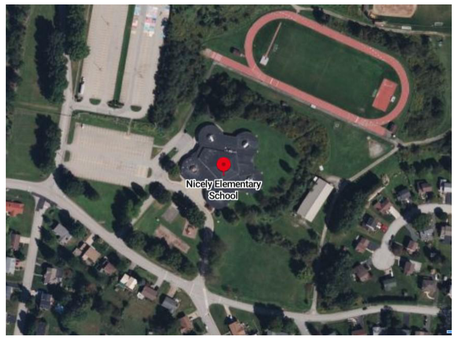
GREENSBURG SALEM SCHOOL DISTRICT
HVAC UPGRADES AT THREE SCHOOLS

CITY OF GREENSBURG, WESTMORELAND COUNTY, PA
SEPTEMBER 15, 2023

Contract No. GBG 2023-1.0009M - Mechanical Construction

Contract No. GBG 2023-1.0009E - Electrical Construction



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REGISTERED ARCHITECT COMMONWEALTH OF PENNSYLVANIA

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION

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GREENSBURG SALEM SCHOOL DISTRICT
HVAC UPGRADES AT THREE SCHOOLS
CITY OF GREENSBURG
WESTMORELAND COUNTY, PA

COVER SHEET

DATE:	SEP 2023
DWG.SCALE:	AS SHOWN
PROJECT NO.	327-839
DRAWN BY:	L. ABDULKHALEIQ
CHECKED BY:	S. MARITZER
APPROVED BY:	R. SUSALLA

DRAWING NO.:
C000

GENERAL MECHANICAL NOTES (ALL DRAWINGS):

1. MECHANICAL CONTRACTOR SHALL PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE HVAC SYSTEMS AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND REQUIRED BY CODE.

2. THE CONTRACT DOCUMENT DRAWINGS ARE DIAGRAMMATIC ONLY, AND ARE INTENDED TO CONVEY THE SCOPE AND GENERAL ARRANGEMENT OF WORK.

3. ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE VERIFIED BY THE CONTRACTOR BY FIELD INSPECTION PRIOR TO BIDDING. ANY INTERFERENCES TO INSTALLATION SHALL BE NOTED AND THE CONTRACTOR SHALL INCLUDE IN HIS BID PRICE THE COST TO AVOID OR RELOCATE ALL ITEMS, INCLUDING ITEMS OF OTHER TRADES, THAT INTERFERE. ALL WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. ALL OFFSETS, RISES, TRANSITIONS AND DROPS IN DUCTS AND PIPING AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.

4. VERIFY ALL EQUIPMENT CONNECTIONS WITH MANUFACTURERS' CERTIFIED DRAWINGS. VERIFY AND PROVIDE DUCT TRANSITIONS OR PIPE ADAPTERS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DIMENSIONS BEFORE FABRICATION.

5. PROVIDE ACCESS IN WALLS & CEILINGS TO ACCESS ALL EQUIPMENT, VALVES, CONTROL DEVICES, VOLUME DAMPERS, AND FIRE/SMOKE DAMPERS.

6. FOLLOW MANUFACTURE'S RECOMMENDATIONS FOR INSTALLATION OF EQUIPMENT. ALSO REFER TO TYPICAL DETAILS FOR INSTALLATION OF EQUIPMENT.

7. ALL MATERIALS FURNISHED, AND ALL WORK PERFORMED BY THE MECHANICAL CONTRACTOR SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES AND REGULATIONS, INCLUDING BUT NOT LIMITED TO THE LATEST APPLICABLE EDITIONS OF NFPA, IEEE, OSHA, SMACNA, INTERNATIONAL MECHANICAL CODE, INTERNATIONAL BUILDING CODE, AND ANY STATE, COUNTY, AND LOCAL CODES.

8. ALL EQUIPMENT, DUCTWORK, ETC., SHALL BE SUPPORTED SUFFICIENTLY AND ANY ADDITIONAL SUPPORT SHALL BE PROVIDED AS REQUIRED TO PROVIDE VIBRATION FREE AND SAFE INSTALLATION. ALL MISCELLANEOUS STEEL REQUIRED AND/OR AS SHOWN IN DETAILS FOR DUCTWORK, AND EQUIPMENT (UNLESS OTHERWISE NOTED) SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR. SUPPORT ALL DUCTWORK, PIPING AND EQUIPMENT MOUNTED ABOVE THE CEILING DIRECTLY FROM THE STRUCTURE. ALL ATTACHMENTS TO BEAMS, TRUSSES, OR JOIST SHALL BE MADE AT PANEL POINTS WITH BEAM CLAMPS MEETING MSS STANDARDS.

9. ALL CONTROL WIRE AND CONDUIT SHALL COMPLY WITH NEC AND ELECTRICAL SPECIFICATIONS FOR THIS PROJECT.

DUCTWORK GENERAL NOTES (ALL DRAWINGS):

1. ALL DUCTWORK INDICATED IS SCHEMATIC AND SHOW ONLY RELATIVE POSITIONS. PROVIDE OFFSETS, RISES, TRANSITIONS AND ELBOWS AS NEEDED TO INSTALL PROPERLY.

2. PROVIDE ACCESS DOORS IN DUCTWORK FOR OPERATION, ADJUSTMENT, AND MAINTENANCE OF ALL HVAC DEVICES, FANS, DAMPERS, (FIRE, SMOKE, BALANCING) COILS, AND TERMINAL EQUIPMENT.

3. LOCATIONS OF TERMINAL DEVICES, AIR OUTLETS AND INLETS ARE APPROXIMATE. LOCATE PER THE ARCHITECTURAL DRAWINGS AND TO AVOID OTHER TRADE'S WORK. COORDINATE LOCATIONS WITH OTHER TRADES. CONSULT ARCHITECT/ENGINEER FOR CLARIFICATION IF CONFLICTS OCCUR.

4. DUCT DIMENSIONS SHOWN ARE CLEAR INSIDE FACE-TO-FACE DIMENSIONS AND DO NOT INCLUDE DUCT LINER WHERE SPECIFIED. INCREASE DIMENSIONS OF LINED DUCTWORK TO PROVIDE FREE INSIDE AREA EQUAL DIMENSIONS SHOWN. REFER TO THE SPECIFICATIONS FOR LOCATION OF LINED DUCTWORK.

5. FINAL CONNECTIONS FROM HIGH VELOCITY MAIN DUCTS TO AIR TERMINAL UNITS SHALL BE MADE WITH FLEXIBLE DUCTWORK NOT EXCEEDING 3 FEET IN LENGTH. CONNECTIONS BETWEEN LOW VELOCITY DUCTWORK AND/OR TERMINAL UNITS TO AIR INLETS AND OUTLETS SHALL BE MADE WITH FLEXIBLE DUCTWORK NOT EXCEEDING 6 FEET IN LENGTH. LONGER DUCT RUN OUTS SHALL BE CONSTRUCTED OF HARD DUCT OF THE SAME MATERIAL SPECIFIED FOR THE SYSTEM SERVED AND INSULATED AS SPECIFIED FOR THAT SYSTEM. FLEXIBLE DUCTWORK SHALL BE OF THE PRESSURE CLASS AND FACTORY INSULATED AS SPECIFIED FOR THE SYSTEM WHERE INSTALLED.

6. FLEXIBLE DUCTWORK SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS WITHOUT ANY SAGS, SHARP TURNS OR KINKS. AT THE MINIMUM, THE FLEXIBLE DUCTWORK SHALL BE FASTENED TO THE HARD DUCT BY A NYLON STRAP SECURED BY SHEETMETAL SCREWS TO PREVENT SLIPPING OFF FROM COLLAR.

7. PROVIDE VOLUME DAMPERS AT EACH AIR OUTLET, AIR INLET AND TERMINAL DEVICE AND AT EACH BRANCH TAKE-OFF CONNECTION FROM THE MAIN.

MECHANICAL PIPING GENERAL NOTES (ALL DRAWINGS):

1. ALL PIPING SHOWN HAS BEEN DRAWN SCHEMATICALLY FOR CLARITY AND SHOW ONLY RELATIVE POSITIONS. PROVIDE OFFSETS AND ELBOWS AS NEEDED TO INSTALL PROPERLY AND TO AVOID INTERFERENCES.

2. ALL NEW OR REPLACED HYDRONIC PIPING SHALL BE INSTALLED SO THAT IT CAN BE COMPLETELY VENTED AT HIGH POINTS AND DRAINED AT LOW POINTS. PROVIDE AIR VENTS AT HIGH POINTS, TYPE PER SPECIFICATIONS. PROVIDE 1/2" BALL VALVES WITH HOSE END CONNECTIONS AND CAPS AT LOW POINT. ALL WATER MAINS SHALL BE INSTALLED LEVEL, UNLESS OTHERWISE NOTES.

3. PROVIDE SERVICE VALVES AT EACH BRANCH CONNECTION FROM MAINS AND AT EACH TERMINAL DEVICE OR EQUIPMENT CONNECTION.

4. CONTRACTOR SHALL PROVIDE NEW VALVES ON EXISTING PIPING WHERE THE PIPES ARE TO BE REMOVED SO THAT THE SYSTEM DOES NOT HAVE TO BE DRAINED WHILE REMOVING EXISTING UNITS, INSTALLING NEW UNITS AND MAKING CONNECTIONS TO NEW EQUIPMENT.

MECHANICAL DEMOLITION GENERAL NOTES (ALL DRAWINGS):

1. DEMOLITION DRAWINGS ARE BASED ON EXISTING PLANS AND FIELD INVESTIGATION PRIOR TO DEMOLITION. VISIT THE SITE PRIOR TO BID IN ORDER TO BECOME FAMILIAR WITH THE EXISTING CONDITIONS AND IN ORDER TO AVOID CONFLICTS.

2. ALL ITEMS SHOWN DASHED ON DEMOLITION PLANS ARE EXISTING AND SHALL BE REMOVED INCLUDING PIPING, DUCTWORK, HANGERS, FASTENERS, CONTROLS, AND ASSOCIATED APPURTENANCES UNLESS OTHERWISE NOTED.

3. ALL ITEMS SHOWN SOLID ON DEMOLITION PLANS ARE EXISTING TO REMAIN UNLESS OTHERWISE NOTED.

4. EXERCISE CARE IN REMOVAL OF DEMOLITION ITEMS. REPAIR, AT NO ADDITIONAL COST TO OWNER, ANY DAMAGE CAUSED TO EXISTING CONSTRUCTION AND/OR EQUIPMENT TO REMAIN.

MECHANICAL LEGEND

SYMBOL	ABRV.	DESCRIPTION
	EX	EXISTING EQUIPMENT OR DUCTWORK TO REMAIN
	RX	EXISTING EQUIPMENT OR DUCTWORK TO BE REMOVED
		NEW EQUIPMENT OR DUCTWORK
		LINED DUCTWORK
		SUPPLY DUCT UP
		SUPPLY DUCT DOWN
		RETURN DUCT UP
		RETURN DUCT DOWN
		EXHAUST DUCT UP
		EXHAUST DUCT DOWN
		ROUND DUCT ELBOW UP
		ROUND DUCT ELBOW DOWN
		ELBOW WITH TURNING VANES
R		DUCT OFFSET - RISE
D		DUCT OFFSET - DROP
		SQUARE / RECTANGULAR DUCT TRANSITION
		SQUARE/RECTANGULAR TO ROUND DUCT TRANSITION
	SD	SUPPLY DIFFUSER - MULTI-DIRECT.
		SUPPLY DIFFUSER - DIRECT. (HATCH DENOTES BLANK OFF)
	SG/EG	SIDEWALL SUPPLY or RETURN GRILLE - (R = REGISTER)
	LD	LINEAR DIFFUSER. SEE SCHEDULE FOR INFORMATION.
	RG/EG	RETURN GRILLE - (R = REGISTER)
	EG	EXHAUST GRILLE - (R = REGISTER)
		FLEXIBLE DUCT
	FLEX	FLEXIBLE DUCT CONNECTION (TO EQUIPMENT)
		SPIN TAP WITH VOLUME CONTROL DAMPER
AD	AD	DUCT ACCESS DOOR
	VD	VOLUME CONTROL DAMPER
BD	BD	BACKDRAFT DAMPER
M	MD	MOTORIZED DAMPER
AP		ACCESS PANEL
	FD	VERTICAL FIRE DAMPER (WALL)
	HFD	HORIZONTAL FIRE DAMPER (FLOOR)
	SD	VERTICAL SMOKE DAMPER (WALL)
	HSD	HORIZONTAL SMOKE DAMPER (FLOOR)
	FD/SD	COMBINATION VERTICAL FIRE & SMOKE DAMPER
	HFD/SD	COMBINATION HORIZONTAL FIRE & SMOKE DAMPER
	RD	CEILING RADIATION FIRE DAMPER
DD	DD	DUCT SMOKE DETECTOR
T		THERMOSTAT
H		HUMIDISTAT
TH		COMBINATION THERMOSTAT & HUMIDISTAT
SP		STATIC PRESSURE SENSOR
CO_2		CARBON DIOXIDE SENSOR
CO		CARBON MONOXIDE SENSOR
NO_x		NITROUS OXIDE SENSOR
S		TEMPERATURE SENSOR
S		STARTER
OS		OCCUPANCY SENSOR
R		REFRIGERANT DETECTOR

SYMBOL	ABRV.	DESCRIPTION
		CONNECTION POINT, NEW TO EXISTING
		DISCONNECTION POINT
1		DRAWING KEYNOTE
A		DEMOLITION DRAWING KEYNOTE
1		REVISION NUMBER
		REVISION CLOUD
		PIPE UP
		PIPE DOWN
		PIPE TEE DOWN
		TOP PIPE CONNECTION
		BALL VALVE OR SHUTOFF VALVE IN RISE
		PIPE CAP
		PIPE UNION
		FLANGED CONNECTION
		CONCENTRIC PIPE REDUCER
		ECCENTRIC PIPE REDUCER
		FLOW ARROW
		PIPE ANCHOR
		PIPE GUIDE
	BV	BALL VALVE
	BFV	BUTTERFLY VALVE
	PV	PLUG VALVE
	GV	GATE VALVE
	GBV	GLOBE VALVE
	PRV	PRESSURE REDUCING VALVE
	CV	CHECK VALVE
	BFP	BACKFLOW PREVENTER
		PRESSURE RELIEF VALVE
		AUTOMATIC FLOW CONTROL VALVE
		CALIBRATED BALANCING VALVE
		AUTOMATIC AIR VENT
		MANUAL AIR VENT
		P/T PLUG
		PRESSURE GAGE W/ SHUT-OFF
		THERMOMETER
		STRAINER (W/ BALL VALVE AND CAP)
		HOSE BIBB
		FLEXIBLE CONNECTOR
		2-WAY CONTROL VALVE
		3-WAY CONTROL VALVE
		TRIPLE DUTY VALVE WITH MEASURING CONNECTIONS
		INVERTED BUCKET STEAM TRAP
		FLOAT & THERMOSTATIC STEAM TRAP
U	UC	UNDER CUT DOOR - 1"
L		LOUVERED DOOR
	RA / EA	RETURN OR EXHAUST AIR
	SA / OA	SUPPLY OR OUTSIDE AIR
TYP #		EQUIPMENT UNIT DESIGNATION
TAG CFM		DIFFUSER, REGISTER & GRILLE UNIT DESIGNATION W/ CFM

SYMBOL	ABRV.	DESCRIPTION
EX (X)	EX	EXISTING PIPING TO REMAIN - (X) DESIGNATES SERVICE
RX (X)	RX	EXISTING PIPING TO BE REMOVED - (X) DESIGNATES SERVICE
HWS	HWS	HEATING WATER SUPPLY PIPING
HWR	HWR	HEATING WATER RETURN PIPING
CWS	CWS	CONDENSER WATER SUPPLY PIPING
CWR	CWR	CONDENSER WATER RETURN PIPING
CHWS	CHWS	CHILLED WATER SUPPLY PIPING
CHWR	CHWR	CHILLED WATER RETURN PIPING
LPS	LPS	LOW PRESSURE STEAM SUPPLY PIPING (0-15 PSIG)
LPR	LPR	LOW PRESSURE STEAM CONDENSATE RETURN
MPS	MPS	MEDIUM PRESSURE STEAM SUPPLY PIPING (16-60 PSIG)
MPR	MPR	MEDIUM PRESSURE STEAM CONDENSATE RETURN
HPS	HPS	HIGH PRESSURE STEAM SUPPLY PIPING (61 TO 200 PSIG)
HPR	HPR	HIGH PRESSURE STEAM CONDENSATE RETURN
GWS	GWS	GLYCOL WATER SUPPLY
GWR	GWR	GLYCOL WATER RETURN
RL	RL	REFRIGERANT LIQUID PIPING
RS	RS	REFRIGERANT SUCTION PIPING
FOS	FOS	FUEL OIL SUPPLY PIPING
FOR	FOR	FUEL OIL RETURN PIPING
CW	CW	CITY (DOMESTIC) WATER
PC	PC	PUMPED STEAM CONDENSATE
D	D	CONDENSATE DRAIN PIPING
V	V	VENT PIPING
G	G	NATURAL GAS PIPING

MECHANICAL ABBREVIATIONS

ABRV.	DESCRIPTION
HVAC	HEATING, VENTILATION AND AIR CONDITIONING
SA	SUPPLY AIR
RA	RETURN AIR
EA	EXHAUST AIR
OA	OUTSIDE AIR
TA	TRANSFER AIR
MA	MIXED AIR
MBH	1000 - BRITISH THERMAL UNITS
kW	1000-WATT (1 KW = 3,412 BTUH)
SENS.	SENSIBLE
LAT.	LATENT
E.A.T.	ENTERING AIR TEMPERATURE
L.A.T.	LEAVING AIR TEMPERATURE
E.W.T.	ENTERING WATER TEMPERATURE
L.W.T.	LEAVING WATER TEMPERATURE
DB/WB	DRY BULB / WET BULB
IN. W.G.	INCHES WATER GAUGE (AIR)
FT. W.G.	FEET WATER GAUGE (HYDRONIC)
E.S.P.	EXTERNAL STATIC PRESSURE
T.S.P.	TOTAL STATIC PRESSURE
TG	TRANSFER GRILLE
TR	TOP REGISTER
°F	FAHRENHEIT
R / R	REMOVE EXISTING ITEM & RELOCATE TO NEW LOCATION
EX	EXISTING
RL	RELOCATE EXISTING
UNO	UNLESS NOTED OTHERWISE
NTS	NOT TO SCALE
NIC	NOT IN CONTRACT
PH	PHASE
HZ	HERTZ
Ø	DIAMETER
AFF	ABOVE FINISHED FLOOR
ELEV.	ELEVATION FROM DATUM

NOTES:
1. NOT ALL SYMBOLS AND ABBREVIATIONS ARE IN USE FOR THIS PROJECT.

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	19 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

Civil & Environmental Consultants, Inc.
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GREENSBURG SALEM SCHOOL DISTRICT:
JAMES H. METZGAR ELEMENTARY SCHOOL,
DR. ROBERT F. NICELY ELEMENTARY SCHOOL,
GREENSBURG SALEM HIGH SCHOOL

MECHANICAL DATA SHEET

DATE:	XX-XX-XX
DWG SCALE:	AS SHOWN
PROJECT NO:	2341083
DRAWN BY:	MAB
CHECKED BY:	MAB
APPROVED BY:	DCP

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412.322.9280
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COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
No. PE081177

DRAWING NO.:
M-0001

MECHANICAL SPECIFICATIONS

MECHANICAL GENERAL CONDITIONS (230010)

A. GENERAL

1. CONFORM TO ALL GENERAL AND SPECIAL CONDITIONS OF CONTRACT AS SPECIFIED BY ARCHITECT AND/OR OWNER.

2. PRODUCTS AND INSTALLATION SHALL COMPLY WITH ALL APPLICABLE LAWS, CODES, GOVERNMENT REGULATIONS, UTILITY COMPANY REQUIREMENTS, ETC. OF ALL AUTHORITIES HAVING JURISDICTION. WORK SHALL COMPLY WITH THE FOLLOWING CODES, STANDARDS AND ORGANIZATIONS: INTERNATIONAL MECHANICAL CODE (IMC), INTERNATIONAL PLUMBING CODE (IPC), INTERNATIONAL ENERGY CODE, NATIONAL ELECTRIC CODE, NFPA, UNDERWRITERS LABORATORY (UL), IRI, FM, SMACNA "HVAC DUCT CONSTRUCTION STANDARDS" GUIDELINES, DETAILS, & MODEL SPECIFICATION, ASHRAE. WHERE CONFLICTS EXIST BETWEEN CODES, STANDARDS OR THIS SPECIFICATION THE HIGHER REQUIREMENT SHALL APPLY. DEVIATIONS FROM THE CONTRACT DOCUMENTS REQUIRED BY THE ABOVE AUTHORITIES SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW. OBTAIN PERMITS AND PAY ALL FEES. ARRANGE FOR ALL REQUIRED INSPECTIONS AND APPROVALS. CONFIRM ALL UTILITY COMPANY REQUIREMENTS AND CONNECTION POINTS IN FIELD, PRIOR TO STARTING WORK.

3. ALL SPECIFICATIONS AND DRAWINGS, I.E., ARCHITECTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL ARE COMPLIMENTARY AND MUST BE USED IN COMBINATION TO OBTAIN COMPLETE CONSTRUCTION INFORMATION. ANY INFORMATION CONFLICTS WITHIN THE SPECIFICATIONS AND DRAWINGS SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION. DRAWINGS ARE DIAGRAMMATIC. CONFIRM ALL DIMENSIONS BY FIELD MEASUREMENT. THE EXACT LOCATIONS FOR APPARATUS, FIXTURES, EQUIPMENT AND PIPING WHICH IS NOT COVERED BY DRAWINGS, SHALL BE OBTAINED FROM THE ARCHITECT OR HIS REPRESENTATIVE IN THE FIELD, AND THE WORK SHALL BE LAID OUT ACCORDINGLY.

4. VISIT SITE, CHECK FACILITIES AND CONDITIONS MAKE ALL NECESSARY OBSERVATIONS, MEASUREMENTS, NOTE CONDITIONS UNDER WHICH WORK IS TO BE PERFORMED, AND TAKE ALL ITEMS INTO CONSIDERATION IN BID.

5. EACH CONTRACTOR SHALL PROVIDE FOR HIS OWN CLEAN-UP, REMOVAL AND LEGAL DISPOSAL OF ALL RUBBISH DAILY. CONTRACTOR SHALL PROTECT THEIR WORK AND EXISTING OR ADJACENT PROPERTY AGAINST WEATHER, TO MAINTAIN THEIR WORK, MATERIALS, APPARATUS AND FIXTURES FREE FROM INJURY OR DAMAGE. ANY WORK DAMAGED BY FAILURE TO PROVIDE PROTECTION REQUIRED, SHALL BE REMOVED AND REPLACED WITH NEW WORK AT THE CONTRACTOR'S EXPENSE.

6. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, SEQUENCES OF CONSTRUCTION AND THE SAFETY OF WORKMEN.

7. NO PIPING, DUCTWORK, CONTROLS, ETC., SHALL BE INSTALLED OR ROUTED ABOVE ELECTRICAL PANELS AND EQUIPMENT OR THROUGH ELEVATOR ROOMS.

8. THE CONTRACTOR SHALL COORDINATE AND OBTAIN A WRITTEN LISTING OF ELECTRICAL CHARACTERISTICS OF ALL MECHANICAL EQUIPMENT FROM ELECTRICAL CONTRACTOR PRIOR TO ORDERING OF EQUIPMENT. NO ADDITIONAL PAYMENT WILL BE MADE FOR LACK OF CONTRACTOR COORDINATION OF ELECTRICAL CHARACTERISTICS.

9. DURING THE BUILDING CONSTRUCTION SOME EXISTING INSTALLATION MAY BE EXPOSED THAT WILL HAVE TO BE CHANGED, ALTERED, REROUTED AND/OR ABANDONED. ANY SUCH WORK WHICH COMES UNDER THE JURISDICTION OF THIS CONTRACTOR SHALL BE DONE BY THIS CONTRACTOR WITHOUT EXTRA COST TO THE OWNER, AS THOUGH FULLY DETAILED ON PLANS AND/OR DESCRIBED IN THE SPECIFICATIONS.

10. WORK RELATED TO THE EXISTING BUILDING SHALL BE COORDINATED TO MINIMIZE INTERFERENCE OR INTERRUPTION OF NORMAL BUILDING USE BY OWNER. REFER TO ARCHITECTURAL PLANS FOR PHASING REQUIREMENTS.

11. IN CASES OF DOUBT AS TO THE WORK INTENDED, OR IN THE EVENT OF NEED FOR EXPLANATION THEREOF, THE CONTRACTOR SHALL REQUEST SUPPLEMENTARY INSTRUCTIONS FROM THE ENGINEER. NO CHANGES ARE TO BE MADE TO THE WORK OF THIS CONTRACT WITHOUT PRIOR KNOWLEDGE AND APPROVAL OF THE ENGINEER. THE CONTRACTOR SHALL HOLD THE OWNER AND ITS CONSULTANTS HARMLESS AGAINST ALL CLAIMS AND JUDGMENTS ARISING OUT OF THE CONTRACTORS PERFORMANCE OF THE WORK OF THIS CONTRACT. THE CONTRACTOR SHALL NOT PROCEED WITH ANY WORK, WHICH HE EXPECTS ADDITIONAL COMPENSATION BEYOND THE CONTRACT AMOUNT, WITHOUT WRITTEN AUTHORIZATION FROM THE APPROPRIATE AUTHORITY. FAILURE TO OBTAIN SUCH AUTHORIZATION SHALL INVALIDATE ANY CLAIM FOR EXTRA COMPENSATION.

12. IT SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR TO INSTALL THE HEATING, VENTILATION AND AIR CONDITIONING SYSTEM SO AS TO INSURE QUIET OPERATION. NO VIBRATION OR SOUND SHALL BE TRANSMITTED TO THE BUILDING, STRUCTURE OR OCCUPIED AREAS. THE DECISION OF THE ENGINEER AS TO THE QUIETNESS OF THE SYSTEM AND EQUIPMENT SHALL BE FINAL. IT SHALL BE THIS CONTRACTORS RESPONSIBILITY TO CORRECT OR REPLACE ANY NOISY SYSTEM OR EQUIPMENT AS REQUIRED.

13. OBTAIN PERMITS AND PAY ALL FEES. ARRANGE FOR ALL REQUIRED INSPECTIONS AND APPROVALS.

B. DEMOLITION

1. DISCONNECT, DISASSEMBLE, CAP, PLUG AND REMOVE ALL MEP ELEMENTS (PIPING, DUCTS, ELECTRICAL DEVICES, WIRING, CONDUIT, EQUIPMENT, HANGERS, SUPPORTS, ETC) INDICATED ON THE DRAWINGS OR NOT OTHERWISE REQUIRED FOR COMPLETED PRODUCT. NO MEP ELEMENTS ARE TO BE ABANDONED IN PLACE UNLESS SPECIFICALLY NOTED. NOT ALL ITEMS TO BE REMOVED ARE INDICATED ON DRAWING.

2. ALL OPENINGS ON PIPING AND DUCTS THAT REMAIN SHALL BE CAPPED AND PROPERLY SECURED. WIRING SHALL BE DISCONNECTED AT CIRCUIT BREAKERS AND REMOVED AND BREAKERS MARKED "SPARE." REMOVE AND RECLAIM ANY REFRIGERANT IN EXISTING SYSTEMS PRIOR TO DEMOLITION OF ANY EQUIPMENT ACCORDING TO FEDERAL REQUIREMENT.

3. ANY EQUIPMENT DESIGNATED BY OWNER TO BE SALVAGED SHALL BE PROTECTED AND DELIVERED TO AN OWNER DESIGNATED AREA ON SITE.

4. ALL ASBESTOS REMOVAL (IF REQUIRED) WILL BE HANDLED BY THE OWNER AND IS NOT A PART OF THIS WORK. IF MATERIALS SUSPECTED OF CONTAINING HAZARDOUS MATERIALS ARE ENCOUNTERED, DO NOT DISTURB; NOTIFY ARCHITECT AND OWNER IMMEDIATELY.

