SPECIFICATION:

1. <u>SCOPE OF WORK</u>

- 1.1. THE SCOPE OF THE PROJECT IS TO REPLACE THE EXISTING HEATING AND COOLING COILS WITH NEW, IN TWO EXISTING AIR-HANDLING UNITS. THE EXISTING COILS ARE DEFECTIVE AND HAVE DEVELOPED LEAKS OVER THE MULTIPLE YEARS OF SERVICE. THE NEW COILS ARE TO BE DESIGNED TO BE AN EXACT MATCH OF THE EXISTING THEREBY ENSURING SIMILAR PERFORMANCE. THE CONTRACTOR IS REQUIRED TO CONFIRM THE EXACT SIZE, CIRCUITING, PHYSICAL PROPERTIES ON SITE PRIOR TO ORDERING OR SUBMITTING SHOP DRAWINGS.
- 1.2. MODIFY THE STEAM, CONDENSATE AND CHILLED WATER PIPING TO/FROM THE COILS FROM SPECIFIC TIE-IN LOCATIONS. THE PIPING MODIFICATIONS ARE REQUIRED TO FACILITATE THE COIL REPLACEMENT AND TO RELOCATE ISOLATION VALVES, CONTROL VALVES AND OTHER ACCESSORIES TO A USER-FRIENDLY LOCATION. REPLACE ALL PRESSURE GAUGES AND TEMPERATURE INDICATORS (THERMOMETERS) WITH NFW.
- 1.3. UPGRADE THE EXISTING PNEUMATIC CONTROL SYSTEMS FOR BOTH AIR HANDLING UNIT HEATING/COOLING/DAMPER CONTROL FUNCTIONS WITH A NEW DDC SYSTEM AND THE ABILITY FOR FUTURE CONNECTION TO THE CITY OF WINNIPEG METASYS CENTRAL CONTROL. RE-USE THE EXISTING PNEUMATIC ACTUATED CONTROL VALVES: REPLACE ALL DAMPER MOTORS WITH NEW ELECTRIC UNITS. REPLACE DAMPERS AS NOTED ON THE DRAWINGS. THE NEW CONTROL SYSTEM IS TO FAIL
- 1.4. SHOP DRAWINGS SUBMIT SHOP DRAWINGS FOR ALL COMPONENTS TO BE PROVIDED INCLUDING A COIL SUPPORT STRUCTURE FOR THE 10th FLOOR COOLING/HEATING COILS. THE COIL SUPPORT STRUCTURE SHOP DRAWING IS TO BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER
- 1.5. CODES AND STANDARDS COMPLETE WORK IN ACCORDANCE WITH
- THE DESIGN DRAWINGS, ACCEPTED GOOD-INDUSTRY PRACTICE AND THE FOLLOWING CODES AND STANDARDS .1 CSA B51 - PRESSURE PIPING FOR STEAM AND CONDENSATE.
- .2 ASME B31.9 BUILDING SERVICES PIPING. .3 NATIONAL BUILDING CODE OF CANADA
- .4 NATIONAL ELECTRICAL CODE OF CANADA
- .5 MANUFACTURER'S INSTALLATION INSTRUCTIONS .6 MANITOBA WORKPLACE HEALTH AND SAFETY REQUIREMENTS
- 1.6. SCHEDULE
- .1 THE SECOND FLOOR AHU MUST REMAIN OPERATIONAL MONDAY TO FRIDAY BETWEEN 6:00 AM AND 7:00 PM. ALL WORK MUST BE DONE OUTSIDE OF THESE HOURS AND THE COOLING OR HEATING FUNCTIONS MUST BE AVAILABLE DURING OCCUPIED HOURS, DEPENDING ON SEASONAL REQUIREMENTS.
- .2 THE 10th FLOOR AHU CAN BE SHUT DOWN TO COMPLETE THE WORK ONLY DURING COOLING SEASON. THE AHU IS REQUIRED TO OPERATE DURING HEATING SEASON.
- 1.7. ACCESS TO THE FAN ROOMS REVIEW ACCESS TO THE FAN ROOMS DURING A MANDATORY SITE VISIT. .1 SECOND FLOOR AHU - IS ACCESSIBLE THROUGH THE FRONT DOORS TO 266 GRAHAM AND VIA A STAIRCASE UP TO THE FAN ROOM. THE CONTRACTOR MUST BE ACCOMPANIED FROM THE MAIN DOORS TO THE FAN ROOM DUE TO SECURITY RESTRICTIONS IN THE BUILDING.
- .2 10th FLOOR AHU ELEVATOR ACCESS IS AVAILABLE UP TO THE 9th FLOOR AND STAIR ACCESS TO THE 10th FLOOR. THERE ARE DOORS FROM THE FAN ROOM ONTO THE ROOF. STAIRS ARE AVAILABLE FROM THE GROUND FLOOR ALL THE WAY TO THE 10th FLOOR.

