

KEYNOTES ARE PROTOTYPICAL. MISSING KEYNOTE NUMBERS INDICATE A PROTOTYPICAL NOTE IS NOT USED OR REMOVED.

MECHANICAL PLAN NOTES

- M17 COORDINATE FINAL INSTALLED LOCATION SUCH THAT THE HVAC EQUIPMENT REMAINS ACCESSIBLE. VERIFY NO OTHER PIPING, ELECTRICAL CONDUIT, STRUCTURE, AND/OR CEILING SUPPORTS IMPEDS ACCESS IN ANY WAY. INSTALL HVAC EQUIPMENT WITHIN 16'-0" ABOVE FINISHED FLOOR FOR SERVICEABILITY. REFRIGERANT PIPING SHALL BE ROUTED AS CLOSE TO DECK AS POSSIBLE. LANDLORD SHALL PROVIDE CHASE FOR REFRIGERANT LINES AND INFORM ENGINEER OF FINAL DEVELOPED LENGTH.
- M82 RETURN AIR DUCTWORK IS EXISTING AND SHALL REMAIN UNLESS NOTED OTHERWISE. CLEAN EXISTING RETURN AIR DUCTWORK AND GRILLES AT COMPLETION OF CONSTRUCTION.
- M83 SUPPLY AIR DUCTWORK IS EXISTING AND SHALL REMAIN UNLESS NOTED OTHERWISE. CLEAN EXISTING SUPPLY AIR DUCTWORK AND REGISTERS AT COMPLETION OF CONSTRUCTION.
- M88 EXISTING SENSORS TO REMAIN. TIE UNIT CONTROLS BACK INTO EMS WITH NEW UNIT.
- M89 EXISTING UNIT HEATER TO REMAIN.

FABRIC DUCT GENERAL NOTES:
 PROVIDE FABRIC DUCT THROUGHOUT THE SPACE AS SHOWN ON PLAN. FABRIC DUCT SHALL NOT REPLACE RECTANGULAR DUCT DROPS OR EXHAUST DUCTS. BASIS OF DESIGN SHALL BE "PRIHODA", "NMI" NONPOROUS FABRIC WITH "PERFORATIONS" (AIR OPENINGS) WITH ADJUSTABLE FLOW DEVICES (I.E. AFD'S) AT OPENINGS, AND ONE ROW, GALVANIZED CABLE. INTERNAL HOOP SUPPORT SYSTEM SHALL BE PROVIDED ON ALL FABRIC DUCT UNLESS NOTED OTHERWISE. INCLUDE ALL COMPONENTS AND ACCESSORIES REQUIRED TO MAKE A COMPLETE SYSTEM AS RECOMMENDED BY PRIHODA DURING BID PHASE, INCLUDING HANGING STRAPS AND CLIPS, END-CAPS, CONNECTIONS TO METAL DUCTS, ETC. PRIHODA FABRIC DUCT SHALL BE SIZED PER FACTORY RECOMMENDATIONS TO PROVIDE MINIMUM AIRFLOWS IN BRANCH DUCTS AS SHOWN. CONFIRM FABRIC DUCT COLOR WITH ARCHITECT PRIOR TO ORDERING ON ALL PROJECTS. (FOR LITE FIXTURE PACKAGE, WHITE IS BASIS OF DESIGN) (FOR GLOBAL 3.0 FIXTURE PACKAGE, PANTONE 420 - LIGHT GREY IS BASIS OF DESIGN). CONTACT PRIHODA SALES DEPARTMENT (E-MAIL: SALES@PRIHODA-NA.COM, PHONE: 1-655-774-6532) FOR PRICING INFORMATION.

FABRIC DUCT DESIGN GUIDELINE:
 DISTRIBUTE AIRFLOW EVENLY ALONG FABRIC DUCT IN THE DIRECTION OF FLOW ARROWS. ORIENT AND SIZE FABRIC DUCT DIFFUSER OPENINGS TO PROVIDE A 50 FPM FLOW VELOCITY HALF WAY TO THE NEAREST ADJACENT FABRIC DUCT OR TO THE NEAREST PARTITION/DEMISING WALL AS APPLICABLE. VENTS ON FABRIC DUCT SHALL BE LOCATED AT 22.5 DEGREES BELOW HORIZONTAL UNLESS NOTED OTHERWISE.

FABRIC DUCT COORDINATION NOTE:
 DURING THE FIRST WEEK OF THE PROJECT, THE GENERAL CONTRACTOR'S SUPERINTENDENT, MECHANICAL SUB-CONTRACTOR, AND A REPRESENTATIVE FROM "PRIHODA" SHALL MEET AT THE PROJECT SITE FOR CONFIRMATION OF ALL FIELD DIMENSIONS AND POTENTIAL OBSTRUCTIONS. THIS EVENT MUST PRECEDE THE ORDERING OF ANY MATERIALS FROM "PRIHODA". CHANGE ORDERS AND EXPEDITING FEES WILL NOT BE APPROVED DUE TO LACK OF ON-SITE COLLABORATION AND/OR MEASUREMENT DURING SITE MEETING AT PROJECT COMMENCEMENT.

FABRIC DUCT INSTALLATION NOTE:
 INSTALL FABRIC DUCT ABOVE ARCHITECTURAL LIGHTING SYSTEM. COORDINATE FABRIC DUCT INSTALLATION WITH GENERAL CONTRACTOR AND DIVISION 26. GENERAL CONTRACTOR SHALL VERIFY FABRIC DUCT IS INSTALLED SUCH THAT IT DOES NOT CLASH WITH ARCHITECTURAL LIGHTING SYSTEM, INCLUDING LIGHT FIXTURES, ARCHITECTURAL LIGHTING SYSTEM GRID AND SUSPENSION CABLES, OR ANY OTHER SUSPENDED FIXTURES WHEN DEFLATED.

THE DUCTWORK LAYOUT INDICATED ON THE DRAWINGS IS SCHEMATIC AND SHOWS DESIGNED INTENT ONLY. PRIOR TO FABRICATION AND INSTALLATION OF DUCTWORK, DIVISION 23 SHALL HAVE A QUALIFIED, EXPERIENCED SKETCHER PREPARE AND SUBMIT SHEET METAL SHOP DRAWINGS. SHOP DRAWINGS SHALL TAKE INTO ACCOUNT ALL EXISTING CONDITIONS, INCLUDING BUT NOT LIMITED TO, STRUCTURAL MEMBERS, CONDUITS AND PIPING TO REMAIN. SHOP DRAWINGS SHALL ALSO TAKE INTO ACCOUNT ALL NEW DESIGN CONDITIONS, INCLUDING BUT NOT LIMITED TO, STRUCTURAL MEMBERS, PIPING, CEILING, SOFFIT HEIGHTS, AND LIGHT FIXTURES.

SHOP DRAWINGS SHALL INDICATE ALL REVISIONS TO THE LAYOUT REQUIRED TO ACCOMMODATE THE EXISTING CONDITIONS AND/OR MAINTAIN THE CEILING HEIGHTS AND CLEARANCES REQUIRED. NOTIFY THE ARCHITECT AND ENGINEER OF ANY LOCATION WHERE THE DESIGN INTENT CANNOT BE MET PRIOR TO FABRICATION AND INSTALLATION OF DUCTWORK. REVISIONS TO DUCTWORK, EQUIPMENT, CONDUIT AND/OR PIPING REQUIRED BY CONTRACTOR'S FAILURE TO SUBMIT PROPERLY PREPARED SHOP DRAWINGS SHALL BE THE RESPONSIBILITY OF DIVISION 23 AT NO ADDITIONAL COST TO THE CLIENT OR DELAY TO THE PROJECT SCHEDULE.

GENERAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING TO ARCHITECT, ENGINEER, LANDLORD, AND BUILDING OFFICIAL/INSPECTOR A FINAL TEST AND BALANCE REPORT PER THE SPECIFICATIONS. PROVIDE TEST AND BALANCE REPORT TO ARCHITECT, ENGINEER, AND LANDLORD PRIOR TO THE FINAL BUILDING INSPECTION.

