Addendum #03

OWNER: Grand Rapids Public Schools

PROJECT: Coit Arts Academy – Phase 2 Summer 2025 Work
617 Coit Ave NE
Grand Rapids, MI 49506

DESIGN PROFESSIONAL: C2AE
Project #23062

CONSTRUCTION MANAGER: Triangle Associates, Inc.

Addendum No. 03

Date Issued: 09/24/2024

Drawings Issued: M-601.2, M701.2, M801.2

Specifications Issued: None

Documents Issued: C2AE Addendum #3 Narrative & Drawings

Revisions to work scopes:

WC 230 - Mechanical:

28 ***Alternate 2: Regardless of the general note on the "Existing Hood Schedule" on M-103.2, the VFD's shall be provided by WC 230 base bid and/or alternate. (Add. 3)***

WC 260 – Electrical:

32 ***Alternate 2: Regardless of the general note on the "Existing Hood Schedule" on M-103.2, the VFD's shall be provided by WC 230 base bid and/or alternate. (Add. 3)***

All bidders are to incorporate these revisions into their proposals and to acknowledge receipt of this addendum where requested on the Proposal Form. Bidders are reminded that verbal clarifications or revisions from the C2AE or Construction Manager are non-binding and that only published addenda shall be honored.

RESPECTFULLY SUBMITTED:
TRIANGLE ASSOCIATES, INC.

50 Loius St. NW Suite 200
Grand Rapids, MI 49503
616.454.9414
www.c2ae.com

Addendum #3

Project No.:	23-0458	Date:	September 23, 2024
Project:	Coit Creative Arts Academy Bid Package #2 Grand Rapids Public Schools Kent County, Michigan	A/E Firm: Project Manager:	C2AE Steve Jurczuk
Owner:	Grand Rapids Public Schools 1331 M.L.K. Jr. St SE Grand Rapids, MI 49506		

The following changes, revisions, modifications, etc. shall be incorporated into the contract documents, specifications, and plans.

BID FORM

A3.1 The Bidder shall acknowledge receipt of Addenda #3 by indicating so in the spaces provided on the Bid Form.

DRAWINGS

A3.2 Refer to Sheet M-601.2 (reissued):
Revise Mechanical Schedules.

A3.3 Refer to Sheet M-701.2 (reissued):
Revise Mechanical Diagrams & Schematics.

A3.4 Refer to Sheet M-801.2 (reissued):
Revise Mechanical Control Sequences of Operation.

WE RECYCLE

THE BAR BELOW SHOWS GRAYSCALE FROM WHITE TO SOLID BLACK

THE BAR BELOW SHOWS PRIMARY COLORS WHITE

FAN POWERED VARIABLE AIR VOLUME BOX SCHEDULE

GENERAL					SUPPLY FAN (ECM)		PRIMARY AIRFLOW		HYDRONIC REHEAT					ELECTRICAL				NOTES
MARK	MANUFACTURER	MODEL	UNIT SIZE	INLET SIZE	AIRFLOW (CFM)	TSP (IN-WG)	MAX (CFM)	MIN (CFM)	AIRFLOW (CFM)	CAPACITY (MBH)	FLOW (GPM)	CONTROL VALVE	FLUID	HP	VOLTAGE	PHASE	FLA	
FVAV-101	TITUS	DTQS	4	12"	1275	0.40	1275	320	1275	34.43	1.72	TWO-WAY	100% WATER	1/3	120	1	9.8	1,2
FVAV-103	TITUS	DTQS	5	12"	1475	0.40	1475	370	1475	39.83	1.99	TWO-WAY	100% WATER	1/3	120	1	10	1,2
FVAV-118	TITUS	DTQS	5	12"	1400	0.40	1400	350	1400	37.80	1.89	TWO-WAY	100% WATER	1/3	120	1	10	1,2
FVAV-120	TITUS	DTQS	5	12"	1350	0.40	1350	340	1350	36.45	1.82	TWO-WAY	100% WATER	1/3	120	1	10	1,2
FVAV-121	TITUS	DTQS	5	12"	1350	0.40	1350	340	1350	36.45	1.82	TWO-WAY	100% WATER	1/3	120	1	10	1,2
FVAV-122	TITUS	DTQS	3	10"	800	0.40	800	200	800	21.60	1.08	TWO-WAY	100% WATER	1/4	120	1	7	1,2
FVAV-123A	TITUS	DTQS	3	10"	650	0.40	650	160	650	17.55	0.88	TWO-WAY	100% WATER	1/4	120	1	7	1,2
FVAV-123B	TITUS	DTQS	2	8"	600	0.40	600	150	600	16.20	0.81	TWO-WAY	100% WATER	1/6	120	1	4	1,2
FVAV-124A	TITUS	DTQS	3	10"	900	0.40	900	230	900	24.30	1.22	TWO-WAY	100% WATER	1/4	120	1	7	1,2
FVAV-124B	TITUS	DTQS	3	10"	900	0.40	900	230	900	24.30	1.22	TWO-WAY	100% WATER	1/4	120	1	7	1,2
FVAV-126	TITUS	DTQS	5	12"	1500	0.40	1500	380	1500	40.50	2.03	TWO-WAY	100% WATER	1/3	120	1	10	1,2
FVAV-127	TITUS	DTQS	5	12"	1400	0.40	1400	350	1400	37.80	1.89	TWO-WAY	100% WATER	1/3	120	1	10	1,2
FVAV-128	TITUS	DTQS	5	12"	1400	0.40	1400	350	1400	37.80	1.89	TWO-WAY	100% WATER	1/3	120	1	10	1,2
FVAV-142	TITUS	DTQS	2	8"	500	0.40	500	130	500	13.50	0.68	TWO-WAY	100% WATER	1/6	120	1	4	1,2
FVAV-143	TITUS	DTQS	3	10"	900	0.40	900	230	900	24.30	1.22	TWO-WAY	100% WATER	1/4	120	1	7	1,2
FVAV-200	TITUS	DTQS	3	10"	800	0.40	800	200	800	21.60	1.08	TWO-WAY	100% WATER	1/4	120	1	7	1,2
FVAV-201	TITUS	DTQS	5	12"	1400	0.40	1400	350	1400	37.80	1.89	TWO-WAY	100% WATER	1/3	120	1	10	1,2
FVAV-204	TITUS	DTQS	5	12"	1350	0.40	1350	340	1350	36.45	1.82	TWO-WAY	100% WATER	1/3	120	1	10	1,2
FVAV-206	TITUS	DTQS	5	12"	1350	0.40	1350	340	1350	36.45	1.82	TWO-WAY	100% WATER	1/3	120	1	10	1,2
FVAV-207	TITUS	DTQS	5	12"	1350	0.40	1350	340	1350	36.45	1.82	TWO-WAY	100% WATER	1/3	120	1	10	1,2
FVAV-208	TITUS	DTQS	6	14"	1650	0.40	1650	410	1650	44.55	2.23	TWO-WAY	100% WATER	3/4	120	1	13.4	1,2
FVAV-209	TITUS	DTQS	3	10"	775	0.40	775	190	775	20.93	1.05	TWO-WAY	100% WATER	1/4	120	1	7	1,2
FVAV-209A	TITUS	DTQS	3	10"	650	0.40	650	160	650	17.55	0.88	TWO-WAY	100% WATER	1/4	120	1	7	1,2
FVAV-212	TITUS	DTQS	3	12"	1600	0.40	1600	400	1600	43.20	2.16	TWO-WAY	100% WATER	1/4	120	1	7	1,2
FVAV-214	TITUS	DTQS	3	10"	950	0.40	950	240	950	25.65	1.28	TWO-WAY	100% WATER	1/4	120	1	7	1,2
FVAV-215A	TITUS	DTQS	5	12"	1350	0.40	1350	340	1350	36.45	1.82	TWO-WAY	100% WATER	1/3	120	1	10	1,2
FVAV-215B	TITUS	DTQS	4	12"	1100	0.40	1100	280	1100	29.70	1.49	TWO-WAY	100% WATER	1/3	120	1	9.8	1,2
FVAV-216	TITUS	DTQS	5	12"	1425	0.40	1425	360	1425	38.48	1.92	TWO-WAY	100% WATER	1/3	120	1	10	1,2
FVAV-218	TITUS	DTQS	5	12"	1480	0.40	1480	370	1480	39.96	2.00	TWO-WAY	100% WATER	1/3	120	1	10	1,2
FVAV-219	TITUS	DTQS	5	12"	1480	0.40	1480	370	1480	39.96	2.00	TWO-WAY	100% WATER	1/3	120	1	10	1,2
FVAV-227	TITUS	DTQS	3	10"	800	0.40	800	200	800	21.60	1.08	TWO-WAY	100% WATER	1/4	120	1	7	1,2

1. PROVIDE WITH REMOTE WALL MOUNTED THERMOSTAT.
2. PROVIDE WITH HIGH-EFFICIENCY ELECTRONICALLY COMMUTATED MOTOR (ECM).

GLYCOL MAKEUP UNIT SCHEDULE

MARK	MANUFACTURER	MODEL	SERVING	CAPACITY (GALLONS)	HP	PRESSURE RANGE (PSI)	CAPACITY (GPM @ PSI)	DIA x LENGTH (IN)	WEIGHT (LBS)
GMU-1	WESSELS COMPANY	GMP-13050	CHILLED WATER SYSTEM	50	1/3	10-70	1.8 @ 70	34 x 45	134

EXHAUST FAN SCHEDULE

GENERAL				FAN			ELECTRICAL					WEIGHT (LBS)	NOTES
MARK	MANUFACTURER	MODEL	TYPE	AIRFLOW (CFM)	ESP (IN-WG)	SPEED (RPM)	HP	VOLTAGE	PHASE	MCA	MOP		
EF-1	GREENHECK	GB-220	BELT DRIVE DOWNBLAST	3975	0.50	686	3/4	460	3	2	15	114	1,2,3,4

1. FURNISH WITH FACTORY PROVIDED DISCONNECT.
2. PROVIDE MOTORIZED DAMPER POWERED BY FAN CIRCUIT.
3. PROVIDE WITH ALUMINUM BIRDSCREEN.
4. REUSE EXISTING ROOF CURB FOR MOUNTING, PROVIDE CURB ADAPTER IF NECESSARY.

