## **DUCTWORK SYMBOLS**

RECTANGULAR	ROUND / OVAL	
	CONICAL FITTING	ROUND BRANCH DUCTWORK
ACOUSTIC	ACOUSTIC	RECTANGULAR BRANCH DUCTWORK
		SQUARE TEE WITH TURNING VANES NOTE: ALL SQUARE ELBOWS IN RECTANGULAR AND ROUND / OVAL DUCTWORK SHALL BE PROVIDED WITH TURNING VANES. REFER TO SPECIFICATIONS FOR ADDITIONAL DETAILS.
		RADIUS'D TEE
		RADIUS'D BRANCH
		UNLESS NOTED OTHERWISE ON DRAWINGS, 15° MAX FOR DIVERGING, 30° MAX FOR CONVERGING TRANSITION
		EXISTING DUCTWORK TO REMAIN
		EXISTING DUCTWORK TO REMOVED
		RETURN AIR, RELIEF AIR, OR TRANSFER AIR DUCTWORK. (UP AND DOWN) RADIUSED OR SQUARE WITH TURNING VANES. SUPPLY AIR OR OUTDOOR AIR DUCTWORK.
		(UP AND DOWN) RADIUSED OR SQUARE WITH TURNING VANES.
		EXHAUST AIR DUCTWORK. (UP AND DOWN) RADIUSED OR SQUARE WITH TURNING VANES.
		RECTANGULAR AND ROUND / OVAL DUCTWORK RISE / DROP WITH 90° RADIUSED OR SQUARE ELBOWS AND TURNING VANES.
		RADIUS ELBOW
		90° SQUARE ELBOW (WITH TURNING VANES) <u>NOTE</u> : ALL SQUARE ELBOWS IN RECTANGULAR AND ROUND DUCTWORK SHALL BE PROVIDED WITH TURNING VANES.
		SQUARE THROAT / RADIUS HEEL FITTINGS <u>NOT</u> ACCEPTABLE
AD	AD	ACCESS DOOR OR PANEL
		DUCTWORK RISE IN DIRECTION OF AIR FLOW
		DUCTWORK DROP IN DIRECTION OF AIR FLOW
+++  ++  +++	┼┼┼┥╽┝┼┥╎┝┼┼┤	FLEXIBLE DUCTWORK
		DUCTWORK WITH ACOUSTICAL LINER. LISTED DUCT SIZES ARE INSIDE CLEAR DIMENSIONS.
		FLEXIBLE CONNECTION
		DUCTWORK CONSTRUCTED OF SPECIAL MATERIAL AS NOTED
		DIRECTION OF PITCH
26x	20	RECTANGULAR DUCTWORK DIMENSIONS (W x H)
26	Ø	ROUND DUCTWORK DIMENSIONS (DIA)
26x20	0 OV	OVAL DUCTWORK DIMENSIONS (W x H)

## **DUCTWORK DEVICE SYMBOLS**

A3 10ø 300	AIR DEVICE. A3 = DESIGNATION (REFER TO FLOOR PLANS AND AIR DEVICE SCHEDULE FOR VARIOUS DESIGNATIONS). 10ø = NECK SIZE (IN INCHES). 300 = REQUIRED CFM. ALL AIR DEVICE DISCHARGE 4-WAY UNLESS NOTED WITH FLOW ARROWS. AIR DEVICE SHOWN IS 2-WAY SIDE THROW. METHOD OF IDENTIFICATION ALSO APPLIES TO OTHER CEILING MOUNTED AIR DEVICES.
SG1 20x12 300 BOG: 9'-0"	WALL OR DUCTWORK MOUNTED AIR DEVICE. SG1 = DESIGNATION (REFER TO AIR DEVICE SCHEDULE). 20x12 = DUCT CONNECTION SIZE (IN INCHES). 300 = REQUIRED CFM. 9'-0" = MOUNTING HEIGHT FROM FLOOR TO BOTTOM OF GRILLE.
	MANUAL BALANCING DAMPER WITH LOCKING DEVICE
	BDD = BACK DRAFT DAMPER CBD = COUNTER-BALANCED BACK DRAFT DAMPER
A-D	FIRE DAMPER A = TYPE (REFER TO FLOOR PLANS FOR VARIOUS TYPES) D OR S = DYNAMIC OR STATIC
	SD = SMOKE DAMPER FS = COMBINATION FIRE - SMOKE DAMPER MDD = MOTORIZED DAMPER AFMS = AIR FLOW MEASURING STATION
SD SD	DUCT MOUNTED SMOKE DETECTOR. COORDINATE LOCATION.
	HUMIDITY SENSOR - DUCT MOUNTED
SP	STATIC PRESSURE SENSOR - DUCT MOUNTED
©	CARBON DIOXIDE SENSOR - DUCT MOUNTED
S S	TEMPERATURE SENSOR - DUCT MOUNTED

## **VALVES AND FITTINGS**

VALVES	AND FITTINGS
	CHECK VALVE
	SHUTOFF VALVE (REFER TO SPECIFICATIONS FOR REQUIRED TYPE BASED ON APPLICATIONS)
	COMBINATION SHUTOFF AND BALANCING VALVE (REFER TO SPECIFICATIONS FOR REQUIRED TYPE BASED ON APPLICATIONS)
	CONCENTRIC PIPE REDUCER
FOT FOB	ECCENTRIC PIPE REDUCER
	PRESSURE GAUGE
	TEMPERATURE GAUGE OR THERMOMETER
	UNION
· · ·	CLEANOUT
	STRAINER
	STRAINER WITH A BLOW DOWN VALVE AND HOSE CONNECTION
 	DRAIN VALVE WITH HOSE END CONNECTION
	AUTOMATIC FLOW CONTROLLER WITH P/T PLUG IN AND OUT
	EXPANSION JOINT
<u> </u>	MANUAL AIR VENT
<u> </u>	AUTOMATIC AIR VENT
	PRESSURE REDUCING VALVE
	MODULATING 2 PORT AUTOMATIC CONTROL VALVE
	2 PORT AUTOMATIC CONTROL VALVE, 2-POSITION UNLESS SPECIFIED OTHERWISE
	MODULATING 3 PORT AUTOMATIC CONTROL VALVE
	3 PORT AUTOMATIC CONTROL VALVE, 2-POSITION UNLESS SPECIFIED OTHERWISE
	AUTOMATIC PRESSURE INDEPENDENT CONTROL VALVE
	QUICK OPENING MANUAL VALVE
	SAFETY RELIEF VALVE. FOR HYDRONIC SYSTEMS PIPE DISCHARGE AIR GAPPED TO FLOOR DRAIN UNLESS NOTED OTHERWISE. FOR STEAM SYSTEMS PIPE DISCHARGE TO OUTDOORS.
	VACUUM BREAKER
	NEEDLE VALVE
	PRESSURE AND TEMPERATURE TEST PLUG
<u> </u>	VACUUM GAUGE WITH STOP
]	END CAP
	GLOBE VALVE
	SHUTOFF VALVE AND BOX
	SHUTOFF VALVE ON RISER
	SOLENOID VALVE
	WATER METER
	FLOW METER
	BI-METALIC STEAM TRAP AND DRIP ASSEMBLY
FT O	
	THERMOSTATIC STEAM TRAP AND DRIP ASSEMBLY
	PRESSURE GAUGE WITH COCK AND SIPHON LOOP
MISC SYN	MBOLS

## 

©	CARBON DIOXIDE SENSOR. WHEN WALL MOUNTED, MOUNTING HEIGHT 46" TO MEET ADA REQUIREMENTS. WHEN MOUNTED NEXT TO WALL SWITCH COORDINATE WITH ARCHITECT.
$\bigcirc$	CARBON MONOXIDE SENSOR. WHEN WALL MOUNTED, MOUNTING HEIGHT 46" TO MEET ADA REQUIREMENTS. WHEN MOUNTED NEXT TO WALL SWITCH COORDINATE WITH ARCHITECT.
DP	DIFFERENTIAL PRESSURE SENSOR. WHEN WALL MOUNTED, MOUNTING HEIGHT 46" TO MEET ADA REQUIREMENTS. WHEN MOUNTED NEXT TO WALL SWITCH COORDINATE WITH ARCHITECT.
$(\exists)$	HUMIDITY SENSOR. WHEN WALL MOUNTED, MOUNTING HEIGHT 46" TO MEET ADA REQUIREMENTS. WHEN MOUNTED NEXT TO WALL SWITCH COORDINATE WITH ARCHITECT.
S	TEMPERATURE SENSOR. WHEN WALL MOUNTED, MOUNTING HEIGHT 46" TO MEET ADA REQUIREMENTS. WHEN MOUNTED NEXT TO WALL SWITCH COORDINATE WITH ARCHITECT.
\$	TEMPERATURE SENSOR MOUNTED IN CEILING PLENUM.
SP	STATIC PRESSURE SENSOR.
1	SPACE TEMPERATURE SENSOR / THERMOSTAT. WHEN WALL MOUNTED, MOUNTING HEIGHT 46" TO MEET ADA REQUIREMENTS. WHEN MOUNTED NEXT TO WALL SWITCH COORDINATE WITH ARCHITECT.
Ĥ	EMERGENCY SHUTOFF STATION. 46" MOUNTING HEIGHT UNLESS NOTED OTHERWISE.

## **GENERAL FLOOR PLAN NOTES**

3	PLAN NOTE. APPLIES ONLY TO THE SHEET WHICH IT IS SHOWN UNLESS NOTED OTHERWISE.
3	DETAIL NOTE. APPLIES ONLY TO THE ASSOCIATED DETAIL.
A1	EQUIPMENT, DEVICE, OR PLUMBING FIXTURE MARK. LETTER DESIGNATIONS REFER TO SCHEDULES.
H1 OR H1	EQUIPMENT REFERENCE. LETTER DESIGNATION VARIES. REFER TO SCHEDULES.
$\bigcirc$	RISER OR STACK NUMBER
B H2	DETAIL: B = DETAIL DESIGNATION H2 = SHEET WHERE DETAIL IS LOCATED
1 H2	SECTION: 1 = SECTION DESIGNATION H2 = SHEET WHERE DETAIL IS LOCATED
A1	"UP TO" SYMBOL (ITEM ON FLOOR ABOVE)
TOE: DEC: DEC: DEC: DEC: DEC: DEC: DEC: DE	APPROXIMATE DIMENSION ABOVE FINISHED FLOOR TO TOP OR BOTTOM OF
ELEV: 8' - 0" ELEV: 8	
20x20 TOD: 20x20 BOD:	3' - 10" APPROXIMATE DIMENSION ABOVE FINISHED FLOOR TO TOP OR BOTTOM OF DUCTWORK, UNLESS NOTED OTHERWISE
"UC-X	DOOR UNDERCUT. X = HEIGHT OF UNDERCUT IN INCHES; 0.75 INCH UNDERCUT IF NO HEIGHT IS NOTED. COORDINATE WITH GC.
<i>"</i> DL-1	DOOR LOUVER. 1 = SQUARE FEET OF LOUVER.
${\color{black} \bullet}$	CONNECT TO EXISTING
${}^{\bullet}$	DEMOLISH TO POINT INDICATED

### PIPING SYMBOLS DOUBLE LINE SINGLE LINE

		BOTTOM CONNECTION (45°)
		BOTTOM CONNECTION (90°)
		BRANCH TEE CONNECTION (NOTE: BULLHEAD TEE'S ARE NOT PERMITTED)
	<b></b>	DIRECTION OF PITCH
	D	DROP
0		ELBOW DOWN
E B	•	ELBOW UP
(======================================		EXISTING PIPE TO BE REMOVED
		EXISTING PIPE TO REMAIN
		FLOW DIRECTION DESIGNATION
	O	PIPE RISER
	$\bigcirc$	PUMP
R R	R	RISE
		TOP CONNECTION (45°)
		TOP CONNECTION (90°)

## **HVAC PIPING DESIGNATIONS**

CHS	CHILLED WATER SUPPLY PIPE
CHR	CHILLED WATER RETURN PIPE
CWS	CONDENSER WATER SUPPLY PIPE
CWR	CONDENSER WATER RETURN PIPE
CHGS-	CHILLED WATER GLYCOL SOLUTION SUPPLY PIPE
CHGR	CHILLED WATER GLYCOL SOLUTION RETURN PIPE
	DRAIN LINE. PITCH IN DIRECTION INDICATED
HWR-	HEATING HOT WATER RETURN PIPE
HWS	HEATING HOT WATER SUPPLY PIPE
MU	WATER MAKE-UP PIPE
v	VENT PIPE
ET	EXPANSION TANK PIPE
HG	REFRIGERANT HOT GAS LINE
	REFRIGERANT LIQUID LINE
	REFRIGERANT SUCTION LINE
	STEAM SUPPLY PIPE - NUMBER INDICATES P.S.I.G.
HPC	HIGH PRESSURE CONDENSATE RETURN PIPE
HPS-	HIGH PRESSURE STEAM SUPPLY PIPE
LPC	LOW PRESSURE CONDENSATE RETURN PIPE
LPS-	LOW PRESSURE STEAM SUPPLY PIPE
MPC	MEDIUM PRESSURE CONDENSATE RETURN PIPE
MPS	MEDIUM PRESSURE STEAM SUPPLY PIPE
PC	PUMPED CONDENSATE RETURN PIPE

## ABBREVIATIONS

AC ACCU AD	- AIR COMPRESSOR OR AIR CONDITIONER - AIR COOLED CONDENSING UNIT - ACCESS DOOR OR AREA DRAIN	ID INV IN	- IN - IN - IN
ADJ AFF AFG	- ADJUSTABLE - ABOVE FINISHED FLOOR - ABOVE FINISHED GRADE	KEC	- Kľ
AFG AFMS ALT	- AIR FLOW MEASURING STATION - ALTERNATE	L LAT	- LE - LE
AP APPROX	- ACCESS PANEL - APPROXIMATE	LAV LBS	- LA - P(
ARCH ASSY ATC	- ARCHITECT OR ARCHITECTURAL - ASSEMBLY - AUTOMATIC TEMPERATURE CONTROL	lpc lps lwt	- LC - LC - LE
AIC	(SYNONYMOUS WITH BAS)	MAX	- LL
BAS BDD	- BUILDING AUTOMATION SYSTEM - BACK DRAFT DAMPER	MDD MEZZ	- M( - M
BFP BLDG BOB	- BACKFLOW PREVENTER - BUILDING - BOTTOM OF BEAM	MFR MH MIN	- M/ - M/ - Ml
BOD BOE	- BOTTOM OF DUCT - BOTTOM OF EQUIPMENT	MISC MTD	- MI - M
BOF BOG BOP	- BOTTOM OF FOOTING - BOTTOM OF GRILLE - BOTTOM OF PIPE	MTG MPC	- M( - MI RE
BOP BOT BTU	- BOTTOM OF PIPE - BOTTOM - BRITISH THERMAL UNIT	MPS MU	- MI - W
BTUH	- BRITISH THERMAL UNIT PER HOUR	N/C	- NC
CBD CFCI	- COUNTER BALANCED BACKDRAFT DAMPER - CONTRACTOR FURNISHED CONTRACTOR INSTALLED	NIC N/O NOM	- N( - N( - N(
CFM CHS	- CUBIC FEET PER MINUTE - CHILLED WATER SUPPLY	NPT NTS	- NA - NO
CHR CHGR CHGS	- CHILLED WATER RETURN - CHILLED WATER GLYCOL SOLUTION RETURN - CHILLED WATER GLYCOL SOLUTION SUPPLY	OA OBD	- 01 - 01
CLG CMU	- CHILLED WATER GETCOL SOLUTION SUPPLY - CEILING - CONCRETE MASONRY UNIT	OD OFCI	- 01 - 01 - 01
CO CO2	- CLEAN OUT - CARBON DIOXIDE	OFOI	IN - 0\
CONN CONTR CTR	- CONNECT OR CONNECTION - CONTRACTOR - CENTER	P PC	- PF - PL
CU CW	- COPPER - COLD WATER	PLBG	OF - PL
CWR CWS	- CONDENSER WATER RETURN - CONDENSER WATER SUPPLY	PRESS PRV PSF	- PF - PF - P(
D DB	- DRAIN LINE - DRY BULB	PSI PSIG	- P( - P(
DDC DI	- DIRECT DIGITAL CONTROLS - DEIONIZED WATER	RA	- RE
dia Dim Dn	- DIAMETER - DIMENSION - DOWN	RAD RCP RD	- R/ - RE - R(
DWG	- DRAWING	REC REQD	- RE - RE
EA EAT EC	- EACH OR EXHAUST AIR - ENTERING AIR TEMPERATURE - ELECTRICAL CONTRACTOR (DIVISION 26)	RI RL ROS	- R( - RE - RE
EU EJ ELEC	- ELECTRICAL CONTRACTOR (DIVISION 20) - EXPANSION JOINT - ELECTRICAL	ROS ROR RPM	- RE - RE
ELEV EQUIP	- ELEVATOR - EQUIPMENT	RS	- RE
ET ETR EQS	- EXPANSION TANK - EXISTING TO REMAIN - EQUIPMENT SUPPLIER	S SA SAN	- SF - Sl - SA
EWT EXH	- ENTERING WATER TEMPERATURE - EXHAUST	SCH SCW	- SC - SC
EXP EXT EX	- EXPANSION - EXTERIOR - EXISTING	SHT SPEC SQ	- SH - SF - SC
FD	- FLOOR DRAIN	SQ SR SRV	- SU - SU - SA
FF FLR	- FINISHED FLOOR ELEVATION - FLOOR	SS STD	- S1 - S1
FOB FOF FOG	- FLAT ON BOTTOM - FUEL OIL FLOW - FUEL OIL GAUGE	STM STRUC SUC	- S1 - S1 - SI
FOR FOS	- FUEL OIL RETURN - FUEL OIL SUPPLY	TEMP	- TE
FOT FPM FSC	- FLAT ON TOP - FEET PER MINUTE - FIRE SUPPRESSION CONTRACTOR (DIVISION 21)	TOB TOD TOE	- TC - TC - TC
FTG	- FEET - FOOTING	TOF TOJ	- TC - TC
G	- GAS OR NATURAL GAS	TOP TOS	- T( - T(
GA GAL GALV	- GAUGE - GALLON - GALVANIZED	TYP UNO	- TY - UI
GC GPM	- GENERAL TRADES CONTRACTOR - GALLONS PER MINUTE	V	- VE
HB HC	- HOSE BIBB - HVAC CONTRACTOR (DIVISION 23)	VAC VEL VFD	- VA - VE - VA
HD HG	- HUB DRAIN - REFRIGERANT HOT GAS		(A M
HP HPC HPS	- HORSEPOWER - HIGH PRESSURE CONDENSATE RETURN - HIGH PRESSURE STEAM SUPPLY	VIB VOL VTR	- VA - VC - VE
HR HT	- HOUR - HEAT TRACE	VR VR	- VE
HTR HVAC	- HEATER - HEATING, VENTILATING, AND AIR CONDITIONING	W/ W/O	- W - W
HW HWR HWS	- HOT WATER - HEATING HOT WATER RETURN - HEATING HOT WATER SUPPLY	WB WCO	- W - W

## NOTE: ALL SYMBOLS AND ABBREVIATIONS ARE SUBJECT TO MODIFICATIONS **ON OTHER DRAWINGS.**

ALL SYMBOLS OR ABBREVIATIONS MIGHT NOT NECESSARILY BE USED ON THIS PROJECT.

