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Legend

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**ENGINEERS
GEOSCIENTISTS
MANITOBA**

Certificate of Authorization
Stantec Consulting Ltd.

No. 1301



Client/Project

WINNIPEG TRANSIT MAINTENANCE FACILITY
OFFICE REDEVELOPMENT

421 OSBORNE ST. SOUTH, WINNIPEG, MB

Title

MECHANICAL SPECIFICATIONS

Project No.	Scale
115421006	

Drawing No.	Sheet	Revision
M-003	3 of 16	0

INSULATION.

24.4.2.2. OUTER JACKET OF METALIZED FIRE-RESISTANT VAPOUR BARRIER.

24.4.2.3. SUITABLE FOR UP TO 500 PA POSITIVE STATIC PRESSURE AND/OR 250 PA NEGATIVE STATIC PRESSURE.

24.4.2.4. ULC LABELED, CLASS 1, DUCT CONNECTOR.

24.4.2.5. CONNECT TO DUCTWORK USING TWO WRAPS OF DUCT TAPE AND STAINLESS STEEL WORM DRIVE CLAMPS OR PANDUIT ADJUSTABLE DIAMETER CLAMPS OR THERMAFLEX DUCT STRAP.

24.5. PROVIDE BACKDRAFT DAMPERS WHERE INDICATED ON THE DRAWINGS.

24.5.1. MINIMUM REQUIREMENTS:

24.5.1.1. 16 GAUGE GALVANIZED STEEL OR ALUMINUM CHANNEL FRAME.

24.5.1.2. 16 GAUGE ALUMINUM BLADES, COMPLETE WITH STIFFENING RIBS/BENDS.

24.5.1.3. FULL BLADE LENGTH SHAFTS; BRASS, BALL OR NYLON BEARINGS.

24.5.1.4. FELT OR NEOPRENE ANTI-CHATTER BLADE STRIPS.

24.5.1.5. BLADE CONNECTING LINKAGE WITH EYELET AND PIN BEARINGS.

24.5.1.6. MAXIMUM BLADE LENGTH OF 760 MM USE MULTIPLES FOR LARGER DIMENSIONS.

24.5.1.7. MANUFACTURER'S LABEL.

24.5.1.8. WHERE A BALANCED BACKDRAFT DAMPER (BBD) IS INDICATED THE DAMPER SHALL INCORPORATE AN ADJUSTABLE COUNTERBALANCE WEIGHT AND LEVER.

24.5.1.9. MAXIMUM PRESSURE DROP ACROSS DAMPER AT 4 M/S SHALL BE 45 PA.

24.5.1.10. STANDARD OF ACCEPTANCE: RUSKIN, GREENHECK, AIR CONTROL PRODUCTS

24.6. PROVIDE BALANCE DAMPERS WITH LOCKING QUADRANT ON EACH RUN OUT TO A GRILLE OR DIFFUSER AND WHERE INDICATED ON THE DRAWINGS.

24.6.1. IDENTIFY THE AIRFLOW DIRECTION AND BLADE ROTATION AND OPEN AND CLOSED POSITION.

24.6.2. PROVIDE SHEET METAL BRIDGE TO RAISE QUADRANT TYPE OPERATORS ABOVE THE INSULATION THICKNESS. PROVIDE OPEN END BEARINGS WHERE BRIDGES ARE USED.