C. BASIS OF DESIGN AND SUBSTITUTIONS

1. WHEREVER THE WORDS "APPROVED BY", "APPROVED EQUAL", "AS DIRECTED" OR SIMILAR PHRASES ARE USED IN THE FOLLOWING SPECIFICATIONS, THEY SHALL BE UNDERSTOOD TO REFER TO THE OWNER AS THE APPROVING AGENCY. THE NAME OR MAKE OF ANY EQUIPMENT OR MATERIALS NAMED IN THE SPECIFICATION (WHETHER OR NOT THE WORDS "OR APPROVED EQUAL" ARE USED) SHALL BE KNOWN AS THE "STANDARD".

2. THESE SPECIFICATIONS ESTABLISH QUALITY STANDARDS OF MATERIALS AND EQUIPMENT TO BE PROVIDED. SPECIFIC ITEMS ARE IDENTIFIED BY MANUFACTURER, TRADE NAME OR CATALOG DESIGNATION. THE CONTRACTOR SHALL SUBMIT THE BASE BID PRICE BASED UPON STANDARD SPECIFIED EQUIPMENT DESCRIBED HEREIN AND AS DETAILED ON DRAWINGS AND ASSOCIATED CONTRACT DOCUMENTS. THE CONTRACTOR MAY SUBMIT INFORMATION ON MATERIALS AND MANUFACTURERS (OTHER THAN THOSE LISTED) FOR REVIEW BY THE OWNER, ARCHITECT, AND ENGINEER NO LATER THAN TEN (10) DAYS BEFORE BIDS ARE SUBMITTED. IN ADDITION, SAMPLES OF THE PROPOSED EQUIPMENT MAY BE REQUIRED TO BE SUBMITTED TO THE ENGINEER FOR REVIEW NO LATER THAN TEN (10) DAYS BEFORE BIDS ARE SUBMITTED. MANUFACTURERS OF PRODUCTS ACCEPTED BY THE OWNER, ARCHITECT, AND ENGINEER WILL BE LISTED IN AN ADDENDUM TO THE SPECIFICATIONS AS AN ACCEPTABLE SUBSTITUTION. EQUIPMENT ACCEPTED AS DETAILED BELOW SHALL BE SHOWN AS A SEPARATE ADD OR DEDUCT PRICE TO BE FACTORED INTO THE BASE PRICE BY THE ARCHITECT AND OWNER IF ACCEPTED.

3. SHOULD THE CONTRACTOR PROPOSE TO FURNISH MATERIALS AND EQUIPMENT OTHER THAN THOSE SPECIFIED OR APPROVED BY ADDENDUM, SUBMIT A WRITTEN REQUEST FOR SUBSTITUTION TO THE OWNER, ARCHITECT AND ENGINEER AT BID OPENING. THE REQUEST SHALL BE AN ALTERNATE TO THE ORIGINAL BID; BE ACCOMPANIED WITH COMPLETE DESCRIPTIVE (MANUFACTURER, BRAND NAME, CATALOG NUMBER, ETC.) AND TECHNICAL DATA FOR ALL ITEMS. FAILURE BY THIS CONTRACTOR TO SUBMIT THE REQUISITE DOCUMENTATION DETAILED ABOVE SHALL BE UNDERSTOOD BY THE OWNER, ARCHITECT, AND ENGINEER TO INDICATE THAT SUBSTITUTE EQUIPMENT WILL NOT BE PRESENTED BY THE CONTRACTOR FOR CONSIDERATION. SUCH SUBSTITUTIONS WILL NOT BE CONSIDERED AFTER THE BID OPENING DATE AND DELAY OF THE PROJECT WILL NOT BE PERMITTED FOR FURTHER INSPECTION AND EVALUATION AFTER THIS DATE.

4. WHERE SUCH SUBSTITUTIONS ALTER THE DESIGN OR SPACE REQUIREMENTS INDICATED ON THE DRAWINGS, INCLUDE ALL ITEMS OF COST FOR THE REVISED DESIGN AND CONSTRUCTION INCLUDING COST OF ALL ALLIED TRADES INVOLVED.

5. ACCEPTANCE OR REJECTION OF THE PROPOSED SUBSTITUTIONS SHALL BE SUBJECT TO APPROVAL OF THE OWNER, ARCHITECT, AND ENGINEER. IF REQUESTED, THE CONTRACTOR SHALL SUBMIT (AT THEIR COST) INSPECTION SAMPLES OF BOTH THE SPECIFIED AND PROPOSED SUBSTITUTE ITEMS.

6. IN ALL CASES WHERE SUBSTITUTIONS ARE PERMITTED, THE CONTRACTOR SHALL BEAR ANY EXTRA COST OF EVALUATING THE QUALITY OF THE MATERIAL AND EQUIPMENT TO BE PROVIDED.

7. ALL EQUIPMENT AND MATERIALS SHALL BE NEW, FREE OF DEFECTS AND U.L. LABELED.

D. CUTTING, PATCHING AND DRILLING

1. ALL CUTTING AND PATCHING OF THE BUILDING CONSTRUCTION REQUIRED FOR THIS WORK SHALL BE BY THIS CONTRACTOR UNLESS SHOWN ON ARCHITECTURAL DRAWINGS AND CONFIRMED AS TO SIZE AND LOCATION PRIOR TO NEW CONSTRUCTION. CUTTING SHALL BE IN A NEAT AND WORKMANLIKE MANNER. NEATLY SAW CUT ALL RECTANGULAR OPENINGS, SET SLEEVE THROUGH OPENING, AND FINISH PATCH OR PROVIDE TRIM FLANGE AROUND OPENING. CORE DRILL AND SLEEVE ALL ROUND OPENINGS. DO NOT CUT ANY STRUCTURAL COMPONENTS WITHOUT ARCHITECT'S APPROVAL.

2. PATCH AND FINISH TO MATCH ADJACENT AREAS THAT HAVE BEEN CUT, DAMAGED OR MODIFIED AS A RESULT OF THE INSTALLATION OF THE MECHANICAL OR ELECTRICAL EQUIPMENT. FIRE STOP ALL PENETRATIONS OF FIRE RATED CONSTRUCTION IN A CODE APPROVED MANNER.

3. ALL CONTRACTORS SHALL CONFIRM WITH OWNER, PRIOR TO BID, TIMES AVAILABLE FOR NOISE PRODUCING WORK SUCH AS CUTTING AND CORE DRILLING OF FLOORS, WALLS, ETC., AS WELL AS TIMES FOR WORK WHICH REQUIRE ACCESS INTO ADJOINING TENANT SPACES. INCLUDE ANY PREMIUM TIME IN BID.

4. EXACT LOCATION OF ROOFTOP EQUIPMENT SHALL BE APPROVED BY OWNER'S STRUCTURAL ENGINEER.

5. INFORMATION REGARDING REQUIRED PIPE OPENINGS IN WALLS, FLOORS, CHASES, ETC., AND CONCRETE EQUIPMENT PADS OR FOUNDATIONS SHALL BE GIVEN TO THE GENERAL CONTRACTOR BY THIS CONTRACTOR PRIOR TO THE CONSTRUCTION PERIOD. IF THIS CONTRACTOR FAILS TO COMPLY WITH THIS REQUEST, OR IF INCORRECT INFORMATION IS GIVEN, THE NECESSARY CUTTING AND PATCHING WILL BE PERFORMED BY THE GENERAL CONTRACTOR, AT THIS CONTRACTOR'S EXPENSE.

E. WARRANTY

1. FULLY WARRANT ALL MATERIALS, EQUIPMENT AND WORKMANSHIP FOR ONE (1) YEAR FROM DATE OF ACCEPTANCE.EXTEND ALL MANUFACTURER'S WARRANTIES TO OWNER, INCLUDING ALL EXTENDED WARRANTIES ON HVAC EQUIPMENT.

2. REPAIR OR REPLACE WITHOUT CHARGE TO THE OWNER ALL ITEMS FOUND DEFECTIVE DURING THE WARRANTY PERIOD. IN THE CASE OF REPLACEMENT OR REPAIR DUE TO FAILURE WITHIN THE WARRANTY PERIOD, THE WARRANTY ON THAT PORTION OF THE WORK SHALL BE EXTENDED FOR A MINIMUM PERIOD OF ONE (1) YEAR FROM THE DATE OF SUCH REPLACEMENT OR REPAIR.

F. SHOP DRAWING SUBMITTALS

1. SUBMIT SHOP DRAWINGS FOR MECHANICAL EQUIPMENT, FIRE PROTECTION SYSTEMS, DUCTWORK, AND PLUMBING FIXTURES AND EQUIPMENT WITH ADEQUATE DETAILS AND SCALES TO CLEARLY SHOW CONSTRUCTION. INDICATE THE OPERATING CHARACTERISTICS FOR EACH REQUIRED ITEM. CLEARLY IDENTIFY EACH ITEM ON THE SUBMITTAL AS TO MARK, LOCATION AND USE, USING SAME IDENTIFICATION AS PROVIDED ON DESIGN DRAWINGS.

2. DUCTWORK AND FIRE PROTECTION DRAWINGS SHALL BE FULLY DIMENSIONED BASED ON FIELD VERIFIED BUILDING CLEARANCES AND ARCHITECTURAL CEILING LAYOUTS, AND INDICATE STRUCTURAL, LIGHTING, DUCTWORK AND PIPING AT ALL CRITICAL LOCATIONS.

3. CONTRACTOR SHALL REVIEW AND INDICATE HIS APPROVAL OF EACH SHOP DRAWING PRIOR TO SUBMITTAL FOR REVIEW. DO NOT START WORK OR FABRICATION UNTIL SHOP DRAWINGS HAVE BEEN REVIEWED BY THE ENGINEER AND RETURNED TO THE CONTRACTOR.

4. SUBMITTALS WILL BE REVIEWED ONLY FOR GENERAL COMPLIANCE WITH THE CONTRACT DOCUMENTS AND NOT FOR DIMENSIONS OR QUANTITIES. THE SUBMITTAL REVIEW SHALL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR PURCHASE OF ANY ITEM IN FULL COMPLIANCE WITH THE CONTRACT DOCUMENTS OR ITS COMPLETE AND PROPER INSTALLATION.

5. WHERE SUBMITTALS VARY FROM THE CONTRACT REQUIREMENTS, THE CONTRACTOR SHALL CLEARLY INDICATE ON SUBMITTAL OR ACCOMPANYING DOCUMENTS THE NATURE AND REASON FOR VARIATIONS.

6. REFER TO VARIOUS SECTIONS FOR LISTING OF SHOP DRAWINGS REQUIRED ON THIS PROJECT.

7. EACH MANUFACTURER OR HIS REPRESENTATIVE MUST CHECK THE APPLICATION OF HIS EQUIPMENT AND CERTIFY AT TIME OF SHOP DRAWING SUBMITTAL THAT EQUIPMENT HAS BEEN PROPERLY APPLIED AND CAN BE INSTALLED, SERVICED AND MAINTAINED WHERE INDICATED ON DRAWINGS. ADVISE ENGINEER IN WRITING WITH SUBMITTAL DRAWINGS OF ANY POTENTIAL PROBLEMS. THE MANUFACTURER SHALL BE RESPONSIBLE FOR ANY CHANGES THAT MIGHT BE NECESSARY BECAUSE OF PHYSICAL CHARACTERISTICS OF EQUIPMENT THAT HAVE NOT BEEN CALLED TO THE ENGINEER'S ATTENTION AT THE TIME OF SUBMITTAL.

G. RECORD DRAWINGS

1. EACH CONTRACTOR OR SUBCONTRACTOR SHALL KEEP ONE (1) COMPLETE SET OF THE CONTRACT WORKING DRAWINGS ON THE JOB SITE ON WHICH HE SHALL REGULARLY RECORD ANY DEVIATIONS OR CHANGES FROM SUCH CONTRACT DRAWINGS MADE DURING CONSTRUCTION.

2. THESE DRAWINGS SHALL RECORD THE LOCATION OF ALL CONCEALED EQUIPMENT, PIPING, ELECTRIC SERVICE, SEWERS, WASTES, VENTS, DUCTS, CONDUIT AND OTHER PIPING, BY MEASURED DIMENSIONS TO EACH SUCH ITEM FROM READILY IDENTIFIABLE AND ACCESSIBLE WALLS OR CORNERS OF THE BUILDING. PLANS ALSO SHALL SHOW INVERT ELEVATION OF SEWERS AND TOP ELEVATION OF ALL OTHER BELOW-GRADE LINES.

3. RECORD DRAWINGS SHALL BE KEPT CLEAN AND UNDAMAGED AND SHALL NOT BE USED FOR ANY PURPOSE OTHER THAN RECORDING DEVIATIONS FROM WORKING DRAWINGS AND EXACT LOCATIONS OF CONCEALED WORK.

4. AFTER THE PROJECT IS COMPLETED, THESE SETS OF DRAWINGS SHALL BE DELIVERED TO THE ARCHITECT IN GOOD CONDITION, AS A PERMANENT RECORD OF THE INSTALLATION AS ACTUALLY CONSTRUCTED.

H. FIRESTOPPING

1. ALL SERVICES THAT PASS THRU FIRE OR SMOKE RATED PARTITIONS, WALLS, FLOORS, SHALL BE FIRESTOPPED. FIRE STOPPING RATING SHALL MATCH PARTITION RATING. ALL FIRE STOPPING SYSTEM SHALL MEET THE REQUIREMENTS OF ASTM E 814,UL 1479, AND BE FACTORY MUTUAL APPROVED.

2. ALL FIRESTOPPING AND/OR SMOKE STOPPING MATERIAL AND INSTALLATION SHALL BE AS MANUFACTURED BY HILTI OR APPROVED EQUAL.

I. ACCESS DOORS & PANELS

1. ACCESS DOORS SHALL BE PROVIDED IN WALLS AND CEILINGS WHERE REQUIRED TO PERMIT PROPER ACCESS TO VALVES AND ANY OTHER SUCH DEVICES WHICH REQUIRE MAINTENANCE OR SERVICE. DOORS PLACED IN WALLS, PARTITIONS OR OTHER FIRE-RATED CONSTRUCTION SHALL HAVE A LABEL SIGNIFYING THAT THE DOOR HAS THE SAME FIRE RATING AS THE FIRE-RATED CONSTRUCTION.

2. THIS CONTRACTOR SHALL FURNISH ACCESS PANELS TO THE GENERAL CONTRACTOR FOR INSTALLATION.

3. ACCESS PANELS SHALL BE CONSTRUCTED OF 14 GAUGE STEEL, WITH 16 GAUGE STEEL FRAMES. DOORS SHALL FINISH FLUSH WITH THE SURROUNDING SURFACE. FRAMES SHALL HAVE 3 INCH WIDE EXPANDED METAL FOR PLASTERED SURFACES AND PLAIN FLANGED TYPE FRAME FOR TILE, MASONRY OR GYPSUM BOARD SURFACES. DOORS AND FRAMES SHALL BE FURNISHED PRIME COATED. DOORS INSTALLED IN CERAMIC TILE OR OTHER NON-PAINTED SURFACES SHALL BE STAINLESS STEEL. HINGES SHALL BE CONCEALED SPRING TYPE, TO ALLOW DOORS TO BE OPENED 175 DEGREES. LOCKS SHALL BE FLUSH SCREWDRIVER TYPE WITH STEEL CAMS. ACCESS PANELS SHALL BE 16 INCHES BY 16 INCHES OR LARGER AS MAY BE REQUIRED FOR PROPER ACCESS TO THE DEVICE BEING SERVED.

4. ACCESS PANELS ARE NOT REQUIRED IN COMPLETELY ACCESSIBLE LIFT OUT TILE CEILINGS. CONTRACTOR SHALL REVIEW THE ROOM FINISH SCHEDULE ON THE ARCHITECTURAL DRAWINGS IN ORDER TO VERIFY THE NEED FOR ACCESS PANEL

J. PAINTING

1. IN FINISHED SPACES, PAINTING OF ALL MECHANICAL EQUIPMENT, APPARATUS, AND PIPING SHALL BE DONE BY THE PAINTING TRADE UNDER THE GENERAL CONTRACTOR SPECIFICATION, EXCEPT WHERE SPECIFIED TO BE DONE BY THE MECHANICAL CONTRACTOR.

K. TEMPORARY HEAT

1. THE COSTS OF TEMPORARY HEAT, INCLUDING UTILITY COSTS, SHALL BE AT THE EXPENSE OF THE HEATING TRADE (MECHANICAL CONTRACTOR). THE HEATING TRADE SHALL PROVIDE THE MEANS OF TEMPORARY HEAT. EXISTING HEATING EQUIPMENT AND SYSTEMS MAY NOT BE USED DURING CONSTRUCTION AS THE SYSTEMS SERVE OTHER OCCUPIED SPACES WITHIN THE BUILDING.

2. THE PERMANENT MECHANICAL SYSTEM SHALL NOT BE USED UNDER ANY EXCEPTIONS TO PROVIDE TEMPORARY HEATING, VENTILATING, EXHAUST OR AIR CONDITIONING UNTIL THE BUILDING IS CLEAN, WITHOUT ANY DUST OR DEBRIS THAT CAN ENTER THE MECHANICAL SYSTEM AND IS READY FOR OCCUPANCY. COVERING THE RETURN/EXHAUST AIR INLETS WITH FILTER MEDIA IS NOT AN ACCEPTABLE ALTERNATIVE TO HAVING AN ENCLOSED, DUST-FREE ENVIRONMENT FOR THE SYSTEMS TO OPERATE IN. IN NO EVENT SHALL THE MECHANICAL CONTRACTOR'S ONE YEAR WARRANTY BE SHORTENED BY THE USE OF PERMANENT EQUIPMENT FOR TEMPORARY HEAT.

HYDRONIC PIPING (232113)

1. PIPE AND FITTINGS -- HYDRONIC PIPING 2" AND SMALLER SHALL BE:
   - 1.1. 1) TYPE "L" HARD COPPER TUBING ASTM B 88-832 WITH SWEATED JOINTS PER ASTM B 16.22 USING 95/5 OR ANTIMONY SOLDER OR "PRESS-FIT" MECHANICAL JOINTING. ALL FITTINGS SHALL BE MADE FROM WROUGHT COPPER.
   - 1.2. 2) SCHEDULE 40 STEEL PIPING WITH VICTAULIC PLAIN END QUICKVIC SD (R) FITTINGS. FITTINGS SHALL BE MADE FROM DUCTILE IRON. PROVIDE SCREWED UNIONS OR GROOVED FITTINGS AT FINAL CONNECTIONS TO EQUIPMENT TO ALLOW DISCONNECTION FOR REPAIR OR SERVICING.

2. PIPING 2 -1/2" AND LARGER SHALL BE SCHEDULE 40, WELDED BLACK STEEL (ASTM A53) WITH BLACK WROUGHT STEEL, BUTT WELDING TYPE (ASTM B16.9) FITTINGS, OR SCHEDULE 40 GROOVED BLACK STEEL (ASTM A53) WITH GROOVED FITTINGS MADE BY VICTAULIC, OR APPROVED EQUAL, MAY BE USED.

3. GROOVED JOINTS QUALITY ASSURANCE: GROOVED JOINTS SHALL BE VISUALLY VERIFIABLE TO ENSURE PROPER INSTALL PER MANUFACTURER'S INSTALLATION INSTRUCTIONS. IF WRITTEN MANUFACTURER'S INSTRUCTIONS REQUIRE A VERIFIED TORQUE RATHER THAN A VISUAL VERIFICATION, A TORQUE LOG OF EVERY COUPLING SHALL BE PROVIDED FOR APPROVAL TO THE ENGINEER AND OWNER TO VERIFY PROPER INSTALL.

4. BALL VALVES --- UP TO 2": BRONZE TWO PIECE BODY, STAINLESS STEEL BALL, TEFLON SEATS AND BLOW-OUT PROOF STUFFING BOX RING, LEVER HANDLE, AND BALANCING STOPS, UNION SOLDER ENDS. ACCEPTABLE MANUFACTURERS: APOLLO, LEGEND VALVE, VICTAULIC, OR WATTS.

5. BUTTERFLY VALVES -- BUTTERFLY VALVES SHALL BE BRAY MODEL 31 OR EQUAL WITH DUCTILE IRON LUG STYLE BODY, OR VICTAULIC WITH GROOVED CONNECTIONS, BRONZE DISC, 416 STAINLESS STEEL SHAFT, BRONZE BEARINGS, "EPDM" RUBBER SEAT, LEVER HANDLE OPERATORS AND SHALL BE RATED AT 175 POUNDS CWP. VALVES SHALL PROVIDE DEAD TIGHT SHUTOFF CAPABILITY IN EITHER DIRECTION UP TO 150 PSI WHEN THE DOWNSTREAM FLANGES ARE REMOVED.

6. VENT AND DRAIN VALVES -- ALL WATER PIPING SYSTEMS SHALL BE INSTALLED IN SUCH A MANNER THAT THEY CAN BE COMPLETELY VENTED AND DRAINED. UNLESS OTHERWISE NOTED, PROVIDE AT ALL HIGH POINTS WHERE AIR CAN COLLECT 1/4" BRASS COMPRESSION VENT COCKS, AND AT ALL LOW POINTS ½" BALL VALVES WITH HOSE BIB ENDS AND CAPS.

7. PRESSURE/TEMPERATURE PLUGS -- PROVIDE SISCO OR PETERSON 1/4_INCH NPT FITTING OF SOLID BRASS, FOR 1/8" O.D. PROBE. VALVE CORE SHALL BE NEOPRENE FOR TEMPERATURE TO 200 F, AND RATED FOR ZERO LEAKAGE FROM VACUUM TO 1,000 PSIG. PROVIDE TEST KIT CONSISTING OF TWO PRESSURE GAGES WITH PROBES AND 2 DIAL THERMOMETERS WITH CARRYING CASE.

8. STRAINERS -- Y-PATTERN, BODY: ASTM A 126, CLASS B CAST IRON, WITH BOLTED OR SCREWED COVER AND BOTTOM DRAIN CONNECTION. END CONNECTIONS: THREADED ENDS FOR STRAINERS NPS 2 AND SMALLER; FLANGED ENDS FOR STRAINERS NPS 2-1/2 AND LARGER. STRAINER SCREEN: STAINLESS-STEEL, 20-MESH STRAINER, OR PERFORATED STAINLESS-STEEL BASKET. WITH TAPPED BLOWOFF PLUG. RATING: 150-PSIG WORKING PRESSURE.

9. BALANCING VALVES -- PROVIDE VICTAULIC MULTI-TURN BALANCING VALVES WHERE SHOWN IN PIPING DETAILS ON THE DRAWINGS. VALVES SHALL BE OF BRONZE CONSTRUCTION (½" TO 2" SIZES) WITH EPDM SEATS/SEALS. VALVES SHALL HAVE DIFFERENTIAL PRESSURE READOUT PORTS, CONCEALED LOCKABLE MEMORY STOP, CALIBRATED NAMEPLATE AND DRAIN PORT. EACH VALVE SHALL HAVE POSITIVE SHUTOFF AND SHALL BE CONSTRUCTED FOR 300 PSIG RATED PRESSURE.

10. AUTOMATIC BALANCING VALVES -- PROVIDE VICTAULIC AUTOMATIC BALANCING VALVES, OR APPROVED EQUAL, WHERE SHOWN IN PIPING DETAILS ON DRAWINGS. VALVES SHALL HAVE BRASS BODIES AND CHANGEABLE FLOW CARTRIDGES.

11. PROVIDE VALVES AND UNIONS WHERE NEEDED TO PERMIT DISCONNECTIONS OF EACH PIECE OF EQUIPMENT FOR REPAIRS. MAKE CONNECTIONS TO EQUIPMENT WITH SHUT-OFF VALVES ON SUPPLY AND BALANCE VALVES ON RETURNS. INSTALL UNIONS IN PIPES 2" AND SMALLER, ADJACENT TO EACH VALVE, AT FINAL CONNECTIONS EACH PIECE OF EQUIPMENT, AND ELSEWHERE AS INDICATED. UNIONS ARE NOT REQUIRED ON FLANGED DEVICES.

12. CONNECTIONS BETWEEN DISSIMILAR PIPING MATERIALS SHALL BE MADE WITH SUITABLE DIELECTRIC INSULATING UNIONS. ISOLATE COPPER PIPING FROM DISSIMILAR METALS, SUCH AS METAL STUDS AND VENT PIPING.

13. CLOSED SYSTEM WATER TREATMENT -- FILL SYSTEM WITH WATER AND LOW FOAM DETERGENT TO REMOVE DIRT AND SCALE, CIRCULATE UNTIL SYSTEM IS CLEAN AND FLUSH UNTIL WATER IS CLEAR AND REFILL WITH CLEAN WATER . ADD CORROSION AND RUST INHIBITORS. CHECK PH AND ADD CHEMICALS TO ADJUST PH PER MANUFACTURER'S INSTRUCTIONS. PROVIDE CHEMICAL POT FEEDER AND PIPE ACROSS SYSTEM. PROVIDE CHEMICAL TO TREAT SYSTEM FOR ONE YEAR. RECHECK AFTER ONE YEAR AND ADD CHEMICAL AS NEEDED FOR PROPER CHEMICAL TREATMENT.

14. PROVIDE CONDENSATE DRAIN FOOR ALL COOLING COILS. ALL CONDENSATE DRAINS SHALL BE TRAPPED PER THE COOLING COIL TRAP DETAIL OR MANUFACTURERS RECOMMENDATIONS, WHICH EVER IS MORE STRINGENT/DEEPER. PROVIDE CLEANOUT.

15. CONDENSATE DRAIN PIPING IN RETURN AIR RATED PLENUMS SHALL BE TYPE L COPPER WITH 1/2" FIBERGLASS INSULATION (MIN. R-VALUE = 3). SCHEDULE 40 PVC WITHOUT INSULATION MAY BE USED IN ALL OTHER LOCATIONS.

16. WHERE DAMAGE TO ANY BUILDING COMPONENT COULD OCCUR AS A RESULT OF OVERFLOW OR STOPPAGE OF THE PRIMARY CONDENSATE DRAIN SYSTEM, PROVIDE UL 508 WATER-LEVEL DETECTION DEVICE IN THE PRIMARY DRAIN PAN, OVERFLOW OUTLET OR IN A SECONDARY DRAIN PAN PER IMC REQUIREMENTS. COOLING SYSTEM SHALL DISABLE UPON DETECTION OF WATER AND GENERATE A BAS ALARM(IF APPLICABLE).

REFRIGERANT PIPING (232300)

1. INSTALL REFRIGERANT PIPING BETWEEN CONDENSING UNIT AND DX COIL. PIPING SHALL BE REFRIGERANT GRADE TYPE ACR COPPER WITH BRAZED JOINTS. PIPE PER MANUFACTURER'S PIPING DIAGRAMS AND RECOMMENDATIONS.

2. ISOLATE PIPING FROM STRUCTURE WITH ONE (1) INCH INSULATION BETWEEN ALL PIPING AND SUPPORT POINTS.

3. AFTER COMPLETION, PRESSURE TEST PIPING, PURGE WITH NITROGEN AND EVACUATE SYSTEM TWICE AND CHARGE SYSTEM WITH REFRIGERANT AND OIL.

4. INSTALL PIPING IN AS SHORT AND DIRECT ARRANGEMENT AS POSSIBLE TO MINIMIZE PRESSURE DROP. PROVIDE OIL TRAPS OR DOUBLE RISERS AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER.

5. INSTALL UNIONS TO ALLOW REMOVAL OF SOLENOID VALVES, PRESSURE REDUCING VALVES, EXPANSION VALVES, AND AT CONNECTIONS TO COMPRESSORS AND EVAPORATORS.

6. FILL THE PIPE AND FITTINGS WITH NITROGEN DURING BRAZING TO PREVENT FORMATION OF SCALE.

PIPE WALL SEALS (230517)

1. WALL PIPE SEALS WITH RUBBER LINKS SHALL BE THUNDERLINE LINK SEAL, OR APPROVED EQUAL. WALL PIPE SEALS WITH INORGANIC MATERIAL LINKS THE PENETRATIONS OF FIRE RATED WALLS SHALL BE THUNDERLINE PYRO-PAC, OR APPROVED EQUAL.

2. SEALS SHALL BE MODULAR MECHANICAL TYPE CONSISTING OF INTERLOCKING SYNTHETIC RUBBER OR INORGANIC MATERIAL LINKS SHAPED TO CONTINUOUSLY FILL THE ANNULAR SPACE BETWEEN THE PIPE AND WALL OPENING. LINKS SHALL BE LOOSELY ASSEMBLED WITH BOLTS TO FORM A CONTINUOUS BELT AROUND THE PIPE. A PRESSURE PLATE SHALL BE PROVIDED UNDER THE BOLT HEAD AND NUT OF EACH LINK. SEALS SHALL BE CONSTRUCTED TO PROVIDE ELECTRICAL INSULATION BETWEEN THE PIPE AND SLEEVE, THUS REDUCING CHANCES OF CATHODIC REACTION BETWEEN THESE TWO MEMBERS.