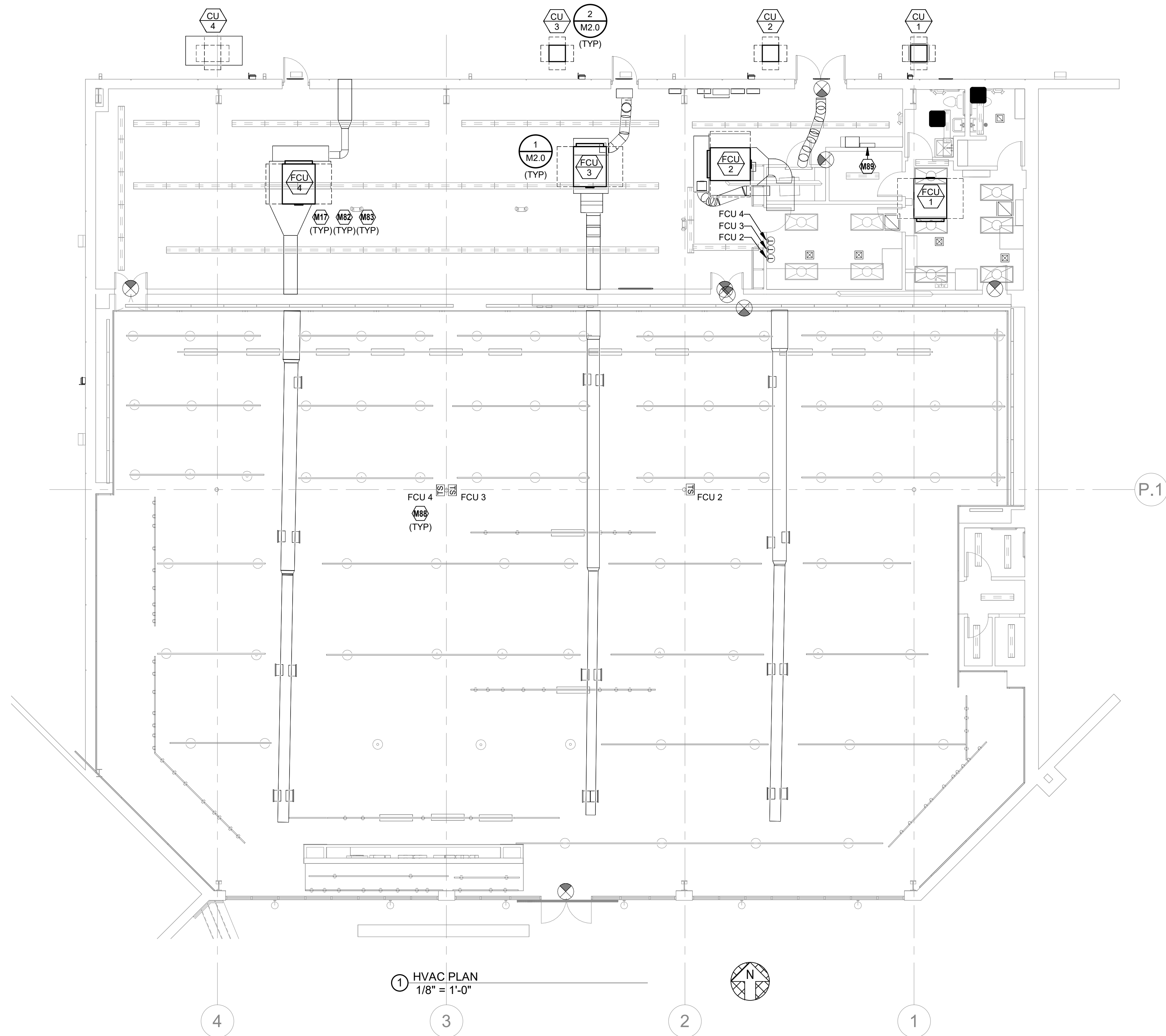
LANDLORD REQUIREMENTS:
 LANDLORD APPROVED ROOFING CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING ALL CUTS THROUGH THE EXISTING ROOF, MODIFYING EXISTING OPENINGS, AND/OR ALTERING CURB FLASHING AT GENERAL CONTRACTOR'S EXPENSE. COORDINATE WITH GENERAL CONTRACTOR.

EMS CONTROLS:
 CONTRACTORS ARE RESPONSIBLE FOR COORDINATING ALL EQUIPMENT CONTROLS WITH EMS VENDOR PRIOR TO PURCHASE AND INSTALLATION. CONTRACTORS SHALL COORDINATE WITH EMS VENDOR TO PROVIDE ALL NECESSARY EQUIPMENT AND ACCESSORIES FOR A FULLY FUNCTIONING SYSTEM.

TEMPERATURE CONTROLS:
 EMS VENDOR SHALL FURNISH SENSORS AND CONTROL COMPONENTS AS INDICATED ON PLANS AND AS NECESSARY TO ACCOMPLISH THE INTENT OF THE DRAWINGS. ALL CONTROLS SHALL BE TIED INTO THE EMS SYSTEM UNLESS NOTED OTHERWISE.

GENERAL CONTRACTOR SHALL INSTALL CARRIER FURNISHED TEMPORARY THERMOSTATS AND FEED THE WIRING DOWN INTO THE SPACE FOR START UP AND CONTROL OF RTU(S) UNTIL THE EMS SYSTEM IS OPERABLE. REFER TO M3.0 FOR CARRIER CONTACT INFORMATION.

INSTALL DUCTWORK AND PIPING AS TIGHT TO STRUCTURE AS POSSIBLE. COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS. COORDINATE INSTALLATION OF DUCTWORK AND PIPING TO AVOID CONFLICTS WITH ELECTRICAL PANELS, LIGHTING FIXTURES, ETC. DO NOT INSTALL DUCTWORK BELOW THE BOTTOM OF THE LIGHT FIXTURES.



1 HVAC PLAN
 1/8" = 1'-0"

Architect:



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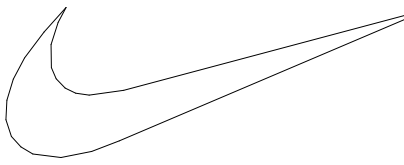
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MECHANICAL PLAN

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MECHANICAL PLAN NOTES

- M10 PROVIDE NEW DX SPLIT SYSTEM FAN COIL UNIT AS SCHEDULED SUPPORTED FROM STRUCTURE ABOVE. PROVIDE A NEW SET OF MERV 13 AIR FILTERS IN UNIT BEFORE TURNING SYSTEM OVER TO OWNER. COORDINATE CONDENSATE PIPING WITH DIVISION 22.
- M11 PROVIDE NEW DX SPLIT SYSTEM OUTDOOR CONDENSING UNIT AS SCHEDULED MOUNTED TO EXISTING CONCRETE EQUIPMENT PAD.
- M17 COORDINATE FINAL INSTALLED LOCATION SUCH THAT THE HVAC EQUIPMENT REMAINS ACCESSIBLE. VERIFY NO OTHER PIPING, ELECTRICAL, CONDUIT, STRUCTURE, AND/OR CEILING SUPPORTS IMPEDE ACCESS IN ANY WAY. INSTALL HVAC EQUIPMENT WITHIN 16'-0" ABOVE FINISHED FLOOR FOR SERVICEABILITY. REFRIGERANT PIPING SHALL BE ROUTED AS CLOSE TO DECK AS POSSIBLE. LANDLORD SHALL PROVIDE CHASE FOR REFRIGERANT LINES AND INFORM ENGINEER OF FINAL DEVELOPED LENGTH.
- M22 PROVIDE NEW CEILING-MOUNTED EXHAUST FAN AS SCHEDULED FOR GENERAL RESTROOM EXHAUST. CONNECT FAN TO EXISTING EXHAUST DUCTWORK. REFER TO SCHEDULES FOR MORE INFORMATION.
- M82 RETURN AIR DUCTWORK IS EXISTING AND SHALL REMAIN UNLESS NOTED OTHERWISE. CLEAN EXISTING RETURN AIR DUCTWORK AND GRILLES AT COMPLETION OF CONSTRUCTION.
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- M88 ALL THERMOSTATS AND TEMPERATURE SENSORS ARE EXISTING TO REMAIN. TIE EXISTING DEVICE CONTROLS FROM EMS INTO NEW ASSOCIATED UNIT(S).

INSTALL DUCTWORK AND PIPING AS TIGHT TO STRUCTURE AS POSSIBLE. COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS. COORDINATE INSTALLATION OF DUCTWORK AND PIPING TO AVOID CONFLICTS WITH ELECTRICAL PANELS, LIGHTING FIXTURES, ETC. DO NOT INSTALL DUCTWORK BELOW THE BOTTOM OF THE LIGHT FIXTURES.

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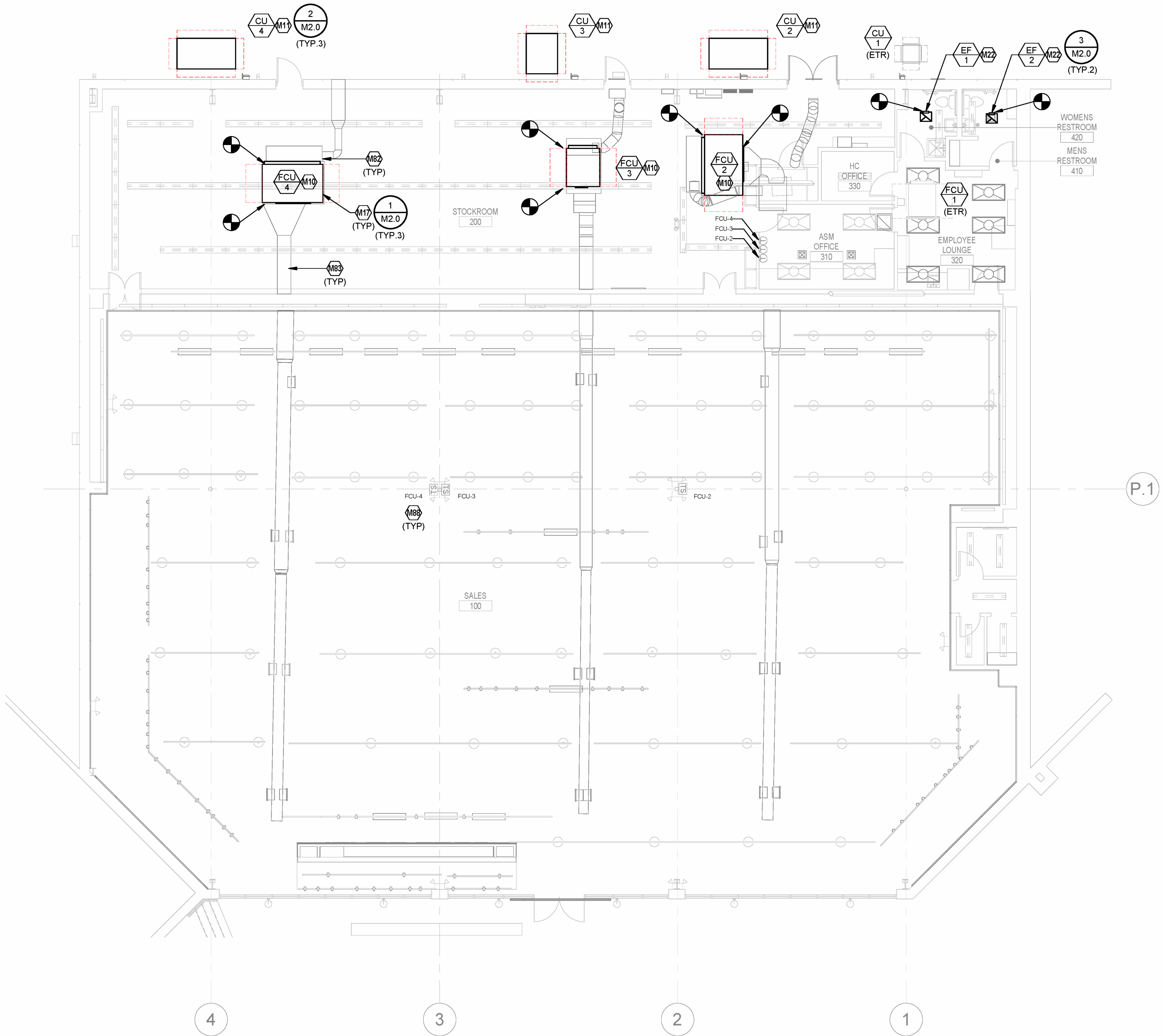
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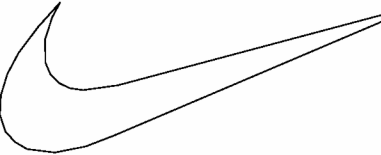
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FAN COIL UNIT (DX COOLING, ELEC HEAT) CONTROL MATRIX