24.6.3. THE DAMPER OPERATING LEVER SHALL BE ARRANGED PARALLEL WITH THE DAMPER BLADE.

24.7. WIRE MESH SCREENS

24.7.1. PROVIDE WIRE MESH SCREENS IN ALL AIR INTAKE OPENINGS WHERE NOTED ON THE DRAWINGS.

24.7.2. SCREENS SHALL BE CONSTRUCTED FROM ALUMINUM WIRE 16 GAUGE DIAMETER.

24.7.3. SCREEN MESH SHALL BE 12.5MM.

24.8. PROVIDE FIRE DAMPERS WHERE INDICATED ON THE DRAWINGS.

24.8.1. FIRE DAMPERS SHALL BE ULC TESTED AND LABELED. FIRE DAMPERS SHALL BE CURTAIN TYPE, FUSIBLE LINK ACTUATED, WEIGHTED TO CLOSE AND LOCK IN CLOSED POSITION WHEN RELEASED OR HAVING NEGATOR-SPRING-CLOSING OPERATOR FOR MULTI-LEAF TYPE IN HORIZONTAL POSITION WITH VERTICAL AIR FLOW. CURTAIN FIRE DAMPERS SHALL HAVE BLADES RETAINED IN A RECESS SO FREE AREA OF CONNECTING DUCTWORK IS NOT REDUCED. STANDARD OF ACCEPTANCE: RUSKIN, NAILOR HART, CONTROLLED AIR.

24.8.2. INSTALL IN ACCORDANCE WITH THE SMACNA FIRE, SMOKE AND RADIATION DAMPER INSTALLATION GUIDE FOR HVAC SYSTEMS - LATEST EDITION.

24.8.3. SIZE SO THAT THE FREE AREA OF THE DUCT IS MAINTAINED THROUGH THE ASSEMBLY.

24.8.4. INSTALL IN GALVANIZED STEEL SLEEVE, RETAINED IN PLACE WITH RETAINING ANGLES ON ALL FOUR SIDES AT EACH FACE OF WALL.

24.8.5. CONNECT DUCTWORK TO DAMPER SLEEVES USING BREAK-AWAY DUCT JOINTS ON ALL FACES.

24.8.6. FIRE DAMPERS MUST BE INSTALLED WITHIN WALL THICKNESS OF FIRE SEPARATION.

24.8.7. USE ULC APPROVED FIRE STOP SEALANT TO CAULK ALL JOINTS BETWEEN THE FIRE DAMPER SLEEVE ANGLES AND THE SLEEVE AND BETWEEN THE FIRE DAMPER SLEEVE ANGLES AND THE FIRE SEPARATION.

24.9. DUCT AND PLENUM ACCESS

24.9.1. PROVIDE ACCESS DOORS AND PANELS AS FOLLOWS:

24.9.1.1. DOORS: WHERE SHOWN ON THE DRAWINGS.

24.9.1.2. PANELS:

24.9.1.2.1. EVERY 12M ON ALL DUCTWORK.

24.9.1.2.2. AT THE BASE OF EACH DUCT RISER.

24.9.1.2.3. BOTH SIDES OF EQUIPMENT BLOCKING THE DUCT, (E.G. AIR FLOW MEASURING STATIONS, COILS)

24.9.1.2.4. AT OR TO ONE SIDE OF OTHER EQUIPMENT IN DUCT, (E.G. BACKDRAFT DAMPERS, BALANCING DAMPERS SERVING MULTIPLE INLETS/OUTLETS, FIRE DAMPERS)

24.9.1.2.5. PANELS NEED NOT BE PROVIDED WHERE ACCESS IS AVAILABLE THROUGH A DOOR OR A REGISTER MOUNTED ON THE SIDE OF THE DUCT.

24.9.1.3. PRODUCTS:

24.9.1.3.1. DOORS - CONSTRUCT IN ACCORDANCE WITH SMACNA DUCT STANDARDS FIG. 6-12 EXCEPT FOR LATCH TYPE, 40MM THICK INSULATION.