### **NSIDE DIAMETER** INVERT ELEVATION

## NCHES

- KITCHEN EQUIPMENT CONTRACTOR
- LENGTH LEAVING AIR TEMPERATURE LAVATORY
- POUNDS LOW PRESSURE CONDENSATE RETURN
- LOW PRESSURE STEAM SUPPLY LEAVING WATER TEMPERATURE
- MAXIMUM MOTORIZED DAMPER MEZZANINE
- MANUFACTURER MANHOLE
- MINIMUM OR MINUTE
- MISCELLANEOUS MOUNTED
- MOUNTING
- MEDIUM PRESSURE CONDENSATE RETURN MEDIUM PRESSURE STEAM SUPPLY
- WATER MAKE-UP
- NORMALLY CLOSED NOT IN CONTRACT
- NORMALLY OPEN NOMINAL NATIONAL PIPE THREAD
- NOT TO SCALE OUTDOOR AIR
- OPPOSED BLADE DAMPER OUTSIDE DIAMETER OWNER FURNISHED CONTRACTOR
- NSTALLED OWNER FURNISHED OWNER INSTALLED
- PROPANE GAS PLUMBING CONTRACTOR (DIVISION 22) OR PUMPED CONDENSATE RETURN PLUMBING
- PRESSURE PRESSURE REGULATING VALVE
- POUNDS PER SQUARE FOOT POUNDS PER SQUARE INCH
- POUNDS PER SQUARE INCH GAUGE
- RETURN AIR RADIUS
- REFLECTED CEILING PLAN ROOF DRAIN
- RECESSED REQUIRED
- ROUGH IN REFRIGERANT LIQUID
- REVERSE OSMOSIS WATER SUPPLY REVERSE OSMOSIS WATER RETURN **REVOLUTIONS PER MINUTE**
- REFRIGERANT SUCTION
- SPRINKLER (WET) SUPPLY AIR
- SANITARY OR SANITARY DRAIN SCHEDULE
- SOFT COLD WATER SHEET
- SPECIFICATIONS SQUARE
- SUPPLY RISER
- SAFETY RELIEF VALVE STAINLESS STEEL
- STANDARD STORM OR STORM DRAINAGE
- STRUCTURAL OR STRUCTURE SITE UTILITY CONTRACTOR
- TEMPERATURE
- TOP OF BEAM TOP OF DUCT
- TOP OF EQUIPMENT TOP OF FOOTING
- TOP OF JOIST
- TOP OF PIPE TOP OF SLAB OR TOP OF STEEL TYPICAL
- UNLESS NOTED OTHERWISE
- VENT
- VACUUM VELOCITY
- VARIABLE FREQUENCY DRIVE ADJUSTABLE FREQUENCY
- MOTOR CONTROLLER) VALVE IN BOX
- VOLUME
- VENT THROUGH ROOF VENT RISER
- WITH WITHOUT
- WET BULB WALL CLEANOUT

## **GENERAL NOTES**

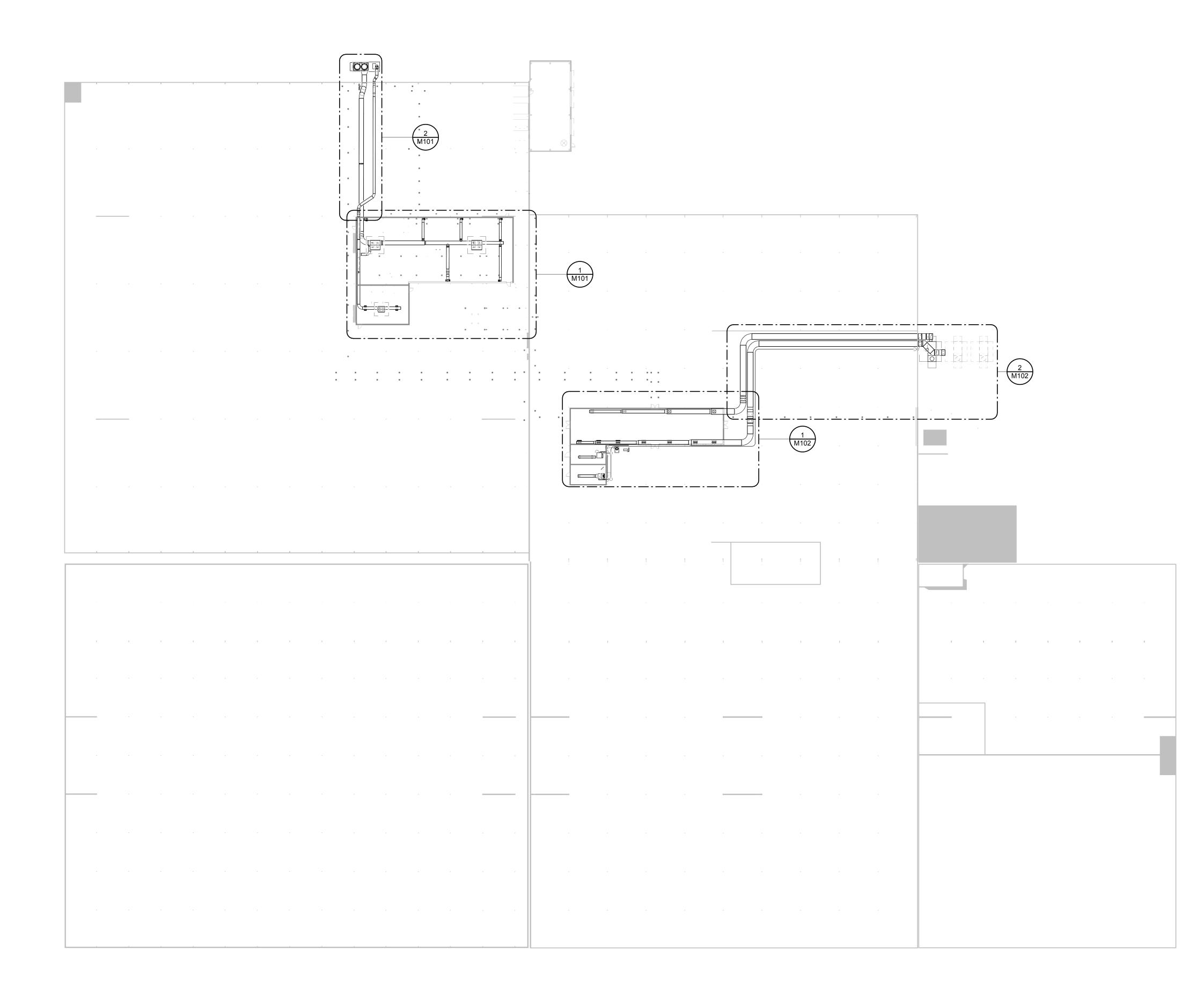
- A. THESE NOTES APPLY TO ALL DIVISION 23 DRAWINGS. B. ALL WORK SHALL BE IN ACCORDANCE WITH THE BEST QUALITY STANDARDS OF THE TRADE, AND SHALL CONFORM WITH ALL FEDERAL, STATE, AND LOCAL CODES AND STANDARDS. THE SAME ARE MADE A PART OF THESE CONTRACT DOCUMENTS.
- C. CONTRACT DOCUMENTS CONSIST OF BOTH THE PROJECT MANUAL AND DRAWINGS, AND BOTH ARE INTENDED TO BE COMPLIMENTARY. ANYTHING APPEARING ON EITHER MUST BE EXECUTED THE SAME AS IF SHOWN ON BOTH.
- D. CONSTRUCTION DOCUMENTS SHALL BE FOLLOWED AS CLOSELY AS POSSIBLE. HOWEVER, SYSTEMS HAVE BEEN SHOWN DIAGRAMMATICALLY AND IN SOME CASES, ENLARGED FOR CLARITY. ANY OFFSETS, ADDITIONAL FITTINGS, AND OR APPURTENANCES REQUIRED TO PROVIDE A COMPLETE AND COORDINATED SYSTEM SHALL BE BORN BY THE CONTRACTOR AND INCLUDED WITH THE CONTRACT.
- E. DUCT RUNOUT SIZES TO DIFFUSERS SHALL BE THE SAME AS THE GRILLE OR DIFFUSER NECK SIZE UNLESS OTHERWISE NOTED.
- F. MAINTAIN REQUIRED SERVICE ACCESS SPACE AT EQUIPMENT. G. REFER TO CONTROL GENERAL NOTES FOR COORDINATION INFORMATION.
- H. ALL CUTTING AND PATCHING WORK REQUIRED FOR THE HVAC WORK SHALL BE INCLUDED IN THE CONTRACT UNLESS NOTED OTHERWISE BELOW. REFINISH ANY SURFACE DISTURBED UNDER THIS WORK TO MATCH EXISTING, EXCEPT WHERE REFINISHING OF THAT SURFACE IS INCLUDED UNDER THE GENERAL TRADES CONTRACT.
- I. COORDINATE ALL REQUIRED SHUT-DOWNS WITH THE OWNER 14 DAYS IN ADVANCE OF SHUT-DOWN. J. AIRFOIL TURNING VANES SHALL BE INSTALLED IN ALL 90 DEGREE ELBOWS EXCEPT TRANSFER DUCTS AND OPEN RETURN AIR BOOTS.
- K. FLOOR PLANS DO NOT INDICATE ALL OF THE REQUIRED VALVING, DEVICES, ETC...ON THE PIPING REQUIRED. REFER TO STANDARD DETAILS, FLUID FLOW DIAGRAMS AND SPECIFICATION FOR ADDITIONAL INFORMATION.
- L. ALL DUCTWORK DESIGNATIONS REFER TO NET FREE AREA INSIDE THE DUCTWORK. M. VOLUME DAMPERS SHALL BE LOCATED AT BRANCH CONNECTION TO THE MAIN PRIOR TO EACH AIR DEVICE.
- N. OFFSET PIPING AND DUCTWORK AS REQUIRED TO MAINTAIN ALL MANUFACTURER RECOMMENDED CLEARANCES.
- O. COORDINATE WALL AND FLOOR OPENINGS WITH ALL TRADES CONTRACTOR. P. BRANCH PIPING TO UNITS SHALL BE SAME SIZE INDICATED ON UNIT SCHEDULE UNLESS NOTED
- OTHERWISE. Q. FIELD VERIFY EXISTING CONDITIONS DURING BIDDING PERIOD, INCLUDING EQUIPMENT, PIPE, AND DUCT SIZES AND LOCATIONS, CLEARANCES, ETC.
- R. DUCTWORK AND PIPING ON DRAWINGS DOES NOT INDICATE ALL REQUIRED OFFSETS AND FITTINGS. INCLUDE THESE OFFSETS AND FITTINGS TO COORDINATE WITH OTHER CONTRACTORS AS PART OF THE CONTRACT.
- S. COORDINATE LOCATION OF THERMOSTATS AND OTHER WALL-MOUNTED DEVICES WITH FURNITURE, WALL FRAMING, ELECTRICAL OUTLETS AND DEVICES, AND TECHNOLOGY OUTLETS AND DEVICES PRIOR TO ROUGH-IN.
- T. THERMOSTATS SHALL BE MOUNTED PERPENDICULAR AND IN VERTICAL ALIGNMENT WITH THE ROOM LIGHT SWITCH WHERE POSSIBLE.

## MECHANICAL SHEET LIST

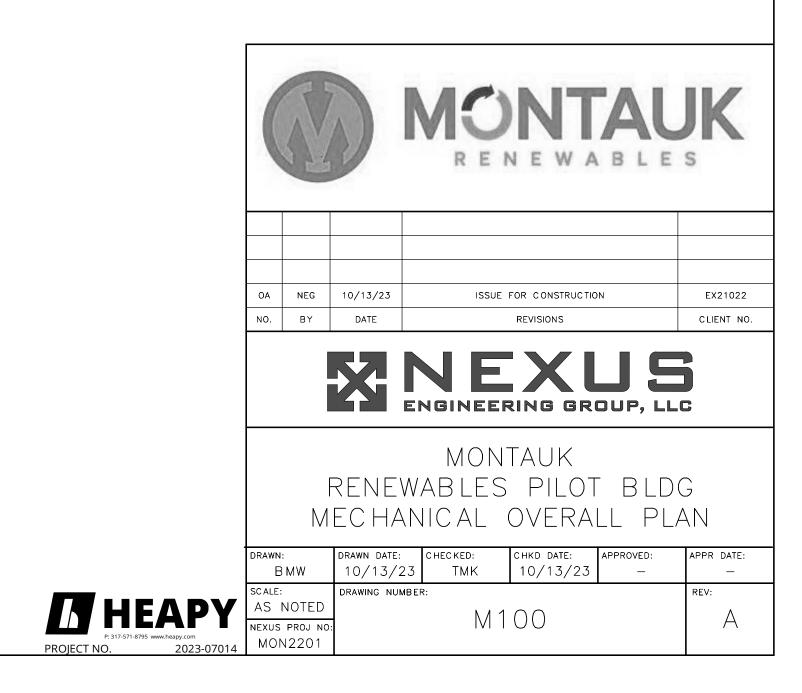
SHEET NUMBER	SHEET NAME
M001	MECHANICAL LEGEND
M100	MECHANICAL OVERALL PLAN
M101	MECHANICAL PLAN - PROCESS BLOCK / HOT OIL ROOM
M102	MECHANICAL PLAN - ELECTRICAL ROOM / SERVER ROOM / CONTROL ROOM
M401	SECTIONS AND ENLARGED VIEWS
M402	SECTIONS AND ENLARGED VIEWS
M501	MECHANICAL DETAILS
M601	ATC LEGEND
M602	ATC DIAGRAMS
M603	ATC DIAGRAMS
M604	ATC DIAGRAMS
M701	MECHANICAL SCHEDULES
M702	MECHANICAL SCHEDULES
Total Count: 13	

		N			
	0A NO.	NEG	10/13/23 DATE	ISSUE FOR CONSTRUCTION REVISIONS	EX21022 CLIENT NO.
				NEXUS ENGINEERING GROUP, LLC	
				MONTAUK Wables pilot bldo Chanical legend	7
,	SCALE: AS NEXUS	MW	DRAWN DATE: 10/13/2 DRAWING NUM	23 TMK 10/13/23 -	APPR DATE: — REV: A

