MECHANICAL LEGEND (not all may apply)

GENERAL ABBREVIATIONS

AAD	AUTOMATIC AIR DAMPER	DET	DETAIL	HX	HEAT EXCHANGER	REQ'D	REQUIRED
AAV	AUTOMATIC AIR VENT	DIA	DIAMETER	IA	INSTRUMENT AIR	REV	REVISE(D)
AB	AIR BLENDER	DN	DOWN	IE	INVERT ELEVATION	RG	RETURN GRILLE
AC-*	AIR CONDITIONING UNIT	DPR	DAMPER	IN	INCH	RH	RELATIVE HUMIDITY/ROOF
ACC	AIR COOLED CONDENSER	DPT	DEW POINT TEMPERATURE	INV	INVERT	RV	RELIEF VENT
ACCU	AIR COOLED CONDENSING UNIT	DR	DRAIN	KEC	KITCHEN EQUIPMENT CONTRACTOR	RM	ROOM
AD	ACCESS DOOR	DTS	DUAL TEMPERATURE SUPPLY	KH	KITCHEN HOOD	RPM	REVOLUTIONS PER MINUTE
ADD'L	ADDITIONAL	DTR	DUAL TEMPERATURE RETURN	KV	KITCHEN VENT	RR	RETURN REGISTER
ADJ	ADJUSTABLE	DWG	DRAWING	LAT	LEAVING AIR TEMPERATURE	SA	SUPPLY AIR
AF	AFTER FILTER	EA	EACH / EXHAUST AIR	LB	POUND	SCHED	SCHEDULE
AFF	ABOVE FINISHED FLOOR	EAH	EXHAUST AIR HOOD	LD	LINEAR DIFFUSER	SCHWP	SECONDARY CHILLED WATER PUMP
ALT	ALTERNATE	EAL	EXHAUST AIR LOUVER	LWT	LEAVING WATER TEMPERATURE	SD	SUCTION DIFFUSER
ALUM	ALUMINUM	EAT	ENTERING AIR TEMPERATURE	MAT'L	MATERIAL	SECT	SECTION
AP	ACCESS PANEL	EC	ELECTRICAL CONTRACTOR	MAV	MANUAL AIR VENT	SG	SUPPLY GRILLE
APPROX	APPROXIMATE	EF	EXHAUST FAN	MAX	MAXIMUM	SHWP	SECONDARY HOT WATER PUMP
ARCH	ARCHITECT(URAL)	EG	EXHAUST GRILLE	MBH	BTU'S PER HOUR, THOUSAND	SHT	SHEET
AUTO	AUTOMATIC	EL	ELEVATION	MC	MECHANICAL CONTRACTOR	SL	SOUND LINING
AVG	AVERAGE	ELEC	ELECTRIC/ELECTRICAL	MCW	MECHANICAL CITY WATER	SM	SURFACE MOUNT
BAS	BUILDING AUTOMATION SYSTEM	EQ	EQUAL	MECH	MECHANICAL	SPEC	SPECIFICATIONS
BBD	BALANCED BACKDRAFT DAMPER	EQUIP	EQUIPMENT	MFG/MFGR	MANUFACTURER	SPT	STATIC PRESSURE TRANSMITTER
BE	BOTTOM ELEVATION	EQUIV	EQUIVALENT	MIN	MINIMUM	SQ	SQUARE
BF	BUTTERFLY	ER	EXHAUST REGISTER	MISC	MISCELLANEOUS	SQ FT/SF	SQUARE FOOT (FEET)
BFP	BACKFLOW PREVENTER	ESP	EXTERNAL STATIC PRESSURE	MSW	MECHANICAL SOFT WATER	SQ IN	SQUARE INCHES
BLDG	BUILDING	ET	EXPANSION TANK	NA	NOT APPLICABLE	SR	SUPPLY REGISTER
BLR	BOILER	EUH	ELECTRIC UNIT HEATER	NC	NORMALLY CLOSED/NOISE CRITERIA	SS	STAINLESS STEEL
BOD	BOTTOM OF DUCT	EWH	ELECTRIC WATER HEATER	NG	NATURAL GAS	STD	STANDARD
BOP	BOTTOM OF PIPE	EWT	ENTERING WATER TEMPERATURE	NIC	NOT IN CONTRACT	STL	STEEL
BOT	BOTTOM	EXCL	EXCLUDING	NO	NORMALLY OPEN	STRUCT	STRUCTURAL
BP	BOOSTER PUMP	EXIST	EXISTING	NOM	NOMINAL	TCC	TEMPERATURE CONTROL CONTRACTOR
BTU	BRITISH THERMAL UNIT	EXP	EXPANSION	NTS	NOT TO SCALE	TCV	TEMPERATURE CONTROL VALVE
BTUH	BTU'S PER HOUR	°F	DEGREE FAHRENHEIT	OA	OUTSIDE AIR	TE	TOP ELEVATION
BV	BALL VALVE	FD	FLAT DRAIN	OAH	OUTSIDE AIR HOOD	TI	TEMPERATURE INDICATOR
CA	COMPRESSED AIR	FF	FINISHED FLOOR	OAL	OUTSIDE AIR LOUVER	TMV	THERMOSTATIC MIXING VALVE
CAF	COMBUSTION AIR FAN	FH	FIRE HYDRANT	OC	ON CENTER	TSP	TOTAL STATIC PRESSURE
CCW	COUNTER CLOCKWISE	FL	FLOOR	OC	OCCUPANCY SENSOR	TSTAT	THERMOSTAT
CD	CEILING DIFFUSER	FOB	FLAT ON BOTTOM	OPG	OPENING	TXV	THERMAL EXPANSION VALVE
CFM	CUBIC FEET PER MINUTE	FOR	FUEL OIL RETURN	OS&Y	OUTSIDE SCREW AND YOKE	TYP	TYPICAL
CHV	CHECK VALVE	FOS	FUEL OIL SUPPLY	OZ	OUNCE	TW	TEMPERED WATER
CH	CHILLER	FOT	FLAT ON TOP	PC	PLUMBING CONTRACTOR	UG	UNDERGROUND
CHWP	CHILLED WATER PUMP	FPC	FIRE PROTECTION CONTRACTOR	PCHWP	PRIMARY CHILLED WATER PUMP	UH	UNIT HEATER
CHWR	CHILLED WATER RETURN	FPM	FEET PER MINUTE	PERIM	PERIMETER	UON	UNLESS OTHERWISE NOTED
CHWS	CHILLED WATER SUPPLY	FPVAV	FAN POWERED VAV	PF	PRE FILTER	UNO	UNLESS NOTED OTHERWISE
CI	CAST IRON	FS	FLOOR SINK	PH	PHASE	VAC	VACUUM
COL	COLUMN	GA	GAUGE	PHWP	PRIMARY HOT WATER PUMP	VA	VALVE
CONN	CONNECTION	GALV	GALVANIZED	PI	PRESSURE INDICATOR	VAV	VARIABLE AIR VOLUME
CT	COOLING TOWER	GC	GENERAL CONTRACTOR	PLBG	PLUMBING	VD	VOLUME DAMPER
CU	CONDENSING UNIT	GPH	GALLONS PER HOUR	PRESS	PRESSURE	VERT	VERTICAL
CUH	CABINET UNIT HEATER	GPM	GALLONS PER MINUTE	PRV	PRESSURE REDUCING VALVE	VFD	VARIABLE FREQUENCY DRIVE
CU FT	CUBIC FEET	HEX	HEAT EXCHANGER	PS	PRESSURE SWITCH	VOL	VOLUME
CU IN	CUBIC INCH	HORIZ	HORIZONTAL	PSD	PLENUM SLOT DIFFUSER	W/	WITH
CW	CLOCKWISE	HR	HOUR	PSI	POUND PER SQUARE INCH	W/O	WITHOUT
CWP	CONDENSING WATER PUMP	HT	HEAT TRACE	PSIA	POUND PER SQUARE INCH ABSOLUTE	WB	WET BULB TEMPERATURE
CWS	CONDENSING WATER SUPPLY	HVAC	HEATING, VENTILATING AND AIR CONDITIONING	PSIG	POUND PER SQUARE INCH GAUGE	WG	WATER GAUGE
CWR	CONDENSING WATER RETURN	HWP	HOT WATER PUMP	PVC	POLYVINYL CHLORIDE	WP	WEATHER PROOF
DB	DRY BULB TEMPERATURE	HWR	HOT WATER RETURN	RCP	RECIRCULATION PUMP	XP	EXPLOSION PROOF
DDC	DIRECT DIGITAL CONTROL	HWS	HOT WATER SUPPLY	REF	REFERENCE		

MECHANICAL SYMBOLS

BALANCING VALVE
A=AUTOMATIC
M=MANUAL CALIBRATED
CIRCUIT SENSOR (VENTURI)
GATE VALUE
BUTTERFLY VALVE
GLOBE VALVE
BALL VALVE
CHECK VALVE
GAS COCK
TEMPERATURE REGULATING VALVE
PRESSUR RELIEF VALVE
RELEIF VALVE
STRAINER
3-WAY VALVE
VALVE AND END CAP
UNION
FLANGED CONNECTION
REDUCER
ELBOW UP
PIPE TEE DOWN
ELBOW DOWN
EQUIP. # T — THERMOSTAT OR TEMPERATURE SENSOR
EQUIP. # H — HUMIDITY TRANSMITTER
EQUIP. # S CO — CARBON MONOXIDE SENSOR
EQUIP. # S CO2 — CARBON DIOXIDE SENSOR

P — PRESSURE TEMPERATURE TEST STATION (PTTS)
THERMOMETER
M — MANUAL AIR VENT (A=AUTOMATIC)
WATER FLOW TRANSMITTER
SUPPLY DIFFUSER
RETURN DIFFUSER
EXHAUST DIFFUSER
PLENUM SLOT DIFFUSER
DUCT TAP LEFT
DUCT TAP RIGHT
AIR FLOW DIRECTION
OPPOSED BLADE DAMPER
PARALLEL BLADE DAMPER
F — FIRE DAMPER (HORIZONTAL OR VERTICAL)
S — SMOKE DAMPER (HORIZONTAL OR VERTICAL)
C — COMBINATION SMOKE FIRE DAMPER
BBD — BALANCED BACKDRAFT DAMPER
AAD — AUTOMATIC AIR DAMPER
MANUAL DAMPER
TT — TEMPERATURE TRANSMITTER
FM — INSERTION TYPE FLOW METER
FM — STRAP-ON TYPE FLOW METER

FLEXIBLE CONNECTION
FLEXIBLE CONNECTION
POINT OF CONNECTION / EXTENT OF REMOVAL
S — DUCT SMOKE DETECTOR
STATIC PRESSURE TRANSMITTER
SQUARE ELBOW WITH TURNING VAINS
S-12X8 — SUPPLY AIR (RECTANGULAR DUCT) R=RETURN, E=EXHAUST, OA=OUTSIDE AIR
S-12 — SUPPLY AIR (ROUND DUCT) R=RETURN, E=EXHAUST, OA=OUTSIDE AIR
S-12X8ø — SUPPLY AIR (OVAL DUCT) R=RETURN, E=EXHAUST, OA=OUTSIDE AIR
CHWS — CHILLED WATER SUPPLY
CHWR — CHILLED WATER RETURN
CWS — CONDENSING WATER SUPPLY
CWR — CONDENSING WATER RETURN
HWS — HOT WATER SUPPLY
HWR — HOT WATER RETURN
DTS — DUAL TEMPERATURE SUPPLY
DTR — DUAL TEMPERATURE RETURN
DR — DRAIN
RHG — REFRIGERANT HOT GAS
RL — REFRIGERANT LIQUID
RS — REFRIGERANT SUCTION
NEW DUCT OR PIPING
EXISTING DUCT OR PIPING
EXISTING DUCT OR PIPING TO BE REMOVED

24X24" CEILING DIFFUSER
S10LX
150FD
S=SUPPLY, R=RETURN, E=EXHAUST, OA=OUTSIDE AIR
NECK SIZE - 6" 8", 10", 12", 14", 15"
L=LAY-IN ACOUSTICAL CEILING, D=DRYWALL CEILING, X=12X12 DIFFUSER
FD=INTEGRAL FIRE DAMPER
CFM

GRILLE
RG5000
24X24E
S=SUPPLY, R=RETURN, E=EXHAUST, OA=OUTSIDE AIR
G=GRILLE
CFM
E=EGGCRATE
HEIGHT
WIDTH

UP — DUCT RISE IN DIRECTION OF AIR FLOW
DN — DUCT DROP IN DIRECTION OF AIR FLOW
RECTANGULAR DUCT TO ROUND DUCT TRANSITION
DUCT TURN DOWN
DUCT TURN UP
INTERNALLY LINED DUCTWORK (DIMENSIONS INDICATED ARE INSIDE CLEAR DIMENSIONS)
MANUFACTURED DOUBLE WALL DUCTWORK (DIMENSIONS INDICATED ARE INSIDE SHEET METAL DIMENSIONS)

CONTROL SYMBOL LEGEND

AI	ANALOG INPUT SIGNAL	TT	TEMPERATURE TRANSMITTER
AO	ANALOG OUTPUT SIGNAL	T	ROOM TEMPERATURE SENSOR
DI	DIGITAL INPUT SIGNAL	H	RELATIVE HUMIDITY SENSOR
DO	DIGITAL OUTPUT SIGNAL	S	CARBON DIOXIDE SENSOR
ES	END SWITCH	DPS	DIFFERENTIAL PRESSURE SWITCH
DPT	DIFFERENTIAL PRESSURE TRANSMITTER	HT	HUMIDITY TRANSMITTER
SPT	STATIC PRESSURE TRANSMITTER	SD	DUCT MOUNTED SMOKE DETECTOR
LTS	LOW TEMPERATURE SWITCH	CTS	CURRENT TRANSFORMER SWITCH
AFT	AIR FLOW TRANSMITTER		
ES	END SWITCH		
NO	NORMALLY OPEN		

GENERAL NOTES (DEMOLITION):

A. UNLESS OTHERWISE NOTED, ALL DUCTWORK AND PIPING SHOWN DASHED AND DARK IS TO BE REMOVED.

B. CONTRACTOR TO COORDINATE DEMOLITION WITH OTHER TRADES BEFORE BEGINNING WORK.

C. REFER TO THIS SHEET FOR GENERAL NOTES AND ABBREVIATIONS.

D. CONTRACTOR SHALL TAKE OVERALL CFM MEASUREMENTS ON ALL EXISTING TO REMAIN EQUIPMENT PRIOR TO COMMENCING ANY DEMOLITION WORK. INFORMATION GATHERED SHALL BE UTILIZED FOR RE-BALANCING SYSTEM. CONTRACTOR SHALL RE-BALANCE ALL SYSTEMS AT THE CONCLUSION OF THE PROJECT.

E. THIS CONTRACTOR SHALL PATCH AND REPAIR ALL HOLES, DAMAGE OR MODIFICATIONS LEFT BY REMOVAL OF DUCTWORK AND REPAIR WALLS, FLOORS, CEILINGS, ETC. TO MATCH EXISTING. ALL PATCHING AND FINISHING SHALL BE PERFORMED BY A QUALIFIED TRADESPERSONS. ALL DEMOLITION WORK AND INSTALLATION SHALL BE COORDINATED WITH OWNER PRIOR TO STARTING.

F. ALL REMOVED EQUIPMENT IN WORKING ORDER SHALL BE REVIEWED BY THE OWNER'S REPRESENTATIVE. IF OWNER'S REPRESENTATIVE WISHES TO RETAIN THE EQUIPMENT, CONTRACTOR REMOVING EQUIPMENT SHALL DELIVER EQUIPMENT TO LOCATION AS DIRECTED BY THE OWNER'S REPRESENTATIVE. IF THE OWNER'S REPRESENTATIVE WISHES THE EQUIPMENT TO BE DISPOSED OF, THE CONTRACTOR REMOVING THE EQUIPMENT SHALL DISPOSE OF EQUIPMENT WITH NO ADDITIONAL COST TO THE OWNER.

GENERAL NOTES (NEW):

A. UNLESS OTHERWISE NOTED, ALL DUCTWORK AND PIPING SHOWN DARK IS NEW.

B. ALL WORK SHALL BE INSTALLED PER THE 2017 IMC AND ALL LOCAL APPLICABLE CODES.

C. VERIFY CONDITIONS IN THE FIELD PRIOR TO BID AND CONSTRUCTION.

D. WHERE CONFLICTS EXIST AMONG DRAWINGS, SPECIFICATIONS AND EQUIPMENT SCHEDULES, THE MORE STRINGENT SHALL APPLY.

E. REFER TO DRAWINGS **M5.00 - M5.40** FOR MECHANICAL DETAILS, DIAGRAMS AND SCHEDULES.

F. CONTRACTOR SHALL CAREFULLY COORDINATE DUCTWORK AND PIPING PATHWAY / LOCATIONS WITH OTHER TRADES AND EXISTING CONDITIONS. ALL DUCTWORK AND PIPING SHALL BE INSTALLED AS TIGHT TO THE STRUCTURE AS POSSIBLE. CONNECTIONS TO THE SUPPLY AIR DEVICES MAY BE MADE WITH FLEXIBLE DUCTWORK. REFER TO THE DETAIL ON DRAWING **M5.10** FOR FLEXIBLE DUCT CONNECTIONS. ALL CONDITIONS SHALL BE FIELD VERIFIED BEFORE ORDERING EQUIPMENT OR FABRICATED MATERIAL.

G. CONTRACTOR SHALL PROVIDE ALL ROOF OR WALL NON-COMBUSTIBLE FRAMING AS REQUIRED TO INSTALL EQUIPMENT, DUCTWORK, AND PIPING. COORDINATE NEW WORK WITH OTHER TRADES PRIOR TO BEGINNING CONSTRUCTION. NO WORK IS TO BE INSTALLED OR FABRICATED UNTIL AFTER THE PROJECT COORDINATION HAS BEEN APPROVED BY THE OWNER'S REPRESENTATIVE.

H. INSTALL A MANUAL BALANCE DAMPER IN ALL BRANCH DUCTS, INCLUDING ALL SUPPLY, RETURN, AND EXHAUST GRILLES.

I. ALL SQUARE THROATED ELBOWS SHALL HAVE AIRFOIL TURNING VANES AND SHALL ONLY BE USED WHEN RADIUS ELBOWS WILL NOT FIT.

J. ALL ROUND BRANCH DUCT CONNECTIONS SHALL BE MADE WITH BELLMOUTH FITTINGS OR ANGLED TEES. STRAIGHT SPIN-IN TAP COLLARS SHALL NOT BE ACCEPTABLE.

K. ALL DAMPERS, VALVES, AND CONTROL COMPONENTS THAT ARE LOCATED ABOVE CEILINGS SHALL BE INSTALLED WHERE COMPLETELY ACCESSIBLE. CONTRACTOR SHALL PROVIDE ACCESS PANELS AS REQUIRED.

L. ALL NEW VARIABLE AIR VOLUME TERMINAL UNITS ARE TO BE INSTALLED WHERE COMPONENTS ARE COMPLETELY ACCESSIBLE. CONTRACTOR SHALL COORDINATE TO PROVIDE THE VAV UNIT WITH A CONTROL ENCLOSURE AND PIPE CONNECTIONS ON THE MOST ACCESSIBLE SIDE OF THE UNIT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE CORRECT LEFT OR RIGHT HAND CONFIGURATION. REFER TO THE APPLICABLE DETAIL ON DRAWING **M200** FOR ADDITIONAL REQUIREMENTS.

