STANDARD MECHANICAL SYMBOLS

GENERAL SYMBOLS

- DRAWING NOTE HEX (NEW WORK)
- DRAWING NOTE SQUARE (DEMOLITION)
- POINT OF REMOVAL / CONNECTION TO EXISTING
- DETAIL OUTLINE
- DETAIL OR SECTION BUBBLE (A = USE "LETTERS" FOR SECTIONS; M3 = USE "NUMBERS" FOR DETAILS; SHEET NUMBER WHERE SECTION/DETAIL IS SHOWN)
- AHU-1 — EQUIPMENT MARK NUMBER

PIPING SYMBOLS

- BALL VALVE
- BUTTERFLY VALVE
- GATE VALVE
- GLOBE VALVE
- GLOBE ANGLE VALVE
- GATE ANGLE VALVE
- RELIEF VALVE
- BALANCING VALVE
- CALIBRATED BALANCING VALVE
- PRESSURE REDUCING VALVE
- CHECK VALVE
- CHECK VALVE W/BALL DRIP
- O.S. & Y VALVE
- QUICK OPENING VALVE
- AAV — AUTOMATIC AIR VENT
- MAV — MANUAL AIR VENT
- AUTOMATIC FLOW CONTROL VALVE (SELF CONTAINED)
- STRAINER
- BLOW-OFF STRAINER
- UNION
- PRESSURE GAGE & COCK
- TW — THERMOMETER WELL
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- FLEXIBLE CONNECTION
- PLUG VALVE
- THERMOMETER
- PRESSURE/TEMPERATURE PORT
- PIPE CAP
- ABV. — ABBREVIATION OF ITEM
- PIPE ELBOW DOWN
- PIPE ELBOW UP
- PIPE TEE DOWN
- PIPE TEE UP
- 45 DEGREE DROP
- ABV — ABBREVIATION OF PIPE CONTENTS
- A — ALIGNMENT GUIDE (A = TYPE)
- A — ANCHOR (A =TYPE)
- A — EXPANSION JOINT (A = TYPE)
- EXPANSION LOOP
- FLEXIBLE CONNECTOR
- R — PITCH OF PIPE (R = RISE; D = DROP) IN DIRECTION OF FLOW
- F & T — TRAP, STEAM W/ TYPE (F & T = FLOAT & THERMOSTAT; BT = BUCKET, TT = THERMOSTATIC)
- PUMP
- PSD — PUMP SUCTION DIFFUSER

HVAC DUCTWORK SYMBOLS

- SG-1 / 200 — AIR SUPPLY OUTLET W/THROW DIRECTION (SG = GRILLE; CD = CEILING DIFFUSER; SR = REGISTER) (200 = CFM QUANTITY)
- RG-1 / 200 — AIR EXHAUST OR RETURN (RG OR EG = GRILLE; RR OR ER = REGISTER) (200 = CFM QUANTITY)
- LD-1 / 200 — LINEAR DIFFUSER (200 = CFM QUANTITY)
- AIR SUPPLY DUCT ELBOW UP
- AIR RETURN, OUTSIDE OR EXHAUST DUCT ELBOW UP
- AIR SUPPLY DUCT ELBOW DOWN
- AIR RETURN, OUTSIDE OR EXHAUST DUCT ELBOW DOWN

HVAC DUCTWORK SYMBOLS (CONT.)

- DUCT CAP
- FAN
- STEAM HUMIDIFIER
- OPPOSED AIR DAMPER
- PARALLEL BLADE AIR DAMPER
- AFMS — AIR FLOW MEASURING STATION
- FIRE DAMPER - VERTICAL POSITION (HORIZONTAL AIR FLOW; AD = ACCESS DOOR)
- FIRE DAMPER - HORIZONTAL POSITION (VERTICAL AIR FLOW; AD = ACCESS DOOR)
- SMOKE DAMPER - VERTICAL POSITION (HORIZONTAL AIR FLOW; AD = ACCESS DOOR)
- SMOKE DAMPER - HORIZONTAL POSITION (VERTICAL AIR FLOW; AD = ACCESS DOOR)
- OR — INTERNAL INSULATION
- AUTOMATIC AIR DAMPER
- VOLUME DAMPER
- BDD — BACKDRAFT DAMPER
- R — DUCT PITCH IN DIRECTION OF FLOW (R = RISE; D = DROP)
- 20X12 — DUCT SIZE; FIRST NUMBER SHOWN IS DIMENSION OF SIDE SHOWN (DIMENSIONS ARE CLEAR INTERNAL)
- AD — ACCESS DOOR (VERTICAL OF HORIZONTAL)
- CEILING DIFFUSER (CEILING OR BOTTOM OF DUCT)
- RETURN GRILLE (CEILING OR BOTTOM OF DUCT)
- SUPPLY GRILLE (WALL OR SIDE OF DUCT, SIMILAR FOR RETURN/EXHAUST GRILLES)
- OR — FLEXIBLE DUCT CONNECTION
- S R — RECTANGULAR BRANCH TAKE-OFF
- MANUAL SPLITTER DAMPER
- SUPPLY AIR
- RETURN OR EXHAUST AIR
- UC 1/2" / 100 — UNDER CUT DOOR,WITH SIZE & CFM
- 20X12 L / 200 — LOUVERED DOOR,WITH SIZE & CFM
- 1/2 — DUCT PRESSURE CLASS INDICATOR (INCHES W.G.)
- UNIT HEATER, HORIZONTAL THROW
- UNIT HEATER, VERTICAL THROW

HVAC CONTROL SYMBOLS

- T — ROOM THERMOSTAT
- H — HUMIDISTAT
- CO_2 — CARBON DIOXIDE SENSOR
- SELF OPERATED VALVE
- TWO-WAY CONTROL VALVE
- C NC NO — THREE-WAY CONTROL VALVE (C=COMMON; NC=NORMALLY CLOSED; NO=NORMALLY OPEN)
- MOTOR STARTER
- VFD — VARIABLE FREQUENCY DRIVE
- CO — CARBON MONOXIDE SENSOR
- NO_X — NITROUS OXIDE SENSOR
- SD — DUCT SMOKE DETECTOR

NOTES:

A. THIS LEGEND IS COMPOSED OF STANDARD SYMBOLS AND APPLIES TO THE SET OF DRAWINGS TO THE EXTENT APPLICABLE.

B. REFER TO HVAC CONTROL SCHEMATIC DRAWINGS FOR ADDITIONAL CONTROL SYMBOLS & ABBREVIATIONS.

STANDARD MECHANICAL ABBREVIATIONS

A	AMPERE
AAD	AUTOMATIC AIR DAMPER
A/C	AIR CONDITIONING
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
B	BOILER
BDD	BACK DRAFT DAMPER
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
CFM	CUBIC FEET PER MINUTE
COND	CONDENSATE
CU****	CONDENSING UNIT
CU****	COPPER
CUH	CABINET UNIT HEATER
CVR	CONSTANT VOLUME REHEAT BOX
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY
CV	COEFFICIENT, VALVE FLOW
DB****	DRY-BULB TEMPERATURE
DN	DOWN
DP	DIFFERENTIAL PRESSURE TRANSMITTER
DWG	DRAWING
EA	EXHAUST AIR
EADB	ENTERING AIR DRY-BULB
EAT	ENTERING AIR TEMPERATURE
EAWB	ENTERING AIR WET-BULB
EXIST	EXISTING
F	FAHRENHEIT TEMPERATURE
FCU	FAN COIL UNIT
FD****	FIRE DAMPER
FD	FLOOR DRAIN
GPM	GALLONS PER MINUTE
H****	HUMIDISTAT
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
HZ	HERTZ
ID	INSIDE DIAMETER
IN	INCHES
KW	KILOWATT
KWH	KILOWATT-HOUR
L****	LOUVER
LADB	LEAVING AIR DRY BULB
LARH	LEAVING AIR RELATIVE HUMIDITY
LAWB	LEAVING AIR WET BULB
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
MA****	MIXED AIR
MADB	MIXED AIR DRY-BULB
MARH	MIXED AIR RELATIVE HUMIDITY
MAT	MIXED AIR TEMPERATURE
MAWB	MIXED AIR WET-BULB
MAX	MAXIMUM
MBH	ONE THOUSAND BRITISH THERMAL UNITS PER HOUR
MCA	MINIMUM CIRCUIT AMPS
MECH	MECHANICAL
MIN	MINIMUM
N/A	NOT APPLICABLE
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OADB	OUTSIDE AIR DRY-BULB TEMPERATURE
OAI	OUTSIDE AIR INTAKE
OARH	OUTSIDE AIR RELATIVE HUMIDITY
OAT	OUTSIDE AIR TEMPERATURE
OAWB	OUTSIDE AIR WET-BULB TEMPERATURE
OD	OUTSIDE DIAMETER
RA	RETURN AIR
RADB	RETURN AIR DRY-BULB TEMPERATURE
RARH	RETURN AIR RELATIVE HUMIDITY
RAT	RETURN AIR TEMPERATURE
RAWB	RETURN AIR WET-BULB
RC	REHEAT COIL
RD	ROOF DRAIN
RF	RETURN AIR FAN
RG	RETURN AIR GRILLE
RH****	RELATIVE HUMIDITY
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION
RTU	ROOF TOP UNIT
SA	SUPPLY AIR
SADB	SUPPLY AIR DRY-BULB TEMPERATURE
SARH	SUPPLY AIR RELATIVE HUMIDITY
SAT	SUPPLY AIR TEMPERATURE
SAWB	SUPPLY AIR WET-BULB TEMPERATURE
SD****	SMOKE DETECTOR
SF****	SUPPLY AIR FAN
SF	SQUARE FOOT
SG	SUPPLY AIR GRILLE
SP****	STATIC PRESSURE
SPEC	SPECIFICATION
TA	TRANSFER AIR
T	THERMOSTAT
TCV	TEMPERATURE CONTROL VALVE
TEMP	TEMPERATURE
TG	TRANSFER AIR GRILLE
TOD	TOP OF DUCT
TOP	TOP OF PIPE
TYP	TYPICAL
WB	WET-BULB TEMPERATURE
WT	WEIGHT

NOTES:

A. THIS LEGEND IS COMPOSED OF STANDARD ABBREVIATIONS AND APPLIES TO THE SET OF DRAWINGS TO THE EXTENT APPLICABLE.

B. **** INDICATES MULTIPLE ABBREVIATIONS. REFER TO THE DRAWINGS FOR EXACT MEANING.

GENERAL NOTES - DEMOLITION
(APPLIES TO ALL 'MD' SERIES SHEETS)

A. DISPOSE / RECLAIM ALL REFRIGERANT IN ACCORDANCE WITH EPA GUIDELINES.

B. REMOVE ANY ABANDONED IN PLACE OR UN-USED PIPING, DUCTWORK, UTILITIES, EQUIPMENT, ETC. IN AREA OF WORK. RELOCATE/RE-ROUTE ANY EXISTING LINES THAT ARE TO REMAIN AND ARE IN THE WAY OF BUILD-OUT WORK. COORDINATE WITH THE CONTRACTING OFFICIER ALL UTILITIES THAT ARE TO REMAIN ACTIVE DURING AND AFTER CONSTRUCTION.

C. ALL DEMOLITION AND ABANDONED IN PLACE PIPING AND DUCTWORK TO BE REMOVED BACK TO AREA OF WORK PERIMETER AND CAPPED 2 FEET OUTSIDE OF PERIMETER.

D. PRIOR TO START OF DEMOLITION, CONTRACTOR TO VERIFY ALL CONDITIONS IN THE FIELD.

E. MAINTAIN EXISTING SERVICES UNLESS INDICATED TO BE REMOVED.

F. CONTAINERS USED TO STORE OR TRANSPORT CLASS I OR CLASS II ODC'S FOR ANY LENGTH OF TIME, REQUIRE THIS WARNING STATEMENT: "WARNING: CONTAINS (LIST NAME OF ODC), SUBSTANCE WHICH HARMS PUBLIC HEALTH AND ENVIRONMENT BY DESTROYING OZONE IN THE UPPER ATMOSTPHERE."

G. LOCATE EXISTING PIPING AND DUCTWORK AND MAKE CONNECTIONS AS REQUIRED.
1. DO NOT CUT EXISTING SERVICES WITHOUT FIRST VERIFYING WITH CONTRACTING OFFICER THAT SERVICE HAS BEEN CORRECTLY IDENTIFIED.
2. PERFORM WORK THAT INTERRUPTS ANY SERVICE (THIS INCLUDES CUTTING INTO EXISTING LINES FOR NEW CONSTRUCTION) AT TIME (COORDINATED WITH CONTRACTING OFFICER) TO CAUSE LEAST INTERFERENCE TO NORMAL OPERATION OF FACILITY. DEMOLITION MAY OCCUR AT ALTERNATE TIMES OR DAYS TO PREVENT UNNECCESSARY DISRUPTION OR TO MAXIMIZE EFFICIENCY.
3. INFORM OWNER IN ADVANCE OF ANY SHUT DOWN THAT WILL OCCUR AND GIVE ESTIMATE OF DURATION.

GENERAL NOTES
(APPLIES TO ALL 'M' SERIES SHEETS)

A. DUCTWORK SHALL BE AS SPECIFIED IN DUCTWORK SCHEDULE AND HVAC SPECIFICATIONS. CONSTRUCT AND INSTALL PER LATEST EDITION OF SMACNA DUCT CONSTRUCTION STANDARDS.

B. ALL DUCTWORK SHALL BE SUPPORTED FROM THE BUILDING STRUCTURE.

C. ALL WORK AND EQUIPMENT SHALL CONFORM WITH THE REQUIREMENTS OF THE INTERNATIONAL BUILDING CODE, INTERNATIONAL MECHANICAL CODE, AND ALL LOCAL CODES.