2. PRODUCTS

- 2.1. DUCTWORK AND HVAC ACCESSORIES .1 FABRICATE ALL DUCTWORK TO SMACNA HVAC DUCT CONSTRUCTION
- .2 DAMPERS REPLACE ALL DAMPERS AS NOTED ON THE DESIGN DRAWINGS. USE TAMCO DAMPERS, AS SPECIFIED ON THE
 - DRAWINGS. .1 SIZE - CONFIRM SIZE ON SITE PRIOR TO ORDERING.

FOR THE REPLACEMENT OF THE DAMPERS.

- .2 ACCESSORIES PROVIDE ALL REQUIRED HARDWARE, RETAINING ANGLES AND INSTALLATION HARDWARE NECESSARY
- .3 SHOP DRAWINGS SUBMIT SHOP DRAWINGS FOR ALL COMPONENTS SUPPLIED.
- 2.2. HEATING COILS
- .1 PROVIDE HEATING COILS TO THE DIMENSIONS SHOWN ON THE DESIGN DRAWINGS. THE NEW COILS ARE TO BE DESIGNED TO BE AN EXACT MATCH OF THE EXISTING THEREBY ENSURING SIMILAR PERFORMANCE. THE CONTRACTOR IS REQUIRED TO CONFIRM THE EXACT SIZE, CIRCUITING, PHYSICAL PROPERTIES ON SITE PRIOR TO ORDERING OR SUBMITTING SHOP DRAWINGS.
- .2 SUBMIT SHOP DRAWINGS BASED ON THE PERFORMANCE CRITERIA PROVIDED. AND THE PHYSICAL CHARACTERISTICS TO COPY THOSE ON SITE. INDICATE PERFORMANCE FOR THE COILS TO BE
- .3 HEATING FLUID STEAM AT APPROXIMATELY 12-PSIG.
- .4 MATERIALS OF CONSTRUCTION: .1 TUBES - CARBON STEEL
- .2 FINS EXPANDED ALUMINUM, FIN SPACING AS SHOWN. 3 HEADERS - CAST IRON OR FABRICATED STEEL
- .4 APPROVED FOR USE WITH LOW PRESSURE STEAM.
- .5 FRAME PRESSED STEEL SUITABLE FOR INSTALLATION IN THE LOCATIONS SHOWN. .6 PHYSICAL PROPERTIES - ARE TO BE CONFIRMED ON SITE BY
- THE CONTRACTOR PRIOR TO ORDERING OR SUBMITTING SHOP DRAWINGS. THE NEW COILS ARE TO MATCH THE PHYSICAL CONSTRUCTION CHARACTERISTICS OF THE EXISTING COILS. .5 PERFORMANCE - SUBMIT SHOP DRAWINGS INDICATING
- PERFORMANCE BASED ON MATCHING THE PHYSICAL CHARACTERISTICS OF THE EXISTING COILS TO BE REPLACED.
- .6 AHRI CERTIFIED.

2.3. COOLING COILS

- .1 PROVIDE COOLING COILS TO THE DIMENSIONS SHOWN ON THE DESIGN DRAWINGS. THE NEW COILS ARE TO BE DESIGNED TO BE AN EXACT MATCH OF THE EXISTING THEREBY ENSURING SIMILAR PERFORMANCE. THE CONTRACTOR IS REQUIRED TO CONFIRM THE EXACT SIZE, CIRCUITING, PHYSICAL PROPERTIES ON SITE PRIOR TO ORDERING OR SUBMITTING SHOP DRAWINGS.
- .2 SUBMIT SHOP DRAWINGS BASED ON THE PERFORMANCE CRITERIA PROVIDED, AND THE PHYSICAL CHARACTERISTICS TO COPY THOSE ON SITE. INDICATE PERFORMANCE FOR THE COILS TO BE
- .3 COOLING FLUID CHILLED WATER WITH ENTERING TEMPERATURES
- AS SHOWN ON THE DESIGN DRAWINGS. FLOW RATES ARE CURRENTLY NOT KNOWN.
- .4 MATERIALS OF CONSTRUCTION .1 TUBES - COPPER
- .2 FINS EXPANDED ALUMINUM, FIN SPACING AS SHOWN. .3 HEADERS - CAST IRON OR FABRICATED STEEL.
- .4 APPROVED FOR USE WITH CHILLED WATER. .5 FRAME - PRESSED STEEL SUITABLE FOR INSTALLATION IN
- THE LOCATIONS SHOWN. THE FRAMES MUST BE FABRICATED TO SUPPORT THE WEIGHT OF ALL HEATING AND COOLING COILS INSTALLED ABOVE THE BOTTOM COIL.
- .6 PHYSICAL PROPERTIES ARE TO BE CONFIRMED ON SITE BY THE CONTRACTOR PRIOR TO ORDERING OR SUBMITTING SHOP DRAWINGS. THE NEW COILS ARE TO MATCH THE PHYSICAL
- CONSTRUCTION CHARACTERISTICS OF THE EXISTING COILS. .5 PERFORMANCE - SUBMIT SHOP DRAWINGS INDICATING PERFORMANCE BASED ON MATCHING THE PHYSICAL CHARACTERISTICS OF THE EXISTING COILS TO BE REPLACED.
- .6 AHRI CERTIFIED.
- .7 PRESSURE RATING MINIMUM 150-PSIG. .8 COIL SUPPORT STRUCTURE - DESIGN A COIL SUPPORT STRUCTURE FOR THE 10th FLOOR AHU AT THE BASE OF THE COOLING COILS. THE STRUCTURE MUST BE DESIGNED, FABRICATED AND INSTALLED BASED ON SEALED ENGINEERING DRAWINGS, TO BE SUBMITTED AS SHOP DRAWINGS.