3. AFTER THE SEAL ASSEMBLY IS POSITIONED IN THE SLEEVE, THE TIGHTENING OF THE BOLTS SHALL CAUSE THE SEALING ELEMENTS TO EXPAND AND PROVIDE AN ABSOLUTELY WATER-TIGHT SEAL BETWEEN THE PIPE AND SLEEVE.

4. SLEEVES SHALL BE MANUFACTURED FROM HEAVY-WALL, WELDED OR SEAMLESS STEEL PIPE. A FULL CIRCLE CONTINUOUSLY WELDED WATER STOP PLATE SHALL BE PROVIDED TO ASSURE POSITIVE WATER SEALING OF THE SLEEVE. SLEEVE SHALL BE PROTECTED BY A COATING OF ENRICHED RED PRIMER.

DUCTWORK (233113)

1. FABRICATE AND ERECT ALL DUCTWORK TO ASHRAE AND SMACNA STANDARDS FROM G90 GALVANIZED STEEL. COMPLY WITH NFPA BULLETIN 90A REQUIREMENTS.

2. SUPPLY DUCTWORK UPSTREAM OF TERMINAL UNITS AND WITHIN 15' OF ANY AHU FAN OUTLET SHALL HAVE A SMACNA 3" STATIC PRESSURE RATING WITH SEAL CLASS A SEAMS AND JOINTS.

3. GENERAL SUPPLY AND RETURN DUCTWORK HAVE A SMACNA 2" STATIC PRESSURE RATING WITH SEAL CLASS B SEAMS AND JOINTS.

4. OUTDOOR AIR INTAKE DUCTWORK SHALL HAVE A SMACNA 2" STATIC PRESSURE RATING WITH SEAL CLASS A SEAMS AND JOINTS.

5. ALL EXPOSED ROUND AND OVAL DUCTWORK IN SHALL HAVE SPIRAL LOCKSEAM CONSTRUCTION.

6. ALL RECTANGULAR TRANSFER DUCTWORK SHALL HAVE 1" THICK ACOUSTICAL LINER. LINER SHALL BE FLEXIBLE AND CONSTRUCTED OF GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. THE SURFACE OF THE LINER SHALL HAVE AN ANTIMICROBIAL EROSION RESISTANCE COATING TESTED BY NRTL AND REGISTERED BY THE EPA FOR USE IN HVAC SYSTEMS. MINIMUM R-VALUE SHALL BE 4.2.

7. INCLUDE ALL ACOUSTIC, DOUBLE RADIUS AIRFOIL SHAPED PERFORATED ALUMINUM TURNING VANES, MANUAL DAMPERS, FLEXIBLE CONNECTORS, GRILLES AND DIFFUSERS, ACOUSTIC LINING, AND OTHER SHEET METAL ACCESSORIES FOR THE PROJECT. VOLUME DAMPERS TO BE OF OPPOSED BLADE TYPE CONSTRUCTED IN ACCORDANCE WITH "SMACNA" STANDARDS.

8. ALL BRANCH CONNECTION FITTINGS IN RECTANGULAR DUCTWORK SHALL BE 45 DEGREE TRANSITION TYPE, CONICAL FITTINGS OR SPIN-IN FITTINGS. BUTT FITTINGS ARE NOT ACCEPTABLE.

9. PROVIDE FIRE DAMPERS WITH ACCESS DOORS AT ALL FIRE RATED WALLS, PARTITIONS AND CEILINGS. DAMPERS SHALL HAVE RATING EQUIVALENT TO BARRIER. DAMPER SHALL BE THE DYNAMIC TYPE AND SHALL BE ABLE TO CLOSE AGAINST AN AIRSTREAM. DAMPERS SHALL MEET ALL NFPA, IBC, AND UL 555 REQUIREMENTS.

10. PROVIDE COMBINATION FIRE/SMOKE DAMPERS AT ALL FIRE AND/OR SMOKE RATED SHAFT AND WALL LOCATIONS. EACH COMBINATION FIRE SMOKE DAMPER SHALL HAVE 16 GA. GALVANIZED BLADES STRENGTHENED WITH GROOVES MEETING REQUIREMENTS OF UL STANDARD 555 & 555S AND HAVE AN 1-1/2 HOUR RATING. BASIS OF DESIGN SHALL BE GREENHECK MODEL FSD 200 SERIES. DAMPERS SHALL BE EQUIPPED STANDARD WITH AN ELECTRIC HEAT-RESPONSIVE DEVICE THAT PERFORMS THE SAME FUNCTION AS A FUSIBLE LINK TO CLOSE DAMPER AT 350 °F. THE DAMPER OPERATION AND CONSTRUCTION SHALL MEET UL 555 REQUIREMENTS.

11. PROVIDE CURBS FOR ALL ROOF OPENINGS FOR DUCTS, FLUES, PIPING AND EQUIPMENT. CURBS SHALL BE FURNISHED AS ACCESSORIES TO THE EQUIPMENT OR 8" HIGH PATE OR EQUAL EQUIPMENT SUPPORTS SPANNING STRUCTURE AND FLASHED INTO ROOFING. ALL CUTTING, FLASHING, AND PATCHING OF ROOF SHALL BE BY OWNER'S ROOFING CONTRACTOR AND PAID FOR BY MECHANICAL CONTRACTOR.

DUCTWORK EXTERNAL INSULATION & PIPE INSULATION (230713, 230719)

1. INSULATE DUCTWORK AS DESCRIBED IN DUCTWORK INSULATION SCHEDULE. FIBERGLASS DUCT WRAP SHALL BE FULLY SECURED TO DUCT. LAP AND TAPE SEAMS AND SECURE TIGHTLY TO THE DUCTS WITH WIRE OR STICK PINS.

2. DO NOT INSULATE:
   - 2.1. MAKE-UP AIR DUCTWORK OPERATING AT SURROUNDING AMBIENT CONDITIONS.
   - 2.2. RETURN AND EXHAUST AIR DUCTWORK LOCATED WITHIN THE BUILDING ENVELOPE. (DOES NOT INCLUDE BUILDING SHAFTS.)
   - 2.3. TRANSFER AIR DUCTWORK (ACOUSTICALLY LINE DUCT, CLEAR INSIDE DIMENSIONS SHOWN ON PLANS)
   - 2.4. EXPOSED SUPPLY DUCTWORK LOCATED IN CONDITIONED SPACE. (DOES NOT INCLUDE RETURN AIR PLENUM)
   - 2.5. PHENOLIC DUCTWORK

3. INTERNAL DUCT INSULATION -- DUCTWORK INDICATED TO HAVE INTERNAL INSULATION SHALL BE INTERNALLY COVERED WITH 1" THICK FIBERGLASS INSULATION MANUFACTURED FROM A ROTARY PROCESS WITH A NON-WOVEN HYDROPHOBIC FACING. FOR DUCTWORK LOCATED OUTDOORS USE INSULATION AS ABOVE THAT IS 2" THICK. INSULATION SHALL HAVE AN "R" RATING OF 4.2 FOR 1" THICK INSULATION AND R-8 FOR 2" THICK INSULATION. INSULATION SHALL HAVE FLAME/SMOKE RATING OF 25/50. INSULATION SHALL WITHSTAND DUCT VELOCITIES OF 4000 FPM MINIMUM. DUCT SIZES SHOWN ON DRAWINGS ARE CLEAR INTERNAL DIMENSIONS. WHERE LINER IS USED, INCREASE OUTSIDE DIMENSIONS OF DUCT TO MAINTAIN INTERNAL DIMENSIONS. INSTALL LINER PER SMACNA OR NAIMA STANDARDS.

4. HYDRONIC PIPING TO BE INSULATED AS DESCRIBED IN PIPING INSULATION SCHEDULE. PROVIDE SECTIONAL GLASS FIBER PIPE INSULATION HAVING FACTORY APPLIED WHITE "ALL SERVICE" JACKET. LONGITUDINAL FLAPS SHALL BE SELF-SEALING TYPE ADDITIONALLY SECURED WITH NONFERROUS FLARE DOOR STAPLES SPACED 6" ON CENTERS. END JOINTS SHALL BE CLOSED WITH 4" WIDE SELF-SEALING TAPE STAPLED IN PLACE. ALL FITTINGS TO BE FINISHED WITH PRE_MOLDED ONE-PIECE ZESTON TYPE PVC COVERS WITH FIBERGLASS INSULATION INSIDE. SEAL ALL VISIBLE RAW FIBERGLASS WITH BENJAMIN FOSTER #3036 WHITE MASTIC.

5. INSULATE REFRIGERANT PIPING LINES AS DESCRIBED IN PIPING INSULATION SCHEDULE WITH ELASTOMERIC FOAM INSULATION WITH SELF-SEALING SEAM. ARMACELL - AP ARMAFLEX SS INSULATION. PAINT CLOSED CELL INSULATION OUTDOORS WITH TWO COATS OF UV RESISTANT PAINT PER MANUFACTURER'S RECOMMENDATIONS. USE PRE-MOLDED COVERS OVER FITTINGS, VALVES, ELBOWS AND CONTROL DEVICES SEALED VAPOR TIGHT.

6. INSULATION SHALL BE OMITTED FROM HOT SYSTEM VALVE BODIES STRAINERS AND UNIONS. SYSTEMS OPERATING BELOW AMBIENT TEMPERATURE SHALL HAVE ALL VALVE BODIES AND PIPING SPECIALTIES FULLY INSULATED. ALL VALVE BODIES, STRAINERS, UNIONS, PUMP CASING, WATER SEPARATORS, ETC. IN COLD PIPING SHALL BE COVERED SAME AS PIPING SYSTEM. PIPE HANGERS ON INSULATED PIPE SHALL BE OUTSIDE OF THE INSULATION, SIZED ACCORDINGLY AND WITH SADDLE INSERT SUFFICIENT TO PROTECT INSULATION FROM CRUSHING.

7. ALL INSULATION TO BE APPLIED IN FULL ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. ALL INSULATION SHALL COMPLY WITH 25/50 FLAME AND SMOKE HAZARD RATINGS PER ASTM E-84, NFPA 255 AND UL 723.

8. PROVIDE REMOVABLE INSULATION SECTIONS TO COVER PARTS OF EQUIPMENT WHICH MUST BE OPENED PERIODICALLY FOR MAINTENANCE; INCLUDE METAL VESSEL COVERS, FASTENERS, FLANGES, CHILLED WATER PUMPS, FRAMES AND ACCESSORIES.

9. REPLACE DAMAGED INSULATION WHICH CANNOT BE REPAIRED SATISFACTORILY, INCLUDING UNITS WITH VAPOR BARRIER DAMAGE AND MOISTURE SATURATED UNITS.

10. CONDENSATE DRAIN PIPING IN RETURN AIR RATED PLENUMS SHALL BE TYPE L COPPER WITH 1/2" FIBERGLASS INSULATION (MIN. R-VALUE = 3). SCHEDULE 40 PVC WITHOUT INSULATION MAY BE USED IN ALL OTHER LOCATIONS.

HANGERS AND SUPPORTS (230529)

1. SUPPORT ALL PIPING FROM STRUCTURE WITH UL LISTED HANGERS AND SUPPORTS SUITABLE FOR THE INTENDED INSTALLATION. DESIGN, SELECTION, SPACING, AND APPLICATION OF HANGERS AND SUPPORTS SHALL COMPLY WITH ANSI B31.1 AND MSS SP-69. HANGERS SHALL BE MANUFACTURED BY PENTAIR., OR APPROVED EQUAL. BLACK OR GALVANIZED STEEL PIPE = MODEL NO. 100, CAST IRON PIPE = MODEL NO. 400, COPPER TUBING = MODEL NO. 102-A.

2. CONTRACTOR SHALL PROVIDE INSULATION HANGER WITH PROTECTIVE SHIELDS, SUCH AS PENTAIR, MODEL NO. 125, OR APPROVED EQUAL FOR ALL INSULATED PIPING.

3. CONTRACTOR SHALL PROVIDE RISER CLAMPS FOR VERTICAL PIPING AT EACH LEVEL. RISER CLAPS SHALL BE PENTAIR MODEL NO. 510 FOR STEEL PIPING AND MODEL NO. 511 FOR COPPER TUBING OR APPROVED EQUAL. USE "SHORT-END" RISER CLAMPS WHERE SPACE IS LIMITED.

4. CONTRACTOR SHALL PROVIDE SIDE BEAM CLAMPS FOR SUPPORTING PIPING FROM STRUCTURAL STEEL MEMBERS. BEAM CLAMPS SHALL BE MANUFACTURED BY PENTAIR, MODEL 300 OR APPROVED EQUAL.

5. WHERE OTHER MEANS OF SUPPORT PIPING ARE REQUIRED OR DESIRED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE ENGINEER'S APPROVAL PRIOR TO INSTALLING THOSE SUPPORTS.

6. HANGERS AND SUPPORTS SHALL BE SPACED AT INTERVALS WHICH WILL PREVENT SAGGING AND REDUCE STRAIN ON VALVES AND SPECIALTIES. HANGER SPACING SHALL BE NO GREATER AND ROD SIZE SHALL BE NO SMALLER THAN THAT SHOWN IN THE FOLLOWING TABLE. HANGERS SHALL ALLOW FOR EXPANSION AND CONTRACTION. HANGER SHALL BE PROVIDED AT EACH CHANGE OF DIRECTION.

7. RISER CLAMPS SHALL BE INSTALLED ABOVE THE FLOOR AT EACH LEVEL. RISER CLAMPS MAY BE SUSPENDED BELOW FLOOR LEVEL, WITH HANGER RODS AND INSERTS, WHERE THE INSTALLATION OF ESCUTCHEON PLATES IS REQUIRED.

EQUIPMENT (235000)

1. MAKE ALL FINAL EQUIPMENT CONNECTIONS AND PROVIDE THE NECESSARY ADAPTORS, FITTINGS, VALVES, DEVICES, ETC. FOR A COMPLETE AND OPERABLE SYSTEM. PROVIDE COMPLETE WITH BASES, ISOLATORS, SUPPORTS AND OTHER REQUIRED ACCESSORIES.

2. EQUIPMENT SHALL BE INSTALLED IN FULL ACCORDANCE WITH THE MANUFACTURER'S DATA AND INSTALLATION INSTRUCTIONS, INCLUDING CLEARANCES; LUBRICATE AND ADJUST AS REQUIRED. IT IS THIS CONTRACTOR'S RESPONSIBILITY TO CHECK AND CONFORM TO THESE REQUIREMENTS PRIOR TO STARTING WORK. FURNISH AND INSTALL CLEAN SET OF FILTERS PRIOR TO BALANCING.

3. THE CONTRACTOR SHALL COORDINATE ELECTRICAL CHARACTERISTICS OF ALL MECHANICAL EQUIPMENT PRIOR TO ORDERING OF EQUIPMENT. COORDINATE REQUIREMENT FOR PROVISION OF MOTOR STARTERS, DISCONNECTS, CONTACTORS, CONTROL WIRING, ETC. AS REQUIRED FOR PROPER FUNCTIONING SYSTEM WITH ELECTRICAL CONTRACTOR. NO ADDITIONAL PAYMENT WILL BE MADE FOR LACK OF CONTRACTOR COORDINATION OF ELECTRICAL CHARACTERISTICS.

4. ALL FLOOR MOUNTED EQUIPMENT SHALL BE INSTALLED ON CONCRETE HOUSEKEEPING PADS. MINIMUM PAD THICKNESS SHALL BE NOMINAL 4". PAD SHALL EXTEND BEYOND THE EQUIPMENT A MINIMUM OF 4" ON EACH SIDE. CONCRETE PADS SHALL BE PROVIDED BY THIS CONTRACTOR. IT SHALL BE THE RESPONSIBILITY OF THE THIS CONTRACTOR TO COORDINATE THE SIZE AND LOCATION OF THE CONCRETE HOUSEKEEPING PADS WITH THE GENERAL CONTRACTOR.

5. ALL EQUIPMENT SHALL BE MOUNTED ON VIBRATION ISOLATORS TO PREVENT THE TRANSMISSION OF VIBRATION AND MECHANICALLY TRANSMITTED SOUND TO THE BUILDING STRUCTURE.

6. ISOLATION EQUIPMENT SHALL BE THE PRODUCT OF A SINGLE MANUFACTURER, AND SHALL BE DESIGNED SPECIFICALLY FOR THE APPLICATION REQUIRED. THIS INCLUDES, BUT IS NOT LIMITED TO, PIPING DUCTWORK, PUMPS, COMPRESSORS. VIBRATION ISOLATORS SHALL BE RATED FOR THE WEIGHT AND SPACING REQUIRED FOR THE EQUIPMENT REQUIRING ISOLATION.

7. PROVIDE CURBS FOR ALL ROOF OPENINGS FOR DUCTS, FLUES, PIPING AND EQUIPMENT. CURBS SHALL BE FURNISHED AS ACCESSORIES TO THE EQUIPMENT OR 8" HIGH PATE OR EQUAL EQUIPMENT SUPPORTS SPANNING STRUCTURE AND FLASHED INTO ROOFING. ALL CUTTING, FLASHING, AND PATCHING OF ROOF SHALL BE BY OWNER'S ROOFING CONTRACTOR AND PAID FOR BY MECHANICAL CONTRACTOR.

CONTROLS (230910)

1. PROVIDE COMPLETE TEMPERATURE CONTROLS FOR ALL HVAC SYSTEMS. PROVIDE NEW CONTROL DEVICES INCLUDING DAMPER OPERATORS, TEMPERATURE SENSORS, STAGING RELAYS AND OTHER REQUIRED DEVICES TO PROVIDE A COMPLETE OPERATIONAL SYSTEM PER THE FOLLOWING OPERATING SEQUENCE. MOUNT ALL CONTROLS FURNISHED AS ACCESSORIES TO EQUIPMENT AND PROVIDE ALL CONTROL WIRING REQUIRED FOR PROPER OPERATION WHERE NOT SPECIFICALLY SHOWN ON ELECTRICAL PLANS. ALL WIRING SHALL BE IN CONDUIT OR PER N.E.C. AND LOCAL CODE REQUIREMENTS. STANDARD MOUNTING HEIGHT TO TOP OF THERMOSTAT IS 48" ABOVE FINISHED FLOOR OR AS INDICATED ON THE ARCHITECTURAL DRAWINGS. DO NOT INSTALL THERMOSTATS NEAR DIMMER SWITCHES. WIRING OF ALL MOTORIZED OPERATORS AND THERMOSTATS (REGARDLESS OF VOLTAGE) ARE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR.

2. IT SHALL BE THE RESPONSIBILITY OF THE BAS CONTRACTOR TO PROVIDE ALL THE REQUIRED LABOR AND PROGRAMMING TO SEAMLESSLY INTEGRATE THE NEW BAS BACNET SYSTEM AND ITS DDC POINTS, GRAPHICS, ALARMS, ETC. INTO AN EXISTING BAS IF PRESENT.

3. THE CONTROLS CONTRACTOR SHALL WARRANT THE SYSTEM FOR 24 MONTHS AFTER SUBSTANTIAL COMPLETION. DURING THE WARRANTY PERIOD, THE BUILDING SYSTEM CONTRACTOR SHALL BE RESPONSIBLE FOR ALL NECESSARY REVISIONS TO THE SOFTWARE AS REQUIRED TO PROVIDE A COMPLETE AND WORKABLE SYSTEM CONSISTENT WITH THE LETTER AND INTENT OF THE SEQUENCE OF OPERATION SECTION OF THE SPECIFICATION.

4. THE FOLLOWING ARE THE APPROVED BAS MANUFACTURERS:
   - DISTECH CONTROLS BY TRINITY AUTOMATED SOLUTIONS (INCUMBENT CONTROLS PROVIDER)

5. THE CONTROL SYSTEM SHALL BE PROGRAMMED WITH THE FOLLOWING SEQUENCES AND FEATURES:
   - 5.1. CONTROLS SYSTEM SHALL UTILIZE THE ESTABLISHED SEQUENCES ALREADY IN USE BY THE SCHOOL DISTRICT. THE NEW EQUIPMENT SHALL FOLLOW THE ESTABLISHED OCCUPANCY SCHEDULES AND TEMPERATURES.
   - 5.2. IF ADDITIONAL SEQUENCES ARE NEEDED, PLEASE SUBMIT AN RFI TO HAVE THEM CREATED.

IDENTIFICATION (230593)

1. CONTRACTOR SHALL PROVIDE IDENTIFICATION LABELS, TAGS, ETC. AS INDICATED ON THE DRAWINGS AND AS SPECIFIED HEREIN.THE IDENTIFICATION SHALL BE IN ACCORDANCE WITH ANSI STANDARD A13.1. PRESSURE SENSITIVE MARKERS SHALL BE MANUFACTURED BY THE BRADY CO., OR APPROVED EQUAL. MARKERS SHALL BE MANUFACTURER'S STANDARD PRODUCT. PRESSURE SENSITIVE PIPE MARKERS SHALL BE MANUFACTURED BY THE BRADY CO., OR APPROVED EQUAL. PIPE MARKERS SHALL BE MANUFACTURER'S STANDARD PRODUCT.

MOTOR CONTROLLERS (230513)

1. UNLESS OTHERWISE INDICATED, EVERY MOTOR NOT SPECIFIED TO BE PROVIDED WITH A CONTROLLER AT THE FACTORY SHALL BE PROVIDED WITH A CONTROLLER AS SPECIFIED HEREIN. CONTROLLERS SHALL BE FURNISHED BY THIS CONTRACTOR. INSTALLATION OF ALL CONTROLLERS SHALL BE BY THE ELECTRICAL CONTRACTOR.

2. MOTOR CONTROLLERS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF NEMA STANDARD IC-1, INDUSTRIAL CONTROL AND BE HEAVY DUTY CONSTRUCTION. CONTROLLER SIZES SHALL BE VERIFIED TO BE COMPATIBLE WITH HORSEPOWER OF THE MOTOR. CONTROLLERS SHALL BE MANUFACTURED BY ALLEN-BRADLEY CO., GENERAL ELECTRIC, CUTLER-HAMMER OR APPROVED EQUAL.

3. MANUAL MOTOR STARTERS:
   - a. SWITCHES SHALL BE TUMBLER-SWITCH STYLE. THE MANUAL MOTOR STARTERS SHALL PROVIDE OVERLOAD PROTECTION WHICH CLOSELY FOLLOWS THE MOTOR LOAD. MANUAL MOTOR STARTERS FOR OUTDOOR USE SHALL BE NEMA TYPE 4X, INDOOR USE SHALL BE NEMA TYPE 1, EXPLOSION PROOF USE SHALL BE NEMA TYPE 7.

4. MAGNETIC MOTOR CONTROLLERS:
   - a. MAGNETIC MOTOR CONTROLLERS SHALL BE PROVIDED AS INDICATED. THEY SHALL NOT BE SMALLER THAN NEMA SIZE 1.
   - b. NON-REVERSING MAGNETIC CONTROLLER SHALL BE UTILIZED TO START FULL VOLTAGE, NON-REVERSING, AC SINGLE SPEED MOTORS. THE CONTROLLERS SHALL BE SIZED FOR THE LOAD UNLESS OTHERWISE INDICATED.
   - c. REVERSING MAGNETIC CONTROLLER SHALL BE UTILIZED TO START FULL VOLTAGE REVERSING, AC SINGLE SPEED MOTORS. THE CONTROLLER SHALL BE SIZED FOR THE LOAD UNLESS OTHERWISE INDICATED. LOCATION OF REVERSING MAGNETIC CONTROLLERS IS INDICATED ON THE DRAWINGS.
   - d. WHERE MULTI-SPEED MOTORS ARE SCHEDULED ON THE DRAWINGS, THE MOTOR CONTROLS SHALL BE COMPATIBLE WITH THE TYPE MOTOR SHOWN.
   - e. OVERLOAD RELAYS SHALL BE SOLID STATE AND BE SUPPLIED IN EACH LEG. OVERLOAD RELAYS SHALL BE MATCHED TO LOAD AND SHALL BE ADJUSTABLE FROM 90% TO 110%. A SINGLE RESET BUTTON SHALL BE MOUNTED ON THE STARTER DOOR TO PERMIT EXTERNAL RESET. RELAYS SHALL BE CONVERTIBLE FROM MANUAL TO AUTOMATIC RESET BY A SIMPLE ADJUSTMENT.
   - f. CONTROL TRANSFORMERS SHALL BE PROVIDED, WHERE REQUIRED. BOTH LEGS OF THE PRIMARY AND ONE LEG OF THE SECONDARY OF THE CONTROL TRANSFORMER SHALL BE PROTECTED BY NEMA CLASS J FUSES. THE OTHER LEG OF THE SECONDARY SHALL BE GROUNDED. CONTROL TRANSFORMER CAPACITY SHALL BE ADEQUATE TO OPERATE ALL CONTROL DEVICES IN THE CIRCUIT. CONTROL VOLTAGE SHALL BE 120V AC UNLESS OTHERWISE SPECIFIED.
   - g. UNLESS OTHERWISE INDICATED, ALL MOTOR STARTERS SHALL BE PROVIDED WITH HAND-OFF-AUTOMATIC (H.O.A.) SWITCH IN THE DOOR. ENCLOSURES FOR MAGNETIC STARTERS SHALL BE NEMA TYPE 1 FOR INDOOR USE NEMA TYPE 4X FOR OUTDOOR USE AND NEMA TYPE 7 FOR EXPLOSION PROOF USE.
   - h. MOTOR CONTROLLERS SHALL BE PROVIDED WITH ALL CONTROL DEVICES, INCLUDING AUXILIARY CONTACTS, REQUIRED FOR EQUIPMENT TO OPERATE AS SPECIFIED.

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER No. PE081572

METZGAR MECHANICAL SPECIFICATIONS

DATE:	XX-XX-XX
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PROJECT NO:	2341083
APPROVED BY:	DCP

DRAWING NO.: **M-1002**

5. COMBINATION MOTOR CONTROLLERS:
   a. COMBINATION MOTOR CONTROLLERS SHALL BE PROVIDED WITH MOLDED CASE MOTOR CIRCUIT PROTECTORS OR MOLDED CASE CIRCUIT BREAKERS AS INDICATED. MOTOR CIRCUIT PROTECTIVE DEVICES SHALL HAVE SHORT CIRCUIT CAPACITY AS REQUIRED. UNIT CONTROL CIRCUIT FUSING SHALL BE PROVIDED. THE MOTOR CIRCUIT PROTECTIVE DEVICE SHALL BE MOUNTED IN THE SAME ENCLOSURE AS THE MAGNETIC CONTROLLER AND SHALL BE OPERABLE BY HAND FROM OUTSIDE THE ENCLOSURE. THE HANDLE SHALL BE SO INTERLOCKED WITH THE DOOR THAT IT MUST BE RETURNED TO THE "OFF" POSITION BEFORE THE DOOR CAN BE OPENED, BUT A COIN-PROOF DEFEAT MECHANISM SHALL BE PROVIDED TO ALLOW AUTHORIZED PERSONNEL TO OPEN THE ENCLOSURE DOOR WITHOUT OPENING THE DISCONNECTING DEVICE. PROVISIONS FOR PADLOCKING THE DISCONNECT HANDLE IN THE "OFF" POSITION SHALL BE MADE. THE ENCLOSURE FOR COMBINATION STARTERS SHALL BE NEMA TYPE 1 FOR INDOOR USE AND NEMA TYPE 4X FOR OUTDOOR USE, AND NEMA TYPE 7 FOR EXPLOSION PROOF USE.
   b. MOTOR CIRCUIT PROTECTORS SHALL BE THE CONTINUOUSLY ADJUSTABLE, INSTANTANEOUS MAGNETIC TRIP TYPE CIRCUIT BREAKER AND SHALL BE SO CONSTRUCTED THAT ALL POLES OPEN, CLOSE AND TRIP SIMULTANEOUSLY.

6. OVERLOAD AND SHORT CIRCUIT PROTECTION:
   a. HEATER ELEMENTS SHALL BE PROVIDED FOR OVERLOAD PROTECTION. MOTOR CIRCUIT PROTECTOR SHALL BE PROVIDED FOR MOTOR SHORT CIRCUIT PROTECTION.