CONTROL FEATURE	UNITS	FCU-1				FCU-2				FCU-3				FCU-4				POINT TYPE INTERFACE WITH DDC (READ/WRITE)	NOTES
		SETPOINT OR Y/N	OR Y/N	OR Y/N	OR Y/N	SETPOINT OR Y/N	OR Y/N	OR Y/N	OR Y/N	SETPOINT OR Y/N	OR Y/N	OR Y/N	OR Y/N	SETPOINT OR Y/N	OR Y/N	OR Y/N	OR Y/N		
BUILDING AUTOMATION SYSTEM (BAS)																			
ENERGY MANAGEMENT SYSTEM INTERFACE			Y			Y				Y				Y			BACNET		
SETPOINTS																			
COOLING - OCCUPIED SETPOINT	"F	72	72	72	72	72										READ/WRITE			
COOLING - UNOCCUPIED SETPOINT	"F	77	77	77	77	77										READ/WRITE			
HEATING - OCCUPIED SETPOINT	"F	70	70	70	70	70										READ/WRITE			
HEATING - UNOCCUPIED SETPOINT	"F	60	60	60	60	60										READ/WRITE			
PROGRAMMED CONTROL FEATURES																			
HVAC SYSTEM OCCUPIED/UNOCCUPIED MODE - EMS INTERFACE		Y	Y	Y	Y	Y										READ	A		
REMOTE TEMPERATURE SENSOR		Y	Y	Y	Y	Y										READ	B		
REMOTE CO2 SENSOR		Y	Y	Y	Y	Y										READ	B		
EQUIPMENT ACCESSORIES AND CONTROL MODULES																			
OUTSIDE AIR DAMPER - MOTOR OPERATED (MODULATING)		Y	Y	Y	Y	Y										READ POSITION	L		
AIRSIDE ECONOMIZER - DIFFERENTIAL ENTHALPY ENABLE (OA ENTHALPY < RA ENTHALPY)		Y	Y	Y	Y	Y										READ/WRITE	N, P		
HEATING COIL (ELECTRIC HEAT)	"F	Y	Y	Y	Y	Y										READ STATUS	J		
COOLING COIL - DX STAGED		Y	Y	Y	Y	Y										READ STATUS	J		
SUPPLY FAN CONTROL METHODS																			
ON DURING OCCUPIED HOURS		Y	Y	Y	Y	Y													
CYCLE WITH LOADS DURING UNOCCUPIED HOURS		Y	Y	Y	Y	Y													
OPTIMUM START SEQUENCE		Y	Y	Y	Y	Y											N		
VARIABLE VOLUME - STAGED FAN CONTROL IN RESPONSE TO ACTIVE COOLING COIL STAGES		Y	Y	Y	Y	Y										READ STATUS	J		
SAFETIES, INTERLOCKS, AND ALARMS																			
SUPPLY AIR SMOKE DETECTOR - UNIT SHUTDOWN		Y	Y	Y	Y	Y										READ	C, D, F		
RETURN AIR SMOKE DETECTOR - UNIT SHUTDOWN		Y	Y	Y	Y	Y										READ	C, D, F		
AUXILIARY DRAIN PAN FLOOD DETECTOR - UNIT SHUTDOWN		Y	Y	Y	Y	Y										READ	C, F		
DIFFERENTIAL PRESSURE SWITCH - FILTER CHANGE ALARM		Y	Y	Y	Y	Y										READ	G		

EMS VENDOR SHALL PROVIDE CONTROL PANEL, RELAYS, THERMOSTATS, TEMPERATURE SENSORS, HUMIDITY SENSORS, AND/OR CO2 SENSORS WHERE SHOWN ON THE DRAWINGS AND AS REQUIRED TO FACILITATE THE SCHEDULED SEQUENCE OF OPERATION. EACH UNIT SHALL HAVE CONTROL BASED ON ITS OWN INTERNAL SAFETIES, TIME DELAYS, AND SEQUENCES UNLESS NOTED OTHERWISE. COORDINATE WITH OWNER FINAL BUILDING AND EQUIPMENT SCHEDULES DURING STARTUP. REFERENCE DIVISION SPECIFICATIONS FOR INDIVIDUAL DEVICE REQUIREMENTS.

- NOTES:
- PROVIDE UNIT WITH TERMINAL STRIP TO RECEIVE CONTROL INPUT(S) COMMUNICATED FROM ENERGY MANAGEMENT SYSTEM OR A CENTRAL DDC CONTROLLER. EMS SHALL PROVIDE REMOTE SETPOINT ADJUSTMENT, SCHEDULING, AND MONITORING OF THE POINTS LISTED IN THE SCHEDULE FOR EACH UNIT.
 - EMS VENDOR SHALL PROVIDE DEVICE AND NECESSARY RELAYS FOR INTERFACE TO EMS.
 - DIVISION 23 CONTRACTOR SHALL PROVIDE DEVICE.
 - DIVISION 28 CONTRACTOR SHALL PROVIDE DEVICE.
 - IF A LOCAL UNIT CONTROL ALARM IS ACTIVE, THE SUPPLY FAN TURNS OFF IMMEDIATELY REGARDLESS OF OCCUPANCY STATE OR DEMAND.
 - DEVICE SHALL BE FACTORY MOUNTED AND PRE-WIRED FOR OPERATION SUBJECT TO THE ONBOARD CONTROLLER.
 - MODULATE AND/OR CYCLE FAN AND COIL CAPACITY STAGES SUBJECT TO THE INTERNAL SAFETIES AND SEQUENCES TO MAINTAIN SCHEDULED SETPOINTS.
 - DIVISION 23 SHALL PROVIDE MODULATING DAMPER AND EMS VENDOR SHALL PROVIDE CONTROLS CAPABLE OF ADJUSTING THE DAMPER POSITION TO MAINTAIN THE SCHEDULED OUTSIDE AIR ON THE DRAWINGS. EMS CONTRACTOR SHALL PROGRAM MULTIPLE DAMPER POSITION SETPOINTS IN THE FIELD DURING TESTING AND BALANCING TO MAINTAIN DEMAND CONTROL VENTILATION AS REQUIRED. DAMPER SHALL ADJUST BASED ON DEMAND CONTROL VENTILATION.
 - THE SYSTEM SHALL UTILIZE THE ECONOMIZER CONTROL DAMPERS FOR FREE COOLING WHEN OUTDOOR AIR CONDITIONS ARE SUITABLE. FOR THE ECONOMIZER TO OPERATE DURING OCCUPIED HOURS, THE FOLLOWING CONDITIONS MUST BE TRUE:
 - OUTDOOR AIR TEMPERATURE IS LESS THAN 55°F.
 - THE INDOOR FAN HAS BEEN ON FOR AT LEAST 30 SECONDS.
 - THE UNIT HAS A VALID SUPPLY AIR TEMPERATURE INPUT.
 - THE UNIT HAS A VALID SPACE TEMPERATURE INPUT.
 IF THE PRECEDING CONDITIONS ARE NOT TRUE, THE OUTSIDE AIR CONTROL DAMPERS SHALL BE SET TO THE MINIMUM DAMPER POSITION (TBD BY TAB CONTRACTOR). IF ALL OF THE PRECEDING CONDITIONS ARE TRUE, THE ECONOMIZER PID LOOP SHALL MODULATE THE DAMPER, THE ECONOMIZER DAMPERS SHALL MODULATE TO MAINTAIN A MIXED AIR TEMPERATURE OF 55°F.
 - DURING UNOCCUPIED HOURS, UNOCCUPIED FREE COOLING SHALL BE ENABLED. THE ECONOMIZER SHALL REMAIN CLOSED UNLESS THE FOLLOWING CONDITIONS ARE TRUE:
 - OUTDOOR AIR TEMPERATURE IS BELOW THE ECONOMIZER HIGH DAT LOCKOUT SETPOINT.
 - OUTDOOR AIR TEMPERATURE IS LESS THAN THE SPACE TEMPERATURE.
 IF ALL OF THE PRECEDING CONDITIONS ARE TRUE AND THE SPACE TEMPERATURE RISES 1 DEGREE ABOVE THE EFFECTIVE UNOCCUPIED COOLING SETPOINT, THE SUPPLY FAN SHALL START AND THE ECONOMIZER DAMPER SHALL OPEN AS NECESSARY TO COOL THE SPACE. THE DAMPER SHALL REMAIN OPEN UNTIL THE SPACE IS SATISFIED OR THE PRECEDING CONDITIONS ARE NO LONGER TRUE. IF ANY OF THE PRECEDING CONDITIONS ARE NOT TRUE, THE ECONOMIZER SHALL CLOSE COMPLETELY.

CARRIER UNIT STARTUP REQUIREMENTS

INSTALLING CONTRACTOR SHALL COMPLETE THE PRE-START CHECKLIST AND EMAIL JENNIFER.TYE@COMFORTSYSTEMSUSA.COM TWO WEEKS PRIOR TO SCHEDULING EQUIPMENT STARTUP.