2.4. PIPING

- .1 USE CARBON STEEL PIPING FOR ALL UTILITIES.
- .2 STEAM AND CHILLED WATER USE SCHEDULE 40 CARBON STEEL TO ASTM A53 GR B, SEAMLESS. THREADED CONNECTIONS UP TO 2" DIAMETER, BUTT WELD CONNECTIONS 2-1/2" AND LARGER. .1 FITTINGS - 2" AND SMALLER USE MALLEABLE IRON FITTINGS,
- CLASS 150 TO ASME B16.3 AND UNIONS TO ASME B16.39. .2 FITTINGS - LARGER THAN 2" USE STANDARD WEIGHT BEVEL END BUTT WELD FITTING TO ASME B16.9. USE
- LONG-RADIUS ELBOWS R/D=1.5. .3 CONDENSATE - USE SCHEDULE 80 CARBON STEEL TO ASTM A53 GR B, SEAMLESS. THREADED CONNECTIONS UP TO 2" DIAMETER, BUTT WELD CONNECTIONS 2-1/2" AND LARGER.
- .1 FITTINGS 2" AND SMALLER USE MALLEABLE IRON FITTINGS, CLASS 300 TO ASME B16.3 AND UNIONS TO ASME B16.39.
- .2 FITTINGS LARGER THAN 2" USE XS WEIGHT BEVEL END BUTT WELD FITTING TO ASME B16.9. USE LONG-RADIUS ELBOWS R/D=1.5.

2.5. INSULATION

- .1 INSULATE ALL CHILLED WATER PIPING, STEAM PIPING AND CONDENSATE PIPING AS NOTED BELOW.
- .1 STANDARD OF ACCEPTANCE OWENS CORNING PRE-FORMED PIPE INSULATION C/W ASJ MAX ALL SERVICE JACKET FOR
- .2 FLAME SPREAD RATING OF 25 OR LESS, AND SMOKE RATING OF 50 OR LESS.
- .3 STEAM AND CONDENSATE USE 2" THICK PRE-FORMED FIBERGLASS PIPE INSULATION AS NOTED ABOVE.
- .4 CHILLED WATER USE 2" THICK PRE-FORMED FIBERGLASS PIPE INSULATION AS NOTED ABOVE.
- .5 INSULATE ALL PIPING IN ACCORDANCE WITH PUBLISHED TIAC STANDARDS.

2.6. PIPING ACCESSORIES

- .1 PIPE HANGERS PROVIDE PIPE HANGERS FOR ALL NEW PIPING. USE MINIMUM 3/8" DIAMETER THREADED ROD FOR ALL PIPE
- .1 LOWER ATTACHMENT USE ADJUSTABLE CLEVIS TYPE PIPE
- .2 SPACING AS NOTED BELOW

4. EXECUTION

- 4.1. GENERAL INSTALL ALL COMPONENTS IN ACCORDANCE WITH THE
- MANUFACTURER'S RECOMMENDATIONS.
- 4.2. RUN ALL PIPING PERPENDICULAR AND PARALLEL TO BUILDING LINES.
- .1 WELDING TO BE COMPLETED BY PERSONNEL QUALIFIED AND
- SKILLED TO COMPLETE THE WORK. .2 INSTALL TO CSA B139 AND ASME B31.9
- .3 INSTALL MANUAL AIR VENTS C/W ISOLATION BALL VALVES AT ALL HIGH POINTS IN THE SYSTEMS. .4 INSTALL DRAIN PIPING C/W CAP AND CHAIN AT ALL LOW SPOTS,
- AND AS INDICATED. .5 ALL CONTROL VALVES, ISOLATION VALVES (WHERE POSSIBLE), AND MAINTENANCE ITEMS ARE TO BE INSTALLED AT AN ACCESSIBLE
- LOCATION SERVICEABLE FROM THE FLOOR WITHOUT THE NEED FOR A LADDER OR SPECIAL LIFT. .6 FLUSH OUT THE NEW PIPING AND PRESSURE TEST PRIOR TO TYING THE SYSTEM INTO THE EXISTING PIPING NETWORK. SUBMIT

THE PRESSURE TEST REPORTS. CLEAN ALL STRAINERS AFTER

- FLUSHING PROCEDURES .7 INSTALL IN ACCORDANCE WITH ACCEPTED INDUSTRY PRACTICE. PROVE ALL VALVES HOLD TIGHT AFTER INSTALLATION.
- 4.4. INSULATION INSTALL IN ACCORDANCE WITH TIAC STANDARDS
- 4.5. COILS INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

