



ISSUANCE/REVISIONS
 ▲ ISSUE FOR PERMIT 08/19/19
 ▲ REV 1 PER CITY 08/21/19
 ▲ REV 2 PER CITY 08/21/19
 ▲ REV 3 PER CITY 08/26/19
 ▲ REV 4 PER CITY 08/29/19
 ▲ REV 5 PER CLIENT AND ISSUE FOR BID 08/30/19



North Carolina Firm Registration
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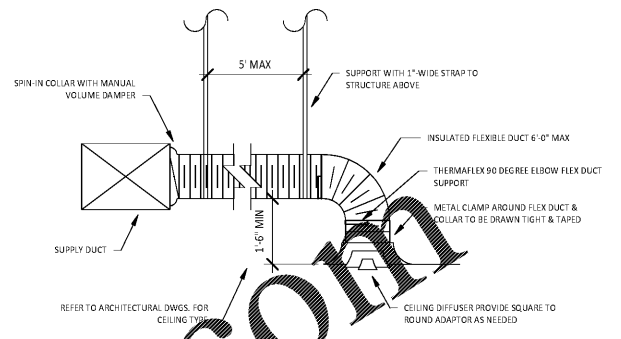
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Drawn By: KAT
 Checked By: RTJ

Scale: 1/4" = 1'-0"
 Date: 07.23.2019

Job No.: 1902037

Sheet No.: M200



DIFFUSER CONNECTION
 NOT TO SCALE

CONTROL FUNCTIONS

A	THE TEMPERATURE IN EACH ZONE IS CONTROLLED BY SPACE TEMPERATURE SENSORS CONNECTED TO THE CENTRAL CONTROLLER LOCATED IN THE IT ROOM. ALL ZONES SHALL OPERATE WITH CONTINUOUS FAN OPERATION DURING OCCUPIED TIMES AND INTERMITTENTLY AS NEEDED TO MAINTAIN SET POINTS DURING UNOCCUPIED TIMES. OUTSIDE AIR DAMPERS SHALL BE OPEN CONTINUOUSLY AND SHALL BE CLOSED DURING UNOCCUPIED PERIODS.
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VAV Box Sequence of Operation
Occupancy:
 With Occupancy Sensor: When the RTU is in occupied mode and the space served by the VAV box is occupied then the fan in the box shall run for a period of one-hour after occupancy of the space/zone has been established. During unoccupied times the fan shall stop and the damper shall modulate close.
Cooling Sequence:
 On a rise in space temperature above the space cooling setpoint, the box will be modulated open from the cooling minimum flow setpoint to the cooling maximum flow setpoint.
 On a decrease in space temperature below the cooling setpoint, the box will modulate to the minimum cooling flow setpoint. When in the unoccupied mode, the cooling setpoint will be 5 deg. F (Adjustable) above the occupied cooling setpoint. The cooling minimum flow setpoint will be zero in the unoccupied mode.
Heating Sequence:
 On a fall in space temperature below the space heating setpoint, the box will modulate to the heating flow set-point and the reheat coils shall be activated. maintain the space temperature at the heating setpoint. The occupied space heating setpoint shall be a minimum of 2 deg. F below the occupied space cooling setpoint. The unoccupied space heating setpoint shall be 5 deg. F (Adjustable) below the occupied space heating setpoint.
Minimum Requirements:
 Each box shall have occupied and unoccupied heating and cooling temperature set-points. Occupied heating and cooling set-points must have a minimum of 2 deg. F deadband between them. Space Set-points shall be adjustable between the max heat and min-cooling Set-points from the space stat. With the exception of common spaces which shall have none adjustable thermostats.
 Each box shall have maximum and minimum cooling flow set-points and maximum and minimum heating flow set-points as determined by balancing procedures.
 In the unoccupied mode the flow set-point shall be zero if not calling for heating or cooling. Occupancy sensors shall control lighting and VAV box occupancy mode.
 Each box equipped with a reheat coil shall have a discharge air temperature sensor.
VAV Air Handler - Standard Sequence of Operation
Occupancy:
 The unit shall be scheduled from a seven day schedule to meet the needs of the occupants.
Unoccupied/ Disabled Mode:
 The supply fan will be disabled, the outside air dampers are to be closed, and the cooling shall be off. If any space calls for heating and the outside air temperature is below 60 degrees then fan shall start at minimum speed and the discharge air temperature of the unit shall be set to 60 degree and the heating shall modulate to maintain the discharge air setpoint.
Safeties, Interlocks:
 If the fire alarm panel or duct mounted smoke detectors indicate a fire or smoke the fan will be disabled and the outside air dampers are to close.
Temp Control Sequence:
Cooling Mode: When Outside Air Temp is no longer suitable for free cooling.
 The Discharge Air Temperature Control Loop shall modulate the compressors to control at the Discharge Air Temperature and the Discharge Air Setpoint. Outside Air Dampers will be at minimum position.
Mixed Economizer Mode: When Outside Air Temp is suitable for free cooling Outside Air Temp below 68 to 72°F dry bulb and 55°F wet bulb and the economizer is at 100% and the Discharge Air Temperature is above setpoint the compressors shall to meet the Discharge Air Temperature setpoint. The economizer shall be allowed to start.
Economizer/Heating Mode: Below 55°F Outside Air Temp
 The Discharge Air Temperature Control Loop shall modulate the outside dampers to maintain Discharge Air Temperature setpoint. The outside air dampers have met their minimum position and there is a continued fall in the discharge air temperature then the heating section shall be energized to modulate to maintain the setpoint.
Minimum Outside Air Control/ Demand Control Ventilation:
Minimum low Outside Air Setpoint: The Minimum Outside Air shall be set to make-up for air exhausted to the space served to prevent building from being negative in pressure.
Minimum High Outside Air Setpoint: The High Minimum setpoint should be maintained to maintain amount of outside air needed to properly ventilate the space or building.
 The Minimum outside air shall be set between the Low Minimum setpoint and the High Minimum setpoint based on CO2 levels to maintain CO2 levels below 900 ppm (AIA) in the space.
Building Pressure Sequence: The return fan shall be set to maintain a building pressure of 0.05" W.C. (adj.) setpoint the exhaust dampers will modulate open to maintain building pressure. The return fan VFD shall modulate to control the return fan discharge static at a 0.1" W.C. (adj.) setpoint.
 Return Pressure Control is not feasible fan track should be used. The return fan speed shall track the supply fan VFD minus a calculated offset. The calculated offset shall come from balancer. The exhaust dampers should follow the mixed air signal and may also have an offset from the mixed air signal.