COORDINATE EQUIPMENT STARTUP WORK WITH COMFORT SYSTEMS USA. EMAIL: JENNIFER.TYE@COMFORTSYSTEMSUSA.COM. OFFICE: (317) 246-5176

DEPARTMENT MANAGER
EMAIL: KLOKAR@COMFORTSYSTEMSUSA.COM. OFFICE: 317-246-4656

TECHNICAL SUPPORT
EMAIL: RICK.FARRIS@COMFORTSYSTEMSUSA.COM. MOBILE: 317-638-5363 X4454

- PRE-START CHECKLIST (VERIFY FOR ALL UNITS)
- VERIFY ALL ITEMS ON THE EQUIPMENT ORDER RECEIVED.
 - VERIFY ALL PACKAGING MATERIAL REMOVED FROM THE UNIT.
 - VERIFY CURB GASKETS PROPERLY INSTALLED.
 - VERIFY ROOFTOP UNIT INSTALLED LEVEL AND PROPERLY ALIGNED WITH CURB.
 - VERIFY DUCTWORK/FABRIC DUCT COMPLETELY INSTALLED PER MECHANICAL PLANS.
 - VERIFY OA HOOD INSTALLED, AIR INLET SCREEN INSTALLED.
 - VERIFY POWER EXHAUST ACCESSORY INSTALLED (IF APPLICABLE).
 - VERIFY CLEAN PLEATED FILTERS INSTALLED, MINIMUM MERV 8 RATING.
 - VERIFY CONDENSATE DRAIN LINE INSTALLED, MINIMUM 2" DEEP TRAP, DRAIN PAN CHECK LEVEL.
 - VERIFY SUPPLY FAN ROTATES FREELY IN THE HOUSING.
 - VERIFY FULLEYS ALIGNED AND BELT TENSION CORRECT.
 - VERIFY SMOKE DETECTORS INSTALLED IN DUCTWORK, CLEANED AND TESTED.
 - VERIFY GAS METER INSTALLED AND GAS AVAILABLE FROM THE UTILITY. GAS PIPING COMPLETED, CHECKED FOR LEAKS AND PURGED (IF APPLICABLE).
 - VERIFY GAS PIPING DRAIN LEG INSTALLED PROPERLY (DOWNSTREAM OF SHUTOFF VALVE AND NO INTERFERENCE WITH ACCESS DOOR).
 - VERIFY FLUE HOOD INSTALLED.
 - VERIFY JOBSITE POWER SUPPLY MATCHES THE VOLTAGE ON THE UNIT DATA PLATE.
 - VERIFY ELECTRIC POWER CONNECTED TO UNIT VIA THE ACCESS PROVIDED. IF NOT, DATE POWER WILL BE AVAILABLE.
 - VERIFY NO WIRES TOUCHING REFRIGERANT LINES OR SHARP EDGES.
 - VERIFY ELECTRIC CONNECTORS AND TERMINALS TIGHT.
 - VERIFY THRU-THE-CURB UTILITY CONNECTIONS COMPLETE.
 - VERIFY UNIT TRANSFORMER PRIMARY TAPPED FOR JOBSITE VOLTAGE.
 - VERIFY VENSTAR THERMOSTAT INSTALLED IN THE RETURN AIR DUCT DROP AND WIRED FOR TEMPORARY UNIT OPERATION.

EMS INSTALLATION CHECKLIST

ITEMS ON EMS CHECK-OFF LIST MUST BE COMPLETED PRIOR TO EMS AND GBS COMMISSIONING AT THE END OF THE JOB. SOME ITEMS LISTED BELOW MAY NOT BE APPLICABLE.

COORDINATE EQUIPMENT STARTUP WORK WITH COMFORT SYSTEMS USA. EMAIL: PAUL.SAWYER@COMFORTSYSTEMSUSA.COM. OFFICE: 317-246-5170

- EMS CHECKLIST
- REVIEW EMS PRINT SET AND INSTALL EMS OPUS PANEL AND LCP AS DESCRIBED IN THE EMS PRINT SET.
 - REVIEW EMS PRINT SET AND PULL ALL WIRE AND TERMINATE ON DEVICES AS DESCRIBED IN THE EMS PRINT SET.
 - REVIEW EMS PRINT SET AND INSTALL ALL EMS HVAC CONTROLS AS DESCRIBED IN THE EMS PRINT SET.
 - REVIEW EMS PRINT SET AND INSTALL ALL EMS LIGHTING CONTROLS AS DESCRIBED IN THE EMS PRINT SET.
 - REVIEW EMS PRINT SET AND WATTSTOPPER SUBMITTAL AND INSTALL THE WATTSTOPPER LIGHTING SYSTEM AND PULL ALL WIRE AS DESCRIBED IN THE EMS PRINT SET AND WATTSTOPPER SUBMITTAL.

SEQUENCE OF OPERATION

- DX SPLIT SYSTEM UNIT CONTROL (FCU/UCU-X)
Refer to Split System Control Matrix for sequence of operations.

OUTSIDE AIR REQUIREMENTS, IMC-2015 (IP)

SYSTEM DESIGNATION	SYSTEM TAB NAME OR LIST 'SINGLE'	SINGLE-ZONE SYSTEMS ONLY		MULTI-ZONE SYSTEMS ONLY		FLOOR AREA SERVED BY SYSTEM [A _s] (SF)	SYSTEM AVERAGED AREA-BASED OUTDOOR AIR RATE (CFMSF)	SYSTEM POPULATION [P _n] (PEOPLE)	SYSTEM AVERAGED PEOPLE-BASED OUTDOOR AIR RATE (CFMP)	REQUIRED OA INTAKE FLOW [V _o] (CFM)	REQUIRED DCV OA INTAKE FLOW [V _o] (CFM)	DESIGN OA INTAKE FLOW [V _o] (CFM)	NOTES
		SINGLE-ZONE SYSTEM ASSOCIATED VENTILATION ZONE	SINGLE-ZONE WORST CASE ZONE AIR DISTRIBUTION EFFECTIVENESS [E _a]	SYSTEM VENTILATION EFFICIENCY [E _v]									
SS-1	MULTIZONE (AHU-1)	-	-	0.85		691	0.019	12	1.67	38	N/A	40	ALL
SS-2,3,4	MULTIZONE (AHU-2,3,4)	-	-	0.85		9,996	0.108	119,552	7.50	2,334	N/A	2,470	ALL
TOTALS										2,372	0	2,510	

- GENERAL NOTES:
- VENTILATION CALCULATIONS BASED ON IMC-2015.
 - SYSTEM POPULATIONS BASED ON MAX SEATING AND/OR CODE MAXIMUM VALUES.
 - SINGLE ZONE SYSTEMS (V_o = V_o): SYSTEM VENTILATION EFFICIENCY CALCULATION IS NOT REQUIRED FOR SINGLE ZONE SYSTEMS. WORST CASE AIR DISTRIBUTION EFFECTIVENESS BETWEEN HEATING AND COOLING MODES OF OPERATION IS SHOWN IN TABLE.
 - 100% OA SYSTEMS (V_o = 2xI_z zones V_o): WHEN ONE AIR HANDLER SUPPLIES ONLY OUTDOOR AIR TO ONE OR MORE ZONES. EACH ZONE IS INDIVIDUALLY CALCULATED WITH ITS WORST CASE ZONE AIR DISTRIBUTION EFFECTIVENESS (HEATING/COOLING).
 - MULTI-ZONE RECIRCULATING SYSTEMS: CALCULATOR USED TO DETERMINE VENTILATION AIRFLOW IN COMPLIANCE WITH IMC-2015 VPR AND ASHRAE 62.1-2013 APPENDIX A. VENTILATION RATE SHOWN IS ACTUAL CALCULATED WITH CORRECTION FACTORS INCLUDED. EACH ZONE IS CALCULATED WITH ITS WORST CASE ZONE AIR DISTRIBUTION EFFECTIVENESS. (HEATING/COOLING) AS PART OF CALCULATIONS TO FIND E_v.

- NOTES:
- VENTILATION AIR PROVIDED VIA TRANSFER FROM SPACES/RETURN PLENUM SERVED BY AHU-X. SYSTEM INCLUDED IN MULTIPLE ZONE CALCULATIONS.
 - VENTILATION AIR PROVIDED VIA TRANSFER FROM SPACES SERVED BY EXISTING AHU.
 - AIRFLOW IS FOR EXHAUST MAKEUP AS REQUIRED BY THE VENTILATION STANDARD.
 - VENTILATION FOR SPACE BASED ON CODE MACHINERY ROOM REQUIREMENTS.

FAN COIL UNIT SCHEDULE (DX COOLING, ELECTRIC HEATING)

MARK	MANUFACTURER	MODEL	SUPPLY FAN				COOLING COIL				HEATING COIL				MIN OA (CFM)	ABS MIN OA (CFM)	ELECTRICAL			WEIGHT (LBS)	NOTES			
			CFM	ESP (IN)	NOM HP	TH (MMB)	SH (MMB)	EAT (°F DB)	WB (°F WB)	LAT (°F WB)	REF TYPE	MIN OUT (MMB)	NOM (KW)	EAT (°F DB)			LAT (°F DB)	MIN NO STAGES	VIPH			MCA	MCCP	
FCU-1		(ETR)																						
FCU-2	CARRIER	15T	4,800	1.00	3.7	143	102	75.9	64.6	56.6	54.7	R-410A	147	50	50	90	2	800	800	480/3	81.3	90	785	ALL
FCU-3	CARRIER	7.5T	2,550	1.00	2.4	72	51	75.9	64.6	56.6	54.7	R-410A	79	35	50	90	2	450	450	480/3	57.4	60	450	ALL
FCU-4	CARRIER	15T	4,800	1.00	3.7	143	102	75.9	64.6	56.6	54.7	R-410A	147	50	50	90	2	800	800	480/3	81.3	90	785	ALL