CONDUCTORS

4.6. CONTROL WIRING - COMPLETE ALL WIRING IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE. EXPOSED ARMOURED (BX) CABLE IS NOT ACCEPTABLE .1 WIRING MEANS AND METHODS - USE EMT CONDUIT AND COPPER

TABLE 1: MAXIMUM HORIZONTAL SPACING BETWEEN PIPE CURRORE FOR CTANDARD WEIGHT CTEEL BIRES

SUPPORTS FOR S	<u> 1 A I</u>	NUA	<u>ari</u>	<u>ע</u> ע	<u>EIG</u>	<u>HI :</u>	<u> </u>		<u> </u>	<u>′Ľ</u>		
	NOMINAL PIPE SIZE (in)											
	1/2	3/4	1	1 1/2	2	2 1/2	3	3 1/2	4	5	6	
MAX. SPAN (FT) WATER SERVICE	7	7	7	9	10	11	12	13	14	16	17	1
MAX. SPAN (FT) VAPOR SERVICE	8	9	9	12	13	14	15	16	17	19	21	2
RECOMMENDED HANGER ROD SIZES	3/8				1/2			5/8		3/4		
THE ABOVE SPACING AND CAPACITIES ARE BA	ASED	ON F	PIPE	FILLED '	WITH	WATER. A	ADDITI	ONAL VA	LVES	AND	FITTI	NC

INCREASE THE LOAD AND THEREFORE CLOSER HANGER SPACING IS REQUIRED. *MANY CODES AND SPECIFICATIONS STATE "PIPE HANGERS MUST BE SPACED EVERY 10ft. REGARDLESS OF SIZE". THIS LOCAL SPECIFICATION MUST BE FOLLOWED

.3 PROVIDE INSULATION PROTECTION SADDLES FOR ALL COLD WATER PIPING. DO NOT PENETRATE THE VAPOUR RETARDER

JACKET.

.2 STEAM SPECIALTIES .1 ISOLATION VALVES - MA STEWART BALL VALVE.

BRONZE BODY, STAINLESS BALL, GLASS REINFORCED TEFLON

- SEATS AND SEALS MODEL BZ355250.
- VACUUM BREAKERS SPIRAX SARCO STRAINER - SPIRAX SARCO
- THERMOSTATIC AIR VENT SPIRAX SARCO PRESSURE GAUGES — MINIMUM 6" DIAMETER SUITABLE FOR STEAM USE. PROVIDE A STEAM SYPHON FOR EACH PRESSURE GAUGE. PROVIDE A PRESSURE GAUGE AT THE STEAM LINE UP STEAM AND DOWNSTREAM OF THE CONTROL VALVE AND AS SHOWN. MOUNT THE PRESSURE GAUGE IN
- AN ACCESSIBLE LOCATION. .6 STEAM TRAPS — USE FLOAT AND THERMOSTATIC STEAM TRAPS, AS MANUFACTURED BY SPIRAX SARCO.

.3 CHILLED WATER

- .1 ISOLATION VALVES
- .1 2" DIAMETER AND SMALLER USE FULL PORT BALL VALVES, THREADED. BRONZE BODY, STAINLESS STEEL BALL AND REINFORCED TEFLON SEATS AND SEALS. WOG RATED FOR 150-PSIG. STANDARD OF ACCEPTANCE: MA STEWART, CRANE, RED AND WHITE.
- .2 2-1/2" AND LARGER USE LUG BODY BUTTERFLY VALVES, CLASS 150. BODY - DUCTILE IRON. LINER - EPDM SUITABLE FOR INTENDED SERVICE, 316 STEM, 316 DISC, USE LEVER HANDLE UP TO 6" DIAMETER. STANDARD OF ACCEPTANCE IS MA STEWART "D" SERIES VALVES.
- TEMPERATURE GAUGES MINIMUM 6" DIAMETER SELECTED TO OPERATE AT MIDPOINT OF SPAN. PROVIDE STAINLESS STEEL THERMOWELL COMPLETE WITH HEAT TRANSFER
- COMPOUND FOR MOUNTING TEMPERATURE GAUGES. PRESSURE GAUGE - MINIMUM 6" DIAMETER SELECTED TO OPERATE AT MIDPOINT OF SPAN. PROVIDE ISOLATION BALL
- VALVE UPSTREAM OF ALL PRESSURE GAUGES.
- .4 STRAINERS 2" AND SMALLER USE A BRONZE BODY THREADED STRAINER, CLASS 150.