DISCONNECT SWITCHES (230514)

1. THIS CONTRACTOR SHALL FURNISH ALL SAFETY DISCONNECT SWITCHES (FUSED AND NON-FUSED) REQUIRED FOR EQUIPMENT FURNISHED UNDER THIS CONTRACT. IN ADDITION, THIS CONTRACTOR SHALL FURNISH A SAFETY DISCONNECT SWITCH FOR ALL MOTORS AND EQUIPMENT WHICH DO NOT HAVE COMBINATION STARTERS OR INTEGRAL DISCONNECTING MEANS. FUSIBLE DISCONNECT SWITCHES SHALL BE PROVIDED FOR ALL EQUIPMENT RATED FOR USE ONLY WITH FUSES (SUCH AS CONDENSING UNITS, COMPRESSORS, ETC.). SUCH SWITCHES SHALL BE ONE, TWO OR THREE POLE TYPE, WITH SOLID NEUTRAL FOR 4 WIRE SERVICE, AND SHALL HAVE THE PROPER CURRENT AND VOLTAGE RATING AS REQUIRED. INSTALLATION OF ALL DISCONNECT SWITCHES SHALL BE BY THE ELECTRICAL CONTRACTOR.

2. ALL SAFETY SWITCHES SHALL BE NEMA HEAVY DUTY TYPE AND SHALL CARRY THE UNDERWRITERS' LABORATORIES LABEL. FUSIBLE SWITCHES SHALL INCORPORATE CLASS "R" FUSE REJECTION FEATURE AND SHALL BE BRACED TO WITHSTAND 200,000 AMPERE RMS SYMMETRICAL FAULT CURRENT. SAFETY SWITCHES SHALL CONFORM TO FEDERAL SPECIFICATION W-S-865.

3. PROVIDE HEAVY-DUTY TYPE, SHEET ENCLOSED, SAFETY SWITCHES. THE TYPE, SIZE, AND RATING SHALL BE AS INDICATED ON THE DRAWINGS OR AS REQUIRED BY THE MOTOR OR EQUIPMENT SERVED. THE ENCLOSURE FOR DISCONNECT SWITCHES SHALL BE NEMA TYPE 1 FOR INDOOR USE, NEMA TYPE 4X FOR OUTDOOR USE AND NEMA TYPE 7 FOR EXPLOSION PROOF USE. DISCONNECTS SHALL BE MANUFACTURED BY ALLEN-BRADLEY, GENERAL ELECTRIC, CUTLER-HAMMER APPROVED EQUAL.

4. SWITCHES SHALL INCORPORATE QUICK-MAKE, QUICK-BREAK OPERATING HANDLES. THE MECHANISM SHALL BE AN INTEGRAL PART OF THE BOX, NOT THE COVER, AND SWITCHES SHALL HAVE A COVER INTERLOCK TO PREVENT UNAUTHORIZED OPENING OF THE SWITCH DOOR IN THE ON POSITION OR CLOSING OF THE SWITCH MECHANISM WITH THE DOOR OPEN. CURRENT CARRYING PARTS SHALL BE CONSTRUCTED OF HIGH-CONDUCTIVITY COPPER WITH SILVER-TUNGSTEN TYPE SWITCH CONTACT.

5. FUSE CLIPS SHALL BE POSITIVE PRESSURE TYPE REINFORCED FUSE CLIPS.

6. THE ELECTRICAL CONTRACTOR SHALL FURNISH, INSTALL AND CONNECT ALL POWER WIRING TO ALL MECHANICAL CONTRACTOR FURNISHED EQUIPMENT. THE MECHANICAL CONTRACTOR SHALL FURNISH, INSTALL AND CONNECT ALL CONTROL WIRING TO ALL FURNISHED EQUIPMENT, INCLUDING CONTROL DEVICES, STARTERS AND INTEGRAL DISCONNECT SWITCHES OF CONTRACTOR FURNISHED EQUIPMENT.

VARIABLE FREQUENCY DRIVES (230515)

1. PROVIDE VARIABLE FREQUENCY DRIVES (VFD) AS SPECIFIED HEREIN AND AS SHOWN ON THE CONTRACT DRAWINGS. BASIS OF DESIGN IS ABB MODEL ACH-550. THE ENCLOSURE FOR VFD SHALL BE NEMA TYPE 1 FOR INDOOR USE AND NEMA TYPE 3R FOR OUTDOOR USE. VFD SHALL PROVIDE MICROPROCESSOR-BASED CONTROL FOR THREE-PHASE INDUCTION MOTORS USING PULSE WIDTH MODULATED (PWM) DESIGN, WHICH CONVERTS THE UTILITY INPUT VOLTAGE AND FREQUENCY TO A VARIABLE VOLTAGE AND FREQUENCY OUTPUT VIA A TWO-STEP OPERATION. VFD SHALL HAVE AN EFFICIENCY AT FULL LOAD AND SPEED THAT EXCEEDS 97%.

2. VFD SHALL MAINTAIN A MINIMUM LINE SIDE DISPLACEMENT POWER FACTOR OF 0.96, REGARDLESS OF SPEED AND LOAD FOR VFD'S LESS THAN 75 HP. VFD SHALL MAINTAIN A MINIMUM LINE SIDE DISPLACEMENT POWER FACTOR OF .99, REGARDLESS OF SPEED AND LOAD FOR MOTORS GREATER THAN 75 HP. THE VFD'S SHALL HAVE A ONE (1) MINUTE OVERLOAD CURRENT RATING OF 110% FOR LOW OVERLOAD APPLICATIONS. VFD SHALL HAVE AN INTEGRAL EMI/RFI FILTER AND CIRCUIT BREAKER AS STANDARD. THE CURRENT WITHSTAND RATING OF THE OPEN VFD SHALL BE 65,000 AIC.

3. COMMUNICATION CAPABILITY OPTIONS SHALL BE BACNET/IP.

4. VFD SHALL HAVE A COOLING FAN(S) THAT IS FIELD REPLACEABLE.

5. VFD SHALL INCLUDE THE FOLLOWING PROTECTIVE FEATURES: OVERCURRENT, OVERVOLTAGE, SYSTEM FAULT, UNDER VOLTAGE, INPUT LINE SUPERVISION, OUTPUT PHASE SUPERVISION, UNDER TEMPERATURE, OVER TEMPERATURE, MOTOR STALLED, MOTOR OVER TEMPERATURE AND MOTOR UNDER LOAD. VFD SHALL PROVIDE GROUND FAULT PROTECTION DURING POWER-UP, STARTING, AND RUNNING.

6. VFD STARTUP SHALL BE BY A FACTORY TRAINED SERVICE TECHNICIAN. THE TECHNICIAN SHALL DOCUMENT THE STARTUP AND SUBMIT THE FORMS AS A CLOSEOUT SUBMITTAL.

7. WARRANTY SHALL BE TWENTY-FOUR (24) MONTHS FROM CERTIFIED START-UP DATE. THIS WARRANTY DURATION INCLUDES START-UP BY AN AUTHORIZED SERVICE REPRESENTATIVE AND PARTS, LABOR AND TRAVEL TIME.

CHECK, TEST, START, ADJUST, BALANCE AND INSTRUCTIONS (230593)

1. AFTER INSTALLATION, CHECK ALL EQUIPMENT, AND PERFORM START UP IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

2. ALL PIPING SHALL BE TESTED AND FREE OF LEAKS.

3. CONCEALED OR INSULATED WORK SHALL REMAIN UNCOVERED UNTIL REQUIRED TESTS HAVE BEEN COMPLETED, BUT IF CONSTRUCTION SCHEDULE REQUIRES IT, ARRANGE FOR PRIOR TESTS ON PARTS OF SYSTEM AS APPROVED BY THE TENANT.

4. BALANCE ALL SYSTEMS, CALIBRATE CONTROLS, CHECK FOR PROPER OPERATION AND SEQUENCE UNDER ALL CONDITIONS AND MAKE ALL NECESSARY ADJUSTMENTS.

5. AFTER INSTALLATION AND EQUIPMENT IS PLACED IN OPERATION, HVAC CONTRACTOR IS RESPONSIBLE FOR BALANCING SYSTEMS. BALANCING SHALL BE PERFORMED BY AN INDEPENDENT AABC CERTIFIED CONTRACTOR.

6. ADJUST AND BALANCE THE AIR SYSTEMS BEFORE HYDRONIC, STEAM, AND REFRIGERANT SYSTEMS. TESTING AND BALANCING SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT AABC NATIONAL STANDARDS FOR TOTAL SYSTEM BALANCE. GPM'S SHALL BE BALANCED WITHIN 10% OF DESIGN. AFTER ALL AIR SYSTEMS ARE INSTALLED, EACH SUPPLY AIR OUTLET SHALL BE AIR BALANCED TO WITHIN 10% OF THE CFM SHOWN WITH AIR PATTERNS SET AS INDICATED ON DRAWINGS (OR WITHIN 10 CFM WHEN BELOW 100 CFM). FAN RPMS AND ZONE DAMPERS SHALL BE ADJUSTED AND SHEAVES SHALL BE REPLACED AS REQUIRED TO ACHIEVE AIR BALANCE. ALL ZONES OR PORTIONS THEREOF SERVING OTHER SPACES AND WHICH MAY BE AFFECTED BY THE PROJECT SHALL BE TRAVERSED PRIOR TO CONSTRUCTION. THE FINAL AIR BALANCE SHALL RESTORE THESE AIR QUANTITIES. BEFORE AND AFTER AIR QUANTITIES SHALL BE LISTED IN THE AIR BALANCE REPORT

7. START UP AND PLACE ALL SYSTEMS IN OPERATION AND TAG ALL SWITCHES AND CONTROLS WITH PERMANENT LABELS.

5. INSTRUCT OWNER IN OPERATION OF SYSTEMS AND SUBMIT OPERATING AND MAINTENANCE MANUAL ON ALL EQUIPMENT AND SYSTEMS.

END OF SPECIFICATIONS.

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APPROVED BY:	DCP		

DRAWING NO.:
M-1003

NORTH

MECHANICAL DEMOLITION GENERAL NOTES:

1. DO NOT DISTURB ANY HARD CEILINGS THAT HAVE A TEXTURED SURFACE, AS THEY MAY CONTAIN ASBESTOS.
2. ALL REFRIGERANT IS TO BE RECOVERED AND DISPOSED OF IN A MANNER COMPLAINT WITH EPA GUIDELINES.
3. COORDINATE ALL DEMOLITION ACTIVITES WITH NEW WORK DRAWINGS.
4. ANY CONTROLS EQUIPMENT SHALL BE DEMOLISHED BY THE CONTROLS CONTRACTOR SO IT MAY BE TURNED OVER TO THE OWNER AS SPARES.

MECHANICAL DEMOLITION KEY NOTES: (#)

1. DEMOLISH CHILLER AND RELATED REFRIGERANT PIPING. UP TO AND INCLUDING ROOF PENETRATION. DEMOLISH PORTIONS OF CHILLED FLUID PIPING AS SHOWN. SALVAGE AND PROTECT DIVERTING VALVE FOR RE-USE IN NEW WORK.
2. DEMOLISH SPLIT CHILLER AND RELATED REFRIGERANT PIPING UP TO AND INCLUDING ROOF PENETRATION. DEMOLISH COLD WATER FEED PIPE AND BACK FLOW PREVENTER UP TO AND INCLUDING TEE. REMOVE TEE AND REPLACE WITH ELBOW TO ELIMINATE ANY PLUMBING DEAD LEG(S). DEMOLISH AS MUCH CHILLED WATER PIPING WITHIN THIS ROOM AND CAP ANY PIPES THAT LEAVE THE ROOM.
3. DEMOLISH UNIT VENTILATOR. MINIMIZE PIPING DEMOLITION AT THE UNIT AND IN THE WALL FOR REUSE IN NEW WORK. HORIZONTAL MAIN PIPING ABOVE THE CEILING SHALL BE DEMOLISHED.
4. DEMOLISH AHU. MINIMIZE PIPING DEMOLITION FOR USE IN NEW WORK.
5. DEMOLISH CHILLED WATER PUMP, CWP-1, AND VERTICAL PIPING AND APPURTENANCES.
6. PIPING FROM THE SPLIT CHILLER IS EXPECTED TO BEGIN IN THIS AREA FOR THE 7 UV UNITS + AHU-11 IN THIS AREA. DEMOLISH AS MUCH MAIN LINE PIPING WITHIN REACH OF THIS OFFICE AND CAP ANYTHING THAT MUST REMAIN.

REST, CLASSROOM, CLASSROOM, CLASSROOM, REST, REST, CLASSROOM, COMMONS, CLASSROOM, REST, REST, CLASSROOM, PATIO, MUSIC, GENERAL STORAGE, REST, CLASSROOM, CLASSROOM, COMMONS, CLASSROOM, REST, CLASSROOM, REST, VESTIBULE, LOBBY, GUIDANCE OFFICE, GIFTED ROOM, HEALTH, PRINCIPAL'S OFFICE, DENTIST, STORAGE, AHU-11, REST, REST, TEACHERS BREAK, COMMONS, REF. PIPE PORTAL TO ROOF, EXISTING BOILERS, WH, HWP, EXISTING CHILLER, GEN, OFFICE, STORAGE, EXISTING SWITCHGEAR, MECHANICAL ROOM, KITCHEN, 2 M1302, ART ROOM, STORAGE, JAN., CONF., STORAGE, WORK, TABLE STORAGE, MULTI PURPOSE, LIBRARY, MATH ROOM, READING ROOM, PATIO, INSTRUCTIONAL AID OFFICE, STOR., UP, STAGE, STORAGE, PATIO, EXISTING SPLIT CHILLER, EXISTING ROOF HATCH, 2, MUSIC, CLASSROOM, PRAC., PRAC., REST, KINDERGARTEN CLASSROOM, COMMONS, CLASSROOM, KINDERGARTEN CLASSROOM, KINDERGARTEN CLASSROOM, REST, REST, STORAGE, GIRLS, BOYS, PATIO, CLASSROOM, COMMONS, CLASSROOM, CLASSROOM, CLASSROOM, CLASSROOM

1 M-1101 METZGAR MECHANICAL FIRST FLOOR DEMOLITION PLAN
3/32" = 1'-0"

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	19 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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GREENSBURG SALEM SCHOOL DISTRICT
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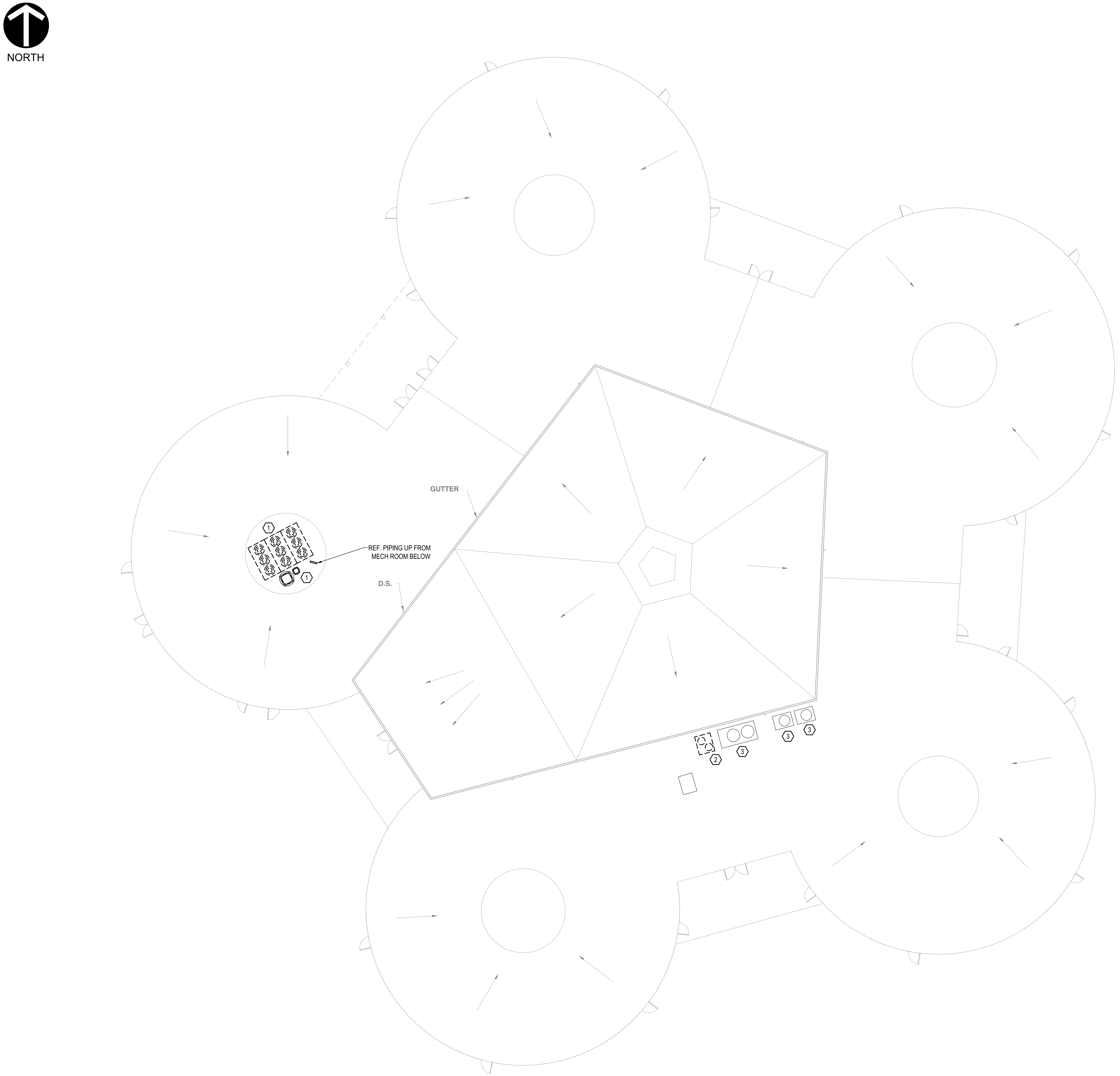
412.322.9280
A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
No. PE081377

METZGAR
MECHANICAL
FIRST FLOOR DEMOLITION PLAN

DATE:	xx-xx-xx
DRAWN BY:	MAB
DWG SCALE:	AS SHOWN
CHECKED BY:	MAB
PROJECT NO:	2341083
APPROVED BY:	DCP

DRAWING NO.:
M-1101



1 M-1102 METZGAR MECHANICAL ROOF DEMOLITION PLAN
3/32" = 1' 0"

MECHANICAL DEMOLITION GENERAL NOTES:

1. ALL REFRIGERANT IS TO BE RECOVERED AND DISPOSED OF IN A MANNER COMPLAINT WITH EPA GUIDELINES.

MECHANICAL DEMOLITION KEY NOTES:

1. DEMOLISH (3) CONDENSING UNIT SECTIONS. DEMOLISH ALL PIPING AND RELATED APPURTENANCES. DO NOT DISTURB THE (2) EXISTING EXHAUST FANS. THE FANS ARE EXISTING TO REMAIN IN OPERATION.
2. DEMOLISH 10-TON CONDENSING UNIT. DEMOLISH ALL PIPING AND RELATED APPURTENANCES. SUPPORT STEEL IS TO REMAIN AS IS.
3. EXISTING CONDENSING UNIT IS EXISTING TO REMAIN AS IS.

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
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COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
ENGINEER
No. PE081572

METZGAR
MECHANICAL
ROOF DEMOLITION PLAN

DATE:	XX-XX-XX	DRAWN BY:	MAB
DWG SCALE:	AS SHOWN	CHECKED BY:	MAB
PROJECT NO:	2341083		
APPROVED BY:	DCP		

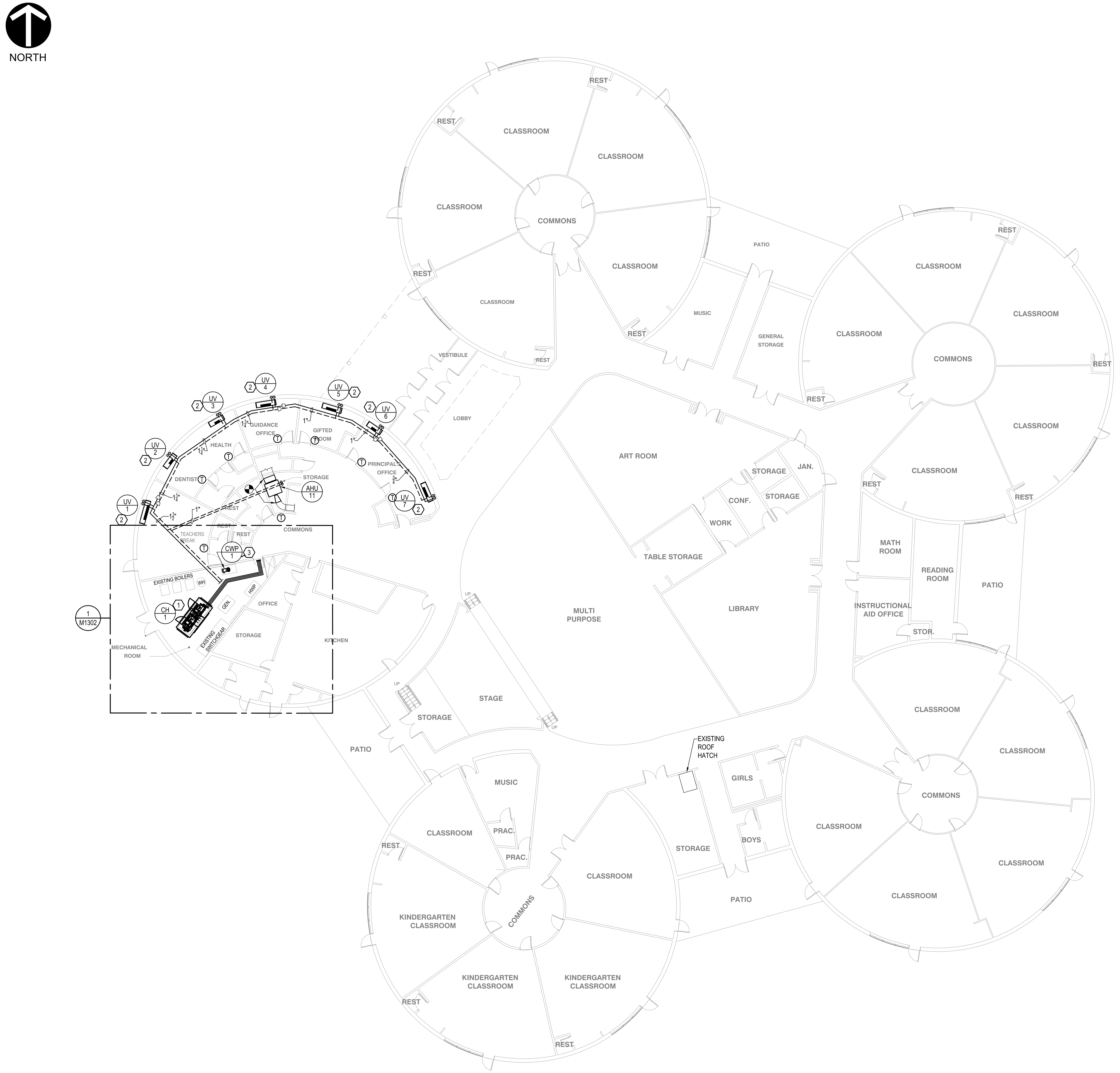
DRAWING NO.:
M-1102

MECHANICAL GENERAL NOTES:

1. NONE.

MECHANICAL KEY NOTES: #

1. INSTALL NEW CHILLER ON EXISTING HOUSEKEEPING PAD. JUSTIFY TO THE SIDE OF THE PAD OPPOSITE OF THE SWITCHGEAR. SOUND ENCLOSURE SHOULD GO AROUND ENTIRE CHILLER AND HOUSEKEEPING PAD SECURED TO FLOOR.
2. INSTALL NEW UNIT HEATERS IN THE SAME LOCATION AS THE DEMOLISHED UNIT. REUSE THE PIPING CONNECTIONS AND ELECTRICAL CONNECTIONS. CONNECT THE NEW PIPING TO THE EXISTING PIPING IN THE WALL THAT FEEDS THE UNITS. ASSUME THE "CONNECT TO EXISTING" SYMBOL IS AT ALL PIPING CONNECTIONS.
3. INSTALL NEW CHILLED WATER PUMP. INSTALL NEW PUMP TRIM PER PUMP DETAIL. SEE DETAIL SHEET. SEE ALSO, ENLARGED MECHANICAL ROOM PLAN.



1 M-1201 METZGAR MECHANICAL FIRST FLOOR PLAN
3/32" = 1'-0"

NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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412.322.9280
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METZGAR MECHANICAL FIRST FLOOR PLAN

DATE: XX-XX-XX
DWG SCALE: AS SHOWN
PROJECT NO: 2341083
DRAWN BY: MAB
CHECKED BY: MAB
APPROVED BY: DCP

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER DAVID C. PRICE

DRAWING NO.: M-1201

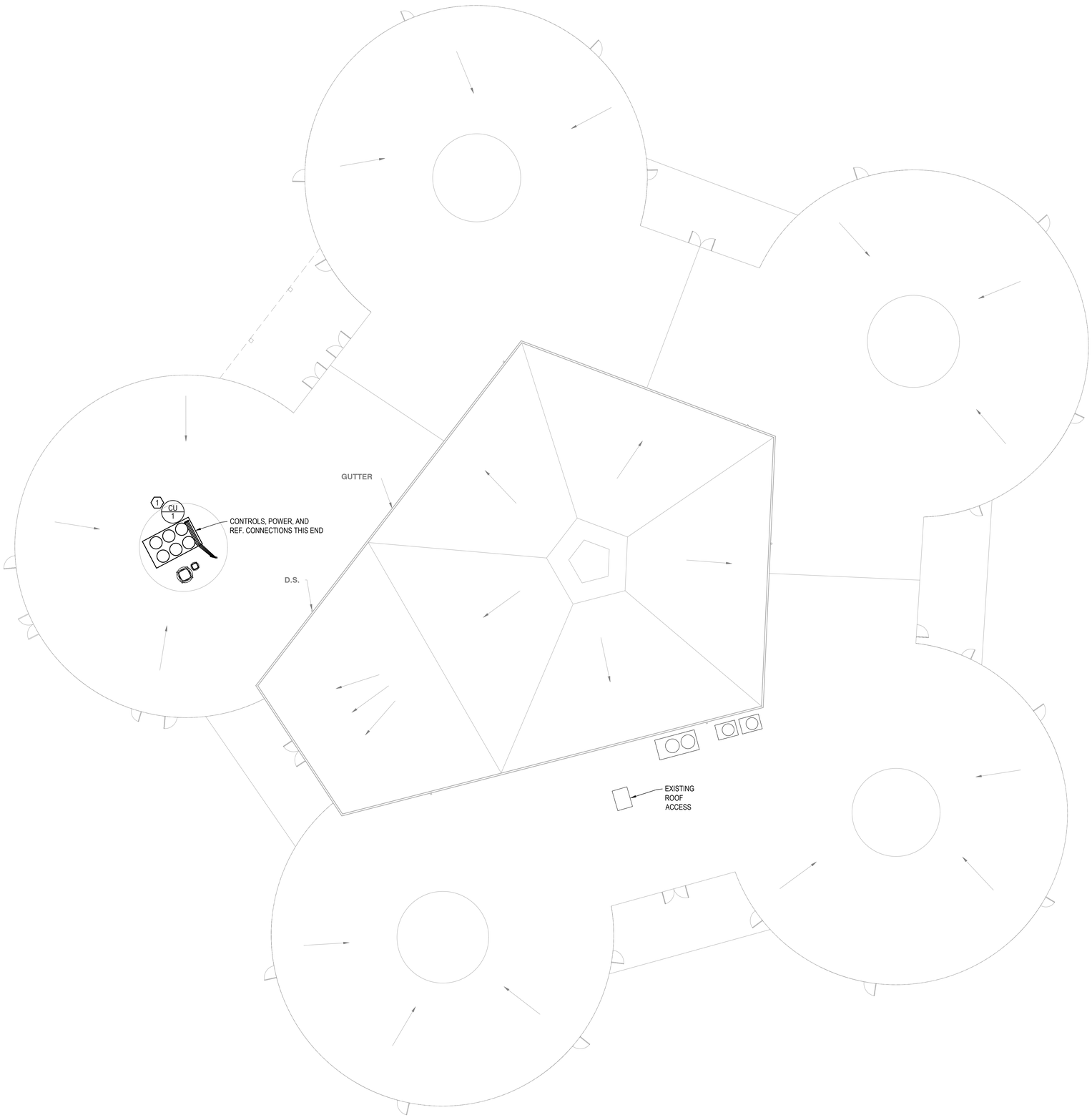
NORTH

MECHANICAL GENERAL NOTES:

1. NONE.

MECHANICAL KEY NOTES: (#)

1. INSTALL CONDENSING UNIT USING EXISTING STEEL AND PROVIDE ANY ADDITIONAL MISCELLANEOUS STEEL NEEDED TO SUPPORT UNIT PER MANUFACTURER'S GUIDELINES. INCLUDE 1" DEFLECTION VIBRATION ISOLATORS FOR THE CONDENSING UNIT. PROVIDE NEW WATERPROOF PIPING PORTAL.