CONDENSER SCHEDULE

GENERAL			SUCTION SIZE O.D. (IN)	LIQUID SIZE O.D. (IN)	COOLING PERFORMANCE		ELECTRICAL					WEIGHT (LBS)	NOTES
MARK	MANUFACTURER	MODEL			REFRIGERANT	CAPACITY (TONS)	FAN HP	VOLTAGE	PHASE	MCA			
CU-1	TRANE	4TTR3018N	3/4"	3/8"	R-454B	1.5	1/8	208	1	12		133	1
CU-2	TRANE	4TTR3036N	3/4"	3/8"	R-454B	3	1/8	208	1	18		161	1

1. PROVIDE WITH PREFABRICATED HDPE BASE FOR ROOF MOUNTING.

DIFFUSER, REGISTER, AND GRILLE SCHEDULE

GENERAL				DESCRIPTION	FINISH	MATERIAL	NECK SIZE	NOTES
MARK	MANUFACTURER	MODEL	TYPE					
EG-1	TITUS	50F	LAY-IN	12"x12" EGGCRATE EXHAUST GRILLE	WHITE	ALUMINUM	SEE PLAN	1
RG-1	TITUS	50F	LAY-IN	24"x24" EGGCRATE RETURN GRILLE	WHITE	ALUMINUM	SEE PLAN	1
RG-2	TITUS	350FL	WALL-MOUNTED	LOUVERED RETURN GRILLE	WHITE	ALUMINUM	SEE PLAN	1,2
SD-1	TITUS	TMS	LAY-IN	24"x24" SUPPLY DIFFUSER	WHITE	STEEL	SEE PLAN	1

1. FURNISH WITH OPPOSED BLADE DAMPER.
2. INSTALL WALL MOUNTED UNITS WITH BLADES ANGLED UP.

ROOM VENTILATION AIR TABLE

GENERAL				VENTILATION						
ROOM NUMBER	ROOM NAME	AREA	ASSOCIATED UNIT	OCCUPANCY CATEGORY	OCCUPANCY CLASSIFICATION	DESIGN NO. OF OCCUPANTS	*PEOPLE OA RATE (CFM/PERSON)	*AREA OA RATE (CFM/SF)	MIN REQUIRED OA (CFM)	DESIGN OA (CFM) (+20%)
145	PIAZZA	1165 SF	AHU-1	OFFICE	RECEPTION AREA	35	7.5	0.06	332	399
112C1	STAGE	521 SF	AHU-2	EDUCATION	MUSIC / THEATER / DANCE	19	10	0.06	221	266
112C2	STAGE	414 SF	AHU-2	EDUCATION	MUSIC / THEATER / DANCE	16	10	0.06	185	222
112	GYMNASIUM	3472 SF	AHU-2	SPORTS	GYM, STADIUM, ARENA (PLAY AREA)	25	20	0.18	1125	1350
112B	GYMNASIUM SPECTATOR AREA	3524 SF	AHU-2	SPORTS	SPECTATOR AREAS	500	7.5	0.06	3961	4754
									AHU-2 TOTAL:	6991
102	GIRLS TOILET	245 SF	AHU-3	-	-	-	-	-		
102A	FAMILY RESTROOM	110 SF	AHU-3	-	-	-	-	-		
11	TESTING	68 SF	AHU-3	GENERAL	CORRIDOR	1	0	0.06	4	5
104	BOYS TOILET	363 SF	AHU-3	-	-	-	-	-		
100	OPEN OFFICE	513 SF	AHU-3	OFFICE	OFFICE SPACE	7	5	0.06	66	79
100A	SICK	84 SF	AHU-3	EDUCATION	CLASSROOM (AGES 5-8)	2	10	0.12	30	36
100C	HEALTH	79 SF	AHU-3	EDUCATION	CLASSROOM (AGES 5-8)	2	10	0.12	29	35
100D	EXAM	93 SF	AHU-3	EDUCATION	CLASSROOM (AGES 5-8)	2	10	0.12	21	25
101	CLASSROOM	1137 SF	AHU-3	EDUCATION	CLASSROOM (AGES 5-8)	28	10	0.12	416	500
103	CLASSROOM	1137 SF	AHU-3	EDUCATION	CLASSROOM (AGES 5-8)	28	10	0.12	416	500
107	PTA STORAGE	124 SF	AHU-3	-	-	-	-	-		
108	OUTDOOR STORAGE	124 SF	AHU-3	-	-	-	-	-		
111	KITCHEN	412 SF	AHU-3	FOOD & BEVERAGE	KITCHEN (COOKING)	9	7.5	0.12	117	140
111A	SERVERY	147 SF	AHU-3	FOOD & BEVERAGE	KITCHEN (COOKING)	3	7.5	0.12	40	48
113	RECEIVING	280 SF	AHU-3	-	-	-	-	-		
114	STORAGE	247 SF	AHU-3	-	-	-	-	-		
115	MENTAL HEALTH	428 SF	AHU-3	EDUCATION	CLASSROOM (AGES 5-8)	9	10	0.12	141	170
116	SENSORY	428 SF	AHU-3	EDUCATION	CLASSROOM (AGES 5-8)	9	10	0.12	141	170
142	EAST HALLWAY	1523 SF	AHU-3	GENERAL	CORRIDOR	0	0	0.06	91	110
143	CENTRAL HALLWAY	1450 SF	AHU-3	GENERAL	CORRIDOR	0	0	0.06	87	104
144	WEST HALLWAY	486 SF	AHU-3	GENERAL	CORRIDOR	0	0	0.06	29	35
200	CONFERENCE	354 SF	AHU-3	OFFICE	OFFICE SPACE	4	5	0.06	41	49
201	CLASSROOM	1051 SF	AHU-3	EDUCATION	CLASSROOM (AGES 5-8)	26	10	0.12	386	463
204	CLASSROOM	1354 SF	AHU-3	EDUCATION	CLASSROOM (AGES 5-8)	34	10	0.12	502	603
206	CLASSROOM	1517 SF	AHU-3	EDUCATION	CLASSROOM (AGES 5-8)	37	10	0.12	552	662
207	CLASSROOM	1304 SF	AHU-3	EDUCATION	CLASSROOM (AGES 5-8)	32	10	0.12	476	572
227	WEST HALLWAY	2479 SF	AHU-3	GENERAL	CORRIDOR	0	0	0.06	149	178
100E	OFFICE	239 SF	AHU-3	OFFICE	OFFICE SPACE	3	5	0.06	29	35
									AHU-3 TOTAL:	4519
127	CLASSROOM	742 SF	AHU-4	EDUCATION	CLASSROOM (AGES 5-8)	19	10	0.12	279	335
128	CLASSROOM	737 SF	AHU-4	EDUCATION	CLASSROOM (AGES 5-8)	19	10	0.12	278	334
122	CONFERENCE	442 SF	AHU-4	GENERAL	CONFERENCE / MEETING	12	5	0.06	86	104
118	ART	1207 SF	AHU-4	EDUCATION	ART CLASSROOM	24	10	0.18	457	549
120	DANCE	1060 SF	AHU-4	EDUCATION	MUSIC / THEATER / DANCE	35	10	0.06	414	496
121	MUSIC	910 SF	AHU-4	EDUCATION	MUSIC / THEATER / DANCE	32	10	0.06	375	449
123	WORK ROOM	936 SF	AHU-4	EDUCATION	CLASSROOM (AGES 5-8)	24	10	0.12	352	423
124	CLASSROOM	1472 SF	AHU-4	EDUCATION	CLASSROOM (AGES 5-8)	36	10	0.12	537	644
126	CLASSROOM	1201 SF	AHU-4	EDUCATION	CLASSROOM (AGES 5-8)	30	10	0.12	444	533
138A	SOUTH HALLWAY	394 SF	AHU-4	GENERAL	CORRIDOR	0	0	0.06	24	28
									AHU-4 TOTAL:	3895
213	STAFF TOILETS	361 SF	AHU-5	-	-	-	-	-		
212	ART	1349 SF	AHU-5	EDUCATION	ART CLASSROOM	27	10	0.18	513	615
214	STAFF LOUNGE	691 SF	AHU-5	GENERAL	BREAK ROOM	6	5	0.06	71	86
215	CLASSROOM	1384 SF	AHU-5	EDUCATION	CLASSROOM (AGES 5-8)	34	10	0.12	506	607
216	CLASSROOM	1197 SF	AHU-5	EDUCATION	CLASSROOM (AGES 5-8)	29	10	0.12	434	520
218	SPECIAL EDUCATION 3-5	1084 SF	AHU-5	EDUCATION	CLASSROOM (AGES 5-8)	25	10	0.12	380	456
219	SPECIAL EDUCATION K-2	1089 SF	AHU-5	EDUCATION	CLASSROOM (AGES 5-8)	25	10	0.12	381	457
208	MEDIA CENTER	1824 SF	AHU-5	EDUCATION	MEDIA CENTER	45	10	0.12	669	803
209A	RESOURCE ROOM	587 SF	AHU-5	OFFICE	OFFICE SPACE	8	5	0.06	75	90
209	OFFICE	739 SF	AHU-5	OFFICE	OFFICE SPACE	15	5	0.06	119	143
									AHU-5 TOTAL: 3777	GRAND TOTALS 15986	19183

*2021 MICHIGAN MECHANICAL CODE MINIMUM VENTILATION RATES TABLE 403.3.1.1.

PUMP SCHEDULE

GENERAL					PERFORMANCE			ELECTRICAL				NOTES
MARK	MANUFACTURER	SERIES	MODEL	SERVING	FLOW (GPM)	WPD (FT-HD)	RPM	HP	W	VOLTAGE	PHASE	
CP-1	BELL & GOSSETT	NRF	22	AHU-1 HEATING COIL	5	10	2940	-	92	115	1	-
CP-2	BELL & GOSSETT	PL	36	AHU-2 HEATING COIL	27	10	3300	1/6	-	115	1	-
CP-3	BELL & GOSSETT	PL	36	AHU-3 HEATING COIL	23	10	3300	1/6	-	115	1	-
CP-4	BELL & GOSSETT	PL	36	AHU-4 HEATING COIL	20	10	3300	1/6	-	115	1	-
CP-5	BELL & GOSSETT	PL	36	AHU-5 HEATING COIL	20	10	3300	1/6	-	115	1	-
P-5	BELL & GOSSETT	E-1510	3GB	CHILLED WATER SYSTEM	400	100	1661	20	-	460	3	1,2,3
P-6	BELL & GOSSETT	E-1510	3GB	CHILLED WATER SYSTEM	400	100	1661	20	-	460	3	1,2,3

1. FURNISH WITH VARIABLE FREQUENCY DRIVE.
2. BASE MOUNTED CONFIGURATION.
3. MOUNT ON 6" HOUSEKEEPING PAD, SEE PLAN FOR DIMENSIONS.