24.9.1.3.2. PANELS - NAILOR, VENTLOK, 25MM THICK INSULATION.

24.9.1.3.3. GASKETS - NEOPRENE OR FOAM RUBBER.

24.9.1.4. HARDWARE:

24.9.1.4.1. PANELS UP TO 150X300MM - 2 SASH LOCKS.

24.9.1.4.2. PANELS - 380X500MM - 4 SASH LOCKS.

24.9.1.4.3. DOORS - PIANO HINGE AND VENTLOK 310 LATCHES C/W FRONT AND INSIDE HANDLES AND FRONT DOOR PULL.

24.9.1.5. INSTALLATION:

24.9.1.5.1. SEAL FRAMES AIRTIGHT.

24.9.1.5.2. INSTALL SO AS TO NOT INTERFERE WITH AIRFLOW.

24.9.1.5.3. INSTALL TO PROVIDE EASIEST POSSIBLE ACCESS FOR SERVICING AND CLEANING.

24.9.1.5.4. DO NOT USE SHEET METAL SCREWS FOR ATTACHING ACCESS PANELS TO DUCTWORK.

24.9.1.5.5. ROUND DUCTS [330MM/13"] AND LARGER SHALL INCLUDE A SHORT COLLAR FOR THE INSTALLATION OF ACCESS PANELS.

24.9.1.5.6. SMALL RECTANGULAR DUCTS SHALL BE TRANSITIONED FOR THE INSTALLATION OF ACCESS PANELS.

24.9.1.6. PROVIDE THERMAL BREAKS AT ALL ROOF AND WALL PENETRATIONS.

24.9.1.7. PROVIDE FLEXIBLE CANVAS DUCT CONNECTIONS ON ALL FAN EQUIPMENT.

25. PIPING INSTALLATION

25.1. REAM PIPE ENDS, CLEAN SCALE AND DIRT, INSIDE AND OUTSIDE BEFORE AND AFTER ASSEMBLY.

25.2. DURING CONSTRUCTION, PROTECT ALL OPENINGS IN PIPING AND EQUIPMENT, BY CAPPING OR PLUGGING TO PREVENT ENTRY OF DIRT.

25.3. CONNECT TO EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTION UNLESS OTHERWISE INDICATED.

25.4. ARRANGE PIPING CONNECTIONS TO ALLOW EASE OF ACCESS AND FOR REMOVAL OF EQUIPMENT.

25.5. ALIGN AND INDEPENDENTLY SUPPORT PIPING CONNECTIONS ADJACENT TO EQUIPMENT TO PREVENT PIPING STRESSES BEING TRANSFERRED.

25.6. CONSTRUCT PIPING TO ALLOW FOR EXPANSION AND CONTRACTION.

26. PIPE TESTING AND CLEANING

26.1. HYDROSTATICALLY TEST ALL PIPES AS PER CODE PRIOR TO INSULATING.

26.2. REPAIR ALL LEAKS AS REQUIRED FOR ZERO LOSS.

26.3. CHEMICALLY CLEAN AND FLUSH ALL NEW HYDRONIC PIPING PRIOR TO RECONNECTION TO EQUIPMENT.

26.4. THOROUGHLY FLUSH ALL NEW DOMESTIC WATER PIPING.

26.5. PROVIDE CHEMICAL TREATMENT TO MATCH EXISTING AS REQUIRED TO REFILL SYSTEM.

27. INSULATION - DUCTWORK

27.1. AS APPLICABLE, USE THE LATEST EDITION OF THE LOCAL APPLICABLE BUILDING CODE AS A REFERENCE STANDARD IF SUFFICIENT DETAIL/INFORMATION IS NOT SPECIFIED HEREIN.

27.2. EXTERNAL DUCT INSULATION - INTERIOR USE

27.2.1. MATERIAL: COMMERCIAL-GRADE FIBERGLASS THERMAL WITH INTEGRAL VAPOUR BARRIER.

27.2.2. TEMPERATURE RANGE: 4°C TO 120°C.

27.2.3. THERMAL CONDUCTIVITY AT MEAN TEMPERATURE: 0.040 W/M°C, 24°C.

27.2.4. ACCEPTABLE MANUFACTURERS: KNAUF FSK DUCT WRAP, MANSON ALLEY-WRAP FSK, OWENS-CORNING FIBERGLAS COMMERCIAL-GRADE ALL-SERVICE DUCT WRAP.

