DUCTLESS SPLIT SYSTEMS (HEAT PUMP + COOLING ONLY)

INDOOR UNIT							OUTDOOR UNIT											
SYMBOL	CFM	ELECTRICAL DATA MCA	FUSE	VOLTAGE	OPERATING WEIGHT	MANUFACTURER DAIKIN	SYMBOL	COOLING CAPACITY TC (BTUH)	SHC (BTUH)	HEATING CAPACITY (BTUH)	COMPRESSOR RLA	ELECTRICAL DATA MCA	FUSE	VOLTAGE	OPERATING WEIGHT	MANUFACTURER DAIKIN	ALLOWABLE LINE-SET LENGTHS
AC-1	242	0.18	–	208V-1ø	38 LBS	FTXS12DVJU	CU-1	11,500	8,625	N/A – COOL ONLY	5.87	7.9	15	208V-1ø	96 LBS	RXS12DVJU	98' TOTAL, 66' VERT.
IDU-A1	742	0.6	15	208V-1ø	38 LBS	FXFQ18TVJU	ODU-A	72,040	61,200	71,140	–	12.3	20	460V-3ø	451 LBS	RXYQ72TAYDU	98' TOTAL, 66' VERT.
IDU-A2	742	0.6	15	208V-1ø	38 LBS	FXFQ18TVJU											
IDU-A3	742	0.6	15	208V-1ø	38 LBS	FXFQ18TVJU											
IDU-A4	742	0.6	15	208V-1ø	38 LBS	FXFQ18TVJU											
IDU-B1	1165	1.5	15	208V-1ø	38 LBS	FXFQ36TVJU	ODU-B	96,042	81,600	84,754	–	20.6	25	460V-3ø	550 LBS	RXYQ96TAYDU	98' TOTAL, 66' VERT.
IDU-B2	436	0.3	15	208V-1ø	38 LBS	FXFQ12TVJU											
IDU-B3	1165	1.5	15	208V-1ø	38 LBS	FXFQ36TVJU											
IDU-B4	436	0.3	15	208V-1ø	38 LBS	FXFQ12TVJU											
IDU-C	570	0.3	–	208V-1ø	31 LBS	FTXS15LVJU	ODU-C	15,000	13,420	18,000	–	13.7	20	208V-1ø	104 LBS	RXS15LVJU	98' TOTAL, 66' VERT.

NOTES:
1. ALL UNITS SHALL BE U.L. LISTED AND HAVE A MINIMUM SEER OF 13.
2. COOLING CAPACITIES ARE BASED ON 95° AMBIENT, 80° ENTERING AIR DRY BULB, 67° ENTERING AIR WET BULB. AIRFLOWS INDICATED ARE AT 'HIGH' SPEED.
3. MOUNT GROUND-MOUNTED UNITS ON 4" CONCRETE PAD.
4. PROVIDE MANUFACTURER'S SUGGESTED CLEARANCES AROUND UNIT.
5. PROVIDE UNITS WITH MANUFACTURER'S WIND BAFFLES OR LOW AMBIENT CONTROLS FOR OPERATION DOWN TO 0° F, CONDENSATE PUMP, INVERTER COMPRESSOR, 7-DAY PROGRAMMABLE THERMOSTAT (WALL-MOUNTED), NON-LOCKING DISCONNECT FOR INDOOR UNIT.
6. PROVIDE OUTDOOR UNITS WITH 6 YEAR EXTENDED COMPRESSOR WARRANTY.
7. SEE MANUFACTURER'S RECOMMENDATIONS FOR REQUIRED ADDITIONAL REFRIGERANT CHARGE AND RECOMMENDED LINE-SET LENGTHS.
8. POWER SUPPLY TO CONDENSING UNIT (CU-1) IS A SINGLE POINT ELECTRICAL CONNECTION FOR THE SYSTEM (A/C UNIT AND CONDENSING UNIT). THE ELECTRICAL CONTRACTOR SHALL PROVIDE POWER TO THE CONDENSING UNIT AND FROM THE CONDENSING UNIT TO THE A/C UNIT INCLUDING CODE REQUIRED DISCONNECT SWITCHES. POWER TO ALL OTHER UNITS SHALL BE AS NOTED IN THE SCHEDULE.
9. REFRIGERANT PIPING AND WIRING FOR WALL-MOUNTED INDOOR UNITS SHALL BE ROUTED IN WALL WHERE POSSIBLE. ANY EXPOSED PIPING SHALL BE PAINTED TO MATCH WALL-FINISH.
10. TELCOM ROOMS: MOUNT INDOOR AC UNIT 8'-0" A.F.F. COORDINATE WITH ALL DATA LADDER RACKS, UTILITIES, LIGHTS, CEILING, DOORS, ETC.
11. SYSTEMS USING SOLENOID CONTROL VALVES MUST INCLUDE FULL PORT ISOLATION VALVES BEFORE AND AFTER REFRIGERANT CONTROL BOX AND ACOUSTIC TREATMENT TO PROVIDE NO GREATER THAN NC20 IN THE OCCUPIED MODE.
12. MC SHALL PROVIDE ALL DISCONNECTS FOR ALL UNITS POWER CONNECTIONS
13. MC SHALL PROVIDE IDUS WITH WATER LEVEL DETECTION IN THE PRIMARY DRAIN PAN, THAT UPON DETECTION OF HIGH WATER, SHUTS DOWN THE ASSOCIATED UNIT.