A03

VARIABLE AIR VOLUME BOX SCHEDULE

GENERAL				AIRFLOW			HYDRONIC RE-HEAT									NOTES
MARK	MANUFACTURER	MODEL	INLET SIZE	MAXIMUM (CFM)	MINIMUM (CFM)	APD (IN-WG)	CAPACITY (MBH)	EAT (°F)	LAT (°F)	FLOW (GPM)	WPD (FT-HD)	EWT (°F)	LWT (°F)	CONTROL VALVE	FLUID	ROWS	
VAV-111	TRANE	VCWF	12"	1250	550	0.05	26.9	55	100	1.50	0.32	180	145	TWO-WAY	100% WATER	1	1
VAV-115	TRANE	VCWF	14"	1700	700	0.16	34.2	55	100	2.00	0.23	180	145	TWO-WAY	100% WATER	1	1

1. PROVIDE WITH REMOTE WALL MOUNTED THERMOSTAT.

A03

AIR HANDLING UNIT SCHEDULE

GENERAL			SUPPLY FAN						CHILLED WATER COOLING												HEATING COIL										ELECTRICAL				WEIGHT (LBS)	NOTES
MARK	MANUFACTURER	MODEL	AIRFLOW (CFM)	DESIGN OUTDOOR AIRFLOW (CFM)	DCV MIN OA (CFM)	ESP (IN-WG)	TSP (IN-WG)	HP	DRIVE	FAN TYPE	TOTAL CAPACITY (MBH)	SENSIBLE CAPACITY (MBH)	EDB (°F)	EWB (°F)	LDB (°F)	LWB (°F)	FLOW (GPM)	WPD (FT-HD)	EWT (°F)	LWT (°F)	CONTROL VALVE	FINS/FT	FLUID	ROWS	CAPACITY (MBH)	EAT (°F)	LAT (°F)	FLOW (GPM)	WPD (FT-HD)	EWT (°F)	LWT (°F)	CONTROL VALVE	FINS/IN	FLUID	ROWS	VOLTAGE	PHASE	FLA	MCA		
AHU-1	TRANE	CSAA06	2500	400	400	2.00	3.28	3	DIRECT	PLENUM	103.5	71.7	80	67	54	53.5	22.4	12.33	44	54	2-WAY	101	30% PG	6	97.6	59	95	4.88	0.49	180	140	3-WAY	137	100% WATER	1	460	3	4.8	6	1306	1,2,3,4,5
AHU-2	TRANE	CSAA017	9000	7000	1000	2.00	4.10	10	DIRECT	PLENUM	362.4	257.9	80	67	54	53.9	78.4	16.32	44	54	3-WAY	141	30% PG	8	546.6	39	95	27.32	0.80	180	140	3-WAY	109	100% WATER	2	460	3	14.0	17.5	2480	1,2,3,4,5
AHU-3	TRANE	CSAA030	14075	4550	3000	2.00	4.09	15	DIRECT	PLENUM	568.3	403.4	80	67	54	53.9	123.0	14.50	44	54	2-WAY	112	30% PG	8	457.9	50	80	22.89	1.12	180	140	3-WAY	97	100% WATER	1	460	3	21	26.25	4069	1,2,3,4
AHU-4	TRANE	CSAA025	12250	3900	2700	2.00	3.94	15	DIRECT	PLENUM	493.8	351.1	80	67	54	53.9	106.9	18.46	44	54	2-WAY	114	30% PG	8	398.6	50	80	19.92	0.82	180	140	3-WAY	102	100% WATER	1	460	3	21	26.25	3675	1,2,3,4
AHU-5	TRANE	CSAA025	12460	3800	2700	2.00	3.98	15	DIRECT	PLENUM	502.4	357.1	80	67	54	53.9	108.7	19.03	44	54	3-WAY	114	30% PG	8	405.4	50	80	20.26	0.85	180	140	3-WAY	103	100% WATER	1	460	3	21	26.25	3334	1,2,3,4
			TOTAL:	19650							TOTAL:	439.3																										

1. PROVIDE VFD AND MOUNTING SUPPORTS AS REQUIRED.
2. BACNET COMMUNICATION INTERFACE WITH BMS INTEGRATION.
3. PROVIDE DISCHARGE AIR SENSOR AND MIXED AIR SENSOR TIED TO BMS.
4. MOUNT ON EXISITNG 4" CONCRETE EQUIPMENT PADS, INSTALL ADDITIONAL CONCRETE PAD AS REQUIRED FOR NEW UNIT SIZES.
5. PROVIDE WITH SUPPLY FAN PLENUM PERFORATED PANELS FOR GREATER ACOUSTICAL PERFORMANCE.

AIR COOLED CHILLER SCHEDULE

GENERAL				PERFORMANCE									PERFORMANCE	CONDENSER				ELECTRICAL					WEIGHT (LBS)	NOTES
MARK	MANUFACTURER	MODEL	EVAPORATOR CONFIGURATION	REFRIGERANT	NOMINAL CAPACITY (TONS)	DESIGN CAPACITY (TONS)	EWT (°F)	LWT (°F)	DESIGN FLOW (GPM)	MINIMUM FLOW (GPM)	WPD (FT-HD)	EER (AHRI)(BTU/W-h)	FLUID	A-WEIGHTED SOUND PRESSURE 100% (dBA)	NO. OF FANS	FAN SPEED (RPM)	AMBIENT AIR DESIGN TEMP (°F)	MODULE LENGTH	TOTAL POWER (kW)	VOLTAGE	PHASE	MCA (A)	MOP (A)		
CH-1	TRANE	ACR1805EU**EEUEX	3-PASS	R-513A	180	155.53	53.86	44	400.00	140.0	38.20	9.911	30% PG	62	10	650	95	5V	183.32	460	3	345.28	450	13500	1,2,3,4,5,6,7

1. FURNISH WITH NON-FUSED DISCONNECT.
2. FURNISH WITH VARIABLE FREQUENCY DRIVE FOR COMPRESSOR(S).
3. PROVIDE WITH BACNET INTERFACE AND BMS INTEGRATION.
4. PROVIDE WITH 20A 115V CONVENIENCE OUTLET.
5. PROVIDE WITH INVISISOUND ULTIMATE SOUND PACKAGE.
6. FACTORY 3/4" INSULATION FOR ALL COLD PARTS.
7. PROVIDE WITH LOW AMBIENT UNIT TYPE.

A03

FAN COIL UNIT SCHEDULE

GENERAL			SUPPLY FAN				DX COOLING							HYDRONIC HEATING									ELECTRICAL				WEIGHT (LBS)	NOTES
MARK	MANUFACTURER	MODEL	AIRFLOW (CFM)	PRIMARY AIRFLOW (CFM)	ESP (IN-WG)	TSP (IN-WG)	HP	TOTAL CAPACITY (MBH)	SENSIBLE CAPACITY (MBH)	EDB (°F)	EWB (°F)	LDB (°F)	LWB (°F)	REFRIGERANT	ROWS	CAPACITY (MBH)	EAT (°F)	LAT (°F)	FLOW (GPM)	WPD (FT-HD)	EWT (°F)	LWT (°F)	CONTROL VALVE	FLUID	ROWS	VOLTAGE	PHASE	FLA	MCA		
FCU-100A	TRANE	BCHE054	1200	150	1.00	1.33	1.014	50.2	32.83	80	67	55	53.3	R-454B	3	40.9	60	91.5	1.5	0.12	180	128.8	TWO-WAY	100% WATER	1	115	1	13.3	16.63	205.6	1,2,3,4
FCU-100B	TRANE	BCHE018	500	250	1.00	1.742	0.543	20.4	13.4	80	67	55.5	53.7	R-454B	4	17.4	60	92.2	0.4	0.15	180	93.5	TWO-WAY	100% WATER	1	115	1	7.46	9.32	124.7	1,2,3,4

1. ELECTRONICALLY COMMUTATED MOTOR FOR VARIABLE AIRFLOW.
2. PROVIDE WITH WALL MOUNTED THERMOSTAT IN SPACE SERVED.
3. PROVIDE WITH CONDENSATE PUMP BLUE DIAMOND MAXBLUE 3.7 GPH OR SIMILAR.
4. PROVIDE WITH CONDENSATE DRAIN PAN OVERFLOW SENSOR.

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MECHANICAL SCHEDULES

COIT CREATIVE ARTS ACADEMY
617 COIT AVE, GRAND RAPIDS, MI 49503

PHASE
CONSTRUCTION DOCUMENTS

ISSUANCES

#	DESCRIPTION	DATE
0	CONSTRUCTION DOCUMENTS	23-AUG-2024
A03	ADDENDUM 3	23-SEP-2024

PROJ. #: 230458

M-601.2

Addendum #3

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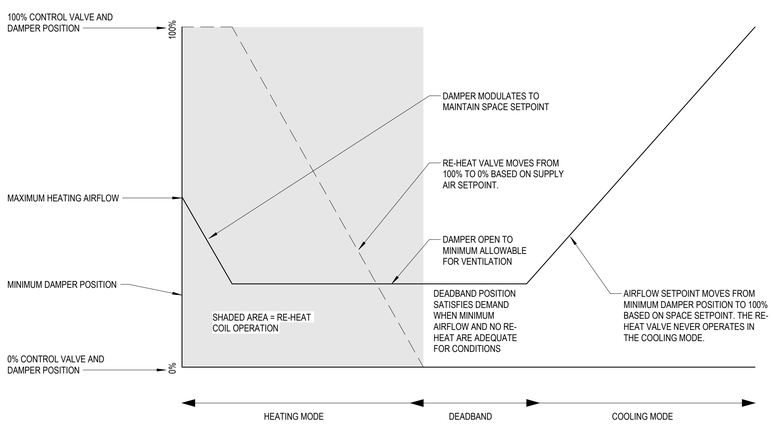
WE RECYCLE

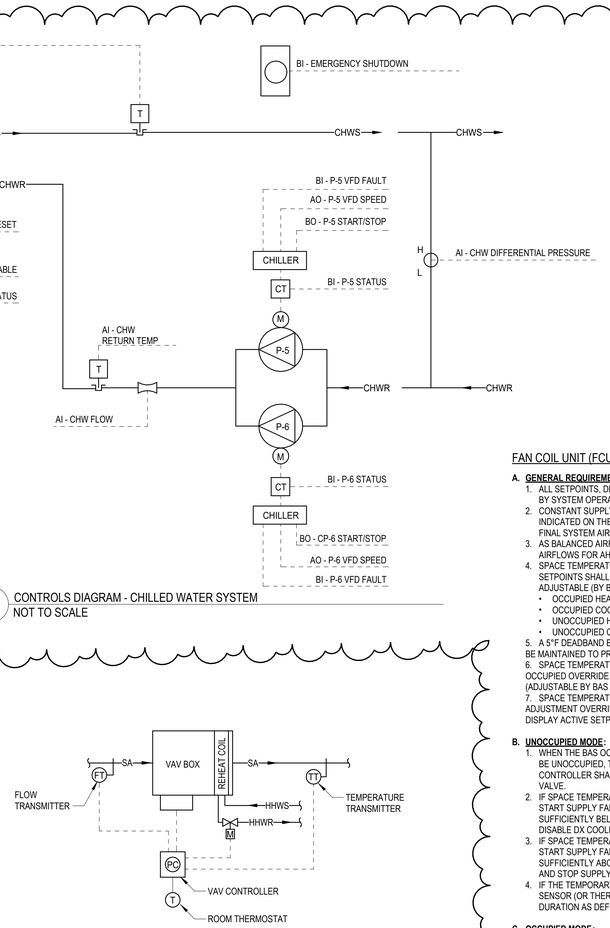
THE BAR BELOW SHOWS GRAYSCALE FROM WHITE TO SOLID BLACK

THE BAR BELOW SHOWS PRIMARY COLORS



VAV BOX OPERATIONAL CHART

2 CONTROLS - VAV OPERATION CHART
NOT TO SCALE



VAV BOX CONTROL DIAGRAM

3 CONTROLS DIAGRAM - CHILLED WATER SYSTEM
NOT TO SCALE

SEQUENCE OF OPERATION FOR CHILLED WATER SYSTEM

CHILLER - RUN CONDITIONS:
THE CHILLER SHALL BE ENABLED TO RUN WHENEVER IT IS COMMANDED TO BE ENABLED BY THE CHILLER MANAGER PROGRAM. THE CHILLER SHALL RUN SUBJECT TO ITS OWN INTERNAL SAFETIES AND CONTROLS.

EMERGENCY SHUTDOWN:
THE CHILLER SHALL SHUT DOWN AND AN ALARM GENERATED UPON RECEIVING AN EMERGENCY SHUTDOWN SIGNAL STATUS.

