMENT AND PREMISES DUE TO IMPROPER LOCATION AND EXECUTION OF WORK IN THIS CONTRACT. PROTECT AND MAINTAIN ALL WORK UNTIL WORK HAS BEEN COMPLETED AND ACCEPTED BY THE CONTRACT ADMINISTRATOR. STORE ALL MATERIALS AS REQUIRED, AND CLEAN UP REFUSE CAUSED BY ALL WORK.

20. IDENTIFY ALL NEW PIPING WITHIN BUILDING INSTALLED IN THIS CONTRACT SHOWING SIZE, PIPE SIZE, AND FLOW DIRECTION. USE CAPITAL LETTERS USING EITHER FIRE RESISTANT HIGH GLOSS INTERIOR ENAMEL PAINT OR WATERPROOF, HEAT RESISTANT PLASTIC MARKER TAGS (SIMILAR TO: W.H. BRADY IDENTIFICATION TAPES, BANDS, MARKERS). IDENTIFY AT MAXIMUM OF EVERY 50 FT. AND AT LEAST ONCE IN EACH ROOM. LOCATE AND SIZE LETTERING SUCH THAT IT CAN BE SEEN FROM FLOOR.

21. IN THE CASE OF DISCREPANCY BETWEEN ARCHITECTURAL AND MECHANICAL DRAWINGS TO NUMBER, TYPE, OR LOCATION OF HVAC EQUIPMENT AND SYSTEMS COMPONENTS, OBTAIN WRITTEN RULING.

22. ALL TIME/DATE SENSITIVE ELECTRONIC EQUIPMENT AND SOFTWARE PROVIDED ON THIS PROJECT SHALL BE A 4 DIGIT YEAR INPUT COMPATIBLE AND SHALL BE BASED ON THE USE OF FULL, UNABREVIATED, UNAMBIGUOUS DISCRETE TIME AND DATE CODES.

23. ALL TIME/DATE SENSITIVE ELECTRONIC EQUIPMENT AND SOFTWARE PROVIDED ON THIS PROJECT SHALL BE A 4 DIGIT YEAR INPUT COMPATIBLE AND SHALL BE BASED ON THE USE OF FULL, UNABREVIATED, UNAMBIGUOUS DISCRETE TIME AND DATE CODES.

24. CONTRACTOR SHALL COORDINATE PROVISION OF POWER TO BUILDING CONTROL TRANSFORMERS WITH DIVISION 16 AND CARRY ALL INCREMENTAL COSTS.

25. COORDINATE THE ELECTRICAL REQUIREMENTS OF ALL MECHANICAL EQUIPMENT WITH DIVISION 16. DIVISION 16 SHALL PROVIDE THE FOLLOWING:

1. ALL POWER WIRING TO EQUIPMENT. 2. ONE 15 AMP 120V/1PH/60HZ FEED POWER SUPPLY TO EACH MECHANICAL EQUIPMENT AND/OR JANITOR ROOM.

26. PROVIDE FIRE STOPPING AT ALL PIPING, CONDUIT (CONTROLS) AND DUCTWORK PENETRATIONS OF ALL REQUIRED FIRE SEPARATIONS WITH APPROVED MATERIAL SYSTEMS. ACCEPTABLE MATERIALS: 3M, DOW, CORNING, APS.

SECTION 15180 INSULATION

A. ALL INSULATING MATERIALS, METHODS, SIZES AND TYPES OF INSULATION FOR ALL PIPING AND DUCT WORK SHALL BE INSTALLED TO THE REQUIREMENTS OF THE ASHRAE STANDARDS 90.1-2004 "ENERGY STANDARD FOR BUILDING EXCEPT LOW-RISE RESIDENTIAL BUILDINGS", STANDARD 90.2-2001 "ENERGY EFFICIENT DESIGN OF LOW-RISE RESIDENTIAL BUILDINGS" AND THERMAL INSULATION ASSOCIATION OF CANADA (TAC) STANDARDS.

1. PROVIDE 1/2" (12 MM) ON PIPING LESS THAN 1 1/2"(38MM) OR 1" (25MM) ON PIPING 2"(50MM) OR GREATER THICK RIGID PIPE INSULATION ON ALL DOMESTIC WATER PIPES. INSULATION C/W VAPOUR BARRIER.