FAN SCHEDULE

SYMBOL	LOCATION	TYPE	CFM	APPROX. S.P.	DRIVE	FAN RPM	ELECTRICAL DATA WATTS	H.P.	VOLTAGE	MANUFACTURER GREENHECK	ACCESSORIES	CONTROLS
F-1	BATHROOM	EXHAUST	75	0.25"	DIRECT	700	50	–	120V-1ø	SP-B90	A,B,F,G,O,H	2
F-2	BATHROOM	EXHAUST	100	0.25"	DIRECT	950	80	–	120V-1ø	SP-B110	A,B,F,G,O,H	2
F-3	L-3 ELECT RM	INLINE	500	0.40"	BELT	1270	NO	1/4	120V-1ø	BSQ-90	A,F,G,L,N	1

ACCESSORIES
- A: DISCONNECT SWITCH
- B: GRAVITY BACKDRAFT DAMPER
- C: MOTORIZED BACKDRAFT DAMPER
- D: PREFAB. ROOF CURB
- E: BIRDSCREEN
- F: ACOUSTICAL LINING
- G: HANGING BRACKETS WITH VIBRATION ISOLATION
- H: WL, WALL LOUVER DISCHARGE
- J: RCC OR GRS ROOF CAP (FLAT ROOF) OR RJ ROOF CAP (PITCHED ROOF)
- K: WALL MOUNTING COLLAR
- L: INLET GUARD
- M: 2" WASHABLE ALUMINUM FILTERS
- N: MOTORSIDE FAN GUARD
- O: EXHAUST GRILLE
- P: U.L. 762
- Q: VENTED ROOF CURB EXTENSION
- R: COMBINATION KITCHEN HOOD FAN CURB
- S: INTERLOCK WITH FUME HOOD
- T: PROVIDE DRAIN PLUG ACCESSORY

CONTROLS
- 1: WALL MOUNTED THERMOSTAT (REVERSE ACTING, SET FOR 80°)
- 2: INTERLOCK WITH ROOM LIGHT SWITCH (FAN SHALL OPERATE WHEN LIGHT IS ON IN ANY ROOM SERVED BY FAN)
- 3: WALL MOUNTED ON/OFF SWITCH WITH IDENTIFICATION LABEL
- 4: WALL MOUNTED MUSHROOM PUSH BUTTON SWITCH/STARTER WITH IDENTIFICATION LABEL
- 5: CONTROLLED BY BUILDING AUTOMATION SYSTEM
- 6: CONTINUOUS OPERATION
- 7: INTERLOCK WITH KITCHEN HOOD CONTROLS
- 8: INTERLOCK WITH DISHWASHER
- 9: INTERLOCK WITH FUME HOOD