D. THE MECHANICAL CONTRACTORS AND EQUIPMENT SUPPLIERS SHALL COMPARE THE ELECTRICAL POWER REQUIREMENTS OF THE INTENDED EQUIPMENT AS SPECIFIED WITH THE POWER CHARACTERISTICS TO THE EQUIPMENT AS SHOWN ON THE ELECTRICAL DRAWINGS. SHOULD THE SELECTED EQUIPMENT AS FURNISHED BY THE CONTRACTOR REQUIRE A LARGER REVISION OF ITS BRANCH FEEDER, THE ADDED COSTS SHALL BE BORNE BY THE CONTRACTOR FURNISHING THE EQUIPMENT.

E. AFTER CONSTRUCTION, THE HVAC AND HYDRONIC SYSTEM SHALL BE TESTED, ADJUSTED, AND BALANCED TO DELIVER THE QUANTITIES SHOWN ON THE DRAWINGS AND A REPORT SUBMITTED TO ARCHITECT/ENGINEER FOR APPROVAL.

F. TRANSFORMERS, CONTROLS, AND CONTROL WIRING REQUIRED FOR ALL MECHANICAL SYSTEMS SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR.

G. ALL MECHANICAL EQUIPMENT SHALL BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.

H. ALL REQUIRED CONTROL WIRING NOT SHOWN ON THE ELECTRICAL DRAWINGS SHALL BE INCLUDED AS PART OF THE MECHANICAL WORK. WIRING IN HVAC PLENUM SPACES SHALL BE INSTALLED ACCORDING TO CODE REQUIREMENTS.

I. LOCATIONS OF GRILLES, REGISTERS, AND DIFFUSERS SHOWN ON THE DRAWINGS ARE APPROXIMATE. COORDINATE EXACT LOCATIONS WITH LIGHTS, STRUCTURE, ETC.

J. CONTRACTOR SHALL COORDINATE THE INSTALLATION OF ALL MECHANICAL EQUIPMENT, DUCTWORK, ETC. TO FIT WITHIN THE SPACE ALLOWED BY THE ARCHITECTURAL AND STRUCTURAL CONDITIONS. CUTTING OR OTHERWISE ALTERING ANY STRUCTURAL MEMBERS SHALL NOT BE PERMITTED WITHOUT WRITTEN PERMISSION FROM THE ARCHITECT.

K. CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS AFFECTING THIS SCOPE OF WORK PRIOR TO PERFORMING WORK.

L. FOR PURPOSES OF CLEARNESS AND LEGIBILITY, DRAWINGS ARE ESSENTIALLY DIAGRAMMATIC ALTHOUGH SIZE AND LOCATION OF EQUIPMENT ARE SHOWN TO SCALE WHEREVER POSSIBLE.

M. PACK SLEEVES FULL AROUND PIPES AND DUCTS PASSING THRU FLOORS AND FIRE-RATED WALLS AND PARTITIONS TO MAINTAIN THE FIRE OR SMOKE RATING OF THAT CONSTRUCTION. SEE SPECIFICATION SECTION 078413- PENETRATION FIRESTOPPING.

N. PROVIDE FIRE DAMPERS PER LATEST NFPA REQUIREMENTS AND LOCAL CODES. FIRE DAMPERS SHALL BE AS SPECIFIED AND NOTED ON THE DRAWINGS. PROVIDE ACCESS DOOR AT EACH FIRE DAMPER.

O. PROVIDE BALANCING DAMPERS WHERE SHOWN AND AT ALL DUCTED ACCESSIBLE BRANCH TAKE-OFFS TO SUPPLY, RETURN, AND EXHAUST GRILLES, REGISTERS, AND DIFFUSERS. WHERE DAMPERS SERVING AIR DEVICES ARE LOCATED IN NON-ACCESSIBLE LOCATIONS, PROVIDE A DAMPER IN THE SUPPLY DUCT NECK AT THE DIFFUSER. (NON-ACCESSIBLE MEANS DRYWALL CEILINGS, ETC.)

P. PROVIDE DUCT SEAM SEALING ON ALL DUCTWORK. REFER TO SCHEDULE.

Q. ALL THERMOSTAT/SENSOR LOCATIONS MUST BE COORDINATED AND APPROVED BY THE OWNER'S REP. VERIFY THE PERIMETER WALLS OR COLUMN ENCLOSURE ARE INSULATED. PROVIDE INSULATED PAD BEHIND THERMOSTAT/SENSOR MOUNTING BRACKET IF MOUNTING LOCATION IS NOT INSULATED. PROVIDE AN EXTRA 10 FT OF THERMOSTAT/SENSOR WIRE COILED ABOVE CEILING TO ALLOW FOR FUTURE RELOCATION OF THERMOSTAT. ALL THERMOSTATS AND WIRING TO BE SURFACE MOUNTED IN SCIF SPACES.

R. ALL DUCT SMOKE DETECTORS ARE TO BE FURNISHED BY MC AND INSTALLED BY EC.

S. ALL RECTANGULAR DUCTWORK ELBOWS SHALL HAVE TURNING VANES.

T. EQUIVALENT DUCT SIZES ARE ACCEPTABLE IN LIEU OF DUCT SIZES SHOWN.

U. ALL EQUIPMENT SHALL BE INSTALLED TO MAINTAIN ALL CODE, MANUFACTURER, AND MAINTENANCE CLEARANCES. VERIFY SPECIFIC LOCATION AND ORIENTATION OF EACH UNIT WITH THE OWNER/DESIGN TEAM PRIOR TO INSTALLATION.

V. ALL EXISTING PIPING, DUCTWORK, EQUIPMENT, ETC. IS TO REMAIN UNLESS NOTED OTHERWISE.

W. SOME OF THE AREAS SURROUNDING THE WORK AREAS ARE OCCUPIED AND WILL REMAIN OCCUPIED DURING THE CONSTRUCTION PERIOD. COORDINATE WORK SCHEDULE WITH OWNER'S REP.

X. WHERE SHUTDOWN OF EXISTING SYSTEMS IS REQUIRED DURING NEW WORK, COORDINATE SHUTDOWN TIME AND DURATION WITH THE CONTRACTING OFFICER TO MINIMIZE DOWNTIME. NOTIFY OWNER'S REP SEVEN (7) DAYS PRIOR TO INTERRUPTION OF SERVICE.

Y. NO PVC PIPING OR COMBUSTIBLE MATERIAL SHALL BE USED IN RETURN AIR PLENUMS. ANY EXISTING PVC PIPING LOCATED IN THE PLENUM IS REQUIRED TO BE INSULATED WITH MATERIALS THAT COMPLY WITH THE FLAME AND SMOKE SPREAD INDEX REQUIREMENTS STATED IN ASTM E84 AND AS STATED IN THE INTERNATIONAL MECHANICAL CODE.

Z. ALL PIPE TO BE SUPPORTED AS REQUIRED FOR SPANS, SUPPORTED INDEPENDENT FROM ANY LIGHTING FIXTURES, CABLE TRAYS, ETC.

AA. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REQUIRED PERMITS AND INSPECTIONS.

BB. CONTRACTOR SHALL PROVIDE MANUAL AIR VENTS AT ALL HIGH POINTS AND DRAINS AT ALL LOW POINTS IN HYDRONIC SYSTEM. ALL AIR VENTS SHALL BE PIPED TO DRAINS.

CC. OPEN ENDS OF ALL DUCTWORK DELIVERED TO SITE SHALL BE COVERED BEFORE DELIVERY TO AVOID CONTAMINATION FIELD.

DD. OPEN ENDS OF NEW PIPE LINES SHALL BE TEMPORARILY CAPPED OR PLUGGED DURING CONSTRUCTION TO PREVENT ENTRY OF DIRT OR FOREIGN MATERIALS.

EE. ANY CHANGES FROM THE BASIS OF DESIGN EQUIPMENT SELECTIONS WILL REQUIRE THE CONTRACTOR TO MAKE ALL ADJUSTMENTS NECESSARY FOR SELECTED EQUIPMENT.

NO.	DATE	DESCRIPTION
1	04-22-2022	FOR PERMIT

MADEIRA HIGH SCHOOL GYM HVAC REPLACEMENT

7465 LOANNES DRIVE
CINCINNATI, OH 45243

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Designing Better Futures

KZF DESIGN INC.
700 Broadway Street
Cincinnati, OH 45202

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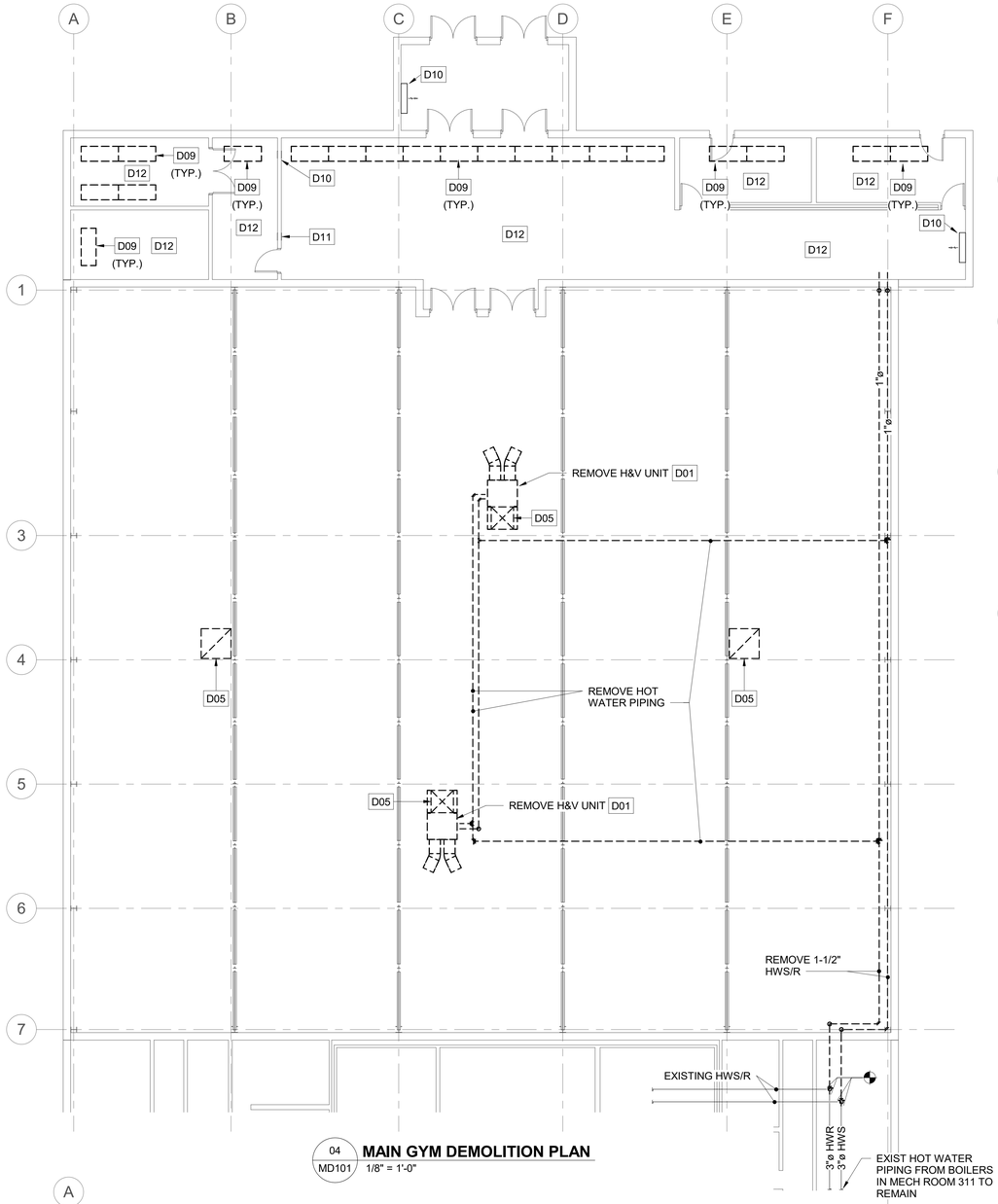
STATE OF OHIO — CLAYTON C. BRANSCUM — E-54916 — REGISTERED PROFESSIONAL ENGINEER

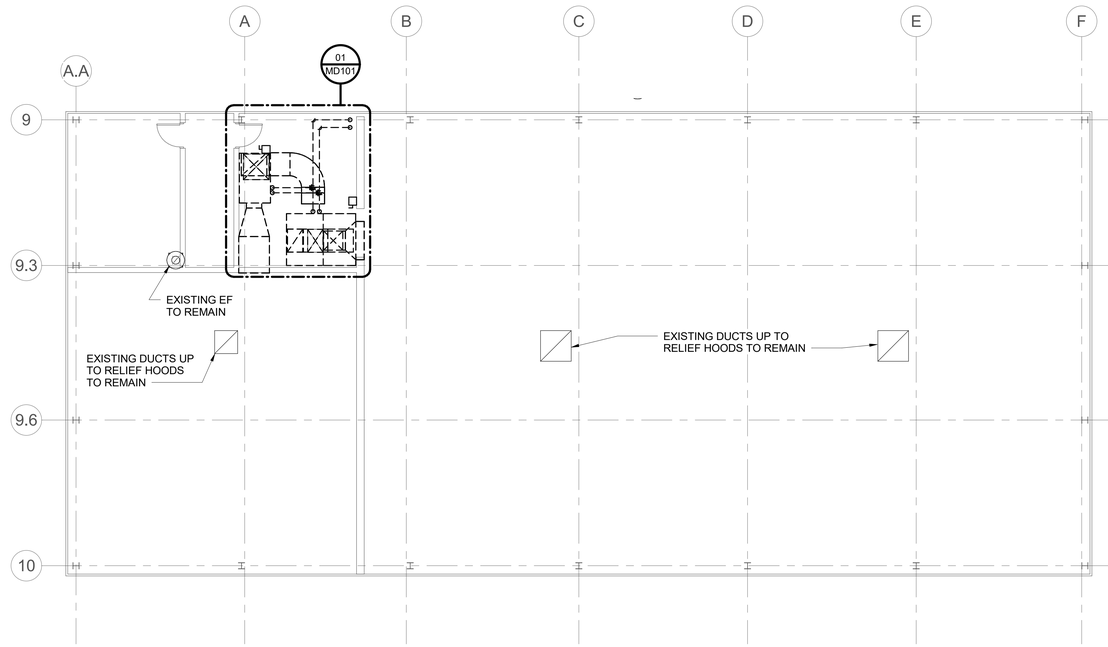
DESIGNED	COMM. NO.
JORDAN	8055.00
DRAWN	DATE
JORDAN	04-22-2022
CHECKED	PROJ. MGR.
BRANSCUM	EVANS