2. PROVIDE 1" (25 MM) THICK PIPE INSULATION ON ALL PLUMBING VENTS PASSING THROUGH ROOF FOR A DISTANCE OF 10'-0" (3 M) INSIDE FROM POINT OF COLD TO WARM SURFACE PENETRATION. INSULATION C/W VAPOUR BARRIER.

3. PROVIDE 1 1/2" (38 MM) THICK FLEXIBLE DUCT INSULATION C/W RFFRK FACING ON EXHAUST DUCTWORK & ALL SUPPLY DUCTWORK FROM ALL AIR HANDLING EQUIPMENT. EXHAUST DUCTWORK SHALL BE INSULATED FOR A MINIMUM DISTANCE OF 10'-0" (3 M) FROM PENETRATION OF BUILDING THERMAL ENVELOPE. REFER TO DRAWINGS FOR ADDITIONAL INSULATION REQUIREMENTS. ALL SUPPLY AIR DUCTWORK CONVEYING AIR-CONDITIONED AIR SHALL BE INSULATED.

6. PROVIDE 2" (50 MM)THICK RIGID THERMAL FACED INSULATION ON ALL DUCTWORK CONVEYING OUTSIDE AIR COMPLETE WITH RFFRK FACING. DUCTWORK SHALL BE INSULATED OVER ENTIRE RUN FROM PENETRATION OF BUILDING THERMAL ENVELOPE TO UNIT CONNECTION.

7. ACUSTICALLY INSULATE DUCTWORK WITH 1" (25 MM) FLEXIBLE DUCT INSULATION WITH FLAME - ATTENUATED FIBRES BONDED WITH THERMOSETTING RESIN. BLACK PLASTIC-COATED MAT FINISH. PROVIDE WHERE NOTED ON DRAWINGS OR AS SHOWN AS HATCHED DUCTWORK OR ALLOW FOR UP TO 10 FT. (3 M) FROM SUPPLY AND RETURN AIR OPENINGS OF ROOF MOUNTED EQUIPMENT.

8. DO NOT EXTERNALLY INSULATE ANY DUCTWORK WHICH IS SPECIFIED OR SHOWN TO BE INTERNALLY INSULATED UNLESS NOTED OTHERWISE.

9. INSULATION COVERINGS: DUCTWORK RUNNING OUTSIDE BUILDING THERMAL ENVELOPE AND EXPOSED TO THE WEATHER:

3. CROSS HATCHED DUCT WORK REFERENCES INTERNALLY INSULATED, SINGLE HATCH DUCT WORK REFERENCES EXTERNALLY INSULATED. DUCT WORK FROM RT-1, EXPOSED TO THE OUTDOORS, SHALL BE EQUIPPED WITH 2" INTERNAL INSULATION AND WATERTIGHT CONSTRUCTION.

1. MASTIC FINISH OVER INSULATION SHALL BE M-CRYL CP-10 WHITE WEATHER BARRIER COATING AS MANUFACTURED BY CHILDERS PRODUCTS COMPANY. IT SHALL BE APPLIED IN TWO COATS, THE FIRST COAT BEING A TACK COAT APPLIED AT A RATE OF TWO GALLONS PER 100 SQ. FT. (8 L /150M), AND WHILE STILL WET A LAYER OF CHE-GLAS 45 OPEN WEAVE GLASS CLOTH MEMBRANE SHALL BE EMBEDDED WITH ALL FABRIC COAT AT A COVERAGE OF FOUR GALLONS PER 100 SQ. FT. (16 L/50M) SHALL BE APPLIED, FULLY COVERING THE CLOTH MEMBRANE, SO THAT THE MINIMUM DRY FILM THICKNESS IS 1/16" (0.635) (1.6 MM). THERE SHALL BE NO VOIDS OR HOLES AND THE MASTIC SHALL BE TOWELLED, SPRAYED OR WET-BRUSHED TO A SMOOTH EVEN FINISH. PROVIDE ALUMINUM JACKET.