NOTES:
1. ALL FANS SHALL BE U.L. LISTED AND LABELED AND SHALL BE AMCA CERTIFIED FOR SOUND AND AIR FLOW. ALL FANS INSTALLED INSIDE, ABOVE, OR ADJACENT TO OCCUPIED SPACES SHALL HAVE A MAXIMUM 9.0 INLET SONE LEVEL.
2. ALL FANS SHALL BE SUPPLIED BY ONE MANUFACTURER UNLESS NOTED OTHERWISE.
3. MECHANICAL CONTRACTOR SHALL PROVIDE MAGNETIC STARTER WITH AUXILLARY CONTACTS AS REQUIRED.
4. PROVIDE ALL DIRECT DRIVE FANS WITH SPEED CONTROLLERS.
5. BACKDRAFT DAMPER ON ROOF SUPPLY FANS SHALL BE MOTORIZED.

ELECTRIC WALL/UNIT HEATER SCHEDULE

SYMBOL	LOCATION	CFM	BTUH	KW	MOTOR R.P.M.	AMPS	VOLTAGE	MANUFACTURER MARKEL	ACCESSORIES
EWH-1	STORAGE-110	175	10,350	(3.0)	600	14.4	277/1/60	G3325	A,B,C
EWH-2	STORAGE-110	175	10,350	(3.0)	600	14.4	277/1/60	G3325	A,B,C
EWH-3	STORAGE-100	175	10,350	(3.0)	600	14.4	277/1/60	G3325	A,B,C
EWH-4	STORAGE-100	175	10,350	(3.0)	600	14.4	277/1/60	G3325	A,B,C
EWH-5	TOILET	100	11,200	(.75)	1060	12.5	120/1/60	E3055	A,B,C
EWH-6	CORRIDOR-111	100	11,200	(.75)	1060	12.5	120/1/60	E3055	A,B,C

NOTES:
1. SEE PLANS FOR TYPE OF THERMOSTAT REQUIRED (WALL MOUNTED OR UNIT MOUNTED) UNIT HEATERS SHOWN WITHOUT THERMOSTAT INDICATED SHALL BE PROVIDED WITH A UNIT MOUNTED THERMOSTAT.

ACCESSORIES
- A: DISCONNECT SWITCH
- B: BUILT-IN THERMOSTAT
- C: WALL MOUNTING TRIM KIT
- D: REMOTE THERMOSTAT
- E: WALL BRACKET

BASE BOARD ELECTRIC HEATER

EH-1,2,3,4,5,6,7

INDEECO – BBI– 1.0 KW, 277/1/60, 3.6 A

ELECT BASE BOARD HEATER W/ ENCLOSURE, 48" LONG, W/ INTEGRAL TSTAT

DISCONNECT BY M.C., COLOR TO BE SELECTED BY ARCH.

VENTILATION CALCULATIONS (NCMC 2012, SECT 403): SPLIT SYSTEM - A

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)	CALCULATED AREA E/A (CFM)
OFFICE SPACES	5	0.060000	5	0.000000	2,500	13	63	150	0
CORRIDORS	0	0.060000	0	0.000000	0	0	0	0	0
			BLDG TOTAL OUTSIDE AIR REQ'D (Ez=0.8, CFM)				266		
			BUILDING TOTAL OUTSIDE AIR PROVIDED (CFM)				400		
					BUILDING TOTAL EXHAUST AIR REQUIRED (CFM)				0
					BUILDING TOTAL EXHAUST AIR PROVIDED (CFM)				0

VENTILATION CALCULATIONS (NCMC 2012, SECT 403): SPLIT SYSTEM - B

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)	CALCULATED AREA E/A (CFM)
CORRIDORS	0	0.060000	0	0.000000	600	0	0	36	0
STORAGE ROOMS	0	0.120000	0	0.000000	2,000	0	0	240	0
			BLDG TOTAL OUTSIDE AIR REQ'D (Ez=0.8, CFM)				345		
			BUILDING TOTAL OUTSIDE AIR PROVIDED (CFM)				400		
					BUILDING TOTAL EXHAUST AIR REQUIRED (CFM)				0
					BUILDING TOTAL EXHAUST AIR PROVIDED (CFM)				0