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

- NOTES:
- ASSOCIATED CONDENSING UNIT SHALL BE BY THE SAME MANUFACTURER.
 - EQUIPMENT SIZES FOR 100°F AMBIENT TEMPERATURE.
 - SPECIFIED FAN ESP ACCOUNTS FOR DUCT LOSSES EXTERNAL TO UNIT. FILTER LOSS IS AT A MAXIMUM OF 400 FPM FACE VELOCITY.
 - PROVIDE WITH BACK INLET CONNECTION.
 - PROVIDE WITH FRONT OUTLET CONNECTION.
 - PROVIDE WITH 7-DAY PROGRAMMABLE THERMOSTAT WITH STAGED HEATING AND COOLING CAPABILITY AS REQUIRED FOR OPERATION OF AUXILIARY HEATING AND COOLING CONTROLS.
 - PROVIDE FACTORY MOUNTED DISCONNECT INSTALLED ON SERVICE SIDE OF UNIT. DISCONNECT SWITCH PROVIDED BY DIVISION 28 CONTRACTOR.
 - SPECIFIED FAN ESP ACCOUNTS FOR DUCT LOSSES EXTERNAL TO UNIT. FILTER LOSS IS AT A MAXIMUM OF 400 FPM FACE VELOCITY.
 - PROVIDE MOTOR HORSEPOWER TO OVERCOME INTERNAL UNIT STATIC PRESSURE DROP PLUS SPECIFIED EXTERNAL STATIC PRESSURE DROP.
 - NOMINAL MOTOR HP SHALL BE NO LARGER THAN THE FIRST AVAILABLE NOMINAL MOTOR SIZE GREATER THAN THE REQUIRED BHP.
 - DIVISION 23 CONTRACTOR SHALL PROVIDE SMOKE DETECTORS IN RETURN AIR DUCT(S).
 - PROVIDE WITH SPRING VIBRATION ISOLATION AND ALL-THREAD HANGING RODS.
 - PROVIDE SEPARATE ELECTRIC HEAT KIT BY WARREN TECHNOLOGY. MODEL NUMBER WFK KW 05A. OR EQUIVALENT. ELECTRIC HEAT KIT SHALL PROVIDE A SINGLE-POINT 480/3 POWER CONNECTION FOR THE ELECTRIC HEATER AND FAN COIL UNIT. NOMINAL KW IS BASED ON LISTED MANUFACTURER'S STANDARD PRODUCT. COORDINATE EQUIPMENT FLOOR SUPPLY WITH ELECTRICAL CONTRACTOR IF DIFFERENT FROM THAT SCHEDULED.
 - PROVIDE AUXILIARY DRAIN PAN WITH FLOOD DETECTOR SWITCH TO SHUT OFF UNIT WHEN WATER IS PRESENT IN DRAIN PAN.

CARRIER NATIONAL ACCOUNT CONTACT
MATT MURPHY
STRATEGIC ACCOUNT MANAGER
CARRIER CORPORATION
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DX CONDENSING UNIT SCHEDULE

MARK	SERVICE	MANUFACTURER	MODEL	REFR TYPE	TH (MMB)	MIN NO OF STAGES	NO OF CIRCUITS	MIN EFF		ELECTRICAL			WEIGHT (LBS)	NOTES
								(EER)	(IEER)	VIPH	MCA	MCCP		
CU-2	FCU-2	CARRIER	15T	R-410A	143.48	2	1	11.2	14.3	480/3	32.1	40	810	ALL
CU-3	FCU-3	CARRIER	7.5T	R-410A	71.74	1	1	11.2	12.9	480/3	20	30	430	ALL
CU-4	FCU-4	CARRIER	15T	R-410A	143.48	2	1	11.2	14.3	480/3	32.1	40	810	ALL

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

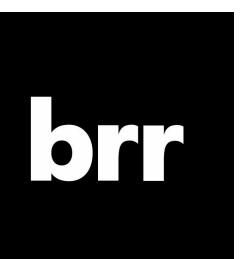
- NOTES:
- ASSOCIATED FAN COIL UNIT SHALL BE BY THE SAME MANUFACTURER.
 - PROVIDE LOW AMBIENT CONTROL TO 0°F.
 - EQUIPMENT SIZED FOR 100°F AMBIENT TEMPERATURE.
 - COORDINATE WITH THE MANUFACTURER THE HORIZONTAL AND VERTICAL REFRIGERANT PIPE ROUTING TO DETERMINE PIPE SIZES FOR THE REFRIGERANT PIPING. MANUFACTURER SHALL PROVIDE DETAILED REFRIGERANT PIPING DIAGRAMS INCLUDING DIMENSIONAL DATA FOR ALL REFRIGERANT PIPING DEVICES. THE MANUFACTURER SHALL SIZE AND LOCATE THE ASSOCIATED REFRIGERANT TRAPS BASED ON THE ACTUAL ROUTING AND PROVIDE OTHER APPURTENANCES TO PROVIDE A FULLY FUNCTIONAL AND OPERATIONAL SYSTEM. COORDINATE WITH THE MANUFACTURER LOCATIONS FOR ALL REFRIGERANT PIPING DEVICES TO MAINTAIN SERVICEABILITY AND ACCESSIBILITY.
 - PROVIDE LIQUID LINE FILTER DRYER AND SIGHT GLASS.
 - COORDINATE SIZE AND LOCATION OF MECHANICAL EQUIPMENT PAD FOR NEW CONDENSING UNIT.
 - EQUIPMENT MOUNTED DISCONNECT INSTALLED ON SERVICE SIDE OF UNIT.
 - STARTERS FOR ALL MOTORS SHALL BE PROVIDED INTEGRAL WITH UNIT.
 - COORDINATE SIZE OF CONDUIT TERMINATION LUGS WITH CONDUCTOR SIZES SHOWN ON ELECTRICAL DRAWINGS.
 - PROVIDE CONDENSER COIL HALL GUARDS.
 - PROVIDE HARD START KIT FOR ALL SINGLE PHASE UNITS.

EXISTING EQUIPMENT REFURBISH CHECKLIST (VERIFY FOR ALL UNITS)

- REPLACE AIR FILTERS AND CLEAN OUTDOOR AIR INLET SCREENS.
- ADJUST FAN(S) AS NEEDED TO ENSURE FAN(S) ARE CENTERED TO THEIR HOUSING.
 - CHECK BLADES FOR EXCESSIVE RUSTING AND FOR THE CHIPS, CRACKS AND DIRT BUILDUP THAT CAUSE NOISE AND VIBRATION.
 - PROVIDE PROPOSAL TO REPAIR DAMAGE IF NOTICED.
 - IF MOTOR BEARINGS ARE NOT PERMANENTLY LUBRICATED, LUBRICATE PER MANUFACTURER WRITTEN DIRECTION.
- REPLACE FAN BELTS AND ADJUST BELT TENSION PER MANUFACTURER WRITTEN DIRECTION. INSPECT THE HEAT EXCHANGER FOR RUSTS OR CRACKS, GASES COULD CONTAMINATE THE BUILDING'S AIR SUPPLY. INSPECT BURNERS, IGNITER, AND COMBUSTION SECTION.
 - CHECK THE GAS PRESSURE AND TEST FOR LEAKS
 - PROVIDE PROPOSAL TO REPAIR DAMAGE / ISSUES TO HEAT EXCHANGER
- WASH AND FLUSH BOTH SIDES OF THE COILS. WASH TOWARD THE RETURN-AIR SECTION TO REMOVE FOREIGN MATERIAL.
- CLEAN CONDENSATE DRAIN PAN AND CONDENSATE TRAP.
- CHECK THE REFRIGERANT CHARGE. BEFORE CHECKING, RUN THE UNIT FOR 15 MINUTES IN THE COOLING MODE TO STABILIZE SYSTEM PRESSURE. IF A SUBSTANTIAL ADJUSTMENT IS INDICATED, CHECK FOR REFRIGERANT LEAKS OR INSUFFICIENT AIRFLOW ACROSS THE COILS.
- CHECK FOR VOLTAGE IMBALANCES AND HIGH AMPERAGE. VOLTAGE IMBALANCES SHOULD NOT EXCEED 1% - A GREATER IMBALANCE CAN CONTRIBUTE TO OVERHEATING AND PREMATURE MOTOR FAILURE. ALSO CHECK FOR LOOSE WIRING AND CONNECTIONS, AND CORRODED OR FRAYED WIRES. A HIGH AMPERAGE DRAW COULD SIGNAL A MECHANICAL PROBLEM, SUCH AS WORN BEARINGS/RODS, OR IT COULD INDICATE A REFRIGERATION ISSUE. NOTIFY OWNER OF ELECTRICAL ISSUES.
- MAKE SURE ALL PANELS ARE FASTENED SECURELY IN PLACE.

EMS CONTROLS:
CONTRACTORS ARE RESPONSIBLE FOR COORDINATING ALL EQUIPMENT CONTROLS WITH EMS VENDOR PRIOR TO PURCHASE AND INSTALLATION. CONTRACTORS SHALL COORDINATE WITH EMS VENDOR TO PROVIDE ALL NECESSARY EQUIPMENT AND ACCESSORIES FOR A FULLY FUNCTIONING SYSTEM.