FRESH AIR REQUIREMENTS

ROOM	OUTDOOR AIRFLOW PER PERSON	CALCULATED OCCUPANCY	OUTDOOR AIRFLOW PER SF	ROOM SF	REQUIRED OUTDOOR AIR FLOW (CFM)
ACTIVITY ROOM	10	4	0.06	111	46.67
ADMIN 1	5	1	0.06	183	15.98
ADMIN 2	5	1	0.06	135	13.1
ADMIN 3	5	1	0.06	173	15.28
ADMIN 4	5	1	0.06	178	12.68
ART ROOM	10	3	0.18	167	60.06
GL 3/TEACH LAB	7.5	7	0.12	196	76.02
GROUP LEARNING 1	7.5	9	0.12	263	99.07
GROUP LEARNING 2	10	9	0.12	263	121.56
GROUP LEARNING 4	10	9	0.12	267	122.04
IT ROOM	-	-	-	48	-
MUSIC ROOM	10	7	0.06	199	81.94
NORTH HALLWAY	-	-	0.06	602	36.12
RECEPTION	5	12	0.06	392	83.52
RESTROOMS	-	-	-	188	-
SCIENCE ROOM	10	4	0.18	150	46.67
SILENT HOMEWORK	5	5	0.12	538	122.04
SOCIAL STUDY	5	11	0.12	1081	122.04
SOUTH HALLWAY	-	-	0.06	548	32.8
STORAGE	-	-	-	61	-
TEACHER WORKROOM	5	13	0.06	255	80.3
TUTOR 1	7.5	3	-	90	22.5
TUTOR 2	7.5	3	-	97	22.5
TUTOR 3	7.5	3	-	82	22.5
TUTOR 4	7.5	4	-	77	30
TUTOR 5	7.5	3	-	88	22.5
TUTOR 6	7.5	3	-	86	22.5
TUTOR 7	7.5	3	-	93	22.5
TUTOR 8	7.5	3	-	90	22.5
TUTOR 9	7.5	4	-	30	30
TUTOR 10	7.5	4	-	30	30
TUTOR 11	7.6	4	-	102	30
TUTOR 12	7.5	4	-	106	30
TUTOR 13	7.5	4	-	101	30
TUTOR 14	7.5	4	-	102	30
TUTOR 15	7.5	4	-	106	30
TUTOR 16	7.5	86	-	22.5	22.5
TUTOR 17	7.5	-	-	86	22.5
TUTOR 18	7.5	-	-	93	22.5
TUTOR 19	7.5	-	-	97	22.5
TUTOR 20	7.5	3	-	97	22.5

FIRE DAMPER SCHEDULE

TAG	DUCT SIZE		TYPE	RATING	FLOW	ORIENTATION	FURNISHED BY	INSTALLED BY	BASIS FOR DESIGN		REMARKS
	DUCT WIDTH	DUCT HEIGHT							MANUFACTURER	MODEL	
FD-1	10"	10"	A	3 HOUR	DYNAMIC	HORIZONTAL	HES	GC	RUSKIN	DBD23	
FD-2	10"	10"	A	3 HOUR	DYNAMIC	HORIZONTAL	HES	GC	RUSKIN	DBD23	