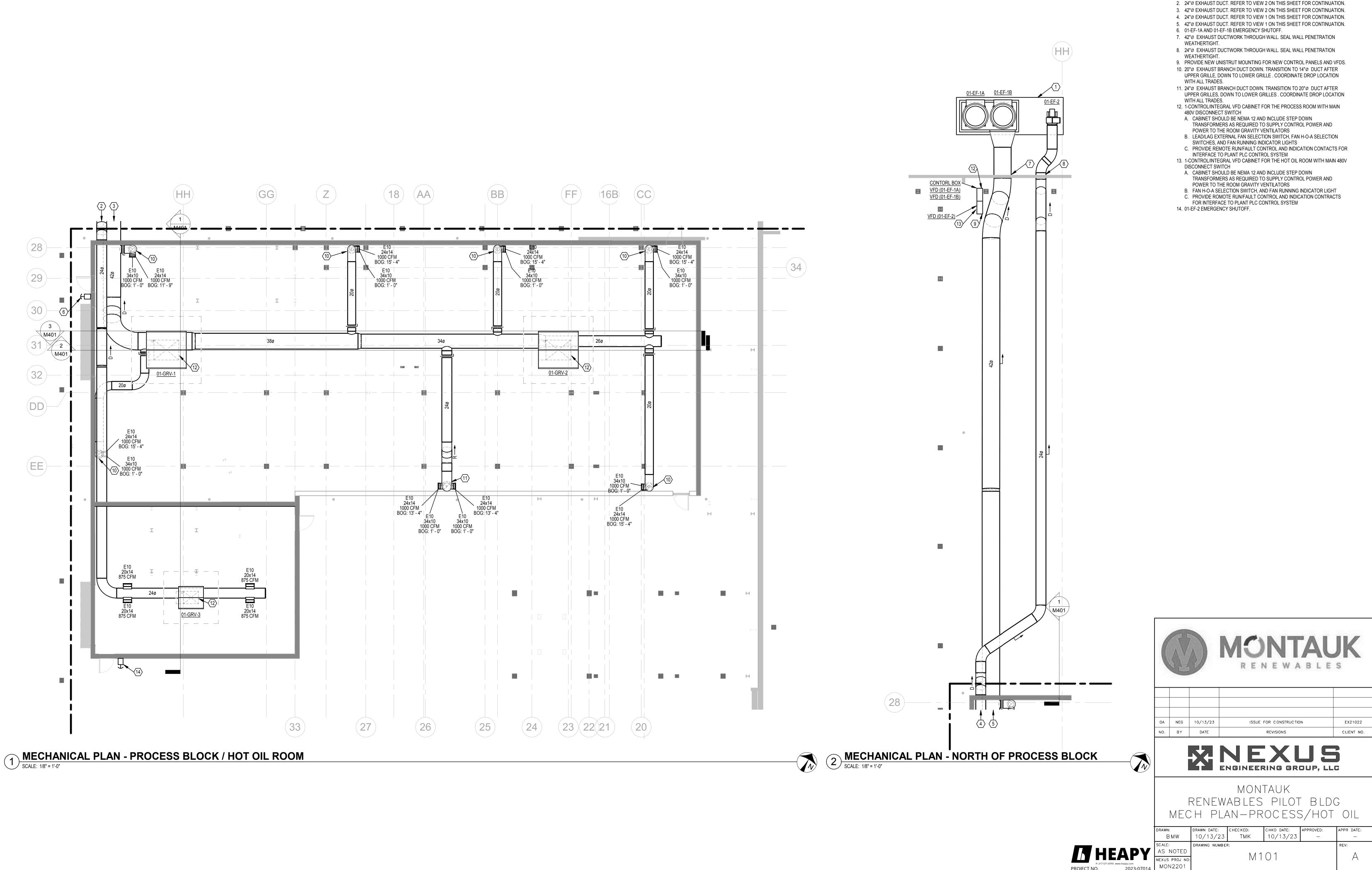








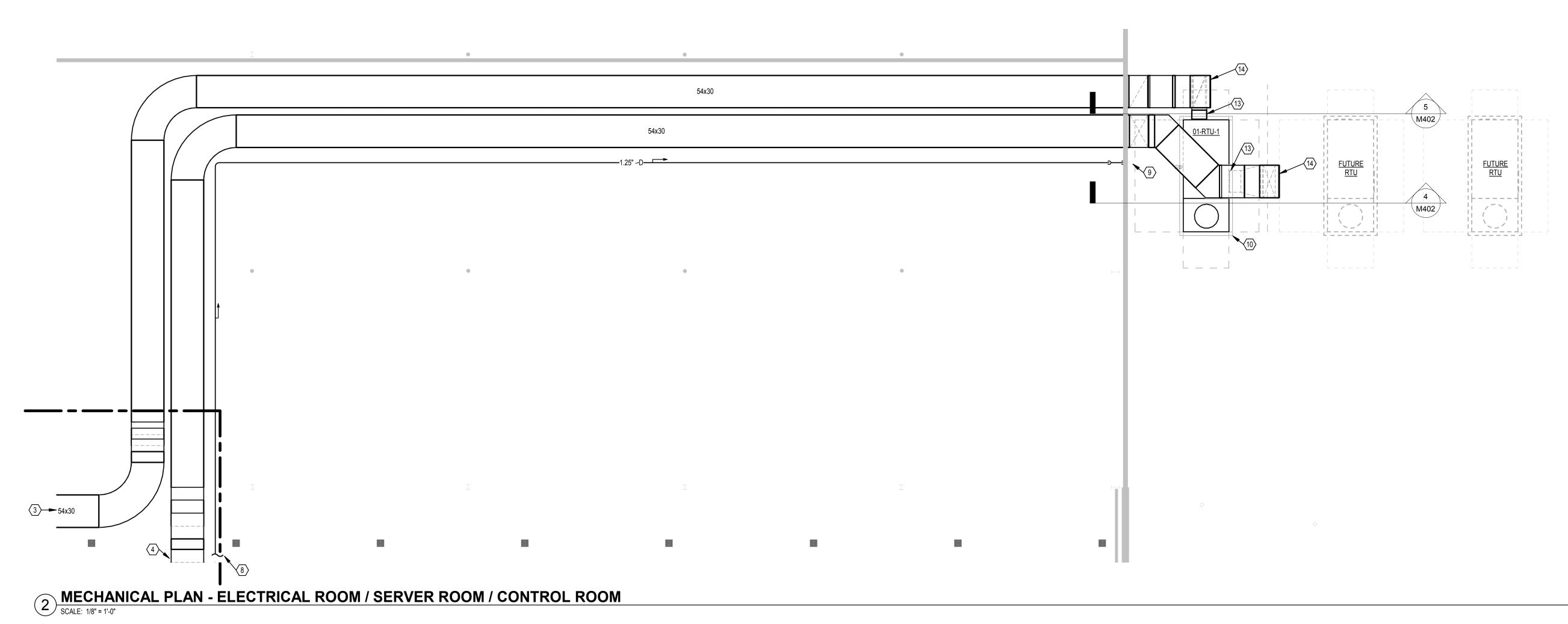


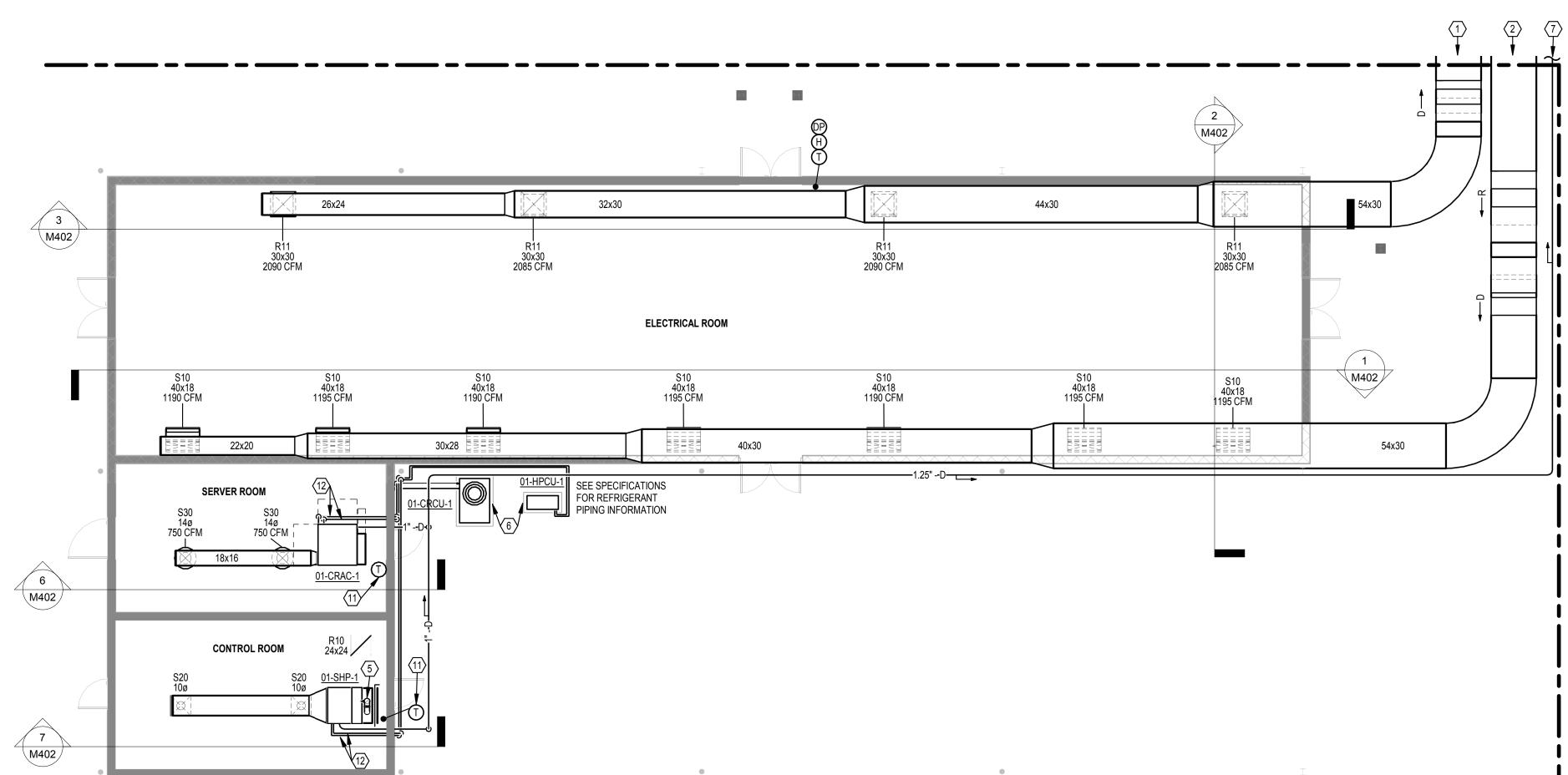


○ PLAN NOTES

NEXUS DRAWINGS FOR PAD DETAIL.

1. INSTALL NEW FANS 01-EF-1 AND 01-EF-2 ON CONCRETE PAD. REFER TO





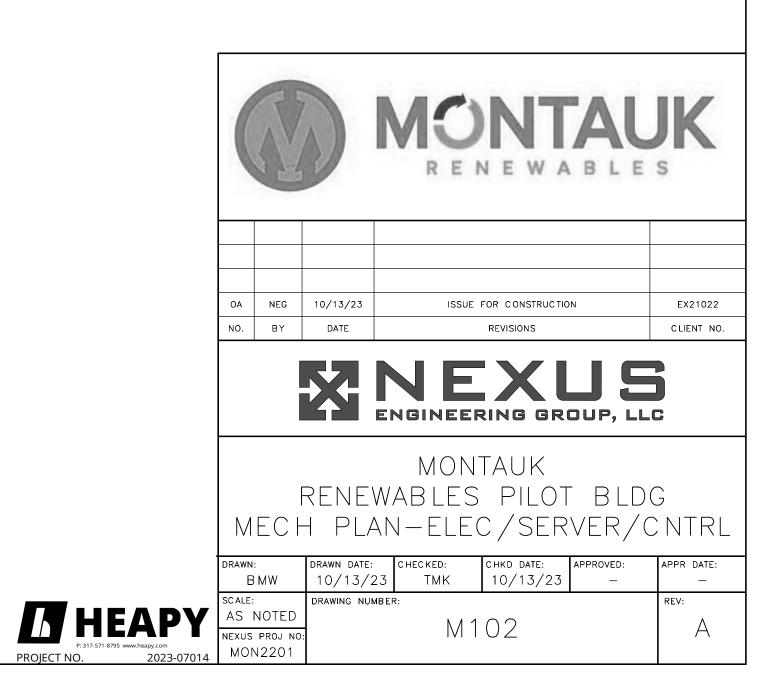
1 MECHANICAL PLAN - ELECTRICAL ROOM / SERVER ROOM / CONTROL ROOM SCALE: 1/8" = 1'-0"

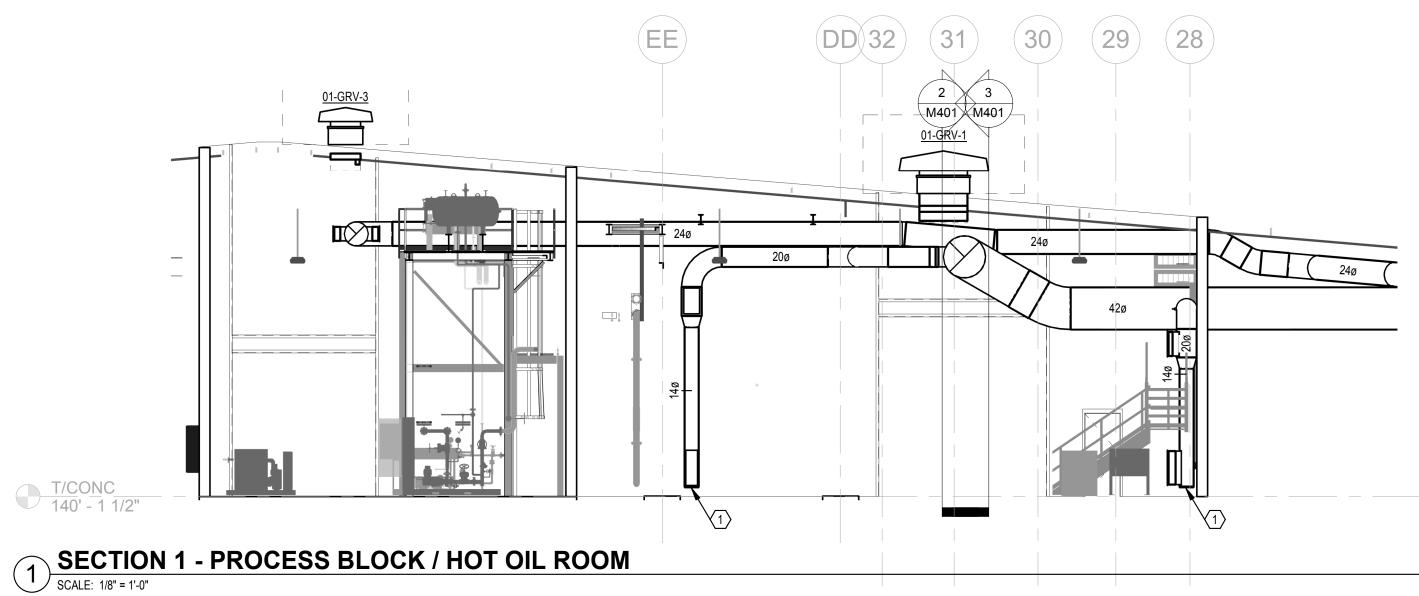


## $\bigcirc$ <u>PLAN NOTES</u>

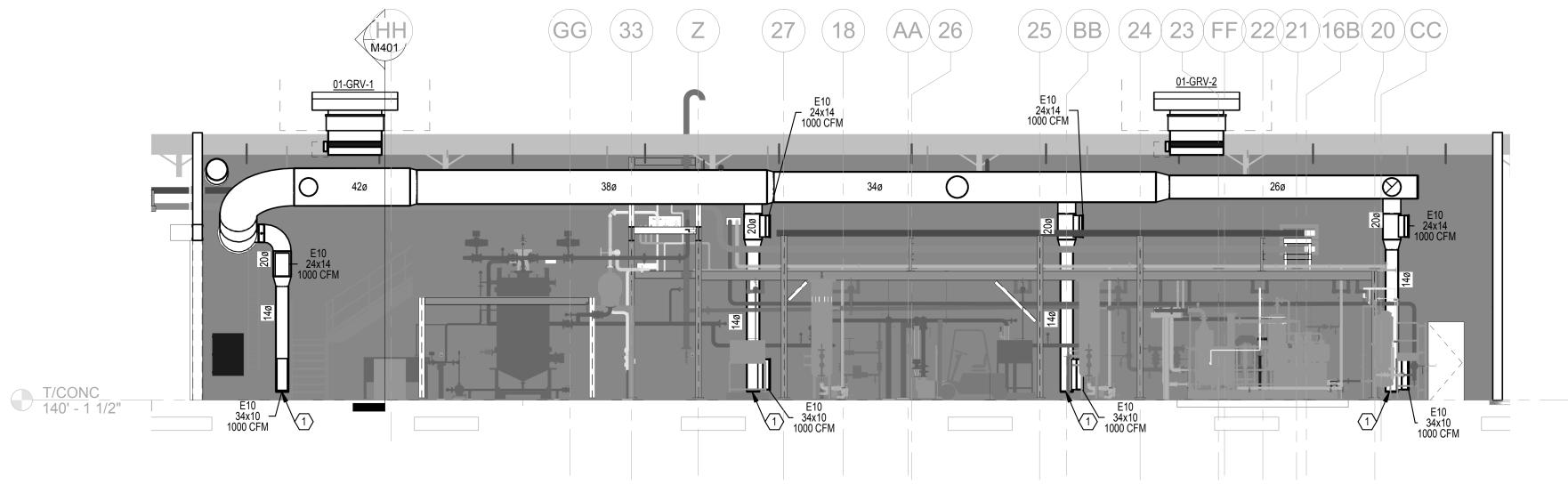
PROJECT NO.

- 1. 54" X 30" RETURN DUCT. REFER TO VIEW 2 ON THIS SHEET FOR CONTINUATION. 2. 54" X 30" SUPPLY DUCT. REFER TO VIEW 2 ON THIS SHEET FOR CONTINUATION.
- 3. 54" X 30" RETURN DUCT. REFER TO VIEW 1 ON THIS SHEET FOR CONTINUATION.
- 4. 54" X 30" SUPPLY DUCT. REFER TO VIEW 1 ON THIS SHEET FOR CONTINUATION. 5. 6Ø OUTSIDE AIR DUCT UP THROUGH ROOF. BALANCE TO 50 CFM.
- 6. 4" CONCRETE HOUSEKEEPING PAD. 7. 1.25" CONDENSATE DRAIN. REFER TO VIEW 2 ON THIS SHEET FOR
- CONTINUATION. PROVIDE INSULATION TO CONDENSATE LINE. 8. 1.25" CONDENSATE DRAIN. REFER TO VIEW 1 ON THIS SHEET FOR
- CONTINUATION. PROVIDE INSULATION TO CONDENSATE LINE. 9. 1.25" DRAIN THROUGH WALL. SEAL WALL PENETRATION WEATHERTIGHT.
- TERMINATE OVER SPLASH BLOCK WITH 90 DEGREE ELBOW. 10. INSTALL 01-RTU-1 ON CONCRETE PAD. REFER TO NEXUS DRAWINGS FOR PAD DETAIL.
- 11. FACTORY FURNISHED CONTROLLER.
- 12. PROVIDE REFRIGERANT PIPING, DEVICES, AND ACCESSORIES PER MANUFACTURERS RECOMMENDATIONS.
- 13. PROVIDE BACKDRAFT DAMPER IN DUCTWORK CONNECTION TO RTU. 14. TEE FITTING SHALL BE CAPPED AND INSULATED FOR FUTURE CONNECTION.