INPUT/OUTPUT SUMMARY

Column groups: INPUTS – ANALOG – MEASURED (TEMPERATURE, PRESSURE, RH, KW, AIR FLOW, WATER FLOW, CO2, HERTZ, STEAM FLOW (LBS), NG FLOW (CFH), AMPS); CALC. (KWH, ENTHALPY, RUN TIME, EFFICIENCY); BINARY (STATUS, FILTER, SMOKE, FREEZE, AIR FLOW, METER, OVER-RIDE); OUTPUTS – DIGITAL (OFF-ON, OFF-AUTO-ON, OFF-HI-LO, OPEN-CLOSE); ANALOG (DMPR. POS., VALVE POS., SETPOINT ADJ., STEP CONTROL); SYSTEM FEATURES – ALARMS (HI ANALOG, LO ANALOG, HI BINARY, LO BINARY, PROOF); PROGRAMS (TIME SCHEDULING, DEMAND LIMITING, DUTY CYCLE, START/STOP OPT., ENTHALPY OPT., SMOKE CNTL, TREND, ALARM INSTRUCT, MAIN. WK. ORD.); GENERAL (COLOR GRAPHICS); SUPPLEMENTAL NOTES

SYSTEM, APPARATUS, OR AREA POINT DESCRIPTION	INPUTS ANALOG MEASURED	INPUTS ANALOG CALC.	INPUTS BINARY	OUTPUTS DIGITAL	OUTPUTS ANALOG	ALARMS	PROGRAMS	GENERAL	SUPPLEMENTAL NOTES
Fans								X	
Toilet Fans				X (OFF-ON)					
DX SPLIT SYSTEM							X	X	
Indoor AC Unit			X (STATUS)	X (OFF-ON)		X			
Outdoor Unit			X (STATUS)			X			
Space Temp	X (TEMPERATURE)								
Supply Temp	X (TEMPERATURE)								
Setpoint Adjust					X (SETPOINT ADJ.)				
Misc. Points									
OA Temp	X (TEMPERATURE)	X				X (HI ANALOG)			
Dew Point	X (TEMPERATURE)	X							
Fire Alarm Status		X							FACP by Division 26
Motor Operated Dampers									
OA CO2	X (CO2)								
OA RH	X (RH)								

GENERAL NOTE:
INPUT/OUTPUT SUMMARY IS A GENERAL LIST OF CONTROL POINTS REQUIRED FOR THE OPERATION OF THE MECHANICAL SYSTEM. IN ADDITION TO CONTROL POINTS INDICATED, THE CONTROLS CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADDITIONAL POINTS AS REQUIRED FOR OPERATION OF THE MECHANICAL SYSTEM AS SPECIFIED AND OUTLINED IN THE SEQUENCE OF OPERATION AND TO COMPLY WITH THE SPECIFICATIONS.

SEQUENCE OF OPERATION

A COMPLETE AND OPERATIONAL DDC CONTROL SYSTEM (BAS) SHALL BE INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS (SECTION 230900) AND AS INTENDED ON THESE PLANS. ALL CONTROL POINTS AND EQUIPMENT SEQUENCES OF OPERATION LISTED IN SPECIFICATION SECTION 230900 SHALL BE CONSIDERED IN ADDITION TO THOSE LISTED HERE. IN THE EVENT THAT THE VERBIAGE IS IN CONFLICT OR CONTRADICTS THE REQUIREMENTS LISTED HERE, THE QUESTION SHALL BE ASKED BEFORE BIDDING OR THE MORE STRINGENT SHALL APPLY AT THE ENGINEER'S DISCRETION.