GRILLS, REGISTERS, AND DIFFUSERS SCHEDULE

TAG	DESCRIPTION	FACE SIZE	MATERIAL	FINISH	MOUNTING	BASIS FOR DESIGN		NOTES
						MANUFACTURER	MODEL	
CD1	PERFORATED CEILING DIFFUSER	24" X 24"	ALUMINUM	WHITE	LAY-IN CEILING	TITUS	PAS TYPE 3	
CD2	PERFORATED CEILING DIFFUSER	24" X 24"	ALUMINUM	WHITE	GYP CEILING	TITUS	PAS TYPE 1	PROVIDE INTEGRAL OBD
ER1	PERFORATED CEILING EXHAUST	24" X 24"	ALUMINUM	WHITE	GYP CEILING	TITUS	PAR TYPE 1	PROVIDE INTEGRAL OBD
RG1	PERFORATED CEILING RETURN	24" X 24"	ALUMINUM	WHITE	LAY-IN CEILING	TITUS	PAR TYPE 3	
RG2	PERFORATED CEILING RETURN	12" X 24"	ALUMINUM	WHITE	LAY-IN CEILING	TITUS	PAR TYPE 3	
RG3	PERFORATED CEILING RETURN	24" X 24"	ALUMINUM	WHITE	GYP CEILING	TITUS	PAR TYPE 1	

MOTORIZED DAMPER SCHEDULE

TAG	DUCT SIZE [in.]		OPERATION	FAIL POSITION	SPRING RETURN	CONTROL SIGNAL	BASIS FOR DESIGN		REMARKS
	WIDTH	HEIGHT					MANUFACTURER	MODEL	
MD-1	10"	10"	MODULATING	OPEN	YES	2-20V	BELIMO	LF24-MFT US	

MINI SPLIT SYSTEM SCHEDULE

TAG	DESCRIPTION	NOMINAL CAPACITY [TONS]	NO. OF CIRCUITS	REFRIGERANT TYPE	APPROXIMATE WEIGHT [LBS]	MOCF	FLA	V/P/PH	MANUFACTURER	MODEL	REMARKS
CU-1	REMOTE CONDENSING UNIT	1.0	1	R-410A	100	15 A		208/1/60	MITSUBISHI	MUY-GL12NA	PROVIDE WITH MEANS OF DISCONNECT AND UNIT MOUNTED CONVENIENCE RECEPTACLE
TU-1	HIGH WALL UNIT	1.0			35	15 A	1.0 A	208/1/60	MITSUBISHI	MSV-GL12NA	

FAN SCHEDULE

TAG	Scheduling Description	DRIVE TYPE	EXHAUST FLOW [CFM]	E.S.P. [in. w.c.]	WEIGHT [lbs]	ELECTRICAL		BASIS FOR DESIGN		REMARKS		
						MOTOR POWER	V/P/PH	MANUFACTURER	MODEL			
EF-1	ART ROOM EXHAUST FAN	DIRECT	50 CFM	0.00 in. w.c.	15	84 W	120/1/60	84 W	120/1/60	CAPTIVE-AIRE	CTA-D70-CA	WITH DISCONNECT AND BACKDRAFT DAMPER
EF-2	SCIENCE ROOM EXHAUST FAN	DIRECT	50 CFM	0.00 in. w.c.	15	84 W	120/1/60	84 W	120/1/60	CAPTIVE-AIRE	CTA-D70-CA	WITH DISCONNECT AND BACKDRAFT DAMPER

VARIABLE AIR VOLUME AIR HANDLER SCHEDULE

TAG	DESCRIPTION	NOMINAL CAPACITY [TONS]	AIRFLOW				COOLING CAPACITY				APPROX WEIGHT [LBS]	BASIS FOR DESIGN		REMARKS
			TOTAL [CFM]	OA [CFM]	ESP [in. w.c.]	TOTAL [MBH]	SENSIBLE [MBH]	EAT [Deg. F]		MANUFACTURER		MODEL		
							DB	WB						
VAV1-5	EXISTING VAV BOX UNIT	6	1510	148	1.0	38	33	77	63	150	TRANE	VPEF-12	PAIRED WITH EXISTING BUILDING SYSTEM	
VAV 1-4	EXISTING VAV BOX UNIT	6	1605	144	1.0	42	36	78	64	150	TRANE	VPEF-12	PAIRED WITH EXISTING BUILDING SYSTEM	
VAV 1-6	EXISTING VAV BOX UNIT	6	1660	71	1.0	36	32	77	63	150	TRANE	VPEF-12	PAIRED WITH EXISTING BUILDING SYSTEM	
VAV 1-12	EXISTING VAV BOX UNIT	6	1425	547	1.0	64	42	84	69	150	TRANE	VCCF-12	PAIRED WITH EXISTING BUILDING SYSTEM	
VAV 1-13	EXISTING VAV BOX UNIT	6	1115	1012	1.0	69	43	92	73	150	TRANE	VCCF-12	PAIRED WITH EXISTING BUILDING SYSTEM	
VAV 1-14	EXISTING VAV BOX UNIT	6	900	267	1.0	37	25	83	68	150	TRANE	VCCF-12	PAIRED WITH EXISTING BUILDING SYSTEM	
VAV 1-18	NEW VAV BOX UNIT	6	1590	83	1.0	37	35	77	62	150	TRANE	VPEF-12	PAIRED WITH EXISTING BUILDING SYSTEM	