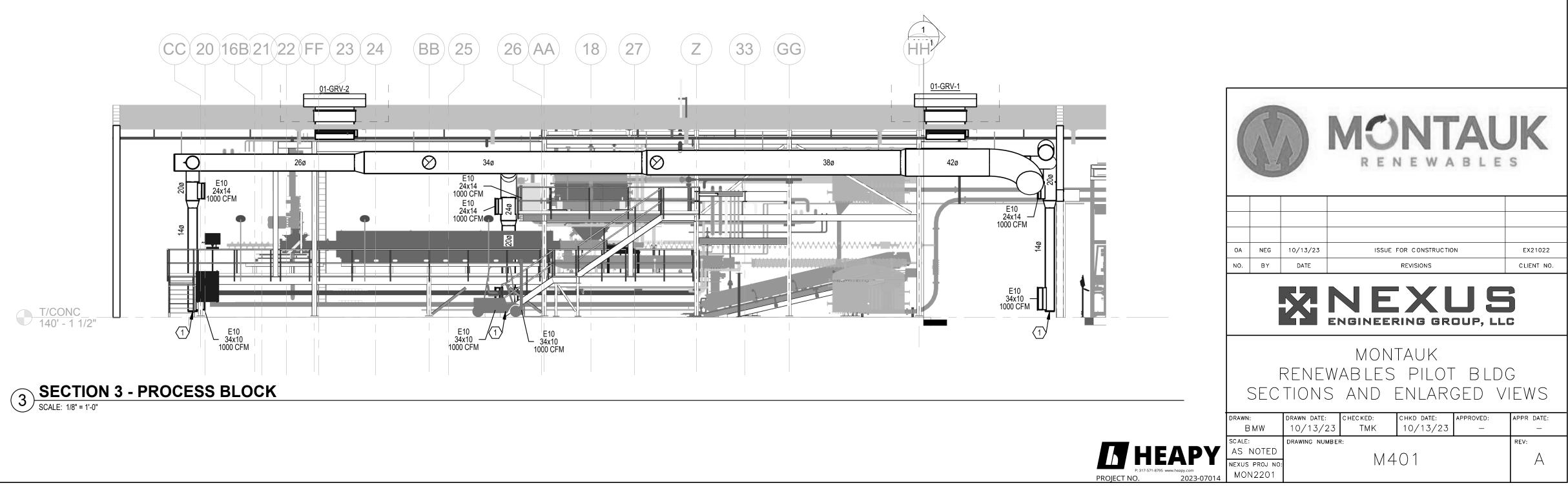








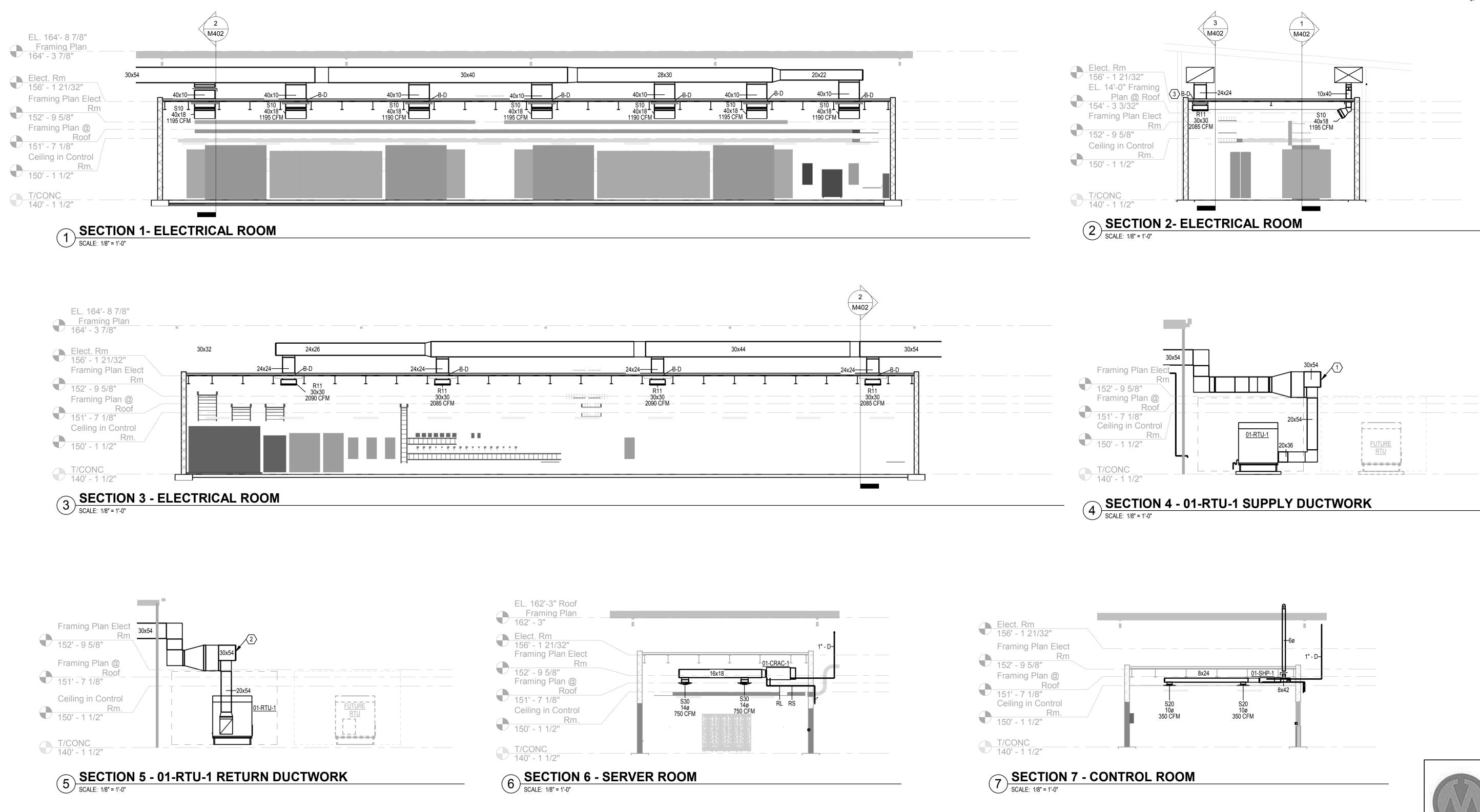
# 2 SECTION 2 - PROCESS BLOCK SCALE: 1/8" = 1'-0"





PLAN NOTES

1. PROVIDE FLOOR STAND TO SUPPORT DUCTWORK.

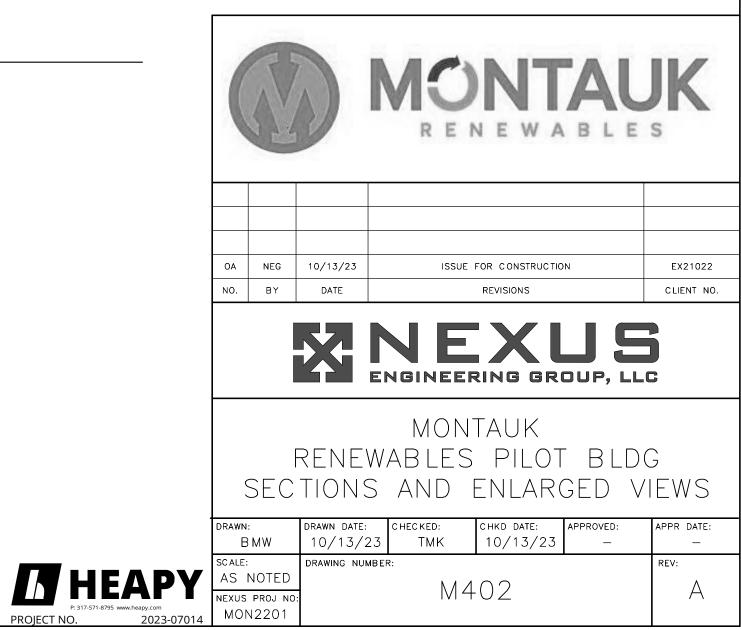


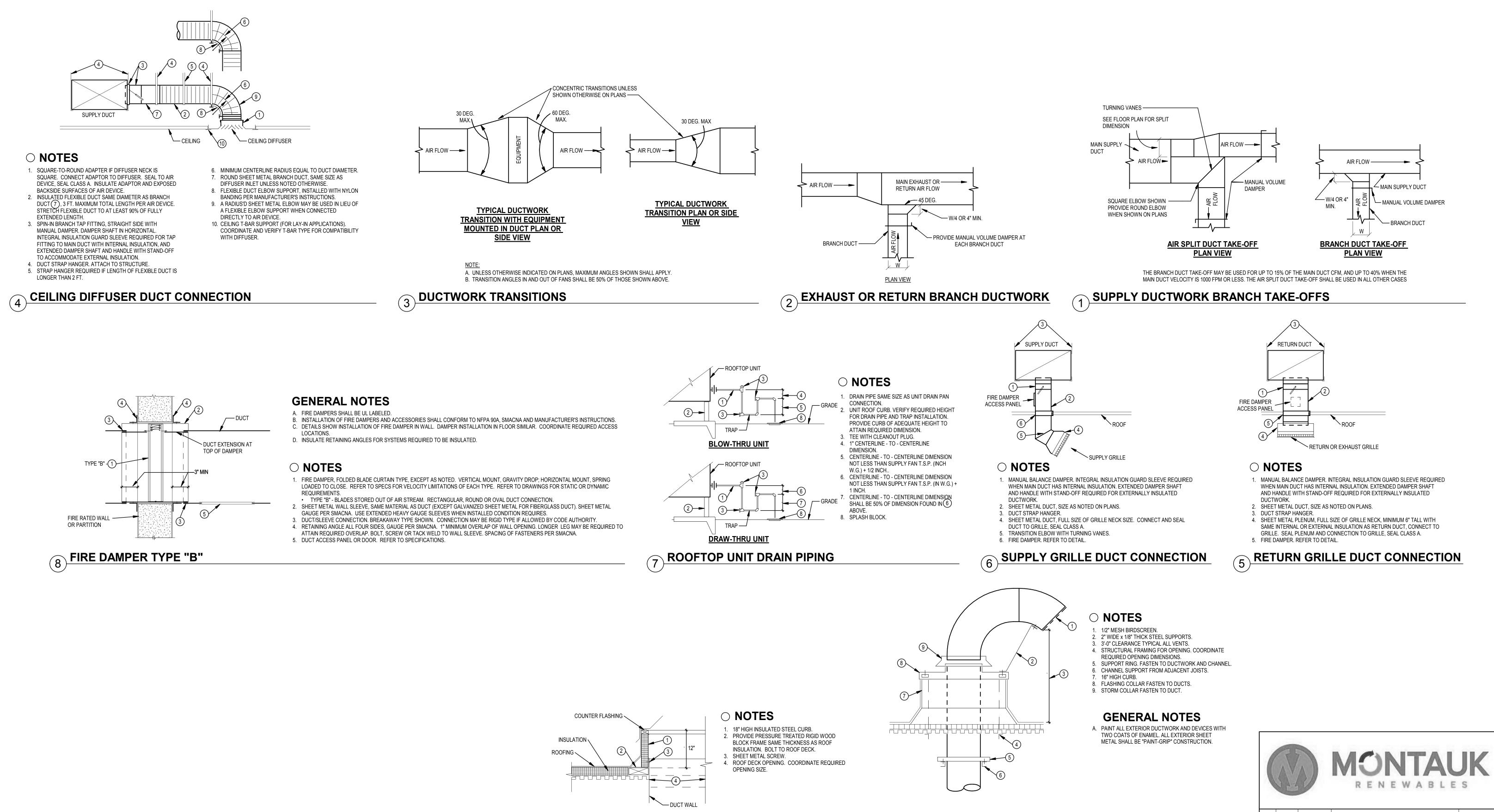
O PLAN NOTES

- CAP FOR CONNECTION OF FUTURE RTU SUPPLY DUCTWORK.
   CAP FOR CONNECTION OF FUTURE RTU RETURN DUCTWORK.
   FIRE DAMPER UL RATING SHALL MATCH UL RATING OF THE CEILING.

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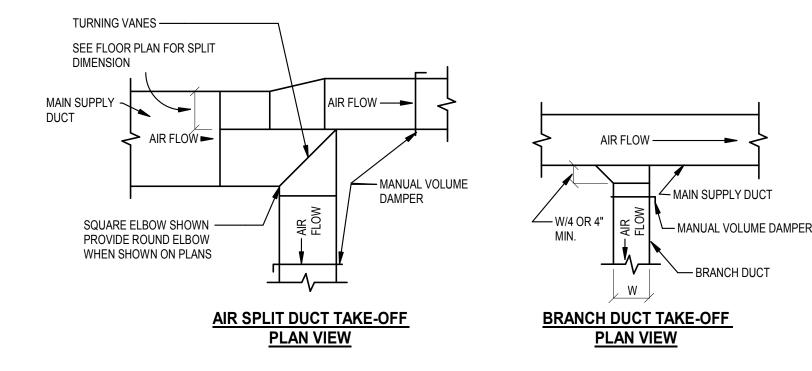
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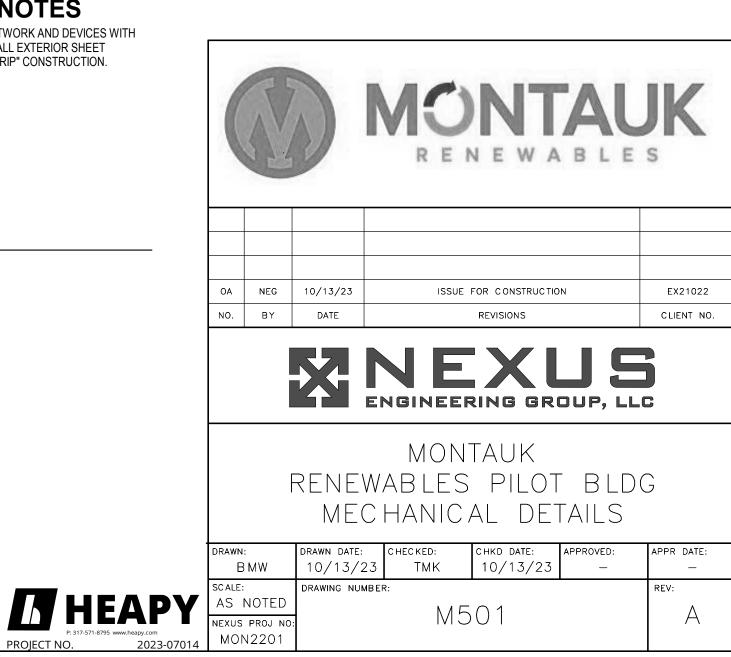
(10) GRAVITY ROOF VENTILATOR MOUNTING CURB

## 9 OUTSIDE AIR DUCTS THRU ROOF



PROIECT NO

2022 07



# LEGEND-

AUTO	MATIC TEMPERATURE CONTROLS
XX-01	CONTROL POINT - SEE POINTS SCHEDULE
AI	ANALOG INPUT
AO	ANALOG OUTPUT
BI	BINARY INPUT
во	BINARY OUTPUT
PI	PULSED INPUT
OAT	OUTSIDE AIR TEMPERATURE
MAT	MIXED AIR TEMPERATURE
RAT	RETURN AIR TEMPERATURE
SAT	SUPPLY AIR TEMPERATURE
CCAT	COOLING COIL LEAVING AIR TEMPERATURE
HCAT	HEATING COIL LEAVING AIR TEMPERATURE
OAHY	OUTSIDE AIR HUMIDITY
RAH	RETURN AIR HUMIDITY
SAH	SUPPLY AIR HUMIDITY
NC	NORMALLY CLOSED (CLOSES ON LOSS OF POWER)
NO	NORMALLY OPEN (OPENS ON LOSS OF POWER)
ч	HIGH
C	COMMON
M	
	2-WAY AUTOMATIC 2-POSITION CONTROL VALVE
	3-WAY AUTOMATIC 2-POSITION CONTROL VALVE
_₩	2-WAY AUTOMATIC MODULATING CONTROL VALVE
	3-WAY AUTOMATIC MODULATING CONTROL VALVE
H DP L	DIFFERENTIAL PRESSURE SENSOR
	DIFFERENTIAL PRESSURE SWITCH
(C)	CARBON DIOXIDE SENSOR
$\bigcirc$	CARBON MONOXIDE SENSOR
(CS)	CURRENT SENSOR TRANSMITTER
EPT	ELECTRONIC TO PNEUMATIC TRANSDUCER
FM	FLOW METER TRANSMITTER
Ĥ	HUMIDITY SENSOR
LC	LEVEL CONTROLLER
(LT)	LEVEL TRANSMITTER
P	PRESSURE SENSOR
(SP)	STATIC PRESSURE SENSOR
	TEMPERATURE SENSOR
(WF)	WATER FLOW SENSOR
(WL)	WATER LEVEL SENSOR
CS	CURRENT SWITCH
ES	END SWITCH
FS	FLOW SWITCH
н	HUMIDISTAT
OS	OCCUPANCY SENSOR
P	PRESSURE SWITCH, HIGH LIMIT
P	PRESSURE SWITCH, LOW LIMIT
	TEMPERATURE LOW LIMIT (FREEZE STAT)
Т	ROOM THERMOSTAT
WL	WATER LEVEL SWITCH
	EMERGENCY SHUT-OFF STATION

LEGEND- AUTOMATIC TEMPERATURE CONTROLS		
AFMS	AIR FLOW MEASURING STATION	
VFD	VARIABLE FREQUENCY DRIVE (ADJUSTABLE FREQUENCY MOTOR CONTROLLER)	
MS	MOTOR STARTER	
CON	CONTACTOR	
TCP	LOCAL TEMPERATURE CONTROL PANEL	
PSH	PRESSURE SAFETY - HIGH	

PSL

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PRESSURE SAFETY - LOW SMOKE DETECTOR DAMPER OR VALVE ACTUATOR - MODULATING DAMPER OR VALVE ACTUATOR - 2-POSITION RELAY UVGI LIGHT PUMP

COOLING COIL HEATING COIL HUMIDIFIER FILTER ENERGY RECOVERY WHEEL OPPOSED BLADE CONTROL DAMPER PARALLEL BLADE CONTROL DAMPER

FAN

MIN OA / ECON DAMPER

SMOKE DAMPER

DX COIL

WALL MOUNTED DEVICE

DUCT INSERTION DEVICE

PIPE INSERTION OR IMMERSION DEVICE WITH WELL

AV

HIELDED OU.

FAN ARRAY, "X" FANS VERTICAL x "Y" FA

- SEQUENCES.
- BE PROVIDED.