2.7. HUMIDIFIERS

- .1 PROVIDE NEW HUMIDIFIERS FOR EACH OF THE TWO AIR HANDLING UNITS COMPLETE WITH ALL NECESSARY ACCESSORIES. REMOVE THE EXISTING HUMIDIFIERS AND REPLACE WITH NEW. LOW PRESSURE STEAM IS BEING USED AS THE HUMIDITY SOURCE.
- .2 STEAM BARS NEPTRONIC OR APPROVED EQUAL.
- .3 STEAM SEPARATORS -.4 ISOLATION VALVES AND ACCESSORIES - AS PER STEAM
- ACCESSORIES ABOVE. .5 DESIGN CRITERIA - AS NOTED ON DESIGN DRAWING.

CONTROLS

3.1. PROVIDE A FULLY FUNCTIONAL FAIL SAFE CONTROL SYSTEM TO SERVICE THE HEATING AND COOLING COILS AND CONTROL VALVES. THE CONTROL METHODOLOGY AND COMPONENTS ARE NOTED ON THE DESIGN DRAWINGS. SUBMIT SHOP DRAWINGS FOR ALL COMPONENTS AND ALL SYSTEMS.

3.2. COMMISSIONING

- .1 FULLY COMMISSION THE CONTROL SYSTEM. THIS WILL NEED TO BE DONE SEASONALLY, AT THE END OF CONSTRUCTION AND AGAIN AT THE BEGINNING OF THE HEATING SEASON.
- .2 PREPARE A COMMISSIONING PLAN PRIOR TO STARTING THE WORK, SUBMIT FOR ENGINEERS REVIEW.
- .3 EXECUTE THE COMMISSIONING PLAN WITH THE ASSISTANCE OF THE INSTALLING CONTRACTOR AND THE LOCAL BUILDING MAINTAINERS. RECORD THE FINDINGS. IMPLEMENT CORRECTIVE ACTIONS WHERE REQUIRED AND RE-TEST.
- .4 SUBMIT A SUMMARY REPORT AFTER THE COMPLETION OF EACH STAGE OF COMMISSIONING.

CONTROLS GENERAL:

- 1. PROVIDE A FULLY FUNCTIONAL CONTROLS SYSTEM, TO FAIL SAFE, TO
- MEET THE OPERATIONAL CRITERIA NOTED BELOW. 2. SUBMIT SHOP DRAWINGS FOR ALL COMPONENTS AND SYSTEMS TO BE
- INSTALLED. INDICATE CONTROL STRATEGY WITHIN THE SHOP DRAWINGS 3. COORDINATE FOR A 120V POWER SOURCE WITH THE BUILDING OPERATIONS STAFF. THERE IS CURRENTLY AN ELECTRICAL PANEL WITHIN THE ROOM THAT HOUSES EACH AIR—HANDLING UNIT WITH OPEN CIRCUITS.
- PROVIDE A COMPATIBLE BREAKER AND WIRING BETWEEN THE PANEL AND THE CONTROLLER.
- 4. ALL WIRING TO MEET THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE AND BE COMPLETED BY JOURNEYMEN COMPETENT IN THE FIELD.
- 5. CONTROLS COMPONENTS/ARCHITECTURE GENERAL a. SUPERVISORY CONTROLLER MUST BE ABLE TO INTEGRATE TO THE EXISTING ADVANCED METASYS SYSTEM EXTENDED ARCHITECTURE (ADX)
- b. 3RD PARTY BACNET INTEGRATION WILL NOT BE ACCEPTED. c. DIRECT DIGITAL CONTROLS (DDC) MUST BE ABLE TO INTERFACE TO THE METASYS SYSTEM EXTENDED ARCHITECTURE (MSEA)
- ARCHITECTURE d. DIRECT DIGITAL CONTROLS (DDC) PROGRAMS MUST BE ABLE TO BE EDITED AND MODIFIED THOUGH THE METASYS SYSTEM EXTENDED ARCHITECTURE (MSEA) SYSTEM.
- e. STANDARD OF ACCEPTANCE: JOHNSON CONTROLS f. CONTRACTOR SHALL SUPPLY, INSTALL AND PROGRAM CONTROLS SO THAT EQUIPMENT IS FULLY OPERATIONAL. CONTRACTOR SHALL PROVIDE THE CITY WITH ALL NECESSARY PROGRAMS TO IMPORT ALL DATA/INFORMATION/POINTS/ETC. INTO METASYS. CONNECTION TO
- METASYS SYSTEM WILL BE BY OTHERS 6. COMMISSION ALL SYSTEMS. PROVE OPERATION OF ALL CONTROLS FEATURES INSTALLED. PROVIDE A COMMISSIONING REPORT SUBSEQUENT TO THE COMMISSIONING ACTIVITIES PROVING COMPLIANCE AND FULL
- OPFRATION. 7. STANDARD OF ACCEPTANCE - JOHNSON CONTROLS. OTHERS WILL NOT BE ACCEPTED.