27.2.5. INSTALLED R-VALUE: 5.6 HR-FT²-F/BTU (BASED ON 50MM NOMINAL THICKNESS).

27.2.6. DENSITY: 12KG/M³.

27.2.7. FACING: FOIL-REINFORCED-KRAFT (FRK) VAPOR-RETARDING.

27.2.8. SEAMS: 50MM FACING TAB.

27.2.9. BASE PRODUCT: OWENS-CORNING FIBERGLAS COMMERCIAL-GRADE ALL-SERVICE DUCT WRAP.

27.3. ACOUSTIC DUCT LINER

27.3.1. INTERNAL FLEXIBLE GLASS FIBRE ACOUSTICAL INSULATION WITH SEALER COATING ON ONE FACE.

27.3.2. THERMAL CONDUCTIVITY AT MEAN TEMPERATURE 24°C, - 0.040 W/M°C.

27.3.3. ACCEPTABLE MANUFACTURERS: CERTAINTED ULTRALITE #150, KNAUF DUCT LINER M, MANSON AKOUST-LINER.

27.4. INSULATION ACCESSORIES

27.4.1. ALL INSULATION ACCESSORIES (ADHESIVES, TAPE, COATINGS, ETC.) SHALL BE APPROVED FOR THE SPECIFIC APPLICATION.

27.5. DUCT INSULATION SCHEDULE:

27.5.1. PROVIDE 50MM THERMAL INSULATION FOR OUTSIDE AIR DUCTS.

27.5.2. PROVIDE 50MM THERMAL INSULATION FOR EXHAUST DUCTS FOR 3M FROM ROOF OR WALL PENETRATION.

27.5.3. PROVIDE 50MM THERMAL INSULATION FOR ALL INTERIOR SUPPLY DUCTS.

27.5.4. PROVIDE ACOUSTIC DUCT LINER WHERE NOTED ON DRAWINGS (25MM MINIMUM, 50MM NOTED).

28. INSULATION - PIPING & EQUIPMENT

28.1. AS APPLICABLE, USE THE LATEST EDITION OF THE LOCAL APPLICABLE BUILDING CODE AS A REFERENCE STANDARD IF SUFFICIENT DETAIL/INFORMATION IS NOT SPECIFIED HEREIN.

28.2. APPLY THE FOLLOWING MATERIALS OVER THE ENTIRE LENGTH OF THE SYSTEM INCLUDING VALVES, TANKS AND PIPING EQUIPMENT ETC.:

28.2.1. COLD PIPING: RIGID FIBROUS GLASS INSULATION WITH VAPOUR BARRIER AND FACTORY APPLIED GENERAL PURPOSE JACKETS. "K" VALUE AT 24°C MAXIMUM 0.035 W/MK

28.2.2. HOT PIPING: RIGID FIBROUS GLASS INSULATION WITH FACTORY APPLIED GENERAL PURPOSE JACKET, MOULDED TO CONFORM TO PIPING. "K" VALUE AT 24°C MAXIMUM 0.035 W/MK

28.2.3. HOT EQUIPMENT: SAME AS HOT PIPING INSULATION, "K" VALUE AT 24°C MAXIMUM 0.035 W/MK

28.2.4. RECOVERY JACKET: ULC LABELLED THERMOCANVAS FLAME SPREAD LESS THAN 25, SMOKE DEVELOPED LESS THAN 50.

28.2.5. COLD EQUIPMENT: COMMERCIAL GRADE ELASTOMERIC THERMAL INSULATION, "K" VALUE AT 24°C MAXIMUM 0.035 W/MK

28.3. INSULATION ACCESSORIES

28.3.1. ALL INSULATION ACCESSORIES (ADHESIVES, TAPE, COATINGS, ETC.) SHALL BE APPROVED FOR THE SPECIFIC APPLICATION.

28.3.2. INSTALL FLEXIBLE FOAMED ELASTOMERIC OR FLEXIBLE CLOSED CELL PREFORMED PIPING INSULATION, SECURE LONGITUDINAL AND BUTT JOINTS WITH ADHESIVE, INSULATE ALL FITTINGS AND COMPONENTS. TO OBTAIN THE SPECIFIED THICKNESS, APPLY IN LAYERS WITH STAGGERED JOINTS.

28.4. INSULATION TERMINATION POINTS

28.4.1. TERMINATE INSULATION 75MM BACK FROM ALL UNINSULATED FITTINGS TO PROVIDE WORKING CLEARANCE AND TERMINATE INSULATION AT 90° AND FINISH WITH REINFORCED SCRIM CLOTH AND VAPOUR BARRIER MASTIC SYSTEM. COVER ONTO PIPE AND OVER THE INSULATION VAPOUR BARRIER. ON CONCEALED HOT SERVICES TERMINATE INSULATION 75MM BACK FROM ALL UNINSULATED FITTINGS, CUT OFF AT 90° AND APPLY REINFORCED SCRIM CLOTH AND BREATHER MASTIC SYSTEM.