TRIM AND RESPOND).

ACCEPTABLE.

HEATING AND COOLING.

I. IT IS NOT THE INTENT OF THE DESIGN SEQUENCES TO SPECIFY EVERY CONTROL ELEMENT REQUIRED FOR STABLE CONTROL. TRANSITION BETWEEN MODES OR SEQUENCING OF OUTPUTS OFTEN REQUIRES DELAYS, RAMPS, RESETS, OR OTHER LOGIC ELEMENTS TO ENSURE STABLE AND SMOOTH CONTROL. IT IS THE RESPONSIBILITY OF THE CONTROLS CONTRACTOR TO TEST EQUIPMENT THROUGH ALL TRANSITIONS, ADDING LOGICAL CONTROL ELEMENTS AS REQUIRED TO ENSURE STABLE PERFORMANCE.

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ERAGING SENSOR OR DEVICE
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## **GENERAL NOTES-AUTOMATIC TEMPERATURE CONTROLS**

A. A COMPLETE SYSTEM OF AUTOMATIC TEMPERATURE CONTROLS SHALL BE INSTALLED AS REQUIRED TO ACCOMPLISH THE SEQUENCE OF CONTROL FOR VARIOUS ITEMS OF EQUIPMENT AND SYSTEMS DESCRIBED HEREINAFTER.

B. THE CONTROL DIAGRAMS AND INFORMATION CONTAINED WITHIN ARE TO SHOW DESIGN INTENT. IT IS THE CONTROL SUPPLIERS RESPONSIBILITY TO DEVELOP DETAILED AND COMPLETE CONTROL DIAGRAMS AND SHOP DRAWINGS TO ACCOMPLISH THE SPECIFIED

C. THE POINTS LIST IS SHOWN AS AN AID TO THE CONTRACTOR INDICATING THE MINIMUM POINTS REQUIRED FOR CONTROL, AND MONITORING. ALL INPUT AND OUTPUT POINTS, AND THEIR REQUIRED INTERFACE AND ACCESSORY HARDWARE, SHALL BE PROVIDED FOR A COMPLETE AND FUNCTIONAL CONTROL SYSTEM. IF OR WHEN ADDITIONAL POINTS ARE REQUIRED TO ACCOMPLISH THE SEQUENCES OF CONTROL SPECIFIED, THESE POINTS, ALONG WITH ADDITIONAL DIRECT DIGITAL CONTROL PANEL(S) (IF REQUIRED), SHALL ALSO

D. BULB WELLS FOR TEMPERATURE SENSING AS INDICATED SHALL BE PROVIDED BY THE HVAC CONTRACT. PIPING WORK SHALL INCLUDE PROPERLY SIZED WELDOLET OR THREADOLET FITTINGS PLACED AS DIRECTED BY THE CONTROL SYSTEM SUPPLIER.

E. ELECTRICAL WORK INCLUDES A POWER SOURCE TO THE MOTOR STARTERS. PROVIDE ALL HVAC POWER SOURCES REQUIRED BEYOND THESE STARTERS OR BEYOND SOURCES EXPLICITLY SHOWN ON THE ELECTRICAL DRAWINGS. THIS SHALL INCLUDE BUT NOT BE LIMITED TO WIRING, CONDUIT, TRANSFORMERS, RELAYS AND FUSES.

F. THE FOLLOWING CONTROL SEQUENCES HAVE BEEN WRITTEN TO COMMUNICATE THE DESIGN INTENT REGARDING EQUIPMENT CONTROL. DESIGN INTENT FOCUSES ON THE SEQUENCE OF DEVICES (FOR EXAMPLE, TO UTILIZE ECONOMIZER BEFORE MECHANICAL COOLING), CONTROLLING INPUTS (FOR EXAMPLE, TO CONTROL THE COOLING COIL TO THE SUPPLY AIR TEMPERATURE), AND DESIRED RESULT (FOR EXAMPLE, TO MAINTAIN SUPPLY AIR TEMPERATURE AT THE EFFECTIVE SETPOINT).

G. CONTROL SEQUENCES SHOULD BE REGARDED AS PERFORMANCE BASED, WITH STRICT ADHERENCE TO THE SPECIFIED LANGUAGE NOT ALWAYS REQUIRED. MANY COMBINATIONS OF LOGIC CAN RESULT IN THE DESIRED CONTROL. ALTERNATE LOGIC THAT RESULTS IN THE SAME PERFORMANCE AND ENERGY USAGE AS SPECIFIED IS CONSIDERED ACCEPTABLE. ALTERNATE LOGIC CREATING SIMULTANEOUS HEATING/COOLING OR UNSTABLE CONTROL IS NOT ACCEPTABLE.

a. "MODES" WHERE SPECIFIED ARE USED TO SIGNAL MAJOR CHANGES TO EQUIPMENT OPERATED (I.E. OCCUPIED / UNOCCUPIED / OPTIMAL START, HEATING/COOLING, ETC.)

b. "RESETS" WHERE SPECIFIED ARE USED TO CHANGE A SETPOINT VALUE DYNAMICALLY. RESETS SHOULD BE BOUND BY THE MINIMUM AND MAXIMUM VALUES AT ALL TIMES. SIMPLE LINEAR/PROPORTIONAL BASED RESETS ARE ONLY ALLOWED WHERE SPECIFIED, OTHERWISE A FEEDBACK-BASED ALGORITHM IS REQUIRED (I.E. PID OR

c. "LOOPS" WHERE SPECIFIED ARE USED TO INDICATE USE OF PID ALGORITHMS TO HOLD AN INPUT SIGNAL AT A SPECIFIED SETPOINT WITHOUT SIGNIFICANT LONG-TERM DEVIATION FROM SETPOINT. SIMPLE ERROR-BASED PROPORTIONAL CONTROL IS NOT

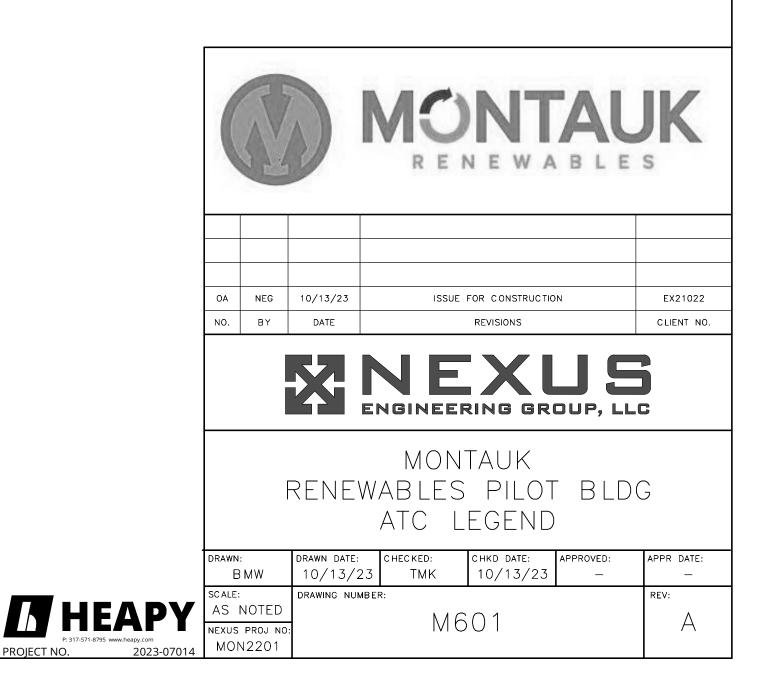
d. "SEQUENCING" WHERE SPECIFIED IS USED TO CONTROL THE ORDER OF COMPONENTS ENGAGED TO SATISFY A CERTAIN CONDITION. FOR INSTANCE, A HEATING COIL, ECONOMIZER, AND COOLING COIL ALL AFFECT THE SUPPLY AIR TEMPERATURE, SO THEY MUST BE SEQUENCED TO MAXIMIZE ENERGY AND ELIMINATE SIMULTANEOUS

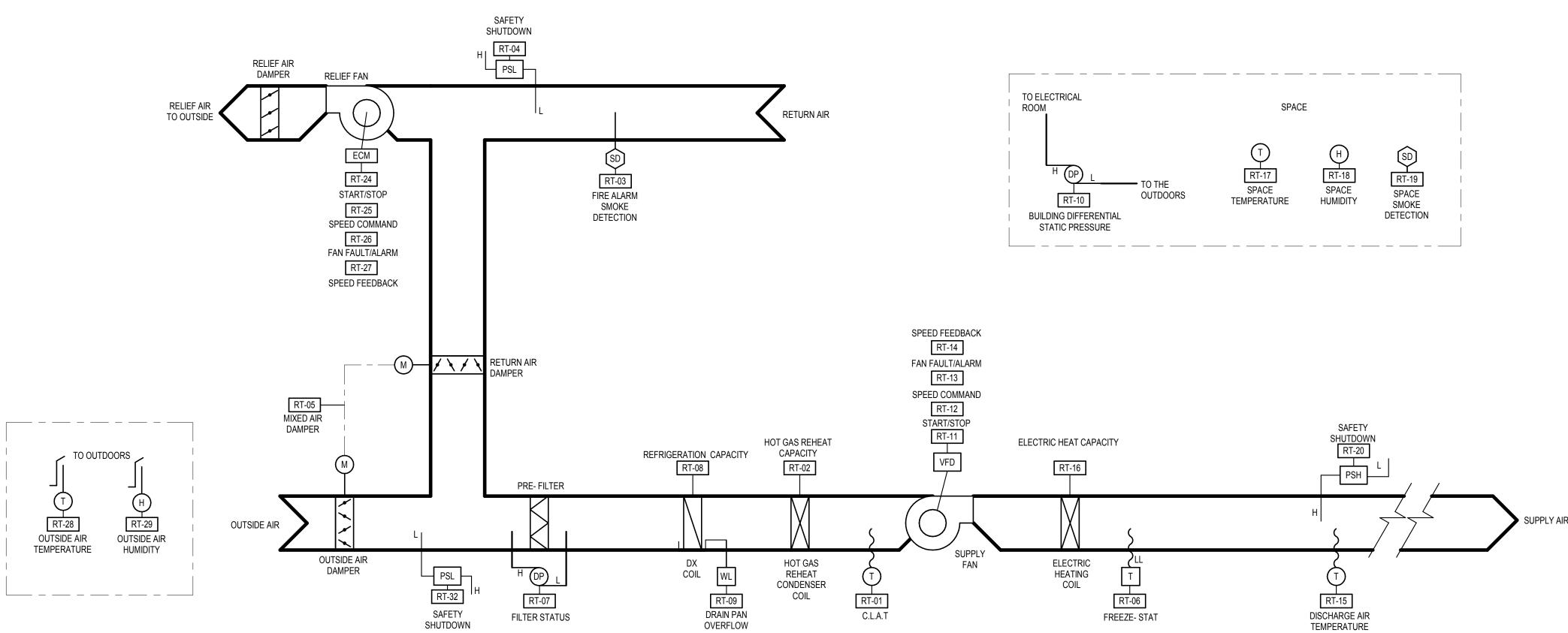
H. ANALOG OUTPUTS SHOULD BE CONTROLLED BASED UPON THE LOOPS AND SEQUENCING AS SPECIFIED. REQUIRED LOGIC TO ENSURE OUTPUTS ACT UPON SAFETIES, MODES, OR OTHER INTERLOCKING LOGIC IS THE RESPONSIBILITY OF THE CONTROL CONTRACTOR. EFFORTS TO STATE INTERLOCKING CONDITIONS HAVE BEEN MADE BUT IT IS THE ULTIMATE RESPONSIBILITY OF THE CONTROLS CONTRACTOR TO ENSURE OUTPUTS ARE COMMANDED APPROPRIATELY DURING ALL CONDITIONS.

J. IT IS ALSO THE RESPONSIBILITY OF THE CONTROL CONTRACTOR TO TUNE ALL LOOPS INITIALLY DURING START UP AND SUBSEQUENTLY THOUGH OPERATION OF THE BUILDING AND VARIOUS WEATHER CONDITIONS. AT MINIMUM, PID TUNING SHOULD BE EVALUATED DURING START-UP AND OCCUPIED SUMMER, WINTER, AND SHOULDER SEASONS.

K. UNDERSTANDING THE ABOVE INFORMATION, CONTROL CONTRACTORS ARE REQUIRED TO SUBMIT SEQUENCES OF OPERATION AS THEY INTEND TO PROGRAM THEIR CONTROLLERS. SIMPLY COPYING-AND-PASTING OF THE DESIGN SEQUENCES WILL BE FLAGGED IN SUBMITTAL REVIEW AS NOT CONFORMING TO THE INTENT OF THE SUBMITTAL. THE SEQUENCE OF OPERATION INCLUDED IN THE CONTROL SUBMITTAL SHOULD DOCUMENT THE CONTROL SEQUENCE "AS PROGRAMMED" IN A WRITTEN FORMAT FOR ENGINEER REVIEW AND FINALIZED POST CONSTRUCTION IN AS-BUILTS FOR OWNER REFERENCE.

PROJECT NO.





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GENERAL NO A. POINT "TY B. MANUFAC C. VFD POIN"	'PE" IS IN I TURER SI	HALL PRO	VIDE SUP	PLEMENT													TION AS IN	IDICATED	BELOW.													
<ol> <li>IN ADDITIO</li> <li>RTU FAUL</li> </ol>	<ol> <li>COORDINATE SMOKE DETECTION ALARM SIGNAL FROM FIRE ALARM SYSTEM SMOKE DETECTOR BY DIV 26/28.</li> <li>IN ADDITION TO BEING A (BI) SAFETIES SHALL BE WIRED INTO THE FAN STARTERS/VFD(S) STARTER CIRCUIT SUCH THAT THE SAFETY SHALL FUNCTION WHETHER THE SELECTOR SWITCH IS IN THE "HAND" OR "AUTOMATIC" POSITION.</li> <li>RTU FAULT SHALL INDICATE WHEN THE RTU HAS SHUT-DOWN IN ALARM FOR ANY REASON.</li> <li>SHALL BE MULTI-STATE POINT CONTAINING AT A MINIMUM: OCCUPIED, UNOCCUPIED.</li> </ol>																															
POINT NO.	RT-01	RT-02	RT-03	RT-04	RT-05	RT-06	RT-07	RT-08	RT-09	RT-10	RT-11	RT-12	RT-13	RT-14	RT-15	RT-16	RT-17	RT-18	RT-19	RT-20	RT-21	RT-22	RT-23	RT-24	RT-25	RT-26	RT-27	RT-28	RT-29	RT-30	RT-31	RT-32
POINT NAME	COIL- LEAVING AIR TEMPERATURE	HOT GAS REHEAT CAPACITY	RETURN AIR SMOKE DETECTION	RETURN DUCT PRESSURE SAFETY SHUT-DOWN	MIXED AIR DAMPERS	FREEZESTAT	PRE FILTER STATUS	DX REFRIGERATION CAPACITY	DRAIN PAN OVERFLOW	BUILDING DIFFERENTIAL STATIC PRESSURE	SUPPLY FAN START/STOP	SUPPLY FAN SPEED COMMAND	SUPPLY FAN FAULT/ALARM	SUPPLY FAN SPEED FEEDBACK	DISCHARGE AIR TEMPERATURE	ELECTRIC HEAT CAPACITY	REPRESENTATIVE SPACE TEMPERATURE	REPRESENTATIVE SPACE HUMIDITY	SPACE SMOKE DETECTION	SUPPLY HIGH DUCT PRESSURE SAFETY SHUT-DOWN	MINIMUM OUTSIDE AIRFLOW SETPOINT	SUPPLY AIR TEMPERATURE SETPOINT	OCCUPANCY MODE REQUEST	RELIEF FAN START/STOP	RELIEF FAN SPEED COMMAND	RELIEF FAN FAULT/ALARM	RELIEF FAN SPEED FEEDBACK	OUTSIDE AIR TEMPERATURE	OUTSIDE AIR HUMIDITY	RTU FAULT STATUS	OCCUPANCY MODE STATUS	MIXED AIR PRESSURE SAFETY SHUT-DOWN
TYPE	AI	AO	BI	BI	AO	BI	BI	AO	BI	AI	BO	AO	BI	AI	AI	AO	AO	AO	BI	BI	AO	AO	AO	во	AO	BI	AI	AO	AO	во	AO	BI
ALARM	ON TRIP		ON TRIP	ON TRIP		ON TRIP	ON TRIP		ON TRIP	HIGH/LOW			ON TRIP	S/S = ON FBK <min spd<="" td=""><td>HIGH/LOW</td><td></td><td></td><td></td><td>ON TRIP</td><td>ON TRIP</td><td></td><td></td><td></td><td></td><td></td><td>ON TRIP</td><td>S/S = ON FBK<min spd<="" td=""><td></td><td></td><td>ON TRIP</td><td>ON MISMATCH</td><td>ON TRIP</td></min></td></min>	HIGH/LOW				ON TRIP	ON TRIP						ON TRIP	S/S = ON FBK <min spd<="" td=""><td></td><td></td><td>ON TRIP</td><td>ON MISMATCH</td><td>ON TRIP</td></min>			ON TRIP	ON MISMATCH	ON TRIP
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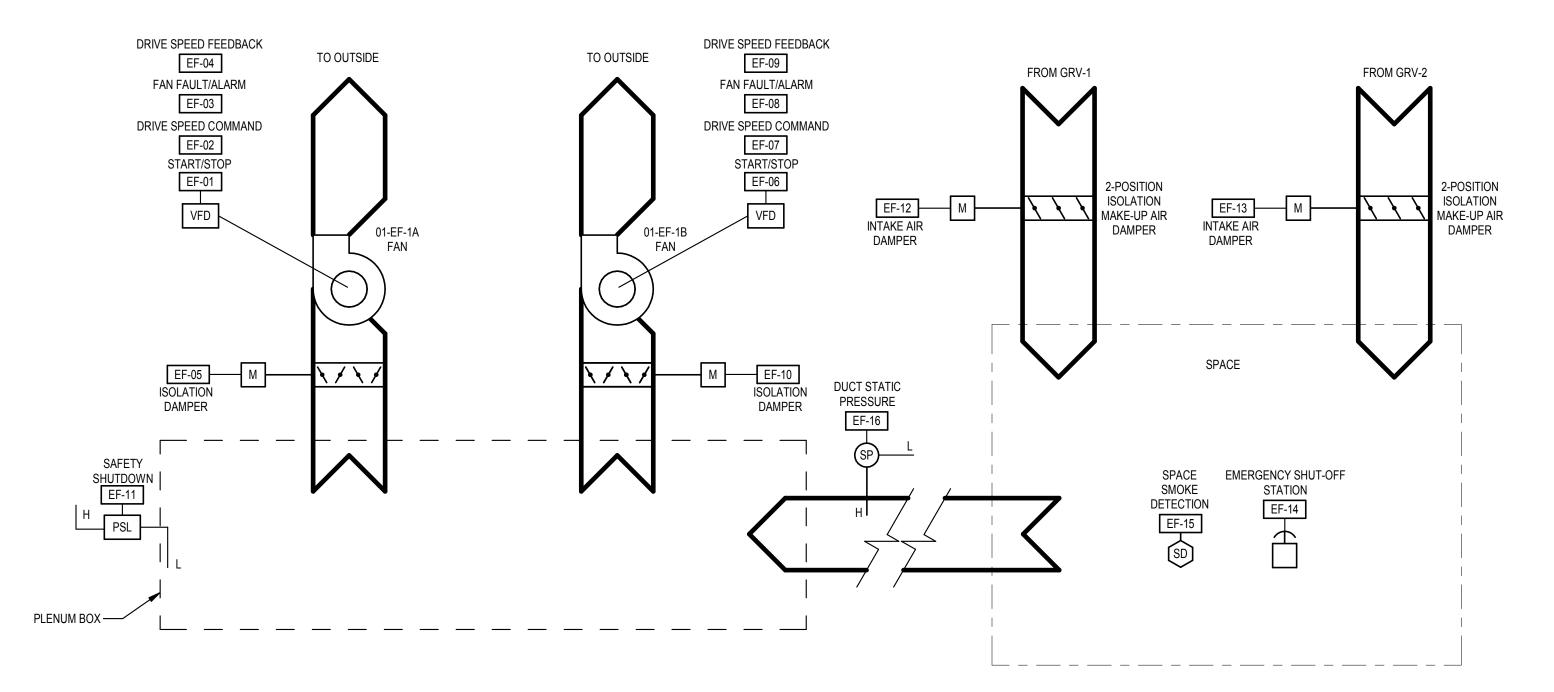
## ROOFTOP UNIT 01-RTU-1 CONTROLS DIAGRAM