2nd FLOOR AHU

- 1. GENERAL INSTALL A JOHNSON CONTROLS STANDARD FEC CONTROLLER IN THE 2nd FLOOR TO CONTROL THIS AIR HANDLING UNIT. THIS CONTROLLER MUST BE WIRED TO THE 12th FLOOR AHU NCE CONTROLLER (NOTED BELOW). THE FEC CONTROLLER WILL COMMUNICATE TO THE NCE ON THE 12th FLOOR. THE NCE CONTROLLER WILL COMMUNICATE TO CITY OF WINNIPEG METASYS CENTRAL CONTROL.
- a. WIRING TO CANADIAN ELECTRICAL CODE. FIELD ROUTE A 4-WIRE 22-GAUGE CABLE, SINGLE BACNET MSTP COMMUNICATION BUS BETWEEN THE 12th FLOOR AHU CONTROLLER AND THE SECOND FLOOR AHU CONTROLLER. THE CABLE IS TO MEET CITY OF WINNIPEG AND NATIONAL ELECTRICAL CODE CABLING GUIDELINES. b. THE 12th FLOOR NCE CONTROLLER WILL COMMUNICATE BACK TO THE CITY OF WINNIPEG'S CENTRAL BUILDING CONTROL. COMMUNICATION FROM THE 12th FLOOR NCE CONTROLLER IS OUTSIDE THE SCOPE OF WORK OF THIS CONTRACT.
- DAMPER CONTROL - DURING OCCUPIED HOURS (AS PROGRAMMED THROUGH THE EXISTING METASYS SYSTEM) MODULATE THE RELIEF AIR, RETURN AIR AND FRESH AIR DAMPERS IN UNISON TO MAINTAIN A MIXED AIR
 - TEMPERATURE SETPOINT, INITIALLY SET AT 13°C - PROVIDE FOR A MINIMUM OUTDOOR AIR POSITION OF
 - APPROXIMATELY 15% BY VOLUME. - AT NO TIME IS THE MIXED AIR TEMPERATURE TO BE LESS THAN +7C. IF THE MIXED AIR TEMPERATURE STARTS TO FALL BELOW 7°C, THE DDC CONTROLLER WILL MODULATE THE RELIEF AIR. RETURN AIR AND FRESH AIR DAMPERS IN UNISON CLOSED TO MAINTAIN THE LOW LIMIT SETPOINT, INITIALLY SET AT 7°C. PROVIDE A FREEZE
 - PREVENT FREEZING CONDITIONS AT THE COIL — THE DAMPER MOTORS FOR THE RELIEF AIR DAMPERS. RETURN AIR DAMPERS AND FRESH AIR DAMPERS ARE ALL TO BE REPLACED WITH NEW ELECTRIC UNITS CONNECTING TO EXISTING DAMPERS. PROVIDE THE NECESSARY JACK-SHAFTS AND OTHER CONNECTING RODS/HARDWARE AS REQUIRED.

PROTECTION THERMOSTAT UPSTREAM OF THE COOLING COIL TO

- PROVIDE ECONOMIZER CONTROL. - ECONOMIZER CONTROL WILL REVERT THE MIXED AIR DAMPERS TO THEIR MINIMUM POSITION WHEN THE OUTSIDE AIR TEMPERATURE RISES ABOVE 18°C.
- THE RETURN AIR DAMPER IS TO FAIL OPEN. THE RELIEF AIR AND FRESH AIR DAMPERS ARE TO FAIL CLOSED WHEN THE FAN STATUS IS OFF OR IN ALARM. - DURING UNOCCUPIED HOURS, THE FAN IS TO OPERATE AT 100%
- 3 HEATING AND COOLING COIL CONTROL - PROVIDE A LEAVING AND RETURN AIR TEMPERATURE SENSOR. - PROVIDE FOR AUTOMATICALLY MODULATING THE CONTROL VALVES ON THE HEATING COIL AND COOLING COIL TO MAINTAIN A PRE-SET AIR

RETURN AIR.

TEMPERATURE BASED ON THE DEMANDS OF THE SYSTEM. IF THE SYSTEM IS DEMANDING COOLING, THEN MODULATE THE COOLING VALVE TO MAINTAIN RETURN AIR TEMPERATURE. INITIALLY SET AT 22°C IF THE SYSTEM IS DEMANDING HEATING, THEN MODULATE THE

HEATING VALVE TO MAINTAIN A LEAVING TEMPERATURE BASED

- ON OUTDOOR RESET TABLE PROVIDED BY THE DDC SYSTEM. - DO NOT PERMIT THE HEATING AND COOLING VALVES TO BE OPEN SIMULTANFOUSLY - THE EXISTING PNEUMATIC CONTROL VALVES ARE BEING RE-USED.
- PROVIDE THE NECESSARY I/P TRANSDUCERS NECESSARY TO CONTROL THE EXISTING VALVES. 4. HUMIDITY CONTROL - MODULATE THE STEAM VALVE ON THE HUMIDIFIER IN THE UNIT.
- PROVIDE A PID CONTROL LOOP TO MAINTAIN THE RETURN AIR - DO NOT PROVIDE HUMIDIFICATION DURING COOLING SEASON. 5. OPERATOR INTERFACE - DDC CONTROLS MUST BE ABLE TO INTERFACE TO THE EXISTING
- JOHNSON CONTROLS MSEA TECHNOLOGY USING BACNET PROTOCOLS. - THE DDC CONTROLS WILL COMMUNICATE TO A SUPERVISORY CONTROLLER, WHICH WILL BE INTEGRATED TO THE EXISTING CITY OF WINNIPEG ADX SERVER. THIS WILL PROVIDE OPERATING CONDITIONS TO CENTRAL CONTROL ON: ALARMS, SETPOINTS, CONTROL RELAYS (FAN, HUMIDITY, START/STOP), CONTROL DAMPERS/VALVES,
- TEMPERATURES AND HUMIDITY - PROVIDE LOCAL INDICATION FOR:

OF THE HEATING VALVE AND COOLING VALVE.