M. DUCTWORK CONNECTION TO DIFFUSER / VAV TO BE THE SAME SIZE AS THE NECK SIZE UNLESS OTHERWISE NOTED.

N. UNLESS OTHERWISE NOTED, ALL DUCTWORK SHALL BE FABRICATED FROM GALVANIZED STEEL METAL, INSTALLED IN ACCORDANCE WITH SMACNA DUCT CONSTRUCTION STANDARDS FOR GAUGE, REINFORCEMENT, AND SUPPORT; 2" W.G. PRESSURE CLASS FOR ALL DUCTWORK, UNLESS NOTED OTHERWISE. ALL JOINTS AND SEAMS SHALL BE SEALED AND FASTENED AND MADE AIRTIGHT IN ACCORDANCE OF CHAPTER 13 OF THE OBC.

O. CONTRACTOR SHALL TAKE OVERALL CFM MEASUREMENTS ON ALL EXISTING DUCTWORK TO REMAIN PRIOR TO COMMENCING ANY WORK. INFORMATION GATHERED SHALL BE UTILIZED FOR REBALANCING SYSTEM. CONTRACTOR SHALL REBALANCE ALL SYSTEMS AT THE CONCLUSION OF THE PROJECT.

P. UL LISTED FIRESTOPPING SHALL BE USED AT ANY PENETRATION THROUGH A FIRE RATED ASSEMBLY. REFER TO ARCHITECTURAL CONSTRUCTION DOCUMENTS FOR LOCATIONS OR RATED ASSEMBLIES. CONTRACTOR SHALL USE UL LISTED FIRESTOP SYSTEM METHODS FOR "THROUGH-PENETRATION ASSEMBLIES." TYPICAL OF ALL FIRE RATED WALLS.

Q. DUCTWORK AND PIPING SHALL BE SUPPORTED INDEPENDENT OF CEILING, CONDUIT, OTHER DUCTWORK, OTHER PIPING,ETC.

R. IN AREAS WHERE CEILINGS ARE NOT BEING REPLACED, AND CONTRACTOR HAS WORK ABOVE CEILINGS, CONTRACTOR SHALL PATCH AND REPAIR CEILINGS TO MATCH EXISTING.

S. CONTRACTOR SHALL COORDINATE ALL REQUIRED WALL PENETRATIONS FOR DUCT OR PIPING WITH GENERAL CONTRACTOR PRIOR TO CONSTRUCTION OF NEW WALLS. ALL DUCT PENETRATIONS SHALL BE IN COMPLIANCE WITH THE PROJECT SPECIFICATIONS. CONTRACTOR SHALL PERFORM ALL CUTTING AND PATCHING REQUIRED FOR DUCT PENETRATIONS THROUGH WALLS.

T. CONTRACTOR SHALL COORDINATE ALL REQUIRED ROOF OPENINGS FOR DUCTWORK WITH THE GENERAL CONTRACTOR.

U. CONTRACTOR SHALL PROVIDE ALL ADDITIONAL STEEL FRAMING AS REQUIRED TO INSTALL ROOF MOUNTED EQUIPMENT CURBS.

V. CONTRACTOR SHALL INSTALL ALL EQUIPMENT, DUCTWORK, PIPING, VALVES, INSULATION, SUPPORTS ETC. AS INDICATED OR AS REQUIRED TO ALLOW OPERATION AND USE OF ALL AREAS AND ALL SYSTEMS REQUIRED FOR OCCUPIED USE DURING CONSTRUCTION.

W. CONTRACTOR TO VERIFY EXISTING DUCTWORK / PIPING SUPPLY AND RETURN SYSTEM, SIZE, AND TYPE PRIOR TO MAKING CONNECTIONS.

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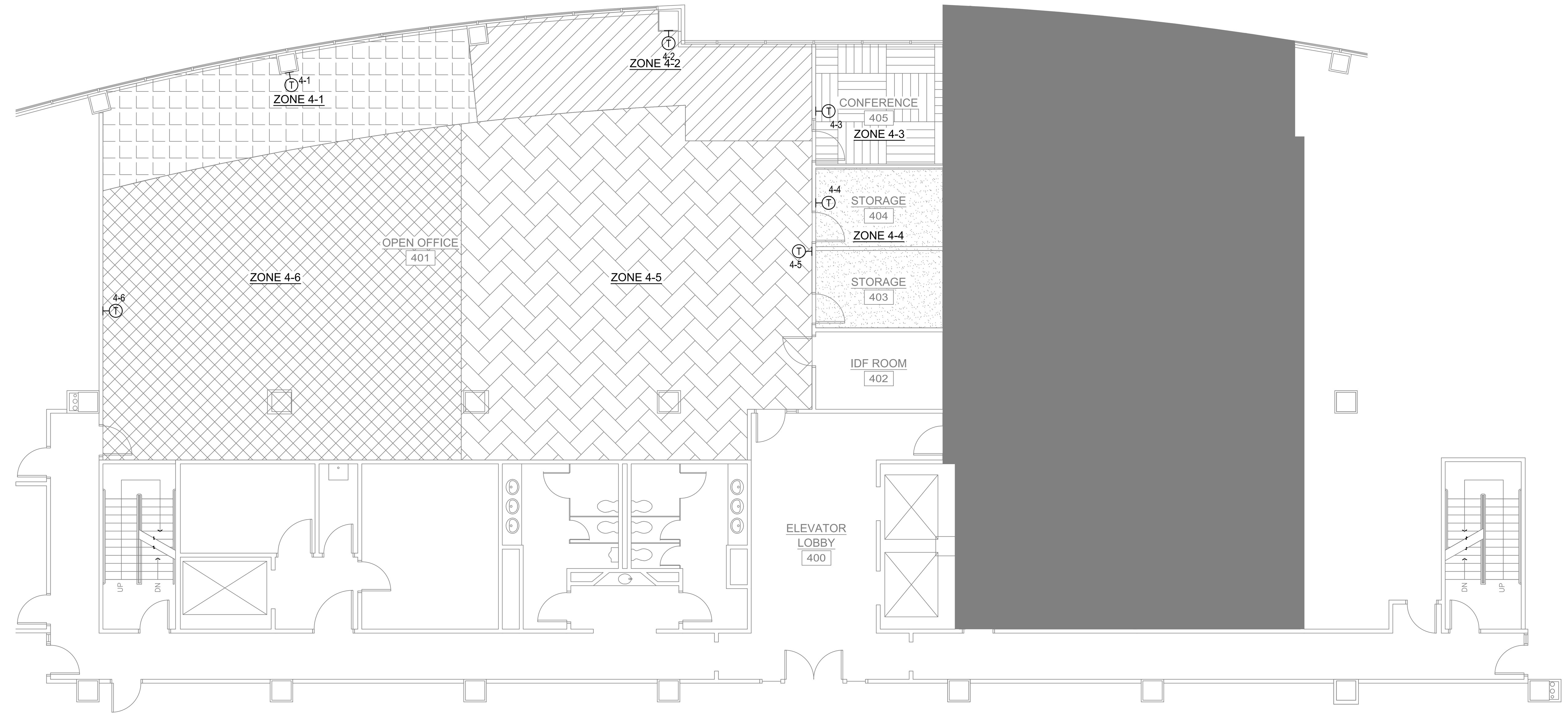
PROPOSED OFFICES FOR:
INTERNAL REVENUE SERVICE
7300 TURFWAY ROAD THIRD & FOURTH FLOORS FLORENCE, KY. 41042

KEVIN SULLIVAN ARCHITECTURE LLC
2646 PANCOAST AVE. CINCINNATI, OHIO 45211
(513) 721-2191 kevin@ksullivanarchitecture.com

SCALE:	COMM. NO.
AS SHOWN	22064
DATE:	DRAWN BY:
11/18/2022	JDH

MECHANICAL GENERAL INFORMATION

SHEET
M0.00



FOURTH FLOOR MECHANICAL ZONING PLAN
SCALE: 1/8"=1'-0"

2
MZ.00

THIRD FLOOR MECHANICAL ZONING PLAN
SCALE: 1/8"=1'-0"

1
MZ.00

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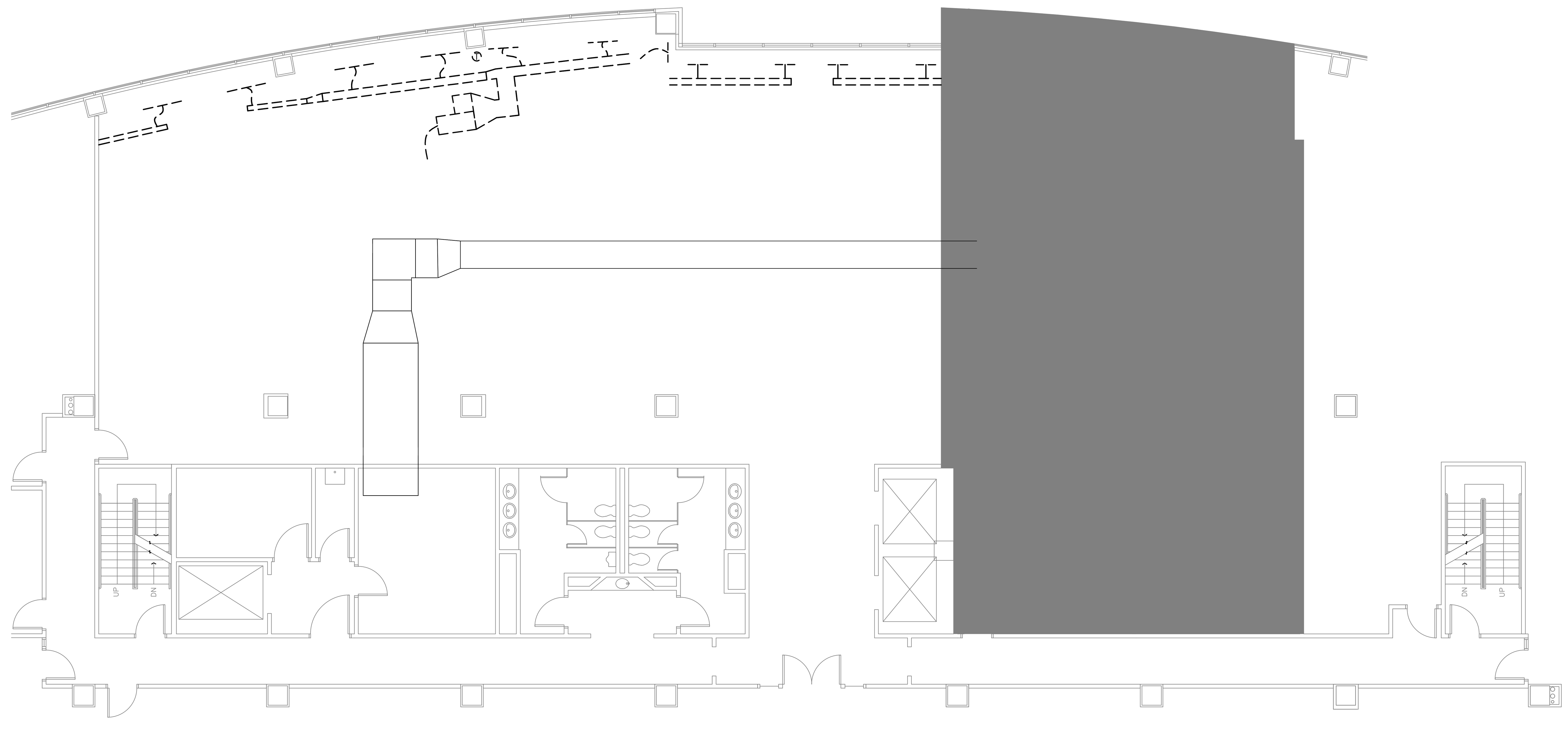
3RD & 4TH FLOOR MECHANICAL ZONING PLAN

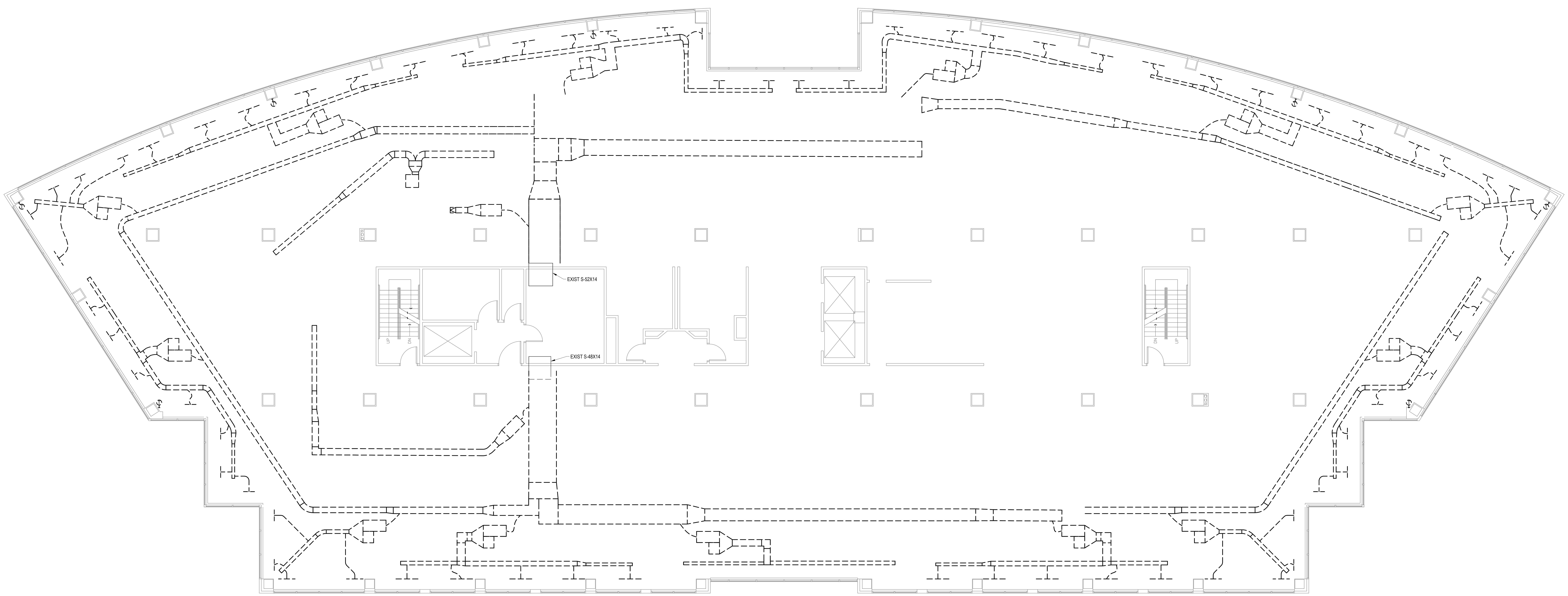
SHEET
MZ.00



FOURTH FLOOR MECHANICAL DEMOLITION PLAN

SCALE: 1/8"=1'-0"

2 M1.30



THIRD FLOOR MECHANICAL DEMOLITION PLAN

SCALE: 1/8"=1'-0"

1 M1.30

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MOTZ ENGINEERING
447 MORGAN STREET
CINCINNATI, OH 45206
T: 513.621.5400
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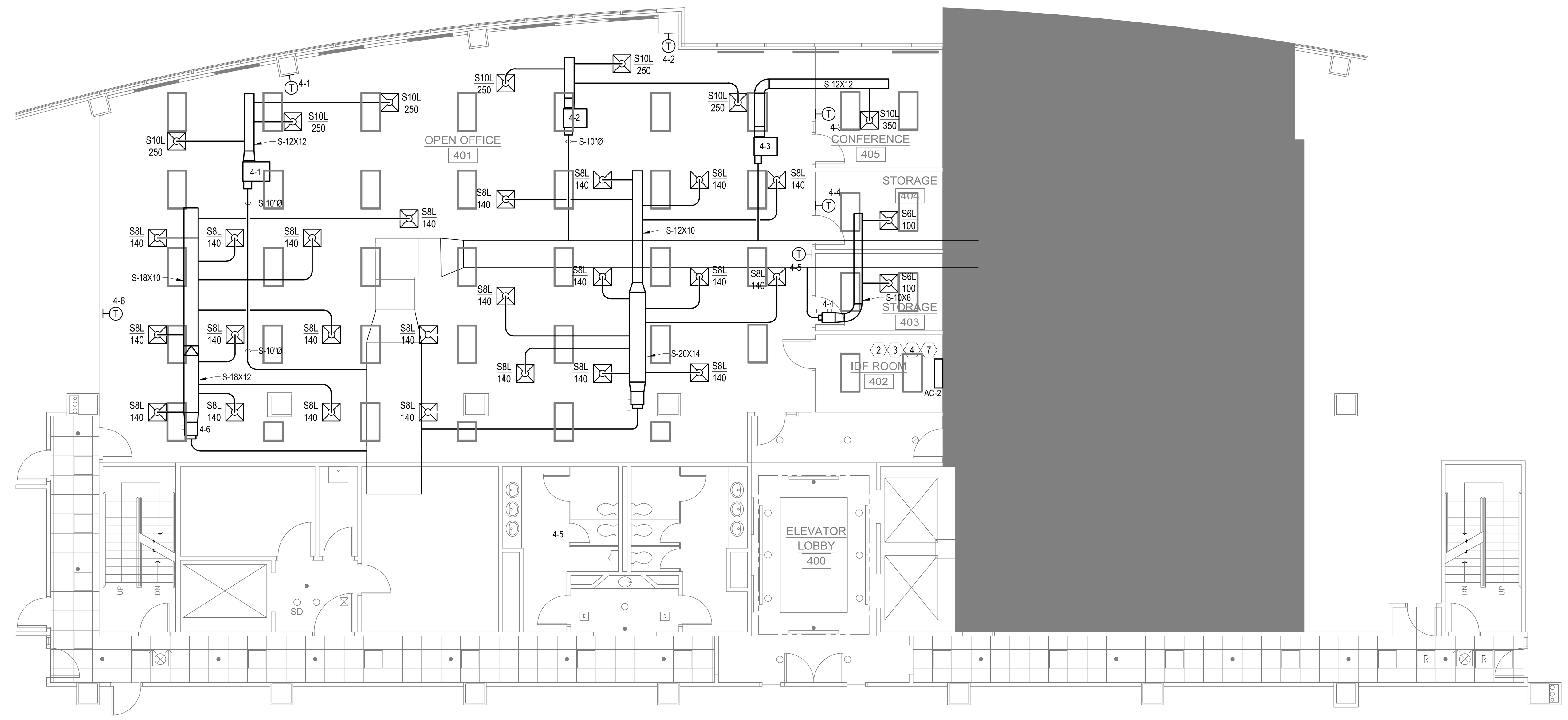
3RD & 4TH FLOOR MECHANICAL DEMOLITION PLAN