## 01-RTU-1 SEQUENCES

- A. RTU CONTROLLER(S) SEQUENCES OF OPERATION 1. ALL SEQUENCES SHALL COMPLY WITH ASHRAE STANDARD 90.1 – 2013.
- 2. THE RTU VENDOR SHALL WORK TO PROVIDE A WELL COORDINATED CONTROL SYSTEM.
- 3. THE RTU OCCUPANCY SCHEDULE SHALL RESIDE WITH-IN THE RTU CONTROLLER. "OCCUPIED" MODE SHALL BE AT ALL TIMES THROUGHOUT THE YEAR.
- 4. SAFETIES SHALL SHUT DOWN THE UNIT IN AN ORDERLY FASHION AND INDICATE ALARM ON THE USER INTERFACE. 5. THE AIR HANDLING UNIT COMPONENTS (DX COIL, ELECTRIC HEATER, ECONOMIZER,
- ETC.) SHALL BE SEQUENCED TO SATISFY THE "OCCUPIED" SPACE TEMPERATURE SETPOINT. 6. MINIMUM OUTSIDE AIR WHEN IN "OCCUPIED" MODE SHALL OPEN OA DAMPER TO
- THE MINIMUM OUTSIDE AIR CFM SETPOINT SCHEDULED. POSITION SHALL BE SET BY BALANCER. 7. ROOM TEMPERATURE SENSORS: CONTROLLER SHALL READ TEMPERATURE FROM
- ROOM TEMPERATURE SENSOR TO DETERMINE SPACE TEMPERATURE. THE CONTROLLER SHALL ENABLE HEATING / COOLING SEQUENCE WHENEVER THE AVERAGE SPACE TEMPERATURE DEVIATES FROM SPACE TEMPERATURE SETPOINT.
- 8. ROOM TEMPERATURE: DISCHARGE AIR RESET. THE SUPPLY AIR TEMPERATURE SHALL BE RESET TO MEET THE SPACE HEATING REQUIREMENTS, OR THE SPACE COOLING REQUIREMENTS BASED ON A DEVIATION FROM THE RESPECTIVE SPACE TEMPERATURE SET POINT. INITIAL SPACE TEMPERATURE SET POINTS SHALL BE 55 DEGREES F FOR HEATING AND 78 DEGREES F FOR COOLING. HEATING DISCHARGE AIR RESET SHALL BE FROM 60 DEGREES F TO A MAXIMUM SUPPLY TEMPERATURE OF 75 DEGREES F. COOLING DISCHARGE AIR RESET SHALL BE FROM 73 DEGREES TO A MINIMUM SUPPLY AIR TEMPERATURE OF 55 DEGREES F. WHEN THE SPACE TEMPERATURE IS IN THE DEAD BAND THE OUTSIDE AIR DAMPERS SHALL BE AT
- MINIMUM AND THERE SHALL BE NO ACTIVE HEATING AND COOLING. 9. ECONOMIZER CONTROL SHALL BE A DIFFERENTIAL ENTHALPY SEQUENCE WITH AN "OFF" SETPOINT OF 75 DEGREES F DB OUTSIDE AIR TEMPERATURE. ECONOMIZER SHALL BE DISABLED WHEN OUTSIDE AIR TEMPERATURE FALLS BELOW 35 DEGREES F DB. MIXED AIR DAMPERS SHALL MODULATE TO MAINTAIN SUPPLY AIR TEMPERATURE.
- 10. RELIEF AIR FAN SHALL BE ACTIVATED BY A WALL-MOUNTED DP SENSOR TRANSMITTER AND THE FAN SHALL MODULATE TO MAINTAIN A BUILDING PRESSURE OF +0.03" W.C.(ADJUSTABLE), REFERENCED TO OUTDOORS. RELIEF AIR FAN SHALL HAVE A SOFTWARE INTER-LOCK WITH THE RTU SUPPLY FAN. THE SPACE PRESSURE DP SENSOR-TRANSMITTER SHALL BE BY THE RTU VENDER.
- 11. DX COIL IF THE RTU FAN SYSTEM IS "ON" AND THE ECONOMIZER IS NOT ACTIVE AND THE COOLING DISCHARGE AIR TEMPERATURE IS ABOVE SETPOINT, THE SOLENOID VALVES AND COMPRESSOR STEPPING / SPEED SHALL BE SEQUENCED TO SATISFY THE SETPOINT. PROVIDE ON AND OFF TIME DELAYS BETWEEN STEPS. USE SUPPLY FAN DRIVE SPEED INTERLOCK ALARM STATE, AS SPECIFIED IN POINTS LIST SCHEDULE, FOR INTERLOCK THRU SOFTWARE TO KEEP COOLING OFF UNLESS THE SUPPLY FAN SYSTEM IS OPERATING. 12. ELECTRIC HEATER – SHALL BE STAGED TO MAINTAIN HEATING DISCHARGE AIR
- SETPOINT. 13. HOT GAS REHEAT DEHUMIDIFICATION - A WALL-MOUNTED HUMIDITY SENSOR SHALL BE USED TO CONTROL ACTIVATION OF DEHUMIDIFICATION MODE WHEN
- SPACE HUMIDITY IS ABOVE 60% RH. WHEN THIS OCCURS, THE COOLING SHALL BE AT MAXIMUMM AND MODULATING VALVES SHALL CONTROL THE FLOW OF REFRIGERANT BETWEEN THE INDOOR REHEAT AND OUTDOOR CONDENSERS TO SATISFY DISCHARGE AIR SETPOINT IN ORDER TO DEHUMIDIFY THE SPACE. THIS MODE SHALL CONTINUE UNTIL THE SPACE RH IS BELOW 55%. 14. UNIT SMOKE DETECTION – UPON SENSING SMOKE OR PRODUCTS OF COMBUSTION
- THE AIR HANDLING SYSTEM SHALL BE DISABLED. SMOKE DETECTORS SHALL BE PROVIDED PER DIVISION 26 / 28 UNLESS OTHERWISE NOTED, INSTALLED IN THE RETURN DUCT SYSTEM AND WIRED TO THE FAN SAFETY CIRCUITS TO STOP THE AIR HANDLING UNIT SYSTEM UPON SMOKE DETECTION. REFER TO THE DRAWINGS FOR DETECTOR LOCATIONS AND COORDINATE THEIR INSTALLATION.
- 15. ALARMS SHALL BE SENT TO REMOTE MONITORING LOCATIONS, AS DETERMINED BY OWNER.

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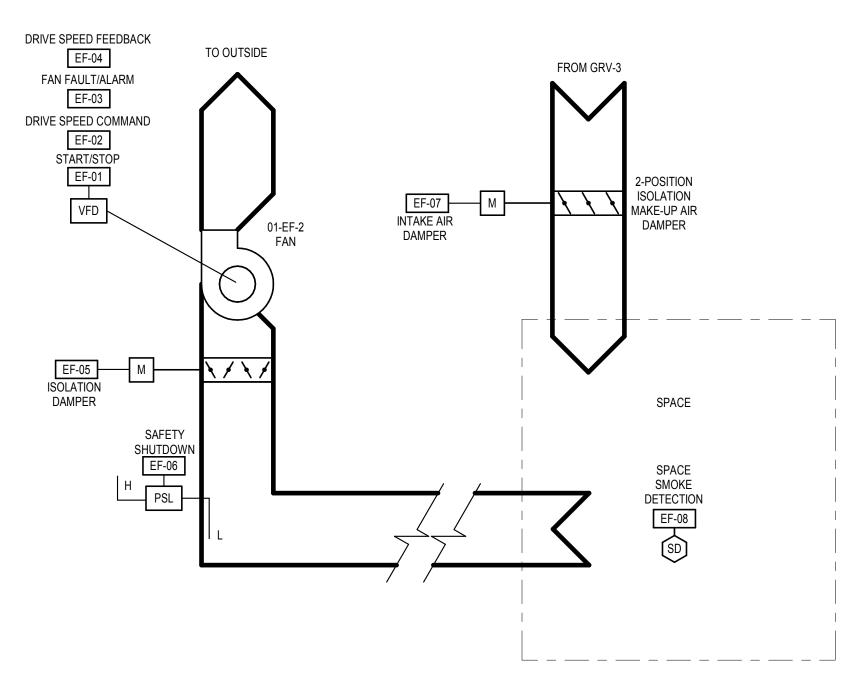




## EXHAUST FAN 01-EF-1 CONTROLS DIAGRAM

	E	XHA	UST	FAN	N 01	-EF-′	1 PC	INT	S LIS	ST S	CHE	DUL	E				01-EF-1 SEQUENCES
MANUFAC NTEGRAT VFD POIN ACCEPTA ES: COORDIN N ADDITIC FUNCTION	PE" IS IN F TURER SF TON AS IN TS SHALL BLE. ATE SMOR DN TO BEI I WHETHE	IDICATED BE DONE KE DETEC NG A (BI) \$	VIDE SUP BELOW THROUGI TION ALAI SAFETIES LECTOR	PLEMENT H HARDW RM SIGNA SHALL BE SWITCH IS	IRE CONN L FROM F E WIRED II	ROLLERS / IECTION W IRE ALARI NTO THE F HAND" OR	/HEN POS M SYSTEM	SIBLE. WH SMOKE I	IEN NOT I	POSSIBLE	2 POINTS 7	THROUGH	I INTEGRA	ATION ARE			<ul> <li>EXHAUST FAN CONTROLLER(S) SEQUENCES OF OPERATION</li> <li>A. SYSTEM DESCRIPTION <ol> <li>THE EXHAUST FAN SYSTEM SHALL CONSIST OF TWO (2) EXHAUST FANS WITH A PER FAN AND TWO (2) GRAVITY ROOF VENTILATORS. FANS SIT ON A COMMON PLENUM BOX.</li> <li>B. SYSTEM ENABLE CONDITIONS: <ol> <li>THE FAN SYSTEM SHALL RUN 24/7.</li> <li>THE FAN SYSTEM SHALL RUN 24/7.</li> <li>THE FAN SYSTEM IS DESIGNED FOR N+1 OPERATION WITH ONE PRIMARY FAN A ONE FAN ON STANDBY. UPON A FAN FAILURE THE SYSTEM SHALL INITIATE THE REDUNDANT FAN, CLOSE THE ISOLATION DAMPER ON THE FAILED FAN, AND TU ON THE ALARM FOR A FAN FAILURE.</li> <li>THE PRIMARY AND STANDBY FAN SHALL BE ROTATED WEEKLY. WHEN ROTATIN</li> </ol> </li> </ol></li></ul>
POINT NO.	EF-01	EF-02	EF-03	EF-04	EF-05	EF-06	EF-07	EF-08	EF-09	EF-10	EF-11	EF-12	EF-13	EF-14	EF-15	EF-16	<ul> <li>FANS, THE STANDBY FAN SHALL TURN ON AND RAMP UP AS THE PRIMARY FAN RAMPING DOWN. THE SEQUENCE SHALL MAINTAIN DUCT STATIC PRESSURE DURING SWITCHOVER.</li> </ul>
Point Name	EXHAUST FAN START/STOP	EXHAUST FAN SPEED COMMAND	EXHAUST FAN FAULT/ALARM	EXHAUST FAN SPEED FEEDBACK	ISOLATION DAMPERS	EXHAUST FAN START/STOP	EXHAUST FAN SPEED COMMAND	EXHAUST FAN FAULT/ALARM	EXHAUST FAN SPEED FEEDBACK	ISOLATION DAMPERS	EXHAUST LOW DUCT PRESSURE SAFETY SHUT-DOWN	GRV ISOLATION DAMPERS	GRV ISOLATION DAMPERS	EMERGENCY SHUT-OFF STATION	SPACE SMOKE DETECTION	DUCT STATIC PRESSURE	<ol> <li>FAN SHALL OPERATE AT CONSTANT VOLUME. VFD SHALL MODULATE FAN SPEE TO MAINTAIN DUCT STATIC PRESSURE.</li> <li>SAFETIES: THE FOLLOWING SAFETIES SHALL BE PROVIDED TO STOP THE FAN SYST AND POSITION ASSOCIATED CONTROL DEVICES TO THEIR "FAIL SAFE" POSITION. SAFETIES SHALL BE WIRED INTO THE FAN STARTER CIRCUIT SUCH THAT THE SAFE SHALL FUNCTION WHETHER THE H-O-A SELECTOR SWITCH IS IN THE HAND ON OR AUTOMATIC POSITION.</li> <li>HIGH NEGATIVE PRESSURE CUTOUT - PROVIDE A MANUAL RESET TYPE DUCT STATIC PRESSURE SWITCH, SET AT THE MAXIMUM NEGATIVE WORKING PRESS OF THE DUCTWORK, TO STOP THE FAN SYSTEM (EXHAUST) ON A FALL IN DUCT STATIC BELOW SETPOINT.</li> <li>UNIT SMOKE DETECTORS – UPON SENSING SMOKE OR PRODUCTS OF COMBUSTION THE FAN SYSTEM SHALL BE DISABLED. SMOKE DETECTORS SHALL</li> </ol>
TYPE	во	AO	BI	AI	BO	BO	AO	BI	AI	BO	BI	BO	BO	BI	BI	AI	BE WIRED TO THE FAN SAFETY CIRCUITS TO STOP THE FAN SYSTEM UPON SMO DETECTION.
ALARM			ON TRIP	ON MISMATCH				ON TRIP	ON MISMATCH		ON TRIP			ON TRIP	ON TRIP	НІСН/ГОМ	<ul> <li>D. MAKE-UP AIR DAMPER CONTROL.</li> <li>1. THE GRV MAKE-UP AIR DAMPERS SHALL OPEN WHEN THE FAN SYSTEM IS RUNNING.</li> <li>E. ALARMS SHALL BE SENT TO REMOTE MONITORING LOCATIONS, AS DETERMINED B' OWNER.</li> </ul>
											2	3	3		1,2		

## (1) EXHAUST FAN EF-1 CONTROLS DIAGRAM



## EXHAUST FAN 01-EF-2 CONTROLS DIAGRAM

01-E	F-2		115	LISI	SC	HED	ULE					
GENERAL NOT A. POINT "TYI B. MANUFAC REQUIRED AS INDICA C. VFD POINT WHEN NOT NOTES: 1. COORDINA SMOKE DE 2. IN ADDITIC STARTERS WHETHER 3. MOTORIZE	PE" IS IN F TURER SH TO PROV TED BELC S SHALL T POSSIBI ATE SMOK TECTOR N TO BEIL S/VFD(S) S THE SELI	HALL PRO' VIDE THE S W. BE DONE LE POINTS E DETEC BY DIV 26 NG A (BI) S TARTER ( ECTOR SV	VIDE SUPF SPECIFIED THROUGH THROUG TION ALAF (28. SAFETIES CIRCUIT S VITCH IS II	PLEMENT/ ) SEQUEN H HARDWI H INTEGR RM SIGNAI SHALL BE UCH THAT N THE "HA	CES, POIN RE CONN ATION AR FROM FI WIRED IN THE SAF ND" OR "/	NTS, AND ECTION W RE ACCEP RE ALARM ITO THE F ETY SHAL	INTEGRAT (HEN POS TABLE. // SYSTEM AN L FUNCTI	rion Sible. I				
POINT NO.	EF-01	EF-02	EF-03	EF-04	EF-05	EF-06	EF-07	EF-08				
EKHAUST FAN SPEED COMMAND       EL-01       EL-02       EL-03       EL-04       EL-02       EL-02       EL-01         EXHAUST FAN SPEED COMMAND       EXHAUST FAN SPEED COMMAND       EXHAUST FAN SPEED COMMAND       EXHAUST FAN SPEED COMMAND       EXHAUST FAN SPEED FEEDBACK       EXHAUST FAN SPEED FEEDBACK         SAFETY SHUT-DOWN       ISOLATION DAMPERS       ISOLATION DAMPERS       EXHAUST FAN SPEED FEEDBACK       EXHAUST FAN SPEED FEEDBACK												
TYPE	BO	AO	BI	AI	BO	BI	BO	BI				
ATALW ON TRIP ON TRIP ON TRIP ON TRIP												
NOTES						2	3	1,2				

### **EXHAUST FAN EF-2 CONTROLS DIAGRAM** (2)

## 01-EF-2 SEQUENCES

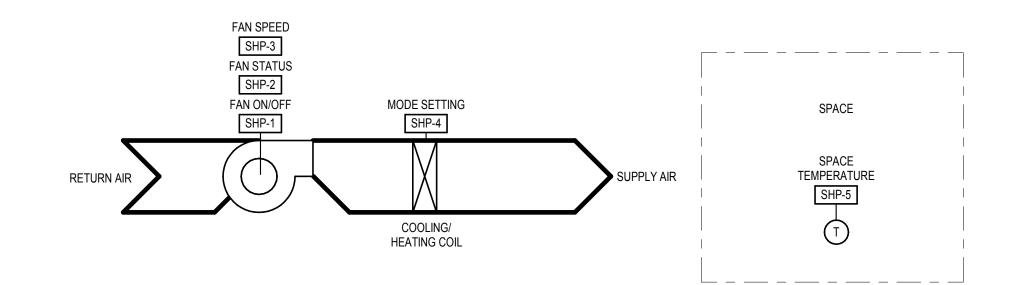
A. SYSTEM DESCRIPTION 1. THE EXHAUST FAN SYSTEM SHALL CONSIST OF ONE (1) EXHAUST FANS WITH A VFD AND ONE GRAVITY ROOF VENTILATOR.