SYMBOLS, ABBREVIATIONS, AND GENERAL NOTES

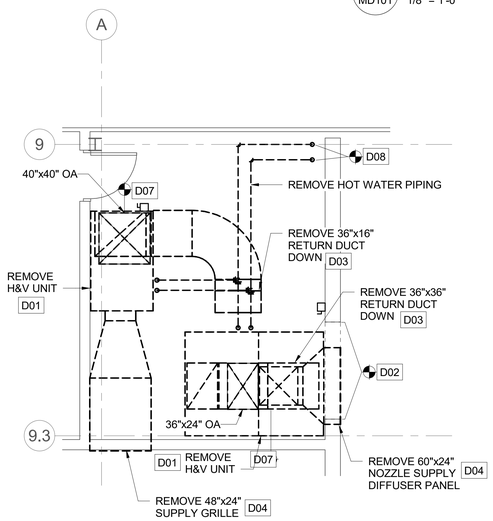
DRAWING NUMBER **M-001** ISSUE 1



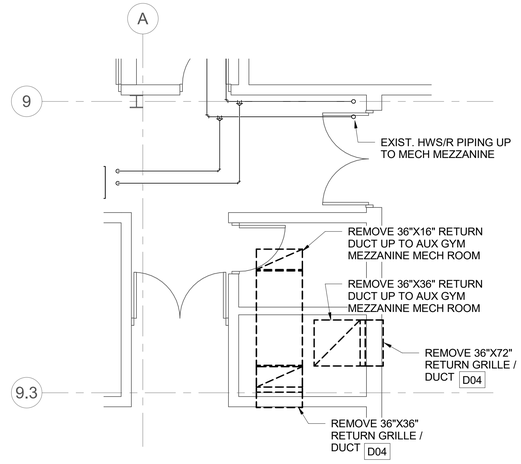
04 MD101 **MAIN GYM DEMOLITION PLAN**
1/8" = 1'-0"



03 MD101 **AUX GYM UPPER DEMOLITION PLAN**
1/8" = 1'-0"



01 MD101 **AUX GYM MEZZANINE MECHANICAL ROOM DEMOLITION PLAN**
1/4" = 1'-0"



02 MD101 **FIRST FLOOR AUX GYM ENLARGED STORAGE ROOM DEMOLITION PLAN**
1/4" = 1'-0"

☐ DRAWING NOTES

D01 REMOVE HEATING AND VENTILATING UNITS AND ASSOCIATED DUCTWORK, HOT WATER PIPING, AND POWER AND DISPOSE OF PROPERLY. REMOVE PNEUMATIC CONTROLS BACK TO COMPRESSED AIR MAINS AND CAP. REMOVE HOT WATER PIPING TO POINTS SHOWN FOR RECONNECTION IN NEW WORK.

D02 PROVIDE NEW OPENING IN EXISTING CMU WALL TO ALLOW FOR EQUIPMENT REMOVAL AND NEW PAIR OF 3'-0" X 7'-0" DOORS. REFER TO SHEET M-301 FOR MORE INFORMATION. FIELD COORDINATE EXACT LOCATION WITH EXISTING CONDITIONS.

D03 REMOVE RETURN DUCTWORK DOWN TO STORAGE ROOM BELOW. INFILL EXISTING OPENINGS IN MECHANICAL ROOM FLOOR TO MATCH EXISTING. REFER TO FIRST FLOOR AUX GYM ENLARGED STORAGE ROOM DEMOLITION PLAN, THIS SHEET, FOR EXTENT OF REMOVAL.

D04 REMOVE EXISTING DUCTWORK AND AIR DEVICE IN CMU WALL. INFILL AND PATCH OPENING IN WALL TO MATCH EXISTING.

D05 REMOVE INTAKE/RELIEF HOOD IN ROOF. PATCH, INSULATE AND SEAL AND SEAL ROOF WEATHERTIGHT TO MATCH EXISTING.

D07 REMOVE OUTSIDE AIR DUCTWORK UP TO ROOF PENETRATION FOR RECONNECTION IN NEW WORK. OA INTAKE ON ROOF TO REMAIN.

D08 REMOVE HOT WATER PIPING BACK TO FLOOR PENETRATION FOR RECONNECTION IN NEW WORK.

D09 REMOVE EXISTING HOT WATER RADIANT PANELS AND ASSOCIATED CONTROLS. REMOVE HOT WATER PIPING TO POINT SHOWN. CONTRACTOR TO PERFORM DEMOLITION OF CEILINGS AS REQUIRED FOR REMOVAL.

D10 EXISTING CABINET UNIT HEATER TO REMAIN.

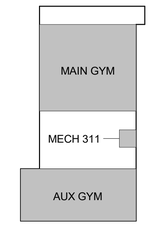
D11 EXISTING TRANSFER GRILLES TO REMAIN.

D12 REMOVE EXISTING CEILING IN THIS SPACE. LIGHTING AND ALL CEILING DEVICES TO BE SAVED FOR RE-INSTALLATION AFTER NEW CEILINGS HAVE BEEN INSTALLED.

LINEWORK LEGEND

EXISTING

DEMOLITION



BUILDING C KEY PLAN

N

NO.	DATE	DESCRIPTION
1	04-22-2022	FOR PERMIT

MADEIRA HIGH SCHOOL POOL GYM HVAC REPLACEMENT

7465 LOANNES DRIVE
CINCINNATI, OH 45243

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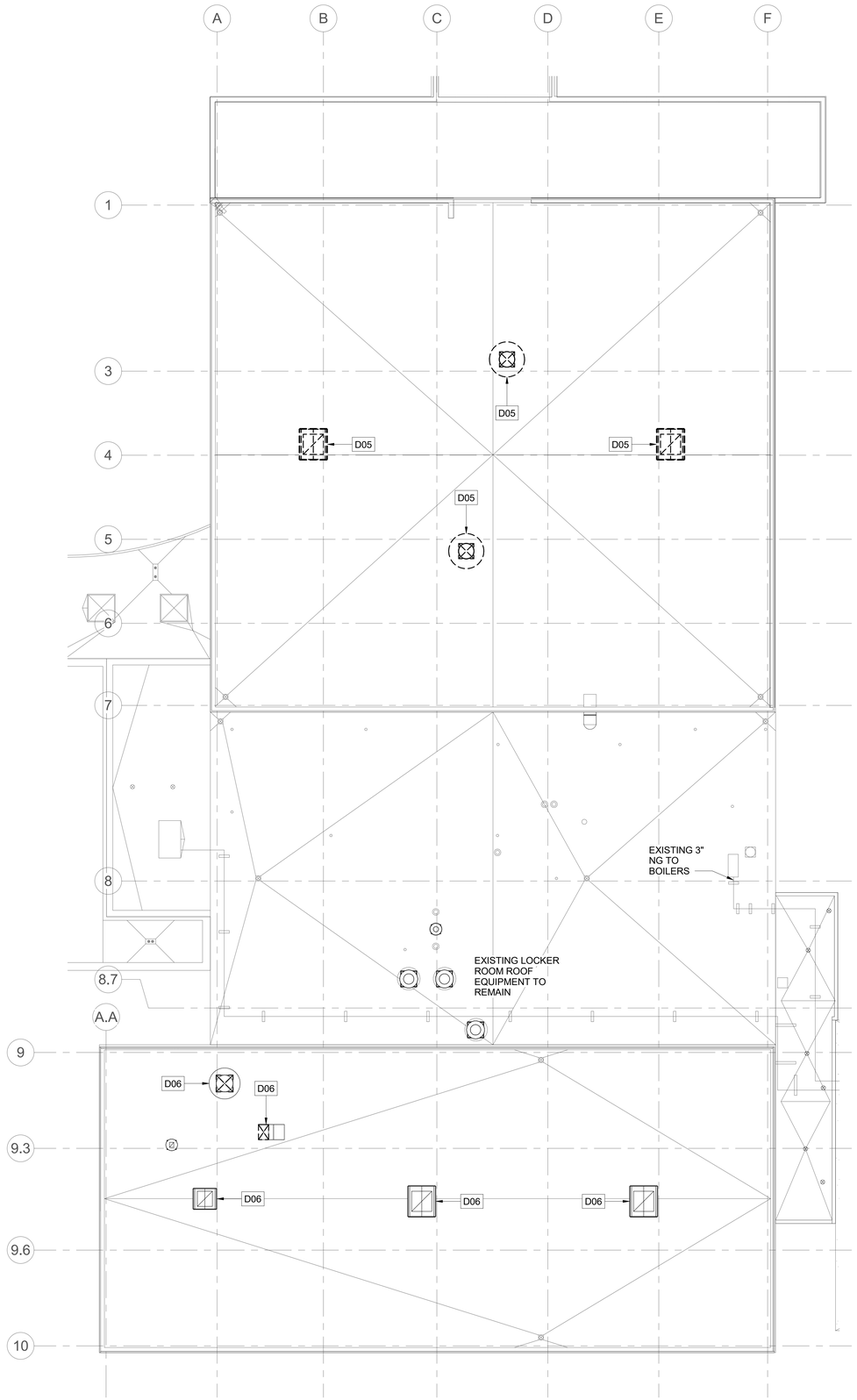
JESSICA C. BRANSCUM
E-54916
REGISTERED PROFESSIONAL ENGINEER

DESIGNED	COMM. NO.
JORDAN	8055.00
DRAWN	DATE
JORDAN	04-22-2022
CHECKED	PROJ. MGR.
BRANSCUM	EVANS

DEMOLITION FLOOR PLANS

DRAWING NUMBER ISSUE
MD101 1



1 MD102 **BUILDING C - ROOF OVERALL DEMOLITION PLAN**
3/32" = 1'-0"

DRAWING NOTES

D05 REMOVE INTAKE/RELIEF HOOD IN ROOF. PATCH, INSULATE AND SEAL AND SEAL ROOF WEATHERTIGHT TO MATCH EXISTING.

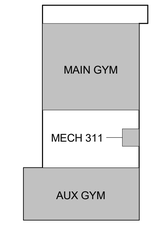
D06 EXISTING INTAKE/RELIEF HOOD IN ROOF TO REMAIN.

NOTE: ALL ROOF FLASHING TO BE PERFORMED BY KRAMER AND SONS ROOFING. CONTACT JEFF KRAMER AT 513-353-1142

LINEWORK LEGEND

EXISTING

NEW WORK



BUILDING C KEY PLAN

N

NO.	DATE	DESCRIPTION
1	04-22-2022	FOR PERMIT

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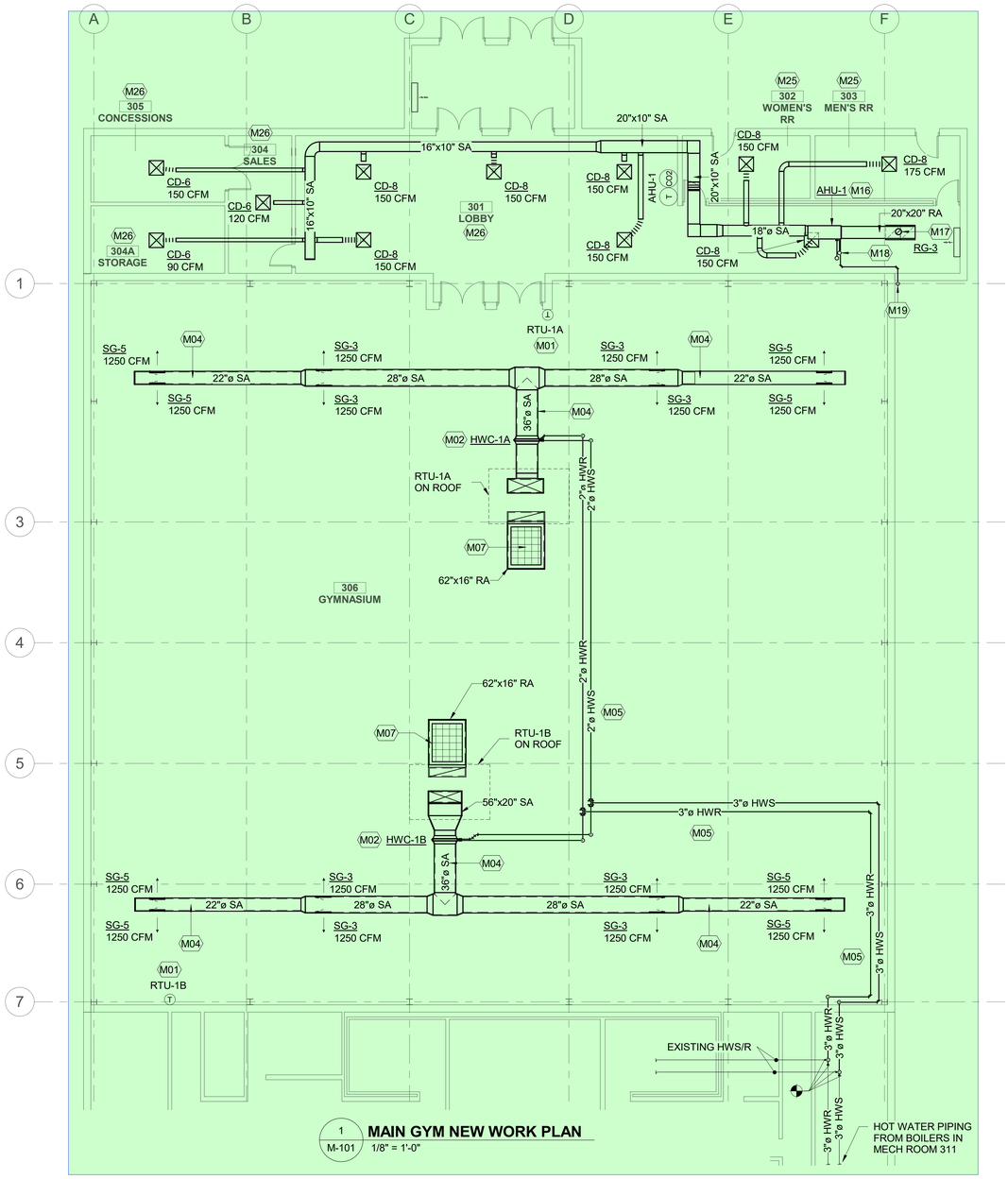
BRANDON C. BRANSCUM
E-54916
REGISTERED PROFESSIONAL ENGINEER