SHEET

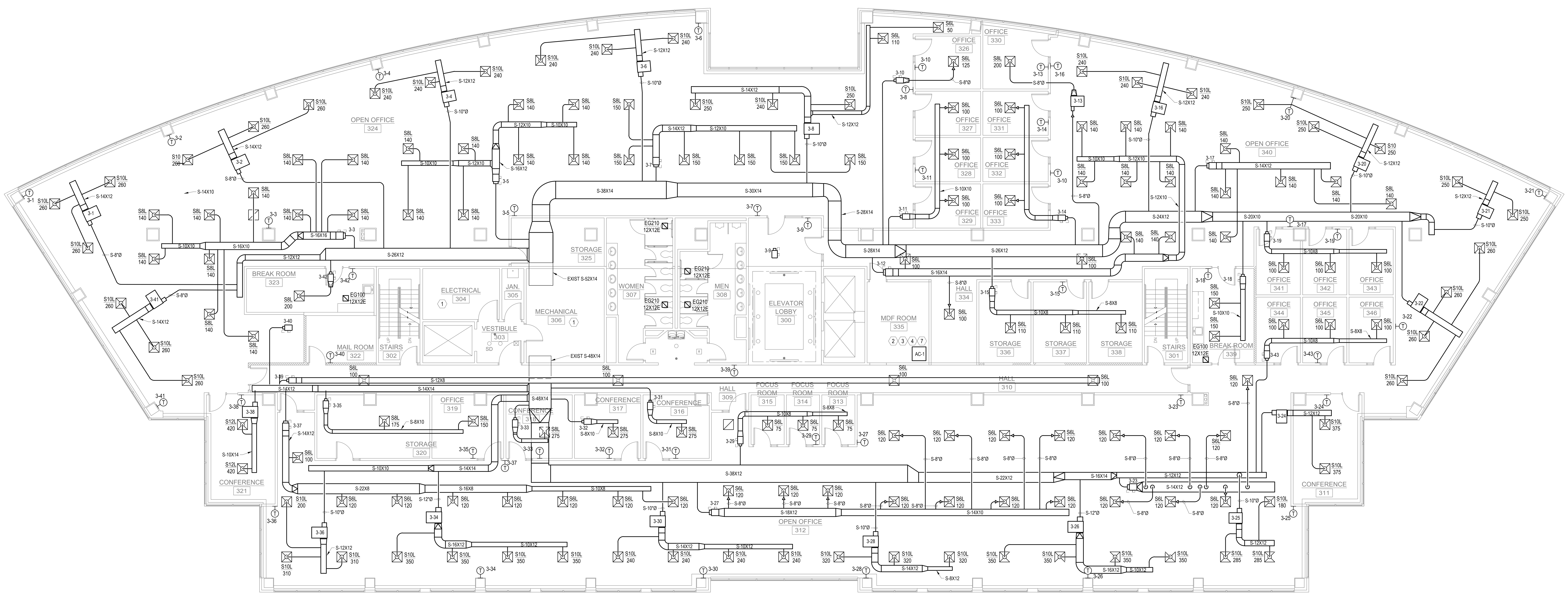
M1.30



FOURTH FLOOR MECHANICAL PLAN

SCALE: 1/8"=1'-0"

2 M2.30



THIRD FLOOR MECHANICAL PLAN

SCALE: 1/8"=1'-0"

1 M2.30

DRAWING NOTES:

1. VENTILATION TO REMAIN UNCHANGED.
2. SIZE AND INSTALL REFRIGERANT LINES IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS FOR LONG LINE APPLICATIONS.
3. ROUTE REFRIGERANT LINES TO MECHANICAL ROOM AND UP TO NEW HEAT CONDENSING UNIT ON ROOF. FIELD COORDINATE EXACT ROUTE WITH EXISTING CONDITIONS. EXACT LOCATION OF CONDENSING UNIT ON ROOF TO BE COORDINATED WITH BUILDING OWNER. SEAL AND MAKE WATER TIGHT ALL REFRIGERANT LINE PENETRATIONS THROUGH ROOF. SEE DETAIL SHEET M5.10 FOR DETAILS.
4. ROUTE $\frac{3}{4}$" COPPER CONDENSATE TO NEAREST RECEPTOR. PROVIDE CONDENSATE PUMP AS REQUIRED.
5. PROVIDE NEW PNEUMATIC THERMOSTAT AND INSTALL IN LOCATION SHOWN ON PLAN.
6. NEW PNEUMATIC THERMOSTAT.
7. FOR CONDENSING UNIT LOCATIONS ON ROOF CONTRACTOR TO OBTAIN THE SERVICES OF A STRUCTURAL ENGINEER (TRUMAN P. YOUNG AND ASSOCIATES 513-861-5655, THP LIMITED INC. 513-241-3222, OR STEPHEN SCHAEFER AND ASSOCIATES 513-542-3300), TO PROVIDE EVALUATION OF THE EXISTING STRUCTURE AND APPROVED RIGGING PLAN. STRUCTURAL DRAWINGS WILL BE AVAILABLE BY THE OWNER.

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3RD & 4TH FLOOR MECHANICAL PLAN

SHEET

M2.30

OUTDOOR AIR VENTILATION SCHEDULE: THIRD FLOOR

ROOM NAME	ROOM NUMBER	GROSS FL AREA (SQ. FT)	NET AREA MULTI.	NET FL AREA (SQ. FT)	BREATING ZONE (FEET)	OCCUPANCY CATEGORY	MAX. NO. OF OCCUPANTS (PER 1000 SF)	OUTSIDE AIR PER OCC. CFM	OUTSIDE AIR PER FL AREA CFM/SQ.FT.	DESIGN NUMBER OF PEOPLE	SHORT TERM OCCUPANT DIVERSITY	ACTUAL NUMBER OF PEOPLE	AIR SYSTEM EFFECTIVENESS	INITIAL ZONE OUTSIDE AIR CFM	SYSTEM OCCUPANT DIVERSITY	UNCORRECTED OUTSIDE AIR CFM	DESIGN SUPPLY AIR CFM	MIN. DESIGN SUPPLY AIR CFM	OUTSIDE AIR PRIMARY AIR RATIO, (Z p)	ACTUAL OA CFM	ACTUAL OUTDOOR AIR %	EXHAUST REQUIREMENTS: NO. OF FIXTURES	EXHAUST REQUIREMENTS: CFM PER FIXTURE	EXHAUST REQUIREMENTS: CFM PER SQ. FT.	EXHAUST REQUIREMENTS: REQUIRED CFM	ACTUAL EXHAUST: CONTINUOUS CFM	ACTUAL EXHAUST: INTERMITTENT CFM
HALL	309/310	889	1	889	6.0	CORRIDORS	0	0	0.06	0	100%	0	80%	67	100%	53	350	350	0.19	38	20.0%			0	0		
ELEVATOR LOBBY	300	350	1	350	6.0	CORRIDORS	0	0	0.06	0	100%	0	80%	26	100%	21	200	150	0.18	22	20.0%			0	0		
CONFERENCE	311	242	1	242	6.0	CONFERENCE/MEETING	50	5	0.06	13	100%	13	80%	99	100%	80	500	500	0.20	54	20.0%			0	0		
OPEN OFFICE	312	5,529	1	5,529	6.0	OFFICE SPACE	5	5	0.06	28	100%	28	80%	590	100%	472	9290	3000	0.20	1008	20.0%			0	0		
FOCUS ROOM	313	54	1	54	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	10	100%	8	75	55	0.19	8	20.0%			0	0		
FOCUS ROOM	314	54	1	54	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	10	100%	8	75	55	0.19	8	20.0%			0	0		
FOCUS ROOM	315	54	1	54	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	10	100%	8	75	55	0.19	8	20.0%			0	0		
CONFERENCE	316	133	1	133	6.0	CONFERENCE/MEETING	50	5	0.06	7	100%	7	80%	54	100%	43	275	275	0.20	30	20.0%			0	0		
CONFERENCE	317	134	1	134	6.0	CONFERENCE/MEETING	50	5	0.06	7	100%	7	80%	54	100%	43	275	275	0.20	30	20.0%			0	0		
CONFERENCE	318	138	1	138	6.0	CONFERENCE/MEETING	50	5	0.06	7	100%	7	80%	54	100%	43	275	275	0.20	30	20.0%			0	0		
OFFICE	319	140	1	140	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	17	100%	13	150	90	0.19	16	20.0%			0	0		
STORAGE	320	230	1	230	6.0	STORAGE ROOMS	0	0	0.12	0	100%	0	80%	35	100%	28	175	175	0.20	19	20.0%			0	0		
CONFERENCE	321	242	1	242	6.0	CONFERENCE/MEETING	50	5	0.06	13	100%	13	80%	99	100%	80	500	500	0.20	54	20.0%			0	0		
MAIL ROOM	322	106	1	106	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	14	100%	11	125	75	0.19	14	20.0%			0	0		
BREAK ROOM	323	196	1	196	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	21	100%	17	200	110	0.19	22	20.0%			0	0		
OPEN OFFICE	324	5992	1	5,992	6.0	OFFICE SPACE	5	5	0.06	30	100%	30	80%	637	100%	510	7700	3200	0.20	835	20.0%			0	0		
STORAGE	325	154	1	154	6.0	STORAGE ROOMS	0	0	0.12	0	100%	0	80%	23	100%	18	115	115	0.20	12	20.0%			0	0		
OFFICE	326	113	1	113	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	15	100%	12	125	75	0.20	14	20.0%			0	0		
OFFICE	327	94	1	94	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	13	100%	11	100	75	0.18	11	20.0%			0	0		
OFFICE	328	93	1	93	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	13	100%	11	100	75	0.18	11	20.0%			0	0		
OFFICE	329	93	1	93	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	13	100%	11	100	75	0.18	11	20.0%			0	0		
OFFICE	330	135	1	135	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	16	100%	13	200	100	0.16	22	20.0%			0	0		
OFFICE	331	96	1	96	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	13	100%	11	100	75	0.18	11	20.0%			0	0		
OFFICE	332	96	1	96	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	13	100%	11	100	75	0.18	11	20.0%			0	0		
OFFICE	333	96	1	96	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	13	100%	11	100	75	0.18	11	20.0%			0	0		
HALL	334	473	1	473	6.0	CORRIDORS	0	0	0.06	0	100%	0	80%	35	100%	28	200	200	0.18	22	20.0%			0	0		
STORAGE	336	138	1	138	6.0	STORAGE ROOMS	0	0	0.12	0	100%	0	80%	21	100%	17	110	110	0.19	12	20.0%			0	0		
STORAGE	337	141	1	141	6.0	STORAGE ROOMS	0	0	0.12	0	100%	0	80%	21	100%	17	110	110	0.19	12	20.0%			0	0		
STORAGE	338	142	1	142	6.0	STORAGE ROOMS	0	0	0.12	0	100%	0	80%	21	100%	17	110	110	0.19	12	20.0%			0	0		
BREAK ROOM	339	198	1	198	6.0	STORAGE ROOMS	0	0	0.12	0	100%	0	80%	30	100%	24	300	175	0.17	33	20.0%			0	0		
OPEN OFFICE	340	3,470	1	3,470	6.0	OFFICE SPACE	5	5	0.06	18	100%	18	80%	373	100%	298	5170	1900	0.20	561	20.0%			0	0		
OFFICE	341	93	1	93	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	13	100%	11	100	75	0.18	11	20.0%			0	0		
OFFICE	342	94	1	94	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	13	100%	11	100	75	0.18	11	20.0%			0	0		
OFFCE	343	95	1	95	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	13	100%	11	100	75	0.18	11	20.0%			0	0		
OFFICE	344	95	1	95	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	13	100%	11	100	75	0.18	11	20.0%			0	0		
OFFICE	345	95	1	95	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	13	100%	11	100	75	0.18	11	20.0%			0	0		
OFFICE	346	95	1	95	6.0	OFFICE SPACE	5	5	0.06	1	100%	1	80%	13	100%	11	100	75	0.18	11	20.0%			0	0		
																			WORST CASE								
TOTALS:		20,582		20,582						143		143		2513		2010	27880	12935	20.1%	3024						0	0

NOTE: 1. The design number of people shown for each room is the estimated maximum for each room per ASHRAE 62.1 in accordance to IMC Section 403.2. The actual number of people is based on either the estimated actual occupancy or the short term occupancy.
2. The ventilation air calculations for this schedule are based on ASHRAE Standard 62 in accordance to IMC Section 403.2.

Sum of Room Peak Occupancies = 143
Peak System Occupancy = 143
Occupant Diversity Factor, (D) = 100%

Sum of Room Supply Air Quantities = 27880 CFM
Supply Fan Diversity Factor = 55%
Actual Total System Supply Air Flow = 15120 CFM

Uncorrected Outdoor Air Flow V ou = 2,010 CFM
Ventilation Efficiency E v = 0.95 (Per ASHRAE 62.1-2007, Table 6-3)
Required OA Flow V ot = 2118 CFM
Actual Final Outdoor Air Flow 3024 CFM

OUTDOOR AIR VENTILATION SCHEDULE: FOURTH FLOOR

ROOM NAME	ROOM NUMBER	GROSS FL AREA (SQ. FT)	NET AREA MULTI.	NET FL AREA (SQ. FT)	BREATING ZONE (FEET)	OCCUPANCY CATEGORY	MAX. NO. OF OCCUPANTS (PER 1000 SF)	OUTSIDE AIR PER OCC. CFM	OUTSIDE AIR PER FL AREA CFM/SQ.FT.	DESIGN NUMBER OF PEOPLE	SHORT TERM OCCUPANT DIVERSITY	ACTUAL NUMBER OF PEOPLE	AIR SYSTEM EFFECTIVENESS	INITIAL ZONE OUTSIDE AIR CFM	SYSTEM OCCUPANT DIVERSITY	UNCORRECTED OUTSIDE AIR CFM	DESIGN SUPPLY AIR CFM	MIN. DESIGN SUPPLY AIR CFM	OUTSIDE AIR PRIMARY AIR RATIO, (Z p)	ACTUAL OA CFM	ACTUAL OUTDOOR AIR %	EXHAUST REQUIREMENTS: NO. OF FIXTURES	EXHAUST REQUIREMENTS: CFM PER FIXTURE	EXHAUST REQUIREMENTS: CFM PER SQ. FT.	EXHAUST REQUIREMENTS: REQUIRED CFM	ACTUAL EXHAUST: CONTINUOUS CFM	ACTUAL EXHAUST: INTERMITTENT CFM
OPEN OFFICE	401	3112	1	3,112	6.0	OFFICE SPACE	5	5	0.06	16	100%	16	80%	333	100%	267	2900	1800	0.19	580	20.0%			0	0		
STORAGE	403	106	1	106	6.0	STORAGE ROOMS	0	0	0.12	0	100%	0	80%	16	100%	13	100	80	0.20	20	20.0%			0	0		
STORAGE	404	106	1	106	6.0	STORAGE ROOMS	0	0	0.12	0	100%	0	80%	16	100%	13	100	80	0.20	20	20.0%			0	0		
CONFERENCE	405	162	1	162	6.0	CONFERENCE/MEETING	50	5	0.06	9	100%	9	80%	68	100%	55	350	350	0.20	70	20.0%			0	0		
																			WORST CASE								
TOTALS:		3,486		3,486						25		25		434		347	3450	2310	19.9%	690						0	0

NOTE: 1. The design number of people shown for each room is the estimated maximum for each room per ASHRAE 62.1 in accordance to IMC Section 403.2. The actual number of people is based on either the estimated actual occupancy or the short term occupancy.
2. The ventilation air calculations for this schedule are based on ASHRAE Standard 62 in accordance to IMC Section 403.2.

Sum of Room Peak Occupancies = 25
Peak System Occupancy = 25
Occupant Diversity Factor, (D) = 100%

Sum of Room Supply Air Quantities = 3450 CFM
Supply Fan Diversity Factor = 100%
Actual Total System Supply Air Flow = 3450 CFM

Uncorrected Outdoor Air Flow V ou = 347 CFM
Ventilation Efficiency E v = 0.95 (Per ASHRAE 62.1-2007, Table 6-3)
Required OA Flow V ot = 365 CFM
Actual Final Outdoor Air Flow 690 CFM

FAN POWERED VAV BOX SCHEDULE

DESIGNATION	AREA SERVED	INLET SIZE	MIN. INLET STATIC PRESSURE (IN. WG.)	MAX. PRIMARY CFM	MIN. PRIMARY CFM	HEATING CFM	EC CAPACITY (kW)	FAN INFORMATION: AIR FLOW (CFM)	FAN INFORMATION: ESP IN. WG.	ELECTRICAL DATA FAN: VOLTS	ELECTRICAL DATA FAN: HP	ELECTRICAL DATA FAN: FLA	ELECTRICAL DATA HEATER: VOLTS / PH / HZ	BASIS OF DESIGN: MANUFACTURER	BASIS OF DESIGN: MODEL NO.	ACCESSORIES
3-1	OPEN OFFICE 324	8	0.07	780	300	470	5.0	470	.5	277-ECM	1/2	4.0	480/3/60	PRICE	FDV5-3008	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-2	OPEN OFFICE 324	8	0.07	780	300	470	4.0	470	.5	277-ECM	1/2	4.0	480/3/60	PRICE	FDV5-3009	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-4	OPEN OFFICE 324	10	0.07	720	300	430	4.0	432	.5	277-ECM	1/3	2.1	480/3/60	PRICE	FDV5-2010	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-6	OPEN OFFICE 324	10	0.07	720	300	430	4.0	340	.5	277-ECM	1/3	2.1	480/3/60	PRICE	FDV5-2011	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-8	OPEN OFFICE 324	10	0.07	1150	300	540	5.0	540	.5	277-ECM	1/2	4.0	480/3/60	PRICE	FDV5-3010	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-13	OFFICE 330	6	0.07	200	100	125	2.0	125	.5	277-ECM	1/3	2.1	480/3/60	PRICE	FDV5-2006	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-16	OPEN OFFICE 340	10	0.07	720	275	365	4.0	365	.5	277-ECM	1/3	2.1	480/3/60	PRICE	FDV5-2010	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-20	OPEN OFFICE 340	10	0.07	750	350	445	4.0	445	.5	277-ECM	1/3	2.1	480/3/60	PRICE	FDV5-2011	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-21	OPEN OFFICE 340	10	0.07	500	175	300	4.0	300	.5	277-ECM	1/3	2.1	480/3/60	PRICE	FDV5-2010	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-22	OPEN OFFICE 340	10	0.07	1040	400	650	6.0	650	.5	277-ECM	1/2	4.0	480/3/60	PRICE	FDV5-3010	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-24	CONFERENCE 311	10	0.07	750	390	450	5.0	450	.5	277-ECM	1/3	2.1	480/3/60	PRICE	FDV5-2010	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-25	OPEN OFFICE 312	10	0.07	750	225	450	5.0	450	.5	277-ECM	1/3	2.1	480/3/60	PRICE	FDV5-2010	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-26	OPEN OFFICE 312	12	0.07	1400	325	850	8.0	850	.5	277-ECM	1/2	4.0	480/3/60	PRICE	FDV5-3012	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-28	OPEN OFFICE 312	10	0.07	960	225	570	6.0	570	.5	277-ECM	1/2	4.0	480/3/60	PRICE	FDV5-3010	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-30	OPEN OFFICE 312	10	0.07	960	325	570	6.0	570	.5	277-ECM	1/2	4.0	480/3/60	PRICE	FDV5-3010	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-34	OPEN OFFICE 312	12	0.07	1400	325	850	8.0	850	.5	277-ECM	1/2	4.0	480/3/60	PRICE	FDV5-3012	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-36	OPEN OFFICE 312	10	0.07	820	225	490	6.0	490	.5	277-ECM	1/2	4.0	480/3/60	PRICE	FDV5-3010	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-38	CONFERENCE 321	10	0.07	840	500	500	6.0	500	.5	277-ECM	1/2	4.0	480/3/60	PRICE	FDV5-3010	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
3-41	OPEN OFFICE 324	6	0.07	780	300	470	5.0	470	.5	277-ECM	1/3	2.1	480/3/60	PRICE	FDV5-2006	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
4-1	OPEN OFFICE 401	10	0.07	750	400	530	5.0	530	.5	277-ECM	1/2	4.0	480/3/60	PRICE	FDV5-3010	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
4-2	OPEN OFFICE401	10	0.07	750	400	530	5.0	530	.5	277-ECM	1/2	4.0	480/3/60	PRICE	FDV5-3010	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION
4-3	CONFERENCE 405	8	0.07	350	180	210	3.0	210	.5	277-ECM	1/3	2.1	480/3/60	PRICE	FDV5-2008	ECM MOTOR, INLET FILTER, DUAL POINT ELECTRIC CONNECTION

AIR CONDITIONING UNIT SCHEDULE

DESIGNATION	AREA SERVED	CONFIGURATION	WEIGHT (LBS)	SUPPLY AIRFLOW (CFM)	FAN MOTOR SPEED	COOLING CAPACITY: ENTERING AIR DB/WB	COOLING CAPACITY: TOTAL BTU/HR	COOLING CAPACITY: SENSIBLE BTU/HR	ELECTRICAL DATA: VOLTS/PH/HZ	ELECTRICAL DATA: FLA	ELECTRICAL DATA: MCA	ELECTRICAL DATA: MOCP	BASIS OF DESIGN: MANUFACTURER	BASIS OF DESIGN: MODEL NO.	REMARKS
AC-1	MDF ROOM	FLOOR MOUNTED	TBD	TBD	HIGH	80 / 67	TBD	TBD	480/3/60	TBD	TBD	--	LIEBERT	TBD	1

1. UNIT TO BE EQUIPPED WITH ELECTRIC REHEAT, INFRARED HUMIDIFIER, LOW AMBIENT CONTROL (-20 F) HIGH EFFICIENCY BLOWER MOTOR, ADVANCED MICROPROCESSOR CONTROL, LOCKING DISCONNECT SWITCH, SMOKE SENSOR, DUAL FLOAT CONDENSATE PUMP.