CHILLED WATER PUMP LEAD/STANDBY OPERATION:
THE TWO CHILLED WATER PUMPS SHALL RUN ANYTIME THE CHILLER IS CALLED TO RUN. THE CHILLED WATER PUMP SHALL ALSO RUN FOR FREEZE PROTECTION WHENEVER THE OUTSIDE AIR TEMPERATURE IS LESS THAN A USER DEFINABLE SETPOINT (ADJ.).
THE LEAD PUMP SHALL START PRIOR TO THE CHILLER BEING ENABLED AND SHALL STOPONLY AFTER THE CHILLER IS DISABLED. THE PUMP(S) SHALL THEREFORE HAVE:
- A USER ADJUSTABLE DELAY ON START.
- AND A USER ADJUSTABLE DELAY ON STOP.

THE DELAY TIMES SHALL BE SET APPROPRIATELY TO ALLOW FOR ORDERLY CHILLED WATER SYSTEM START-UP, SHUTDOWN AND SEQUENCING.
THE TWO PUMPS SHALL OPERATE IN A LEAD/STANDBY FASHION.
- THE LEAD PUMP SHALL RUN FIRST.
- ON FAILURE OF THE LEAD PUMP, THE STANDBY PUMP SHALL RUN AND THE LEAD PUMP SHALL TURN OFF.

THE DESIGNATED LEAD PUMP SHALL ROTATE UPON ONE OF THE FOLLOWING CONDITIONS (USER SELECTABLE):
- MANUALLY THROUGH A SOFTWARE SWITCH
- IF PUMP RUNTIME (ADJ.) IS EXCEEDED
- DAILY
- WEEKLY
- MONTHLY

ALARMS SHALL BE PROVIDED AS FOLLOWS:
CHILLED WATER PUMP (EACH)
- FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.
- VFD FAULT.

CHILLED WATER DIFFERENTIAL PRESSURE CONTROL:
THE CONTROLLER SHALL MEASURE CHILLED WATER DIFFERENTIAL PRESSURE AND MODULATE THE LEAD CHILLED WATER PUMP VFD TO MAINTAIN ITS CHILLED WATER DIFFERENTIAL PRESSURE SETPOINT. THE FOLLOWING SETPOINTS ARE RECOMMENDED VALUES. ALL SETPOINTS SHALL BE FIELD ADJUSTED DURING THE COMMISSIONING PERIOD TO MEET THE REQUIREMENTS OF ACTUAL FIELD CONDITIONS. THE CONTROLLER SHALL MODULATE CHILLED WATER PUMP SPEED TO MAINTAIN A CHILLED WATER DIFFERENTIAL PRESSURE OF 12 LBF/IN2 (ADJ.). THE VFD MINIMUM SPEED SHALL NOT DROP BELOW THAT REQUIRED TO MAINTAIN MINIMUM CHILLER GPM.
ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH CHILLED WATER DIFFERENTIAL PRESSURE: IF THE CHILLED WATER DIFFERENTIAL PRESSURE IS 25% (ADJ.) GREATER THAN SETPOINT.
- LOW CHILLED WATER DIFFERENTIAL PRESSURE: IF THE CHILLED WATER DIFFERENTIAL PRESSURE IS 25% (ADJ.) LESS THAN SETPOINT.

CHILLER:
THE CHILLER SHALL BE ENABLED A USER ADJUSTABLE TIME AFTER PUMP STATUSES ARE PROVEN ON. THE CHILLER SHALL THEREFORE HAVE A USER ADJUSTABLE DELAY ON START. THE DELAY TIME SHALL BE SET APPROPRIATELY TO ALLOW FOR ORDERLY CHILLED WATER SYSTEM START-UP, SHUTDOWN AND SEQUENCING.
THE CHILLER SHALL RUN SUBJECT TO ITS OWN INTERNAL SAFETIES AND CONTROLS.
ALARMS SHALL BE PROVIDED AS FOLLOWS:
- CHILLER FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
- CHILLER RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
- CHILLER RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.

CHILLED WATER SUPPLY TEMPERATURE SETPOINT:
THE CHILLED WATER SUPPLY TEMPERATURE SETPOINT SHALL RESET BASED ON OUTSIDE AIR TEMPERATURE.
AS OUTSIDE AIR TEMPERATURE DROPS FROM 75°F (ADJ.) T O 50°F (ADJ.) THE CHILLED WATER SUPPLY TEMPERATURE SETPOINT SHALL RESET UPWARDS BY ADDING FROM 0°F (ADJ.) TO 10°F (ADJ.) TO THE CURRENT SETPOINT.

CHILLED WATER TEMPERATURE MONITORING:
THE FOLLOWING TEMPERATURES SHALL BE MONITORED:
- CHILLED WATER SUPPLY.
- CHILLED WATER RETURN.

ALARMS SHALL BE PROVIDED AS FOLLOWS:
- HIGH CHILLED WATER SUPPLY TEMP: IF THE CHILLED WATER SUPPLY TEMPERATURE IS GREATER THAN 55°F (ADJ.).
- LOW CHILLED WATER SUPPLY TEMP: IF THE CHILLED WATER SUPPLY TEMPERATURE IS LESS THAN 38°F (ADJ.).

FAN COIL UNIT (FCU) – HW HEATING COIL & DX COOLING COIL

A. GENERAL REQUIREMENTS FOR ALL ATUS :
1. ALL SETPOINTS, DEADBANDS, AND TIME DELAYS DESCRIBED IN SEQUENCES SHALL BE ADJUSTABLE BY SYSTEM OPERATORS (CREATE REQUIRED VIRTUAL POINTS).
2. CONSTANT SUPPLY AIRFLOW (FCU FAN) AND PRIMARY AIRFLOW (FROM AHU-3) SHALL BE AS INDICATED ON THE FCU SCHEDULES. AIRFLOWS ESTABLISHED WITH MANUAL DAMPERS DURING FINAL SYSTEM AIR BALANCING.
3. AS BALANCED AIRFLOWS SHALL BE INDICATED ON BAS GRAPHICS. INCLUDE FCU PRIMARY AIRFLOWS FOR AHU-3 ACTIVE AIRFLOW TOTALIZATION.
4. SPACE TEMPERATURE SHALL BE MEASURED IN REAL TIME FOR BAS DISPLAY. SPACE TEMPERATURE SETPOINTS SHALL BE AS FOLLOWS (UNLESS NOTED OTHERWISE). ALL SETPOINTS SHALL BE ADJUSTABLE (BY BAS OPERATOR ONLY).
   - OCCUPIED HEATING: 70° F
   - OCCUPIED COOLING: 75° F
   - UNOCCUPIED HEATING 65° F
   - UNOCCUPIED COOLING: 78° F
5. A 5°F DEADBAND BETWEEN ACTIVE HEATING AND COOLING SPACE TEMPERATURE SETPOINTS SHALL BE MAINTAINED TO PREVENT SHORT CYCLING SITUATIONS.
6. SPACE TEMPERATURE SENSOR (OR THERMOSTAT) SHALL INCLUDE A TEMPORARY UNCCUPIED-TO-OCCUPIED OVERRIDE BUTTON. DURATION OF TEMPORARY OVERRIDE SHALL BE LIMITED TO ONE-HOUR (ADJUSTABLE BY BAS OPERATOR ONLY).
7. SPACE TEMPERATURE SENSOR (OR THERMOSTAT) SHALL ALLOW FOR TEMPERATURE SETPOINT ADJUSTMENT OVERRIDE. SETPOINT OVERRIDE SHALL BE LIMITED TO +/- 2° F. BAS GRAPHICS SHALL DISPLAY ACTIVE SETPOINT ADJUSTMENT.

B. UNOCCUPIED MODE:
1. WHEN THE BAS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING, ZONE, AND SPACE IS TO BE UNOCCUPIED, THE UNOCCUPIED HEATING/COOLING SETPOINTS SHALL BE ACTIVE. FCU CONTROLLER SHALL STOP SUPPLY FAN, DISABLE DX COOLING, AND CLOSE THE HEATING COIL VALVE.
2. IF SPACE TEMPERATURE RISES ABOVE UNOCCUPIED COOLING SETPOINT, FCU CONTROLLER SHALL START SUPPLY FAN AND MODULATE/STAGE DX COOLING. ONCE SPACE TEMPERATURE DROPS SUFFICIENTLY BELOW UNOCCUPIED COOLING SETPOINT, FCU SHALL STOP SUPPLY FAN AND DISABLE DX COOLING.
3. IF SPACE TEMPERATURE DROPS BELOW UNOCCUPIED HEATING SETPOINT, FCU CONTROLLER SHALL START SUPPLY FAN AND OPEN HEATING COIL VALVE. ONCE SPACE TEMPERATURE RISES SUFFICIENTLY ABOVE UNOCCUPIED HEATING SETPOINT, FCU SHALL CLOSE HEATING COIL VALVE AND STOP SUPPLY FAN.
4. IF THE TEMPORARY UNOCCUPIED-TO-OCCUPIED OVERRIDE BUTTON ON THE SPACE TEMPERATURE SENSOR (OR THERMOSTAT) IS PRESSED, FCU SHALL OPERATE IN OCCUPIED MODE FOR A LIMITED DURATION AS DEFINED ABOVE.

C. OCCUPIED MODE:
1. WHEN THE BAS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING, ZONE, AND SPACE IS TO BE OCCUPIED, FCU CONTROLLER SHALL START SUPPLY FAN, MODULATE/STAGE DX COOLING TO MAINTAIN OCCUPIED COOLING SETPOINT, OR MODULATE HEATING COIL VALVE TO MAINTAIN OCCUPIED HEATING SETPOINT.
   - MORNING WARM-UP/COOL-DOWN: IF THE SPACE TEMPERATURE IS BEYOND THE OCCUPIED HEATING/COOLING SETPOINTS 60 MINUTES (ADJUSTABLE) PRIOR TO SCHEDULED OCCUPANCY, FCU CONTROLLER SHALL START SUPPLY FAN AND MODULATE HEATING/COOLING TO ACHIEVE OCCUPIED SETPOINTS. UTILIZE OPTIMUM START ALGORYTHM TO MINIMUMIZE WARM-UP/COOL-DOWN DURATION.