Architect:



ARCHITECT OF RECORD:
BRR ARCHITECTURE, INC.
815 NICKLAUF AVE
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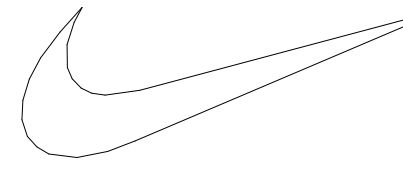
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CHECKED BY:
xx
DRAWN BY:
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Issued For:

FAN COIL UNIT (DX COOLING, ELEC HEAT) CONTROL MATRIX									
CONTROL FEATURE	UNITS	FCU-1 SETPOINT OR Y/N	FCU-2 SETPOINT OR Y/N	FCU-3 SETPOINT OR Y/N	FCU-4 SETPOINT OR Y/N	POINT TYPE INTERFACE WITH DOC (READWRITE)	NOTES	BACNET	
								Y	N
BUILDING AUTOMATION SYSTEM (BAS)									
ENERGY MANAGEMENT SYSTEM INTERFACE									
SETPOINTS									
COOLING - OCCUPIED SETPOINT	"F	72	72	72	72	72	READWRITE		
COOLING - UNOCCUPIED SETPOINT	"F	77	77	77	77	77	READWRITE		
HEATING - OCCUPIED SETPOINT	"F	70	70	70	70	70	READWRITE		
HEATING - UNOCCUPIED SETPOINT	"F	60	60	60	60	60	READWRITE		
PROGRAMMED CONTROL FEATURES									
HVAC SYSTEM OCCUPIED/UNOCCUPIED MODE - EMS INTERFACE		Y	Y	Y	Y	Y	READ		A
REMOTE TEMPERATURE SENSOR		Y	Y	Y	Y	Y	READ		B
REMOTE CO2 SENSOR		Y	Y	Y	Y	Y	READ		B
EQUIPMENT ACCESSORIES AND CONTROL MODULES									
OUTSIDE AIR DAMPER - MOTOR OPERATED (MODULATING)		Y	Y	Y	Y	Y	READ POSITION		L
AIRSIDE ECONOMIZER - DIFFERENTIAL ENTHALPY ENABLE (OA ENTHALPY < RA ENTHALPY)		Y	Y	Y	Y	Y	READWRITE		N, P
HEATING COIL (ELECTRIC HEAT)	"F	Y	Y	Y	Y	Y	READ STATUS		J
COOLING COIL - DX STAGED		Y	Y	Y	Y	Y	READ STATUS		J
SUPPLY FAN CONTROL METHODS									
ON DURING OCCUPIED HOURS		Y	Y	Y	Y	Y			
CYCLE WITH LOADS DURING UNOCCUPIED HOURS		Y	Y	Y	Y	Y			
OPTIMUM START SEQUENCE		Y	Y	Y	Y	Y			
VARIABLE VOLUME - STAGED FAN CONTROL IN RESPONSE TO ACTIVE COOLING COIL STAGES		Y	Y	Y	Y	Y	READ STATUS		N
SAFETIES, INTERLOCKS, AND ALARMS									
SUPPLY AIR SMOKE DETECTOR - UNIT SHUTDOWN		Y	Y	Y	Y	Y	READ		C, D, F
RETURN AIR SMOKE DETECTOR - UNIT SHUTDOWN		Y	Y	Y	Y	Y	READ		C, D, F
AUXILIARY DRAIN PAN FLOOD DETECTOR - UNIT SHUTDOWN		Y	Y	Y	Y	Y	READ		C, F
DIFFERENTIAL PRESSURE SWITCH - FILTER CHANGE ALARM		Y	Y	Y	Y	Y	READ		G
EMS VENDOR SHALL PROVIDE CONTROL PANEL, RELAYS, THERMOSTATS, TEMPERATURE SENSORS, HUMIDITY SENSORS, AND/OR CO2 SENSORS WHERE SHOWN ON THE DRAWINGS AND AS REQUIRED TO FACILITATE THE SCHEDULED SEQUENCE OF OPERATION. EACH UNIT SHALL CONTROL BASED ON ITS OWN INTERNAL SAFETIES, TIME DELAYS, AND SEQUENCES UNLESS NOTED OTHERWISE. COORDINATE WITH OWNER FINAL BUILDING AND EQUIPMENT SCHEDULES DURING STARTUP. REFERENCE DIVISION SPECIFICATIONS FOR INDIVIDUAL DEVICE REQUIREMENTS.									
NOTES									
A. PROVIDE UNIT WITH TERMINAL STRIP TO RECEIVE CONTROL INPUT(S) COMMUNICATED FROM ENERGY MANAGEMENT SYSTEM OR A CENTRAL DDC CONTROLLER. EMS SHALL PROVIDE REMOTE SETPOINT ADJUSTMENT, SCHEDULING, AND MONITORING OF THE POINTS LISTED IN THE SCHEDULE FOR EACH UNIT.									
B. EMS VENDOR SHALL PROVIDE DEVICE AND NECESSARY RELAYS FOR INTERFACE TO EMS.									
C. DIVISION 23 CONTRACTOR SHALL PROVIDE DEVICE.									
D. DIVISION 28 CONTRACTOR SHALL PROVIDE DEVICE.									
F. IF A LOCAL UNIT CONTROL ALARM IS ACTIVE, THE SUPPLY FAN TURNS OFF IMMEDIATELY REGARDLESS OF OCCUPANCY STATE OR DEMAND.									
G. DEVICE SHALL BE FACTORY MOUNTED AND PRE-WIRED FOR OPERATION SUBJECT TO THE ONBOARD CONTROLLER.									
J. MODULATE AND/OR CYCLE FAN AND COIL CAPACITY STAGES SUBJECT TO THE INTERNAL SAFETIES AND SEQUENCES TO MAINTAIN SCHEDULED SETPOINTS.									
L. DIVISION 23 SHALL PROVIDE MODULATING DAMPER AND EMS VENDOR SHALL PROVIDE CONTROLS CAPABLE OF ADJUSTING THE DAMPER POSITION TO MAINTAIN THE SCHEDULED OUTSIDE AIR ON THE DRAWINGS. EMS CONTRACTOR SHALL PROGRAM MULTIPLE DAMPER POSITION SETPOINTS IN THE FIELD DURING TESTING AND BALANCING TO MAINTAIN DEMAND CONTROL VENTILATION AS REQUIRED. DAMPER SHALL ADJUST BASED ON DEMAND CONTROL VENTILATION.									
N. THE SYSTEM SHALL UTILIZE THE ECONOMIZER CONTROL DAMPERS FOR FREE COOLING WHEN OUTDOOR AIR CONDITIONS ARE SUITABLE. FOR THE ECONOMIZER TO OPERATE DURING OCCUPIED HOURS, THE FOLLOWING CONDITIONS MUST BE TRUE: - OUTDOOR AIR TEMPERATURE IS LESS THAN 85°F. - THE INDOOR FAN HAS BEEN ON FOR AT LEAST 30 SECONDS. - THE UNIT HAS A VALID SUPPLY AIR TEMPERATURE INPUT. - THE UNIT HAS A VALID SPACE TEMPERATURE INPUT. IF THE PRECEDING CONDITIONS ARE NOT TRUE, THE OUTSIDE AIR CONTROL DAMPERS SHALL BE SET TO THE MINIMUM DAMPER POSITION (TBD BY TAB CONTRACTOR). IF ALL OF THE PRECEDING CONDITIONS ARE TRUE, THE ECONOMIZER PID LOOP SHALL MODULATE THE DAMPER. THE ECONOMIZER DAMPERS SHALL MODULATE TO MAINTAIN A MIXED AIR TEMPERATURE OF 55°F.									
P. DURING UNOCCUPIED HOURS, UNOCCUPIED FREE COOLING SHALL BE ENABLED. THE ECONOMIZER SHALL REMAIN CLOSED UNLESS THE FOLLOWING CONDITIONS ARE TRUE: - OUTDOOR AIR TEMPERATURE IS BELOW THE ECONOMIZER HIGH AT LOCKOUT SETPOINT. - OUTDOOR AIR TEMPERATURE IS LESS THAN THE SPACE TEMPERATURE. - ALL OF THE PRECEDING CONDITIONS ARE TRUE AND THE SPACE TEMPERATURE RISES 1 DEGREE ABOVE THE EFFECTIVE UNOCCUPIED COOLING SETPOINT. THE SUPPLY FAN SHALL START AND THE ECONOMIZER DAMPER SHALL OPEN AS NECESSARY TO COOL THE SPACE. THE DAMPER SHALL REMAIN OPEN UNTIL THE SPACE IS SATISFIED OR THE PRECEDING CONDITIONS ARE NO LONGER TRUE. IF ANY OF THE PRECEDING CONDITIONS ARE NOT TRUE, THE ECONOMIZER SHALL CLOSE COMPLETELY.									

PROJECT DESIGN CONDITIONS									
CLIMATE CONDITIONS					JOHNSTON, NC, USA				
WEATHER STATION:									
CLIMATE ZONE: 3A									
HEATING (DB): 19.3 °F									
DESIGN HEATING CONDITIONS (DB): 19.3 °F									
HUMIDIFICATION (DP/HR/MCWB): 99.6% -5.7 °F/1 4.1 gr/lb 35.3 °F									
COOLING (DB/MCWB): 0.4% 94.9 °F 76.1 °F									
DESIGN COOLING CONDITIONS (DB/MCWB): 94.9 °F 76.1 °F									
DEHUMIDIFICATION (DP/HR/MCWB): 0.4% 79.2 °F 152.6 gr/lb 82.2 °F									
UNIT / SPACE DESCRIPTION									
SET POINTS									
SPACE OPERATING HOURS OCCUPIED / UNOCCUPIED									
NOTES									
A. ZONE LEVEL VENTILATION RESET / DEMAND CONTROL VENTILATION (DCV) CONTROL METHOD. CARBON DIOXIDE SENSOR (CO2).									
B. ZONE LEVEL SET POINT CONDITIONS SHALL BE AS SCHEDULED UNLESS OTHERWISE SCHEDULED OR NOTED ON THE DRAWINGS FOR ROOM SPECIFIC SPACE CONDITIONS.									
C. ZONE LEVEL OCCUPANCY HOUR SCHEDULE SHALL BE PER BUILDING OPERATING HOURS UNLESS OTHERWISE SCHEDULED.									
D. ZONE LEVEL CONTROLS SHALL BE CAPABLE OF OPERATING WITH INDEPENDENT OCCUPANCY SCHEDULES.									