NOTE: NEW BAS SHALL BE INTEGRATED WITH THE OWNER'S EXISTING CAMPUS BAS SYSTEM. BAS CONTRACTOR SHALL INCLUDE ALL NECESSARY HARDWARE AND SOFTWARE TO FULLY INTEGRATE NEW SYSTEM WITH THE EXISITNG SYSTEM.

DUCTLESS IDF SPLIT SYSTEMS:

UNITS SHALL PROVIDE COOLING ON A CONTINUOUS BASIS. SUPPLY FAN SHALL RUN CONTINUOUSLY AND COOLING CYCLE SHALL CYCLE WITH A CALL FOR COOLING TO MAINTAIN ROOM TEMPERATURE SETPOINT OF 75° F. (ADJ.). UNITS SHALL BE PROVIDED WITH STANDALONE FACTORY CONTROLS. BAS SHALL MONITOR SYSTEM STATUS AND SHALL ALSO MONITOR ROOM TEMPERATURE WITH A WALL MOUNTED TEMPERATURE SENSOR. AN ALARM SHALL BE GENERATED UPON AN EQUIPMENT FAILURE OR IF THE ROOM TEMPERATURE RISES ABOVE 85° F. (ADJ.)

UNIT HEATERS / BASEBOARD

A SPACE TEMPERATURE SENSOR SHALL CONTROL UNIT HEATER FAN AND ELECTRIS HEAT IN STAGES (IF EQUIPED) TO MAINTAIN SPACE TEMPERATURE, 65° F. (ADJ) WITH SPACE TEMPERATURE ABOVE SETPOINT, FAN SHALL REMAIN OFF AND HEAT SHALL REMAIN OFF. AS SPACE TEMPERATURE FALLS BELOW SETPOINT, THE FAN SHALL BE STARTED AND THE ELECTRIC HEAT SHALL STAGE ON TO SATISFY SETPOINT.
BASEBOARD SEQUENCE SHALL BE AS NOTED ABOVE, EXCEPT NO FAN CONTROL

MISC. EXHAUST FANS

PROVIDE WALL SWITCHES, WALL THERMOSTATS, INTERLOCKS, ETC. AS INDICATED ON THE FAN SCHEDULE TO CONTROL FANS AS INDICATED ON PLANS.

TOILET EXHAUST FANS

BAS SHALL OPERATE EXHAUST FANS ON A PROGRAMMED SCHEDULE.

DUCTLESS VRV SPLIT SYSTEM

UNIT SHALL BE CONTROLLED BY ITS THERMOSTAT. UNIT SUPPLY FAN SHALL RUN CONTINUOUSLY IN THE OCCUPIED MODE, CYCLE WITH HEATING AND COOLING WHILE UNOCCUPIED. UPON A RISE IN SPACE TEMPERATURE, UNIT COMPRESSOR AND CONDENSER FAN SHALL ACTIVATE TO SATISFY SPACE. UPON A DROP IN SPACE TEMPERATURE, UNIT COMPRESSOR SHALL ACTIVATE IN REVERSE CYCLE FOR HEATING. THERMOSTATS SHALL PROVIDE A DEADBAND OF 5°, WITHIN WHICH THE SUPPLY OF HEATING OR COOLING ENERGY TO THE ZONE CAN BE REDUCED TO THE MINIMUM. OCCUPANCY SCHEDULES SHALL BE SET TO OCCUPED MONDAY THRU FRIDAY, X AM TO X PM (OWNER DETERMINED), UNOCCUPIED NIGHTS AND WEEKENDS. THERMOSTATS SHALL BE SET FOR OCCUPIED COOLING 75°, OCCUPIED HEATING 70°, UNOCCUPIED COOLING 85°, UNOCCUPIED HEATING 55°. ALL TIME AND TEMPERATURE SETPOINTS SHALL BE VERIFIED BY THE OWNER PRIOR TO PROGRAMMING.