AIR COOLED CONDENSING UNIT SCHEDULE

SYMBOL	SERVES	CAPACITY (TONS)	WEIGHT (LBS)	REFRIGERANT	SST (°F)	EAT (°F)	ELECTRICAL DATA: QUANTITY FANS/COMPR	ELECTRICAL DATA: MCA	ELECTRICAL DATA: MOCP	ELECTRICAL DATA: V/PH/HZ	BASIS OF DESIGN: MANUFACTURER	BASIS OF DESIGN: MODEL	REMARKS
ACCU-1	MDF ROOM	6.5	TBD	R410a	TBD	TBD	TBD	TBD	TBD	460/3/60	LIEBERT	TBD	

REMARKS:
1

DUCTLESS SPLIT SYSTEM SCHEDULE

NO.	QUANTITY	SUPPLY FAN DATA (EACH INDOOR UNIT): NO. OF FANS	SUPPLY FAN DATA (EACH INDOOR UNIT): TOTAL CAPACITY, CFM	SUPPLY FAN DATA (EACH INDOOR UNIT): MOTOR FLA	REFRIGERATION COMPRESSOR DATA (EACH INDOOR UNIT): QUANTITY	REFRIGERATION COMPRESSOR DATA (EACH INDOOR UNIT): REFRIGERANT	REFRIGERATION COMPRESSOR DATA (EACH INDOOR UNIT): TYPE	DX COOLING COIL DATA: TOTAL BTUH	ACCU DATA: TOTAL BTUH	ELECTRIC CHARACTERISTICS: OUTDOOR UNIT	MITSUBISHI MODEL NO.: OUTDOOR UNIT	MITSUBISHI MODEL NO.: INDOOR UNIT	NOTES
AC-2	1	1	425	0.33	1	R410A	INVERTER	12,000	12,000	208/3/60	PUY-A12NKA7	PKA-A12HA7	PROVIDE FRONT REAR AND SIDE BAFFLES FOR COOLING TO -20

VARIABLE AIR VOLUME TERMINAL UNIT SCHEDULE

DESIGNATION	AREA SERVED ROOM NUMBER(S)	AREA SERVED ROOM NAME(S)	INLET SIZE (IN)	CAPACITY: MAX CFM	CAPACITY: MIN CFM	CAPACITY: HEATING CFM	ELECTRIC REHEAT COIL: EAT	ELECTRIC REHEAT COIL: LAT	ELECTRIC REHEAT COIL: CAPACITY (KW)	ELECTRIC REHEAT COIL: POWER	MAX. AIR PRESSURE DROP	DUCT SIZE: WIDTH	DUCT SIZE: DEPTH	BASIS OF DESIGN: MANUFACTURER	MODEL	REMARKS
VAV-3-3	324	OPEN OFFICE	12	1540	500		55	-	N/A	-	0.5	14	12.5	PRICE	SDV-12	
VAV-3-5	324	OPEN OFFICE	10	1120	460		55	-	N/A	-	0.5	14	12.5	PRICE	SDV-10	
VAV-3-7	324	OPEN OFFICE	10	1050	440		55	-	N/A	-	0.5	14	12.5	PRICE	SDV-10	
VAV-3-9	300	ELEVATOR LOBBY	6	200	150		55	-	N/A	-	0.5	12	8	PRICE	SDV-06	
VAV-3-10	326	OFFICE	6	125	75	100	55	90	1.0	480/3/60	0.5	12	8	PRICE	SDV-06	1, 2, 3, 4
VAV-3-11	327,328,329	OFFICE	6	300	225	250	55	90	3.0	480/3/60	0.5	12	8	PRICE	SDV-06	1, 2, 3, 4
VAV-3-12	334,340	HALL / OPEN OFFICE	12	1320	400		55	-	N/A	-	0.5	16	15	PRICE	SDV-12	
VAV-3-14	331,332,333	OFFICE	6	300	225	250	55	90	3.0	480/3/60	0.5	12	8	PRICE	SDV-06	1, 2, 3, 4
VAV-3-15	336,337,338	STORAGE	6	330	330		55	-	N/A	-	0.5	12	8	PRICE	SDV-06	
VAV-3-17	340	OPEN OFFICE	10	840	300		55	-	N/A	-	0.5	14	12.5	PRICE	SDV-10	
VAV-3-18	339	BREAK ROOM	6	300	175		55	-	N/A	-	0.5	12	8	PRICE	SDV-06	
VAV-3-19	341,342,343	OFFICE	6	300	225	250	55	90	3.0	480/3/60	0.5	12	8	PRICE	SDV-06	1, 2, 3, 4
VAV-3-23	312	OPEN OFFICE	10	840	400		55	-	N/A	-	0.5	14	12.5	PRICE	SDV-10	
VAV-3-27	312	OPEN OFFICE	10	1320	550		55	-	N/A	-	0.5	14	12.5	PRICE	SDV-10	
VAV-3-29	313,314,315	FOCUS ROOM	6	225	165		55	-	N/A	-	0.5	12	8	PRICE	SDV-06	
VAV-3-31	316	CONFERENCE	6	275	275		55	-	N/A	-	0.5	12	8	PRICE	SDV-06	
VAV-3-32	317	CONFERENCE	6	275	275		55	-	N/A	-	0.5	12	8	PRICE	SDV-06	
VAV-3-33	318	CONFERENCE	6	275	275		55	-	N/A	-	0.5	12	8	PRICE	SDV-06	
VAV-3-35	319,320	OFFICE/STORAGE	6	325	265		55	-	N/A	-	0.5	12	8	PRICE	SDV-06	
VAV-3-37	312	OPEN OFFICE	10	940	400		55	-	N/A	-	0.5	14	12.5	PRICE	SDV-10	
VAV-3-39	309,310	HALL	6	400	350		55	-	N/A	-	0.5	12	8	PRICE	SDV-06	
VAV-3-40	322	MAIL ROOM	6	125	75		55	-	N/A	-	0.5	12	8	PRICE	SDV-06	
VAV-3-42	323	BREAK ROOM	6	200	110		55	-	N/A	-	0.5	12	8	PRICE	SDV-06	
VAV-3-43	344,345,346	OFFICE	6	300	225	250	55	90	3.0	480/3/60	0.5	12	8	PRICE	SDV-06	1, 2, 3, 4
VAV-4-4	403,404	STORAGE	6	200	160		55	-	N/A	-	0.5	12	8	PRICE	SDV-06	
VAV-4-5	401	OPEN OFFICE	10	1820	900		55	-	N/A	-	0.5	14	12.5	PRICE	SDV-10	
VAV-4-6	401	OPEN OFFICE	12	1400	900		55	-	N/A	-	0.5	16	15	PRICE	SDV-12	

REMARKS:
1. PROVIDE MANUFACTURER SUPPLIED AND INSTALLED ELECTRIC HEATING COILS SIZED TO MATCH AIR TERMINAL BOX SIZE.
2. HEATING COIL CONTROLS TO BE SCR TYPE.
3. POWER SUPPLY IS 480V, 3 PH, 3-WIRE. VAV BOX MANUFACTURER TO PROVIDE 480V/24VAC TRANSFORMER.
4. PROVIDE CLEARANCES AS REQUIRED PER CODE.

NOT FOR CONSTRUCTION

MOTZ ENGINEERING

NO.	ISSUE / REVISION	DATE
1	ISSUED FOR 75% CONSTRUCTION DOCS.	1/13/2023

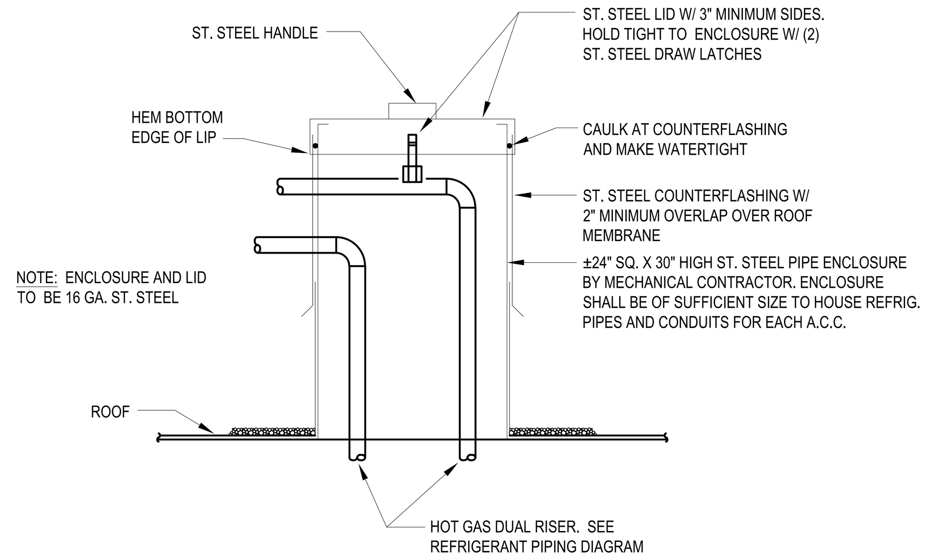
PROPOSED OFFICES FOR:
INTERNAL REVENUE SERVICE
7300 TURFWAY ROAD THIRD & FOURTH FLOORS FLORENCE, KY. 41042

KEVIN SULLIVAN ARCHITECTURE LLC
2646 PANCOAST AVE. CINCINNATI, OHIO 45211
(513) 721-2191 kevin@ksullivanarchitecture.com

SCALE: AS SHOWN	COMM. NO. 22064
DATE: 11/18/2022	DRAWN BY: JDH

3RD & 4TH FLOOR MECHANICAL DEMOLITION PLAN

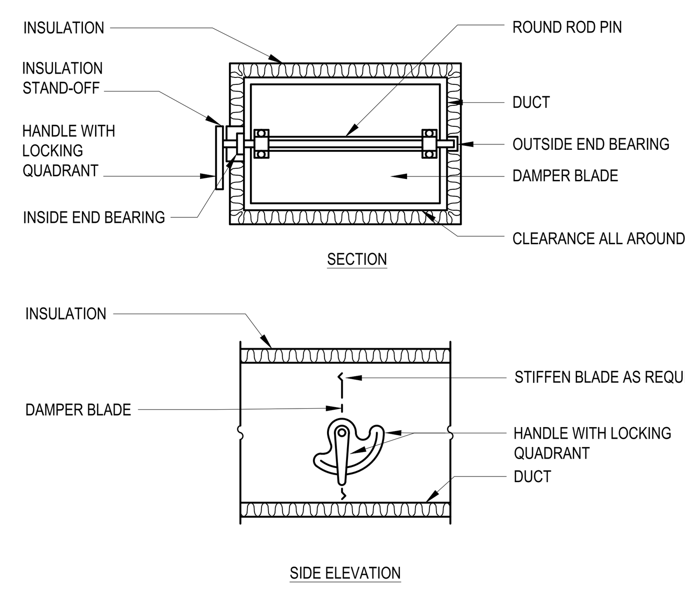
SHEET
M5.00



ROOF PIPE ENCLOSURE DETAIL

SCALE: N.T.S.

11 / M5.10



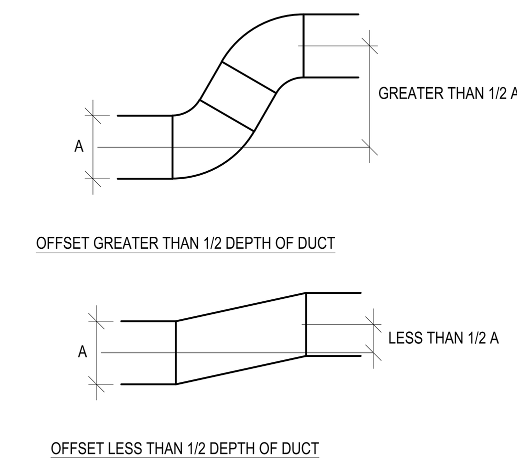
NOTES:

1. DELETE INSULATION STAND-OFF ON DUCTWORK WITHOUT EXTERIOR INSULATION.
2. DETAIL SHOWS SINGLE BLADE DAMPER. DAMPER INSTALLATION SHALL BE SIMILAR FOR MULTI-BLADE DAMPERS AND ROUND DAMPERS.

SUBTITLE
TITLE

SCALE: N.T.S.

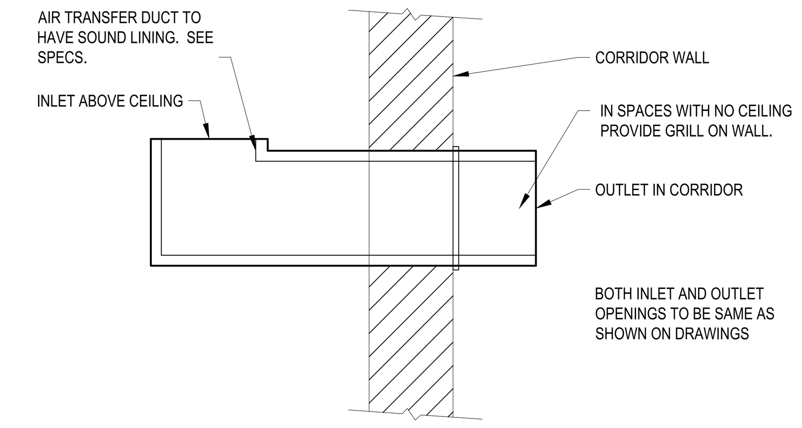
10 / M5.10



DUCT OFFSET DETAIL

SCALE: N.T.S.

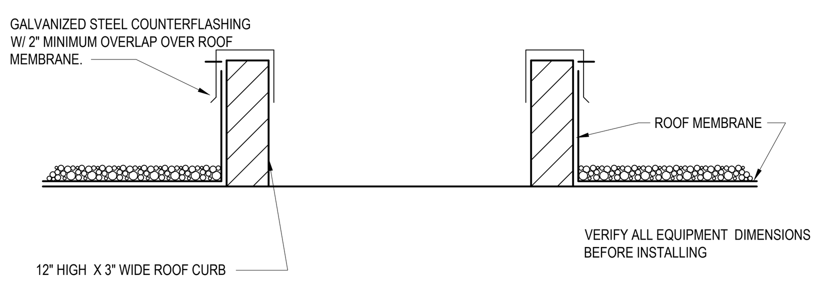
9 / M5.10



SUBTITLE
TITLE

SCALE: N.T.S.

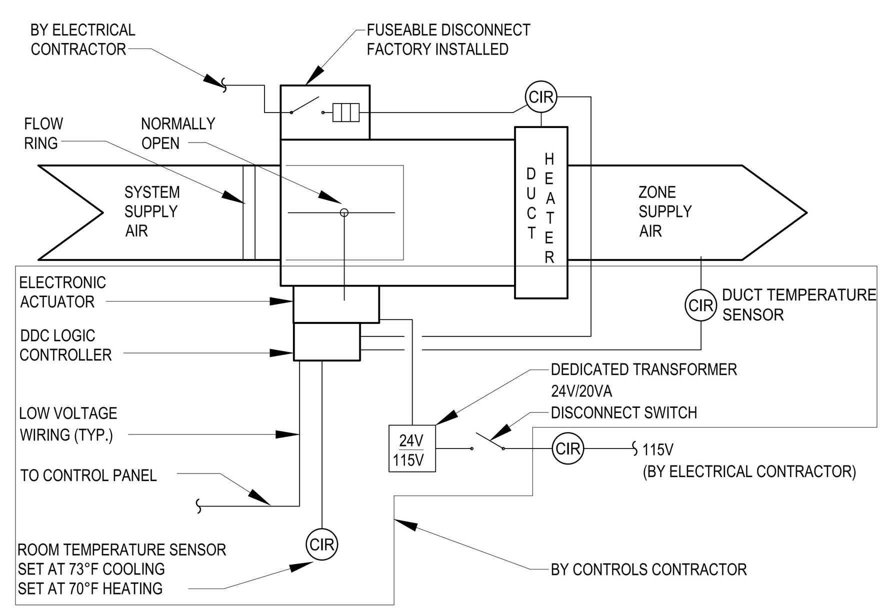
8 / M5.10



AIR COOLED CONDENSING UNIT ROOF CURB DETAIL

SCALE: N.T.S.