B. SYSTEM ENABLE CONDITIONS: 1. THE FAN SYSTEM SHALL RUN 24/7.

PROJECT NO.

- 2. FAN SHALL OPERATE AT CONSTANT VOLUME. VFD SHALL BE SET BY AIR
- BALANCER. C. SAFETIES: THE FOLLOWING SAFETIES SHALL BE PROVIDED TO STOP THE FAN SYSTEM AND POSITION ASSOCIATED CONTROL DEVICES TO THEIR "FAIL SAFE" POSITION. SAFETIES SHALL BE WIRED INTO THE FAN STARTER CIRCUIT SUCH THAT THE SAFETY SHALL FUNCTION WHETHER THE H-O-A SELECTOR SWITCH IS IN THE HAND ON OR AUTOMATIC POSITION.
- 1. HIGH NEGATIVE PRESSURE CUTOUT PROVIDE A MANUAL RESET TYPE DUCT STATIC PRESSURE SWITCH, SET AT THE MAXIMUM NEGATIVE WORKING PRESSURE OF THE DUCTWORK, TO STOP THE FAN SYSTEM (EXHAUST) ON A FALL IN DUCT STATIC BELOW SETPOINT. 2. UNIT SMOKE DETECTORS – UPON SENSING SMOKE OR PRODUCTS OF
- COMBUSTION THE FAN SYSTEM SHALL BE DISABLED. SMOKE DETECTORS SHALL BE WIRED TO THE FAN SAFETY CIRCUITS TO STOP THE FAN SYSTEM UPON SMOKE DETECTION.
- D. MAKE-UP AIR DAMPER CONTROL. 1. THE GRV MAKE-UP AIR DAMPERS SHALL OPEN WHEN THE FAN SYSTEM IS RUNNING.
- E. ALARMS SHALL BE SENT TO REMOTE MONITORING LOCATIONS, AS DETERMINED BY OWNER.

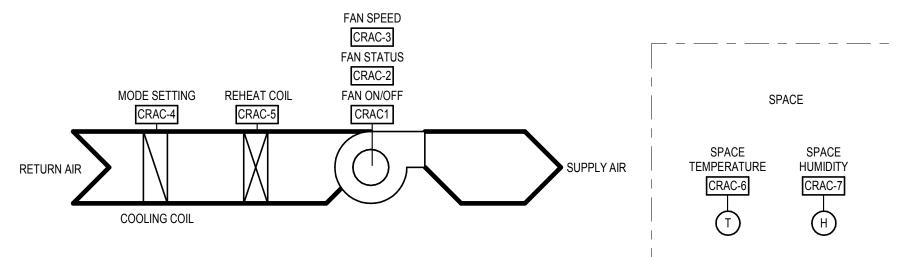
### MONTAUK RENEWABLES OA NEG 10/13/23 ISSUE FOR CONSTRUCTION EX21022 CLIENT NO. NO. BY DATE REVISIONS **ENGINEERING GROUP, LLC** MONTAUK RENEWABLES PILOT BLDG ATC DIAGRAMS DRAWN DATE: CHECKED: CHKD DATE: APPROVED: 10/13/23 TMK 10/13/23 — APPR DATE: DRAWN: ВMW \_ DRAWING NUMBER: SC ALE: THEAPY SCALE: AS NOTED NEXUS PROJ NO: M603 А MON2201 2023-07



# SPLIT SYSTEM HEAT PUMP 01-SHP-1 ATC DIAGRAM SCALE: NONE

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SPL	.IT S	YST			T PUMI LIST	P 01-	SHP	-1	SPLIT SYSTEM HEAT PUMP 01-
INTENT T	OWING LI O SHOW A D TO ACC	ALL REQUI	RED POIN THE SEQL	ITS. IF OR	oints require When addition F control spe	IAL POINTS	ARE		<ul> <li>SPLIT SYSTEM HEAT PUMP CONTROLLER SEQUENCES OF OPERATION</li> <li>A. OCCUPIED MODE <ol> <li>WHEN IN OCCUPIED MODE THE INDOOR UNIT FAN SHALL RUN CONTI</li> <li>OPERATION MODE SHALL MAINTAIN SETPOINT LISTED IN HVAC DESIGN SCHEDULE</li> </ol> </li> <li>B. UNOCCUPIED MODE</li> </ul>
NOTES: 1. CURRENT	I SENSOR								<ol> <li>OPERATE UNIT AS REQUIRED TO MAINTAIN UNOCCUPIED SETBACK 1 SETPOINT OF 55°F (ADJ) IN HEATING AND 80°F (ADJ) IN COOLING.</li> <li>C. ALARMS SHALL BE SENT TO REMOTE MONITORING LOCATIONS, AS DETERMINED</li> </ol>
POINT NO.	SHP-1	SHP-2	SHP-3	SHP-4	SHP-5				OWNER.
Point Name	FAN ON/OFF	FAN STATUS	FAN SPEED	MODE SETTING	SPACE TEMPERATURE				
TYPE	во	BI	AO	AO	AI				
ALARM		ON FAULT			BELOW 40°F				
NOTES		1							

**SPLIT SYSTEM HEAT PUMP CONTROL DIAGRAM** 



# COMPUTER ROOM AC UNIT 01-CRAC-1 ATC DIAGRAM SCALE: NONE

## -SHP-1 SEQUENCES

NTINUOUSLY. ESIGN DATA

K TEMPERATURE ERMINED BY

NOTES:														
1. CURRENT	SENSOR													
POINT NO.	CRAC-1	CRAC-2	CRAC-3	CRAC-4	CRAC-5	CRAC-6	CRAC-7							
Point Name	FAN ON/OFF	FAN STATUS	FAN SPEED	COOLING COIL	REHEAT COIL	SPACE TEMPERATURE	SPACE HUMIDITY							
TYPE BO BI AO AO AO AI AI														
TYPE       BO       BI       AO       AO       AO       AI       AI         ALARM       Image: Angle of the second sec														
NOTES		1												

COMPUTER ROOM AC UNIT 01-CRAC-1

**POINTS LIST** 

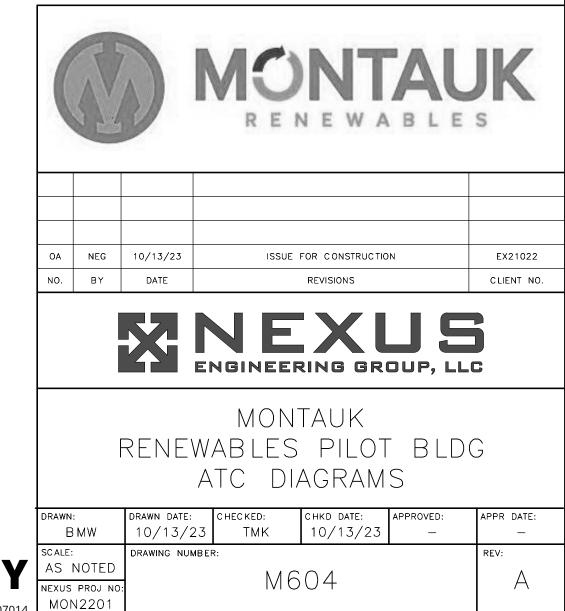
GENERAL NOTES: A. THE FOLLOWING LIST SHALL BE THE MINIMUM POINTS REQUIRED. IT IS NOT THE

## COMPUTER ROOM AC UNIT 01-CRAC-1 SEQUENCES

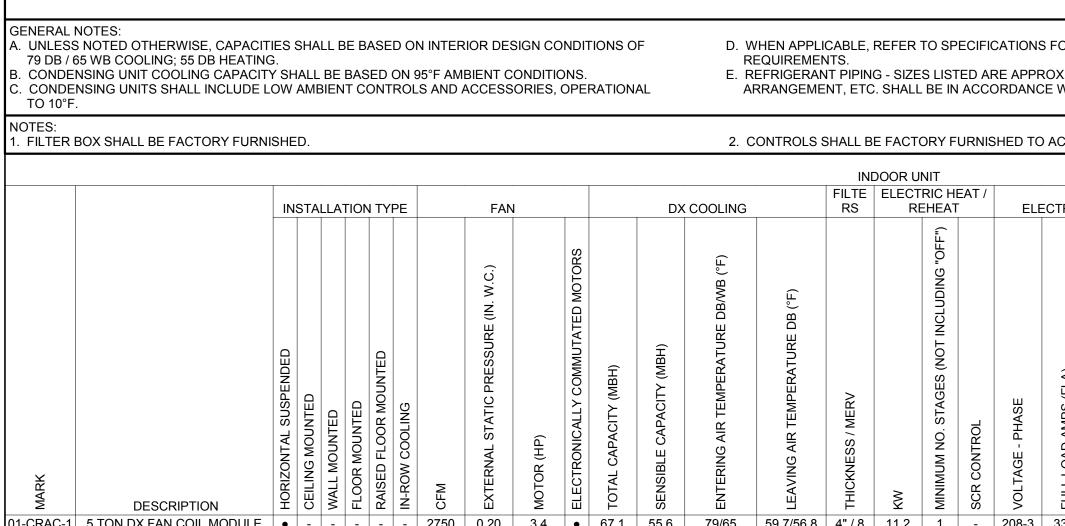
- CRAC UNIT CONTROLLER SEQUENCES OF OPERATION. 1. UNIT SHALL OPERATE AS REQUIRED TO MAINTAIN SPACE TEMPERATURE AND HUMIDITY SETPOINTS BASED ON HVAC DESIGN DATA SCHEDULE.
- 2. ALARMS SHALL BE SENT TO REMOTE MONITORING LOCATIONS, AS DETERMINED BY OWNER.

2 COMPUTER ROOM AC UNIT CONTROL DIAGRAM



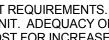






													F	ROOF	TOF	P HEA	TING	G & C		lNG	UN		- AIF	R-CC	OLED	DX/ELE	CTR	IC H	EAT											
A. CO B. HI C. UI HO	ATING I	CAPAC L.A.T. IS NFIGUR/ TAL DR/	S BASE ATIONS AW TH	ed on fl S (Suppl Iru; "Vdt	ILL UNIT CFI Y FAN POSI " - VERTICA	IENT AIR TEMP M AT LISTED E TION RELATIVE L DRAW THRU; RAWINGS FOR	A.T. AND MBH E TO COOLIN ; "HBT" - HORI	G COIL) - "HE		E	E. ELECTRI LISTED C CHANGE	IC SERVICI CIRCUIT SIZ	E - SINGL ZE MUST FRIC SER	E POINT I BE VERIF VICE FOR	POWER &	DNS FOR SE SERVICE CO H.C. AND UN MENT SELEC QUIREMENT	ONNECT	TION TO U PLIER. C	UNIT. AE	EQUACY R INCREA	Y OF ASE OR	FA SF	ACTORY PEED CO	/ DISCON	NECTING ME	OR SPECIFIED ANS, INTERNAL E ANALOG SPE H THE BUILDIN	OVERL	.OAD PR ITROL IN	OTECTION PUT WHE	N, FIELD	ADJUSTA		INCL REG	LUDE THE	E SPECIFIE D BE INCR	ED CURE REASED,	B (HEIGH SUCH AS	T). IF THE S TO ACCC	TEGRAL UNIT E HEIGHT OF TH DMMODATE CC ASED BY THAT	HE SPECIFIEI ONDENSATE
	NTROL	S SHAL		ACTORY	FURNISHE	D TO ACCOMPL	LISH THE SEC	UENCES OF	-	2	2. POWERE CONTRO	ED EXHAUS	ST UP TO	FULL SPI	ECIFIED	SUPPLY FAI	N CFM, V	WITH BU	ILDING F	RESSUR	RE	3. 10	00% ECC	ONOOMI	ZER WITH COM	/PARITIVE ENT	THALPY (	CONTRO	DL.											
						SUPPLY FAN						COC	LING SE	CTION					HOT C	AS AT	HEA	ATING SE	ECTION	1	PRE-FILTERS	FINAL FILTERS	OUTS		DIMEN	SIONS	MISC	ELLANE( US	0	ELE	CTRICAL	. SERVIC	ЭE		BASIS	S OF DESIGN
								EED ITROL		D	DX-COOLIN				СС	ONDENSING	SECTI	ON																						
01.5		25 NOMINAL TONS	UNIT CONFIGURATION	cFM (TOTAL)	EXTERNAL / TOTAL STATIC PRESSURE (IN. W.C.)	FAN QTY / WHEEL TYPE	B MOTOR (HP EACH) ELECTRONICALLY COMMUTATED MOTORS	<ul> <li>VARIABLE FREQUENCY DRIVE</li> <li>VARIABLE FREQUENCY DRIVE (QTY)</li> <li>MAXIMUM FACE VELOCITY (FPM)</li> </ul>	B TOTAL CAPACITY (MBH)	SENSIBLE CAPACITY (MBH)	ENTERING AIR TEMPERATURE DB/WB (°F)	LEAVING AIR TEMPERATURE DB/WB (°F)	MAXIMUM AIR PRESSURE DROP (IN. W.C.)	REFRIGERANT TYPE	MINIMUM QUANTITY OF COMPRESSORS	MINIMUM STAGES OF COOLING (NOT INCLUDING "OFF")	HOT GAS BYPASS	<ul> <li>LOW AMBIENT OPERATION</li> <li>LOW AMBIENT MIN OPERATING TEMP (°F)</li> </ul>	HOT GAS REHEAT	B HOT GAS REHEAT CAPACITY (MBH)	HEATING CAPACITY (KW)	ENTERING AIR TEMPERATURE DB (°F)	b     LEAVING AIR TEMPERATURE DB (°F) (NOTE B)	MINIMUM STAGES OF HEATING (NOT INCLUDING "OFF")	THICKNESS / MERV	THICKNESS / MERV		ECONOMIZER	MAX UNIT LENGTH (INCHES)		APPROXIMATE UNIT WEIGHT INCLUDING CURB (LBS)	INTEGRAL 100% POWERED RELIEF	Dervice recentacie	EULL LOAD AMPS (FLA)	MIN CIRCUIT AMPS (MCA)	MAX OVER CURRENT PROTECTION (MOCP)	MINIMUM SCCR (AMPS)			MC
01-F	TU-1	25	HDT	8,350	1.75 / 4.5	1 / SWSI AF	<u>  10   -  </u>	• 1 500	) 299.8	216.5	78.3 / 66.2	2   54.6 / 54	4.5 0.5	R410A	2 N	ODULATIN	<u>G   </u>	• 15	• 1	39.5 45	5.0 5	52.6	69.6	SCCR	2" / MERV 8	4" / MERV 14	4 500	• 10	62.3"   76	.5" 82.	5" 4000	)   •   •	460-3	72.5	90.6	125	10,000	• (	CARRIER	