2. ALL ADJOINING UNINSULATED SURFACES MUST BE COMPLETELY WATER-PROOFED AND FLASHED EITHER BY EXTENDING THE M-CRYL CP-10/11 WEATHER BARRIER COATING AND FABRIC MEMBRANE A MINIMUM OF 4" (102 MM) ON THE ADJOINING SURFACE, OR, IF THAT SURFACE WILL ATTAIN TEMPERATURES IN EXCESS OF 180 DEGREES F (82 DEGREES C), USE CHIL-JOINT CP-70 SEALANT AS THE FLASHING COMPOUND.

3. ALL INSULATION IN EXPOSED LOCATIONS, AND ALL DUCTWORK IN FAN ROOMS, GARAGES, CARAGES, ETC., SHALL BE COVERED WITH CANVAS WRAP. INSULATION EXPOSED TO THE MOISTURE SHALL BE COMPLETE WITH COVER PER 9.1/9.2 ABOVE.

10. PIPE INSULATION: 1. ALL PIPING IN EXPOSED LOCATIONS SHALL BE COVERED WITH CANVAS WRAP. THIS SHALL INCLUDE PIPING IN FAN ROOMS, SERVICE ROOMS, GARAGES, ETC.

2. INSULATION EXPOSED TO MOISTURE SHALL BE PROVIDED WITH PVC JACKET (PROTOL, OR EQUAL IN ACCORDANCE WITH B6).

3. ALL PIPING EXPOSED TO OUTDOOR CONDITIONS SHALL BE PROVIDED WITH ALUMINUM JACKETING.

SECTION 15400 PLUMBING

1. PROVIDE COMPLETE FUNCTIONAL PLUMBING SYSTEM COMPRISED OF DOMESTIC WATER PIPING, VENTS, SANITARY AND DRAINAGE PIPING, RAIN WATER LEADERS, ETC.

2. ALL WATER PIPING ABOVE GROUND INSIDE BUILDING SHALL BE TYPE "K" HARD COPPER, OR POLISHED, SHORT HORIZONTAL INTERIOR SWEAT TUBES WITH VP COMBINATION WHEEL HANDLE/LOOSE KEY BALL VALVE ANGLE SCOTS. ESCUTCHEONS AND BRANDED FLEXIBLE RISERS, MCGUIRE #8872C 'P' TRAP, C.P., POLISHED, CAST BRASS 1-1/4" (32MM) WITH CLEANOUT AND ESCUTCHEON. SMITH SERIES #0700-B CARRIER, WITH STEEL PIPE LEGS, BLOCK BASE FEET SUPPORT, CONCEALED ARMS AND PEDESTAL PLATE. (FOR NARROW WALL INSTALLATION PROVIDE "Z" TYPE SLEEVE FOR ARMS.) AMERICAN STANDARD #0050.020 SEM-CHINA PEDESTAL TO COVER EXPOSED PIPING AS PER LOCAL CODES.

3. DRAINS AND VENT PIPING UNDERGROUND INSIDE BUILDING SHALL BE CAST IRON CLASS 4000, OR PVC PLASTIC. FITTINGS SHALL BE MECHANICAL JOINT FOR CAST IRON OR SOLVENT CEMENT FOR PVC.

4. SANITARY WASTE STACKS, HORIZONTAL WASTE, VENT AND RAIN WATER LEADERS, ABOVE GROUND INSIDE BUILDING, SHALL BE CAST IRON CLASS 4000. VENT PIPING AND FIXTURE RUN-OUTS MAY ALSO BE DWV COPPER OR PVC PLASTIC. FITTINGS SHALL BE MECHANICAL JOINT FOR CAST IRON, SOLDER FOR DWV COPPER AND SOLVENT CEMENT FOR PVC.

5. ALL PVC PLASTIC PIPING USED FOR HIGH-RISE BUILDINGS SHALL HAVE A FLAME SPREAD RATING OF 0, AND A SMOKE DEVELOPED RATING OF 35. PIPING AND FITTINGS SHALL BE OF ONE MANUFACTURE: IPEX SYSTEM 15XR.

6. CONTRACTOR SHALL VERIFY ON SITE ALL CONNECTION POINTS TO EXISTING BUILDING SERVICES. COORDINATE ALL NEW PIPING RUNS WITH CONTRACT ADMINISTRATOR.