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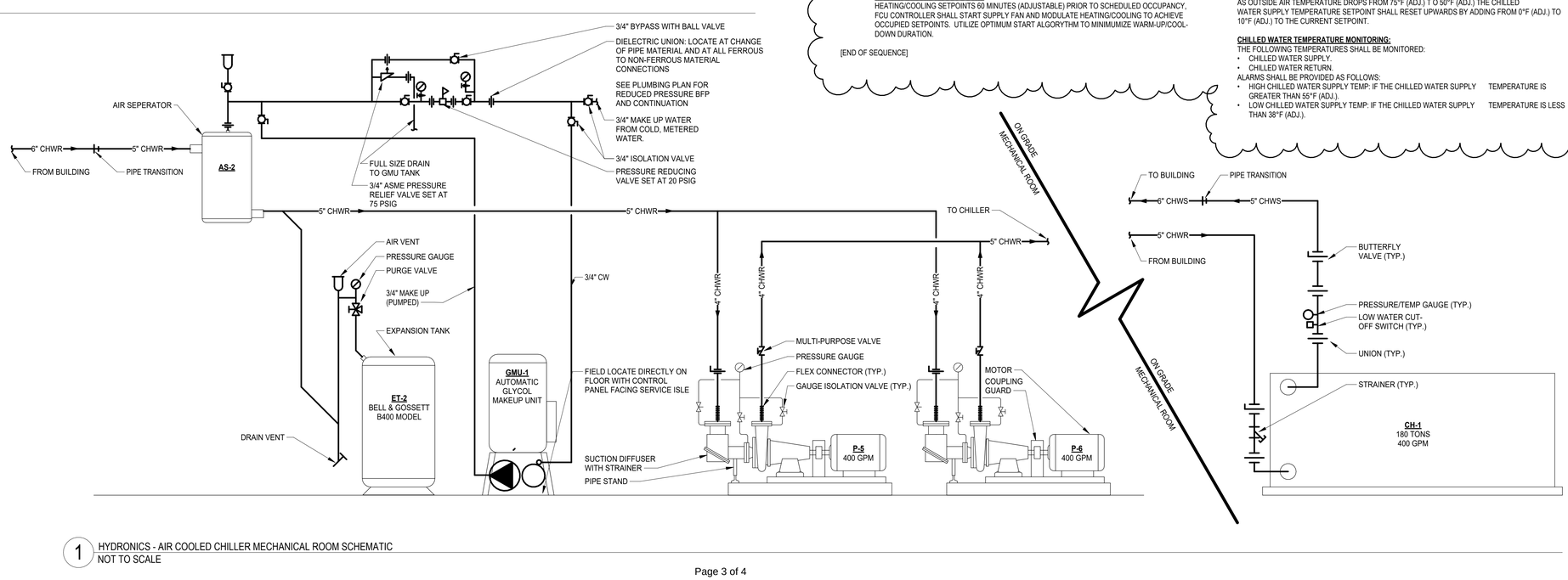

1 HYDRONICS - AIR COOLED CHILLER MECHANICAL ROOM SCHEMATIC
NOT TO SCALE

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MECHANICAL DIAGRAMS & SCHEMATICS

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ISSUANCES

#	DESCRIPTION	DATE
0	CONSTRUCTION DOCUMENTS	23-AUG-2024
A03	ADDENDUM 3	23-SEP-2024

PROJ. #: 230458

M-701.2

Addendum #3

VARIABLE AIR VOLUME (VAV) AIR TERMINAL UNIT (ATU) – W / REHEAT COIL

A. GENERAL REQUIREMENTS FOR ALL ATUS :

1. ALL SETPOINTS, DEADBANDS, AND TIME DELAYS DESCRIBED IN SEQUENCES SHALL BE ADJUSTABLE BY SYSTEM OPERATORS (CREATE REQUIRED VIRTUAL POINTS).
2. MINIMUM AND MAXIMUM DESIGN AIRFLOWS SHALL BE AS INDICATED ON THE VAV SCHEDULES (ADJUSTABLE BY BAS OPERATOR ONLY). ATU DAMPERS SHALL FAIL IN CURRENT POSITION UPON LOSS OF POWER.
3. THE ATU CONTROLLER SHALL PERIODICALLY CALIBRATE ITS AIRFLOW SENSOR. ACTUAL AIRFLOWS SHALL BE MEASURED IN REAL TIME FOR BAS DISPLAY. PROVIDE TOTAL ACTIVE ATU AIRFLOWS FOR EACH AHU.
4. SPACE TEMPERATURE SHALL BE MEASURED IN REAL TIME FOR BAS DISPLAY. SPACE TEMPERATURE SETPOINTS SHALL BE AS FOLLOWS (UNLESS NOTED OTHERWISE). ALL SETPOINTS SHALL BE ADJUSTABLE (BY BAS OPERATOR ONLY).
   - OCCUPIED HEATING: 70° F
   - OCCUPIED COOLING: 75° F
   - UNOCCUPIED HEATING 65° F
   - UNOCCUPIED COOLING: 78° F
5. A 5°F DEADBAND BETWEEN ACTIVE HEATING AND COOLING SPACE TEMPERATURE SETPOINTS SHALL BE MAINTAINED TO PREVENT SHORT CYCLING SITUATIONS.
6. SPACE TEMPERATURE SENSOR (OR THERMOSTAT) SHALL INCLUDE A TEMPORARY UNCCUPIED-TO-OCCUPIED OVERRIDE BUTTON. DURATION OF TEMPORARY OVERRIDE SHALL BE LIMITED TO ONE-HOUR (ADJUSTABLE BY BAS OPERATOR ONLY).
7. SPACE TEMPERATURE SENSOR (OR THERMOSTAT) SHALL ALLOW FOR TEMPERATURE SETPOINT ADJUSTMENT OVERRIDE. SETPOINT OVERRIDE SHALL BE LIMITED TO +/- 2° F. BAS GRAPHICS SHALL DISPLAY ACTIVE SETPOINT ADJUSTMENT.

B. UNOCCUPIED MODE:

1. WHEN THE BAS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING, ZONE, AND SPACE IS TO BE UNOCCUPIED, THE UNOCCUPIED HEATING/COOLING SETPOINTS SHALL BE ACTIVE. ATU CONTROLLER SHALL MODULATE DAMPER CLOSED AND CLOSE REHEAT COIL VALVE.
2. IF SPACE TEMPERATURE RISES ABOVE UNOCCUPIED COOLING SETPOINT, ATU CONTROLLER SHALL SIGNAL A CALL FOR AIRFLOW FROM ASSOCIATED AHU AND MODULATE DAMPER UP TO MAXIMUM AIRFLOW TO COOL THE SPACE. ONCE SPACE TEMPERATURE DROPS SUFFICIENTLY BELOW UNOCCUPIED COOLING SETPOINT, ATU SHALL CANCEL THE CALL FOR AIRFLOW AND CLOSE DAMPER.
3. IF SPACE TEMPERATURE DROPS BELOW UNOCCUPIED HEATING SETPOINT, ATU CONTROLLER SHALL SIGNAL A CALL FOR AIRFLOW FROM ASSOCIATED AHU, OPEN REHEAT COIL VALVE AND MODULATE DAMPER TO THE MINIMUM AIRFLOW TO HEAT THE SPACE. ONCE THE SPACE TEMPERATURE RISES SUFFICIENTLY ABOVE UNOCCUPIED HEATING SETPOINT, ATU SHALL CANCEL THE CALL FOR AIRFLOW, CLOSE REHEAT COIL VALVE AND CLOSE DAMPER.
4. IF THE TEMPORARY UNOCCUPIED-TO-OCCUPIED OVERRIDE BUTTON ON THE SPACE TEMPERATURE SENSOR (OR THERMOSTAT) IS PRESSED, ATU CONTROLLER SHALL SIGNAL A CALL FOR AIRFLOW FROM ASSOCIATED AHU AND OPERATE IN OCCUPIED MODE FOR A LIMITED DURATION AS DEFINED ABOVE.
   - ATU CONTROLLER SHALL ONLY SIGNAL A CALL FOR AIRFLOW FROM ASSOCIATED AHU WHEN SPACE TEMPERATURE IS ABOVE THE OCCUPIED COOLING SETPOINT AND THE DAMPER IS FULL OPEN.

C. OCCUPIED MODE:

1. WHEN THE BAS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING, ZONE, AND SPACE IS TO BE OCCUPIED, THE OCCUPIED HEATING/COOLING SETPOINTS SHALL BE ACTIVE. ATU CONTROLLER SHALL MODULATE THE DAMPER TO MINIMUM AIRFLOW.
   - MORNING WARM-UP/COOL-DOWN: IF THE SPACE TEMPERATURE IS BEYOND THE OCCUPIED HEATING/COOLING SETPOINTS 60 MINUTES (ADJUSTABLE) PRIOR TO SCHEDULED OCCUPANCY, ATU CONTROLLER SHALL MODULATE REHEAT VALVE OR DAMPER TO ACHIEVE OCCUPIED SETPOINTS. UTILIZE OPTIMUM START ALGORYTHM TO MINIMUMIZE WARM-UP/COOL-DOWN DURATION.
2. IF SPACE TEMPERATURE RISES ABOVE OCCUPIED COOLING SETPOINT, DAMPER SHALL MODULATE UP TO MAXIMUM AIRFLOW TO MAINTAIN SETPOINT. ONCE SPACE TEMPERATURE DROPS BELOW THE OCCUPIED COOLING SETPOINT, DAMPER SHALL MODULATE TO MINIMUM AIRFLOW.
3. IF SPACE TEMPERATURE DROPS BELOW OCCUPIED HEATING SETPOINT, MODULATE REHEAT VALVE TO MAINTAIN SETPOINT. ONCE OCCUPIED HEATING SETPOINT IS ACHIEVED, REHEAT VALVE SHALL MODULATE TO MAINTAIN ROOM NEUTRAL DISCHARGE AIR TEMPERATURE OF 70°F, AND CLOSE WHEN SPACE TEMEPRATURE IS 1°F ABOVE OCCUPIED HEATING SETPOINT.
   - REHEAT MODE LIMITS: WHENEVER THE ASSOCIATED AHU IS OPERATING IN COOLING MODE, THE ATU DISCHARGE AIR TEMPERATURE SHALL BE LIMITED TO A MAXIMUM OF 95°F.

D. DEMAND CONTROL VENTILATION MODE (SPACES WITH CARBON DIOXIDE SENSOR) :

1. DURING OCCUPIED MODE ONLY, ATU CONTROLLER SHALL MONITOR THE SPACE CO_2 SENSOR AND HAVE THE ABILITY TO OVERRIDE DAMPER CONTROL BASED ON SPACE CO_2 CONCENTRATION, AND CORRESPONDING LOW/HIGH CO_2 SETPOINTS, IN CONJUNCTION WITH NORMAL TEMPERATURE CONTROL.
2. WHEN THE SPACE CO_2 CONCENTRATION EXCEEDS 900 PPM (ADJUSTABLE), ATU SHALL INCREASE AIRFLOW TO REDUCE THE CO_2 CONCENTRATION WHILE MAINTAINING SPACE TEMPERATURE BETWEEN OCCUPIED HEATING AND COOLING SETPOINTS. ONCE CO_2 CONCENTRATION DROPS BELOW 800 PPM (ADJUSTABLE), ATU CONTROLLER SHALL RETURN TO NORMAL OPERATION.
   - IF ATU IS IN DEMAND CONTROL VENTILATION MODE FOR MORE THAN 4 HOURS (ADJUSTABLE), ATU WILL RETURN TO NORMAL OPERATION AND A BAS ALARM SHALL BE GENERATED.
   - A BAS GRAPHICAL ICON SHALL BE SHOWN WHEN AN ATU IS IN DEMAND CONTROL VENTILATION MODE.
3. IF SPACE CO_2 CONCENTRATION CONTINUES TO RISE ABOVE 1,000 PPM (ADJUSTABLE), ATU CONTROLLER SHALL INITIATE A CRITICAL ZONE CO_2 NOTIFICATION TO THE BAS AND ASSOCIATED AHU, AND THE AHU SHALL INCREASE THE OUTSIDE AIR INTAKE VOLUME. ONCE THE CO_2 CONCENTRATION DROPS BELOW 800 PPM (ADJUSTABLE), ATU CONTROLLER WILL CANCEL THE CRITICAL ZONE CO_2 NOTIFICATION AND RETURN TO NORMAL OPERATION.
   - IF THE CRITICAL ZONE CO_2 NOTIFICATION IS NOT CANCELLED BY THE ATU CONTROLLER WITHIN A DURATION OF 4 HOURS (ADJUSTABLE), THE ATU WILL RETURN TO NORMAL OPERATION AND A BAS ALARM SHALL BE GENERATED.
   - A BAS GRAPHICAL ICON SHALL BE SHOWN WHEN AN ATU IS IN A CRITICAL ZONE CO_2 CONTROL MODE.