		COMPUTER ROOM A/C UNITS - AIR-COOLED
		<ul> <li>UNLESS NOTED OTHERWISE, CAPACITIES SHALL BE BASED ON INTERIOR DESIGN CONDITIONS OF</li> <li>D. WHEN APPLICABLE, REFER TO SPECIFICATIONS FOR VIBRATION ISOLATOR TYPES AND SEISMIC RESTRAINT</li> <li>P. ELECTRIC SERVICES FOR OUTDOOR UNIT - SINGLE POINT POWER SERVICE</li> <li>D. WHEN APPLICABLE, REFER TO SPECIFICATIONS FOR VIBRATION ISOLATOR TYPES AND SEISMIC RESTRAINT</li> <li>P. ELECTRIC SERVICES FOR OUTDOOR UNIT - SINGLE POINT POWER SERVICE</li> <li>D. WHEN APPLICABLE, REFER TO SPECIFICATIONS FOR VIBRATION ISOLATOR TYPES AND SEISMIC RESTRAINT</li> <li>P. ELECTRIC SERVICES FOR OUTDOOR UNIT - SINGLE POINT POWER SERVICE</li> <li>D. WHEN APPLICABLE, REFER TO SPECIFIED, EACH MOTOR SHALL BE PROVIDED WITH FACTORY</li> <li>REQUIREMENTS.</li> <li>CONDENSING UNIT COOLING CAPACITY SHALL BE BASED ON 95°F AMBIENT CONDITIONS.</li> <li>E. REFRIGERANT PIPING - SIZES LISTED ARE APPROX. CIRCUITING, SIZING, NUMBER OF PIPES AND CIRCUITS,</li> <li>B. VERIFIED BY H.C. AND UNIT SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE</li> <li>CONDENSING UNITS SHALL INCLUDE LOW AMBIENT CONTROLS AND ACCESSORIES, OPERATIONAL</li> <li>C. WHEN APPLICABLE, REFER TO SPECIFIED, EACH MOTOR SHALL BE PROVIDED WITH FACTORY</li> <li>B. VERIFIED STORY OF LISTED CIRCUIT SIZES MUST</li> <li>DISCONNECTING MEANS, INTERNAL OVERLOAD PROTECTION, AND FIELD ADJUSTABLE SPEED CONTROL</li> <li>B. VERIFIED BY H.C. AND UNIT SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE</li> <li>B. VERIFIED BY H.C. AND UNIT SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE</li> <li>COL UNIT VOLTAGE AND POWERED FROM THE INDOOR FAN COIL UNIT SINGLE POINT POWER</li> <li>COL UNIT VOLTAGE AND POWERED FROM THE INDOOR FAN COIL UNIT SINGLE POINT POWER</li> <li>COL UNIT VOLTAGE AND POWERED FROM THE INDOOR FAN COIL UNIT SINGLE POINT POWER</li> </ul>
		FILTER BOX SHALL BE FACTORY FURNISHED.       2. CONTROL S HALL BE FACTORY FURNISHED TO ACCOMPLISH THE SEQUENCES OF CONTROL SPECIFIED.       3. FILTER BOX SHALL BE FACTORY FURNISHED.
		Under the control of the con
		ROOFTOP HEATING & COOLING UNITS - AIR-COOLED DX/ELECTRIC HEAT
		DLING CAPACITIES BASED ON 95°F AMBIENT AIR TEMPERATURE. TING L.A.T. IS BASED ON FULL UNIT CFM AT LISTED E.A.T. AND MBH OUTPUT. TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TIZONTAL DRAW THRU; "HDT" - HORIZONTAL BLOW THRU; TOT" - VERTICAL DRAW THRU; "HDT" - HORIZONTAL BLOW THRU; TOT" - VERTICAL DRAW THRU; "HDT" - HORIZONTAL BLOW THRU; TOTS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING COIL) - "HDT" - TOONFIGURATIONS (SUPPLY FAN POSITION RELATIVE TO COOLING CO
		UNIT NUMBER         NOMINAL TONS         NOMINAL TONS         UNIT CONFIGURATION         UNIT CONFIGURATION         UNIT CONFIGURATION         UNIT CONFIGURATION         EXTERNAL / TOTAL)         EXTERNAL / TOTAL STATIC PRI         EXTERNAL / TOTAL STATIC PRI         FAN GTY / WHEEL TYPE         FAN GTY / WHEEL TYPE         MOTOR (HP EACH)         MOTOR (HP EACH) </td
		SPLIT SYSTEM HEAT PUMP UNITS
Total       Control service       Participation       Control service       Control serv	Effective         Control to unit at the the the the the the the the the th	ENERAL NOTES: UNLESS NOTED OTHERWISE, CAPACITIES SHALL BE BASED ON INTERIOR DESIGN UNLESS NOTED OTHERWISE, CAPACITIES SHALL BE BASED ON INTERIOR DESIGN UNLESS NOTED OTHERWISE, CAPACITIES SHALL BE BASED ON INTERIOR DESIGN HEAT PUMP COOLING; 70DB HEATING. HEAT PUMP COOLING CAPACITY SHALL BE BASED ON 95°F AMBIENT CONDITIONS. HEAT PUMP HEATING CAPACITY SHALL BE BASED ON 95°F AMBIENT CONDITIONS. HEAT PUMP HEATING CAPACITY SHALL BE BASED ON 17°F AMBIENT CONDITIONS. HEAT PUMP HEATING CAPACITY SHALL BE BASED ON 17°F AMBIENT CONDITIONS. HEAT PUMP HEATING CAPACITY SHALL BE BASED ON 17°F AMBIENT CONDITIONS. HEAT PUMP HEATING CAPACITY SHALL BE BASED ON 17°F AMBIENT CONDITIONS. CONTROL S SHALL INCLUDE LOW AMBIENT COOLING & HEATING CONTROL S SHALL INCLUDE LOW AMBIENT COOLING & HEATING CONTROL S AND ACCESSORIES. OPERATIONAL TO 23F. SUPPLIER. COST FOR INCREASE OR CHANGE OF CELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE SFOR OUTDOOR UNIT AND INDOOR UNIT - SINGLE POINT WITH THE BUILDING AUTOMATION SYSTEM. SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRIC SERVICE FOR SUPPLIER. COST FOR INCREASE OR CHANGE OF ELECTRI
PT/PE         FM         COOL CAPACITY         FLTERS         LECTRICAL SERVICE         BASIS OF DESIGN         U           10000         10000         10000	TYPE         FM         COOL (CH/CHYY)         PELTIPES         LELETIPOL SERVICE         MPROC DELEMIN         T         LELETIPOL SERVICE         MPROC DELEMIN         T         N	2. CONTROLS SHALL BE FACTORY FURNISHED TO ACCOMPLISH THE SEQUENCES OF 3. FILTER BOX SHALL BE FACTORY FURNISHED.
	DRAWN: B MW SCALE:	



						FAN	S						
AND SH B. SONES C. MOTOR	INS SH HALL E S VALL R HOR	S: IALL BE A.M.C.A. 211 AND 311 PERFORMANCE CERTIFIED BEAR THE A.M.C.A. LABEL. JES BASED ON A.M.C.A. 301 MEASURED AT 5 FT. ISEPOWERS LISTED SHALL BE CONSIDERED MINIMUM. L OPENINGS ARE APPROX. VERIFY SIZE & COORDINATE.	F. COORDINATE ST FOR DECK SUPP G. WHEN APPLICAE TYPES AND SEIS H. VFD'S SHALL BE (SHORT CIRCUIT	ORT, AND BLE, REFE MIC REST CONSTRI	WALL L R TO SF RAINT F JCTED F	INTELS PECIFICA REQUIRE AND LAB	FOR WA ATIONS F EMENTS ELED FO	ILL OPEI FOR VIB OR REQU	NINGS. RATION   JIRED S(	ISOLA CCR		0 R	F E( SE F OVE REM SPE
NOTES: 1. FAN SH	IALL H	IAVE N+1 REDUNDANCY WITH FACTORY FURNISHED CON	TROLS. 2. STATIC PRESSU SELECTION SHAL NOZZLES, INLET	L ACCOU	NT FOR TC.					FAN	STACKS		
MARK	TYPE (REFER TO SPECS)	DESCRIPTION	SERVICE	FAN CFM	EXTERNAL STATIC PRESSURE (IN. W.C.)	APPROX. WHEEL DIAMETER	MAXIMUM SONES	HORSEPOWER (HP)	VOLTAGE - PHASE	ELECTRONICALLY COMMUTATED	ECM MCA (AMPS, TOTAL)	ECM MOCP (AMPS, TOTAL)	
01-EF-1A	L2	HIGH PLUME DILUTION EXHAUST FAN	PROCESS BLOCK	16000	1.15	33.5	60	20	460/3	-	_	-	
01-EF-1B	L2	HIGH PLUME DILUTION EXHAUST FAN	PROCESS BLOCK	16000	1.15	33.5	60	20	460/3	-	-	-	•
01-EF-2	B1	CENTRIFUGAL EXHAUST FAN WITH INTEGRAL STACK	HOT OIL ROOM	3500	1	18.25	26	5	460/3	-	-	-	

## **AIR DISTRIBUTION DEVICES**

GENERAL NOTES: A. ALL LAY-IN AIR DEVICES SHALL FIT IN 24"X24" LAY-IN CLG SYSTEM. VERIFY GRID TYPE AND COORDINATE AIR DEVICE COMPATIBILITY. 3. FINISH KEY: "W.B.E." - WHITE BAKED ENAMEL;

- C. SUPPLY AIR DIFFUSERS SHALL BE 4-WAY BLOW, UNLESS INDICATED OTHERWISE ON DRAWINGS.
- D. PROVIDE AUX. FRAMES FOR AIR DEVICES IN PLASTER,
- "E.C.L." ETCHED CLEAR LACQUER OR ANODIZED; "C.C.B.A." - CUSTOM COLOR SELECTED BY ARCHITECT.
- GYPSUM BOARD, TILE OR OTHER HARD SURFACES.

NOTES:

		M	OUN	TIN	<u>Ģ TY</u>	ΡE	MA	TER	IAL	F	INIS	Н	Ľ	۲	BASIS OF DI	ESIGN	
MARK	DESCRIPTION	LAY-IN	SURFACE	DUCT	SPLINE	SNAP-IN	STEEL	ALUMINUM	STAINLESS STEEL	W.B.E.	E.C.L.	C.C.B.A.	OPPOSED BLADE DAMPER	SQ-TO-RD NECK ADAPTOR	MANUFACTURER	MODEL	SEE NOTE
E10	LOUVERED FACE EXHAUST GRILLE			•				•			•		•		PRICE	630	
R10	EGGCRATE CEILING GRILLE	•						•		٠					PRICE	80	
R11	DUCT MOUNTED EGGCRATE GRILLE			•				•		٠					PRICE	80	
S10	DOUBLE DEFLECTION LOUVERED SUPPLY GRILLE			•						٠					PRICE	520	
S20	STANDARD SQ. PLAQUE CEILING DIFFUSER - ROUND NECK - 24 X 24	•					•			٠			•		PRICE	SPD	
S30	ROUND CONE DIFFUSER			•			٠			٠			•		PRICE	RCD	

GRAVITY ROOF VENTILATORS															
GENERAL NOTES: A. ROOF OPENING SIZES ARE APPROXIMATE. VERIFY B. COORDINATE STEEL FRAMING AROUND ROOF SIZE AND COORDINATE. OPENING, WHERE REQUIRED FOR DECK SUPPORT. NOTES:															
1															
				APPRO	DX. HOOD SIZE				DAMPE		BASIS OF DESIGN				
MARK	SERVICE	CFM	MAX. STATIC PRESSURE (IN.	LENGTH	WIDTH	LENGTH	WIDTH / DIAMETER	HEIGHT	CURB HEIGHT	APPROX. WEIGHT (LBS.)	MOTORIZED	GRAVITY	MANUFACTURER	MODEL	SEE NOTE
01-GRV-1	INTAKE	8000	0.03	60"	48"	99"	94"	25"	18"	450	•	-	GREENHECK	FGI	
01-GRV-2	INTAKE	8000	0.03	60"	48"	99"	94"	25"	18"	450	•	-	GREENHECK	FGI	
01-GRV-3	INTAKE	3500	0.03	36"	30"	63"	58"	19"	18"	200	•	-	GREENHECK	FGI	

## DUCT CONSTRUCTION, SEALING, AND INSULATION

GENERAL NOTES: A. REFER TO SPECIFICATIONS FOR DUCT CONSTRUCTION: B. DUCT CONSTRUCTION AND SEALING SHALL BE PER SHEET METAL DUCT; INTERIOR LINING; EXTERIOR LATEST S.M.A.C.N.A. STANDARDS. INSULATION; ETC.

NOTES: 1. DUCTWORK LOCATED OUTDOORS SHALL BE COVERED WITH A WEATHERTIGHT, UV RESISTANT JACKETING. 2. WATERTIGHT SEAL.

INSULATE 36" FROM PENETRATION OF WALL INTO BUILDING.
 DUCT RUNOUTS TO AIR DEVICES MAY BE 1" CONSTRUCTION.

	S.M.A.C.N.A. CLASS.								
	LEAKAGE CLASS				DOUBLE				
DUCT SYSTEM	S.P. CON- STRUCT.	SEAL CLASS	RECT	RND	INTERNALLY LINED	EXTERNAL INSULATION	WALL	NOT INSULATED	SEE NOTE
SUPPLY DUCTWORK FOR ELECTRICAL ROOM RTU - OUTSIDE	+3"	Α	8	4	•	-	-	-	1
RETURN DUCTWORK FOR ELECTRICAL ROOM RTU - OUTSIDE	-2"	Α	16	8	•	-	-	-	1
SUPPLY DUCTWORK FOR ELECTRICAL ROOM RTU - INSIDE	+3"	А	8	4	•	-	-	-	4
RETURN DUCTWORK FOR ELECTRICAL ROOM RTU- INSIDE	-2"	Α	16	8	•	-	-	-	4
SUPPLY DUCTWORK FOR SPLIT SYSTEMS	+2"	Α	16	8	•	-	-	-	4
RETURN DUCTWORK FOR SPLIT SYSTEMS	-2"	А	16	8	-	-	-	•	-
EXHAUST DUCTWORK	-3"	Α	8	4	-	NOTE 3	-	-	-
OUTSIDE AIR DUCTWORK	-1"	А	16	8	-	•	-	-	2

C MOTORS ARE INDICATED OR SPECIFIED, EACH MOTOR SHALL PROVIDED WITH FACTORY DISCONNECTING MEANS, INTERNAL ERLOAD PROTECTION, FIELD ADJUSTABLE SPEED CONTROL, AND MOTE ANALOG SPEED CONTROL INPUT WHEN REMOTE CONTROL IS ECIFIED, COORDINATED WITH THE BUILDING AUTOMATION SYSTEM.

### BASIS OF DESIGN MANUFACTURER MODEL 4,900 E1 GREENHECK VECTOR-MD-27-4-85 1,2 4,900 E1 VECTOR-MD-27-4-85 1,2 GREENHECK 400 E1 GREENHECK FJI-18-BI 2

HVAC DESIGN DATA

GENERAL NOTES: A. OUTDOOR DESIGN CONDITIONS: 95.2°F DB SUMMER 77°F WB SUMMER

15°F DB WINTER

B. DESIGN ALTITUDE: 148 FT.

NOTES: . LISTED RH IS MAXIMUM ANTICIPATED AT LISTED DB TEMPERATURE. "FLOATING" MEANS THERE IS NO ACTIVE CONTROL.

3. OUTDOOR AIR VENTILATION ONLY.								
INTERIOR DESIGN DATA								
SUM	MER	WIN						
	% RH							
°F DB	(NOTE 1)	°F DB	% RH	SEE NOTE				
75	55	72	FLOATING	2				
78	60	55	FLOATING	2				
NOTE 3	FLOATING	NOTE 3	FLOATING	2				
	SUM °F DB 75 78	INTERIOR DI           SUMMER           °F DB         % RH           75         55           78         60	INTERIOR DESIGN DATA           SUMMER         WIN           °F DB         (NOTE 1)         °F DB           75         55         72           78         60         55	INTERIOR DESIGN DATASUMMERWINTER°F DB% RH (NOTE 1)°F DB% RH755572FLOATING786055FLOATING				

## **ROOM AIRFLOW SCHEDULE**

ROOM NAME	VOLUME (CUBIC FEET)	AIRFLOW (CFM)	TARGET AIR CHANGES PER HOUR	DESIGN AIR CHANGES PER HOUR
PROCESS ROOM	155,000	16,000	6	6.2
HOT OIL ROOM	34,250	3,500	6	6.1
ELECTRICAL ROOM	52,000	8,350	-	-
SERVER ROOM	6,450	2,750	-	-
CONTROL ROOM	4,000	741	-	-



### 2018 APPENDIX B **BUILDING CODE SUMMARY FOR ALL COMMERCIAL PROJECTS**

MECHANICAL DESIGN (PROVIDE ON THE MECHANICL SHEETS IF APPLICABLE)

MECHANICAL SUMMARY

MECHANICAL SYSTEMS, SERVICE SYSTEMS AND EQUIPMENT

**Thermal Zone** 

winter dry bulb: 15° summer dry bulb: 95.2°

Interior design conditions winter dry bulb:  $72^{\circ}$ summer dry bulb: 75°

relative humidity: 55%

Building heating load: 25 MBH

Building cooling load: 24 MBH

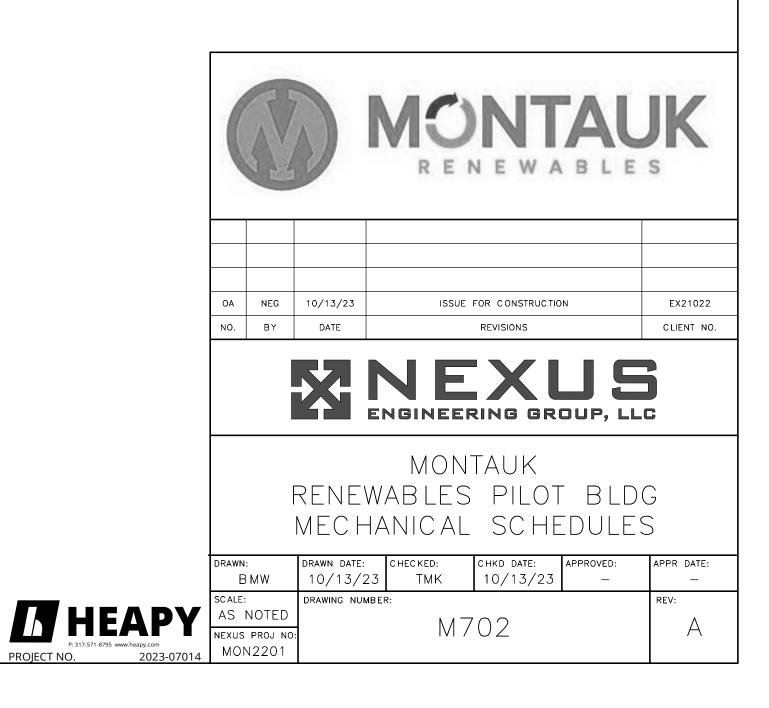
Mechanical Spacing Conditioning System Unitary

description of unit: SHP-1 heating efficiency: HSPF 10.4 cooling efficiency: SEER 16.6 size category of unit: 2 tons

List equipment efficiencies: See Above

## **APPENDIX B**

SCALE: NONE



PROJECT NO.