7. USE 95/5 TIN-ANTIMONY BRAZING SOLDER ON ALL HOT AND COLD WATER PIPING. USE NON-CORROSIVE NON-LEADED FLUX.

8. ALL VALVES TO BE BY ONE MANUFACTURER. STANDARD OF EQUIPMENT: JENKINS BROS. LTD.

9. MANUFACTURED SHOCK ABSORBERS, AUTOMATIC AIR VENTS, AND PARTITION STOPS SHALL BE INSTALLED AT THE TOP OF ALL RISERS, AND ON ALL FIXTURES OR BATTERY OF FIXTURES.

10. CONTRACTOR SHALL ALLOW FOR IN TENDER QUOTATION ANY ADDITIONAL LABOUR, MATERIALS, ETC. DEEMED NECESSARY DUE TO EXACT SITE CONDITIONS WHICH HAVE NOT BEEN REFLECTED IN MECHANICAL DRAWING OR IN MECHANICAL SPECIFICATION. NOTIFY CONTRACT ADMINISTRATOR OF ALL DISCREPANCIES PRIOR TO TENDER CLOSE.

11. ON COMPLETION, ALL PIPING SYSTEMS SHALL BE CLEANED & FLUSHED OUT TO REMOVE ANY FOREIGN MATERIAL IN THE PIPING.

12. GAS PIPING SHALL BE BLACK STEEL PIPE, EQUAL TO ASTM A-53 SCH. 40 WITH 150 LBS. STANDARD BLACK MALLEABLE IRON SCREWED FITTINGS. ALL WORK SHALL COMPLY WITH C.G.A. B149.1-00 "NATURAL GAS AND PROPANE INSTALLATION CODE", COMPLETE WITH DEPARTMENT OF LABOUR GAS NOTICES, AND SHALL BE PERFORMED BY FULLY QUALIFIED GAS FITTERS AND/OR WELDERS LICENSED TO PRACTICE IN THE PROVINCE OF MANITOBA.

13. VALVES IN GAS PIPING SHALL BE GRINNELL FIG. C.G.A. OR EQUAL IN ACCORDANCE WITH B6.

14. RUN GAS PIPING TO SERVE CONTRACT ADMINISTRATORS EQUIPMENT. TAKE OUT PERMITS AND CONNECT EQUIPMENT READY FOR USE. PROVIDE GAS REGULATORS TO SERVE NEW GAS FIRED EQUIPMENT. GAS REGULATORS SHALL BE C.G.A. APPROVED AS MANUFACTURED BY FISHER, OR EQUAL IN ACCORDANCE WITH B6. PROVIDE GAS COCK DIRT LEG AND FLEXIBLE CONNECTIONS AT EACH PIECE OF EQUIPMENT.

15. CONTRACTOR SHALL COORDINATE SERVICE INSTALLATIONS AND/OR MODIFICATIONS WITH LOCAL UTILITY PRIOR TO COMMENCEMENT OF WORK. PAY ALL COSTS AND/OR FEES.

16. CONTRACTOR SHALL PROVIDE PRE-ASSEMBLED AND PRE-TESTED OVER-PRESSURE RELIEF REGULATORS AND VENT ASSEMBLIES ON ALL PROPANE AND NATURAL GAS PIPING SYSTEMS GREATER THAN 7" W.C., INSTALLED AT EACH APPLIANCE AND/OR EQUIPMENT. INSTALLATION AND REQUIREMENTS TO MEET THE CAN/CSA-B149.1-05 AND TSSA/MB. DEPT. OF LABOUR REQUIREMENTS.

17. PROVIDE DIELECTRIC COUPLINGS WHEREVER PIPES OF DISSIMILAR METALS ARE JOINED.

18. USE THE FOLLOWING ROD DIAMETER AND SPACING SCHEDULE TO ESTABLISH MINIMUM HANGING STANDARDS FOR HORIZONTAL PIPING:

Table with columns: PIPE SIZE, ROD DIA., STEEL, COPPER. Rows include sizes up to 3/4", 1", 1 1/2", 2", 2 1/2", 4" and 5".

Table with columns: CONDUIT SIZE, GAUGE OF METAL. Rows include sizes 1" to 1 1/4", 1 1/2" & 2", 2 1/2" & 3", 4" & 5".