1 / M-1202 METZGAR MECHANICAL ROOF PLAN
3/32" = 1' 0"

REVISION RECORD

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	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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METZGAR MECHANICAL ROOF PLAN

DATE:	XX-XX-XX
DRAWN BY:	MAB
DWG SCALE:	AS SHOWN
CHECKED BY:	MAB
PROJECT NO:	2341083
APPROVED BY:	DCP

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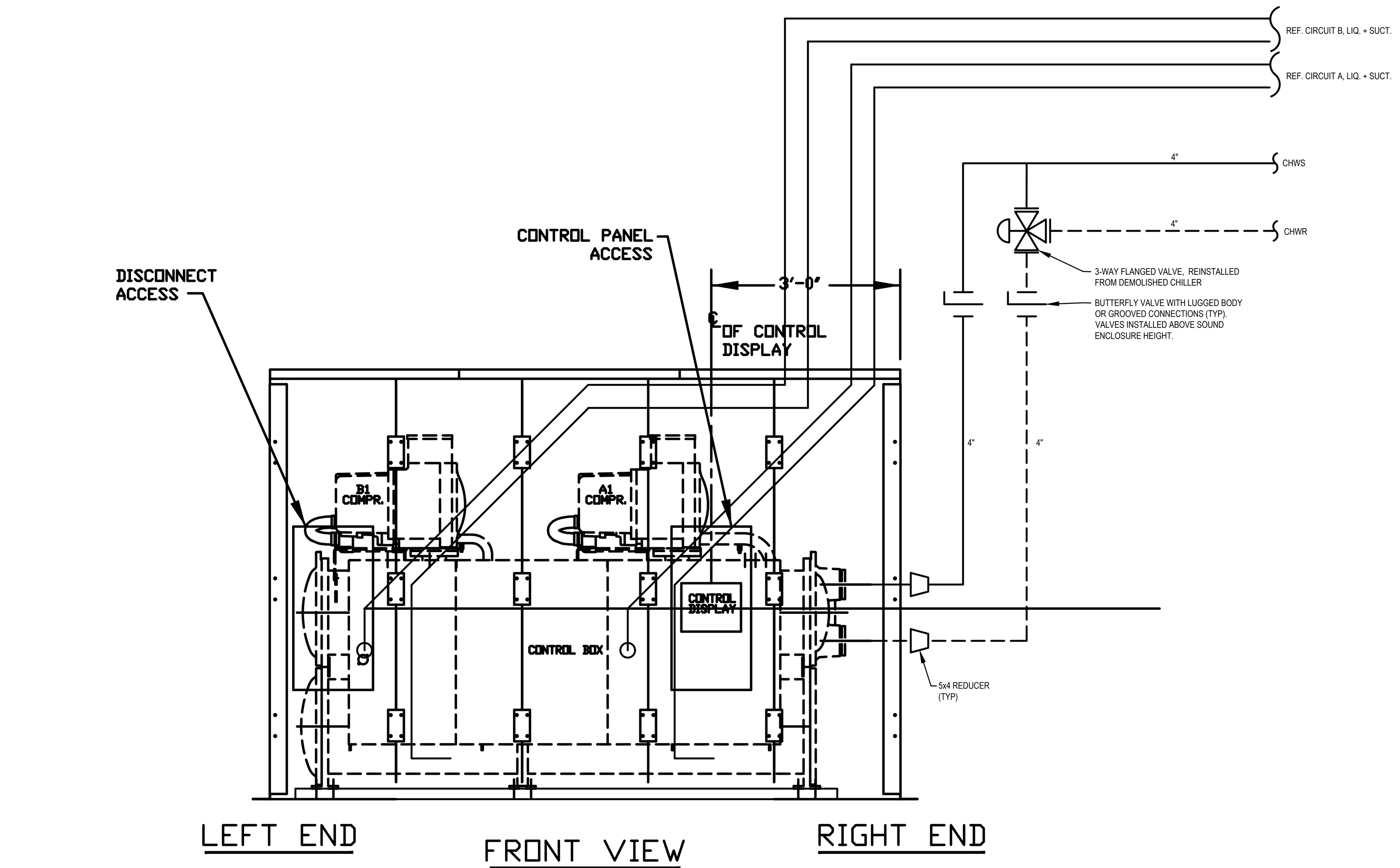
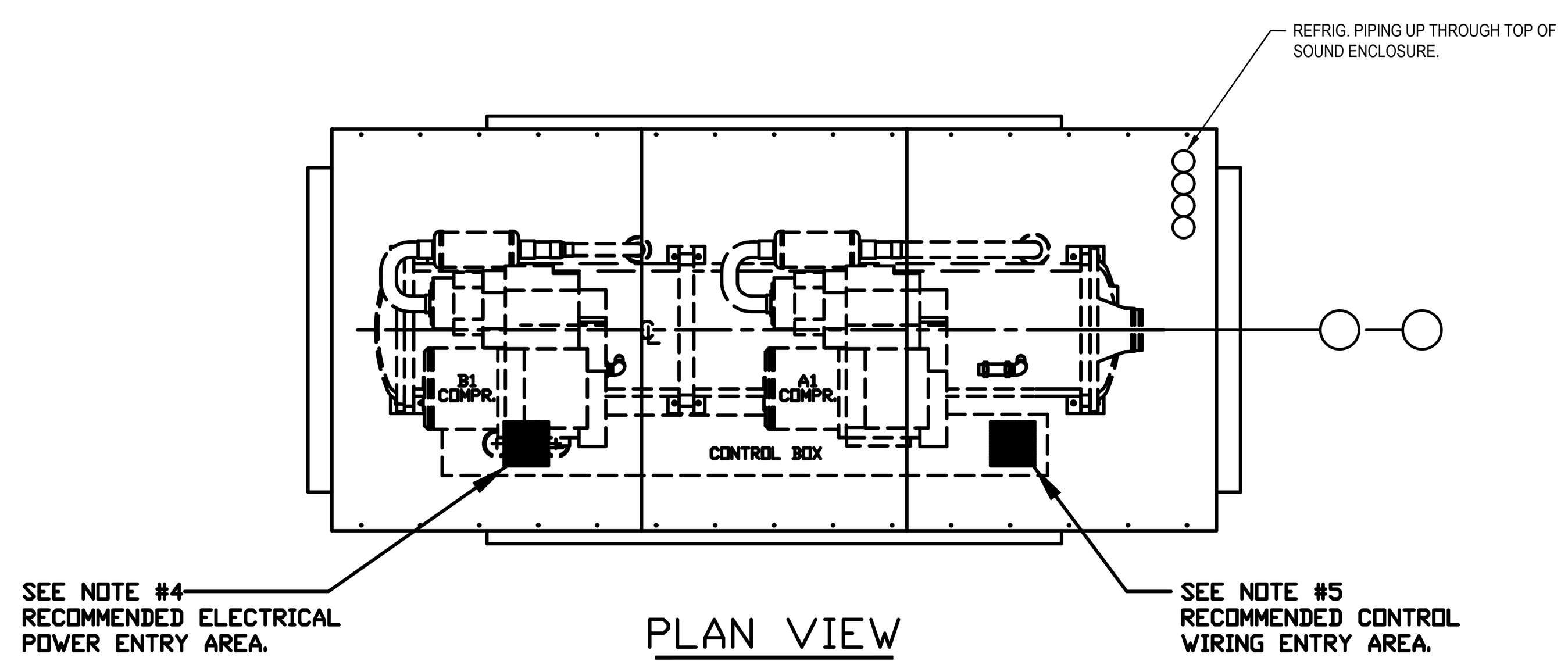
COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
No. PE081778

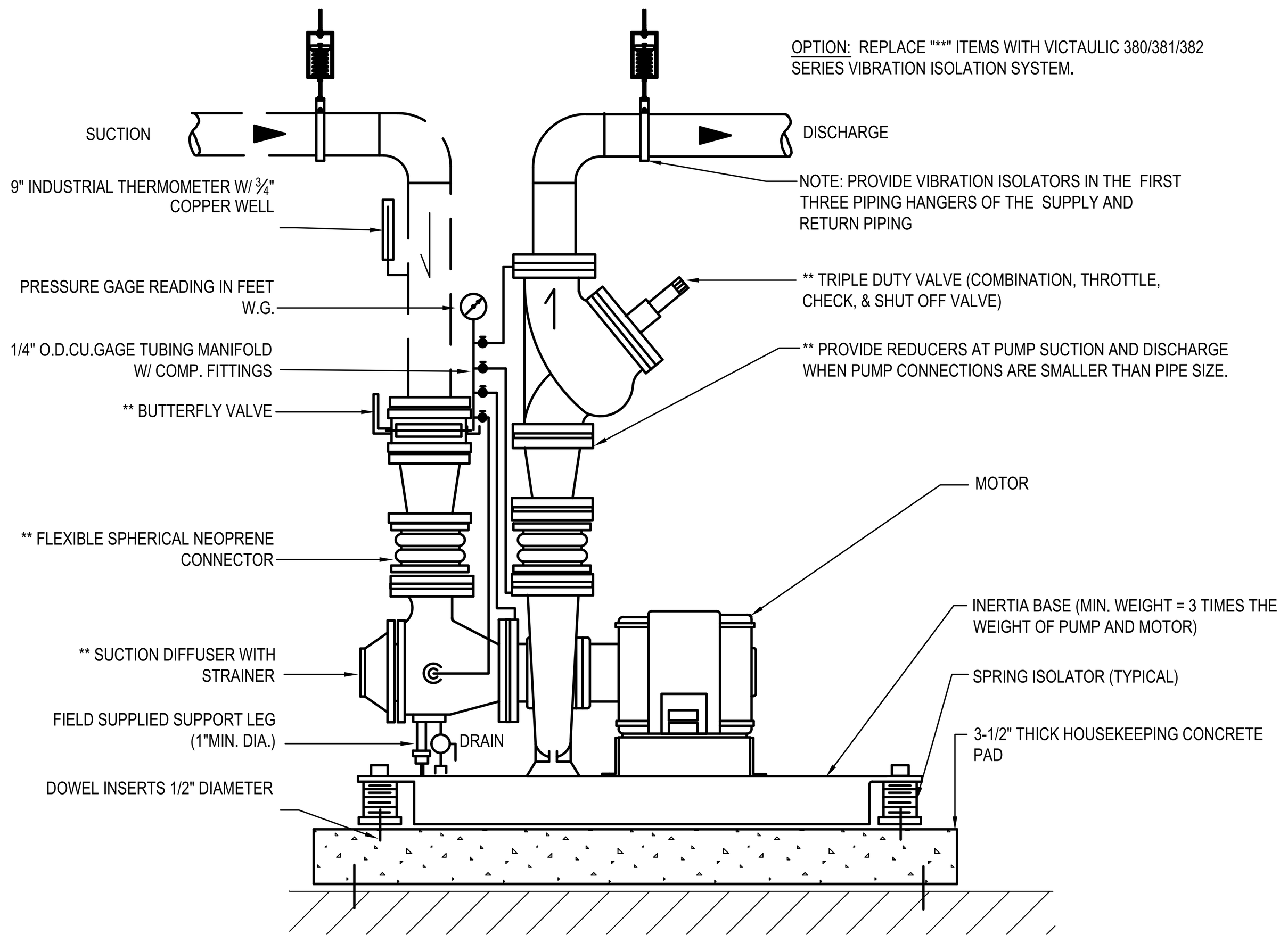
DRAWING NO.:
M-1202



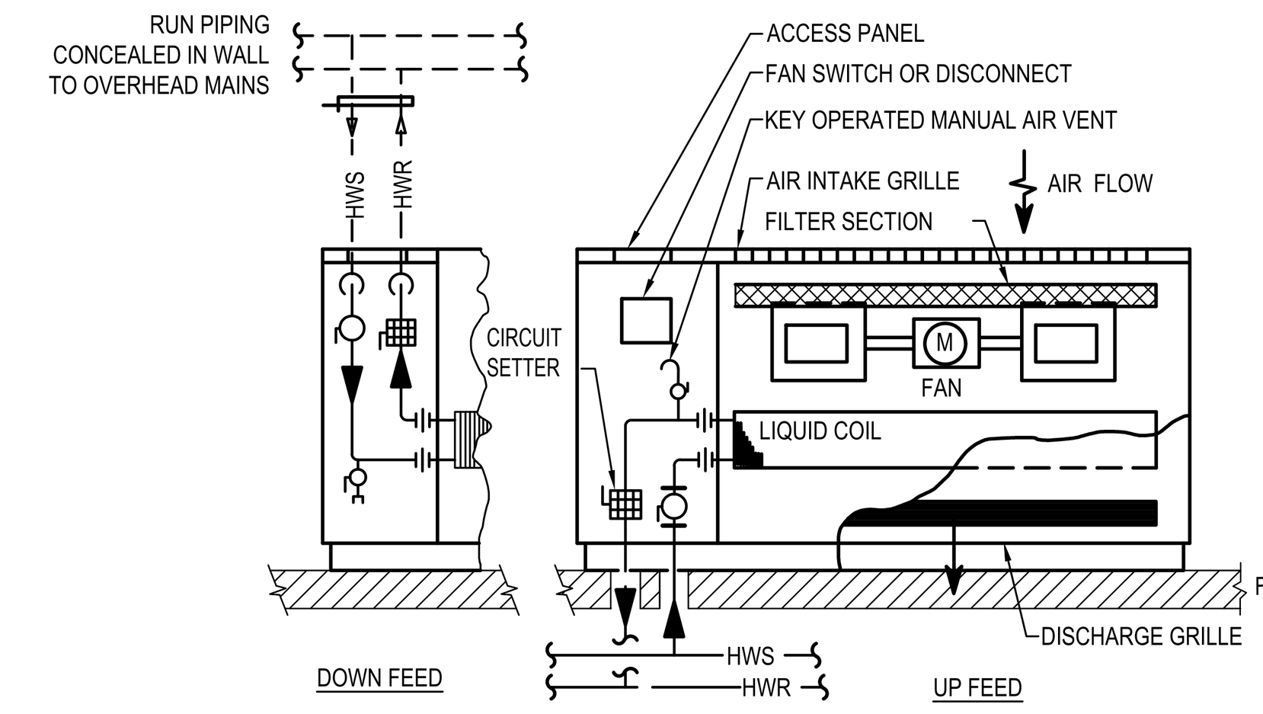
1 CHILLER SCHEMATIC SECTION VIEW
M1301 NONE.



2 CHILLER SCHEMATIC PLAN VIEW
M1301 NONE.

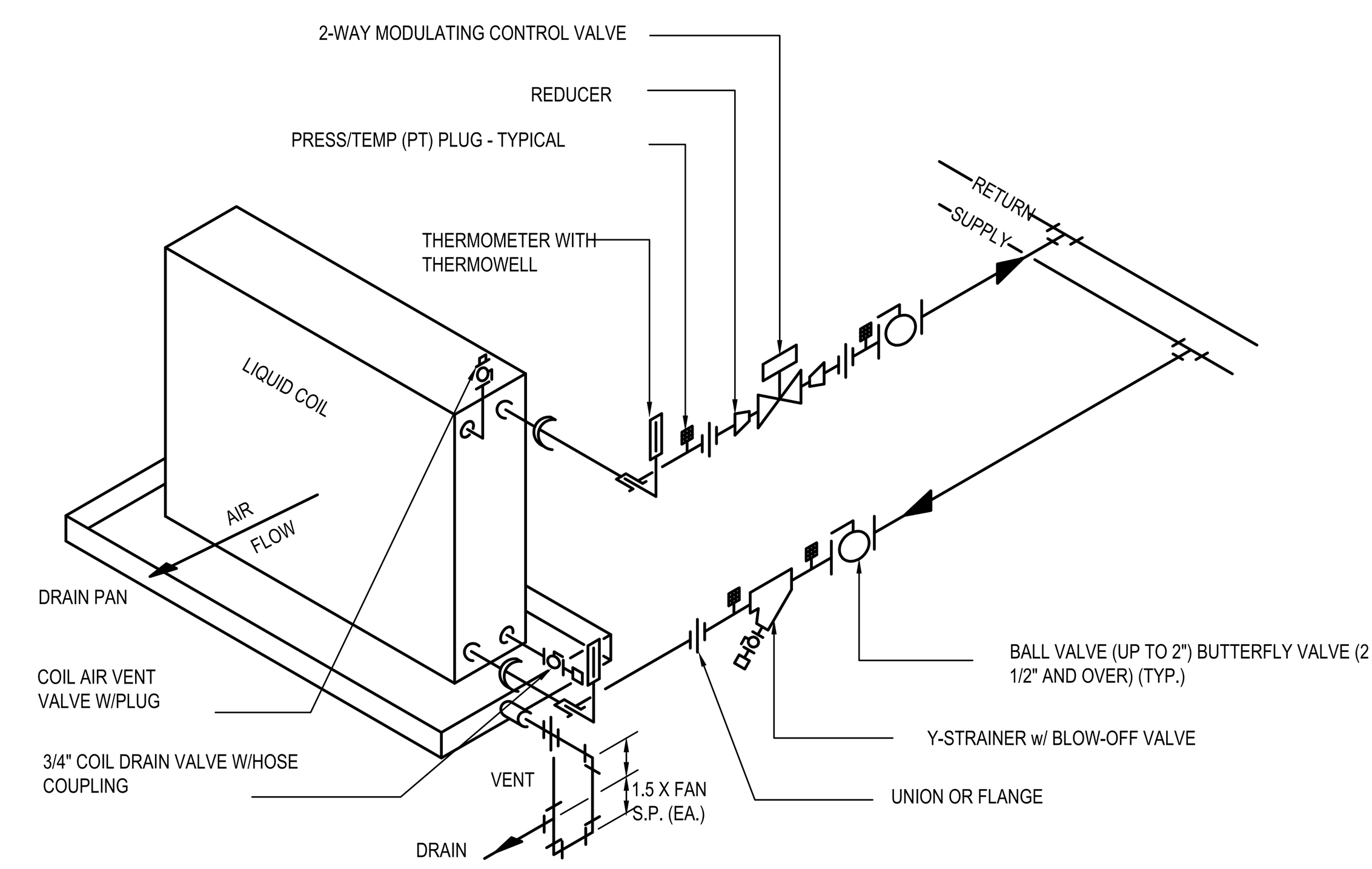


3 END SUCTION, BASE MOUNTED PUMP DETAIL
M1301 NONE.

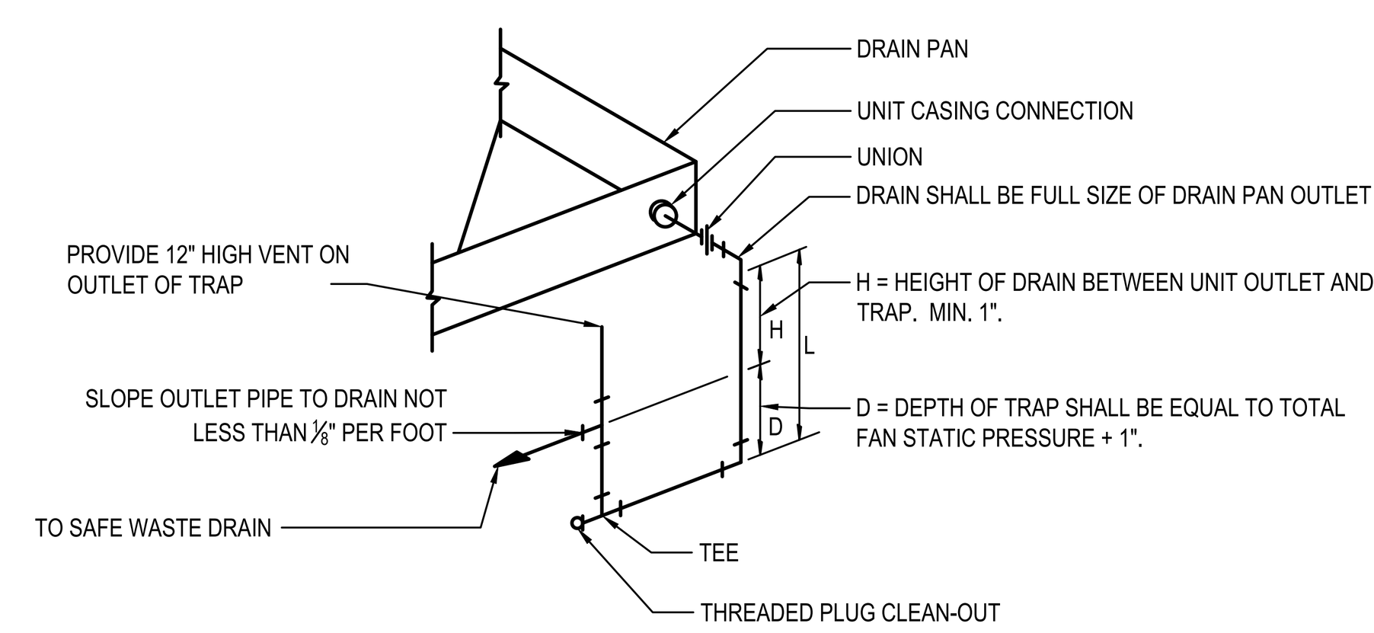


NOTE:
LOOK AT PLANS AND SCHEDULES, FOR MOUNTING OF UNITS EITHER AS WALL HUNG, FLOOR MOUNT OR RECESSED.

4 CABINET UNIT PIPING DIAGRAM
M1301 NOT TO SCALE

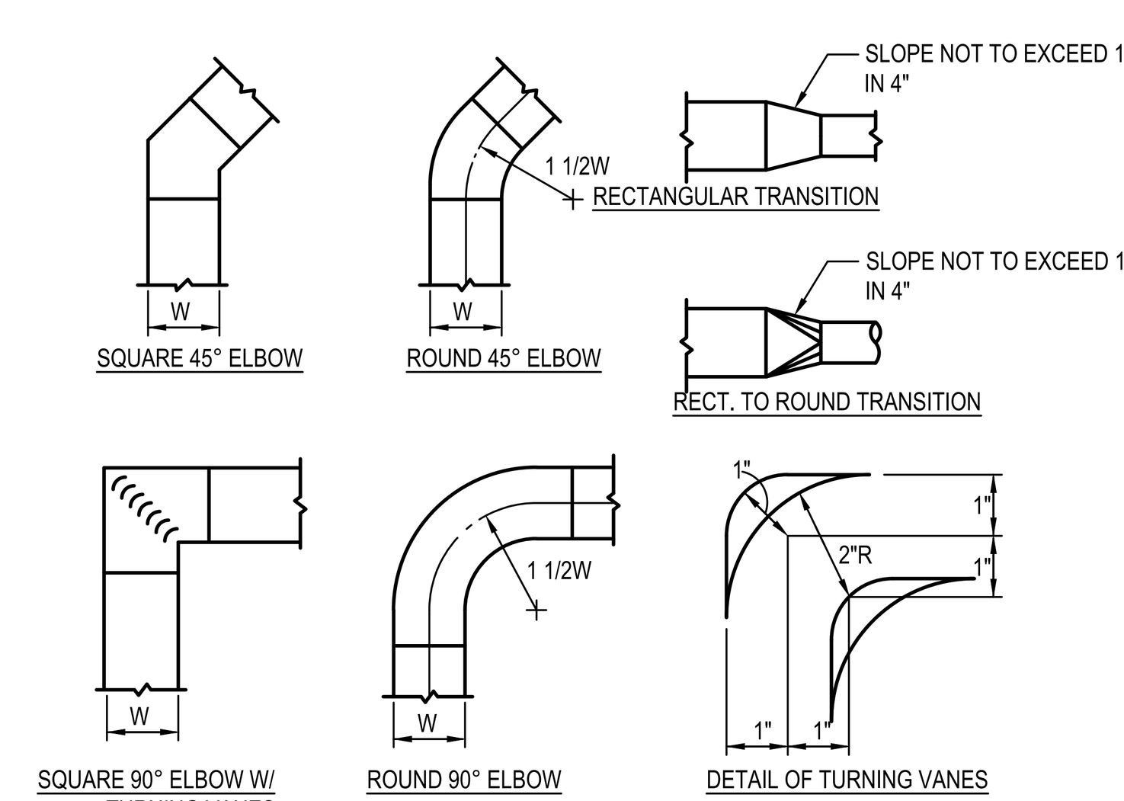


5 LIQUID COIL PIPING DETAIL
M1301 NO SCALE



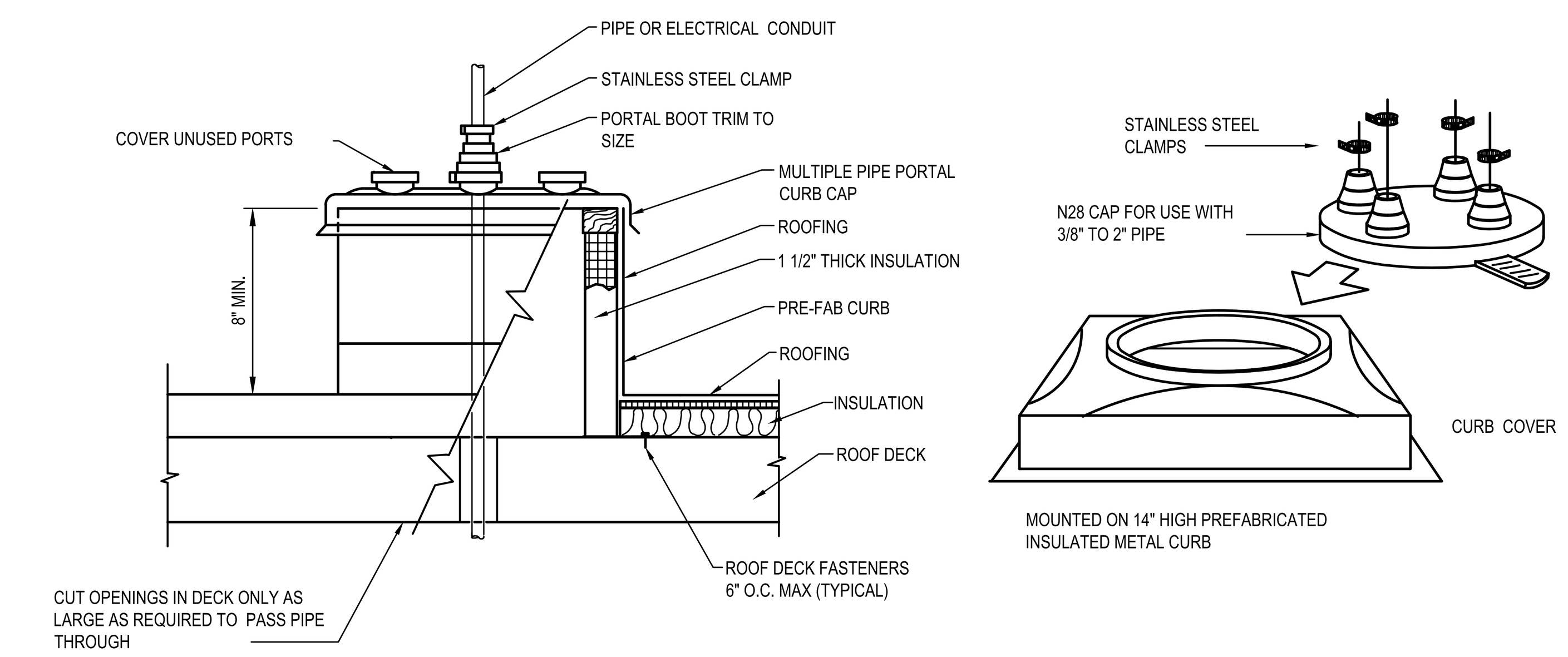
TRAP ON POSITIVE OR NEGATIVE SIDE OF FAN
H" = MIN. 1".
D" = MAX. TOTAL FAN STATIC PRESS. + 1".
L" = H + D + PIPE DIA. + INSULATION THICKNESS.