7 / M5.10



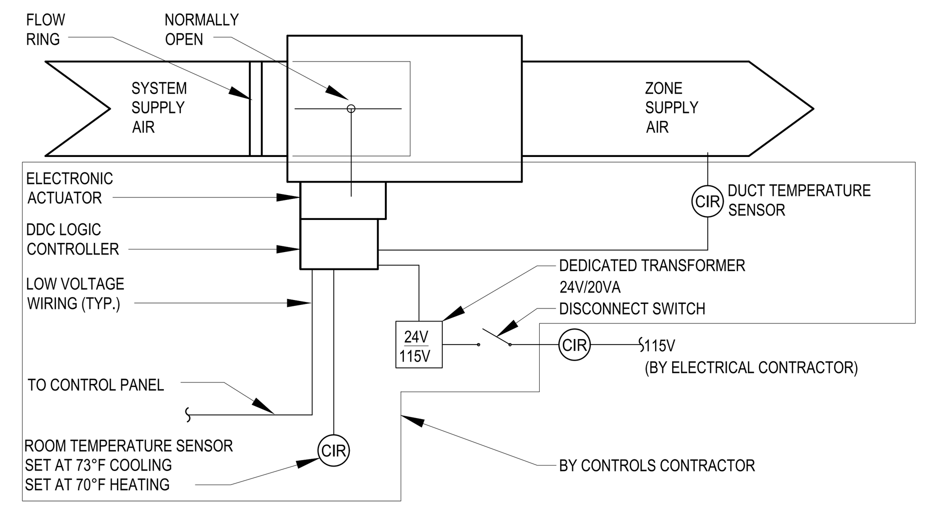
VAV BOX OPERATION:

THE ROOM TEMPERATURE SENSOR (T), THROUGH THE DDC LOGIC MODULE, MODULATES THE ELECTRONIC VAV DAMPER AND SUPPLY AIR FLOW TO MAINTAIN SPACE TEMPERATURE SETPOINT. ON A TEMPERATURE DROP THE DAMPER WILL CLOSE UNTIL IT REACHES ITS MINIMUM SETPOINT. IF SPACE TEMPERATURE CONTINUES TO DROP BELOW THE SETPOINT THE DDC LOGIC MODULE WILL ENERGIZE THE DUCT HEATER WITH A PROPORTIONAL SIGNAL TO THE SCR CONTROLLER TO MAINTAIN SPACE TEMPERATURE. THE ROOM SENSOR WILL PROPORTIONATELY CONTROL THE SCR CONTROLLER WHICH WILL MODULATE THE DUCT HEATER OUTPUT TO MAINTAIN SPACE TEMPERATURE SETPOINT.

SUBTITLE
TITLE

SCALE: N.T.S.

6 / M5.10



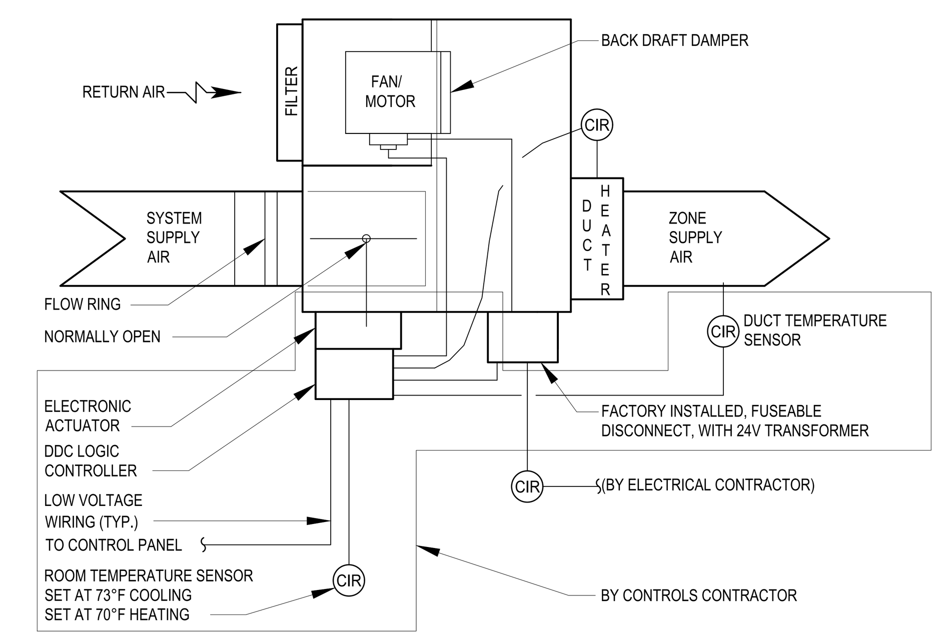
TYPICAL 'DDC' VAV BOX OPERATION:

THE ROOM TEMPERATURE SENSOR (T), THROUGH THE DDC LOGIC CONTROLLER, MODULATES THE ELECTRONIC VAV DAMPER AND SUPPLY AIR FLOW (FROM MINIMUM TO MAXIMUM CFM) TO MAINTAIN SPACE TEMPERATURE SETPOINT. ON A DROP IN SPACE TEMPERATURE THE DAMPER WILL CLOSE UNTIL THE THERMOSTAT IS SATISFIED OR THE DAMPER REACHES MINIMUM POSITION.

SUBTITLE
TITLE

SCALE: N.T.S.

5 / M5.10



'DDC' IAQ FAN POWERED VAV BOX (W/REHEAT) OPERATION:

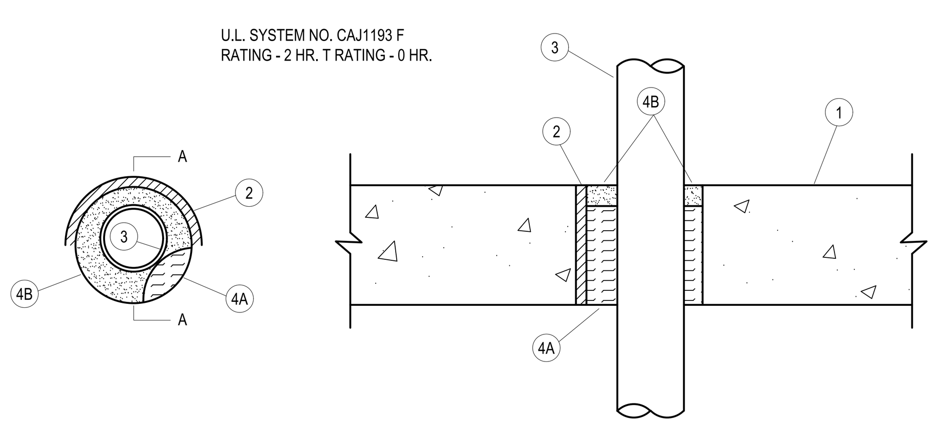
THE ROOM TEMPERATURE SENSOR (T), THROUGH THE DDC LOGIC MODULE, MODULATES THE ELECTRONIC VAV DAMPER WITHIN THE FAN POWERED BOX AND SUPPLY AIR FLOW TO MAINTAIN THE SPACE TEMPERATURE SETPOINT. ON A DROP IN TEMPERATURE THE DAMPER WILL CLOSE UNTIL IT REACHES ITS MINIMUM SET POINT. IF SPACE TEMPERATURE CONTINUES TO DROP BELOW SETPOINT, THE DDC LOGIC M0DULE WILL START THE RECIRCULATION FAN AND ENERGIZE THE DUCT HEATER WITH A PROPORTIONAL SIGNAL TO THE SCR CONTROLLER TO MAINTAIN SPACE TEMPERATURE. THE DUCT SENSOR AND ROOM SENSOR/THERMOSTAT WILL PROPORTIONALLY CONTROL THE SCR CONTROLLER WHICH WILL MODULATE THE DUCT HEATER OUTPUT TO MAINTAIN SPACE TEMPERATURE SETPOINT.

SUBTITLE
TITLE

SCALE: N.T.S.

4 / M5.10

U.L. SYSTEM NO. CAJ1193 F RATING - 2 HR, T RATING - 0 HR.



SECTION A-A

1. FLOOR OR WALL ASSEMBLY - MIN. 4-1/2" IN. THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100 - 150 PCF) CONCRETE FLOOR OR MIN. 5" THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT CONCRETE WALL. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS, MAX. DIAM. OF OPENING IS 10".
2. METALLIC SLEEVE - (OPTIONAL) - NOM. 16" IN DIAM. (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL SLEEVE CAST OR GROUTED IN TO FLOOR OR WALL ASSEMBLY FLUSH WITH FLOOR OR WALL SURFACES.
3. THROUGH PENETRANT - ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. THE ANNULAR SPACE BETWEEN PIPES, CONDUITS OR TUBING AND PERIPHERY OF OPENING SHALL BE MIN. 1/2" TO MAX. 2-1/4". PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:
   A. STEEL PIPE - NOM. 12" DIAM. (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
   B. CONDUIT - NOM. 4" DIAM. (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR NOM. 6" DIAM. (OR SMALLER) STEEL CONDUIT.
4. FIRESTOP SYSTEM - THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:
   A. PACKING MATERIAL - MIN. 4" THICKNESS OF MIN. 4 PCF MINERAL WOOL BATT INSULATION FIRMLY PACKED INTO OPENING AS A PERMANENT FORM. PACKING MATERIAL TO BE RECESSED FROM TOP SURFACE OF FLOOR OR FROM BOTH SURFACES OF WALL AS REQUIRED TO ACCOMMODATE THE REQUIRED THICKNESS OF FILL MATERIAL.
   B. FILL, VOID, OR CAVITY MATERIAL - CAULK - MIN. 1/2" THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS FLUSH WITH TOP SURFACE OF FLOOR OR WITH BOTH SURFACES OF WALL ASSEMBLY.

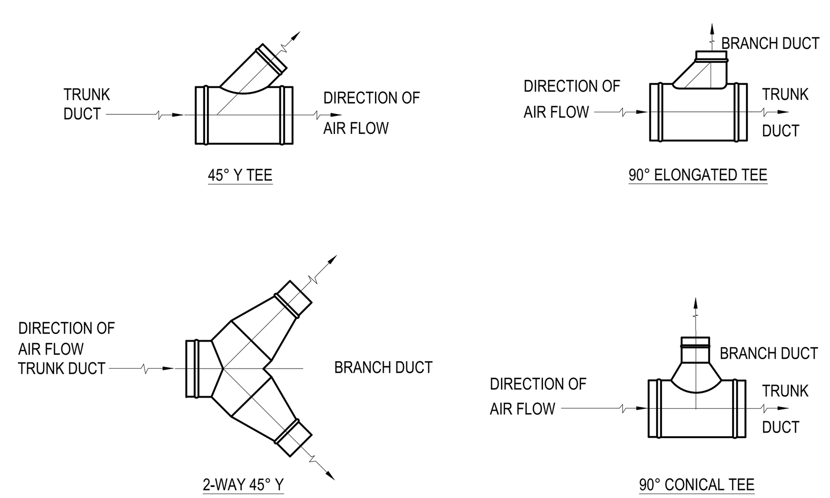
NELSON FIRESTOP PRODUCTS - CK N/S (NON-SAG) CAULK FOR USE IN FLOORS OR WALL OR CLK S/L (SOFT-LEVELING) CAULK FOR USE IN WALLS ONLY.

U.L. SYSTEM NO. CAJ1193

THROUGH-PENETRATION FIRESTOP SYSTEMS

SCALE: N.T.S.

3 / M5.10

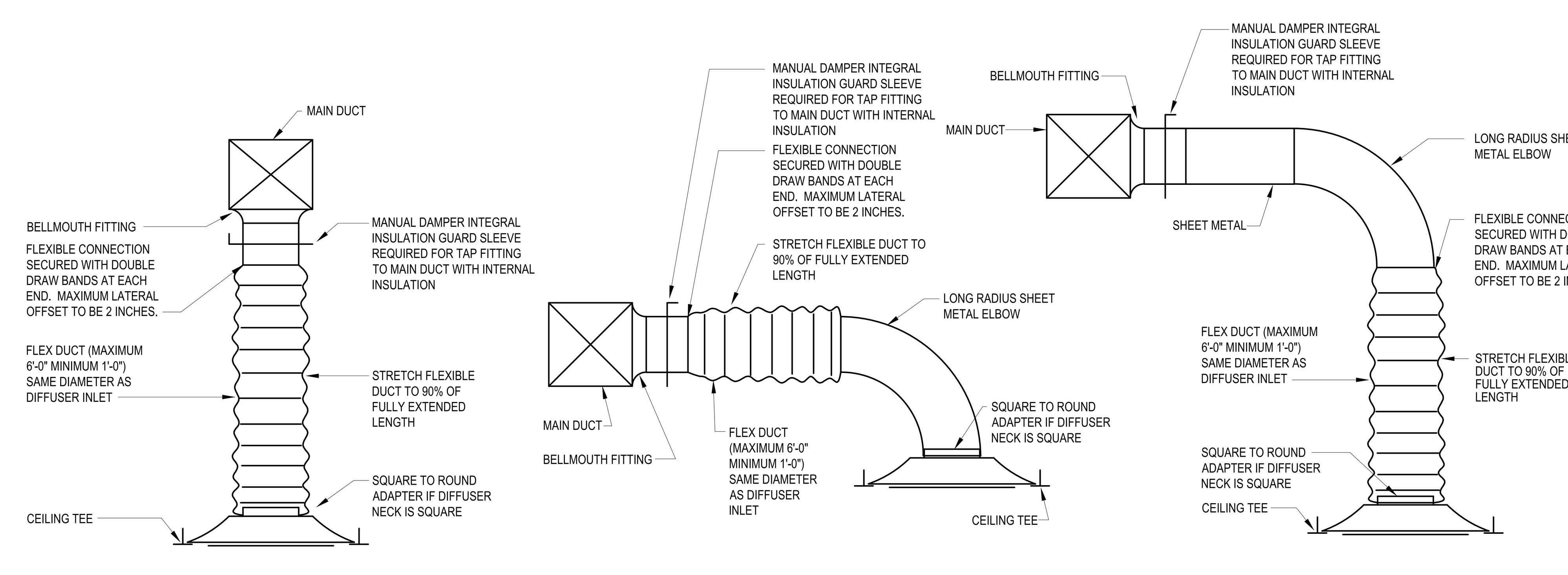


NOTE:
1. PROVIDE BALANCING DAMPER AT ALL BRANCH TAKE-OFFS

ROUND DUCT BRANCH TAKE-OFF DETAILS

SCALE: N.T.S.

2 / M5.10



CEILING DIFFUSER CONNECTION DETAILS

SCALE: N.T.S.

1 / M5.10

NOT FOR CONSTRUCTION

MOTZ ENGINEERING
447 MORGAN STREET
CINCINNATI, OH 45206
T: 513.621.5400
F: 513.621.5407

NO.	ISSUE / REVISION	DATE:
1	ISSUED FOR 75% CONSTRUCTION DOCS.	1/13/2023

PROPOSED OFFICES FOR:

INTERNAL REVENUE SERVICE

7300 TURFWAY ROAD THIRD & FOURTH FLOORS FLORENCE, KY. 41042

KEVIN SULLIVAN ARCHITECTURE LLC
2646 PANCOAST AVE. CINCINNATI, OHIO 45211
(513) 721-2191 kevin@ksullivanarchitecture.com

SCALE:	COMM. NO.
AS SHOWN	22064
DATE:	DRAWN BY:
11/18/2022	JDH

3RD & 4TH FLOOR MECHANICAL DEMOLITION PLAN

SHEET

M5.10

SECTION 230000 - HEATING, VENTILATING, AND AIR CONDITIONING WORK

PART1 - GENERAL

1.1 SUMMARY

A. This Section includes a summary of all Heating, Ventilating, and Air Conditioning related work.

B. Work by Others:
   1. The following work will be done by other contractors, as specified under respective headings, which this contractor shall read to ascertain what is called for therein:
      a. General Construction
      b. Fire Suppression
      c. Plumbing
      d. Integrated Automation
      e. Electric
      f. Technology

1.2 PROJECT CONDITIONS - BASE BID

A. Alterations of and Additions to Existing HVAC Systems:
   1. The contract shall include the installation of the work as shown, specified, or required and shall include, but not limited to, the following principal components:
      a. Remove existing terminal units and associated supply ductwork.
      b. Remove existing ceiling diffusers and grilles.
      c. Provide new supply diffusers and grilles.
      d. Provide new return grilles.
      e. Provide new electrical temperature sensors to modulate the terminal unit supply air and reheat coils to maintain space conditions.
      f. Provide duct insulation on all new supply ductwork.
      g. Provide all required air balancing.
      h. Provide new computer room units
      i. Perform start-up for all new HVAC systems and commission same in accordance with the commissioning requirement.
      j. Provide and/or participate in training of Owner's personnel on the use of all new HVAC systems.
   2. Refer to drawings for Schedules of HVAC Equipment.
   3. The contractor shall exercise adequate protective and safety measures for all persons and property and shall be responsible for any damages or injuries arising from the execution of this work.
   4. Alterations and additions to existing work shall include the requisite rigging, wrecking, hauling, protections of permanent equipment and the building structures, and cleaning up. Care shall be exercised to keep dust and dirt to a minimum and to confined to the area where the removal work is being performed. All debris shall be promptly removed.
   5. The existing facility will be occupied and will remain in operation throughout the period that this work is being performed, and certain new work will be performed during this period. Unscheduled interruptions of the facility will not be tolerated. The contractor shall exercise extreme caution, shall thoroughly inform his workmen and subcontractors of the critical nature of this work, and shall continually review the work procedure being followed in order to prevent accidental interruption of service. Before performing any act which could result in interruption of service, the contractor shall notify the Owner and Engineer of the hazards involved and the contractor shall proceed in a manner and at a time specifically approved by the Owner and Engineer.
   6. All work necessitating the temporary turning off or shutting down the operation of existing mechanical and/or electrical facilities shall be done at times specifically approved by the Owner and Engineer in advance of any disruption of existing facilities. Also, refer to Section 23 04 00 - General Heating, Ventilating, and Air Conditioning (HVAC) Requirements.

D. Guarantee
   1. The HVAC equipment will be guaranteed as specified in the specific equipment specifications. This contractor shall guarantee all other workmanship, materials, and equipment entering into this contract for a period of two (2) years; all from date of substantial completion or from the "recognized" start_up date, whichever is later. Should the Owner elect to accept a portion of work prior to the date of substantial completion, the guarantee period for the accepted portion of the work shall commence on the date of acceptance or on the "recognized" start_up date for that portion of the work, whichever is later. If the specifications dictate a different period of guarantee for a given component or piece of equipment, the more stringent requirements shall govern.
   2. The "recognized" start_up date shall be defined as that date on which the contractor has successfully completed all work, including the following:
      a. Submitted and received approval of three (3) paper copies of the Instruction Booklets plus one (1) electronic copy.
      b. Submitted complete "As_Built" drawings.
      c. Completed all testing, cleaning, adjusting, and trial run.
      d. Completed all training of Owner's personnel.

E. Equipment
   1. Any and all costs associated with piping, electric, wiring, conduit, supports, pads, or other modifications to accommodate installation for manufacturer's equipment that differs from equipment layout on drawings shall be included on contractor's bid. The contractor is responsible to insure that the equipment will fit within space allocated with appropriate clearances for maintenance, operation, servicing, and code.

F. Schedule
   1. The contractor shall be responsible to meet the project schedule as stated by the Owner. The contractor shall include in his bid the cost associated with all requisite coordination.
   2. In addition, the contractor must prepare a schedule for his work that integrates with the Owner's schedule. The contractor shall update progress and revise schedule at least twice monthly.
   3. This contractor shall be responsible to expedite any materials and work any overtime in order to meet the schedule. The cost for any expediting of overtime work shall be included in his bid.