- ALL DAMPERS POSITIONS SETPOINTS AND ACTUAL; RETURN AIR TEMPERATURE;
- MIXED AIR TEMPERATURE, SETPOINT AND ACTUAL; SUPPLY AIR TEMPERATURE, SETPOINT AND ACTUAL; CONTROL VALVE POSITION, SETPOINT AND ACTUAL FOR EACH

- 12th FLOOR AHU
- 1. GENERAL INSTALL A JOHNSON CONTROLS NCE COMPONENT. PROGRAM THE NCE UNIT TO CONTROL THE AIR HANDLING UNIT AS NOTED BELOW. MIGRATE THE CONTROL AND SYSTEMS INTO THE CITY OF WINNIPEG'S METASYS VIA A NETWORK CABLE. THE CITY OF WINNIPEG WILL SUPPLY A
- NETWORK CABLE TO THE CONTROLLER. 2. DAMPER CONTROL
 - DURING OCCUPIED HOURS (AS PROGRAMMED THROUGH THE EXISTING METASYS SYSTEM) MODULATE THE RELIEF AIR. RETURN AIR AND FRESH AIR DAMPERS IN UNISON TO MAINTAIN A MIXED AIR TEMPERATURE SETPOINT, INITIALLY SET AT 13°C - PROVIDE FOR MINIMUM OUTDOOR AIR FRACTION OF APPROXIMATELY 15% BY VOLUME.
 - PROVIDE ECONOMIZER CONTROL - AT NO TIME IS THE MIXED AIR TEMPERATURE TO BE LESS THAN +7°C. IF THE MIXED AIR TEMPERATURE STARTS TO FALL BELOW 7°C, THE DDC CONTROLLER WILL MODULATE THE RELIEF AIR, RETURN AIR AND FRESH AIR DAMPERS IN UNISON CLOSED TO MAINTAIN THE LOW LIMIT SETPOINT, INITIALLY SET AT 7°C. PROVIDE A FREEZE PROTECTION THERMOSTAT UPSTREAM OF THE COOLING COIL TO PREVENT FREEZING CONDITIONS AT THE COIL - THE DAMPER MOTORS FOR THE RELIFF AIR DAMPERS. RETURN AIR DAMPERS AND FRESH AIR DAMPERS ARE ALL TO BE REPLACED WITH NEW ELECTRIC UNITS CONNECTING TO EXISTING DAMPERS. PROVIDE THE NECESSARY JACK-SHAFTS AND OTHER CONNECTING RODS/HARDWARF AS REQUIRED
 - THEIR MINIMUM POSITION WHEN THE OUTSIDE AIR TEMPERATURE RISES ABOVE 18°C - THE RETURN AIR DAMPER IS TO FAIL OPEN, THE RELIEF AIR AND FRESH AIR DAMPERS ARE TO FAIL CLOSED WHEN THE FAN STATUS IS OFF OR IN ALARM.

- ECONOMIZER CONTROL WILL REVERT THE MIXED AIR DAMPERS TO

- DURING UNOCCUPIED HOURS, THE FAN IS TO OPERATE AT 100% - REPLACE THE DAMPERS AND ASSOCIATED HARDWARE ON THE RELIEF AIR AND FRESH AIR. USE TAMCO 9000 INSULATED
- REPLACE ALL DAMPER MOTORS FOR ALL DAMPERS USING ELECTRIC DAMPER MOTORS. INTEGRATE CONTROL OF THE DAMPERS INTO THE NEW CONTROL SYSTEM.
- HEATING AND COOLING COIL CONTROL - PROVIDE A LEAVING AND RETURN AIR TEMPERATURE SENSOR FOR EACH OF THE HOT DECK AND COLD DECK. - PROVIDE FOR AUTOMATICALLY MODULATING THE CONTROL VALVES ON
 - THE HEATING COIL AND COOLING COIL TO MAINTAIN A PRE-SET AIR TEMPERATURE BASED ON THE DEMANDS OF THE SYSTEM. IF THE SYSTEM IS DEMANDING COOLING, THEN MODULATE THE COOLING VALVE TO MAINTAIN A LEAVING TEMPERATURE BASED ON OUTDOOR RESET TABLE PROVIDED BY THE DDC
 - IF THE SYSTEM IS DEMANDING HEATING, THEN MODULATE THE HEATING VALVE TO MAINTAIN A LEAVING TEMPERATURE BASED ON OUTDOOR RESET TABLE PROVIDED BY THE DDC SYSTEM. - DO NOT PERMIT THE HEATING AND COOLING VALVES TO BE OPEN
 - SIMULTANEOUSLY. - THE EXISTING PNEUMATIC CONTROL VALVES ARE BEING RE-USED. PROVIDE THE NECESSARY I/P TRANSDUCERS NECESSARY TO CONTROL THE EXISTING VALVES.
- MODULATE THE STEAM VALVE ON THE HUMIDIFIER IN THE UNIT. - PROVIDE A PID CONTROL LOOP TO MAINTAIN A PRE-SET SUPPLY AIR HUMIDITY ONLY DURING HEATING SEASON. DURING COOLING SEASON, THE HUMIDIFICATION IS TO BE SHUT DOWN. 5. PERIMETER HEAT CONTROL VALVES