28.4.2. CUT BACK INSULATION AT 45° AND FINISH WITH A SILICONE CAULKING SEALANT AROUND THE BASE OF THERMOMETER WELLS, PRESSURE GAUGES, FLOW SWITCHES AND PRESSURE AND CONTROL SENSORS.

28.5. PIPE INSULATION SCHEDULE:

28.5.1. INSULATE PLUMBING VENTS FOR 2.5M FROM ROOF PENETRATION WITH COLD PIPING INSULATION. DO NOT USE FLEXIBLE DUCT WRAP INSULATION.

28.5.2. INSULATE ALL VALVES AND PIPE MOUNTED EQUIPMENT.

28.5.3. PROVIDE 40MM INSULATION FOR ALL HEATING PIPING PIPES 50MM AND SMALLER, 50MM FOR ALL HEATING PIPING GREATER THAN 50MM.

28.5.4. PROVIDE 25MM INSULATION FOR ALL DOMESTIC HOT WATER AND HOT WATER RECIRCULATION PIPES 50MM AND SMALLER, 40MM FOR ALL DOMESTIC HOT WATER HOT WATER AND RECIRCULATION PIPES GREATER THAN 50MM.

28.5.5. PROVIDE 25MM INSULATION FOR ALL DOMESTIC COLD WATER PIPE.

29. REFRIGERATION SYSTEMS

29.1. DO REFRIGERATION SYSTEM WORK IN ACCORDANCE WITH LATEST VERSION OF APPLICABLE LOCAL PRESSURE VESSELS SAFETY ACT AND REGULATIONS ("REFRIGERATION CODE"), CSA B52 AND ANSI B31.5.

29.2. PROVIDE PROCESSED TUBING FOR REFRIGERATION INSTALLATION, DEOXIDIZED, DEHYDRATED AND SEALED.

29.2.1. HARD COPPER TUBE, TYPE L, TO ASTM B88M.

29.3. ANNEALED COPPER TUBE TO ASTM B280, WITH MINIMUM WALL THICKNESS. [AS PER CSA B52].

29.4. SERVICE:

29.4.1. DESIGN PRESSURE 2070 KPA/300 PSIG AND TEMPERATURE 121°C.

29.5. BRAZED:

29.5.1. WROUGHT COPPER TO ANSI B16.22 OR CAST BRONZE TO MIL-F-1183E.

29.6. FLARE:

29.6.1. BRONZE OR BRASS, FOR REFRIGERATION, TO ANSI B16.26.

29.7. LONG RADIUS TYPE FOR ELBOWS AND RETURN BENDS.

29.8. BRAZING MATERIALS SHALL BE SIL-FOS-15 PHOSPHOR-COPPER-SILVER ALLOY FOR COPPER PIPING JOINED BY COPPER FITTINGS AND SILVER SOLDER FOR BRASS FITTINGS.

29.9. FLEXIBLE CONNECTIONS:

29.9.1. 10MM NOMINAL OR LESS SHALL BE MADE USING COILED SOFT COPPER TUBING.

29.9.2. FOR LARGER SIZES, USE SEAMLESS FLEXIBLE BRONZE HOSE WITH BRONZE WIRE BRAID COVERING. USE FACTORY SEALED NEOPRENE JACKET UNIT WHERE FREEZING MAY OCCUR.

29.10. EACH REFRIGERANT SYSTEM SHALL BE TESTED BEFORE OPERATION WITH DRY NITROGEN GAS TO A PRESSURE NOT LESS THAN 1.5 TIMES THE SYSTEM WORKING PRESSURE. DURING THE TEST, EACH JOINT SHALL BE TESTED FOR LEAKS WITH A SOLUTION OF SOAP AND WATER. COMPRESSORS WITH REFRIGERANT HOLDING CHARGE SHALL REMAIN ISOLATED FROM SYSTEM.