1. WELDED STAINLESS STEEL (WATERTIGHT CONSTRUCTION) SHALL BE USED ON THE SUPPLY AND RETURN DUCT MAINS SERVING RT-1, ONLY IN AREAS WHICH EXTEND THROUGH THE INDOOR EXHIBIT AREA 106. GALVANIZED METAL DUCT WORK FOR ALL OTHER SUPPLY AND RETURN DUCT WORK SHALL BE ACCEPTABLE.

19. PIPE HANGERS WHERE REQUIRED SHALL BE GRINNELL FIG.65 FOR STEEL PIPE AND FIG.117 EXPANSION CASE SET IN HOLES DRILLED IN CONCRETE OR ATTACHED TO FIG.225 FOR 22" CLAMP ATTACHED TO FLOOR JOIST AND ROOF JOIST. FOR INSULATED PIPING, PROVIDE PROTECTION FIG.167 SADDLES SIZE HANGER TO ACCOMMODATE INSULATION WHERE APPLIED.

PLUMBING FIXTURES AND EQUIPMENT:

WC-1 TOILET - FLOOR MOUNTED FLUSH VALVE (BARRIER FREE DESIGN)

1. AMERICAN STANDARD/MADERA ELONGATED 16-1/8" (410MM) HIGH #2305.100 'LOW CONSUMPTION' TOILET, FLOOR MOUNTED FOR FLUSH VALVE, VITREOUS CHINA, ELONGATED SYPHON JET FLUSH ACTION BOWL, FULLY GLAZED 2" (50MM) BALL PASS INTERNAL TRAPWAY, 10" x 12" (254MM x 304MM) LARGE WATER SURFACE, 1.3 GAL. (6 L) FLUSH, 1-1/2" (38MM) TOP SPRUD AND BOLT CAPS. PROVIDE FLOOR FLANGE, FLANGE BOLTS AND GASKET. SLOAN 'REGAL' #111-V0-XL FLUSH VALVE, C.P. LOW CONSUMPTION, FACTORY SET FLOW, QUIET ACTION DIAPHRAGM TYPE WITH NON-HOLD OPEN FEATURE, VACUUM BREAKER AND EXTENDED SEAT BUMPER ON BACK-CHECK ANGLE STOP. CENTOO 880255 SEAT, ELONGATED HEAVY DUTY SOLID PLASTIC OPEN FRONT WITH COVER, REINFORCED STAINLESS STEEL CHECK-HINGE, POSTS, WASHERS AND NUTS.

L-1 BASIN - WALL HUNG (BARRIER FREE DESIGN AND GENERAL USE) FOR TIGHT SPACE AREAS

1. AMERICAN STANDARD 'MURRO' #0954.000 BASIN, 4" (102MM) CENTRES, 22" x 21" x 5 - 7-1/2" (569MM x 533MM x 127-191MM) DEEP, WALL HUNG, VITREOUS CHINA, REAR OVEFLOW, FOR CONCEALED ARM SUPPORT. CHICAGO FAUCETS #902-VK FAUCET, C.P. 4" (102MM) C.C., SOLID CAST BRASS LEAD-FREE BODY, 1/4 TURN CERAMIC DISC VALVE CARTRIDGES, WITH VANDAL-RESISTANT 1.84 GPM (8 L) FLOW AERATOR OUTLET AND CAST BRASS LEVER HANDLES. MCGUIRE #155A DRAIN, C.P. OPEN GRID. MCGUIRE #HT030V8B SUPPLIES, C.P., POLISHED, SHORT HORIZONTAL INTERIOR SWEAT TUBES WITH VP COMBINATION WHEEL HANDLE/LOOSE KEY BALL VALVE ANGLE SCOTS. ESCUTCHEONS AND BRANDED FLEXIBLE RISERS, MCGUIRE #8872C 'P' TRAP, C.P., POLISHED, CAST BRASS 1-1/4" (32MM) WITH CLEANOUT AND ESCUTCHEON. SMITH SERIES #0700-B CARRIER, WITH STEEL PIPE LEGS, BLOCK BASE FEET SUPPORT, CONCEALED ARMS AND PEDESTAL PLATE. (FOR NARROW WALL INSTALLATION PROVIDE "Z" TYPE SLEEVE FOR ARMS.) AMERICAN STANDARD #0050.020 SEM-CHINA PEDESTAL TO COVER EXPOSED PIPING AS PER LOCAL CODES.