- PROVIDE OUTDOOR AIR TEMPERATURE ACTIVATION OF PERIMETER

4. HUMIDITY CONTROL

FXISTING VALVES.

- HEATING CONTROL VALVES. - ON OUTDOOR TEMPERATURES BELOW A PRE-SET VALUE, OPEN THE TWO PERIMETER HEATING LOOP CONTROL VALVES SEQUENTIALLY. PROVIDE MINIMUM 5-MINUTE (ADJUSTABLE) DELAY BETWEEN ACTIVATION OF THE VALVES.
- PROVIDE OUTDOOR AIR RESET CONTROL FOR THE VALVES. MODULATE TO 50% OPEN AT OUTDOOR AIR TEMPERATURE OF 8°C, AND 100% OPEN AT -10°C. - THE EXISTING PNEUMATIC CONTROL VALVES ARE BEING REUSED. PROVIDE THE NECESSARY I/P TRANSDUCERS TO CONTROL THE
- 6. OPERATOR INTERFACE - DDC CONTROLS MUST BE ABLE TO INTERFACE TO THE EXISTING JOHNSON CONTROLS MSEA TECHNOLOGY USING BACNET PROTOCOLS - THE DDC CONTROLS WILL COMMUNICATE TO A SUPERVISORY CONTROLLER WHICH WILL BE INTEGRATED TO THE EXISTING CITY O WINNIPEG ADX SERVER. THIS WILL PROVIDE OPERATING CONDITIONS TO CENTRAL CONTROL ON: ALARMS, SETPOINTS, CONTROL RELAYS (FAN. HUMIDITY. START/STOP), CONTROL DAMPERS/VALVES,
 - TEMPERATURES AND HUMIDITY - PROVIDE LOCAL INDICATION FOR: ALL DAMPER POSITIONS, SETPOINT AND ACTUAL;
 - RETURN AIR TEMPERATURE; MIXED AIR TEMPERATURE, SETPOINT AND ACTUAL; SUPPLY AIR TEMPERATURE, HOT DECK AND COLD DECK,
 - SETPOINT AND ACTUAL; CONTROL VALVE POSITION, HEATING VALVE AND COOLING VALVE, SETPOINT AND ACTUAL.

COILS 10th FLOOR 2nd FLOOR 56 867 CFM AIRFLOW (CFM) 258 CFM ENTERING AIR TEMP (DB/WB) 76/64°F 76/64°F LEAVING AIR TEMP (DB/WB) 55°F/55°F 55°F/55°F AIR PRESSURE DROP 0.16" WC 0.63" WC COOLING MEDIUM WATER WATER 45°F 45°F 55°F APPROX 60°F APPROX 200usgpm APPROX 35usgpm APPROX WATER FLOW TOTAL COOLING (BTU/hr) 160 000 BTH/hr 1 500 000 BUT/hr S AIR FLOW (CFM) 6258 CFM 24 624 CFM SENTERING AIR TEMP 55°F (13°C) 55°F (13°C) 140°F LEAVING AIR TEMP AIR PRESSURE DROP 0.15" WC 0.12" WC HEATING MEDIUM LP STEAM LP STEAM INLET PRESSURE 12 psig 12 psig STEAM FLOW ±2500 lb/hr MINIMUM COIL PERFORMANCE REQUIREMENTS - MATCH EXISTING COIL CONSTRUCTION AND MEET MINIMUM PERFORMANCE

REQUIREMENTS NOTED ABOVE.



8				
7				
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1	ISSUED FOR TENDER	KCV	BKW	MAY 27 2016
REV	DESCRIPTION	DWN	APP	REV DATE

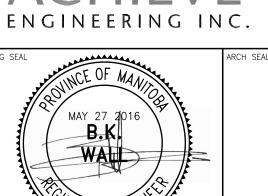


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266 GRAHAM COIL REPLACEMENT

MECHANICAL ROOM, 10th FLOOR ROOF CONTROL - SPECIFICATIONS - SCHEDULE BID OPPORTUNITY No. 467-2016

M105 BKW MAY 27 2016 BKW AS NOTED