SECTION 230400 - GENERAL HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) REQUIREMENTS

PART 1 - GENERAL

1.1 HVAC WORK

A. The following paragraphs are applicable to Division 23 and are complementary to other sections of specifications. Where items described in other sections of the specifications are repeated herein, it is done to call special attention to or to qualify them, but it is not intended that any part of the documents shall be assumed to be omitted if not repeated herein.

B. Where contradictions occur between this section and Division 1, the more stringent of the two shall apply. Architect/Engineer shall decide which is most stringent.

1.2 VERIFYING CONDITIONS

A. The work under this contract occurs on the site of and within the existing facility. The work under this contract shall be scheduled and performed so as to provide a minimum of interference with the normal operation of the existing facilities.

B. Before submitting a proposal, contractors shall visit the site, and shall also carefully examine all bidding documents including those for other branches of the work, to satisfy themselves as to the nature and scope of all work to be done. Prints showing the original building architectural, structural, mechanical, and electrical work are available at the Engineer's office for contractors' review.

C. The submission of a proposal shall be taken as evidence that such an examination has been made and difficulties, if any, noted. Later claims for labor, work, material, and equipment required for any difficulties encountered which could have been foreseen, shall not be recognized, and all such difficulties shall be properly taken care of by the contractor at no additional expense to the Owner.

1.3 EXISTING WORK AND/OR CONDITIONS

A. The accompanying drawings and specifications illustrate and describe the existing conditions, mechanical utilities, sewers, water mains, pipes, ducts, conduits, etc. that are particularly relevant to the new work insofar as these mains are shown on existing records or evident by field inspections and tests; however, it is not the intent that these documents shall be construed to guarantee to the contractor the exact location of these items. Each contractor shall verify and determine the exact location of these items in the field, and all work under this contract shall be executed to avoid conflict with or damage to existing work. The work shall be planned and executed to avoid interference, as much as possible, with traffic and with the normal use of the existing facility.

B. All work involving hazards to persons shall be suitably barricaded and provided with warning lights or signs, as required.

C. Where necessary for the performance of the contract, existing work shall be cut, altered, removed, or temporarily removed and replaced. Work that is altered or replaced shall match similar existing work and said work shall be performed by trade applicable to the work; if said work is NOT shown or noted the Drawings relating to applicable trade, cost shall be paid by contractor requiring said work. However, unless otherwise provided by the drawings or specifications, no structural members shall be cut or altered without authorization of the Architect and Engineer. Work remaining in place, which is damaged or defaced by reason of work done under this contract, shall be restored in kind equal to its condition at the time of award of the contract by applicable trade as hereinbefore specified.

D. Existing work shall not be disturbed further than necessary for proper installation of new work. New work to be connected or made integral with existing work shall be properly erected to secure solidity and be continuous in finish. Such new work in extension of existing work shall correspond in all respects with that to which it connects, or similar existing sound work, unless otherwise specified.

1.4 EXISTING MECHANICAL FACILITIES

A. Where existing mechanical facilities and/or service lines occur in the area of the work and such facilities or lines are to be abandoned or changed, the contractor for the branch of work or trade involved shall cut off and properly cap the old lines, so as not to interfere with the new construction work. If any portions of such lines are required for the operation of an existing building the lines shall be altered and relocated to clear new construction and shall also be restored into continued operation of the existing building.

1.5 INTERRUPTION OF SERVICES

A. Work which requires the temporary turning off or shutting down the operation of existing mechanical and/or electrical facilities shall be done at times specifically approved by the Owner or utility company and the work shall be pre_scheduled and executed so there is a minimum outage of such services and/or delay in the new construction work.

B. Unscheduled interruptions of the facility will not be tolerated. The contractor shall exercise extreme caution, shall thoroughly inform his workmen and subcontractors of the critical nature of this work, and shall continually review the work procedure being followed in order to prevent accidental interruption of service. Before performing any act which could result in interruption of service, the contractor shall notify the Owner and Engineer of the hazards involved and the contractor shall proceed in a manner and at a time specifically approved by the Owner and Engineer.

C. All work necessitating the temporary turning off or shutting down the operation of existing mechanical and/or electrical facilities shall be done at times specifically approved by the Owner and Engineer in advance of any disruption of existing facilities.

1.6 MATERIALS AND EQUIPMENT

A. All materials and equipment entering into the work shall be approved by the Engineer, and must be new, without defects, and of the sizes and capacities shown on the drawings or hereinafter specified. All manufactured materials or equipment shall bear the identification mark of the manufacturer or, if required by the Engineer, shall be certified by an approved testing laboratory. All equipment shall operate within the manufacturer's range of speeds, guaranteed capacities, performance, etc. as indicated by the manufacturer's latest catalog and/or engineering data, shall be of proper size and dimension for the allocated space, and shall be placed in the space allocated in the proper construction sequence. Special consideration will be given to equipment which has been in successful field use or similar applications for at least three (3) years (exclusive of field tests), and to equipment which has an extended guarantee period in lieu of long use period. The contractor shall submit with his bid complete data on equipment he proposes to use; failure to so submit, or to meet these requirements fully and those of the specifications, shall be grounds for rejecting the items.

B. All electrical materials, apparatus, and equipment shall be new, of the make and characteristics specified, shall conform to NEMA standards, and shall be designed to comply with and be installed in accordance with the latest rules and regulations of the National Electrical Code, and all of the legally constituted public authorities having local jurisdiction. Verify the exact voltage and current characteristics at the building before ordering motors or similar equipment.

C. All motors shall be NEMA frame sizes, heavy duty, 40 degree C. ambient motors with ball or roller bearings and with maximum full load temperature rise not exceeding NEMA limits of temperature rise. All motors shall have adequate starting and protective equipment as specified or required, and shall have a conduit terminal box of size adequate to accommodate conduits and wires as sized on electrical drawings or as specified. The capacity of each motor shall be sufficient to operate associated driven devices under all conditions of operation and load without overloading or overheating and each motor shall be of not less than the horsepower indicated or specified.

D. Conduct such tests and adjustment of equipment as specified or necessary to verify performance requirements. Submit data taken during such tests.

1.7 PROTECTION

A. In performing this contract, safeguard workmen and the public and protect the work and equipment until final completion and acceptance. After delivery and before and after installation, protect work against theft, injury, or damage. Carefully store material and equipment received on site which are not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of obstructing materials. Protect related or adjacent work and the material of the other trades or the Owner from damage that might be caused by this work and make good any damage thus caused. Provide all safeguards, scaffolding, drop cloths, etc. as required.

1.8 EXECUTION OF WORK

A. The HVAC Work shall be performed and coordinated with the program of the General Contractor and the other subcontractors. Promptly upon award of the contracts, the subcontractors shall confer with the General Contractor and the Engineer and other subcontractors to prepare a time schedule for the completion of the various divisions and details of the work. Each subcontractor shall proceed diligently with the work and shall cooperate with the General Contractor and the other contractors to maintain the approved time schedule to the best of his ability and as conditions permit.

1.9 SLEEVES, CUTTING, PATCHING, CLEANING, WATERPROOFING, ETC.

A. Provide and accurately set frames and Schedule 40 steel pipe sleeves for required openings in new work to minimize cutting. Perform all cutting, patching, etc. required to install the work. Use approved power operated boring machine for small holes wherever practical. Remove all rubbish incidental to the work. Where any work pierces waterproofing, provide all necessary sleeves, caulking, and flashing required to make openings absolutely watertight.

B. Refer to the ACI Code 381.71, Section 6.3 for limitations and requirements for penetrations and openings.

1.10 ACCIDENT PREVENTION

A. Precaution shall be exercised at all times for the protection of persons and property. The safety provisions of applicable law, building, and construction codes shall be observed. Machinery, equipment, and other hazards shall be guarded in accordance with safety provisions of the "Manual of Accident Prevention in Construction" published by Associated General Contractors of America to the extent that such provisions are not inconsistent with applicable law or regulations.

1.11 PROPERTY PROTECTION

A. All hoisting shall be done with proper tag lines and buffers to prevent damage to the sides of the building. Where it is necessary to hoist materials to the roof, the parapets at top of the building and the roof where materials are landed from hoists shall be protected with heavy wood covers. Parapet protection shall be placed on both sides and top, and shall extend far enough on either side of landing point to insure adequate cover. The roof, from the landing point at parapet to final location of material, shall be adequately protected by planks laid side by side on roofing and spiked together on outside edges with planks running at right angles to main planking. The roof shall be adequately protected against leaks at all times.

B. Where hoists are erected on the roof for hoisting material up the side of the building, the roof shall be adequately protected against abrasion or other damage. Materials stored on the roof shall be placed on planks or other protection approved by the Engineer and shall be placed only at locations approved by the Engineer.

C. If hoisted materials are taken through windows, the jams, head, and sill shall be adequately protected with wood planking or proper buffers.

D. Any work, equipment, or property damaged during construction of this project and due to operations under this contract shall be repaired or replaced by this contractor, without additional cost to the Owner. Upon completion of the work, the contractor shall remove all protections herein specified.

SECTION 230500 - COMMON WORK RESULTS FOR HVAC

PART1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Mechanical demolition.
   2. Equipment installation requirements common to equipment sections.
   3. Painting and finishing.
   4. Concrete bases.
   5. Supports and anchorages.
   6. Fire stopping.

1.2 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Electrical Characteristics for Mechanical Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified, at the expense of the Contractor installing the mechanical equipment. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

PART 2 - PRODUCTS

2.1 FIRE STOPPING

A. Description: UL-classified Systems; C-AJ or W-L-7001-7999. Type of fill materials; one or both of the following: Latex sealant or mortar.

PART 3 - EXECUTION

3.1 BUILDING EXTERIOR WORK

A. The General Contractor shall provide wall openings where indicated on the architectural drawings and where specifically coordinated with the HVAC contractor. All additional steel support framing that is required for wall penetrations shall be provided by the HVAC Contractor except where indicated on the structural design drawings.

B. The HVAC Contractor shall coordinate the size and location of all wall openings.

3.2 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.3 PAINTING

A. All general painting of piping, insulation, and equipment, if any, will be performed by the Contractor. Unless otherwise noted, where this contractor has cut finished building surfaces, this contractor shall patch and paint these surfaces.

3.4 FIRE STOPPING

A. Provide fire stopping for all mechanical penetrations of all fire rated construction such as walls and floors.

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes hangers and supports for mechanical system equipment.

1.2 DEFINITIONS

A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.3 PERFORMANCE REQUIREMENTS

A. Design channel support systems for piping to support multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the manufacturers specified:
   1. Channel Support Systems:
      a. Grinnell Corp.; Power-Strut Unit.
      b. Michigan Hanger Co., Inc.; O-Strut Div.
      c. National Pipe Hanger Corp.
      d. Thomas & Betts Corp.
      e. Unistrut Corp.
   2. Thermal-Hanger Shield Inserts:
      a. Michigan Hanger Co., Inc
      b. Pipe Shields, Inc.
      c. Rilco Manufacturing Co., Inc.
      d. Value Engineered Products, Inc.
   3. Powder-Actuated Fastener Systems:
      a. Gunnebo Fastening Corp.
      b. Hilti, Inc.
      c. ITW Ramset/Red Head.
      d. Masterset Fastening Systems, Inc.

2.2 MANUFACTURED UNITS

A. Pipe Hangers, Supports, and Components: MSS SP-58, factory-fabricated components. Refer to "Hanger and Support Applications" Article in Part 3 for where to use specific hanger and support types.
   1. Galvanized, Metallic Coatings: For piping and equipment that will not have field-applied finish.
   2. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

B. Channel Support Systems: MFMA-2, factory-fabricated components for field assembly.
   1. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
   2. Nonmetallic Coatings: On attachments for electrolytic protection where attachments are in direct contact with copper tubing.

C. Thermal-Hanger Shield Inserts: 100 psi minimum compressive-strength insulation, encased in sheet metal shield.
   1. Material for Hot Piping: ASTM C 552, Type I cellular glass.
   2. For Trapeze or Clamped System: Insert and shield cover entire circumference of pipe.
   3. For Clevis or Band Hanger: Insert and shield cover lower 180 degrees of pipe.

2.3 MISCELLANEOUS MATERIALS

A. Powder-Actuated Drive-Pin Fasteners: Powder-actuated-type, drive-pin attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

B. Mechanical-Anchor Fasteners: Insert-type attachments with pull-out and shear capacities appropriate for supported loads and building materials where used.

C. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars, black and galvanized.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger requirements are specified in Sections specifying equipment and systems.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Specification Sections.

3.2 ADJUSTING

A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

3.3 PAINTING

A. Touching Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780.

SECTION 230548 - VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Elastomeric isolation pads.
   2. Elastomeric hangers.
   3. Spring hangers.

1.2 SUBMITTALS

A. Product Data: Include load deflection curves for each vibration isolation device.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the manufacturers specified.
   1. Amber/Booth Company, Inc.
   2. Kinetics Noise Control, Inc.
   3. Mason Industries, Inc.
   4. Vibration Eliminator Co., Inc.
   5. Vibration Mountings & Controls/Korfund.

B. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
   1. Material: Standard neoprene.

C. Elastomeric Mounts: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-Code or otherwise identify to indicate capacity range.

D. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
   1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
   2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
   3. Lateral Stiffness: More than 80 percent of the rated vertical stiffness.
   4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
   5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 100 psig.
   6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation devices for compliance with requirements, installation tolerances, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Provide vibration isolators for equipment and piping as indicated on the design drawings and as required by other sections of Division 23.

B. Install steel angles or channel, sized to prevent buckling, clamped with ductile-iron clamps to hanger rods for trapeze and individual pipe hangers. At trapeze anchor locations, shackle piping to trapeze. Requirements apply equally to hanging equipment. Do not weld angles to rods.

3.3 ADJUSTING

A. Adjust isolators after piping systems have been filled and equipment is at operating weight.

SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL (NOT USED)

PART 2 - PRODUCTS

2.1 DUCT IDENTIFICATION DEVICES

A. Stencils: Prepared with minimum letter height of 1-1/4 inches for ducts.
   1. Stencil Paint: Exterior, gloss, alkyd enamel black, unless otherwise indicated. Paint may be in pressurized spray-can form.
   2. Identification Paint: Exterior alkyd enamel in colors as indicated in specification schedule.

B. Manual dampers: Wrap duct with red plastic ribbon with 12" long tail at each manual damper.

PART 3 - EXECUTION

3.1 APPLICATIONS, GENERAL

A. Products specified are for applications referenced in other Division 15 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installers option.

B. Installing Contractor is responsible for valve tagging, equipment markers and pipe identification of all valves, equipment and piping on packaged pumping skids.

3.2 EQUIPMENT IDENTIFICATION

A. Install equipment markers with screws, or, if screws might damage equipment, use permanent adhesive on or near each major item of mechanical equipment.
   1. Locate markers where accessible and visible. Include markers for the following general categories of equipment:
      a. Main control and operating valves, including safety devices.
      b. Terminal VAV units.
      c. Coils.
      d. Fans, and primary balancing dampers.

3.3 DUCT IDENTIFICATION

A. Stenciled Duct Markers: Stenciled markers, showing service and direction of flow.

B. Locate markers near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system and at access doors in concealed spaces.

C. Duct Identification:

TYPE OF SERVICE	1" BAND COLOR	DESIGNATION
Supply Air	Green	SUPPLY
Return Air	Blue	RETURN
Exhaust Air	Blue	EXH
Outdoor Air	Blue	OA

3.4 CLEANING

A. Clean faces of mechanical identification devices and glass and frames of valve schedules.

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. The testing, adjusting and balancing work as specified in this section is to be performed by a certified balancing contractor that is hired by the HVAC Contractor. All final tab work will be completed at the end of the final phase of work. The HVAC Contractor is to provide all necessary assistance and coordination with the testing, adjusting and balancing, (TAB) contractor as required to complete the balancing work and generate the balancing report as specified in this section. The HVAC Contractor is to provide all system start-up procedures and commissioning tasks that are required prior to balancing work as specified in the other sections of this specification.

B. This Section includes testing, adjusting and balancing to produce design objectives for the following:
   1. Air Systems:
      a. Constant-volume air systems.
      b. Variable-air-volume systems.
   2. HVAC equipment quantitative-performance settings.
   3. Reporting results of activities and procedures specified in this Section.
   4. In general, the Balancing Work will occur at the end of the last phase of this project.

1.2 DEFINITIONS

A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.

B. Balance: To proportion flows within the distribution system, including sub-mains, branches, and terminals, according to indicated quantities.

C. Barrier or Boundary: Construction, either vertical or horizontal, such as walls, floors, and ceilings that are designed and constructed to restrict the movement of airflow, smoke, odors, and other pollutants.

D. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.

E. NC: Noise criteria.

F. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.

G. RC: Room criteria.

H. Report Forms: Test data sheets for recording test data in logical order.

I. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.

J. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.

K. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.

L. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.

M. TAB: Testing, adjusting, and balancing.

N. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.

O. Test: A procedure to determine quantitative performance of systems or equipment.

P. Testing, Adjusting, and Balancing (TAB) Firm: The entity responsible for performing and reporting TAB procedures.

1.3 SUBMITTALS

A. Qualification Data: Within 30 days from Contractor's Notice to Proceed, submit two (2) copies of evidence that TAB firm and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Contract Documents Examination Report: Within 30 days from Contractor's Notice to Proceed, submit two (2) copies of the Contract Documents review report as specified in Part 3.

C. Strategies and Procedures Plan: Within 90 days from Contractor's Notice to Proceed, submit two (2) copies of TAB strategies and step-by-step procedures as specified in Part 3 "Preparation" Article. Include a complete set of report forms intended for use on this Project.

D. Certified TAB Reports: Submit two (2) copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.

E. Sample Report Forms: Submit two (2) sets of sample TAB report forms.

F. Warranties specified in this Section.

(CONTINUED ON SHEET M5.2)

NOT FOR CONSTRUCTION

MOTZ ENGINEERING

NO.	ISSUE / REVISION	DATE:
1	ISSUED FOR 75% CONSTRUCTION DOCS.	1/13/2023

PROPOSED OFFICES FOR:
INTERNAL REVENUE SERVICE
7300 TURFWAY ROAD THIRD & FOURTH FLOORS FLORENCE, KY. 41042

KEVIN SULLIVAN ARCHITECTURE LLC
2646 PANCOAST AVE. CINCINNATI, OHIO 45211
(513) 721-2191 kevin@ksullivanarchitecture.com

SCALE: AS SHOWN	COMM. NO. 22064
DATE: 11/18/2022	DRAWN BY: JDH

3RD & 4TH FLOOR MECHANICAL DEMOLITION PLAN

SHEET
M5.20

(CONTINUED FROM SHEET M5.1)

1.4 QUALITY ASSURANCE

A. TAB Firm Qualifications: Engage a TAB firm certified by either AABC or NEBB.TAB Conference: Meet with Owner's and Architect's representatives on approval of TAB strategies and procedures plan to develop a mutual understanding of the details. Ensure the participation of TAB team members, equipment manufacturers' authorized service representatives, HVAC controls installers, and other support personnel. Provide seven (7) days' advance notice of scheduled meeting time and location.
1. Agenda Items: Include at least the following:
a. Submittal distribution requirements.
b. The Contract Documents examination report.
c. TAB plan.
d. Work schedule and Project-site access requirements.
e. Coordination and cooperation of trades and subcontractors.
f. Coordination of documentation and communication flow.