CONTROL SYSTEM NOTES

1. THE SEQUENCE OF OPERATION OF OPERATION AND POINTS LIST IS INTENDED TO COMMUNICATE THE MINIMUM REQUIREMENTS AND GENERAL DESIGN INTENT TO THE CONTROLS CONTRACTOR AND IS NOT INTENDED TO BE A FULLY DEVELOPED OR COMPLETE SEQUENCE OF OPEARTION. IN THE CONTROLS SUBMITTAL THE CONTROLS CONTRACTOR SHALL FULLY DEVELOP THE SEQUENCE OF OPERATIONS FOR ALL SYSTEMS IDENTIFIED AN SHALL PRESENT ALL SETPOINTS, CONTROL PARAMETERS, TIME DELAYS, ALARM POINTS, ETC. AS REQUIRED TO COMPLY WITH THE DESIGN INTENT. THE CONTROLS CONTRACTOR SHALL INCORPORATE STANDARD FEATURES SUCH AS MINIMUM RUN TIME DELAYS AND DEAD BANDS TO PREVENT SHORT CYCLING. ALL MONITORED POINTS SHALL INCLUDE EARLY HIGH/LOW ALARM NOTIFICATIONS PRIOR TO REQUIRED CORRECTIVE ACTIONS OR UNIT SHUT-DOWNS. CONTROL CONTRACTOR SHALL SPECIFY IN THE CONTROL SUBMITTAL FAIL SAFE POSITION FOR OUT OF RANGE, FAIL SAFE POSITIONING FOR OPEN CIRCUITS OR LOSS OF COMMUNICATION.
2. SYSTEM SHALL USE CAMPUS SYSTEM GLOBAL OUTSIDE AIR TEMPERATURE AND HUMIDITY SENSORS FOR PRIMARY SYSTEM OPERATION. LOCAL OUTSIDE AIR TEMPERATURE AND HUMIDITY SENSORS SHALL BE PROVIDED FOR SYSTEM OPERATION UPON LOSS OF NETWORK COMMUNICATION.
3. ALL CONTROL SETPOINTS SHALL BE ADJUSTABLE AND TRENDABLE. INDICATED TEMPERATURE SETPOINTS SHOULD BE USED FOR ORIGINAL SYSTEM SET-UP. ANY CHANGES IN SETPOINT SETTINGS REQUIRED FOR INTENDED SYSTEM OPERATION SHALL BE NOTED ON AS-BUILT CONTROL DRAWINGS.
4. ELECTRICAL CONTRACTOR SHALL PROVIDE DEDICATED 120V CIRCUIT(S) IN A J-BOX FOR CONTROL POWER. CONTROLS CONTRACTOR SHALL EXTEND 120V POWER FROM J-BOX TO CONTROL PANELS, DAMPER ACTUATORS, TRANSFORMERS, ETC. AS REQUIRED FOR OPERATION OF CONTROL SYSTEM.
5. LOCATE MAIN DDC CONTROL PANEL(S) IN 104 MECHANICAL ROOM. COORDINATE EXACT LOCATION PANEL WITH ALL OTHER TRADES PRIOR TO INSTALLATION.
6. PROVIDE EXPORT TAGGING AND CONTROLS PROGRAMMING AS REQUIRED TO FULLY INTEGRATE WITH THE UNIVERSITY BAS SERVER PLATFORM TO SIMPLIFY IMPORTING TO EXISTING ALC PLATFORM, POINTS LIST, AND GRAPHIC CONTROL SCREENS.
7. PROVIDE ALL CONTROL PANELS WITH 3RD PARTY U.L. LISTING

mcmillan pazdan smith ARCHITECTURE

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 17228 RONALD V. ALMOND 03/07/18

WESTERN CAROLINA UNIVERSITY

MOORE HALL GROUND FLOOR RENOVATION

CULLOWHEE, NC

SHEET ISSUE:

NO.	DATE	DESCRIPTION	BY
1	03/07/18	ISSUED FOR BID	

PRINCIPAL IN CHARGE: LR
PROJECT ARCHITECT: APR
DRAWN BY:

SHEET TITLE:
MECHANICAL SCHEDULES

SHEET NO. M002

PROJ. NO. 017384
AGENCY REVIEW ID: 17-17742-01A