[END OF SEQUENCE]

FAN-POWERED VARIABLE AIR VOLUME (FVAV) AIR TERMINAL UNIT (ATU) – W / REHEAT COIL

A. GENERAL REQUIREMENTS FOR ALL ATUS :

1. ALL SETPOINTS, DEADBANDS, AND TIME DELAYS DESCRIBED IN SEQUENCES SHALL BE ADJUSTABLE BY SYSTEM OPERATORS (CREATE REQUIRED VIRTUAL POINTS).
2. MINIMUM AND MAXIMUM PRIMARY AIRFLOWS SHALL BE AS INDICATED ON THE FVAV SCHEDULES (ADJUSTABLE BY BAS OPERATOR ONLY). ATU DAMPERS SHALL FAIL IN CURRENT POSITION UPON LOSS OF POWER.
3. THE ATU CONTROLLER SHALL PERIODICALLY CALIBRATE ITS PRIMARY AIRFLOW SENSOR. ACTUAL AIRFLOWS SHALL BE MEASURED IN REAL TIME FOR BAS DISPLAY. PROVIDE TOTAL ACTIVE ATU AIRFLOWS FOR EACH AHU.
4. SPACE TEMPERATURE SHALL BE MEASURED IN REAL TIME FOR BAS DISPLAY. SPACE TEMPERATURE SETPOINTS SHALL BE AS FOLLOWS (UNLESS NOTED OTHERWISE). ALL SETPOINTS SHALL BE ADJUSTABLE (BY BAS OPERATOR ONLY).
   - OCCUPIED HEATING: 70° F
   - OCCUPIED COOLING: 75° F
   - STANDBY HEATING: 69° F
   - STANDBY COOLING: 76° F
   - UNOCCUPIED HEATING 65° F
   - UNOCCUPIED COOLING: 78° F
5. A 5°F DEADBAND BETWEEN ACTIVE HEATING AND COOLING SPACE TEMPERATURE SETPOINTS SHALL BE MAINTAINED TO PREVENT SHORT CYCLING SITUATIONS.
6. SPACE TEMPERATURE SENSOR (OR THERMOSTAT) SHALL INCLUDE A TEMPORARY UNCCUPIED-TO-OCCUPIED OVERRIDE BUTTON. DURATION OF TEMPORARY OVERRIDE SHALL BE LIMITED TO ONE-HOUR (ADJUSTABLE BY BAS OPERATOR ONLY).
7. SPACE TEMPERATURE SENSOR (OR THERMOSTAT) SHALL ALLOW FOR TEMPERATURE SETPOINT ADJUSTMENT OVERRIDE. SETPOINT OVERRIDE SHALL BE LIMITED TO +/- 2° F. BAS GRAPHICS SHALL DISPLAY ACTIVE SETPOINT ADJUSTMENT.

B. UNOCCUPIED MODE:

1. WHEN THE BAS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING, ZONE, AND SPACE IS TO BE UNOCCUPIED, THE UNOCCUPIED HEATING/COOLING SETPOINTS SHALL BE ACTIVE. ATU CONTROLLER SHALL STOP THE FAN, MODULATE DAMPER CLOSED AND CLOSE THE REHEAT COIL VALVE.
2. IF SPACE TEMPERATURE RISES ABOVE UNOCCUPIED COOLING SETPOINT, ATU CONTROLLER SHALL SIGNAL A CALL FOR AIRFLOW FROM ASSOCIATED AHU, START FAN AND MODULATE DAMPER UP TO MAXIMUM PRIMARY AIRFLOW TO COOL THE SPACE. ONCE SPACE TEMPERATURE DROPS SUFFICIENTLY BELOW UNOCCUPIED COOLING SETPOINT, ATU SHALL CANCEL THE CALL FOR AIRFLOW, STOP FAN, AND CLOSE DAMPER.
3. IF SPACE TEMPERATURE DROPS BELOW UNOCCUPIED HEATING SETPOINT, ATU CONTROLLER SHALL START FAN AND OPEN REHEAT COIL VALVE TO HEAT THE SPACE. ONCE THE SPACE TEMPERATURE RISES SUFFICIENTLY ABOVE UNOCCUPIED HEATING SETPOINT, ATU SHALL CLOSE REHEAT COIL VALVE AND STOP FAN.
4. IF THE TEMPORARY UNOCCUPIED-TO-OCCUPIED OVERRIDE BUTTON ON THE SPACE TEMPERATURE SENSOR (OR THERMOSTAT) IS PRESSED, ATU SHALL OPERATE IN OCCUPIED MODE FOR A LIMITED DURATION AS DEFINED ABOVE.
   - ATU CONTROLLER SHALL ONLY SIGNAL A CALL FOR AIRFLOW FROM ASSOCIATED AHU WHEN SPACE TEMPERATURE IS ABOVE THE OCCUPIED COOLING SETPOINT AND THE DAMPER IS FULL OPEN.

C. OCCUPIED MODE:

1. WHEN THE BAS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING, ZONE, AND SPACE IS TO BE OCCUPIED, THE OCCUPIED HEATING/COOLING SETPOINTS SHALL BE ACTIVE. ATU CONTROLLER SHALL START FAN AND MODULATE DAMPER TO MINIMUM PRIMARY AIRFLOW.
   - MORNING WARM-UP/COOL-DOWN: IF THE SPACE TEMPERATURE IS BEYOND THE OCCUPIED HEATING/COOLING SETPOINTS 60 MINUTES (ADJUSTABLE) PRIOR TO SCHEDULED OCCUPANCY, ATU CONTROLLER SHALL START FAN AND MODULATE REHEAT VALVE OR DAMPER TO ACHIEVE OCCUPIED SETPOINTS. UTILIZE OPTIMUM START ALGORYTHM TO MINIMUMIZE WARM-UP/COOL-DOWN DURATION.
2. IF SPACE TEMPERATURE RISES ABOVE OCCUPIED COOLING SETPOINT, DAMPER SHALL MODULATE UP TO MAXIMUM PRIMARY AIRFLOW TO MAINTAIN SETPOINT. ONCE SPACE TEMPERATURE DROPS BELOW THE OCCUPIED COOLING SETPOINT, DAMPER SHALL MODULATE TO MINIMUM PRIMARY AIRFLOW.
3. IF SPACE TEMPERATURE DROPS BELOW OCCUPIED HEATING SETPOINT, MODULATE REHEAT VALVE TO MAINTAIN SETPOINT. ONCE OCCUPIED HEATING SETPOINT IS ACHIEVED, REHEAT VALVE SHALL MODULATE TO MAINTAIN ROOM NEUTRAL DISCHARGE AIR TEMPERATURE OF 70°F, AND CLOSE WHEN SPACE TEMPERATURE IS 1°F ABOVE OCCUPIED HEATING SETPOINT.

D. STANDBY MODE (SPACES WITH OCCUPANCY SENSOR) :

1. WHEN THE BAS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING, ZONE, AND SPACE IS TO BE OCCUPIED, HOWEVER THE OCCUPANCY SENSOR INDICATES (AFTER A TIME DELAY) THAT THERE ARE NO PEOPLE PRESENT IN THE SPACE, THE STANDBY HEATING/COOLING SETPOINTS SHALL BE ACTIVE.
2. TEMPERATURE CONTROL SEQUENCES SHALL BE THE SAME FOR BOTH OCCUPIED AND STANDBY MODES. ATU CONTROLLER SHALL STOP THE FAN WHENEVER THE SPACE TEMPERATURE IS BETWEEN THE STANDBY HEATING AND COOLING SETPOINTS.
3. WHEN THE OCCUPANCY SENSOR DETECTS THAT A PERSON HAS ENTERED THE SPACE, ATU SHALL RETURN TO NORMAL OCCUPIED MODE.

E. DEMAND CONTROL VENTILATION MODE (SPACES WITH CARBON DIOXIDE SENSOR) :

1. DURING OCCUPIED MODE ONLY, ATU CONTROLLER SHALL MONITOR SPACE CO_2 SENSOR AND HAVE THE ABILITY TO OVERRIDE DAMPER CONTROL BASED ON SPACE CO_2 CONCENTRATION, AND CORRESPONDING LOW/HIGH CO_2 SETPOINTS, IN CONJUNCTION WITH NORMAL TEMPERATURE CONTROL.
2. WHEN SPACE CO_2 CONCENTRATION EXCEEDS 900 PPM (ADJUSTABLE), ATU SHALL INCREASE PRIMARY AIRFLOW TO REDUCE THE CO_2 CONCENTRATION WHILE MAINTAINING SPACE TEMPERATURE BETWEEN OCCUPIED HEATING AND COOLING SETPOINTS. ONCE CO_2 CONCENTRATION DROPS BELOW 800 PPM (ADJUSTABLE), ATU CONTROLLER SHALL RETURN TO NORMAL OPERATION.
   - IF ATU IS IN DEMAND CONTROL VENTILATION MODE FOR MORE THAN 4 HOURS (ADJUSTABLE), ATU WILL RETURN TO NORMAL OPERATION AND A BAS ALARM SHALL BE GENERATED.
   - A BAS GRAPHICAL ICON SHALL BE SHOWN WHEN AN ATU IS IN DEMAND CONTROL VENTILATION MODE.
3. IF SPACE CO_2 CONCENTRATION CONTINUES TO RISE ABOVE 1,000 PPM (ADJUSTABLE), ATU CONTROLLER SHALL INITIATE A CRITICAL ZONE CO_2 NOTIFICATION TO THE BAS AND ASSOCIATED AHU, AND THE AHU SHALL INCREASE THE OUTSIDE AIR INTAKE VOLUME. ONCE THE CO_2 CONCENTRATION DROPS BELOW 800 PPM (ADJUSTABLE), ATU CONTROLLER WILL CANCEL THE CRITICAL ZONE CO_2 NOTIFICATION AND RETURN TO NORMAL OPERATION.
   - IF THE CRITICAL ZONE CO_2 NOTIFICATION IS NOT CANCELLED BY THE ATU CONTROLLER WITHIN A DURATION OF 4 HOURS (ADJUSTABLE), THE ATU WILL RETURN TO NORMAL OPERATION AND A BAS ALARM SHALL BE GENERATED.
   - A BAS GRAPHICAL ICON SHALL BE SHOWN WHEN AN ATU IS IN A CRITICAL ZONE CO_2 MODE.