6 CONDENSATE DRAIN TRAP DETAIL
M1301 NO SCALE



7 LOW VELOCITY DUCTWORK DIAGRAMS
M1301 NO SCALE

NOTE:
PROVIDE RADIUS ELBOWS, 18" AND LARGER WITH TURNING BLADES AT 1/3 AND 1/2 THE WIDTH OF THE DUCT FROM THE INSIDE RADIUS. TURNING BLADES SHALL BE PROVIDED WITH HEMMED ENDS. (SEE SECTION 15840 OF MECHANICAL SPECIFICATIONS FOR ADDITIONAL DUCT CONSTRUCTION INFORMATION AND RESTRICTIONS.)



8 PIPE PORTAL DETAIL
M1301 NOT TO SCALE

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140 CC HALL DR, NEW ALEXANDRIA, PA 15670

METZGAR
MECHANICAL
DETAILS

DATE:	XX-XX-XX	
DWG SCALE:	AS SHOWN	
DRAWN BY:	MAB	
CHECKED BY:	MAB	
PROJECT NO:	2341083	
APPROVED BY:	DCP	

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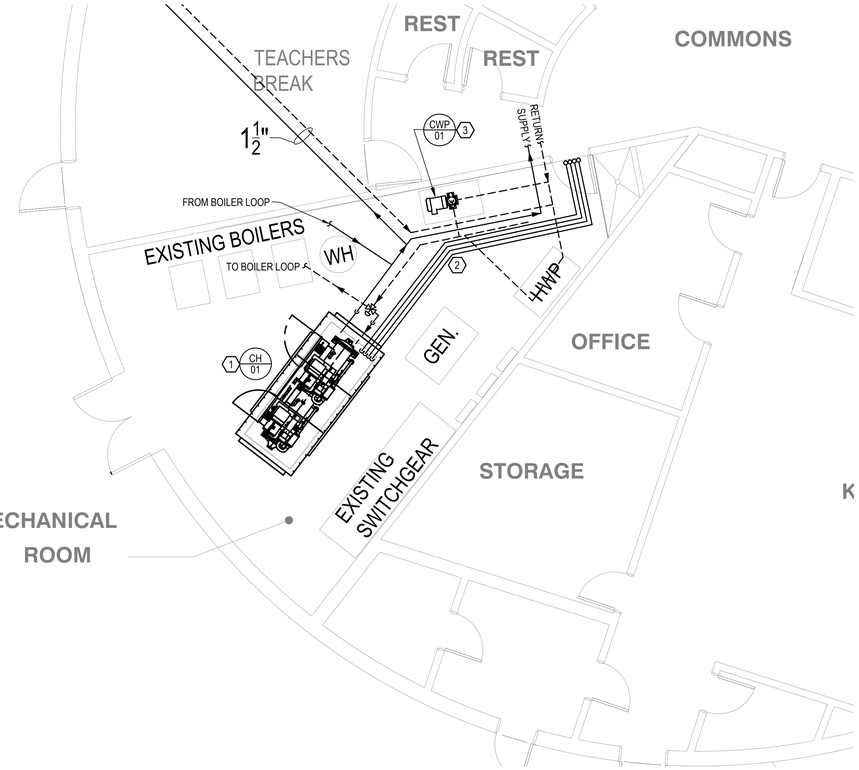
COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
DAVID C. PRICE

DRAWING NO.:
M-1301

NORTH



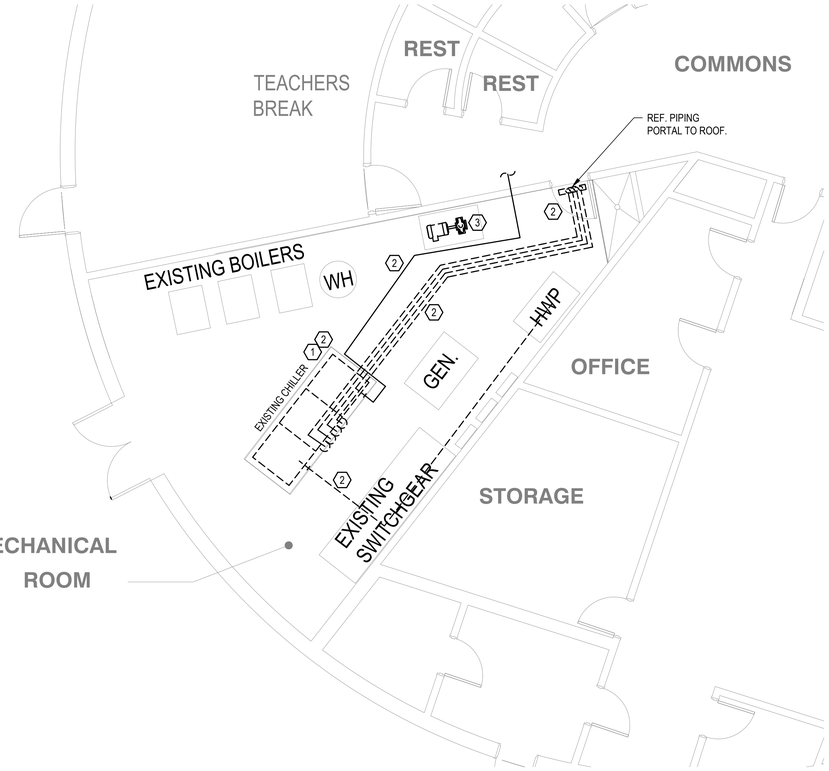
1 M-1302 METZGAR MECHANICAL ROOM ENLARGED MECHANICAL PLAN
3/16" = 1' 0"

MECHANICAL GENERAL NOTES:

1. SEE SCHEMATIC SHEET FOR LIQUID PIPING CONNECTIONS. NEW PIPING ROUTING SHALL NOT BE ABOVE ELECTRICAL PANELS OR SWITCHGEAR.
2. HOT WATER PUMP (GRUNDFOS) IS EXISTING TO REMAIN AS IS.
3. PIPING SIZES ARE BASED ON COPPER PIPE.

MECHANICAL KEY NOTES: (#)

1. INSTALL NEW CHILLER ON EXISTING HOUSEKEEPING PAD. JUSTIFY TO THE SIDE OF THE PAD OPPOSITE OF THE SWITCHGEAR. SOUND ENCLOSURE SHOULD GO AROUND ENTIRE CHILLER AND HOUSEKEEPING PAD SECURED TO FLOOR.
2. ROUTE NEW REFRIGERATION PIPING AS SHOWN. REF. PIPING SHOULD BE THE HIGHEST PIPING IN THE SPACE. ALL REF. PIPES TO BE INSULATED WITH 3/4" ARMACELL INSULATION WITH A UV-RATED JACKET.
3. NEW CHILLED WATER PUMP. SEE DETAILS FOR TRIM AND PUMP CONNECTIONS.



2 M-1302 METZGAR MECHANICAL ROOM ENLARGED MECHANICAL DEMOLITION PLAN
3/16" = 1' 0"

MECHANICAL DEMOLITION GENERAL NOTES:

1. ALL REFRIGERANT IS TO BE RECOVERED AND DISPOSED OF IN A MANNER COMPLAINT WITH EPA GUIDELINES.
2. COORDINATE ALL DEMOLITION ACTIVITES WITH NEW WORK DRAWINGS.

MECHANICAL DEMOLITION KEY NOTES: (#)

1. DEMOLISH CHILLER AND RELATED REFRIGERANT PIPING. UP TO AND INCLUDING ROOF PENETRATION. DEMOLISH PORTIONS OF CHILLED FLUID PIPING AS SHOWN. SALVAGE AND PROTECT DIVERTING VALVE FOR RE-USE IN NEW WORK.
2. DEMOLISH SPLIT CHILLER AND RELATED REFRIGERANT PIPING UP TO AND INCLUDING ROOF PENETRATION. DEMOLISH CHILLED WATER PIPING UP TO AREA SHOWN. DEMOLISH COLD WATER FEED PIPE AND BACK FLOW PREVENTER UP TO AND INCLUDING TEE. REMOVE TEE AND REPLACE WITH ELBOW TO ELIMINATE DEAD LEG.
3. DEMOLISH CHILLED WATER PUMP, CWP-1, AND VERTICAL PIPING AND APPURTENANCES.

REVISION RECORD

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140 CC HALL DR, NEW ALEXANDRIA, PA 15670

METZGAR
MECHANICAL ROOM
ENLARGED MECHANICAL PLANS

DRAWN BY:	MAB
CHECKED BY:	MAB
DWG SCALE:	AS SHOWN
PROJECT NO.	2341083
APPROVED BY:	DCP

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MEP Engineering
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A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
No. PE081577

DRAWING NO.:
M-1302

PIPE INSULATION THICKNESS SCHEDULE

FLUID OPERATING TEMPERATURE AND USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (IN)				
	CONDUCTIVITY BTU·IN.(h·ft²·°F)	MEAN RATING TEMPERATURE (°F)	< 1	1 to < 1½	1½ < 4	4 to < 8	≥ 8
> 350	0.32 - 0.34	250	4.5	5.0	5.0	5.0	5.0
251 - 350	0.29 - 0.32	200	3.0	4.0	4.5	4.5	4.5
201 - 250	0.27 - 0.30	150	2.5	2.5	2.5	3.0	3.0
141 - 200	0.25 - 0.29	125	1.5	1.5	2.0	2.0	2.0
105 - 140	0.21 - 0.28	100	1.0	1.0	1.5	1.5	1.5
40 - 60	0.21 - 0.27	75	0.5	0.5	1.0	1.0	1.0
40	0.20 - 0.26	50	0.5	1.0	1.0	1.0	1.5

REMARKS:

PIPING SERVING AS PART OF A HEATING OR COOLING SYSTEM SHALL BE THERMALLY INSULATED IN ACCORDANCE WITH TABLE ABOVE (IECC 2015 TABLE C403.2.10) WITH THE FOLLOWING EXCEPTIONS:
1. FACTORY-INSTALLED PIPING WITHIN HVAC EQUIPMENT TESTED AND RATED IN ACCORDANCE WITH A TEST PROCEDURE REFERENCED BY THIS CODE.
2. FACTORY-INSTALLED PIPING WITHIN ROOM FAN-COILS AND UNIT VENTILATORS TESTED AND RATED ACCORDING TO AHRI 330 (EXCEPT THAT THE SAMPLING AND VARIATION PROVISIONS OF SECTION 6.5 SHALL NOT APPLY) AND AHRI 840, RESPECTIVELY.
3. PIPING THAT CONVEYS FLUIDS THAT HAVE A DESIGN OPERATING TEMPERATURE RANGE BETWEEN 60°F AND 105°F.
4. PIPING THAT CONVEYS FLUIDS THAT HAVE NOT BEEN HEATED OR COOLED THROUGH THE USE OF FOSSIL FUELS OR ELECTRIC POWER.
5. STRAINERS, CONTROL VALVES, AND BALANCE VALVES ASSOCIATED WITH PIPING 1 INCH OR LESS IN DIAMETER.
6. DIRECT BURIED PIPING THAT CONVEYS FLUIDS AT OR BELOW 60°F.

THERMAL INSULATION SCHEDULE

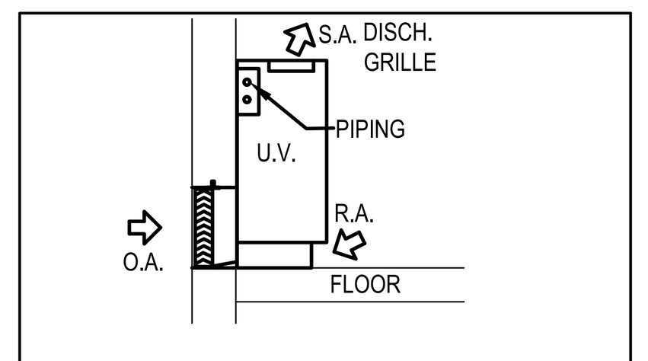
SYSTEM	SYSTEM- LOCATION	OPERATING TEMPERATURE	MATERIAL	SMACNA CLASS					REMARKS
				TYPE	THICKNESS IN.S	DENSITY LB/CU. FT.	INSTALLED "R" VALUE/ CONDUCTIVITY	JACKET	
DUCT	SUPPLY AIR DUCT - INDOOR CONCEALED, ACCESSIBLE	40-120	MINERAL-FIBER	BLANKET	2.5"	0.75	6.0	FSK	1, 4
DUCT	SUPPLY AIR DUCT - INDOOR EXPOSED	40-120	MINERAL-FIBER	BOARD	1.0	2.25	5.0	ASJ	1, 4

NOTES:
1. CONCEALED, ACCESSIBLE LOCATIONS - ABOVE LAY-IN OR ACCESSIBLE CEILINGS, ACCESSIBLE MECHANICAL SHAFTS.
2. CONCEALED, INACCESSIBLE LOCATIONS - ABOVE HARD CEILINGS, (DRY WALL, PLASTER), MECHANICAL SHAFTS, BEHIND WALLS.
3. DO NOT INSULATE:
   - MAKE-UP AIR DUCTWORK OPERATING AT SURROUNDING AMBIENT CONDITIONS
   - RETURN AND EXHAUST AIR DUCTWORK LOCATED INDOORS.
   - TRANSFER AIR DUCTWORK (ACOUSTICALLY LINE DUCT)
   - EXPOSED SUPPLY DUCTWORK LOCATED IN CONDITIONED SPACE. (DOES NOT INCLUDE RETURN AIR PLENUM)
4. MULTIPLE INSULATION METHODS MAY BE USED TO ACHIEVE THE TOTAL REQUIRED R-VALUE.

AIR HANDLING UNIT SCHEDULE

TAG	SERVICE/LOCATION	SUPPLY FAN					COOLING COIL											FILTER				WEIGHT (LB)	BASIS OF DESIGN/ MODEL	REMARKS
		CFM	E.S.P. (IN WG)	HP	FLA	VOLTS/PHASE	SENSIBLE MBH	TOTAL MBH	EAT DB/WB (°F)	LAT DB/WB (°F)	MAX AIR PD IN W.G.	EWT (°F)	LWT (°F)	WATER FLOW (GPM)	MAX WATER PD (FT)	COIL ROWS / FPI / CIRC	MAX WATER PD (FT)	DIMENSIONS WIDTH x LENGTH	THICK (IN.)	QUANTITY	%EFF MERV RATING			
AHU-11	OPEN OFFICE AREA	1200	0.5	0.75	1.6	460 / 3	23.7	27.9	77.0	57.7	0.18	45	55	6.4	3.1	6 / 10 / FULL	3.1	20x20	2"	2	13	335	39SH-04	ALL, SEE BELOW

REMARKS:
1. UNIT CAPACITIES ARE BASED ON 1000' ASL AND 50% PG AS COIL FLUID. OA CONNECTIONS SHALL REMAIN AS IS.
2. PROVIDE A VARIABLE FREQUENCY DRIVE FOR THE SUPPLY FAN. BASIS OF DESIGN ABB MODEL ACH 580 WITH BACNET IP COMMUNICATIONS.
3. HEATING CAPACITY IS EXPECTED TO EXCEED REQUIREMENTS SINCE THE COOLING COIL WILL ALSO ACT AS HEATING COIL IN A 2-PIPE CHANGE OVER SYSTEM.
4. CONTROLS TO BE PROVIDED BY THE INCUMBANT CONTROLS PROVIDER.



OPEN PIPE TUNNEL, FLOOR-LEVEL O.A. INTAKE

UNIT VENTILATORS

TAG	LOCATION	DESIGN CFM (HIGH SP.)	EXT. SP IN W.C.	COOLING CAP (MBTUH) @ 75F db/64F wb EAT & 45F EWT						HEATING CP. (HIGH SPEED) @70F EAT & 180F EWT				ELECTRICAL				MINIMUM OUTSIDE AIR (CFM)	BASIS OF DESIGN	MODEL	WEIGHT LB.S	REMARKS
				CLG. CFM	TOTAL CAP.	SENS.	GPM	P.D. FT. W.C.	ROWS	MBTUH	GPM	P.D. FT. W.C.	ROWS	FAN HP	UNIT MCA	UNIT MOCP	VOLTS/PH					
UV-1	TEACHERS	1000	0.1	700	25.5	17.7	7.0	15.5	5	65.7	5.0	5.8	5	0.33	2.0	15	277 / 1	125	CARRIER	40UVF	480	1,2,3,4,5
UV-2	DENTIST	500	0.1	336	7.7	6.1	2.0	1.3	5	26.2	2.0	0.7	5	0.33	1.8	15	115 / 1	30	CARRIER	40UVF	330	1,2,3,4,5
UV-3	HEALTH	500	0.1	336	7.7	6.1	2.0	1.3	5	26.2	2.0	0.7	5	0.33	1.8	15	115 / 1	30	CARRIER	40UVF	330	1,2,3,4,5
UV-4	GUIDENCE	750	0.1	484	13.5	10.5	3.0	2.8	5	44.5	3.0	1.9	5	0.33	4.6	15	115 / 1	50	CARRIER	40UVF	400	1,2,3,4,5
UV-5	GIFTED	750	0.1	484	13.5	10.5	3.0	2.8	5	44.5	3.0	1.9	5	0.33	4.6	15	115 / 1	50	CARRIER	40UVF	400	1,2,3,4,5
UV-6	PRINCIPAL 1	500	0.1	336	7.7	6.1	2.0	1.3	5	26.2	2.0	0.7	5	0.33	1.8	15	115 / 1	30	CARRIER	40UVF	330	1,2,3,4,5
UV-7	PRINCIPAL 2	750	0.1	484	13.5	10.5	3.0	2.8	5	44.5	3.0	1.9	5	0.33	4.6	15	115 / 1	30	CARRIER	40UVF	400	1,2,3,4,5

NOTES: *CONTRACTOR TO VERIFY PHYSICAL SIZE AND OA INLET DIMENSIONS TO MATCH EXISTING EQUIPMENT, PRIOR TO ORDERING EQUIPMENT.
1. ALL UNITS SHALL BE CONFIGURED WITH REAR BOTTOM OA INLET, FRONT BOTTOM RA INLET, TOP VERTICAL SA OUTLET, FRONT ACCESS PANEL, SIDE-END PANELS, AND NOMINAL 16.5" UNIT DEPTH.
2. ALL UNITS SHALL BE CONFIGURED WITH 3-SPEED ECM FAN MOTOR, STANDARD OA DAMPER ASSEMBLY, FACE AND BYPASS DAMPER, AND 2" MERV-08 FILTER.
3. ALL UNITS SHALL BE CONFIGURED WITH 5-ROW, 2-PIPE STANDARD CAPACITY HW/CHW COIL, AND STAINLESS STEEL DRAIN PAN.
4. UNITS WILL BE CONTROLLED BY THE EXISTING BUILDING BAS. CONTROL VALVES AND BACNET IP INTERFACE WILL BE PROVIDED BY CONTROLS CONTRACTOR.
5. ALL UNITS SHALL BE BEIGE IN COLOR.

PUMP SCHEDULE

TAG	SYSTEM	LOCATION	TYPE	DESIGN CAPACITY GPM	DESIGN HEAD FT.	NPSHA HEAD FT.	PUMP EFF.	SOLUTION	FLUID TEMP.	MOTOR				PUMP SIZE		WEIGHT	BASIS OF DESIGN MANUF./MODEL	REMARKS
										HP	RPM	ENCL.	VOLTS/PH/ HZ	SUCT. IN. DIA.	DISCH. IN. DIA.			
CWP-1	CHILLED WATER	MECH. RM.	END-SUCTION, CLOSE-COUPLED	170	70	4	75%	50% P.G.	55	5	1760	TEFC	460 / 3 /60	2.500	2.000	215	TACO / 2009D	ALL, SEE BELOW.

REMARKS:
1. PUMP SHALL BE CAST IRON BODY WITH BRONZE IMPELLER, STEEL SHAFT, BRONZE SLEEVE, AND CERAMIC/EPT SEALS.
2. PUMP SHALL BE FITTED WITH 125# FLANGES.
3. PUMP SPEED SHALL BE CONTROLLED WITH A VFD. VFD BASIS OF DESIGN: ABB MODEL ACH580 WITH BACNET IP COMMUNICATION.

SPLIT CHILLER SCHEDULE

TAG	LOCATION	NOMINAL CAPACITY TONS	REFRIG.	EER	EVAPORATOR (BASED ON 30% P.G. SOLUTION.)				ELECTRICAL				WEIGHT LB.S	BASIS OF DESIGN	REMARKS
					E.W.T. °F	L.W.T. °F	WATER FLOW GPM	WATE R PD (FT)	MCA	MOC P	ICF	V/Ph/Hz			
CH-1	MECH RM	76	R-134A	11.8	55	45	169.9	12.9	146	200	206	460 / 3 / 60	4,717	CARRIER 30 HCA076	ALL, SEE BELOW.

NOTES:
1. PROVIDE NON-FUSED DISCONNECT, WYE-DELTA STARTER, AND CONTROLS TRANSFORMER FOR SINGLE POINT POWER.
2. PROVIDE MINIMUM LOAD CONTROL (HOT GAS BYPASS) FOR OPERATION DOWN TO 10% CAPACITY.
3. PROVIDE 2-PASS EVAPORATOR AND FULL EVAPORATOR INSULATION KIT.
4. PROVIDE VIBRATION ISOLATION SPRINGS WITH 2" DEFLECTION.
5. PROVIDE FULL SOUND ENCLOSURE.
6. PROVIDE NITROGEN HOLINDG CHARGE AND SUCTION SERVICE VALVES.

AIR COOLED CONDENSING UNIT SCHEDULE

TAG	SERVES	NOMINAL CAP. TONS	HEAT REJECTION @ 45f SUCT/95 F, O.A.	EER	REFR.	EAT MIN/MAX	SUCTION TEMP	ELECTRICAL			WEIGHT	MANUF./MODEL NUMBER	REMARKS
								VOLTS/ PH	MCA	MOCP			
CU-1	CH-1	95	45 TONS / 45 TONS	11.2	R-143a	0/95 F	45F	460 / 3	20.6	25	2,296	CARRIER / 09DP095	1,2,3,4,5

NOTES:
1. PROVIDE DUAL CIRCUIT MODEL WITH 50/50 SPLIT AND ROUND-TUBE PLATE FIN CONDENSER COILS.
2. RATINGS PROVIDED ARE BASED ON 119°F SATURATED CONDENSING TEMP, 95° AMBIENT TEMP, AND 15°F SUBCOOLING.
3. PROVIDE BOTTOM SKID, SECURITY GRILLES, AND LOUVERED HAIL GUARDS.
4. PROVIDE SINGLE POINT POWER TERMINAL BLOCK FROM THE FACTORY AND EXTERNAL 60-AMP FUSED DISCONNECT WITH 25 AMP FUSES.

COMBINATION CHEMICAL FEEDER-FLUID FILTER SCHEDULE

TAG	DESCRIPTION	SYSTEM SERVED	PIPE SIZE (IN)	FLOW (GPM)	PRESS. DROP (FT. HD.)	WEIGHT (LBS)	BASIS OF DESIGN		REMARKS
							MFG.	MODEL	
FF-1	FLUID FILTER	GLYCOL LOOP	2	10	6.5	188	SKIDMORE	X-POT XP	ALL, SEE BELOW

REMARKS:
1. PROVIDE PRESSURE DIFFERENTIAL SENSOR.
2. PROVIDE THE FOLLOWING FILTER BAGS TO CLIENT FOR EACH X-POT: (3) 50 μM, (3) 25 μM, (10) 5 μM. TOTAL 16 BAGS.

Allen + Shariff
MEP Engineering
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412.322.9280
A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
DAVID C. PRICE

REVISION RECORD				
NO	DATE	DRAWN	CHECK	DESCRIPTION
1	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

CEC
Civil & Environmental Consultants, Inc.
700 Cherrington Parkway • Moon Township, Pa 15108
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GREENSBURG SALEM SCHOOL DISTRICT
JAMES H. METZGAR ELEMENTARY SCHOOL
140 CC HALL DR, NEW ALEXANDRIA, PA 15670

METZGAR
MECHANICAL
SCHEDULES

DATE:	xx-xx-xx
DWG SCALE:	AS SHOWN
PROJECT NO:	2341083
DRAWN BY:	MAB
CHECKED BY:	MAB
APPROVED BY:	DCP

DRAWING NO.:
M-1501

MECHANICAL SPECIFICATIONS

MECHANICAL GENERAL CONDITIONS (230010)

A. GENERAL

1. CONFORM TO ALL GENERAL AND SPECIAL CONDITIONS OF CONTRACT AS SPECIFIED BY ARCHITECT AND/OR OWNER.

2. PRODUCTS AND INSTALLATION SHALL COMPLY WITH ALL APPLICABLE LAWS, CODES, GOVERNMENT REGULATIONS, UTILITY COMPANY REQUIREMENTS, ETC. OF ALL AUTHORITIES HAVING JURISDICTION. WORK SHALL COMPLY WITH THE FOLLOWING CODES, STANDARDS AND ORGANIZATIONS: INTERNATIONAL MECHANICAL CODE (IMC), INTERNATIONAL PLUMBING CODE (IPC), INTERNATIONAL ENERGY CODE, NATIONAL ELECTRIC CODE, NFPA, UNDERWRITERS LABORATORY (UL), IRI, FM, SMACNA "HVAC DUCT CONSTRUCTION STANDARDS" GUIDELINES, DETAILS, & MODEL SPECIFICATION, ASHRAE. WHERE CONFLICTS EXIST BETWEEN CODES, STANDARDS OR THIS SPECIFICATION THE HIGHER REQUIREMENT SHALL APPLY. DEVIATIONS FROM THE CONTRACT DOCUMENTS REQUIRED BY THE ABOVE AUTHORITIES SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW. OBTAIN PERMITS AND PAY ALL FEES. ARRANGE FOR ALL REQUIRED INSPECTIONS AND APPROVALS. CONFIRM ALL UTILITY COMPANY REQUIREMENTS AND CONNECTION POINTS IN FIELD, PRIOR TO STARTING WORK.

3. ALL SPECIFICATIONS AND DRAWINGS, I.E., ARCHITECTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL ARE COMPLIMENTARY AND MUST BE USED IN COMBINATION TO OBTAIN COMPLETE CONSTRUCTION INFORMATION. ANY INFORMATION CONFLICTS WITHIN THE SPECIFICATIONS AND DRAWINGS SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION. DRAWINGS ARE DIAGRAMMATIC. CONFIRM ALL DIMENSIONS BY FIELD MEASUREMENT. THE EXACT LOCATIONS FOR APPARATUS, FIXTURES, EQUIPMENT AND PIPING WHICH IS NOT COVERED BY DRAWINGS, SHALL BE OBTAINED FROM THE ARCHITECT OR HIS REPRESENTATIVE IN THE FIELD, AND THE WORK SHALL BE LAID OUT ACCORDINGLY.

4. VISIT SITE, CHECK FACILITIES AND CONDITIONS MAKE ALL NECESSARY OBSERVATIONS, MEASUREMENTS, NOTE CONDITIONS UNDER WHICH WORK IS TO BE PERFORMED, AND TAKE ALL ITEMS INTO CONSIDERATION IN BID.

5. EACH CONTRACTOR SHALL PROVIDE FOR HIS OWN CLEAN-UP, REMOVAL AND LEGAL DISPOSAL OF ALL RUBBISH DAILY. CONTRACTOR SHALL PROTECT THEIR WORK AND EXISTING OR ADJACENT PROPERTY AGAINST WEATHER, TO MAINTAIN THEIR WORK, MATERIALS, APPARATUS AND FIXTURES FREE FROM INJURY OR DAMAGE. ANY WORK DAMAGED BY FAILURE TO PROVIDE PROTECTION REQUIRED, SHALL BE REMOVED AND REPLACED WITH NEW WORK AT THE CONTRACTOR'S EXPENSE.

6. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, SEQUENCES OF CONSTRUCTION AND THE SAFETY OF WORKMEN.

7. NO PIPING, DUCTWORK, CONTROLS, ETC., SHALL BE INSTALLED OR ROUTED ABOVE ELECTRICAL PANELS AND EQUIPMENT OR THROUGH ELEVATOR ROOMS.