B. Certification of TAB Reports: Certify TAB field data reports. This certification includes the following:
1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that TAB team complied with approved TAB plan and the procedures specified and referenced in this Specification.

C. TAB Report Forms: Use standard forms from AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing", or TAB firm's forms approved by Engineer.

D. Instrumentation Type, Quantity, and Accuracy: As described in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."

E. Instrumentation Calibration: Calibrate instruments at least every six (6) months or more frequently if required by instrument manufacturer.
1. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.

1.5 COORDINATION

A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.

B. Notice: Provide seven (7) days' advance notice for each test. Include scheduled test dates and times.

C. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

1.6 WARRANTY

A. National Project Performance Guarantee: Provide a guarantee on AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" forms stating that AABC will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents or provide a guarantee on NEBB forms stating that NEBB will assist in completing the requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee shall include the following provisions:
1. The certified TAB firm has tested and balanced systems according to the Contract Documents.
2. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
1. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.

B. Examine approved submittal data of HVAC systems and equipment.

C. Examine Project Record Documents described in Division 1 Section "Project Record Documents."

D. Examine design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine equipment performance data including fan curves. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system. Calculate system effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.

F. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Sections have been performed.

G. Examine system and equipment test reports.

H. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.

I. Examine HVAC equipment to ensure that bearings are greased and equipment with functioning controls is ready for operation.

J. Examine terminal units, such as variable-air-volume boxes, to verify that they are accessible and their controls are connected and functioning.

K. Examine strainers for clean screens and proper perforations.

L. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

M. Examine equipment for installation and for properly operating safety interlocks and controls.

N. Examine automatic temperature system components to verify the following:
1. Dampers, valves, and other controlled devices are operated by the intended controller.
2. Dampers and valves are in the position indicated by the controller.
3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions. This includes dampers in variable-air-volume terminals.
4. Automatic modulating and shutoff valves, including two-way valves, are properly connected.
5. Thermostats and humidistats are located to avoid adverse effects of sunlight, drafts, and cold walls.
6. Sensors are located to sense only the intended conditions.
7. Sequence of operation for control modes is according to the Contract Documents.
8. Controller set points are set at indicated values.
9. Interlocked systems are operating.
10. Changeover from heating to cooling mode occurs according to indicated values.

O. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system readiness checks and prepare system readiness reports. Verify the following:
1. Permanent electrical power wiring is complete.
2. Hydronic systems are filled, clean, and free of air.
3. Automatic temperature control systems are operational.
4. Equipment and duct access doors are securely closed.
5. Balance and fire dampers are open.
6. Isolating and balancing valves are open and control valves are operational.
7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" or NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" and this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.

C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Cross check the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.

D. Check airflow patterns from the outside-air louvers and dampers and the return- and exhaust-air dampers, through the supply-fan discharge and mixing dampers.

E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

F. Verify that motor starters are equipped with properly sized thermal protection.

G. Check dampers for proper position to achieve desired airflow path.

H. Check for airflow blockages.

I. Check for proper sealing of air duct system.

3.5 PROCEDURES FOR CONSTANT VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
1. Measure fan static pressures to determine actual static pressure as follows:
a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
b. Measure static pressure directly at the fan outlet or through the flexible connection.
c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
d. Measure inlet static pressure across the inlet of double-inlet fans through the wall of the plenum that houses the fan.
2. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system effect factors with calculated system effect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.
3. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Make required adjustments to electrical connections to accommodate fan-speed changes.
4. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur.

B. Adjust volume dampers for main duct, sub-main ducts, and major branch ducts to indicated airflows within specified tolerances.
1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
a. Where sufficient space in sub-main and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
2. Re-measure each sub-main and branch duct after all have been adjusted. Continue to adjust sub-main and branch ducts to indicated airflows within specified tolerances.

C. Measure terminal outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.

D. Adjust terminal outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using volume dampers rather than extractors and the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 PROCEDURES FOR VARIABLE AIR VOLUME SYSTEMS

A. Pressure-Independent, Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:
1. Set outside-air dampers at minimum, and return- and exhaust-air dampers at a position that simulates full-cooling load.
2. Measure total system airflow. Adjust to within indicated airflow.
3. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units as described for constant-volume air systems.
4. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow as described for constant-volume air systems.
a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.

3.7 PROCEDURES FOR MOTORS

A. Motors: Test at final balanced conditions and record the following data:
1. Manufacturer, model, and serial numbers.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate measured voltage and amperage for each phase.
6. Starter thermal-protection-element rating.

3.8 PROCEDURES FOR HEAT TRANSFER COILS

A. Water Coils: Measure the following data for each coil:
1. Entering and leaving water temperature.
2. Water flow rate.
3. Water pressure drop
4. Dry-bulb temperature of entering and leaving air.
5. Wet-bulb temperature of entering and leaving air for cooling coils.
6. Airflow.
7. Air pressure drop.

3.9 PROCEDURES FOR TEMPERATURE MEASUREMENTS

A. During TAB, report the need for adjustment in temperature regulation within the automatic temperature-control system.

B. Measure outside air, wet and dry-bulb temperatures.

3.10 TEMPERATURE-CONTROL VERIFICATION

A. Verify that controllers are calibrated and commissioned.

B. Check transmitter and controller locations and note conditions that would adversely affect control functions.

C. Record controller settings and note variances between set points and actual measurements.

D. Check the operation of limiting controllers (i.e., high and low temperature controllers).

E. Check free travel and proper operation of control devices such as damper and valve operators.

F. Check the sequence of operation of control devices. Note air pressures and device positions and correlate with airflow and water flow measurements. Note the speed of response to input changes.

G. Check the interaction of electrically operated switch transducers.

H. Check the interaction of interlock and lockout systems.

I. Record voltages of power supply and controller output. Determine whether the system operates on a grounded or non-grounded power supply.

J. Note operation of electric actuators using spring return for proper fail-safe operations.

3.11 TOLERANCES

A. Set HVAC system airflow and water flow rates within the following tolerances:
1. Supply, Return, and exhaust Fans and Equipment with Fans: Plus 5% to plus 10%.
2. Air Outlets and Inlets: 0 to minus 10%.
3. Heating-Water Flow Rate: 0 to minus 10%.

3.12 REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

B. Status Reports: As Work progresses, prepare reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system.

3.13 FINAL REPORT

A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in three-ring binder, tabulated and divided into sections by tested and balanced systems.

B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing engineer.
1. Include a list of instruments used for procedures, along with proof of calibration.

C. Final Report Contents: In addition to certified field report data, include the following:
1. Fan curves.
2. Manufacturers' test data.
3. Field test reports prepared by system and equipment installers.
4. Other information relative to equipment performance, but do not include Shop Drawings and Product Data.

D. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:
1. Title page.
2. Name and address of TAB firm.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB firm who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
11. Summary of contents including the following:
a. Indicated versus final performance.
b. Notable characteristics of systems.
c. Description of system operation sequence if it varies from the Contract Documents.
12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer, type size, and fittings.
14. Notes to explain why certain final data in the body of reports varies from indicated values.
15. Test conditions for fans performance forms including the following:
a. Settings for outside, return, and exhaust air dampers.
b. Fan drive settings including settings.
f. Settings for supply air, static pressure controller.
g. Other system operating conditions that affect performance.

F. Round and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
1. Report Data:
a. System and air-handling unit number.
b. Location and zone.
c. Duct static pressure in inches wg.
d. Duct size in inches.
e. Duct area in sq. ft.
f. Indicated airflow rate in cfm.
g. Indicated velocity in fpm.
h. Actual airflow rate in cfm.
i. Actual average velocity in fpm.

G. Air-Terminal-Device Reports:
1. Unit Data:
a. System and air-handling unit identification.
b. Location and zone.
c. Test apparatus used.
d. Area served.
2. Test Data (Indicated and Actual Values):
a. Airflow rate in cfm.
b. Air velocity in fpm.
c. Preliminary airflow rate as needed in cfm.
d. Preliminary velocity as needed in fpm.
e. Final airflow rate in cfm.
f. Final velocity in fpm.
g. Space temperature in deg F.

H. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:
1. Unit Data:
a. System and air handling unit identification.
b. Location and zone.
c. Room or riser served.
d. Coil make and size.
2. Test Data (Indicated and Actual Values):
a. Airflow rate in cfm.
b. Entering air temperature in deg F.
c. Leaving air temperature in deg F.

3.14 INSPECTIONS

A. Initial Inspection:
1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the Final Report.
2. Randomly check the following for each system:
a. Measure airflow of at least 10% of air outlets.
b. Measure water flow.
c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
d. Verify that balancing devices are marked with final balance position.
e. Note deviations to the Contract Documents in the Final Report.

B. Final Inspection:
1. After initial inspection is complete and evidence by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Architect.
2. TAB firm test and balance engineer shall conduct the inspection in the presence of Architect.
3. Architect shall randomly select measurements documented in the final report to be rechecked. The rechecking shall be limited to 10% of the total measurements recorded
4. If the rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10% of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
6. TAB firm shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes and resubmit the final report.
7. Request a second final inspection. If the second final inspection also fails, Owner shall contract the services of another TAB firm to complete the testing and balancing in accordance with the Contract Documents and deduct the cost of the services from the final payment.

3.15 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional testing and balancing to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional testing, inspecting, and adjusting during near-peak summer and winter conditions.

SECTION 230702 - DUCT INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes semi-rigid and flexible duct insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.

1.2 SUBMITTALS

A. Product Data: Identify thermal conductivity, thickness and jackets (both factory and field applied, if any), for each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for the following:
1. Application of field-applied jackets.
2. Applications at linkages for control devices.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.

B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.
1. Insulation Installed Indoors: Flame-spread rating of 25 or less and smoke-developed rating of 50 or less.

C. ASHRAE Standards: Comply with performance efficiencies prescribed for ASHRAE 90.1, "Energy Efficient Design for New Buildings, Except Low Rise Residential Buildings" for duct insulation.

D. No damaged or water soaked insulation shall be used.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Ship insulation materials in containers marked by manufacturer with appropriate ASTM specification designation, type and grade and maximum use temperature.

1.5 COORDINATION

A. Coordinate clearance requirements with duct Installer for insulation application.

1.6 SCHEDULING

A. Schedule insulation application after testing duct systems. Insulation application may begin on segments of ducts that have satisfactory test results.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the manufacturers specified:
1. Mineral-Fiber Insulation:
a. CertainTeed Manson.
b. Knauf FiberGlass GmbH.
c. Owens-Corning Fiberglas Corp.

2.2 INSULATION MATERIALS

A. Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, without facing and with all-service jacket manufactured from aluminum foil, skrim kraft, vapor seal.

2.3 ACCESSORIES AND ATTACHMENTS

A. Self-Adhesive Anchor Pins and Speed Washers: Galvanized steel plate, pin, and washer manufactured for attachment to duct and plenum with adhesive. Pin length sufficient for insulation thickness indicated.

B. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 14.3 oz./sq. yd.
1. Tape Width: 4 inches

2.4 VAPOR RETARDERS

A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 GENERAL APPLICATION REQUIREMENTS

A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.

B. Refer to schedules at the end of this Section for materials and thicknesses required for each duct system.

C. Use accessories compatible with insulation materials and suitable for the service. Use accessories that do not corrode, soften or otherwise attack insulation or jacket in either wet or dry state.

D. Apply multiple layers of insulation with longitudinal and end seams staggered.

E. Keep insulation materials dry during application and finishing.

F. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.

G. Apply insulation with the least number of joints practical.

H. Apply insulation over fittings and specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.

I. Apply insulation with integral jackets as follows:
1. Pull jacket tight and smooth.
2. Joints and Seams: Cover with tape and vapor retarder as recommended by insulation material manufacturer to maintain vapor seal.

J. Cut insulation according to manufacturer's written instructions to prevent compressing insulation to less than 75 percent of its nominal thickness.

K. Provide weld pins located a maximum of 18 inches on center for all insulation serving ductwork that has a width or height dimension that exceeds 20 inches.

3.4 MINERAL FIBER INSULATION APPLICATION

A. Blanket or Board Applications for Ducts: Secure blanket insulation with adhesive, anchor pins and speed washers.
1. Apply adhesives according to manufacturer's recommended coverage rates per square foot for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
3. Install anchor pins and speed washers on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
a. On duct sides with dimensions 18 inches and smaller, along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints and locate 16 inches on center.
b. On duct sides with dimensions larger than 18 inches. Space 16 inches on center each way and 3 inches maximum from insulation joints. Apply additional pins and clips to hold insulation tightly against surface at cross bracing.
c. Anchor pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
d. Do not over-compress insulation during installation.
4. Impale insulation over anchors and attach speed washers.
5. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
6. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2-inch staples, 1 inch on center and cover with pressure-sensitive tape having same facing as insulation.
7. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Apply insulation on round duct elbows with individually mitered gores cut to fit the elbow.
8. Insulate duct stiffeners, hangers and flanges that protrude beyond the insulation surface with 6-inch wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger and flange with anchor pins spaced 6 inches on center.

3.5 DUCT SYSTEM APPLICATIONS

A. Materials and thicknesses for systems listed below are specified in schedules at the end of this Section.

B. Insulate the following duct systems:
1. Indoor concealed supply air ductwork.
2. Indoor outside air plenums connected to louvers.
3. Indoor exhaust air ductwork and plenums from exhaust louver or discharge hood to the discharge of the exhaust fan or air handling unit.

C. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials and equipment:
1. Factory-insulated flexible ducts.
2 Flexible connectors.
3. Nameplates and data plates.

3.6 INDOOR DUCT AND PLENUM APPLICATION SCHEDULE

A. Service: Round supply, exhaust and outdoor air ducts; concealed.
1. Material: Mineral-fiber blanket.
2. Thickness: 1-1/2 inches.
3. Minimum R value: 3.5.
4. Number of Layers: One.

B. Service: Rectangular supply, exhaust and outdoor air ducts; concealed.
1. Material: Mineral-fiber blanket.
2. Thickness: 1-1/2 inches.
3. Minimum R value: 3.5.
4. Number of Layers: One

SECTION 230800 - COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes commissioning process requirements for HVAC systems, assemblies, and equipment.

1.2 DEFINITIONS

A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

B. CxA: Commissioning Authority.

C. HVAC&R: Heating, Ventilating, Air Conditioning, and Refrigeration.

D. DDC: Direct Digital Controls.

E. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.3 CONTRACTOR'S RESPONSIBILITIES

A. Perform commissioning tests at the direction of the CxA.

B. Attend construction phase HVAC and Integrated Automation coordination meetings.

C. Attend testing, adjusting, and balancing review and coordination meetings.

D. Participate in HVAC systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.

E. Provide information requested by the CxA for final commissioning documentation.

F. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

1.4 CxA'S RESPONSIBILITIES

A. Provide Project-specific construction checklists and commissioning process test procedures for actual HVAC systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.

B. Direct commissioning testing.

C. Verify testing, adjusting, and balancing of Work are complete.

D. Provide test data, inspection reports, and certificates in Systems Manual.

1.5 COMMISSIONING DOCUMENTATION

A. Provide the following information to the CxA for inclusion in the commissioning plan:
1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for HVAC systems, assemblies, equipment, and components to be verified and tested.
4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
5. Certificate of readiness certifying that HVAC systems, subsystems, equipment, and associated controls are ready for testing.
6. Test and inspection reports and certificates.
7. Corrective action documents.
8. Verification of testing, adjusting, and balancing reports.

1.6 SUBMITTALS

A. Certificates of readiness.

B. Certificates of completion of installation, prestart, and startup activities.

1.7 COMMISSIONING AUTHORITY

A. Motz Engineering acting in conjunction with the Owner's Maintenance Personnel will take the role of the Commissioning Authority for this project. The Commissioning Authority will respond to all issues directly to the Owner and shall have the authority to grant final acceptance of each system commissioned.

1.8 COMMISSIONING PLAN

A. This section and sections in other Divisions shall outline the work required for the project, consistent with the Commissioning Plan. Any discrepancies between the Commissioning Plan and the Project Manual sections shall be brought to the attention of the Commissioning Agent for clarification.

1.9 COORDINATION

A. The General Contractor and appropriate Subcontractors shall be responsible for cooperating and coordinating their work during the installation and commissioning process. Refer to the specific requirements and other sections for required work associated with coordination of installation work and preparation of Coordination Construction Drawings by the contractors.

B. The Commissioning Authority will participate in the coordination of installation work as necessary to insure the installation of system components meet the Owner's project requirements and will provide a facility that has appropriate access and means for future maintenance and service by Owner.

(CONTINUED ON SHEET M5.3)

NOT FOR CONSTRUCTION

MOTZ ENGINEERING

NO.	ISSUE / REVISION	DATE
1	ISSUED FOR 75% CONSTRUCTION DOCS.	1/13/2023

PROPOSED OFFICES FOR:
INTERNAL REVENUE SERVICE
7300 TURFWAY ROAD THIRD & FOURTH FLOORS FLORENCE, KY. 41042

KEVIN SULLIVAN ARCHITECTURE LLC
2646 PANCOAST AVE. CINCINNATI, OHIO 45211
(513) 721-2191 kevin@ksullivanarchitecture.com

SCALE:	COMM. NO.
AS SHOWN	22064
DATE:	DRAWN BY:
11/18/2022	JDH

3RD & 4TH FLOOR MECHANICAL DEMOLITION PLAN

SHEET
M5.30

(CONTINUED FROM SHEET M5.2)

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 TESTING PREPARATION

A. Certify that HVAC systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

B. Certify that HVAC instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Certify that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.

D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

E. Inspect and verify the position of each device and interlock identified on checklists.

F. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.

G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.2 TESTING VERIFICATION

A. Prior to performance of testing and balancing Work, provide copies of reports, sample forms, checklists, and certificates to the CxA.

B. Notify the CxA at least 10 days in advance of testing and balancing Work, and provide access for the CxA to witness testing and balancing Work.

C. Provide technicians, instrumentation, and tools to verify testing and balancing of HVAC systems at the direction of the CxA.
1. The CxA will notify testing and balancing Subcontractor 10 days in advance of the date of field verification. Notice will not include data points to be verified.
2. The testing and balancing Subcontractor shall use the same instruments (by model and serial number) that were used when original data were collected.
3. Failure of an item includes, other than sound, a deviation of more than 10 percent. Failure of more than 10 percent of selected items shall result in rejection of final testing, adjusting, and balancing report. For sound pressure readings, a deviation of 3 dB shall result in rejection of final testing. Variations in background noise must be considered.
4. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.3 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of HVAC testing shall include entire HVAC installation.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. Tests will be performed using design conditions whenever possible.

E. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

F. The CxA may direct that set points be altered when simulating conditions is not practical.

G. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

H. If tests cannot be completed because of a deficiency outside the scope of the HVAC system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.

I. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.4 HVAC SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

H. The following systems shall be commissioned:
1. HVAC systems including:
a. Direct digital automatic temperature control system.
b. Air distribution systems.
c. Exhaust systems.

SECTION 233113 - METAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes metal ducts for supply, return and exhaust air-distribution systems in pressure classes from minus 2 to plus 4 inch wg. Metal ducts are to include the following:
1. Rectangular ducts and fittings.
2. Single-wall, round spiral-seam ducts and formed fittings.