[END OF SEQUENCE]

MULTI-ZONE VARIABLE AIR VOLUME (MZVAV) AIR HANDLING UNIT – W/ HHW & CHW COILS

A03

A. GENERAL REQUIREMENTS:

1. ALL SETPOINTS, DEADBANDS, AND TIME DELAYS DESCRIBED IN SEQUENCES SHALL BE ADJUSTABLE BY SYSTEM OPERATORS (CREATE REQUIRED VIRTUAL POINTS).
2. EXHAUST FAN (EF-1) SHALL BE INTERLOCKED WITH AIR HANDLING UNIT (AHU-3) SO THAT EF-1 IS OPERATING WHENEVER AHU-3 IS IN OCCUPIED MODE.
3. EXHAUST FANS (EF-3 AND EF-4) SHALL BE INTERLOCKED WITH AIR HANDLING UNITS (AHU-4 AND AHU-5) SO THAT BOTH EXHAUST FANS ARE OPERATING WHEN EITHER AHU-4 OR AHU-5 ARE IN OCCUPIED MODE.

B. UNOCCUPIED MODE:

1. WHEN THE BAS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING AND ZONE IS TO BE UNOCCUPIED, THE AHU CONTROLLER SHALL STOP THE SUPPLY AND RELIEF FANS, CLOSE THE HEATING AND COOLING COIL VALVES, AND CLOSE THE OUTSIDE AIR AND RELIEF AIR DAMPERS.
2. IF 3 (ADJUSTABLE) OR MORE ASSOCIATED AIR TERMINAL UNITS (ATU) SIGNAL A CALL FOR COOLING AIRFLOW, AND THE CHILLED WATER SYSTEM IS OPERATING, THE AHU SHALL MODULATE THE SUPPLY FAN TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT AND THE COOLING COIL VALVE TO MAINTAIN A 55°F DISCHARGE AIR TEMPERATURE. ONCE ALL SIGNALS FOR COOLING AIRFLOW ARE CANCELED BY THE ATUS, THE COOLING COIL VALVE SHALL MODULATE CLOSED AND SUPPLY FAN SHALL CYCLE OFF.
3. IF 3 (ADJUSTABLE) OR MORE SPACE TEMPERATURES ASSOCIATED WITH THE AHU DROP BELOW THEIR UNOCCUPIED HEATING SETPOINT FOR MORE THAN 30 MINUTES, AND THE HEATING WATER SYSTEM IS OPERATING, THE AHU SHALL MODULATE THE SUPPLY FAN TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT AND THE HEATING COIL VALVE TO MAINTAIN A 80°F DISCHARGE AIR TEMPERATURE. ONCE ALL SPACE TEMPERATURES ARE SUFFICIENTLY ABOVE THEIR UNOCCUPIED HEATING SETPOINT, THE HEATING COIL VALVE SHALL MODULATE CLOSED AND THE SUPPLY FAN SHALL CYCLE OFF.

C. OCCUPIED MODE:

1. WHEN THE BAS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING AND ZONE IS TO BE OCCUPIED, THE AHU CONTROLLER SHALL MODULATE THE SUPPLY FAN TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT AND OPEN THE OUTSIDE AIR DAMPER TO MINIMUM POSITION.
   - MINIMUM OUTSIDE AIR DAMPER POSITION AND DUCT STATIC PRESSURE SETPOINT ARE ESTABLISHED DURING THE FINAL SYSTEM AIR BALANCING.

D. DISCHARGE AIR TEMPERATURE (DAT) CONTROL :

1. THE COOLING COIL VALVE, HEATING COIL VALVE, AND MIXED AIR DAMPERS SHALL MODULATE TO MAINTAIN THE ACTIVE DAT SETPOINT. AHU CONTROLLER SHALL INDICATE VIA BAS GRAPHICS WHENEVER IT IS IN COOLING, HEATING, OR ECONOMIZER MODES.
2. COOLING MODE: WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 45 °F (ADJUSTABLE) THE HEATING COIL VALVE SHALL REMAIN CLOSED AND THE COOLING COIL VALVE SHALL MODULATE TO MAINTAIN THE DAT SETPOINT.
   - COOLING DAT RESET: AHU CONTROLLER SHALL RESET THE DAT SETPOINT BETWEEN 55°F - 65°F BASED ON ASSOCIATED ATU AIRFLOWS. RESET UP IN 1°F INCREMENTS IF ALL ATUS ARE OPERATING BELOW THEIR MAXIMUM AIRFLOW. RESET DOWN IF ANY TWO ATUS ARE OPERATING AT MAXIMUM AIRFLOW, OR IF AHU RETURN AIR RELATIVE HUMIDITY IS ABOVE 60%.
   - ECONOMIZER MODE (FREE COOLING): WHENEVER THE OUTSIDE AIR TEMPERATURE IS BELOW 70°F AND THE RETURN AIR ENTHALPY IS HIGHER THAN THE OUTDOOR AIR ENTHALPY, THE MIXED AIR DAMPERS SHALL MODULATE TO MAINTAIN THE ACTIVE DAT SETPOINT AS THE FIRST MODE OF COOLING. COOLING COIL VALVE SHALL ONLY MODULATE OPEN ONCE THE OUTSIDE AIR DAMPER REACHES THE FULLY OPEN POSITION.
3. HEATING MODE: WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 45°F (ADJUSTABLE), THE COOLING COIL VALVE SHALL REMAIN CLOSED AND THE HEATING COIL VALVE SHALL MODULATE TO MAINTAIN THE ACTIVE DAT SETPOINT.
   - HEATING DAT RESET: AHU CONTROLLER SHALL RESET THE DAT SETPOINT BETWEEN 55°F - 70°F BASED ON ASSOCIATED ATU REHEAT COIL VALVE POSITIONS. RESET IN 1°F INCREMENTS BASE ON DEMAND OF REHEAT COILS (MINIMUM, AVERAGE, AND MAXIMUM VALVE POSITIONS).

E. DEMAND CONTROL VENTILATION (DCV) MODE :

1. WHEN THE AHU CONTROLLER RECEIVES A CRITICAL ZONE CO_2 NOTIFICATION FROM ANY ASSOCIATED ATU, OUTSIDE AIR DAMPER SHALL MODULATE (IN 10% INCREMENTS) TO INCREASE THE OUTSIDE AIR INTAKE VOLUME. ONCE THE ASSOCIATED ATU CANCELS THE CRITICAL ZONE CO_2 NOTIFICATION, OUTSIDE AIR DAMPER SHALL MODULATE BACK TO MINIMUM POSITION.
   - THE AHU SHALL NOT FURTHER INCREASE THE OUTSIDE AIR DAMPER POSITION IF THE DISCHARGE SUPPLY AIR TEMPERATURE EXCEEDS ACTIVE SETPOINT BY 2°F (ADJUSTABLE).
   - IF THE AHU CONTINUES TO OPERATE IN DCV MODE FOR LONGER THAN 8 HOURS (ADJUSTABLE), A VENTILATION ALARM NOTIFICATION SHALL BE GENERATED.
2. BAS OPERATOR SHALL HAVE THE ABILITY TO ENABLE/DISABLE DCV MODE FOR AN AHU.
3. WHEN AHU IS IN DCV MODE, A GRAPHICAL ICON SHALL BE ACTIVATED AT THE BAS.

F. PRE- AND POST-OCCUPANCY VENTILATION FLUSH :

1. 1 HOUR PRIOR TO SCHEDULED OCCUPANCY, AHU CONTROLLER SHALL MODULATE SUPPLY FAN TO MAINTAIN DUCT STATIC PRESSURE SETPOINT AND OPERATE IN OCCUPIED MODE. IF THE RETURN AIR CO_2 CONCENTRATION IS ABOVE 600 PPM (ADJUSTABLE) AFTER 15 MINUTES, THE AHU CONTROLLER SHALL ENABLE DCV MODE. ONCE THE RETURN AIR CO_2 CONCENTRATION DROPS BELOW 600 PPM (ADJUSTABLE), OR THE SCHEDULED OCCUPANCY PERIOD BEGINS, THE AHU WILL RETURN TO NORMAL OCCUPIED MODE.
   - DURING PRE-OCCUPANCY FLUSH, THE AHU CONTROLLER AND BAS SHALL OVERRIDE ALL ASSOCIATED ATUS INTO OCCUPIED MODE.
2. FOR AN ADDITIONAL 2 HOURS AFTER SCHEDULED OCCUPANCY, THE AHU WILL CONTINUE TO OPERATE IN OCCUPIED MODE. IF THE RETURN AIR CO_2 CONCENTRATION IS ABOVE 600 PPM (ADJUSTABLE) AFTER 15 MINUTES, THE AHU CONTROLLER SHALL ENABLE DCV MODE. ONCE THE RETURN AIR CO_2 CONCENTRATION DROPS BELOW 600 PPM (ADJUSTABLE), OR THE SCHEDULED UNOCCUPANCY PERIOD BEGINS, THE AHU WILL RETURN TO NORMAL UNOCCUPIED MODE
   - DURING POST-OCCUPANCY FLUSH, THE AHU CONTROLLER AND BAS SHALL OVERRIDE ALL ASSOCIATED ATUS INTO STANDBY MODE.
3. BAS GRAPHICS SHALL VISIBLY WHEN AN AHU AND ASSOCIATED ATUS ARE OPERATING IN A PRE- OR POST-OCCUPANCY FLUSH.
4. BAS OPERATOR SHALL HAVE THE ABILITY TO ACTIVATE OR DEACTIVATE EITHER THE PRE- OR POST-OCCUPANCY FLUSH FOR EITHER AHU WITH A SIMPLE GRAPHICAL INTERFACE.

G. RELIEF AIR CONTROL:

1. ONLY WHEN THE AHU IS IN EITHER ECONOMIZER OR DEMAND CONTROL VENTILATION MODE, THE AHU CONTROLLER SHALL OPEN THE ASSOCIATED RELIEF AIR DAMPER. WHENEVER THE OUTSIDE AIR DAMPER EXCEEDS THE 40% (ADJUSTABLE) OPEN POSITION, THE AHU CONTROLLER WILL ENERGIZE THE RELIEF FAN. WHEN THE OUTSIDE AIR DAMPER MODULATES BELOW 40% OPEN, THE RELIEF FAN SHALL BE DEENERGIZED.
2. THE AHU CONTROLLER SHALL MODULATE RELEIF FAN SPEED BY A FACTOR OF OUTSIDE AIR DAMPER POSITION MULTIPLIED BY THE SPEED RATIO OF THE SUPPLY FAN (I.E. 50% DAMPER POSITION X 0.60 FAN SPEED RATIO = 30% RELIEF FAN SPEED).
   - THE SUPPLY FAN SPEED RATIO IS EQUAL TO THE ACTIVE FAN SPEED (%) DIVIDED BY THE MAXIMUM SUPPLY FAN SPEED (%) THAT IS ESTABLISHED DURING THE FINAL SYSTEM AIR BALANCING, WITH A MAX RATIO OF 1.0.

H. ALARMS & SAFETIES:

1. HEATING COIL RECIRCULATION PUMP – THE HEATING COIL PUMP SHALL RUN CONTINUOUSLY WHEREVER THE OUTDOOR AIR TEMPERATURE IS BELOW 38 °F. ALARM NOTIFICATION SHALL BE GENERATED WHEN THE PUMP IS COMMANDED ON BUT THE PUMP STATUS IS OFF.
2. FREEZE PROTECTION - IF THE AIR TEMPERATURE ON THE DOWNSTREAM SIDE OF THE HEATING COIL FALLS BELOW 45°F FOR MORE THAN 10 MINUTES, AN ALARM NOTIFICATION SHALL BE GENERATED. IF THE TEMPERATURE CONTINUES TO FALL BELOW 38°F (FREEZESTAT), THE SUPPLY FAN SHALL SHUT DOWN, THE OA DAMPER SHALL CLOSE AND THE HEATING COIL VALVE SHALL OPEN TO 100%. THE AHU FREEZESTAT WILL NEED TO BE MANUALLY RESET.
3. AUTOMATIC SHUTDOWN/RESTART - WHEN SMOKE IS DETECTED BY DUCT SMOKE DETECTORS THE SUPPLY FAN SHALL SHUT DOWN AND AN ALARM SIGNAL SHALL BE TRANSMITTED TO THE FIRE ALARM SYSTEM. WHEN THE FIRE ALARM CIRCUIT IS RESET, AHU SHALL BE ALLOWED TO RESTART.