DESIGNED	COMM. NO.
JORDAN	8055.00
DRAWN	DATE
JORDAN	04-22-2022
CHECKED	PROJ. MGR.
BRANSCUM	EVANS

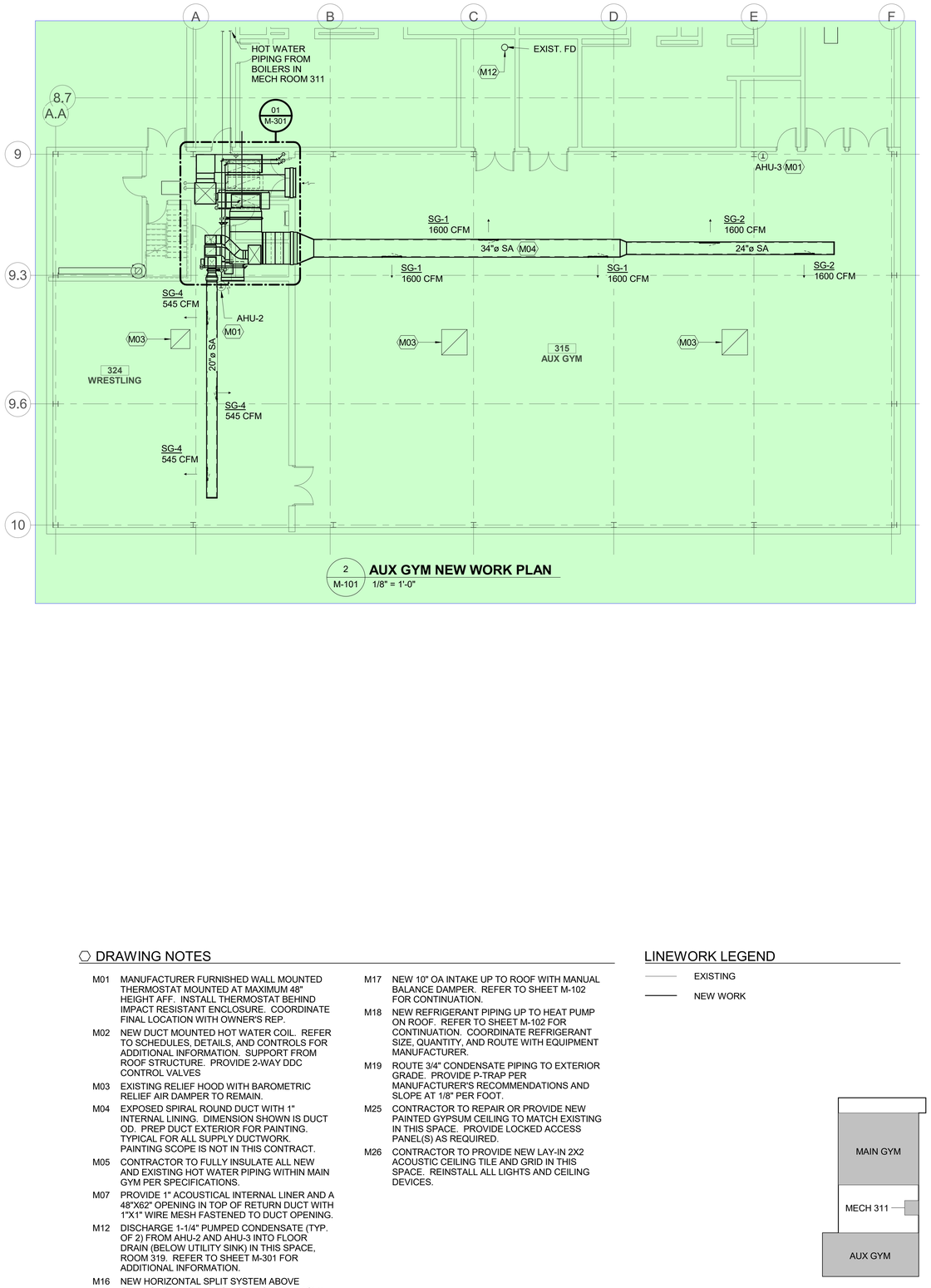
ROOF DEMOLITION PLAN

DRAWING NUMBER ISSUE

MD102 1



1 M-101 **MAIN GYM NEW WORK PLAN**
1/8" = 1'-0"



2 M-101 **AUX GYM NEW WORK PLAN**
1/8" = 1'-0"

DRAWING NOTES

M01 MANUFACTURER FURNISHED WALL MOUNTED THERMOSTAT MOUNTED AT MAXIMUM 48" HEIGHT AFF. INSTALL THERMOSTAT BEHIND IMPACT RESISTANT ENCLOSURE. COORDINATE FINAL LOCATION WITH OWNER'S REP.

M02 NEW DUCT MOUNTED HOT WATER COIL. REFER TO SCHEDULES, DETAILS, AND CONTROLS FOR ADDITIONAL INFORMATION. SUPPORT FROM ROOF STRUCTURE. PROVIDE 2-WAY DDC CONTROL VALVES

M03 EXISTING RELIEF HOOD WITH BAROMETRIC RELIEF AIR DAMPER TO REMAIN.

M04 EXPOSED SPIRAL ROUND DUCT WITH 1" INTERNAL LINING. DIMENSION SHOWN IS DUCT OD. PREP DUCT EXTERIOR FOR PAINTING. TYPICAL FOR ALL SUPPLY DUCTWORK. PAINTING SCOPE IS NOT IN THIS CONTRACT.

M05 CONTRACTOR TO FULLY INSULATE ALL NEW AND EXISTING HOT WATER PIPING WITHIN MAIN GYM PER SPECIFICATIONS.

M07 PROVIDE 1" ACOUSTICAL INTERNAL LINER AND A 48"X62" OPENING IN TOP OF RETURN DUCT WITH 1"X1" WIRE MESH FASTENED TO DUCT OPENING.

M12 DISCHARGE 1-1/4" PUMPED CONDENSATE (TYP. OF 2) FROM AHU-2 AND AHU-3 INTO FLOOR DRAIN (BELOW UTILITY SINK) IN THIS SPACE, ROOM 319. REFER TO SHEET M-301 FOR ADDITIONAL INFORMATION.

M16 NEW HORIZONTAL SPLIT SYSTEM ABOVE CEILING. SUPPORT FROM STRUCTURE ABOVE.

M17 NEW 10" OA INTAKE UP TO ROOF WITH MANUAL BALANCE DAMPER. REFER TO SHEET M-102 FOR CONTINUATION.

M18 NEW REFRIGERANT PIPING UP TO HEAT PUMP ON ROOF. REFER TO SHEET M-102 FOR CONTINUATION. COORDINATE REFRIGERANT SIZE, QUANTITY, AND ROUTE WITH EQUIPMENT MANUFACTURER.

M19 ROUTE 3/4" CONDENSATE PIPING TO EXTERIOR GRADE. PROVIDE P-TRAP PER MANUFACTURER'S RECOMMENDATIONS AND SLOPE AT 1/8" PER FOOT.

M25 CONTRACTOR TO REPAIR OR PROVIDE NEW PAINTED GYPSUM CEILING TO MATCH EXISTING IN THIS SPACE. PROVIDE LOCKED ACCESS PANEL(S) AS REQUIRED.

M26 CONTRACTOR TO PROVIDE NEW LAY-IN 2X2 ACOUSTIC CEILING TILE AND GRID IN THIS SPACE. REINSTALL ALL LIGHTS AND CEILING DEVICES.

LINEWORK LEGEND

EXISTING

NEW WORK

BUILDING C KEY PLAN

NO.	DATE	DESCRIPTION
1	04-22-2022	FOR PERMIT

MADEIRA HIGH SCHOOL GYM HVAC REPLACEMENT

7465 LOANNES DRIVE
CINCINNATI, OH 45243

KZF DESIGN
Designing Better Futures

KZF DESIGN INC.
700 Broadway Street
Cincinnati, OH 45202

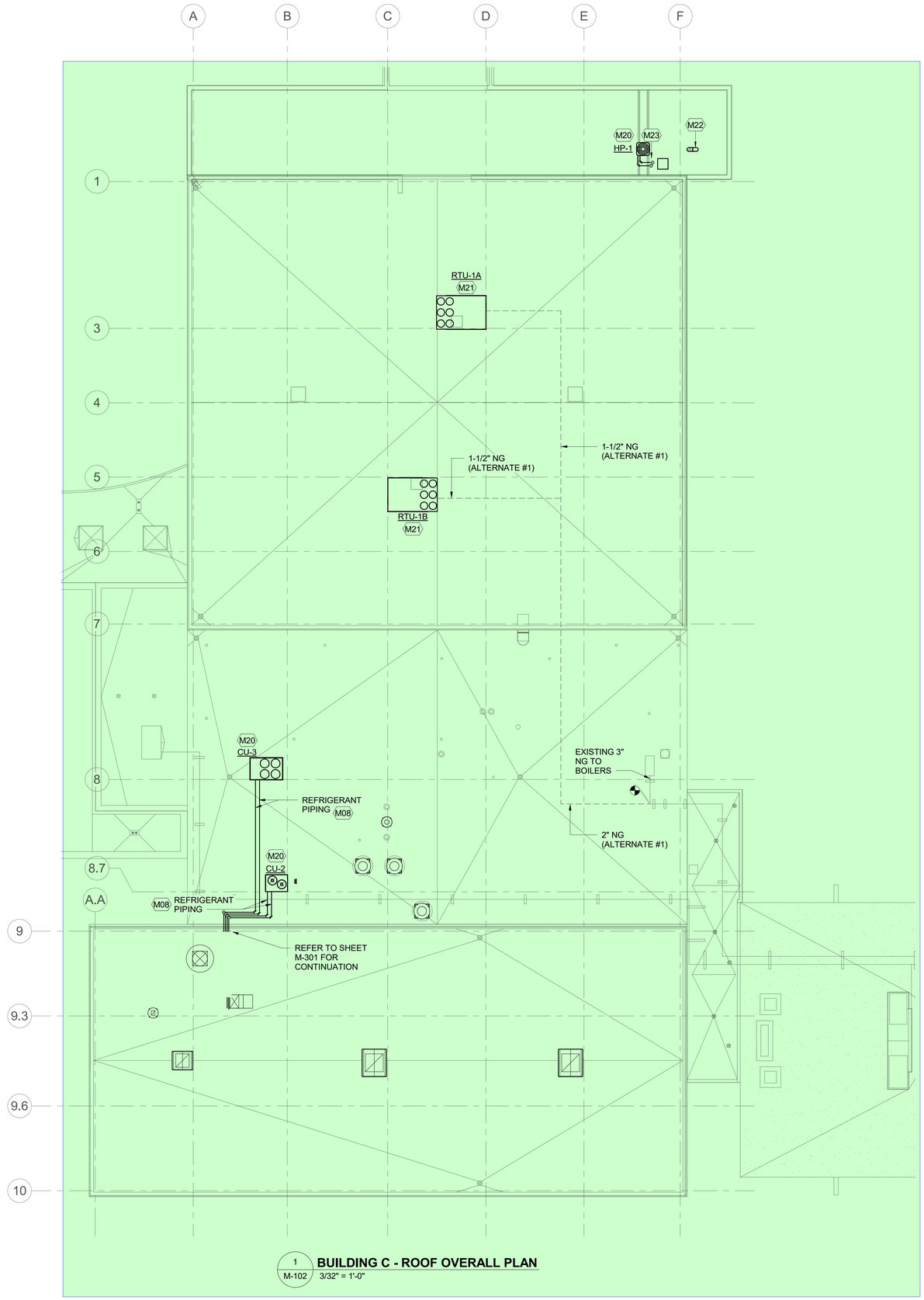
main 513.621.6211
kzf.com

STATE OF OHIO
CLAYTON C. BRANSCUM
E-54916
REGISTERED PROFESSIONAL ENGINEER

DESIGNED	COMM. NO.
JORDAN	8055.00
DRAWN	DATE
JORDAN	04-22-2022
CHECKED	PROJ. MGR.
BRANSCUM	EVANS

FLOOR PLANS

DRAWING NUMBER	ISSUE
M-101	1



1 M-102 **BUILDING C - ROOF OVERALL PLAN**
3/32" = 1'-0"

DRAWING NOTES

M08 ROUTE NEW REFRIGERANT PIPING FROM OUTDOOR CONDENSING UNIT TO RESPECTIVE DX COILS INSIDE MEZZANINE MECHANICAL ROOM PER MANUFACTURER'S INSTRUCTIONS. CONTRACTOR TO COORDINATE REFRIGERANT PIPE ROUTE, QUANTITY, AND SIZE WITH EQUIPMENT MANUFACTURER.