CARRIER UNIT STARTUP REQUIREMENTS	
INSTALLING CONTRACTOR SHALL COMPLETE THE PRE-START CHECKLIST AND EMAIL JENNIFER.TYE@COMFORTSYSTEMSUSA.COM TWO WEEKS PRIOR TO SCHEDULING EQUIPMENT STARTUP.	
COORDINATE EQUIPMENT STARTUP WORK WITH COMFORT SYSTEMS USA EMAIL: JENNIFER.TYE@COMFORTSYSTEMSUSA.COM, OFFICE: (317) 246-5176	
DEPARTMENT MANAGER EMAIL: KLORI.KARAMDAD@COMFORTSYSTEMSUSA.COM, OFFICE: 317-246-4656	
TECHNICAL SUPPORT EMAIL: RICK.FARRIS@COMFORTSYSTEMSUSA.COM, MOBILE: 317-638-5383 X4454	
PRE-START CHECKLIST (VERIFY FOR ALL UNITS)	
<input type="checkbox"/>	VERIFY ALL ITEMS ON THE EQUIPMENT ORDER RECEIVED.
<input type="checkbox"/>	VERIFY ALL PACKAGING MATERIAL REMOVED FROM THE UNIT.
<input type="checkbox"/>	VERIFY CURB GASKETS PROPERLY INSTALLED.
<input type="checkbox"/>	VERIFY ROOFTOP UNIT INSTALLED LEVEL AND PROPERLY ALIGNED WITH CURB.
<input type="checkbox"/>	VERIFY DUCTWORK/FABRIC DUCT COMPLETELY INSTALLED PER MECHANICAL PLANS.
<input type="checkbox"/>	VERIFY OA HOOD INSTALLED, AIR INLET SCREEN INSTALLED.
<input type="checkbox"/>	VERIFY POWER EXHAUST ACCESSORY INSTALLED (IF APPLICABLE).
<input type="checkbox"/>	VERIFY CLEAN PLEATED FILTERS INSTALLED, MINIMUM MERV 8 RATING.
<input type="checkbox"/>	VERIFY CONDENSATE DRAIN LINE INSTALLED, MINIMUM 2" DEEP TRAP, DRAIN PAN CHECKLEVEL.
<input type="checkbox"/>	VERIFY SUPPLY FAN ROTATES FREELY IN THE HOUSING.
<input type="checkbox"/>	VERIFY PULLEYS ALIGNED AND BELT TENSION CORRECT.
<input type="checkbox"/>	VERIFY SMOKE DETECTORS INSTALLED IN DUCTWORK, CLEANED AND TESTED.
<input type="checkbox"/>	VERIFY GAS METER INSTALLED AND GAS AVAILABLE FROM THE UTILITY, GAS PIPING COMPLETED, CHECKED FOR LEAKS AND PURGED (IF APPLICABLE).
<input type="checkbox"/>	VERIFY FLUE HOOD INSTALLED.
<input type="checkbox"/>	VERIFY JOBSITE POWER SUPPLY MATCHES THE VOLTAGE ON THE UNIT DATA PLATE.
<input type="checkbox"/>	VERIFY ELECTRIC POWER CONNECTED TO UNIT VIA THE ACCESS PROVIDED. IF NOT, DATE POWER WILL BE AVAILABLE.
<input type="checkbox"/>	VERIFY NO WIRES TOUCHING REFRIGERANT LINES OR SHARP EDGES.
<input type="checkbox"/>	VERIFY ELECTRIC CONNECTORS AND TERMINALS TIGHT.
<input type="checkbox"/>	VERIFY THRU-THE-CURB UTILITY CONNECTIONS COMPLETE.
<input type="checkbox"/>	VERIFY UNIT TRANSFORMER PRIMARY TAPPED FOR JOBSITE VOLTAGE.
<input type="checkbox"/>	VERIFY VENSTAR THERMOSTAT INSTALLED IN THE RETURN AIR DUCT DROP AND WIRED FOR TEMPORARY UNIT OPERATION.

EXISTING EQUIPMENT REFURBISH CHECKLIST (VERIFY FOR ALL UNITS)	
<input type="checkbox"/>	REPLACE AIR FILTERS AND CLEAN OUTDOOR AIR INLET SCREENS.
<input type="checkbox"/>	ADJUST FAN(S) AS NEEDED TO ENSURE FAN(S) ARE CENTERED TO THEIR HOUSING.
<input type="checkbox"/>	CHECK BLADES FOR EXCESSIVE RUSTING AND FOR THE CHIPS, CRACKS AND DIRT BUILDUP THAT CAUSE NOISE AND VIBRATION.
<input type="checkbox"/>	PROVIDE PROPOSAL TO REPAIR DAMAGE IF NOTICED.
<input type="checkbox"/>	IF MOTOR BEARINGS ARE NOT PERMANENTLY LUBRICATED, LUBRICATE PER MANUFACTURER WRITTEN DIRECTION.
<input type="checkbox"/>	REPLACE FAN BELTS AND ADJUST BELT TENSION PER MANUFACTURER WRITTEN DIRECTION. INSPECT THE HEAT EXCHANGER FOR RUSTS OR CRACKS, GASES COULD CONTAMINATE THE BUILDING'S AIR SUPPLY. INSPECT BURNERS, IGNITER, AND COMBUSTION SECTION.
<input type="checkbox"/>	CHECK THE GAS PRESSURE AND TEST FOR LEAKS
<input type="checkbox"/>	PROVIDE PROPOSAL TO REPAIR DAMAGE / ISSUES TO HEAT EXCHANGER
<input type="checkbox"/>	WASH AND FLUSH BOTH SIDES OF THE COILS. WASH TOWARD THE RETURN AIR SECTION TO REMOVE FOREIGN MATERIAL.
<input type="checkbox"/>	CLEAN CONDENSATE DRAIN PAN AND CONDENSATE TRAP.
<input type="checkbox"/>	CHECK THE REFRIGERANT CHARGE. BEFORE CHECKING, RUN THE UNIT FOR 15 MINUTES IN THE COOLING MODE TO STABILIZE SYSTEM PRESSURE. IF A SUBSTANTIAL ADJUSTMENT IS INDICATED, CHECK FOR REFRIGERANT LEAKS OR INSUFFICIENT AIRFLOW ACROSS THE COILS.
<input type="checkbox"/>	CHECK FOR VOLTAGE IMBALANCES AND HIGH AMPERAGE. VOLTAGE IMBALANCES SHOULD NOT EXCEED 1% - A GREATER IMBALANCE CAN CONTRIBUTE TO OVERHEATING AND PREMATURE MOTOR FAILURE. ALSO CHECK FOR LOOSE WIRING AND CONNECTIONS, AND CORRODED OR FRAYED WIRES. A HIGH AMPERAGE DRAW COULD SIGNAL A MECHANICAL PROBLEM, SUCH AS WORN BEARINGS/RODS, OR IT COULD INDICATE A REFRIGERATION ISSUE. NOTIFY OWNER OF ELECTRICAL ISSUES.
<input type="checkbox"/>	MAKE SURE ALL PANELS ARE FASTENED SECURELY IN PLACE.

OUTSIDE AIR REQUIREMENTS, IMC-2018 (IP)														
SYSTEM DESIGNATION	SYSTEM TAB NAME OR LIST 'SINGLE'	SINGLE-ZONE SYSTEMS ONLY			MULTI-ZONE SYSTEMS ONLY		FLOOR AREA SERVED BY SYSTEM [Aa] (SF)	SYSTEM AVERAGED AREA-BASED OUTDOOR AIR RATE (CFM/SF)	POPULATION (PEOPLE)	SYSTEM AVERAGED PEOPLE-BASED OUTDOOR AIR RATE (CFM/PP)	REQUIRED OA INTAKE FLOW [Vd] (CFM)	REQUIRED DCV OA INTAKE FLOW [Vd] (CFM)	DESIGN OA INTAKE FLOW [Vd] (CFM)	NOTES
		SINGLE-ZONE SYSTEM ASSOCIATED VENTILATION ZONE	SINGLE ZONE WORST CASE ZONE AIR DISTRIBUTION EFFECTIVENESS [Ea]	SYSTEM VENTILATION SYSTEM EFFICIENCY [Ev]	SYSTEM VENTILATION SYSTEM EFFICIENCY [Ev]									
SS-1	MULTIZONE (FCU-1)	-	-	0.85	681	0.019	12	1.67	38	N/A	40	ALL		
SS-2,3,4	MULTIZONE (FCU-2,3,4)	-	-	0.85	119,538	0.108	119,538	7.50	2,334	N/A	2,390	ALL		
TOTALS											2,372	0	2,390	

GENERAL NOTES:

- VENTILATION CALCULATIONS BASED ON IMC-2018.
- SYSTEM POPULATIONS BASED ON MAX SEATING AND/OR CODE MAXIMUM VALUES.
- SINGLE ZONE SYSTEMS (Vd1 + Vd2) - SYSTEM VENTILATION EFFICIENCY CALCULATION IS NOT REQUIRED FOR SINGLE ZONE SYSTEMS. WORST CASE AIR DISTRIBUTION EFFECTIVENESS BETWEEN HEATING AND COOLING MODES OF OPERATION IS SHOWN IN TABLE.
- 100% OA SYSTEMS (Vd1 + 2xVd2) - WHEN ONE AIR HANDLER SUPPLIES ONLY OUTDOOR AIR TO ONE OR MORE ZONES. EACH ZONE IS INDIVIDUALLY CALCULATED WITH ITS WORST CASE ZONE AIR DISTRIBUTION EFFECTIVENESS (HEATING/COOLING).
- MULTI-ZONE RECIRCULATING SYSTEMS - CALCULATOR USED TO DETERMINE VENTILATION AIRFLOW IN COMPLIANCE WITH IMC-2015 VPR AND ASHRAE 62.1, 2013 APPENDIX A. VENTILATION RATE SHOWN IS ACTUAL CALCULATED WITH CORRECTION FACTORS INCLUDED. EACH ZONE IS CALCULATED WITH ITS WORST CASE ZONE AIR DISTRIBUTION EFFECTIVENESS (HEATING/COOLING) AS PART OF CALCULATIONS TO FIND EV.