FD-1 FLOOR DRAINS - FIN AREAS

1. SMITH SERIES 2005A FLOOR DRAIN, ALL DUCO COATED CAST IRON BODY, REVERSIBLE FLASHING CLAMP WITH SEAPAGE OPENINGS AND ADJUSTABLE 57 (127MM) DIAMETER NICKEL BRONZE 1/4" (6.35MM) THICK STRAINER, SECURED WITH S.S. SCREWS. 4" (100MM) THROUGH STRAINER (WHERE REQUIRED BY LOCAL CODE. PROVIDE TRAP PRIMER CONNECTION "P").

CO-1 FLOOR CLEANOUT (UNFINISHED AND OUTSIDE AREAS)

1. SMITH "TWO-TO-FLOOR" SERIES 4220 FLOOR CLEANOUT, DUCO COATED CAST IRON BODY AND REMOVABLE POSITIVE GASKET SEAL CLOSURE PLUG AND HEAVY DUTY 6" (150MM) ROUND ADJUSTABLE SCORRIATED CAST IRON COVER WITH STAINLESS STEEL SCREWS, C.O. CAST IN COVER. (FOR WATER-PROOFED AREAS PROVIDE "C" FLANGE WITH FLASHING CLAMP).

CO-2 STACK CLEANOUT

1. SMITH SERIES 4510 STACK CLEANOUT, IN BASE OF CAST IRON STACKS WITH NEOPRENE GASKETED TUBES. WARE CLEANOUTS ARE CONCEALED BEHIND FINISHED WALLS ACCESS SHALL BE MADE BY SMITH 4530 ROUND STAINLESS STEEL PLATE AND SLOTTED FLAT HEAD STAINLESS STEEL SCREW

TP-1 TRAP SEAL PRIMER SERVING 1 TO 2 DRAINS

1. P.P.P. INC. MODEL PR-500 AUTOMATIC TRAP SEAL PRIMER VALVE, CAST BRASS BODY, SERVING 1 OR 2 INDIVIDUAL OR REMOTE AREA DRAINS (PRIMER AUTOMATICALLY ACTIVATED WHEN THERE IS A PRESSURE DROP IN THE SYSTEM) WITH 1/2" (12.7MM) NPT (MTO) CONNECTIONS WITH STRAINER AND INTEGRAL BACK FLOW PREVENTER & VACUUM BREAKER. (FOR TWO DRAIN PRIMER PROVIDE UNIT WITH ASSEMBLY #0U-2/558)

WHA WATER HAMMER ARRESTORS

1. SMITH 'HYDROTROL' WATER HAMMER ARRESTORS SERIES #5000, STAINLESS STEEL, PRESSURIZED CHAMBERS, BELLOW, SIZE ACCORDING TO MANUFACTURER'S RECOMMENDATIONS CHART BELOW TO ELIMINATE WATER HAMMER AND SHOCK FROM PIPING SYSTEM. PROVIDE WATER HAMMER ARRESTORS ON HOT AND COLD WATER SUPPLIES TO ALL QUICK VALVES, SOLENOIDS, AND PLUMBING FIXTURES, AND LOCATE IN AN UPRIGHT POSITION BETWEEN THE LAST TWO FIXTURES ON A LINE, OR HORIZONTALLY AT THE END OF LINE CLOSEST TO SUPPLY SOURCE.