M20 NEW ROOF MOUNTED EQUIPMENT ON SUPPORT RAILS. INSTALL PER MANUFACTURER'S INSTRUCTIONS. LOCATE A MINIMUM OF 10'-0" FROM ROOF'S EDGE. REFER TO SCHEDULES AND DETAILS FOR ADDITIONAL INFORMATION.

M21 NEW PACKAGED COOLING ONLY RTU MOUNTED ON MANUFACTURER FURNISHED ROOF CURB. INSTALL PER MANUFACTURER'S INSTRUCTIONS. REFER TO SCHEDULES AND DETAILS FOR ADDITIONAL INFORMATION.

M22 NEW 10" OA INTAKE FOR AHU-1 BELOW. TERMINATE ABOVE ROOF WITH GOOSENECK FITTING.

M23 PROVIDE PIPE CURB ASSEMBLY. COORDINATE QUANTITY OF PORTALS IN CURB WITH REFRIGERANT PIPING AND ELECTRICAL CONTRACTOR. REFER TO DETAILS FOR ADDITIONAL INFORMATION.

ALTERNATE #1

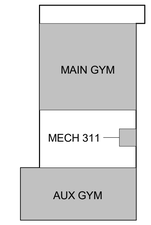
CONTRACTOR TO PROVIDE ALTERNATE PRICING FOR PROVIDING GAS HEAT TO RTU-1A, RTU-1B IN LIEU OF HOT WATER HEATING COILS. RTU-1A AND RTU-1B TO HAVE PACKAGED GAS HEAT AS PART OF ALTERNATE #1.

NOTE: ALL ROOF FLASHING TO BE PERFORMED BY KRAMER AND SONS ROOFING. CONTACT JEFF KRAMER AT 513-353-1142

LINEWORK LEGEND

EXISTING

NEW WORK



BUILDING C KEY PLAN

N

NO.	DATE	DESCRIPTION
1	04-22-2022	FOR PERMIT

MADEIRA HIGH SCHOOL GYM HVAC REPLACEMENT

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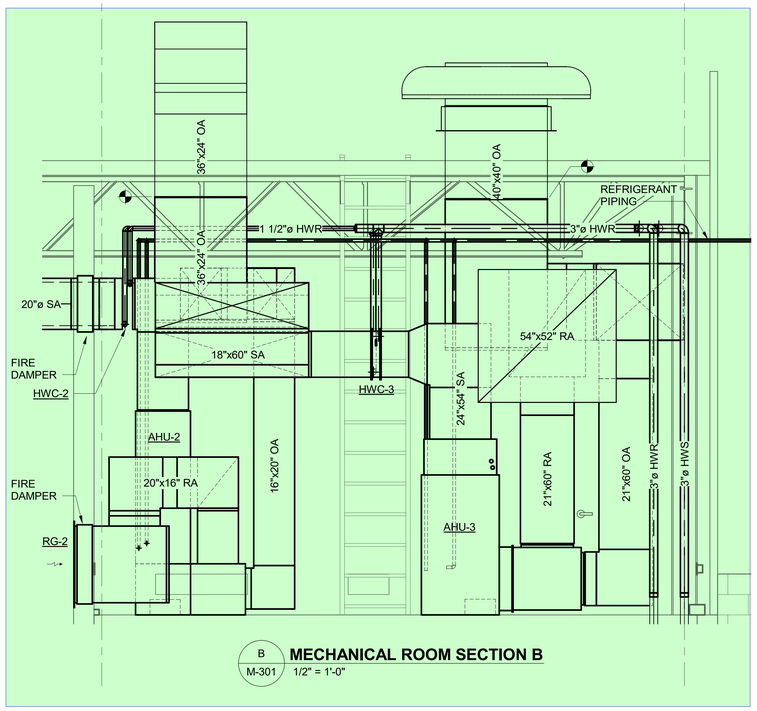
STATE OF OHIO
BRANCE C. BRANSCUM
E-54916
REGISTERED PROFESSIONAL ENGINEER

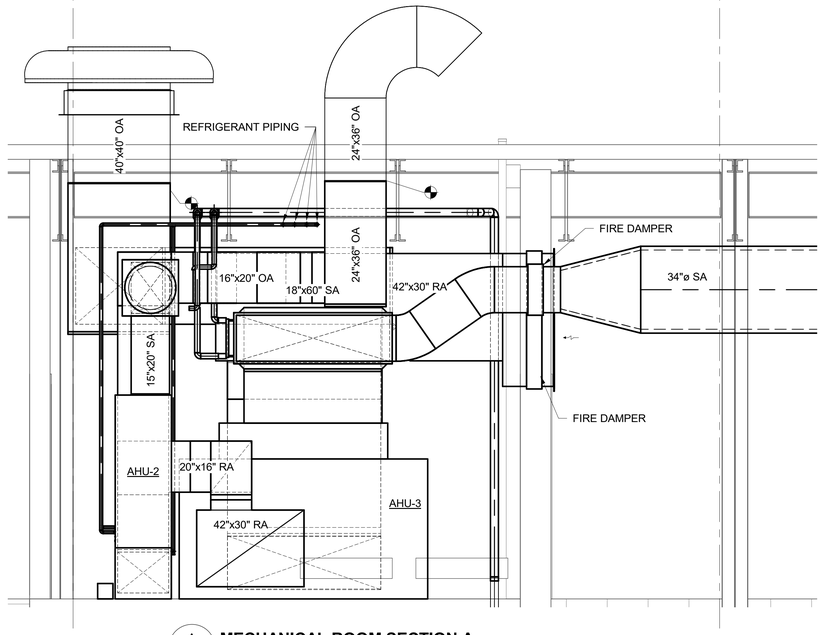
DESIGNED	COMM. NO.
JORDAN	8055.00
DRAWN	DATE
JORDAN	04-22-2022
CHECKED	PROJ. MGR.
BRANSCUM	EVANS

ROOF PLAN

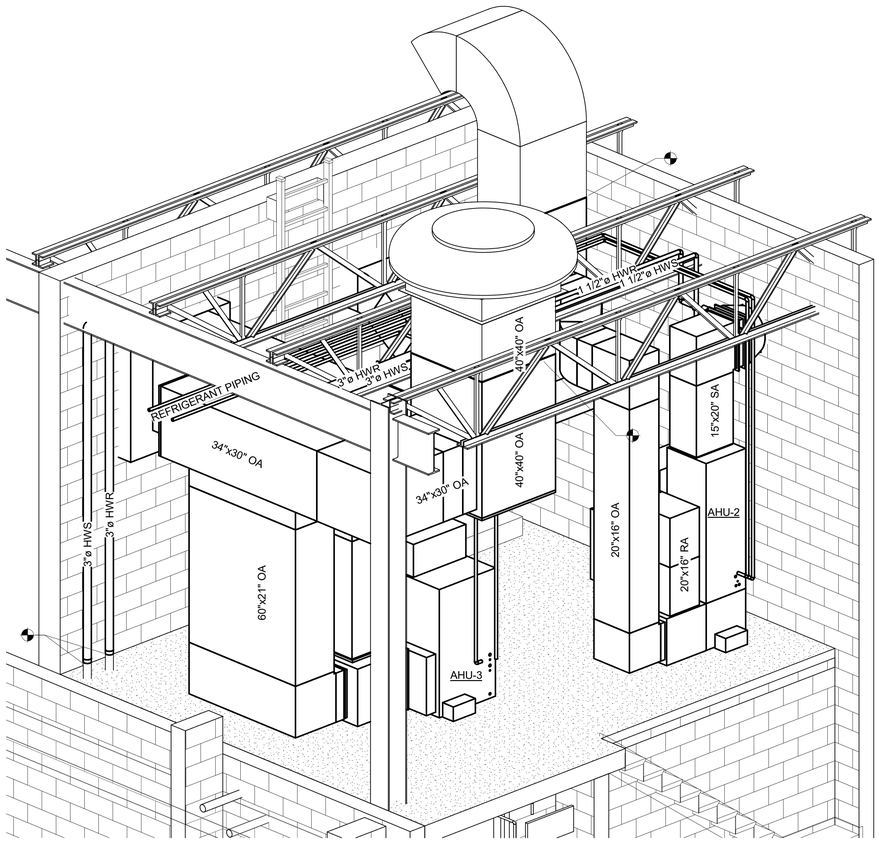
DRAWING NUMBER ISSUE
M-102 1



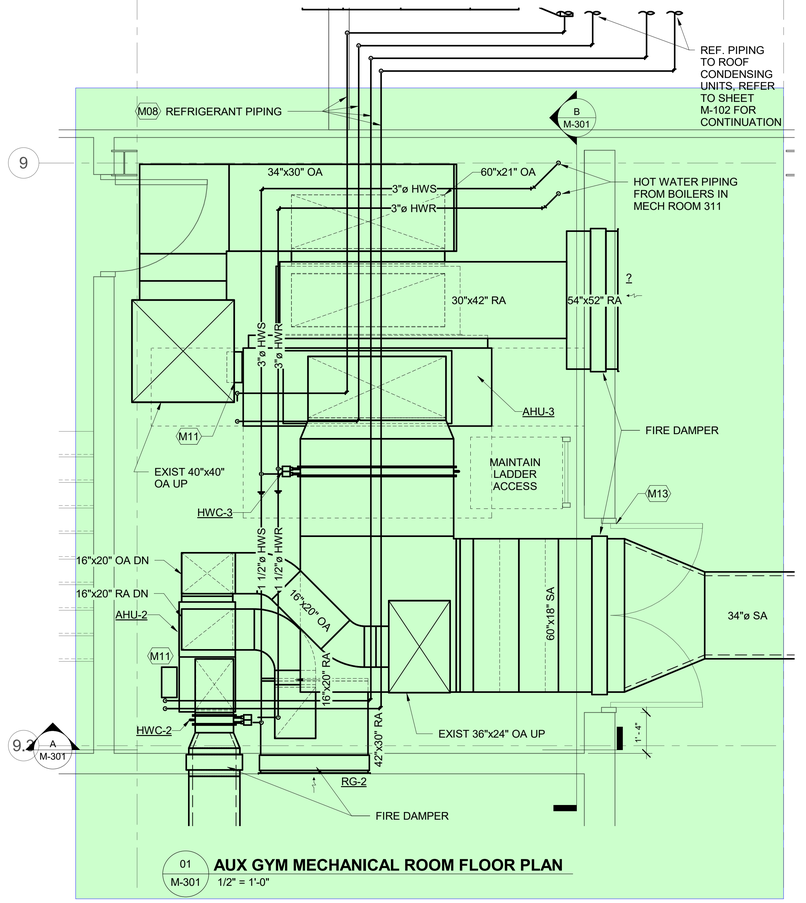
B M-301 **MECHANICAL ROOM SECTION B**
1/2" = 1'-0"



A M-301 **MECHANICAL ROOM SECTION A**
1/2" = 1'-0"



04 M-301 **AUX GYM MECHANICAL ROOM ISOMETRIC**



01 M-301 **AUX GYM MECHANICAL ROOM FLOOR PLAN**
1/2" = 1'-0"

DRAWING NOTES

M08 ROUTE NEW REFRIGERANT PIPING FROM OUTDOOR CONDENSING UNIT TO RESPECTIVE DX COILS INSIDE MEZZANINE MECHANICAL ROOM PER MANUFACTURER'S INSTRUCTIONS. CONTRACTOR TO COORDINATE REFRIGERANT PIPE ROUTE, QUANTITY, AND SIZE WITH EQUIPMENT MANUFACTURER.

M11 PROVIDE CONDENSATE PUMP EQUAL TO LITTLE GIANT VCMA-15 FOR EACH AHU (TOTAL OF 2). INSTALL PER MANUFACTURER'S INSTRUCTIONS. FIELD ROUTE PUMPED CONDENSATE TO FLOOR DRAIN IN ROOM 319. REFER TO SHEET M-101 FOR LOCATION. REFER TO DETAILS FOR CONDENSATE TRAP DIMENSIONS.

M13 NEW PAIR OF 3'-0" X 7'-0" HOLLOW METAL DOORS WITH HOLLOW METAL FRAME. PROVIDE FALL PROTECTION BAR FOR 72" OUTSWING DOOR EQUAL TO DOORWARE MODEL NUMBER ESI-SB-01-0072.