30. DUCT MOUNTED HEATING COILS

30.1. ACCEPTABLE MANUFACTURERS

30.1.1. THERMOLEC, DAIKIN, GREENHECK

30.2. AIR PRESSURE DROPS SHALL BE LIMITED TO 50 PA UNLESS NOTED OTHERWISE.

30.3. REFER TO SCHEDULES FOR SELECTIONS.

31. DUCT MOUNTED COOLING COILS

31.1. ACCEPTABLE MANUFACTURERS

31.1.1. DAIKIN, GREENHECK, TRANE

31.2. AIR PRESSURE DROPS SHALL BE LIMITED TO 50 PA UNLESS NOTED OTHERWISE.

32. ROOFTOP UNITS

32.1. ACCEPTABLE MANUFACTURERS

32.1.1. TRANE, CARRIER, PRICE MECHANICAL

32.2. SEE SCHEDULE

33. ENERGY RECOVERY VENTILATORS

33.1. ACCEPTABLE MANUFACTURERS

33.1.1. TEMPEFF, PRICE SOLUTIONAIRE (REGENCORE)

33.2. SEE SCHEDULE.

34. CONDENSING UNITS

34.1. ACCEPTABLE MANUFACTURERS

34.1.1. CARRIER, DAIKIN, TRANE

34.2. SEE SCHEDULE

35. CONTROLS GENERAL

35.1. ACCEPTABLE MANUFACTURERS

35.1.1. MATCH EXISTING.

35.2. CONTROL SYSTEM SHALL BE AN ELECTRONIC SYSTEM. THE SYSTEM ARCHITECTURE SHALL UTILIZE INTELLIGENT DISTRIBUTED CONTROL MODULES, LOCATED AT EACH PIECE OF EQUIPMENT, WHICH WILL COMMUNICATE ON A PEER TO PEER LAN TRUNK.

35.3. THE SYSTEM SHALL PROVIDE DIRECT DIGITAL CONTROL, ENERGY MANAGEMENT AND BUILDING AUTOMATION FOR THE HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS BASED UPON HEATING AND COOLING DEMANDS AS PER THE SEQUENCE OF OPERATIONS DESCRIBED HEREIN.

35.4. THE INSTALLATION SHALL BE PERFORMED BY CONTRACTORS SPECIALIZING IN THIS TYPE OF CONTROL SYSTEM INSTALLATION AND SETUP AND SHALL SEAMLESSLY INTEGRATE WITH THE EXISTING BUILDING CONTROLS SYSTEM.

35.5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FOLLOWING ITEMS:

35.5.1. ALL CONDUIT AND WIRING FOR THE LOW VOLTAGE CONTROL SYSTEM.

35.5.2. SUPPLY OF CONTROL VALVES AND EXTERNAL CONTROL DAMPERS AND OPERATORS TO THE MECHANICAL CONTRACTOR.

35.5.3. ALL PROGRAMMING, COMMISSIONING AND TUNING OF THE COMPLETE CONTROL SYSTEM.

35.5.4. SHOP DRAWINGS, AS-BUILT DIAGRAMS AND OPERATING MANUALS.

35.5.5. DEMONSTRATION AND INSTRUCTION FOR THE OWNER.

35.6. SPACE TEMPERATURE SENSOR

35.6.1. SENSORS SHALL BE THERMISTOR TYPE AND SHALL CONTAIN A SLIDE ADJUSTMENT FOR SETPOINT (GRADUATED WARMER-COOLER), PUSH BUTTON OVER-RIDE TO TEMPORARILY RETURN THE ZONE TO OCCUPIED MODE.

35.7. MIXED AIR TEMPERATURE SENSORS

35.7.1. AVERAGING TYPE THERMISTORS DUCT TEMPERATURE SENSOR WITH MULTIPLE PASSES ACROSS THE FACE OF THE AIR STREAM.

35.8. WATER FLOW SWITCHES

35.8.1. WATER FLOW SWITCH SHALL HAVE STAINLESS STEEL PADDLES.

35.9. PUMP AND FAN STATUS INDICATION

35.9.1. ADJUSTABLE SETPOINT CURRENT SENSING RELAY.

35.10. CONTROL DAMPERS

35.10.1. LOW LEAKAGE OUTSIDE AIR DAMPER C/W SIDE SEALS AND EDGE SEALS, OPPOSED OR PARALLEL BLADE AS APPLICABLE.

35.11. DAMPER ACTUATORS

35.11.1. GEAR DRIVE DIRECT COUPLED WITH SPRING RETURN ELECTRONIC ACTUATORS SIZED FOR A MINIMUM OF 15% EXCESS TORQUE FOR THE DAMPER AREA CONTROLLED.