Table with columns: SIZE, FIXTURE UNITS, MODEL NO., CONN. SIZE. Row: A 1-11 5005 1/2" (12MM)

SECTION 15800 HEATING, VENTILATION & AIR CONDITIONING

1. PROVIDE SUPPLY, RETURN AND EXHAUST AIR DUCT SYSTEMS FROM AIR HANDLING EQUIPMENT AND FANS AS SHOWN.

2. ALL DUCTWORK INSTALLATION SHALL BE PERFORMED IN ACCORDANCE WITH ASHRAE, SMACNA LATEST EDITION DUCT STANDARDS.

3. THIS CONTRACTOR SHALL SUPPLY AND INSTALL ALL DUCTWORK INCLUDING APPURTENANCES, HANGERS, DAMPERS, ETC.

4. DUCT CONSTRUCTION: 1. RECTANGULAR DUCTWORK SHALL BE CONSTRUCTED FROM GALVANIZED SHEET METAL OF THE FOLLOWING U.S. STANDARD GAUGES:

Table with columns: DUCTS UP TO 12", LONGEST DIMENSION, 26 GA., 24 GA., 22 GA., 20 GA. Rows include sizes 13" to 28", 28" to 54", 55" to 84".

2. ROUND AND OVAL DUCTWORK SHALL BE SPIRAL CONDUIT CONSTRUCTION OF ZINC COATED WITH THE FOLLOWING U.S. GAUGES:

1. WELDED STAINLESS STEEL (WATERTIGHT CONSTRUCTION) SHALL BE USED ON THE SUPPLY AND RETURN DUCT MAINS SERVING RT-1, ONLY IN AREAS WHICH EXTEND THROUGH THE INDOOR EXHIBIT AREA 106. GALVANIZED METAL DUCT WORK FOR ALL OTHER SUPPLY AND RETURN DUCT WORK SHALL BE ACCEPTABLE.

5. DUCT SIZES INDICATED ON DRAWINGS REFERENCE INTERNAL DIMENSIONS. ALL SEAMS AND JOINTS IN ROUND OR OVAL DUCT FITTINGS SHALL BE CONTIGUOUSLY WELDED. RE-COAT ZINC COATING DAMAGED BY WELDING PROCEDURE.

5. BALANCING DAMPERS SHALL BE CONSTRUCTED FROM GALVANIZED STEEL 2 GAUGES HEAVIER THAN THE DUCTWORK IN WHICH THEY ARE INSTALLED C/W LOCKING QUADRANT AND INDICATING DEVICE.

6. TURNING VANES SHALL BE CONSTRUCTED TO THE FOLLOWING REQUIREMENTS: - USE DUCT ELBOWS WHICH HAVE A THROAT RADIUS OF 1-1/2 TIMES THE DUCT DIAMETER. - WHERE SPACE IS LIMITED, USE DUCT ELBOWS FABRICATED WITH FLANGE THROATS AND BACKS AND FITTED WITH ROVANE TURNING VANES.

7. THE FOLLOWING DUCT JOINING METHODS SHALL BE USED: - PITTSBURGH LOCK OR DOUBLE SLIDE LOCK HAMMERED FLAT FOR LONGITUDINAL JOINTS ON STRAIGHT DUCTWORK. - PITTSBURGH LOCK FOR CORNER LOCK OF FITTING. - FLAT DRIVE CLEAT JOINT ON ALL SIDE JOINTS 18" (450MM) AND UNDER IN LENGTH. - FLAT SUP CLEAT JOINT ON ALL TRANSVERSE JOINTS 18" (450MM) AND UNDER IN LENGTH. - ANGLE "S" OR STANDING DRIVE CLEATS ON ALL SIDE JOINTS 19"(475MM) TO 30"(750MM) ON HEIGHT. - STANDING "S" OR STANDING DRIVE CLEATS ON ALL TRANSVERSE JOINTS 19"(475MM) TO 30"(750MM) IN LENGTH. - ANGLE "S" OR STANDING DRIVE CLEATS ON ALL TRANSVERSE AND SIDE JOINTS 31"(789MM) TO 72"(1800MM). - STANDING "S" OR STANDING DRIVE CLEATS REINFORCED WITH 1 1/2"(38MM) X 4.5MM MILD STEEL BAR ON ALL TRANSVERSE AND SIDE JOINTS 73"(1825MM) AND OVER.

8. PROVIDE FIRE DAMPERS WHICH CONFORM TO NFPA REGULATIONS, BEAR ULC LABEL, AND HAVE APPROVAL OF AUTHORITY HAVING JURISDICTION. DAMPERS TO BE TYPE 'B' AND 'C' (UNLESS OTHERWISE NOTED) AND INSTALLED IN DUCTWORK AT FIRE SEPARATIONS WHETHER SHOWN OR NOT. VERIFY LOCATIONS ON ARCHITECTURAL DRAWINGS.