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STATE OF OHIO
JESSE C. BRANSCUM
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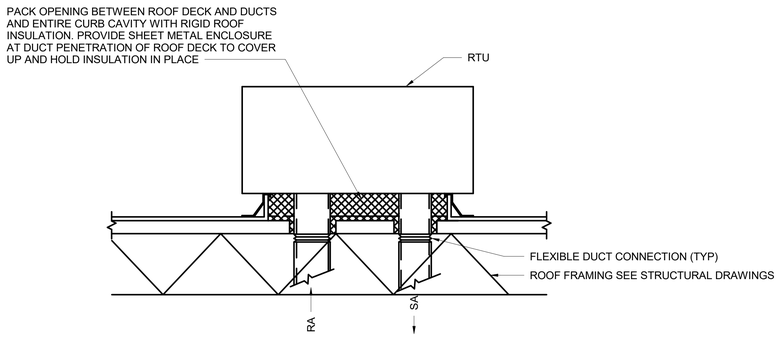
REGISTERED
PROFESSIONAL ENGINEER

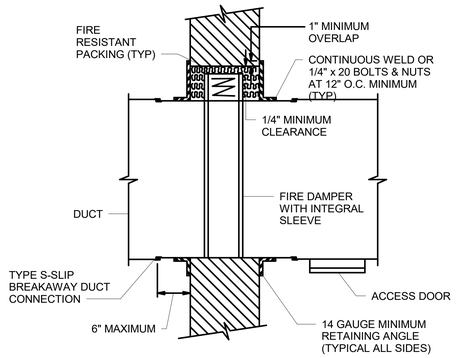
DESIGNED	COMM. NO.
JORDAN	8055.00
DRAWN	DATE
JORDAN	04-22-2022
CHECKED	PROJ. MGR.
BRANSCUM	EVANS

ENLARGED MECHANICAL ROOM PLANS

DRAWING NUMBER ISSUE
M-301 1



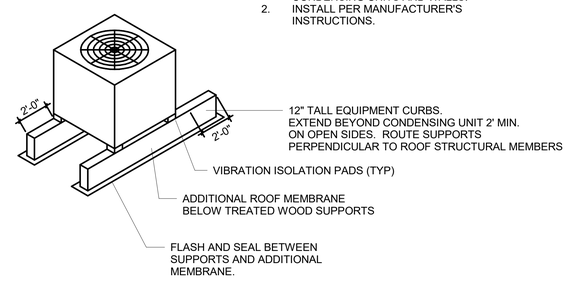
07 M-501 **ROOFTOP UNIT INSTALLATION DETAIL**
NTS



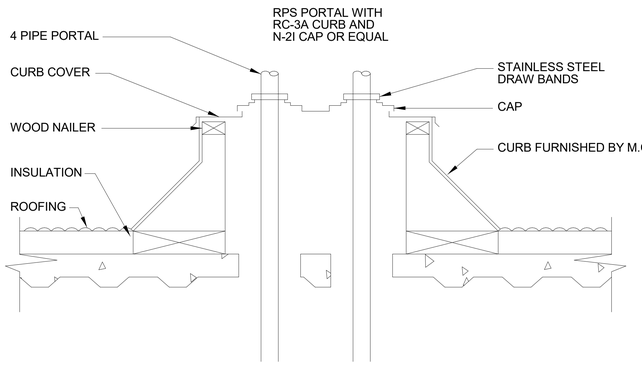
NOTE:
INSTALLATION SHALL CONFORM TO NFPA-90A.

04 M-501 **VERTICAL FIRE DAMPER DETAIL**
NTS

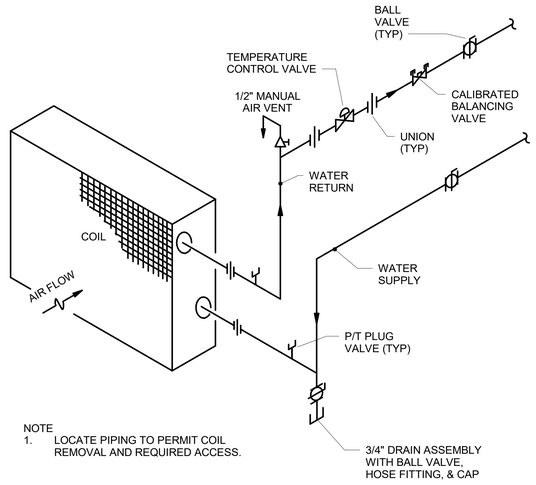
NOTES:
1. PROVIDE MANUFACTURERS RECOMMENDED CLEARANCES BETWEEN CONDENSING UNITS AND WALLS.
2. INSTALL PER MANUFACTURER'S INSTRUCTIONS.



01 M-501 **ROOF MOUNTED CONDENSING UNIT DETAIL**
NTS

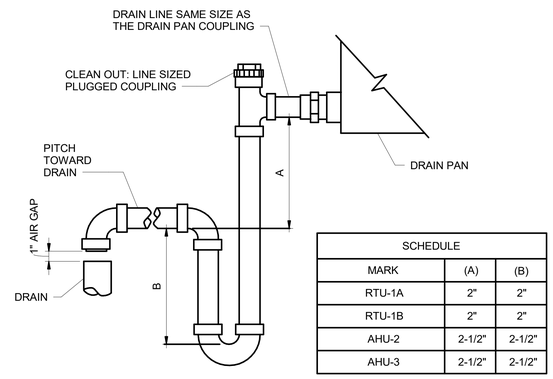


8 M-501 **ROOF PIPE PENETRATION DETAIL**
NTS



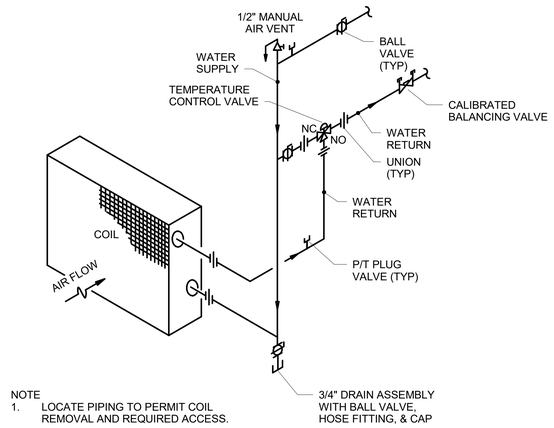
NOTE
1. LOCATE PIPING TO PERMIT COIL REMOVAL AND REQUIRED ACCESS.

05 M-501 **HOT WATER COIL WITH 2-WAY VALVE**
NTS



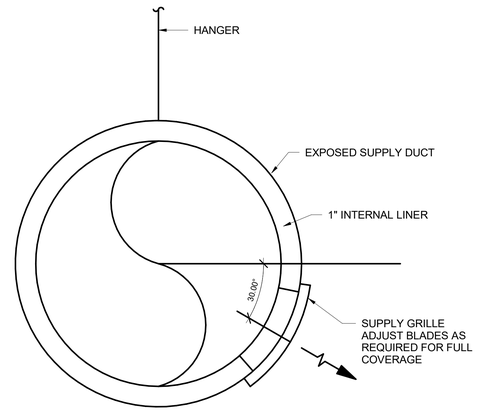
SCHEDULE		
MARK	(A)	(B)
RTU-1A	2"	2"
RTU-1B	2"	2"
AHU-2	2-1/2"	2-1/2"
AHU-3	2-1/2"	2-1/2"

02 M-501 **CONDENSATE DRAIN TRAP DETAIL**
NOT TO SCALE



NOTE
1. LOCATE PIPING TO PERMIT COIL REMOVAL AND REQUIRED ACCESS.

06 M-501 **HOT WATER COIL WITH 3-WAY VALVE**
NTS



03 M-501 **DUCT SURFACE MOUNTED AIR DEVICE**
NTS

NO.	DATE	DESCRIPTION
1	04-22-2022	FOR PERMIT

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BRANCE C. BRANSCUM
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DESIGNED	COMM. NO.
JORDAN	8055.00
DRAWN	DATE
JORDAN	04-22-2022
CHECKED	PROJ. MGR.
BRANSCUM	EVANS

DETAILS

DRAWING NUMBER ISSUE
M-501 1

ROOFTOP UNIT SCHEDULE

MARK	MANUFACTURER	MODEL NUMBER	LOCATION	AIRFLOW (CFM)	OUTSIDE AIR (CFM)	ESP (IN. WG.)	HP	ELECTRICAL DATA					DX COOLING COIL DATA						REMARKS
													AIR TEMP (°F)				NET SENSIBLE CAP (MBH)	NET TOTAL CAP (MBH)	
													ENT		LVG				
								MCA	MOCP	VOLTAGE	PHASE	HZ	DB (°F)	WB (°F)	DB (°F)	WB (°F)			
RTU-1A BELT	LENNOX	KCC300S4M	GYM ROOF	10000 CFM	2000 CFM	0.5	10	63.0 A	70 A	460 V	3	60 Hz	80.0	67	58.3	57.4	204.2	270.3	COOLING ONLY. UNIT TO HAVE FULL ECONOMIZER CAPABILITIES. FURNISH WITH BACNET COMPATIBLE UNIT CONTROLLER, RETURN AIR SMOKE DETECTOR, BIPOLAR IONIZATION, ROOF CURB. EC TO PROVIDE DISCONNECT.
RTU-1B BELT	LENNOX	KCC300S4M	GYM ROOF	10000 CFM	2000 CFM	0.5	10	63.0 A	70 A	460 V	3	60 Hz	80.0	67	58.3	57.4	204.2	270.3	COOLING ONLY. UNIT TO HAVE FULL ECONOMIZER CAPABILITIES. FURNISH WITH BACNET COMPATIBLE UNIT CONTROLLER, RETURN AIR SMOKE DETECTOR, BIPOLAR IONIZATION, ROOF CURB. EC TO PROVIDE DISCONNECT.

AIR HANDLING UNIT SCHEDULE

MARK	MANUFACTURER	MODEL NUMBER	LOCATION	AIRFLOW (CFM)	OUTDOOR AIR	FAN DATA						HEATING COIL DATA				DX COOLING COIL DATA						REMARKS
						ESP (IN. WG.)	HP (EACH)	FAN QUANTITY	VOLTAGE	PHASE	HZ	AIR TEMP (°F)		CAPACITY (KW)	CAPACITY OUTPUT (MBH)	AIR TEMP (°F)				NET SENSIBLE CAP (MBH)	NET TOTAL CAP (MBH)	
												EAT DB (°F)	LAT DB (°F)			ENT		LVG				
																DB (°F)	WB (°F)	DB (°F)	WB (°F)			
AHU-1	LENNOX	CBA38MV-048	MAIN GYM LOBBY	1410 CFM	460 CFM	0.5	1	1	208 V	1	60 Hz	70.0	97.8	15	38.5	80.0	67	55.4	55.2	32.4	44.1	PROVIDE AUXILIARY DRAIN PAN WITH FLOAT SWITCH TO DISABLE UNIT. PROVIDE WITH 15KW ELECTRIC HEATER AND BACNET COMPATIBLE UNIT CONTROLLER. EC TO PROVIDE DISCONNECT.
AHU-2	LENNOX	CBA38MV-060	AUX GYM MECH ROOM	1630 CFM	600 CFM	0.5	1	1	208 V	1	60 Hz					80.0	67	55.8	55.1	40.1	56.6	ECM FAN MOTOR AND HOT WATER COIL. UNIT TO HAVE FULL ECONOMIZER CAPABILITIES. FURNISH WITH BACNET COMPATIBLE UNIT CONTROLLER, BIPOLAR IONIZATION, AND 10" BASE RAILS. MAX HEIGHT 10'-2 3/16". EC TO PROVIDE DISCONNECT.
AHU-3 BELT	LENNOX	ELA240S4D-STD-460	AUX GYM MECH ROOM	8000 CFM	2100 CFM	0.5	7.5	1	460 V	3	60 Hz					80.0	67	58.5	57.6	174.3	225.2	ECM FAN MOTOR AND HOT WATER COIL. UNIT TO HAVE FULL ECONOMIZER CAPABILITIES. FURNISH WITH BACNET COMPATIBLE UNIT CONTROLLER, BIPOLAR IONIZATION, AND 10" BASE RAILS. EC TO PROVIDE DISCONNECT.

HEAT PUMP SCHEDULE

MARK	MANUFACTURER	MODEL NUMBER	MAXIMUM COOLING CAPACITY (MBH)	ELECTRICAL DATA					COMMENTS
				MCA	MAX FUSE	VOLTAGE	HZ	PHASE	
HP-1	LENNOX	EL16XP1-048-230	46.5	26 A	40 A	208 V	60 Hz	1	HIGH PRESSURE SWITCH

CONDENSING UNIT SCHEDULE

MARK	MANUFACTURER	MODEL NUMBER	MAXIMUM COOLING CAPACITY (MBH)	ELECTRICAL DATA					COMMENTS
				MCA	MOCP	VOLTAGE	HZ	PHASE	
CU-2	LENNOX	EL16XC1-060-230	59.0	30 A	50 A	208 V	60 Hz	1	PROVIDE WITH LOW AMBIENT KIT. EC TO PROVIDE DISCONNECT.
CU-3	LENNOX	ELS240S4D-460-3	242.6	36 A	50 A	460 V	60 Hz	3	PROVIDE WITH LOW AMBIENT KIT. EC TO PROVIDE DISCONECT.