FAN COIL UNIT SCHEDULE (DX COOLING, ELECTRIC HEATING)																								
MARK	MANUFACTURER	MODEL	SUPPLY FAN			COOLING COIL				HEATING COIL				WEIGHT (LBS)	NOTES									
			CFM	ESP (IN)	NOM HP (MBH)	TH (MBH)	SH (MBH)	EAT (°F DB) (°F WB)	LAT (°F WB)	REFR TYPE	MIN OUT (MBH)	NOM (KW)	EAT (°F DB) (°F WB)			LAT (°F WB)	MIN NO STAGES	MIN OIA (CFM)	MIN OIA (CFM)	VIPH	MCA	MOCPP		
FCU-1	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)
FCU-2	CARRIER	1ST	4,800	1.00	3.7	143	102	75.9	64.6	56.6	54.7	R-454B	147	50	50	90	2	925	925	208/3	143.8	150	785	ALL
FCU-3	CARRIER	75T	2,550	1.00	2.4	72	51	75.9	64.6	56.6	54.7	R-454B	79	35	50	90	2	500	500	208/3	91.4	100	450	ALL
FCU-4	CARRIER	1ST	4,800	1.00	3.7	143	102	75.9	64.6	56.6	54.7	R-454B	147	50	50	90	2	925	925	208/3	143.8	150	785	ALL

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:

- ASSOCIATED CONDENSING UNIT SHALL BE BY THE SAME MANUFACTURER.
- EQUIPMENT SIZED FOR 100°F AMBIENT TEMPERATURE.
- PROVIDE 2" MERV 13 PLEATED THROUGHWAY AIR FILTERS.
- PROVIDE WITH BACK INLET CONNECTION.
- PROVIDE WITH FRONT OUTLET CONNECTION.
- PROVIDE WITH 7-DAY PROGRAMMABLE THERMOSTAT WITH STAGED HEATING AND COOLING CAPABILITY AS REQUIRED FOR OPERATION OF AUXILIARY HEATING AND COOLING CONTROLS.
- DISCONNECT SWITCH PROVIDED BY DIVISION 26 CONTRACTOR.
- SPECIFIED FAN ESP ACCOUNTS FOR DUCT LOSSES EXTERNAL TO UNIT. FILTER LOSS IS AT A MAXIMUM OF 400 FPM FACE VELOCITY.
- PROVIDE MOTOR HORSEPOWER TO OVERCOME INTERNAL UNIT STATIC PRESSURE DROP PLUS SPECIFIED EXTERNAL STATIC PRESSURE DROP.
- NOMINAL MOTOR HP SHALL BE NO LARGER THAN THE FIRST AVAILABLE NOMINAL MOTOR SIZE GREATER THAN THE REQUIRED BHP.
- DIVISION 23 CONTRACTOR SHALL PROVIDE SMOKE DETECTORS IN RETURN AIR DUCT(S).
- PROVIDE WITH SPRING VIBRATION ISOLATION AND ALL-TREAD HANGING RODS.
- PROVIDE SEPARATE ELECTRIC HEAT KIT BY WARREN TECHNOLOGY. MODEL NUMBER WFK KW 05A, OR EQUIVALENT. ELECTRIC HEAT KIT SHALL PROVIDE A SINGLE-POINT 480V POWER CONNECTION FOR THE ELECTRIC HEATER AND FAN COIL UNIT. NOMINAL KW IS BASED ON LISTED MANUFACTURER'S STANDARD PRODUCT.
- COORDINATE EQUIPMENT POWER SUPPLY WITH ELECTRICAL CONTRACTOR IF DIFFERENT FROM THAT SCHEDULED.
- PROVIDE AUXILIARY DRAIN PAN WITH FLOOD DETECTOR SWITCH TO SHUT OFF UNIT WHEN WATER IS PRESENT IN DRAIN PAN.

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DX CONDENSING UNIT SCHEDULE														
MARK	SERVICE	MANUFACTURER	MODEL	REFR TYPE	TH (MBH)	MIN NO OF STAGES	NO OF CIRCUITS	MIN EFF		ELECTRICAL			WEIGHT (LBS)	NOTES
								(EER)	(IEER)	VIPH	MCA	MOCPP		
CU-1	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)	(ETR)
CU-2	FCU-2	CARRIER	1ST	R-454B	143.48	2	1	11.2	14.3	208/3	70	90	810	ALL
CU-3	FCU-3	CARRIER	75T	R-454B	71.74	1	1	11.2	12.9	208/3	37	60	430	ALL
CU-4	FCU-4	CARRIER	1ST	R-454B	143.48	2	1	11.2	14.3	208/3	70	90	810	ALL

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:

- ASSOCIATED FAN COIL UNIT SHALL BE BY THE SAME MANUFACTURER.
- PROVIDE LOW AMBIENT CONTROL TO D/F.
- EQUIPMENT SIZED FOR 100°F AMBIENT TEMPERATURE.
- COORDINATE WITH THE MANUFACTURER THE HORIZONTAL AND VERTICAL REFRIGERANT PIPE ROUTING TO DETERMINE PIPE SIZES FOR THE REFRIGERANT PIPING. MANUFACTURER SHALL PROVIDE DETAILED REFRIGERANT PIPING DIAGRAMS INCLUDING DIMENSIONAL DATA FOR ALL REFRIGERANT PIPING DEVICES TO BE ORDERED. THE MANUFACTURER SHALL SIZE AND LOCATE THE ASSOCIATED REFRIGERANT TRAPS BASED ON THE ACTUAL ROUTING AND PROVIDE OTHER APPURTENANCES TO MAINTAIN FULLY FUNCTIONAL AND OPERATIONAL SYSTEM. COORDINATE WITH THE MANUFACTURER LOCATIONS FOR ALL REFRIGERANT PIPING DEVICES TO MAINTAIN SERVICEABILITY AND ACCESSIBILITY.
- PROVIDE LIQUID LINE FILTER DRYER AND SIGHT GLASS.
- COORDINATE SIZE AND LOCATION OF MECHANICAL EQUIPMENT PAD FOR NEW CONDENSING UNIT.
- DISCONNECT SWITCH PROVIDED BY DIVISION 26.
- STARTERS FOR ALL MOTORS SHALL BE PROVIDED INTEGRAL WITH UNIT.
- COORDINATE SIZE OF CONDUCTOR TERMINATION LUGS WITH CONDUCTOR SIZES SHOWN ON ELECTRICAL DRAWINGS.
- PROVIDE CONDENSER COIL HAIL GUARDS.
- PROVIDE HARD START KIT FOR ALL SINGLE PHASE UNITS.

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FAN SCHEDULE														
MARK	SERVICE DESCRIPTION	MANUFACTURER	MOUNTING	MODEL	CFM	ESP (IN)	BHP	NOM HP	FAN RPM	DRIVE (BELT/DIRECT)	VFD (Y/N)	ELECTRICAL VPH	WEIGHT (LBS)	NOTES
EF-1	RESTROOM	GREENHECK	CEILING	SP-A80-130-VG	100	0.5	12 W	12 W	1401	DIRECT	N	120V	15	ALL
EF-2	RESTROOM	GREENHECK	CEILING	SP-A80-130-VG	100	0.5	12 W	12 W	1401	DIRECT	N	120V	15	ALL

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

NOTES:

- INSTALL FAN WITHIN 16" OF ABOVE FLOOR OR WITHIN 12" OF CEILING FOR SERVICEABILITY. COORDINATE LOCATION WITH STRUCTURE, LIGHTS, PIPING, AND DUCTWORK SUCH THAT FAN IS FULLY ACCESSIBLE.
- INSTALL EXHAUST FAN OR EXTERIOR DUCT TERMINATION TO MAINTAIN A MINIMUM OF 15" FROM AIR INTAKES.
- PROVIDE WITH RUBBER IN SHEAR ISOLATION AND ALL-TREAD HANGING RODS.
- PROVIDE WITH FACTORY MOUNTED STARTER AND DISCONNECT SWITCH.
- PROVIDE WITH MANUFACTURER'S ELECTRONICALLY COMMUTATED (EC) MOTOR. CONTRACTOR SHALL USE FAN POTENTIOMETER FOR BALANCING PURPOSES.
- NOMINAL MOTOR HP SHALL BE NO LARGER THAN THE FIRST AVAILABLE NOMINAL MOTOR SIZE GREATER THAN THE BHP.
- INTERLOCK FAN OPERATION WITH EMS. 24V RELAY FURNISHED BY EMS VENDOR.

EMS INSTALLATION CHECKLIST	
ITEMS ON EMS CHECK-OFF LIST MUST BE COMPLETED PRIOR TO EMS AND GBS COMMISSIONING AT THE END OF THE JOB. SOME ITEMS LISTED BELOW MAY NOT BE APPLICABLE.	
COORDINATE EQUIPMENT STARTUP WORK WITH COMFORT SYSTEMS USA. EMAIL: PAUL.SAWYER@COMFORTSYSTEMSUSA.COM OFFICE: 317-246-5170	
EMS CHECKLIST	
<input type="checkbox"/>	REVIEW EMS PRINT SET AND INSTALL EMS OPUS PANEL AND LCP AS DESCRIBED IN THE EMS PRINT SET.
<input type="checkbox"/>	REVIEW EMS PRINT SET AND PULL ALL WIRE AND TERMINATE ON DEVICES AS DESCRIBED IN THE EMS PRINT SET.
<input type="checkbox"/>	REVIEW EMS PRINT SET AND INSTALL ALL EMS HVAC CONTROLS AS DESCRIBED IN THE EMS PRINT SET.
<input type="checkbox"/>	REVIEW EMS PRINT SET AND INSTALL ALL EMS LIGHTING CONTROLS AS DESCRIBED IN THE EMS PRINT SET.
<input type="checkbox"/>	REVIEW EMS PRINT SET AND WATTSTOPPER SUBMITTAL AND INSTALL THE WATTSTOPPER LIGHTING SYSTEM AND PULL ALL WIRE AS DESCRIBED IN THE EMS PRINT SET AND WATTSTOPPER SUBMITTAL.

SEQUENCE OF OPERATION	
A. DX SPLIT SYSTEM UNIT CONTROL (FCU/CU-1,2,3,4)	
Refer to Split System Control Matrix for sequence of operations.	
B. RESTROOM EXHAUST FAN CONTROL (EF-1,2)	
Interlock Exhaust Fan control with EMS Panel and timeclock. Fan shall operate during occupied hours and de-energize during unoccupied hours.	
EMS CONTROLS: CONTRACTORS ARE RESPONSIBLE FOR COORDINATING ALL EQUIPMENT CONTROLS WITH EMS VENDOR PRIOR TO PURCHASE AND INSTALLATION. CONTRACTORS SHALL COORDINATE WITH EMS VENDOR TO PROVIDE ALL NECESSARY EQUIPMENT AND ACCESSORIES FOR A FULLY FUNCTIONING SYSTEM.	

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