8. THE CONTRACTOR SHALL COORDINATE AND OBTAIN A WRITTEN LISTING OF ELECTRICAL CHARACTERISTICS OF ALL MECHANICAL EQUIPMENT FROM ELECTRICAL CONTRACTOR PRIOR TO ORDERING OF EQUIPMENT. NO ADDITIONAL PAYMENT WILL BE MADE FOR LACK OF CONTRACTOR COORDINATION OF ELECTRICAL CHARACTERISTICS.

9. DURING THE BUILDING CONSTRUCTION SOME EXISTING INSTALLATION MAY BE EXPOSED THAT WILL HAVE TO BE CHANGED, ALTERED, REROUTED AND/OR ABANDONED. ANY SUCH WORK WHICH COMES UNDER THE JURISDICTION OF THIS CONTRACTOR SHALL BE DONE BY THIS CONTRACTOR WITHOUT EXTRA COST TO THE OWNER, AS THOUGH FULLY DETAILED ON PLANS AND/OR DESCRIBED IN THE SPECIFICATIONS.

10. WORK RELATED TO THE EXISTING BUILDING SHALL BE COORDINATED TO MINIMIZE INTERFERENCE OR INTERRUPTION OF NORMAL BUILDING USE BY OWNER. REFER TO ARCHITECTURAL PLANS FOR PHASING REQUIREMENTS.

11. IN CASES OF DOUBT AS TO THE WORK INTENDED, OR IN THE EVENT OF NEED FOR EXPLANATION THEREOF, THE CONTRACTOR SHALL REQUEST SUPPLEMENTARY INSTRUCTIONS FROM THE ENGINEER. NO CHANGES ARE TO BE MADE TO THE WORK OF THIS CONTRACT WITHOUT PRIOR KNOWLEDGE AND APPROVAL OF THE ENGINEER. THE CONTRACTOR SHALL HOLD THE OWNER AND ITS CONSULTANTS HARMLESS AGAINST ALL CLAIMS AND JUDGMENTS ARISING OUT OF THE CONTRACTORS PERFORMANCE OF THE WORK OF THIS CONTRACT. THE CONTRACTOR SHALL NOT PROCEED WITH ANY WORK, WHICH HE EXPECTS ADDITIONAL COMPENSATION BEYOND THE CONTRACT AMOUNT, WITHOUT WRITTEN AUTHORIZATION FROM THE APPROPRIATE AUTHORITY. FAILURE TO OBTAIN SUCH AUTHORIZATION SHALL INVALIDATE ANY CLAIM FOR EXTRA COMPENSATION.

12. IT SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR TO INSTALL THE HEATING, VENTILATION AND AIR CONDITIONING SYSTEM SO AS TO INSURE QUIET OPERATION. NO VIBRATION OR SOUND SHALL BE TRANSMITTED TO THE BUILDING, STRUCTURE OR OCCUPIED AREAS. THE DECISION OF THE ENGINEER AS TO THE QUIETNESS OF THE SYSTEM AND EQUIPMENT SHALL BE FINAL. IT SHALL BE THIS CONTRACTORS RESPONSIBILITY TO CORRECT OR REPLACE ANY NOISY SYSTEM OR EQUIPMENT AS REQUIRED.

13. OBTAIN PERMITS AND PAY ALL FEES. ARRANGE FOR ALL REQUIRED INSPECTIONS AND APPROVALS.

B. DEMOLITION

1. DISCONNECT, DISASSEMBLE, CAP, PLUG AND REMOVE ALL MEP ELEMENTS (PIPING, DUCTS, ELECTRICAL DEVICES, WIRING, CONDUIT, EQUIPMENT, HANGERS, SUPPORTS, ETC) INDICATED ON THE DRAWINGS OR NOT OTHERWISE REQUIRED FOR COMPLETED PRODUCT. NO MEP ELEMENTS ARE TO BE ABANDONED IN PLACE UNLESS SPECIFICALLY NOTED. NOT ALL ITEMS TO BE REMOVED ARE INDICATED ON DRAWING.

2. ALL OPENINGS ON PIPING AND DUCTS THAT REMAIN SHALL BE CAPPED AND PROPERLY SECURED. WIRING SHALL BE DISCONNECTED AT CIRCUIT BREAKERS AND REMOVED AND BREAKERS MARKED "SPARE." REMOVE AND RECLAIM ANY REFRIGERANT IN EXISTING SYSTEMS PRIOR TO DEMOLITION OF ANY EQUIPMENT ACCORDING TO FEDERAL REQUIREMENT.

3. ANY EQUIPMENT DESIGNATED BY OWNER TO BE SALVAGED SHALL BE PROTECTED AND DELIVERED TO AN OWNER DESIGNATED AREA ON SITE.

4. ALL ASBESTOS REMOVAL (IF REQUIRED) WILL BE HANDLED BY THE OWNER AND IS NOT A PART OF THIS WORK. IF MATERIALS SUSPECTED OF CONTAINING HAZARDOUS MATERIALS ARE ENCOUNTERED, DO NOT DISTURB; NOTIFY ARCHITECT AND OWNER IMMEDIATELY.

C. BASIS OF DESIGN AND SUBSTITUTIONS

1. WHEREVER THE WORDS "APPROVED BY", "APPROVED EQUAL", "AS DIRECTED" OR SIMILAR PHRASES ARE USED IN THE FOLLOWING SPECIFICATIONS, THEY SHALL BE UNDERSTOOD TO REFER TO THE OWNER AS THE APPROVING AGENCY. THE NAME OR MAKE OF ANY EQUIPMENT OR MATERIALS NAMED IN THE SPECIFICATION (WHETHER OR NOT THE WORDS "OR APPROVED EQUAL" ARE USED) SHALL BE KNOWN AS THE "STANDARD".

2. THESE SPECIFICATIONS ESTABLISH QUALITY STANDARDS OF MATERIALS AND EQUIPMENT TO BE PROVIDED. SPECIFIC ITEMS ARE IDENTIFIED BY MANUFACTURER, TRADE NAME OR CATALOG DESIGNATION. THE CONTRACTOR SHALL SUBMIT THE BASE BID PRICE BASED UPON STANDARD SPECIFIED EQUIPMENT DESCRIBED HEREIN AND AS DETAILED ON DRAWINGS AND ASSOCIATED CONTRACT DOCUMENTS. THE CONTRACTOR MAY SUBMIT INFORMATION ON MATERIALS AND MANUFACTURERS (OTHER THAN THOSE LISTED) FOR REVIEW BY THE OWNER, ARCHITECT, AND ENGINEER NO LATER THAN TEN (10) DAYS BEFORE BIDS ARE SUBMITTED. IN ADDITION, SAMPLES OF THE PROPOSED EQUIPMENT MAY BE REQUIRED TO BE SUBMITTED TO THE ENGINEER FOR REVIEW NO LATER THAN TEN (10) DAYS BEFORE BIDS ARE SUBMITTED. MANUFACTURERS OF PRODUCTS ACCEPTED BY THE OWNER, ARCHITECT, AND ENGINEER WILL BE LISTED IN AN ADDENDUM TO THE SPECIFICATIONS AS AN ACCEPTABLE SUBSTITUTION. EQUIPMENT ACCEPTED AS DETAILED BELOW SHALL BE SHOWN AS A SEPARATE ADD OR DEDUCT PRICE TO BE FACTORED INTO THE BASE PRICE BY THE ARCHITECT AND OWNER IF ACCEPTED.

3. SHOULD THE CONTRACTOR PROPOSE TO FURNISH MATERIALS AND EQUIPMENT OTHER THAN THOSE SPECIFIED OR APPROVED BY ADDENDUM, SUBMIT A WRITTEN REQUEST FOR SUBSTITUTION TO THE OWNER, ARCHITECT AND ENGINEER AT BID OPENING. THE REQUEST SHALL BE AN ALTERNATE TO THE ORIGINAL BID; BE ACCOMPANIED WITH COMPLETE DESCRIPTIVE (MANUFACTURER, BRAND NAME, CATALOG NUMBER, ETC.) AND TECHNICAL DATA FOR ALL ITEMS. FAILURE BY THIS CONTRACTOR TO SUBMIT THE REQUISITE DOCUMENTATION DETAILED ABOVE SHALL BE UNDERSTOOD BY THE OWNER, ARCHITECT, AND ENGINEER TO INDICATE THAT SUBSTITUTE EQUIPMENT WILL NOT BE PRESENTED BY THE CONTRACTOR FOR CONSIDERATION. SUCH SUBSTITUTIONS WILL NOT BE CONSIDERED AFTER THE BID OPENING DATE AND DELAY OF THE PROJECT WILL NOT BE PERMITTED FOR FURTHER INSPECTION AND EVALUATION AFTER THIS DATE.

4. WHERE SUCH SUBSTITUTIONS ALTER THE DESIGN OR SPACE REQUIREMENTS INDICATED ON THE DRAWINGS, INCLUDE ALL ITEMS OF COST FOR THE REVISED DESIGN AND CONSTRUCTION INCLUDING COST OF ALL ALLIED TRADES INVOLVED.

5. ACCEPTANCE OR REJECTION OF THE PROPOSED SUBSTITUTIONS SHALL BE SUBJECT TO APPROVAL OF THE OWNER, ARCHITECT, AND ENGINEER. IF REQUESTED, THE CONTRACTOR SHALL SUBMIT (AT THEIR COST) INSPECTION SAMPLES OF BOTH THE SPECIFIED AND PROPOSED SUBSTITUTE ITEMS.

6. IN ALL CASES WHERE SUBSTITUTIONS ARE PERMITTED, THE CONTRACTOR SHALL BEAR ANY EXTRA COST OF EVALUATING THE QUALITY OF THE MATERIAL AND EQUIPMENT TO BE PROVIDED.

7. ALL EQUIPMENT AND MATERIALS SHALL BE NEW, FREE OF DEFECTS AND U.L. LABELED.

D. CUTTING, PATCHING AND DRILLING

1. ALL CUTTING AND PATCHING OF THE BUILDING CONSTRUCTION REQUIRED FOR THIS WORK SHALL BE BY THIS CONTRACTOR UNLESS SHOWN ON ARCHITECTURAL DRAWINGS AND CONFIRMED AS TO SIZE AND LOCATION PRIOR TO NEW CONSTRUCTION. CUTTING SHALL BE IN A NEAT AND WORKMANLIKE MANNER. NEATLY SAW CUT ALL RECTANGULAR OPENINGS, SET SLEEVE THROUGH OPENING, AND FINISH PATCH OR PROVIDE TRIM FLANGE AROUND OPENING. CORE DRILL AND SLEEVE ALL ROUND OPENINGS. DO NOT CUT ANY STRUCTURAL COMPONENTS WITHOUT ARCHITECT'S APPROVAL.

2. PATCH AND FINISH TO MATCH ADJACENT AREAS THAT HAVE BEEN CUT, DAMAGED OR MODIFIED AS A RESULT OF THE INSTALLATION OF THE MECHANICAL OR ELECTRICAL EQUIPMENT. FIRE STOP ALL PENETRATIONS OF FIRE RATED CONSTRUCTION IN A CODE APPROVED MANNER.

3. ALL CONTRACTORS SHALL CONFIRM WITH OWNER, PRIOR TO BID, TIMES AVAILABLE FOR NOISE PRODUCING WORK SUCH AS CUTTING AND CORE DRILLING OF FLOORS, WALLS, ETC., AS WELL AS TIMES FOR WORK WHICH REQUIRE ACCESS INTO ADJOINING TENANT SPACES. INCLUDE ANY PREMIUM TIME IN BID.

4. EXACT LOCATION OF ROOFTOP EQUIPMENT SHALL BE APPROVED BY OWNER'S STRUCTURAL ENGINEER.

5. INFORMATION REGARDING REQUIRED PIPE OPENINGS IN WALLS, FLOORS, CHASES, ETC., AND CONCRETE EQUIPMENT PADS OR FOUNDATIONS SHALL BE GIVEN TO THE GENERAL CONTRACTOR BY THIS CONTRACTOR PRIOR TO THE CONSTRUCTION PERIOD. IF THIS CONTRACTOR FAILS TO COMPLY WITH THIS REQUEST, OR IF INCORRECT INFORMATION IS GIVEN, THE NECESSARY CUTTING AND PATCHING WILL BE PERFORMED BY THE GENERAL CONTRACTOR, AT THIS CONTRACTOR'S EXPENSE.

E. WARRANTY

1. FULLY WARRANT ALL MATERIALS, EQUIPMENT AND WORKMANSHIP FOR ONE (1) YEAR FROM DATE OF ACCEPTANCE.EXTEND ALL MANUFACTURER'S WARRANTIES TO OWNER, INCLUDING ALL EXTENDED WARRANTIES ON HVAC EQUIPMENT.

2. REPAIR OR REPLACE WITHOUT CHARGE TO THE OWNER ALL ITEMS FOUND DEFECTIVE DURING THE WARRANTY PERIOD. IN THE CASE OF REPLACEMENT OR REPAIR DUE TO FAILURE WITHIN THE WARRANTY PERIOD, THE WARRANTY ON THAT PORTION OF THE WORK SHALL BE EXTENDED FOR A MINIMUM PERIOD OF ONE (1) YEAR FROM THE DATE OF SUCH REPLACEMENT OR REPAIR.

F. SHOP DRAWING SUBMITTALS

1. SUBMIT SHOP DRAWINGS FOR MECHANICAL EQUIPMENT, FIRE PROTECTION SYSTEMS, DUCTWORK, AND PLUMBING FIXTURES AND EQUIPMENT WITH ADEQUATE DETAILS AND SCALES TO CLEARLY SHOW CONSTRUCTION. INDICATE THE OPERATING CHARACTERISTICS FOR EACH REQUIRED ITEM. CLEARLY IDENTIFY EACH ITEM ON THE SUBMITTAL AS TO MARK, LOCATION AND USE, USING SAME IDENTIFICATION AS PROVIDED ON DESIGN DRAWINGS.

2. DUCTWORK AND FIRE PROTECTION DRAWINGS SHALL BE FULLY DIMENSIONED BASED ON FIELD VERIFIED BUILDING CLEARANCES AND ARCHITECTURAL CEILING LAYOUTS, AND INDICATE STRUCTURAL, LIGHTING, DUCTWORK AND PIPING AT ALL CRITICAL LOCATIONS.

3. CONTRACTOR SHALL REVIEW AND INDICATE HIS APPROVAL OF EACH SHOP DRAWING PRIOR TO SUBMITTAL FOR REVIEW. DO NOT START WORK OR FABRICATION UNTIL SHOP DRAWINGS HAVE BEEN REVIEWED BY THE ENGINEER AND RETURNED TO THE CONTRACTOR.

4. SUBMITTALS WILL BE REVIEWED ONLY FOR GENERAL COMPLIANCE WITH THE CONTRACT DOCUMENTS AND NOT FOR DIMENSIONS OR QUANTITIES. THE SUBMITTAL REVIEW SHALL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR PURCHASE OF ANY ITEM IN FULL COMPLIANCE WITH THE CONTRACT DOCUMENTS OR ITS COMPLETE AND PROPER INSTALLATION.

5. WHERE SUBMITTALS VARY FROM THE CONTRACT REQUIREMENTS, THE CONTRACTOR SHALL CLEARLY INDICATE ON SUBMITTAL OR ACCOMPANYING DOCUMENTS THE NATURE AND REASON FOR VARIATIONS.

6. REFER TO VARIOUS SECTIONS FOR LISTING OF SHOP DRAWINGS REQUIRED ON THIS PROJECT.

7. EACH MANUFACTURER OR HIS REPRESENTATIVE MUST CHECK THE APPLICATION OF HIS EQUIPMENT AND CERTIFY AT TIME OF SHOP DRAWING SUBMITTAL THAT EQUIPMENT HAS BEEN PROPERLY APPLIED AND CAN BE INSTALLED, SERVICED AND MAINTAINED WHERE INDICATED ON DRAWINGS. ADVISE ENGINEER IN WRITING WITH SUBMITTAL DRAWINGS OF ANY POTENTIAL PROBLEMS. THE MANUFACTURER SHALL BE RESPONSIBLE FOR ANY CHANGES THAT MIGHT BE NECESSARY BECAUSE OF PHYSICAL CHARACTERISTICS OF EQUIPMENT THAT HAVE NOT BEEN CALLED TO THE ENGINEER'S ATTENTION AT THE TIME OF SUBMITTAL.

G. RECORD DRAWINGS

1. EACH CONTRACTOR OR SUBCONTRACTOR SHALL KEEP ONE (1) COMPLETE SET OF THE CONTRACT WORKING DRAWINGS ON THE JOB SITE ON WHICH HE SHALL REGULARLY RECORD ANY DEVIATIONS OR CHANGES FROM SUCH CONTRACT DRAWINGS MADE DURING CONSTRUCTION.

2. THESE DRAWINGS SHALL RECORD THE LOCATION OF ALL CONCEALED EQUIPMENT, PIPING, ELECTRIC SERVICE, SEWERS, WASTES, VENTS, DUCTS, CONDUIT AND OTHER PIPING, BY MEASURED DIMENSIONS TO EACH SUCH ITEM FROM READILY IDENTIFIABLE AND ACCESSIBLE WALLS OR CORNERS OF THE BUILDING. PLANS ALSO SHALL SHOW INVERT ELEVATION OF SEWERS AND TOP ELEVATION OF ALL OTHER BELOW-GRADE LINES.

3. RECORD DRAWINGS SHALL BE KEPT CLEAN AND UNDAMAGED AND SHALL NOT BE USED FOR ANY PURPOSE OTHER THAN RECORDING DEVIATIONS FROM WORKING DRAWINGS AND EXACT LOCATIONS OF CONCEALED WORK.

4. AFTER THE PROJECT IS COMPLETED, THESE SETS OF DRAWINGS SHALL BE DELIVERED TO THE ARCHITECT IN GOOD CONDITION, AS A PERMANENT RECORD OF THE INSTALLATION AS ACTUALLY CONSTRUCTED.

H. FIRESTOPPING

1. ALL SERVICES THAT PASS THRU FIRE OR SMOKE RATED PARTITIONS, WALLS, FLOORS, SHALL BE FIRESTOPPED. FIRE STOPPING RATING SHALL MATCH PARTITION RATING. ALL FIRE STOPPING SYSTEM SHALL MEET THE REQUIREMENTS OF ASTM E 814,UL 1479, AND BE FACTORY MUTUAL APPROVED.

2. ALL FIRESTOPPING AND/OR SMOKE STOPPING MATERIAL AND INSTALLATION SHALL BE AS MANUFACTURED BY HILTI OR APPROVED EQUAL.

I. ACCESS DOORS & PANELS

1. ACCESS DOORS SHALL BE PROVIDED IN WALLS AND CEILINGS WHERE REQUIRED TO PERMIT PROPER ACCESS TO VALVES AND ANY OTHER SUCH DEVICES WHICH REQUIRE MAINTENANCE OR SERVICE. DOORS PLACED IN WALLS, PARTITIONS OR OTHER FIRE-RATED CONSTRUCTION SHALL HAVE A LABEL SIGNIFYING THAT THE DOOR HAS THE SAME FIRE RATING AS THE FIRE-RATED CONSTRUCTION.

2. THIS CONTRACTOR SHALL FURNISH ACCESS PANELS TO THE GENERAL CONTRACTOR FOR INSTALLATION.

3. ACCESS PANELS SHALL BE CONSTRUCTED OF 14 GAUGE STEEL, WITH 16 GAUGE STEEL FRAMES. DOORS SHALL FINISH FLUSH WITH THE SURROUNDING SURFACE. FRAMES SHALL HAVE 3 INCH WIDE EXPANDED METAL FOR PLASTERED SURFACES AND PLAIN FLANGED TYPE FRAME FOR TILE, MASONRY OR GYPSUM BOARD SURFACES. DOORS AND FRAMES SHALL BE FURNISHED PRIME COATED. DOORS INSTALLED IN CERAMIC TILE OR OTHER NON-PAINTED SURFACES SHALL BE STAINLESS STEEL. HINGES SHALL BE CONCEALED SPRING TYPE, TO ALLOW DOORS TO BE OPENED 175 DEGREES. LOCKS SHALL BE FLUSH SCREWDRIVER TYPE WITH STEEL CAMS. ACCESS PANELS SHALL BE 16 INCHES BY 16 INCHES OR LARGER AS MAY BE REQUIRED FOR PROPER ACCESS TO THE DEVICE BEING SERVED.

4. ACCESS PANELS ARE NOT REQUIRED IN COMPLETELY ACCESSIBLE LIFT OUT TILE CEILINGS. CONTRACTOR SHALL REVIEW THE ROOM FINISH SCHEDULE ON THE ARCHITECTURAL DRAWINGS IN ORDER TO VERIFY THE NEED FOR ACCESS PANEL

J. PAINTING

1. IN FINISHED SPACES, PAINTING OF ALL MECHANICAL EQUIPMENT, APPARATUS, AND PIPING SHALL BE DONE BY THE PAINTING TRADE UNDER THE GENERAL CONTRACTOR SPECIFICATION, EXCEPT WHERE SPECIFIED TO BE DONE BY THE MECHANICAL CONTRACTOR.

K. TEMPORARY HEAT

1. THE COSTS OF TEMPORARY HEAT, INCLUDING UTILITY COSTS, SHALL BE AT THE EXPENSE OF THE HEATING TRADE (MECHANICAL CONTRACTOR). THE HEATING TRADE SHALL PROVIDE THE MEANS OF TEMPORARY HEAT. EXISTING HEATING EQUIPMENT AND SYSTEMS MAY NOT BE USED DURING CONSTRUCTION AS THE SYSTEMS SERVE OTHER OCCUPIED SPACES WITHIN THE BUILDING.

2. THE PERMANENT MECHANICAL SYSTEM SHALL NOT BE USED UNDER ANY EXCEPTIONS TO PROVIDE TEMPORARY HEATING, VENTILATING, EXHAUST OR AIR CONDITIONING UNTIL THE BUILDING IS CLEAN, WITHOUT ANY DUST OR DEBRIS THAT CAN ENTER THE MECHANICAL SYSTEM AND IS READY FOR OCCUPANCY. COVERING THE RETURN/EXHAUST AIR INLETS WITH FILTER MEDIA IS NOT AN ACCEPTABLE ALTERNATIVE TO HAVING AN ENCLOSED, DUST-FREE ENVIRONMENT FOR THE SYSTEMS TO OPERATE IN. IN NO EVENT SHALL THE MECHANICAL CONTRACTOR'S ONE YEAR WARRANTY BE SHORTENED BY THE USE OF PERMANENT EQUIPMENT FOR TEMPORARY HEAT.

HYDRONIC PIPING (232113)

1. PIPE AND FITTINGS -- HYDRONIC PIPING 2" AND SMALLER SHALL BE:
   - 1.1. 1) TYPE "L" HARD COPPER TUBING ASTM B 88-832 WITH SWEATED JOINTS PER ASTM B 16.22 USING 95/5 OR ANTIMONY SOLDER OR "PRESS-FIT" MECHANICAL JOINTING. ALL FITTINGS SHALL BE MADE FROM WROUGHT COPPER.
   - 1.2. 2) SCHEDULE 40 STEEL PIPING WITH VICTAULIC PLAIN END QUICKVIC SD (R) FITTINGS. FITTINGS SHALL BE MADE FROM DUCTILE IRON. PROVIDE SCREWED UNIONS OR GROOVED FITTINGS AT FINAL CONNECTIONS TO EQUIPMENT TO ALLOW DISCONNECTION FOR REPAIR OR SERVICING.

2. PIPING 2 -1/2" AND LARGER SHALL BE SCHEDULE 40, WELDED BLACK STEEL (ASTM A53) WITH BLACK WROUGHT STEEL, BUTT WELDING TYPE (ASTM B16.9) FITTINGS, OR SCHEDULE 40 GROOVED BLACK STEEL (ASTM A53) WITH GROOVED FITTINGS MADE BY VICTAULIC, OR APPROVED EQUAL, MAY BE USED.

3. GROOVED JOINTS QUALITY ASSURANCE: GROOVED JOINTS SHALL BE VISUALLY VERIFIABLE TO ENSURE PROPER INSTALL PER MANUFACTURER'S INSTALLATION INSTRUCTIONS. IF WRITTEN MANUFACTURER'S INSTRUCTIONS REQUIRE A VERIFIED TORQUE RATHER THAN A VISUAL VERIFICATION, A TORQUE LOG OF EVERY COUPLING SHALL BE PROVIDED FOR APPROVAL TO THE ENGINEER AND OWNER TO VERIFY PROPER INSTALL.

4. BALL VALVES --- UP TO 2": BRONZE TWO PIECE BODY, STAINLESS STEEL BALL, TEFLON SEATS AND BLOW-OUT PROOF STUFFING BOX RING, LEVER HANDLE, AND BALANCING STOPS, UNION SOLDER ENDS. ACCEPTABLE MANUFACTURERS: APOLLO, LEGEND VALVE, VICTAULIC, OR WATTS.

5. BUTTERFLY VALVES -- BUTTERFLY VALVES SHALL BE BRAY MODEL 31 OR EQUAL WITH DUCTILE IRON LUG STYLE BODY, OR VICTAULIC WITH GROOVED CONNECTIONS, BRONZE DISC, 416 STAINLESS STEEL SHAFT, BRONZE BEARINGS, "EPDM" RUBBER SEAT, LEVER HANDLE OPERATORS AND SHALL BE RATED AT 175 POUNDS CWP. VALVES SHALL PROVIDE DEAD TIGHT SHUTOFF CAPABILITY IN EITHER DIRECTION UP TO 150 PSI WHEN THE DOWNSTREAM FLANGES ARE REMOVED.

6. VENT AND DRAIN VALVES -- ALL WATER PIPING SYSTEMS SHALL BE INSTALLED IN SUCH A MANNER THAT THEY CAN BE COMPLETELY VENTED AND DRAINED. UNLESS OTHERWISE NOTED, PROVIDE AT ALL HIGH POINTS WHERE AIR CAN COLLECT 1/4" BRASS COMPRESSION VENT COCKS, AND AT ALL LOW POINTS ½" BALL VALVES WITH HOSE BIB ENDS AND CAPS.

7. PRESSURE/TEMPERATURE PLUGS -- PROVIDE SISCO OR PETERSON 1/4_INCH NPT FITTING OF SOLID BRASS, FOR 1/8" O.D. PROBE. VALVE CORE SHALL BE NEOPRENE FOR TEMPERATURE TO 200 F, AND RATED FOR ZERO LEAKAGE FROM VACUUM TO 1,000 PSIG. PROVIDE TEST KIT CONSISTING OF TWO PRESSURE GAGES WITH PROBES AND 2 DIAL THERMOMETERS WITH CARRYING CASE.

8. STRAINERS -- Y-PATTERN, BODY: ASTM A 126, CLASS B CAST IRON, WITH BOLTED OR SCREWED COVER AND BOTTOM DRAIN CONNECTION. END CONNECTIONS: THREADED ENDS FOR STRAINERS NPS 2 AND SMALLER; FLANGED ENDS FOR STRAINERS NPS 2-1/2 AND LARGER. STRAINER SCREEN: STAINLESS-STEEL, 20-MESH STRAINER, OR PERFORATED STAINLESS-STEEL BASKET. WITH TAPPED BLOWOFF PLUG. RATING: 150-PSIG WORKING PRESSURE.

9. BALANCING VALVES -- PROVIDE VICTAULIC MULTI-TURN BALANCING VALVES WHERE SHOWN IN PIPING DETAILS ON THE DRAWINGS. VALVES SHALL BE OF BRONZE CONSTRUCTION (½" TO 2" SIZES) WITH EPDM SEATS/SEALS. VALVES SHALL HAVE DIFFERENTIAL PRESSURE READOUT PORTS, CONCEALED LOCKABLE MEMORY STOP, CALIBRATED NAMEPLATE AND DRAIN PORT. EACH VALVE SHALL HAVE POSITIVE SHUTOFF AND SHALL BE CONSTRUCTED FOR 300 PSIG RATED PRESSURE.

10. AUTOMATIC BALANCING VALVES -- PROVIDE VICTAULIC AUTOMATIC BALANCING VALVES, OR APPROVED EQUAL, WHERE SHOWN IN PIPING DETAILS ON DRAWINGS. VALVES SHALL HAVE BRASS BODIES AND CHANGEABLE FLOW CARTRIDGES.