35.12. CONTROLLERS

35.12.1. FIELD PROGRAMMABLE USING EITHER OPERATORS CONTROL LANGUAGE OR EIKON PROGRAMMING. PRE-PROGRAMMED OR "CANNED" PROGRAMMING IS NOT ACCEPTABLE.

35.12.2. EACH CONTROLLER SHALL BE CAPABLE OF OPERATING STAND-ALONE WITHOUT ADVERSELY AFFECTING THE REMAINDER OF THE CONTROL SYSTEM.

35.12.3. SHOULD ANY CONTROLLER FAIL, THE REMAINDER OF THE CONTROL SYSTEM SHALL NOT BE AFFECTED.

35.12.4. ZONE CONTROLLERS SHALL HAVE A DEFAULT PROGRAM WHICH WILL START OPERATING UPON THE LOSS OF NETWORK COMMUNICATIONS.

35.12.5. EACH ZONE SHALL BE CAPABLE OF HAVING ITS OWN OCCUPANCY SCHEDULE AS WELL AS OPERATING FROM THE BUILDING OR TENANT GROUP SCHEDULE.

36. CONTROLS - SEQUENCE OF OPERATION

36.1. ENERGY RECOVERY VENTILATOR (ERV-1) SHALL RUN CONTINUOUSLY DURING OCCUPIED HOURS. ERV SHALL BE OFF AND EXTERIOR ISOLATION DAMPERS CLOSED DURING UNOCCUPIED MODE.

36.2. VENTILATION DUCT HEATING COILS (DHC-x) SHALL MODULATE TO SUPPLY VENTILATION AIR AT 75°F (ADJUSTABLE).

36.3. VENTILATION DUCT COOLING COILS (CC-x) SHALL MODULATE TO SUPPLY VENTILATION AIR AT 55°F (ADJUSTABLE).

36.4. ROOFTOP UNITS (RTU-x)

36.4.1. DURING UNOCCUPIED HOURS, RTU-x SHALL CYCLE ON AND OFF TO MEET ROOM TEMPERATURE SETPOINT.

36.4.1.1. HEATING: THE SUPPLY FAN SHALL OPERATE AND THE HEATING COIL MODULATE TO MAINTAIN SUPPLY AIR TEMPERATURE SETPOINT, WHICH IS RESET UP AND DOWN TO MEET ROOM SETPOINT TEMPERATURE.

36.4.1.2. COOLING: THE SUPPLY FAN SHALL OPERATE AND THE DX COOLING COIL CYCLE TO MAINTAIN ROOM AIR TEMPERATURE SETPOINT.

36.4.2. DURING OCCUPIED HOURS, RTU-x SHALL OPERATE CONTINUOUSLY TO MAINTAIN ROOM TEMPERATURE SETPOINTS. THE RTU SHALL HEAT AIR ABOUT 71°F (ADJUSTABLE).

36.4.2.1. COOLING: VARIABLE AIR VOLUME BOXES WILL ADJUST AIRFLOW TO THE SPACE TO MAINTAIN THERMOSTAT TEMPERATURE SETPOINTS AS CLOSE AS POSSIBLE BASED ON THE AIR SUPPLY TEMPERATURE FROM THE RTU.

36.4.2.2. HEATING: VARIABLE AIR VOLUME BOXES WILL ADJUST AIRFLOW TO THE SPACE TO MAINTAIN THERMOSTAT TEMPERATURE SETPOINTS AS CLOSE AS POSSIBLE BASED ON THE SUPPLY AIR TEMPERATURE FROM THE RTU AND TRIM THE HEAT TO THE SPACE VIA ELECTRIC REHEAT COILS.