HOT WATER COIL SCHEDULE

MARK	FIN H X W (IN)	AIRFLOW	AIR PRESSURE DROP	HEATING CAPACITY (MBH)	HOT WATER FLOW RATE	FLUID PRESSURE DROP (FT WG)	EWT (°F)	LWT (°F)	COMMENTS
HWC-1A	40 X 40	10000 CFM	0.70 in-wg	391.5	39.8 GPM	9.20	140 °F	120	
HWC-1B	40 X 40	10000 CFM	0.70 in-wg	391.5	39.8 GPM	9.20	140 °F	120	
HWC-2	60 X 18	8000 CFM	0.70 in-wg	345.6	34.5 GPM	10.00	140 °F	120	
HWC-3	15 x 20	1630 CFM	0.70 in-wg	70.4	7.5 GPM	10.00	140 °F	120	

AIR DEVICE SCHEDULE

MARK	MANUFACTURER	MODEL	DESCRIPTION	Module Size	NECK SIZE (IN)	SPIRAL DUCT DIAMETER	FINISH	MATERIAL	COMMENTS
	TITUS	350RL	WALL MOUNTED MULTISECTION LOUVERED RETURN GRILLE	54x52	54"x52"		WHITE	STEEL	HEAVY DUTY
CD-6	TITUS	OMNI	SQUARE PLAQUE FACE DIFFUSER	24 x 24	6"ø		WHITE	STEEL	
CD-8	TITUS	OMNI	SQUARE PLAQUE FACE DIFFUSER	24 x 24	8"ø		WHITE	STEEL	
RG-2	TITUS	350RL	WALL MOUNTED MULTISECTION LOUVERED RETURN GRILLE	42x30	42"x30"		WHITE	STEEL	HEAVY DUTY
RG-3	TITUS	50F	LAY-IN EGGCRATE RETURN GRILLE	24 x 24	6"x4"		WHITE	STEEL	
SG-1	TITUS	S300FS	SPIRAL MOUNTED SUPPLY GRILLE		36"x12"	34" Duct Dia.	MILL	ALUMINUM	DOUBLE DEFLECTION, AIR EXTRACTOR, REFER TO DETAILS FOR MOUNTING.
SG-2	TITUS	S300FS	SPIRAL MOUNTED SUPPLY GRILLE		36"x12"	24" Duct Dia.	MILL	ALUMINUM	DOUBLE DEFLECTION, AIR EXTRACTOR, REFER TO DETAILS FOR MOUNTING.
SG-3	TITUS	S300FS	SPIRAL MOUNTED SUPPLY GRILLE		24"x12"	28" Duct Dia.	MILL	ALUMINUM	DOUBLE DEFLECTION, AIR EXTRACTOR, REFER TO DETAILS FOR MOUNTING.
SG-4	TITUS	S300FS	SPIRAL MOUNTED SUPPLY GRILLE		24"x6"	20" Duct Dia.	MILL	ALUMINUM	DOUBLE DEFLECTION, AIR EXTRACTOR, REFER TO DETAILS FOR MOUNTING.
SG-5	TITUS	S300FS	SPIRAL MOUNTED SUPPLY GRILLE		24"x12"	22" Duct Dia.	MILL	ALUMINUM	DOUBLE DEFLECTION, AIR EXTRACTOR, REFER TO DETAILS FOR MOUNTING.

VENTILATION SCHEDULE

Project: MADEIRA HIGH SCHOOL GYM HVAC REPLACEMENT
Job No: 8055.00

Designer: JORDAN
Engineer: JORDAN

Unit #	room number	room name	Az area	occupancy classification	TBL 6-1 occ density peo/1000	Pz population	TBL 6-1 Rp peo oa	TBL 6-1 Ra area oa	Vbz oa cfm	TBL 6-2 Ez air dist eff	Voz oa req'd	design cfm	%oa req'd	system %oa	actual oa cfm
HP-1	301	LOBBY	1423	Lobbies/prefunction	30	15	7.5	0.06	198	0.8	248	850	29%	30%	255
	302	WOMEN'S RR	155	Toilet room	0	0	0	0	0	0.8	0	150	0%	30%	45
	303	MEN'S RR	175	Toilet room	0	0	0	0	0	0.8	0	175	0%	30%	53
	304	SALES	166	Sales	15	2	2	0.12	25	0.8	32	120	27%	30%	36
	304A	STORAGE	173	Storage rooms	0	0	0	0.12	21	0.8	26	90	29%	30%	27
	305	CONCESSIONS	170	Kitchen - Commercial Cooking	20	3	2	0.12	27	0.8	34	150	23%	30%	45
												1,535			461
RTU-1A	306	GYMNASIUM	5460	Gym, stadium, arena (play area)	30	164	0	0.3	1638	0.8	2048	10,000	20%	20%	2,000
RTU-1B	306	GYMNASIUM	5460	Gym, stadium, arena (play area)	30	164	0	0.3	1638	0.8	2048	10,000	20%	20%	2,000
AHU-2	324	WRESTLING	1431	Gym, stadium, arena (play area)	30	43	0	0.3	429	0.8	537	3,000	18%	20%	600
AHU-3	315	AUXILLIARY GYM	5546	Gym, stadium, arena (play area)	30	166	0	0.3	1664	0.8	2080	10,500	20%	20%	2,100

OUTSIDE VENTILATION AIR DESIGN IN ACCORDANCE WITH INTERNATIONAL MECHANICAL CODE SECTION 403.2

Vbz = (Rp * Pz) + (Ra * Az)

Vbz = Breathing zone outdoor air flow
Rp = Outdoor air flow rate per person (table 6-1)
Pz = Zone population - maximum occupancy (table 6-1)
Ra = Outdoor air flow rate per unit area (table 6-1)
Az = Zone floor area

Voz = Vbz / Ez

Voz = Zone outdoor air flow
Vbz = Breathing zone outdoor air flow (calculated)
Ez = Zone air distribution effectiveness (table 6-2)
Ez = 0.80 (based on ceiling supply, ceiling return)

DUCTWORK SCHEDULE

SERVICE	LOCATION	SERVES	MATERIAL	PRESSURE CLASS	INSULATION 1	2	3	4	5	6	REMARKS
SUPPLY	INSIDE	ALL	GALVANIZED	2" wc	X	X				X	
RETURN	INSIDE	ALL	GALVANIZED	2" wc	X	X			X	X	
OUTSIDE AIR DUCT	INSIDE	AHU-2 / AHU-3	GALVANIZED	2" wc		X					
EXHAUST AIR DUCT	INSIDE	AHU-2 / AHU-3	GALVANIZED	2" wc		X					

INSULATION (SEE SPECIFICATIONS FOR ADDITIONAL DETAILS)
1 1" INTERNAL LINER (IF EXPOSED)
2 1.5" EXTERNALLY WRAPPED (IF CONCEALED)
3 FIRE WRAP
4 1" INTERNAL LINER FIRST 10 FEET FROM CONNECTION TO UNIT UNLESS OTHERWISE NOTED
5 1" INTERNAL LINER FIRST 5 FEET FROM ROOF/EXTERIOR PENETRATION
6 ALL EXPOSED DUCTWORK TO BE PAINTGRIP - READY FOR PAINT BY OTHERS - WITH 1" INTERNAL INSULATION

NO.	DATE	DESCRIPTION
1	04-22-2022	FOR PERMIT

MADEIRA HIGH SCHOOL GYM HVAC REPLACEMENT
7465 LOANNES DRIVE
CINCINNATI, OH 45243

KZF DESIGN
Designing Better Futures

KZF DESIGN INC.
700 Broadway Street
Cincinnati, OH 45202

main 513.621.6211
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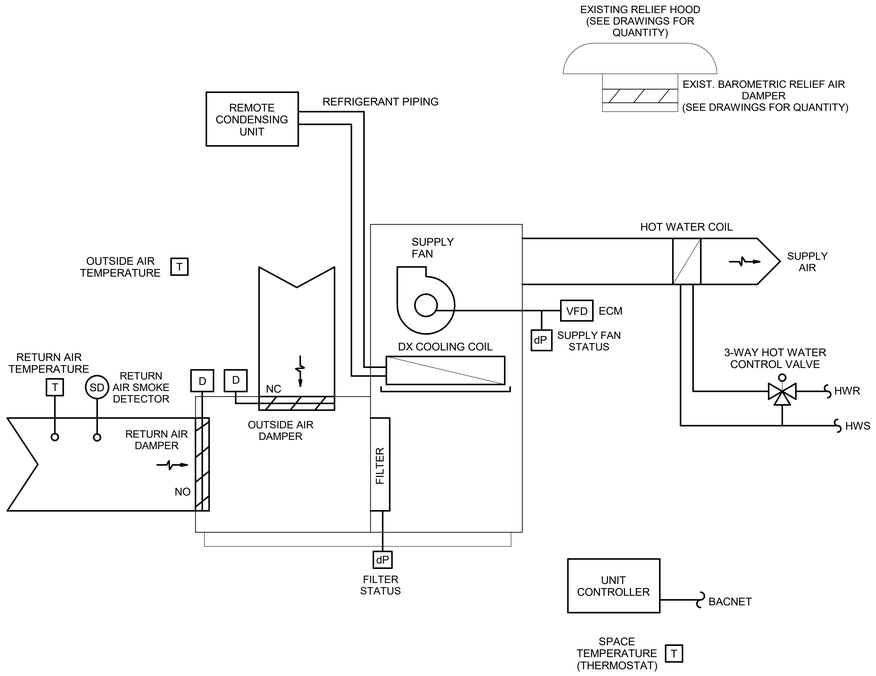
STATE OF OHIO
BRANSCUM
E-54916
REGISTERED PROFESSIONAL ENGINEER

DESIGNED	COMM. NO.
JORDAN	8055.00
DRAWN	DATE
JORDAN	04-22-2022
CHECKED	PROJ. MGR.
BRANSCUM	EVANS

SCHEDULES

DRAWING NUMBER ISSUE
M-601 1



SEQUENCE OF OPERATIONS - AIR HANDLING UNIT (AHU-2,3)

THE AIR HANDLING UNIT (AHU-2, AHU-3) SHALL OPERATE UNDER FIELD INSTALLED CONTROLS PROGRAMMED BY THE TEMPERATURE CONTROLS CONTRACTOR.
THE FOLLOWING IS FOR GENERAL REFERENCE OF THE CONTROL SEQUENCE OF THE AIR HANDLING UNIT.

BUILDING AUTOMATION SYSTEM INTERFACE:
ALL NEW CONTROLS SHALL BE BACNET COMPATIBLE AND COMMUNICATE BACK TO EXISTING TRIDIUM NIAGARA BAS. IF THE BUILDING AUTOMATION SYSTEM (BAS) IS NOT PRESENT, OR COMMUNICATION IS LOST WITH THE BAS, THE CONTROLLER SHALL OPERATE USING DEFAULT MODES AND SETPOINTS.

OCCUPIED:
DURING SCHEDULED OCCUPIED PERIODS (ADJ.), THE SUPPLY FAN SHALL RUN CONTINUOUSLY AND THE OUTSIDE AIR DAMPER AND RETURN AIR DAMPER SHALL MODULATE TO MAINTAIN MINIMUM VENTILATION REQUIREMENTS. THE UNIT CONTROLLER SHALL CONTROL THE SUPPLY FAN SPEED TO MAINTAIN THE SPACE TEMPERATURE SETPOINT (ADJ.). THE DX COOLING AND THE HOT WATER COIL SHALL CONTROL TO MAINTAIN THE ACTIVE DISCHARGE AIR TEMPERATURE SETPOINT. IF ECONOMIZING IS ENABLED, THE OUTDOOR AIR OR MIXED AIR DAMPERS SHALL MODULATE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT AND THE RELIEF AIR DAMPER SHALL TRACK THE MIXED AIR DAMPERS. IF THE DISCHARGE AIR TEMPERATURE SENSOR FAILS, THE DX COOLING SHALL BE DISABLED, THE HOT WATER CONTROL VALVE SHALL CLOSE, AND AN ALARM SHALL ANNUNCIATE AT THE BAS.

UNOCCUPIED:
DURING SCHEDULED UNOCCUPIED PERIODS (ADJ.), THE OUTSIDE AIR AND RELIEF DAMPERS SHALL CLOSE. THE UNIT CONTROLLER SHALL MODULATE THE SUPPLY FAN, DX COIL, AND HOT WATER CONTROL VALVE TO MAINTAIN A MINIMUM SPACE TEMPERATURE OF 60.0 DEG. F (ADJ.) AND A MAXIMUM SPACE TEMPERATURE OF 85.0 DEG. F (ADJ.)

REMOTE RELIEF AIR DAMPER:
AT ANY TIME DURING UNIT OPERATION, THE REMOTE RELIEF AIR DAMPER(S) POSITION SHALL BE INVERSELY PROPORTIONATE TO THE OUTSIDE AIR DAMPER POSITION.

HEAT/COOL MODE:
COOLING: THE UNIT CONTROLLER SHALL USE THE RETURN AIR TEMPERATURE SENSOR AND SPACE TEMPERATURE COOLING SETPOINT TO DETERMINE WHEN TO INITIATE REQUESTS FOR COOLING. DISCHARGE AIR SETPOINT SHALL BE MAINTAINED BY CONTROLLING THE COOLING AS REQUIRED.

HEATING: THE UNIT CONTROLLER SHALL USE THE RETURN AIR TEMPERATURE SENSOR AND SPACE AIR TEMPERATURE HEATING SETPOINT TO DETERMINE WHEN TO INITIATE REQUESTS FOR HEATING. DISCHARGE AIR SETPOINT SHALL BE MAINTAINED BY CONTROLLING THE HOT WATER CONTROL VALVE AS REQUIRED.

DISCHARGE AIR TEMPERATURE RESET CONTROL:
THE DISCHARGE AIR TEMPERATURE SETPOINT, 55.0 DEG. F - 60.0 DEG. F (ADJ.) SHALL BE RESET BASED ON EITHER THE OUTSIDE AIR TEMPERATURE OR SPACE AVERAGE TEMPERATURE (ADJ.). THE MINIMUM DISCHARGE AIR SETPOINT SHALL BE SET AT 55.0 DEG. F (ADJ.). THE DISCHARGE TEMPERATURE SENSOR SHALL PREVENT THE DISCHARGE AIR TEMPERATURE FROM FALLING BELOW THE MINIMUM DISCHARGE AIR SETPOINT (ADJ.). IF THE DISCHARGE AIR TEMPERATURE CONTINUES TO FALL, THE DISCHARGE TEMPERATURE SENSOR SHALL ACT AS A LOW DISCHARGE TEMPERATURE LIMIT, A LOW TEMPERATURE ALARM SHALL ANNUNCIATE, AND THE UNIT SHALL SHUT DOWN. IF THE DISCHARGE TEMPERATURE RISES ABOVE THE HIGH LIMIT SETPOINT THE SENSOR SHALL ACT AS A HIGH DISCHARGE TEMPERATURE LIMIT AND SHALL KEEP THE UNIT RUNNING, A HIGH TEMPERATURE ALARM SHALL ANNUNCIATE.