9. ALL NEW DUCTWORK SHALL BE SEALED USING DUCT BOND II HIGH PRESSURE, NON-TOXIC, DUCT SEALER THROUGHOUT ALL SEAMS AND JOINTS.

10. SUPPORT HORIZONTAL DUCTS ON MAXIMUM 8'-0" (2.4 M)CENTERS BY PERFORATED GALV. STEEL RIVETED STRAP FOR DUCTWORK 36" (915 MM) (EITHER DIMENSION) OR LESS, AND MINIMUM 1" x 1" x 1/8" (25 x 25 x 2 MM) GALV. IRON UNDER DUCTS OVER 36" (915 MM) (EITHER DIMENSION) WITH 3/8" (6 MM) DIAM. THREADED RODS SUSPENDING ANGLES FROM STRUCTURE.

11. PROVIDE ACCESS DOORS WHERE REQUIRED FOR SERVING OF EQUIPMENT AND FIRE DAMPERS.

12. PROVIDE 4" (100 MM) FLEXIBLE DUCT CONNECTIONS ON BOTH INLET AND OUTLET DISCHARGE SIDES OF EACH FAN.

13. PROVIDE ONE SPARE SET OF FILTERS FOR EACH AIR HANDLING UNIT.

14. ALL DUCT MOUNTED MOTORIZED DAMPERS SHALL BE INSULATED LOW LEAKAGE TYPE TO TAMCO 9000 OR EQUAL IN ACCORDANCE WITH B6.

15. PROVIDE VIBRATION ISOLATORS FOR ALL MECHANICAL EQUIPMENT, INCLUDING PUMPS, UTILITY FANS, AND VENT SETS, AIR HANDLERS, ROOF-TOPS UNITS, CONDENSING UNITS, COMPRESSED, ETC. AS APPLICABLE. SUBMIT SHOP DRAWINGS PRIOR TO INSTALLATION.

16. BACK-DRAFT DAMPERS SHALL BE PROVIDED WITH THE FOLLOWING MINIMUM REQUIREMENTS: - 16 GA. GALVANIZED STEEL OR ALUMINUM CHANNEL FRAME; 16 GA. GALVANIZED BLADES C/W STIFFENERS, FULL BLADE-LENGTH SHAFT; BRASS, BALL OR NYLON BUSHING; FELT OR NEOPRENE ANTI-CHATTER BLADE STRIPS; ADJUSTABLE COUNTER-BALANCE.

17. CHIMNEYS AND BREECING SHALL BE LABORATORY TESTED AND LISTED BY THE UNDERWRITERS LABORATORIES INC. FOR USE WITH BUILDING HEATING EQUIPMENT BURNING NATURAL GAS OR PROPANE GAS, AS DESCRIBED IN NFPA 211, SECTION 60. THE DOUBLE WALL STACK SHALL HAVE AN OUTER JACKET OF GALVANIZED STEEL CONFORMING TO ASTM A525. THERE SHALL BE AN AIR SPACE BETWEEN THE WALLS. THE INNER GAS CONVEYING PIPE SHALL BE AN ALUMINUM ALLOY - JOINTS TO BE SECURED WITH SHEET METAL SCREWS.

18. PROVIDE CHIMNEYS AND/OR BREECING FOR: 1. GAS-FIRED (INDIRECT) MAKE-UP AIR UNITS.

19. PROVIDE BASE TEE WITH CLEANOUT, ROOF FLASHING AND VENT CAP FOR ALL EQUIPMENT AS REQUIRED.

20. ALL AIR SYSTEMS SHALL BE BALANCED AND TESTED BY A CERTIFIED A.B.C. INDEPENDENT BALANCING AGENCY TO PROVIDE QUANTITIES AS SHOWN. PROVIDE THREE(3) SETS OF BALANCE REPORTS FOR REVIEW BY THE CONTRACT ADMINISTRATOR. ALL BALANCING REPORTS SHALL INCLUDE FIRE DAMPER TESTING AND CERTIFICATION.

MECHANICAL EQUIPMENT SCHEDULES: 1. DIFFUSERS AND GRILLES: (BASED ON PRICE)