[END OF SEQUENCE]

SINGLE-ZONE VARIABLE AIR VOLUME (SZVAV) AIR HANDLING UNIT – W/ HHW & CHW COILS

A. GENERAL REQUIREMENTS:

1. ALL SETPOINTS, DEADBANDS, AND TIME DELAYS DESCRIBED IN SEQUENCES SHALL BE ADJUSTABLE BY SYSTEM OPERATORS (CREATE REQUIRED VIRTUAL POINTS).
2. SPACE TEMPERATURE SHALL BE MEASURED IN REAL TIME FOR BAS DISPLAY. SPACE TEMPERATURE SETPOINTS SHALL BE AS FOLLOWS (UNLESS NOTED OTHERWISE). ALL SETPOINTS SHALL BE ADJUSTABLE (BY BAS OPERATOR ONLY).
   - OCCUPIED HEATING: 70° F
   - OCCUPIED COOLING: 75° F
   - UNOCCUPIED HEATING 65° F
   - UNOCCUPIED COOLING: 78° F
3. A 5°F DEADBAND BETWEEN ACTIVE HEATING AND COOLING SPACE TEMPERATURE SETPOINTS SHALL BE MAINTAINED TO PREVENT SHORT CYCLING SITUATIONS.
4. GYMNASIUM AHU: AHU-2 HAS AN ASSOCIATED RELIEF AIR DAMPER AND POWERED RELIEF HOOD THAT SHALL ENERGIZE WHENEVER THE AHU ENTERS EITHER THE DEMAND CONTROL VENTILATION MODE OR ECONOMIZER MODE. MODULATE RELIEF FAN SPEED TO MAINTAIN NEUTRAL STATIC PRESSURE FOR THE GYMNASIUM RELATIVE TO THE MAIN LOBBY (VIA SPACE DIFFERENTIAL PRESSURE SENSOR).

B. UNOCCUPIED MODE:

1. WHEN THE BAS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING, ZONE, AND SPACE IS TO BE UNOCCUPIED, THE UNOCCUPIED HEATING/COOLING SETPOINTS SHALL BE ACTIVE. THE AHU CONTROLLER SHALL STOP THE SUPPLY FAN, CLOSE THE HEATING AND COOLING COIL VALVES, CLOSE THE OUTSIDE AIR DAMPER, AND CLOSE THE RELIEF AIR DAMPER (AHU-2).
2. IF THE SPACE TEMPERATURE RISES ABOVE THE UNOCCUPIED COOLING SETPOINT, AND THE CHILLED WATER SYSTEM IS OPERATING, THE AHU CONTROLLER SHALL MODULATE THE SUPPLY FAN TO MAXIMUM DESIGN AIRFLOW AND MODULATE THE COOLING COIL VALVE TO MAINTAIN A 55° F DISCHARGE AIR TEMPERATURE. ONCE THE SPACE TEMPERATURE DROPS SUFFICIENTLY BELOW SETPOINT, THE COOLING COIL VALVE SHALL MODULATE CLOSED AND THE SUPPLY FAN SHALL CYCLE OFF.
3. IF THE SPACE TEMPERATURE DROPS BELOW THE UNOCCUPIED HEATING SETPOINT, AND THE HEATING WATER SYSTEM IS OPERATING, THE AHU CONTROLLER SHALL MODULATE THE SUPPLY FAN TO MAXIMUM DESIGN AIRFLOW AND OPEN THE HEATING COIL VALVE. ONCE THE SPACE TEMPERATURE RISES SUFFICIENTLY ABOVE SETPOINT, THE HEATING COIL VALVE SHALL MODULATE CLOSED AND THE SUPPLY FAN SHALL CYCLE OFF.
   - AHU-1: PERIMETER HEATING VALVE FOR MAIN LOBBY SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE 1° F ABOVE HEATING SETPOINT DURING UNOCCUPIED MODE.

C. OCCUPIED MODE:

1. WHEN THE BAS OCCUPANCY SCHEDULE DETERMINES THAT THE BUILDING, ZONE, AND SPACE IS TO BE OCCUPIED, THE OCCUPIED HEATING/COOLING SETPOINTS SHALL BE ACTIVE. THE AHU CONTROLLER SHALL MODULATE THE SUPPLY FAN TO 50% DESIGN AIRFLOW AND OPEN THE OUTSIDE AIR DAMPER TO THE MINIMUM POSITION.
   - MINIMUM OUTSIDE AIR DAMPER POSITION (%) AND MAXIMUM SUPPLY FAN SPEED ARE ESTABLISHED DURING THE FINAL AIR BALANCING. MAXIMUM SUPPLY FAN SPEED IS ASSOCIATED WITH THE BALANCED MAXIMUM DESIGN AIRFLOW. COORDINATE WITH TAB CONTRACTOR.
2. IF THE SPACE TEMPERATURE RISES ABOVE OCCUPIED COOLING SETPOINT, THE AHU CONTROLLER SHALL FIRST MODULATE THE COOLING COIL VALVE TO MAINTAIN COOLING SETPOINT. IF THE SPACE TEMPERATURE CONTINUES TO RISE, THE SUPPLY FAN SHALL MODULATE UP TO MAXIMUM DESIGN AIRFLOW WHILE THE COOLING COIL VALVE MODULATES TO MAINTAIN A 55°F DISCHARGE AIR TEMPERATURE. ONCE THE SPACE TEMPERATURE DROPS BELOW SETPOINT, SUPPLY FAN SHALL MODULATE BACK TO 50% DESIGN AIRFLOW AND THE COOLING COIL VALVE SHALL MODULATE TO MAINTAIN OCCUPIED COOLING SETPOINT.
3. IF THE SPACE TEMPERATURE DROPS BELOW THE OCCUPIED HEATING SETPOINT, THE AHU CONTROLLER SHALL FIRST MODULATE THE HEATING COIL VALVE TO MAINTAIN HEATING SETPOINT. ONCE THE DISCHARGE AIR TEMPERATURE REACHES A MAXIMUM OF 95°F, THE SUPPLY FAN SHALL MODULATE UP TO MAXIMUM DESIGN AIRFLOW TO MAINTAIN THE OCCUPIED HEATING SETPOINT. ONCE THE SPACE TEMPERATURE RISES ABOVE SETPOINT, THE SUPPLY FAN SHALL MODULATE TO 50% DESIGN AIRFLOW THE HEATING COIL VALVE SHALL MODULATE TO MAINTAIN SPACE HEATING SETPOINT.
   - AHU-1: PERIMETER HEATING VALVE FOR MAIN LOBBY SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE 1° F ABOVE HEATING SETPOINT DURING OCCUPIED MODE.

D. ECONOMIZER MODE (FREE COOLING) :

1. WHEN IN COOLING MODE AND THE RETURN AIR ENTHALPY IS HIGHER THAN THE OUTDOOR AIR ENTHALPY, AND THE OUTDOOR AIR TEMPERATURE IS BELOW 70°F, THE MIXED AIR DAMPERS AND SUPPLY FAN SHALL MODULATE TO MAINTAIN THE OCCUPIED COOLING SETPOINT AS THE FIRST MODE OF COOLING.
2. ONCE THE OUTSIDE AIR DAMPER REACHES THE FULLY OPEN POSITION, THE COOLING COIL VALVE SHALL MODULATE TO MAINTAIN THE OCCUPIED COOLING SETPOINT.
3. GYMNASIUM AHU-2: OPEN RELIEF AIR DAMPER AND ENABLE POWERED RELIEF FAN.
4. WHEN AHU IS IN ECONOMIZER MODE, A GRAPHICAL ICON SHALL BE ACTIVATED AT THE BAS.

E. DEMAND CONTROL VENTILATION MODE :

1. DURING OCCUPIED MODE ONLY, THE AHU CONTROLLER SHALL MONITOR THE RETURN AIR CO_2 SENSOR. WHEN THE CO_2 CONCENTRATION EXCEEDS 900 PPM (ADJUSTABLE), THE OUTSIDE AIR DAMPER SHALL MODULATE ABOVE MINIMUM POSTION (IN 10% INCREMENTS) TO INCREASE THE OUTSIDE AIR INTAKE VOLUME. ONCE THE CO_2 CONCENTRATION DROPS BELOW 700 PPM, THE OUTSIDE AIR DAMPER SHALL MODULATE TO MINIMUM POSITION.
   - THE AHU SHALL NOT FURTHER INCREASE THE OUTSIDE AIR DAMPER POSITION ONCE THE SPACE TEMPERATURE EXCEEDS ITS SETPOINT BY 2°F (ADJUSTABLE).
2. GYMNASIUM AHU-2: OPEN RELIEF AIR DAMPER AND ENABLE POWERED RELIEF FAN.
3. WHEN AHU IS IN DEMAND CONTROL VENTILATION MODE, A GRAPHICAL ICON SHALL BE ACTIVATED AT THE BAS.

F. ALARMS & SAFETIES:

1. HEAT COIL RECIRCULATION PUMP – THE HEAT COIL PUMP SHALL RUN CONTINUOUSLY WHEREVER THE OUTDOOR AIR TEMPERATURE IS BELOW 38 °F. ALARM NOTIFICATION SHALL BE GENERATED WHEN PUMP IS COMMANDED ON BUT THE PUMP STATUS IS OFF.
2. FREEZE PROTECTION - IF THE AIR TEMPERATURE ON THE DOWNSTREAM SIDE OF THE HEATING COIL FALLS BELOW 45°F FOR MORE THAN 10 MINUTES AN ALARM NOTIFICATION SHALL BE GENERATED. IF THE TEMPERATURE CONTINUES TO FALL BELOW 38°F (FREEZESTAT), THE SUPPLY FAN SHALL SHUT DOWN, THE OA DAMPER SHALL CLOSE AND THE HEATING COIL VALVE SHALL OPEN TO 100%. THE AHU FREEZESTAT WILL NEED TO BE MANUALLY RESET.
3. AUTOMATIC SHUTDOWN/RESTART - WHEN SMOKE IS DETECTED BY DUCT SMOKE DETECTORS THE SUPPLY FAN SHALL SHUT DOWN AND AN ALARM SIGNAL SHALL BE TRANSMITTED TO THE FIRE ALARM SYSTEM. WHEN THE FIRE ALARM CIRCUIT IS RESET, AHU SHALL BE ALLOWED TO RESTART.

[END OF SEQUENCE]

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MECHANICAL CONTROLS

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PHASE

CONSTRUCTION DOCUMENTS

ISSUANCES

#	DESCRIPTION	DATE
0	CONSTRUCTION DOCUMENTS	23-AUG-2024
A03	ADDENDUM 3	23-SEP-2024

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