OUTDOOR AIR TEMPERATURE RESET: THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE ADJUSTED BASED ON THE OUTSIDE AIR TEMPERATURE AND THE COOLING AND HEATING LOAD OF THE BUILDING.

SPACE TEMPERATURE RESET: THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE ADJUSTED BASED ON THE TEMPERATURE OF THE CRITICAL SPACE(S).

ECONOMIZER:
ENABLE (REFERENCE DRY BULB): OUTSIDE AIR (OA) TEMPERATURE SHALL BE COMPARED WITH A REFERENCE DRY BULB SETPOINT. THE ECONOMIZER SHALL ENABLE WHEN THE OA TEMPERATURE IS LESS THAN REFERENCE DRY BULB SETPOINT. THE ECONOMIZER SHALL BE DISABLED WHEN OA TEMPERATURE IS GREATER THAN REFERENCE DRY BULB SETPOINT + 2.0 DEG. F.

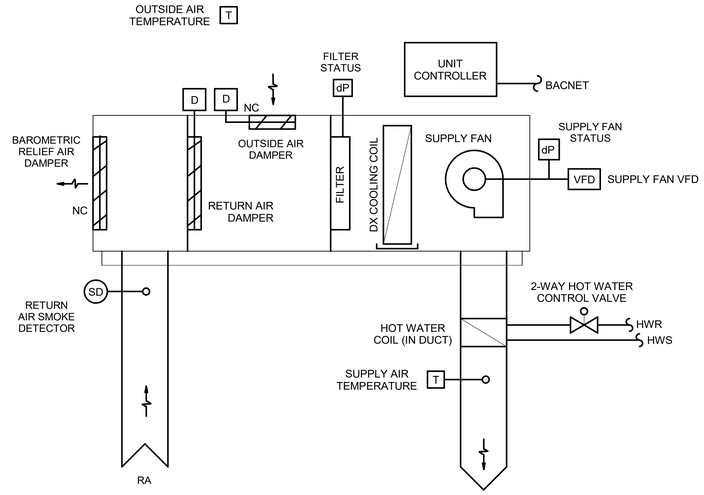
ECONOMIZER OPERATION: THE SUPPLY AIR SENSOR SHALL MEASURE THE DRY BULB TEMPERATURE OF THE AIR LEAVING THE EVAPORATOR COIL WHILE ECONOMIZING. WHEN ECONOMIZING IS ENABLED AND THE UNIT IS OPERATING IN THE COOLING MODE, THE ECONOMIZER DAMPER SHALL BE MODULATED BETWEEN ITS MINIMUM POSITION AND 100% TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT. THE ECONOMIZER DAMPER SHALL MODULATE TOWARD MINIMUM POSITION IN THE EVENT THE DISCHARGE AIR TEMPERATURE FALLS BELOW THE DISCHARGE LOW LIMIT TEMPERATURE SETPOINT. COMPRESSORS SHALL BE DELAYED FROM OPERATING UNTIL THE ECONOMIZER HAS OPENED TO 100%.

SUPPLY FAN:
THE SUPPLY FAN SHALL BE ENABLED WHILE IN THE OCCUPIED MODE.

SUPPLY DUCT STATIC PRESSURE CONTROL:
DURING THE OCCUPIED MODE THE UNIT CONTROLLER SHALL MODULATE THE OUTPUT OF THE VARIABLE SPEED DRIVE AS REQUIRED TO MAINTAIN THE SUPPLY DUCT STATIC PRESSURE SETPOINT OF 1.0 INCHES W.C. (ADJ.). UPON A CALL FOR HEATING OR COOLING IN THE UNOCCUPIED MODE, THE UNIT CONTROLLER SHALL MODULATE THE SPEED OF THE FAN TO 100%.

STATIC PRESSURE HIGH LIMIT:
IF FOR ANY REASON THE SUPPLY AIR PRESSURE EXCEEDS THE SUPPLY AIR PRESSURE HIGH LIMIT, THE SUPPLY FAN SHALL SHUT DOWN. THE UNIT SHALL DISPLAY A MANUAL RESET DIAGNOSTIC AT THE BAS SYSTEM AND A MANUAL RESET WILL BE REQUIRED TO START THE FAN AGAIN.

FILTER STATUS:
A DIFFERENTIAL PRESSURE SWITCH SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FILTER(S) WHEN THE FAN IS RUNNING. IF THE SWITCH CLOSES DURING NORMAL OPERATION A DIRTY FILTER ALARM SHALL ANNUNCIATE AT THE BAS.



SEQUENCE OF OPERATIONS - PACKAGED ROOFTOP UNIT (RTU-1A/1B)

THE ROOFTOP UNIT (RTU-1A, RTU-1B) SHALL OPERATE UNDER FACTORY PROVIDED CONTROLS.
THE FOLLOWING IS FOR GENERAL REFERENCE OF THE CONTROL SEQUENCE OF THE ROOFTOP UNIT.

BUILDING AUTOMATION SYSTEM INTERFACE:
ALL NEW CONTROLS SHALL BE BACNET COMPATIBLE AND COMMUNICATE BACK TO EXISTING TRIDIUM NIAGARA BAS. IF THE BUILDING AUTOMATION SYSTEM (BAS) IS NOT PRESENT, OR COMMUNICATION IS LOST WITH THE BAS, THE CONTROLLER SHALL OPERATE USING DEFAULT MODES AND SETPOINTS.

OCCUPIED:
DURING SCHEDULED OCCUPIED PERIODS (ADJ.), THE SUPPLY FAN SHALL RUN CONTINUOUSLY AND THE MIXED AIR DAMPERS SHALL OPEN TO MAINTAIN MINIMUM VENTILATION REQUIREMENTS. THE UNIT CONTROLLER SHALL CONTROL THE SUPPLY FAN SPEED TO MAINTAIN THE CURRENT TEMPERATURE SETPOINT (ADJ.). THE DX COOLING AND THE HOT WATER COIL SHALL CONTROL TO MAINTAIN THE ACTIVE DISCHARGE AIR TEMPERATURE SETPOINT. IF ECONOMIZING IS ENABLED, THE OUTDOOR AIR OR MIXED AIR DAMPERS SHALL MODULATE TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT AND THE RELIEF AIR DAMPER SHALL TRACK THE MIXED AIR DAMPERS. IF THE DISCHARGE AIR TEMPERATURE SENSOR FAILS, THE DX COOLING SHALL BE DISABLED, THE HOT WATER CONTROL VALVE SHALL CLOSE, AND AN ALARM SHALL ANNUNCIATE AT THE BAS.

UNOCCUPIED:
DURING SCHEDULED UNOCCUPIED PERIODS (ADJ.), THE OUTSIDE AIR AND RELIEF DAMPERS SHALL CLOSE. THE UNIT CONTROLLER SHALL MODULATE THE SUPPLY FAN, DX COIL, AND HOT WATER CONTROL VALVE TO MAINTAIN A MINIMUM SPACE TEMPERATURE OF 60.0 DEG. F (ADJ.) AND A MAXIMUM SPACE TEMPERATURE OF 80.0 DEG. F (ADJ.).

HEAT/COOL MODE:
COOLING: THE UNIT CONTROLLER SHALL USE THE DISCHARGE AIR TEMPERATURE SENSOR AND DISCHARGE AIR TEMPERATURE COOLING SETPOINT TO DETERMINE WHEN TO INITIATE REQUESTS FOR COOLING. DISCHARGE AIR SETPOINT SHALL BE MAINTAINED BY CONTROLLING THE COOLING AS REQUIRED.

HEATING (CONTROLLED BY BMS): THE HOT WATER CONTROL VALVE SHALL MODULATE USING THE DISCHARGE AIR TEMPERATURE SENSOR AND SPACE THERMOSTAT TO DETERMINE WHEN TO INITIATE REQUESTS FOR HEATING. DISCHARGE AIR SETPOINT SHALL BE MAINTAINED BY MODULATING THE HOT WATER CONTROL VALVE AS REQUIRED.

DISCHARGE AIR TEMPERATURE RESET CONTROL:
THE DISCHARGE AIR TEMPERATURE SETPOINT, 55.0 DEG. F - 60.0 DEG. F (ADJ.) SHALL BE RESET BASED ON EITHER THE OUTSIDE AIR TEMPERATURE OR SPACE AVERAGE TEMPERATURE (ADJ.). THE MINIMUM DISCHARGE AIR SETPOINT SHALL BE SET AT 55.0 DEG. F (ADJ.). THE DISCHARGE TEMPERATURE SENSOR SHALL PREVENT THE DISCHARGE AIR TEMPERATURE FROM FALLING BELOW THE MINIMUM DISCHARGE AIR SETPOINT (ADJ.). IF THE DISCHARGE AIR TEMPERATURE CONTINUES TO FALL, THE DISCHARGE TEMPERATURE SENSOR SHALL ACT AS A LOW DISCHARGE TEMPERATURE LIMIT, A LOW TEMPERATURE ALARM SHALL ANNUNCIATE, AND THE UNIT SHALL SHUT DOWN. IF THE DISCHARGE TEMPERATURE RISES ABOVE THE HIGH LIMIT SETPOINT THE SENSOR SHALL ACT AS A HIGH DISCHARGE TEMPERATURE LIMIT AND SHALL KEEP THE UNIT RUNNING, A HIGH TEMPERATURE ALARM SHALL ANNUNCIATE.

OUTDOOR AIR TEMPERATURE RESET: THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE ADJUSTED BASED ON THE OUTSIDE AIR TEMPERATURE AND THE COOLING AND HEATING LOAD OF THE BUILDING.

SPACE TEMPERATURE RESET: THE DISCHARGE AIR TEMPERATURE SETPOINT SHALL BE ADJUSTED BASED ON THE TEMPERATURE OF THE CRITICAL SPACE(S).

ECONOMIZER:
ENABLE (REFERENCE DRY BULB): OUTSIDE AIR (OA) TEMPERATURE SHALL BE COMPARED WITH A REFERENCE DRY BULB SETPOINT. THE ECONOMIZER SHALL ENABLE WHEN THE OA TEMPERATURE IS LESS THAN REFERENCE DRY BULB SETPOINT. THE ECONOMIZER SHALL BE DISABLED WHEN OA TEMPERATURE IS GREATER THAN REFERENCE DRY BULB SETPOINT + 2.0 DEG. F.

OPERATION: THE SUPPLY AIR SENSOR SHALL MEASURE THE DRY BULB TEMPERATURE OF THE AIR LEAVING THE EVAPORATOR COIL WHILE ECONOMIZING. WHEN ECONOMIZING IS ENABLED AND THE UNIT IS OPERATING IN THE COOLING MODE, THE ECONOMIZER DAMPER SHALL BE MODULATED BETWEEN ITS MINIMUM POSITION AND 100% TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SETPOINT. THE ECONOMIZER DAMPER SHALL MODULATE TOWARD MINIMUM POSITION IN THE EVENT THE DISCHARGE AIR TEMPERATURE FALLS BELOW THE DISCHARGE LOW LIMIT TEMPERATURE SETPOINT. COMPRESSORS SHALL BE DELAYED FROM OPERATING UNTIL THE ECONOMIZER HAS OPENED TO 100%.

SUPPLY FAN:
THE SUPPLY FAN SHALL BE ENABLED WHILE IN THE OCCUPIED MODE.

SUPPLY FAN:
THE SUPPLY FAN SHALL BE ENABLED WHILE IN THE OCCUPIED MODE. THE FAN SHALL OPERATE AT STAGED SPEEDS AND BE COMMANDED ON OR OFF BY THE UNIT CONTROLLER.

STATIC PRESSURE HIGH LIMIT:
IF FOR ANY REASON THE SUPPLY AIR PRESSURE EXCEEDS THE SUPPLY AIR PRESSURE HIGH LIMIT, THE SUPPLY FAN SHALL SHUT DOWN. THE UNIT SHALL DISPLAY A MANUAL RESET DIAGNOSTIC AT THE BAS SYSTEM AND A MANUAL RESET WILL BE REQUIRED TO START THE FAN AGAIN.

FILTER STATUS:
A DIFFERENTIAL PRESSURE SWITCH SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE FILTER(S) WHEN THE FAN IS RUNNING. IF THE SWITCH CLOSES DURING NORMAL OPERATION A DIRTY FILTER ALARM SHALL ANNUNCIATE AT THE BAS.

SMOKE DETECTOR SHUTDOWN:
THE UNIT SHALL SHUT DOWN IN RESPONSE TO A SIGNAL FROM THE SMOKE DETECTOR INDICATING THE PRESENCE OF SMOKE. THE SMOKE DETECTOR SHALL BE INTERLOCKED TO THE UNIT THROUGH THE DRY CONTACTS OF THE SMOKE DETECTOR. A MANUAL RESET OF THE SMOKE DETECTOR SHALL BE REQUIRED TO RESTART THE UNIT.

NO.	DATE	DESCRIPTION
1	04-22-2022	FOR PERMIT

MADEIRA HIGH SCHOOL GYM HVAC REPLACEMENT

7465 LOANNES DRIVE
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STATE OF OHIO
GEORGE C. BRANSCUM
E-54916
REGISTERED
PROFESSIONAL ENGINEER

DESIGNED	COMM. NO.
JORDAN	8055.00
DRAWN	DATE
JORDAN	04-22-2022
CHECKED	PROJ. MGR.
BRANSCUM	EVANS

CONTROLS

DRAWING NUMBER	ISSUE
M-701	1