1.2 SYSTEM DESCRIPTION

A. Duct system design, as indicated, has been used to select size and type of air moving and distribution equipment and other air system components. Changes to layout or configuration of duct system must be specifically approved in writing by the Engineer. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

1.3 SUBMITTALS

A. Shop Drawings: The Sheet Metal Contractor shall prepare ductwork drawings, at a minimum scale of 1/4" = 1'-0", in ACAD Release 2000 or newer edition. Submit an electronic copy of ductwork drawings for review and approval by the Architect/Engineer before coordination drawings are submitted for coordination. Drawings may be submitted to the Architect/Engineer in stages if required to expedite work. Do not proceed with fabrication of ductwork until submitted drawings are approved by the Architect/Engineer

1.4 QUALITY ASSURANCE

A. NFPA Compliance:
1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Comply with the most current version of SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653 and having G60 (Z180) coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.

D. Tie Rods: Galvanized steel, 1/4 inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 SHEET METAL COATINGS

A. Provide paint grip for all exposed ductwork.

2.3 SEALANT MATERIALS

A. Joint and Seam Sealants, General: The term "sealant" is not limited to materials of adhesive or mastic nature but includes tapes and combinations of open-weave fabric strips and mastics.

B. Joint and Seam Tape: 2 inches wide; glass-fiber-reinforced fabric.

C. Tape Sealing System: Woven-fiber tape impregnated with gypsum mineral compound and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.

D. Water-Based Joint and Seam Sealant: Flexible, adhesive sealant, resistant to UV light when cured, UL 723 listed, and complying with NFPA requirements for Class 1 ducts.

E. Solvent-Based Joint and Seam Sealant: One-part, non-sag, solvent-release-curing, polymerized butyl sealant formulated with a minimum of 75 percent solids.

2.4 HANGERS AND SUPPORTS

A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.

B. Hanger Materials: Galvanized sheet steel or threaded steel rod.
1. Strap and Rod Sizes: Comply with the most current version of SMACNA's "HVAC Duct Construction Standards-Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.
2. Galvanized-steel straps attached to aluminum ducts shall have contact surfaces painted with zinc-chromate primer.

C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36.
1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

2.5 RECTANGULAR DUCT FABRICATION

A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to the most current version of SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."

B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.
1. Manufacturers:
a. Ductmate Industries, Inc.
b. Nexus Inc.
c. Ward Industries, Inc.

C. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.
1. Duct Size: Maximum 30 inches wide and up to 2-inch wg pressure class.
2. Longitudinal Seams: Pittsburgh lock sealed with non-curing polymer sealant.

D. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches and larger and 0.0359 inch thick or less, with more than 10 sq. ft. of non-braced panel area unless ducts are lined.

2.6 ROUND DUCT AND FITTING FABRICATION

A. Round, Spiral Lock Seam Ducts: Fabricate supply ducts of galvanized steel according to the most current version of SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
1. Manufacturers:
a. Lindab
b. McGill AirFlow Corporation.
c. SEMCO Incorporated.

B. Duct Joints:
1. Minus 2 inches wg to plus 2 inches wg pressure class
a. Ducts up to 20 inches in Diameter: Interior, center-beaded slip coupling, sealed before and after fastening, attached with sheet metal screws.
b. Joints shall be made with pop rivets or sheet metal screws and sealed.
2. Less than minus 2 inches wg or more than plus 2 inches wg pressure class
a. All fitting ends shall come factory equipped with a double lipped, U-profile, EPDM rubber gasket. Gasket shall be manufactured to gauge and flexibility so as to insure that system will meet all of the performance criteria set forth in the manufacturers literature. Gasket shall be classified by Underwriters Laboratories to conform to ASTM E84-91a and NFPA 90A flame spread and smoke developed ratings of 25/50.
b. All fitting ends shall be calibrated to manufacturers published dimensional tolerance standard and associated spiral duct.
c. All fitting ends from 3" to 24" Dia. shall have rolled over edges for added strength and rigidity.
d. All elbows from 3" to 12" Dia. shall be 2-piece die stamped and continuously stitch welded. All elbows 14" Dia. and larger shall be standing seam gorelock construction and internally sealed.
e. The radius of all 90 and 45 elbows shall be 1.5 times the elbow diameter.
f. All fittings that are of either spot welded or button punched construction shall be internally sealed.
g. Fittings shall be connected with self tapping sheet metal screws or pressure proof pop rivets in quantity and procedure per manufacturers recommendations.

C. 90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA's "1985 HVAC Duct Construction Standards--Metal and Flexible," with metal thicknesses specified for longitudinal-seam straight ducts.

D. Diverging-Flow Fittings: Fabricate with reduced entrance to branch taps and with no excess material projecting from fitting onto branch tap entrance.

E. Fabricate elbows using die-formed, gored, pleated, or mitered construction. Bend radius of die-formed, gored, and pleated elbows shall be 1-1/2 times duct diameter. Unless elbow construction type is indicated, fabricate elbows as follows:
1. Mitered-Elbow Radius and Number of Pieces: Welded construction complying with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.
2. Die-Formed Elbows for Sizes through 12 Inches in Diameter with 2-piece welded construction, 24 ga.
3. Round Elbows Larger Than 14 Inches in Diameter: Fabricate gored elbows 22 ga. for 16 inches through 26 inches, 20 ga. for 28 inches and above.

F. All tees and crosses shall be conical fittings.

G. Round connections to rectangular ducts shall be made with bellmouth fittings.

H. All connections to round ductwork shall be made with full body fittings. Side taps and saddles are not acceptable.

PART 3 - EXECUTION

3.1 DUCT APPLICATIONS

A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:
1. Supply Ducts (from air handling units to VAV terminal units), (Positive Pressure): 4 inch w.g. pressure class.
2. Supply Ducts: (from terminal units to air devices), (Positive Pressure): 2-inch w.g. pressure class.
3. Return Ducts: (from air devices to air handling units) (Negative Pressure): 2-inch w.g. pressure class.
4. Exhaust Ducts, (Negative Pressure): 2-inch w.g. pressure class.

B. All ducts shall be of galvanized steel construction.

3.2 DUCT INSTALLATION

A. Construct and install ducts according to the most current version of SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.

B. Install round ducts in lengths not less than 10 feet unless interrupted by fittings.

C. Install ducts with fewest possible joints.

D. Install fabricated fittings for changes in directions, size, and shape and for connections. Fittings indicated on drawings are diagrammatic and are for information purposes only.

E. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches, with a minimum of three (3) screws in each coupling.

F. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

I. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.

J. Coordinate layout with suspended ceiling, fire-dampers, lighting layouts, and similar finished work.

K. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws. Longitudinal joints shall be on the top side of horizontal ducts.

L. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's "Duct Cleanliness for New Construction." All ductwork is to be maintained at the SMACNA Intermediate Cleanliness level.

M. This Contractor shall paint interiors of metal ducts, that do not have duct liner, for 24 inches upstream and downstream of duct mounted registers and grilles. Apply one (1) coat of flat, black, latex finish coat over a compatible galvanized-steel primer.

N. Duct dimensions on drawings are inside clear dimensions.

3.3 SEAM AND JOINT SEALING

A. Seal all duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.

B. Seal ducts before external insulation is applied.

3.4 HANGING AND SUPPORTING

A. Support horizontal ducts within 24 inches of each elbow and within 48 inches of each branch intersection.

B. Support vertical ducts at maximum intervals of 6 feet and at each floor.

C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.

3.5 CONNECTIONS

A. Make connections to equipment with flexible connectors.

B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.6 DUCT CLEANING

A. Clean new duct system(s) before testing, adjusting, and balancing.

B. Use service openings for entry and inspection.
1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated duct.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

C. Particulate Collection and Odor Control:
1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:
1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Coils and related components.
4. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
5. Supply-air ducts, dampers, actuators, and turning vanes.
6. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:
1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Provide drainage and cleanup for wash-down procedures.
5. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.7 FIELD QUALITY CONTROL

A. Perform the following field tests and inspections according to SMACNA's "HVAC Air Duct Leakage Test Manual" and prepare test reports:
1. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
2. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If pressure classes are not indicated, test the entire system at the maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven (7) days' advance notice for testing.
3. Maximum Allowable Leakage: Comply with requirements for Leakage Class 3 for round ducts, Leakage Class 12 for rectangular ducts in pressure classes lower than and equal to 2 inch w.g. (both positive and negative pressures) and leakage class 6 for pressure classes above 2 inch w.g.

Remake leaking joints and retest until leakage is equal to or less than maximum allowable.SECTION 233300 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Volume dampers.
2. Motorized Control Dampers.
3. Turning vanes.
4. Duct-mounting access doors.
5. Flexible connectors.
6. Flexible ducts.
8 Duct accessory hardware.

B. The motorized automatic control dampers are supplied by the HVAC Contractor. The HVAC contractor shall install the motorized automatic control dampers. TCC shall provide operators and linkage.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

A. Comply with the most current version of SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.

B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653 and having G60 (Z180) coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.

C. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

D. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.2 VOLUME DAMPERS

A. Manufacturers:
1. Air Balance, Inc.
2. American Warming and Ventilating
3. Lindab (Medium velocity Basis of Design)
3. McGill AirFlow Corporation
4. Metalaire, Inc.
5. Ruskin Company (Low velocity Basis of Design)

B. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include dial type quadrant handle locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class. Provide stand-off assembly for all balancing dampers that are installed in insulated ducts.

C. Standard Volume Dampers: Single-blade up to 6" blade width and opposed multi-blade on 8" and larger blade width, standard leakage rating, and suitable for horizontal or vertical applications.
1. Steel Frames: 22 gauge, hat-shaped, galvanized sheet steel channels, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
2. Roll-Formed Steel Blades: 22 gauge galvanized sheet steel.
3. Blade Axles: Galvanized steel.
4. Bearings: Molded synthetic.
5. Tie Bars and Brackets: Aluminum.
6. Tie Bars and Brackets: Galvanized steel.

D. Low velocity rectangular: Ruskin Model MD25

E. Low velocity round: Ruskin Model MDRS25

F. Medium velocity round: Lindab Model DRU

2.3 MOTORIZED CONTROL DAMPERS

A. Manufacturers:
1. Air Balance, Inc.
2. American Warming and Ventilating.
3. Greenheck.
4. Ruskin Company.

B. General Description: AMCA-rated, parallel or opposed blade design; minimum of 11 gauge thick, galvanized-steel frames with holes for duct mounting with maximum blade width of 8 inches.
1. Secure blades to 1/2 inch diameter, zinc-plated axles using zinc-plated hardware, with nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
2. Operating Temperature Range: From minus 40 to plus 200 deg F .
3. Provide parallel or opposed-blade design with inflatable seal blade edging, or replaceable rubber seals, rated for leakage at less than 10 cfm per sq. ft. of damper area, at differential pressure of 4 inch wg when damper is being held by torque of 50 in. x lbf; when tested according to AMCA 500D.
4. Coordinate damper configuration with the Temperature Control Contractor including blade and rod as well as the operator mounting.

2.4 TURNING VANES

A. Fabricate to comply with the most current version of SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.

B. Manufactured Turning Vanes: Fabricate 1-1/2 inch wide, airfoil-vane, curved blades of galvanized sheet steel set 3/4 inch o.c.; support with bars perpendicular to blades set 2 inches o.c.; and set into vane runners suitable for duct mounting.
1. Manufacturers:
a. Ductmate Industries, Inc.
b. Duro Dyne Corp.
c. METALAIRE, Inc.

2.5 DUCT-MOUNTING ACCESS DOORS

A. General Description: Fabricate doors airtight and suitable for duct pressure class.

B. Door: Double wall, duct mounting, and rectangular; fabricated of galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class. Include piano hinge and cam latches.
1. Manufacturers:
a. American Warming and Ventilating.
b. CESCO Products.
c. Ductmate Industries, Inc.
d Greenheck.
e. McGill AirFlow Corporation.
f. Ruskin
2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
3. Provide number of hinges and locks as follows:
a. Less Than 12 Inches square: Secure with two (2) sash locks.
b. Up to 18 Inches Square: Two (2) sash locks.
c. Up to 24 by 48 Inches: Secure with two (2) compression locks.

C. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

D. Insulation: 1-inch thick, fibrous-glass or polystyrene-foam board.

2.6 FLEXIBLE CONNECTORS

A. Manufacturers:
1. Ductmate Industries, Inc.
2. Duro Dyne Corp.
3. Ventfabrics, Inc.

B. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

C. Metal-Edged Connectors: Factory fabricated with a fabric strip 3" to 6" wide attached to two strips of 2-3/4-inch wide, 0.028-inch thick, galvanized sheet steel or 0.032-inch thick aluminum sheets. Select metal compatible with ducts.

D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
1. Minimum Weight: 26 oz./sq. yd.
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

E. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
1. Minimum Weight: 24 oz./sq. yd..
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F.

2.7 FLEXIBLE DUCTS

A. Manufacturers:
1. Flexmaster U.S.A., Inc.
2. Hart & Cooley, Inc.
3. McGill AirFlow Corporation.

B. Non-insulated-Duct Connectors: UL 181, Class 1, black polymer film supported by helically wound, spring-steel wire.
1. Pressure Rating:4-inch wg positive and 0.5-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 20 to plus 175 deg F.

C. Insulated-Duct Connectors: UL 181, Class 1, black polymer film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene vapor barrier film.
1. Pressure Rating: 4-inch wg positive and 0.5-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 20 to plus 175 deg F.

D. Flexible Duct Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action, in sizes 3 through 18 inches to suit duct size.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION

A. Install duct accessories according to applicable details in the most current version of SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel ducts.

C. Install backdraft dampers on exhaust fans or exhaust ducts where indicated.

D. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts as required for air balancing. Install at a minimum of two (2) duct widths from branch takeoff. Locking quadrants shall be easily accessible and shall be installed on the outside of the duct insulation.

E. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:
1. Downstream from volume dampers and equipment.
2. To interior of ducts for cleaning; before and after each change in direction, at maximum 50-foot spacing. Duct mounted grilles will replace access doors for duct cleaning.
3. On sides of ducts where adequate clearance is available.

F. Install the following sizes for duct-mounting, rectangular access doors: Based on the following maximum duct dimensions:
1. 9" and smaller: 6" x 8" door size.
2. 10" to 12": 9" x 12" door size.
3. 13" to 16": 12" x 16" door size.
4. 18" and larger: 14" x 14" door size.

G. Label access doors according to Division 23 Section "Mechanical Identification."

H. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.

I. Connect terminal units to supply ducts with maximum 12-inch lengths of flexible duct. Do not use flexible ducts to change directions.

J. Connect diffusers to low pressure ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place. See detail on drawings.

K. Connect flexible ducts to metal ducts with draw bands.

3.2 ADJUSTING

A. Adjust duct accessories for proper settings.

B. Final positioning of manual-volume dampers is specified in Division 23 Section "Testing, Adjusting, and Balancing."

SECTION 233713 - DIFFUSERS, REGISTERS AND GRILLES

PART 1 - GENERAL

1.1 REFERENCE

A. SCOPE OF WORK
1. Provide grilles, diffusers, air devices and appurtenances with size and capacities as shown on drawings.

1.2 SUBMITTALS

A. Product Data: For each product indicated, include the following:
1. Data Sheet: Indicate materials of construction, finish and mounting details; and performance date including throw and drop, static-pressure drop and noise ratings.
2. Diffuser, Register and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size and accessories furnished.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one (1) of the manufacturers specified:
1. Price (Basis of design)
2. Krueger
3. Anemostat

2.2 SQUARE PLAQUE FACED CEILING DIFFUSERS

A. Ceiling diffusers of sizes and mounting types designated by the plans and air device schedule. Diffusers shall consist of a precision formed back cone of one piece seamless construction which incorporates a round inlet collar of sufficient length for connecting rigid or flexible duct. An inner plaque assembly shall be incorporated that drops no more than 1/4" below the ceiling plane to assure proper air distribution performance. The inner plaque assembly shall be completely removable from the diffuser face to allow full access to any dampers or other ductwork components located near the diffuser neck. The diffuser is to include an integral opposed blade damper that is adjustable from the face of the air device. Where required, provide quadrant blank off plates to eliminate air flow in an undesired direction. Finish shall be white powder coat.

2.3 SUPPLY REGISTERS

A. Supply registers of the sizes and mounting types indicated on the plans and outlet schedule. Registers shall be double deflection type with two sets of fully adjustable deflection blades space 3/4" on center. The front set of blades shall run parallel to the short or long dimension of the register as indicated in the air device schedule. The integral volume control damper shall be of the opposed blade type and shall be constructed of cold rolled steel. The damper shall be operable from the register face. The damper shall be coated steel. Registers are to be suitable for surface mounting or duct mounting as indicated on the drawings. Registers mounted in walls shall have steel plaster frames. Provide 1-1/4" margin with countersink screw mounting for drywall and masonry surfaces complete with mounting frame. Units in equipment rooms shall be a mill finish. All other registers shall have a white powder coat finish.

2.4 HEAVY DUTY BAR TYPE RETURN REGISTER AND GRILLES

A. Exhaust registers of the sizes and mounting types indicated on the plans and outlet schedule. Registers shall be 45 degree deflection fixed louver type with blades spaced 3/4" on center. The outlet shall have 14 gauge steel blades and heavy duty steel support bars and frame. Blades shall run parallel to the long dimension of the register. The integral volume control damper shall be of the opposed blade type and shall be constructed of cold rolled steel. The damper shall be operable from the register face. The damper shall be coated steel. All registers shall have a white powder coat finish.

2.5 EGGCRATE GRILLES AND REGISTERS

A. Exhaust registers and grilles of the sizes and mounting types indicated on the plans and air device schedule. Units shall be of aluminum construction, consisting of aluminum 1/2" x 1/2" x 1/2" eggcrate core and an extruded aluminum border. Units designated as registers shall be equipped with integral volume control damper of the opposed blade type and shall be constructed of heavy gauge cold rolled steel. The damper shall be operable from the register face. The damper shall be coated steel. All units shall have white powder coat finish.

2.6 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install grilles, registers, diffusers and air devices level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw and pressure drop. Make final locations where indicated as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install grilles, registers, diffusers and air devices with airtight connections to ducts and to allow service and maintenance of dampers, air extractors and fire dampers.

3.3 ADJUSTING

A. After installation, adjust grilles, registers, diffusers and air devices to air patterns indicated, or as directed before starting air balancing.

NOT FOR CONSTRUCTION

MOTZ ENGINEERING
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NO.	ISSUE / REVISION	DATE:	NO.	ISSUE / REVISION	DATE:	NO.	ISSUE / REVISION	DATE:
1	ISSUED FOR 75% CONSTRUCTION DOCS.	1/13/2023						

PROPOSED OFFICES FOR:
INTERNAL REVENUE SERVICE
7300 TURFWAY ROAD THIRD & FOURTH FLOORS FLORENCE, KY. 41042

KEVIN SULLIVAN ARCHITECTURE LLC
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SCALE:	COMM. NO.
AS SHOWN	22064
DATE:	DRAWN BY:
11/18/2022	JDH

3RD & 4TH FLOOR MECHANICAL DEMOLITION PLAN

SHEET
M5.40