11. PROVIDE VALVES AND UNIONS WHERE NEEDED TO PERMIT DISCONNECTIONS OF EACH PIECE OF EQUIPMENT FOR REPAIRS. MAKE CONNECTIONS TO EQUIPMENT WITH SHUT-OFF VALVES ON SUPPLY AND BALANCE VALVES ON RETURNS. INSTALL UNIONS IN PIPES 2" AND SMALLER, ADJACENT TO EACH VALVE, AT FINAL CONNECTIONS EACH PIECE OF EQUIPMENT, AND ELSEWHERE AS INDICATED. UNIONS ARE NOT REQUIRED ON FLANGED DEVICES.

12. CONNECTIONS BETWEEN DISSIMILAR PIPING MATERIALS SHALL BE MADE WITH SUITABLE DIELECTRIC INSULATING UNIONS. ISOLATE COPPER PIPING FROM DISSIMILAR METALS, SUCH AS METAL STUDS AND VENT PIPING.

13. CLOSED SYSTEM WATER TREATMENT -- FILL SYSTEM WITH WATER AND LOW FOAM DETERGENT TO REMOVE DIRT AND SCALE, CIRCULATE UNTIL SYSTEM IS CLEAN AND FLUSH UNTIL WATER IS CLEAR AND REFILL WITH CLEAN WATER . ADD CORROSION AND RUST INHIBITORS. CHECK PH AND ADD CHEMICALS TO ADJUST PH PER MANUFACTURER'S INSTRUCTIONS. PROVIDE CHEMICAL POT FEEDER AND PIPE ACROSS SYSTEM. PROVIDE CHEMICAL TO TREAT SYSTEM FOR ONE YEAR. RECHECK AFTER ONE YEAR AND ADD CHEMICAL AS NEEDED FOR PROPER CHEMICAL TREATMENT.

14. PROVIDE CONDENSATE DRAIN FOOR ALL COOLING COILS. ALL CONDENSATE DRAINS SHALL BE TRAPPED PER THE COOLING COIL TRAP DETAIL OR MANUFACTURERS RECOMMENDATIONS, WHICH EVER IS MORE STRINGENT/DEEPER. PROVIDE CLEANOUT.

15. CONDENSATE DRAIN PIPING IN RETURN AIR RATED PLENUMS SHALL BE TYPE L COPPER WITH 1/2" FIBERGLASS INSULATION (MIN. R-VALUE = 3). SCHEDULE 40 PVC WITHOUT INSULATION MAY BE USED IN ALL OTHER LOCATIONS.

16. WHERE DAMAGE TO ANY BUILDING COMPONENT COULD OCCUR AS A RESULT OF OVERFLOW OR STOPPAGE OF THE PRIMARY CONDENSATE DRAIN SYSTEM, PROVIDE UL 508 WATER-LEVEL DETECTION DEVICE IN THE PRIMARY DRAIN PAN, OVERFLOW OUTLET OR IN A SECONDARY DRAIN PAN PER IMC REQUIREMENTS. COOLING SYSTEM SHALL DISABLE UPON DETECTION OF WATER AND GENERATE A BAS ALARM(IF APPLICABLE).

REFRIGERANT PIPING (232300)

1. INSTALL REFRIGERANT PIPING BETWEEN CONDENSING UNIT AND DX COIL. PIPING SHALL BE REFRIGERANT GRADE TYPE ACR COPPER WITH BRAZED JOINTS. PIPE PER MANUFACTURER'S PIPING DIAGRAMS AND RECOMMENDATIONS.

2. ISOLATE PIPING FROM STRUCTURE WITH ONE (1) INCH INSULATION BETWEEN ALL PIPING AND SUPPORT POINTS.

3. AFTER COMPLETION, PRESSURE TEST PIPING, PURGE WITH NITROGEN AND EVACUATE SYSTEM TWICE AND CHARGE SYSTEM WITH REFRIGERANT AND OIL.

4. INSTALL PIPING IN AS SHORT AND DIRECT ARRANGEMENT AS POSSIBLE TO MINIMIZE PRESSURE DROP. PROVIDE OIL TRAPS OR DOUBLE RISERS AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER.

5. INSTALL UNIONS TO ALLOW REMOVAL OF SOLENOID VALVES, PRESSURE REDUCING VALVES, EXPANSION VALVES, AND AT CONNECTIONS TO COMPRESSORS AND EVAPORATORS.

6. FILL THE PIPE AND FITTINGS WITH NITROGEN DURING BRAZING TO PREVENT FORMATION OF SCALE.

PIPE WALL SEALS (230517)

1. WALL PIPE SEALS WITH RUBBER LINKS SHALL BE THUNDERLINE LINK SEAL, OR APPROVED EQUAL. WALL PIPE SEALS WITH INORGANIC MATERIAL LINKS THE PENETRATIONS OF FIRE RATED WALLS SHALL BE THUNDERLINE PYRO-PAC, OR APPROVED EQUAL.

2. SEALS SHALL BE MODULAR MECHANICAL TYPE CONSISTING OF INTERLOCKING SYNTHETIC RUBBER OR INORGANIC MATERIAL LINKS SHAPED TO CONTINUOUSLY FILL THE ANNULAR SPACE BETWEEN THE PIPE AND WALL OPENING. LINKS SHALL BE LOOSELY ASSEMBLED WITH BOLTS TO FORM A CONTINUOUS BELT AROUND THE PIPE. A PRESSURE PLATE SHALL BE PROVIDED UNDER THE BOLT HEAD AND NUT OF EACH LINK. SEALS SHALL BE CONSTRUCTED TO PROVIDE ELECTRICAL INSULATION BETWEEN THE PIPE AND SLEEVE, THUS REDUCING CHANCES OF CATHODIC REACTION BETWEEN THESE TWO MEMBERS.

3. AFTER THE SEAL ASSEMBLY IS POSITIONED IN THE SLEEVE, THE TIGHTENING OF THE BOLTS SHALL CAUSE THE SEALING ELEMENTS TO EXPAND AND PROVIDE AN ABSOLUTELY WATER-TIGHT SEAL BETWEEN THE PIPE AND SLEEVE.

4. SLEEVES SHALL BE MANUFACTURED FROM HEAVY-WALL, WELDED OR SEAMLESS STEEL PIPE. A FULL CIRCLE CONTINUOUSLY WELDED WATER STOP PLATE SHALL BE PROVIDED TO ASSURE POSITIVE WATER SEALING OF THE SLEEVE. SLEEVE SHALL BE PROTECTED BY A COATING OF ENRICHED RED PRIMER.

DUCTWORK (233113)

1. FABRICATE AND ERECT ALL DUCTWORK TO ASHRAE AND SMACNA STANDARDS FROM G90 GALVANIZED STEEL. COMPLY WITH NFPA BULLETIN 90A REQUIREMENTS.

2. SUPPLY DUCTWORK UPSTREAM OF TERMINAL UNITS AND WITHIN 15' OF ANY AHU FAN OUTLET SHALL HAVE A SMACNA 3" STATIC PRESSURE RATING WITH SEAL CLASS A SEAMS AND JOINTS.

3. GENERAL SUPPLY AND RETURN DUCTWORK HAVE A SMACNA 2" STATIC PRESSURE RATING WITH SEAL CLASS B SEAMS AND JOINTS.

4. OUTDOOR AIR INTAKE DUCTWORK SHALL HAVE A SMACNA 2" STATIC PRESSURE RATING WITH SEAL CLASS A SEAMS AND JOINTS.

5. ALL EXPOSED ROUND AND OVAL DUCTWORK IN SHALL HAVE SPIRAL LOCKSEAM CONSTRUCTION.

6. ALL RECTANGULAR TRANSFER DUCTWORK SHALL HAVE 1" THICK ACOUSTICAL LINER. LINER SHALL BE FLEXIBLE AND CONSTRUCTED OF GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. THE SURFACE OF THE LINER SHALL HAVE AN ANTIMICROBIAL EROSION RESISTANCE COATING TESTED BY NRTL AND REGISTERED BY THE EPA FOR USE IN HVAC SYSTEMS. MINIMUM R-VALUE SHALL BE 4.2.

7. INCLUDE ALL ACOUSTIC, DOUBLE RADIUS AIRFOIL SHAPED PERFORATED ALUMINUM TURNING VANES, MANUAL DAMPERS, FLEXIBLE CONNECTORS, GRILLES AND DIFFUSERS, ACOUSTIC LINING, AND OTHER SHEET METAL ACCESSORIES FOR THE PROJECT. VOLUME DAMPERS TO BE OF OPPOSED BLADE TYPE CONSTRUCTED IN ACCORDANCE WITH "SMACNA" STANDARDS.

8. ALL BRANCH CONNECTION FITTINGS IN RECTANGULAR DUCTWORK SHALL BE 45 DEGREE TRANSITION TYPE, CONICAL FITTINGS OR SPIN-IN FITTINGS. BUTT FITTINGS ARE NOT ACCEPTABLE.

9. PROVIDE FIRE DAMPERS WITH ACCESS DOORS AT ALL FIRE RATED WALLS, PARTITIONS AND CEILINGS. DAMPERS SHALL HAVE RATING EQUIVALENT TO BARRIER. DAMPER SHALL BE THE DYNAMIC TYPE AND SHALL BE ABLE TO CLOSE AGAINST AN AIRSTREAM. DAMPERS SHALL MEET ALL NFPA, IBC, AND UL 555 REQUIREMENTS.

10. PROVIDE COMBINATION FIRE/SMOKE DAMPERS AT ALL FIRE AND/OR SMOKE RATED SHAFT AND WALL LOCATIONS. EACH COMBINATION FIRE SMOKE DAMPER SHALL HAVE 16 GA. GALVANIZED BLADES STRENGTHENED WITH GROOVES MEETING REQUIREMENTS OF UL STANDARD 555 & 555S AND HAVE AN 1-1/2 HOUR RATING. BASIS OF DESIGN SHALL BE GREENHECK MODEL FSD 200 SERIES. DAMPERS SHALL BE EQUIPPED STANDARD WITH AN ELECTRIC HEAT-RESPONSIVE DEVICE THAT PERFORMS THE SAME FUNCTION AS A FUSIBLE LINK TO CLOSE DAMPER AT 350 °F. THE DAMPER OPERATION AND CONSTRUCTION SHALL MEET UL 555 REQUIREMENTS.

11. PROVIDE CURBS FOR ALL ROOF OPENINGS FOR DUCTS, FLUES, PIPING AND EQUIPMENT. CURBS SHALL BE FURNISHED AS ACCESSORIES TO THE EQUIPMENT OR 8" HIGH PATE OR EQUAL EQUIPMENT SUPPORTS SPANNING STRUCTURE AND FLASHED INTO ROOFING. ALL CUTTING, FLASHING, AND PATCHING OF ROOF SHALL BE BY OWNER'S ROOFING CONTRACTOR AND PAID FOR BY MECHANICAL CONTRACTOR.

DUCTWORK EXTERNAL INSULATION & PIPE INSULATION (230713, 230719)

1. INSULATE DUCTWORK AS DESCRIBED IN DUCTWORK INSULATION SCHEDULE. FIBERGLASS DUCT WRAP SHALL BE FULLY SECURED TO DUCT. LAP AND TAPE SEAMS AND SECURE TIGHTLY TO THE DUCTS WITH WIRE OR STICK PINS.

2. DO NOT INSULATE:
   - 2.1. MAKE-UP AIR DUCTWORK OPERATING AT SURROUNDING AMBIENT CONDITIONS.
   - 2.2. RETURN AND EXHAUST AIR DUCTWORK LOCATED WITHIN THE BUILDING ENVELOPE. (DOES NOT INCLUDE BUILDING SHAFTS.)
   - 2.3. TRANSFER AIR DUCTWORK (ACOUSTICALLY LINE DUCT, CLEAR INSIDE DIMENSIONS SHOWN ON PLANS)
   - 2.4. EXPOSED SUPPLY DUCTWORK LOCATED IN CONDITIONED SPACE. (DOES NOT INCLUDE RETURN AIR PLENUM)
   - 2.5. PHENOLIC DUCTWORK

3. INTERNAL DUCT INSULATION -- DUCTWORK INDICATED TO HAVE INTERNAL INSULATION SHALL BE INTERNALLY COVERED WITH 1" THICK FIBERGLASS INSULATION MANUFACTURED FROM A ROTARY PROCESS WITH A NON-WOVEN HYDROPHOBIC FACING. FOR DUCTWORK LOCATED OUTDOORS USE INSULATION AS ABOVE THAT IS 2" THICK. INSULATION SHALL HAVE AN "R" RATING OF 4.2 FOR 1" THICK INSULATION AND R-8 FOR 2" THICK INSULATION. INSULATION SHALL HAVE FLAME/SMOKE RATING OF 25/50. INSULATION SHALL WITHSTAND DUCT VELOCITIES OF 4000 FPM MINIMUM. DUCT SIZES SHOWN ON DRAWINGS ARE CLEAR INTERNAL DIMENSIONS. WHERE LINER IS USED, INCREASE OUTSIDE DIMENSIONS OF DUCT TO MAINTAIN INTERNAL DIMENSIONS. INSTALL LINER PER SMACNA OR NAIMA STANDARDS.

4. HYDRONIC PIPING TO BE INSULATED AS DESCRIBED IN PIPING INSULATION SCHEDULE. PROVIDE SECTIONAL GLASS FIBER PIPE INSULATION HAVING FACTORY APPLIED WHITE "ALL SERVICE" JACKET. LONGITUDINAL FLAPS SHALL BE SELF-SEALING TYPE ADDITIONALLY SECURED WITH NONFERROUS FLARE DOOR STAPLES SPACED 6" ON CENTERS. END JOINTS SHALL BE CLOSED WITH 4" WIDE SELF-SEALING TAPE STAPLED IN PLACE. ALL FITTINGS TO BE FINISHED WITH PRE_MOLDED ONE-PIECE ZESTON TYPE PVC COVERS WITH FIBERGLASS INSULATION INSIDE. SEAL ALL VISIBLE RAW FIBERGLASS WITH BENJAMIN FOSTER #3036 WHITE MASTIC.

5. INSULATE REFRIGERANT PIPING LINES AS DESCRIBED IN PIPING INSULATION SCHEDULE WITH ELASTOMERIC FOAM INSULATION WITH SELF-SEALING SEAM. ARMACELL - AP ARMAFLEX SS INSULATION. PAINT CLOSED CELL INSULATION OUTDOORS WITH TWO COATS OF UV RESISTANT PAINT PER MANUFACTURER'S RECOMMENDATIONS. USE PRE-MOLDED COVERS OVER FITTINGS, VALVES, ELBOWS AND CONTROL DEVICES SEALED VAPOR TIGHT.

6. INSULATION SHALL BE OMITTED FROM HOT SYSTEM VALVE BODIES STRAINERS AND UNIONS. SYSTEMS OPERATING BELOW AMBIENT TEMPERATURE SHALL HAVE ALL VALVE BODIES AND PIPING SPECIALTIES FULLY INSULATED. ALL VALVE BODIES, STRAINERS, UNIONS, PUMP CASING, WATER SEPARATORS, ETC. IN COLD PIPING SHALL BE COVERED SAME AS PIPING SYSTEM. PIPE HANGERS ON INSULATED PIPE SHALL BE OUTSIDE OF THE INSULATION, SIZED ACCORDINGLY AND WITH SADDLE INSERT SUFFICIENT TO PROTECT INSULATION FROM CRUSHING.

7. ALL INSULATION TO BE APPLIED IN FULL ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. ALL INSULATION SHALL COMPLY WITH 25/50 FLAME AND SMOKE HAZARD RATINGS PER ASTM E-84, NFPA 255 AND UL 723.

8. PROVIDE REMOVABLE INSULATION SECTIONS TO COVER PARTS OF EQUIPMENT WHICH MUST BE OPENED PERIODICALLY FOR MAINTENANCE; INCLUDE METAL VESSEL COVERS, FASTENERS, FLANGES, CHILLED WATER PUMPS, FRAMES AND ACCESSORIES.

9. REPLACE DAMAGED INSULATION WHICH CANNOT BE REPAIRED SATISFACTORILY, INCLUDING UNITS WITH VAPOR BARRIER DAMAGE AND MOISTURE SATURATED UNITS.

10. CONDENSATE DRAIN PIPING IN RETURN AIR RATED PLENUMS SHALL BE TYPE L COPPER WITH 1/2" FIBERGLASS INSULATION (MIN. R-VALUE = 3). SCHEDULE 40 PVC WITHOUT INSULATION MAY BE USED IN ALL OTHER LOCATIONS.

HANGERS AND SUPPORTS (230529)

1. SUPPORT ALL PIPING FROM STRUCTURE WITH UL LISTED HANGERS AND SUPPORTS SUITABLE FOR THE INTENDED INSTALLATION. DESIGN, SELECTION, SPACING, AND APPLICATION OF HANGERS AND SUPPORTS SHALL COMPLY WITH ANSI B31.1 AND MSS SP-69. HANGERS SHALL BE MANUFACTURED BY PENTAIR., OR APPROVED EQUAL. BLACK OR GALVANIZED STEEL PIPE = MODEL NO. 100, CAST IRON PIPE = MODEL NO. 400, COPPER TUBING = MODEL NO. 102-A.

2. CONTRACTOR SHALL PROVIDE INSULATION HANGER WITH PROTECTIVE SHIELDS, SUCH AS PENTAIR, MODEL NO. 125, OR APPROVED EQUAL FOR ALL INSULATED PIPING.

3. CONTRACTOR SHALL PROVIDE RISER CLAMPS FOR VERTICAL PIPING AT EACH LEVEL. RISER CLAPS SHALL BE PENTAIR MODEL NO. 510 FOR STEEL PIPING AND MODEL NO. 511 FOR COPPER TUBING OR APPROVED EQUAL. USE "SHORT-END" RISER CLAMPS WHERE SPACE IS LIMITED.

4. CONTRACTOR SHALL PROVIDE SIDE BEAM CLAMPS FOR SUPPORTING PIPING FROM STRUCTURAL STEEL MEMBERS. BEAM CLAMPS SHALL BE MANUFACTURED BY PENTAIR, MODEL 300 OR APPROVED EQUAL.

5. WHERE OTHER MEANS OF SUPPORT PIPING ARE REQUIRED OR DESIRED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE ENGINEER'S APPROVAL PRIOR TO INSTALLING THOSE SUPPORTS.

6. HANGERS AND SUPPORTS SHALL BE SPACED AT INTERVALS WHICH WILL PREVENT SAGGING AND REDUCE STRAIN ON VALVES AND SPECIALTIES. HANGER SPACING SHALL BE NO GREATER AND ROD SIZE SHALL BE NO SMALLER THAN THAT SHOWN IN THE FOLLOWING TABLE. HANGERS SHALL ALLOW FOR EXPANSION AND CONTRACTION. HANGER SHALL BE PROVIDED AT EACH CHANGE OF DIRECTION.

7. RISER CLAMPS SHALL BE INSTALLED ABOVE THE FLOOR AT EACH LEVEL. RISER CLAMPS MAY BE SUSPENDED BELOW FLOOR LEVEL, WITH HANGER RODS AND INSERTS, WHERE THE INSTALLATION OF ESCUTCHEON PLATES IS REQUIRED.

EQUIPMENT (235000)

1. MAKE ALL FINAL EQUIPMENT CONNECTIONS AND PROVIDE THE NECESSARY ADAPTORS, FITTINGS, VALVES, DEVICES, ETC. FOR A COMPLETE AND OPERABLE SYSTEM. PROVIDE COMPLETE WITH BASES, ISOLATORS, SUPPORTS AND OTHER REQUIRED ACCESSORIES.

2. EQUIPMENT SHALL BE INSTALLED IN FULL ACCORDANCE WITH THE MANUFACTURER'S DATA AND INSTALLATION INSTRUCTIONS, INCLUDING CLEARANCES; LUBRICATE AND ADJUST AS REQUIRED. IT IS THIS CONTRACTOR'S RESPONSIBILITY TO CHECK AND CONFORM TO THESE REQUIREMENTS PRIOR TO STARTING WORK. FURNISH AND INSTALL CLEAN SET OF FILTERS PRIOR TO BALANCING.

3. THE CONTRACTOR SHALL COORDINATE ELECTRICAL CHARACTERISTICS OF ALL MECHANICAL EQUIPMENT PRIOR TO ORDERING OF EQUIPMENT. COORDINATE REQUIREMENT FOR PROVISION OF MOTOR STARTERS, DISCONNECTS, CONTACTORS, CONTROL WIRING, ETC. AS REQUIRED FOR PROPER FUNCTIONING SYSTEM WITH ELECTRICAL CONTRACTOR. NO ADDITIONAL PAYMENT WILL BE MADE FOR LACK OF CONTRACTOR COORDINATION OF ELECTRICAL CHARACTERISTICS.

4. ALL FLOOR MOUNTED EQUIPMENT SHALL BE INSTALLED ON CONCRETE HOUSEKEEPING PADS. MINIMUM PAD THICKNESS SHALL BE NOMINAL 4". PAD SHALL EXTEND BEYOND THE EQUIPMENT A MINIMUM OF 4" ON EACH SIDE. CONCRETE PADS SHALL BE PROVIDED BY THIS CONTRACTOR. IT SHALL BE THE RESPONSIBILITY OF THE THIS CONTRACTOR TO COORDINATE THE SIZE AND LOCATION OF THE CONCRETE HOUSEKEEPING PADS WITH THE GENERAL CONTRACTOR.

5. ALL EQUIPMENT SHALL BE MOUNTED ON VIBRATION ISOLATORS TO PREVENT THE TRANSMISSION OF VIBRATION AND MECHANICALLY TRANSMITTED SOUND TO THE BUILDING STRUCTURE.

6. ISOLATION EQUIPMENT SHALL BE THE PRODUCT OF A SINGLE MANUFACTURER, AND SHALL BE DESIGNED SPECIFICALLY FOR THE APPLICATION REQUIRED. THIS INCLUDES, BUT IS NOT LIMITED TO, PIPING DUCTWORK, PUMPS, COMPRESSORS. VIBRATION ISOLATORS SHALL BE RATED FOR THE WEIGHT AND SPACING REQUIRED FOR THE EQUIPMENT REQUIRING ISOLATION.

7. PROVIDE CURBS FOR ALL ROOF OPENINGS FOR DUCTS, FLUES, PIPING AND EQUIPMENT. CURBS SHALL BE FURNISHED AS ACCESSORIES TO THE EQUIPMENT OR 8" HIGH PATE OR EQUAL EQUIPMENT SUPPORTS SPANNING STRUCTURE AND FLASHED INTO ROOFING. ALL CUTTING, FLASHING, AND PATCHING OF ROOF SHALL BE BY OWNER'S ROOFING CONTRACTOR AND PAID FOR BY MECHANICAL CONTRACTOR.

CONTROLS (230910)

1. PROVIDE COMPLETE TEMPERATURE CONTROLS FOR ALL HVAC SYSTEMS. PROVIDE NEW CONTROL DEVICES INCLUDING DAMPER OPERATORS, TEMPERATURE SENSORS, STAGING RELAYS AND OTHER REQUIRED DEVICES TO PROVIDE A COMPLETE OPERATIONAL SYSTEM PER THE FOLLOWING OPERATING SEQUENCE. MOUNT ALL CONTROLS FURNISHED AS ACCESSORIES TO EQUIPMENT AND PROVIDE ALL CONTROL WIRING REQUIRED FOR PROPER OPERATION WHERE NOT SPECIFICALLY SHOWN ON ELECTRICAL PLANS. ALL WIRING SHALL BE IN CONDUIT OR PER N.E.C. AND LOCAL CODE REQUIREMENTS. STANDARD MOUNTING HEIGHT TO TOP OF THERMOSTAT IS 48" ABOVE FINISHED FLOOR OR AS INDICATED ON THE ARCHITECTURAL DRAWINGS. DO NOT INSTALL THERMOSTATS NEAR DIMMER SWITCHES. WIRING OF ALL MOTORIZED OPERATORS AND THERMOSTATS (REGARDLESS OF VOLTAGE) ARE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR.

2. IT SHALL BE THE RESPONSIBILITY OF THE BAS CONTRACTOR TO PROVIDE ALL THE REQUIRED LABOR AND PROGRAMMING TO SEAMLESSLY INTEGRATE THE NEW BAS BACNET SYSTEM AND ITS DDC POINTS, GRAPHICS, ALARMS, ETC. INTO AN EXISTING BAS IF PRESENT.

3. THE CONTROLS CONTRACTOR SHALL WARRANT THE SYSTEM FOR 24 MONTHS AFTER SUBSTANTIAL COMPLETION. DURING THE WARRANTY PERIOD, THE BUILDING SYSTEM CONTRACTOR SHALL BE RESPONSIBLE FOR ALL NECESSARY REVISIONS TO THE SOFTWARE AS REQUIRED TO PROVIDE A COMPLETE AND WORKABLE SYSTEM CONSISTENT WITH THE LETTER AND INTENT OF THE SEQUENCE OF OPERATION SECTION OF THE SPECIFICATION.

4. THE FOLLOWING ARE THE APPROVED BAS MANUFACTURERS:
   - DISTECH CONTROLS BY TRINITY AUTOMATED SOLUTIONS (INCUMBENT CONTROLS PROVIDER)

5. THE CONTROL SYSTEM SHALL BE PROGRAMMED WITH THE FOLLOWING SEQUENCES AND FEATURES:
   - 5.1. CONTROLS SYSTEM SHALL UTILIZE THE ESTABLISHED SEQUENCES ALREADY IN USE BY THE SCHOOL DISTRICT. THE NEW EQUIPMENT SHALL FOLLOW THE ESTABLISHED OCCUPANCY SCHEDULES AND TEMPERATURES.
   - 5.2. IF ADDITIONAL SEQUENCES ARE NEEDED, PLEASE SUBMIT AN RFI TO HAVE THEM CREATED.

IDENTIFICATION (230593)

1. CONTRACTOR SHALL PROVIDE IDENTIFICATION LABELS, TAGS, ETC. AS INDICATED ON THE DRAWINGS AND AS SPECIFIED HEREIN.THE IDENTIFICATION SHALL BE IN ACCORDANCE WITH ANSI STANDARD A13.1. PRESSURE SENSITIVE MARKERS SHALL BE MANUFACTURED BY THE BRADY CO., OR APPROVED EQUAL. MARKERS SHALL BE MANUFACTURER'S STANDARD PRODUCT. PRESSURE SENSITIVE PIPE MARKERS SHALL BE MANUFACTURED BY THE BRADY CO., OR APPROVED EQUAL. PIPE MARKERS SHALL BE MANUFACTURER'S STANDARD PRODUCT.

MOTOR CONTROLLERS (230513)

1. UNLESS OTHERWISE INDICATED, EVERY MOTOR NOT SPECIFIED TO BE PROVIDED WITH A CONTROLLER AT THE FACTORY SHALL BE PROVIDED WITH A CONTROLLER AS SPECIFIED HEREIN. CONTROLLERS SHALL BE FURNISHED BY THIS CONTRACTOR. INSTALLATION OF ALL CONTROLLERS SHALL BE BY THE ELECTRICAL CONTRACTOR.

2. MOTOR CONTROLLERS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF NEMA STANDARD IC-1, INDUSTRIAL CONTROL AND BE HEAVY DUTY CONSTRUCTION. CONTROLLER SIZES SHALL BE VERIFIED TO BE COMPATIBLE WITH HORSEPOWER OF THE MOTOR. CONTROLLERS SHALL BE MANUFACTURED BY ALLEN-BRADLEY CO., GENERAL ELECTRIC, CUTLER-HAMMER OR APPROVED EQUAL.

3. MANUAL MOTOR STARTERS:
   - a. SWITCHES SHALL BE TUMBLER-SWITCH STYLE. THE MANUAL MOTOR STARTERS SHALL PROVIDE OVERLOAD PROTECTION WHICH CLOSELY FOLLOWS THE MOTOR LOAD. MANUAL MOTOR STARTERS FOR OUTDOOR USE SHALL BE NEMA TYPE 4X, INDOOR USE SHALL BE NEMA TYPE 1, EXPLOSION PROOF USE SHALL BE NEMA TYPE 7.

4. MAGNETIC MOTOR CONTROLLERS:
   - a. MAGNETIC MOTOR CONTROLLERS SHALL BE PROVIDED AS INDICATED. THEY SHALL NOT BE SMALLER THAN NEMA SIZE 1.
   - b. NON-REVERSING MAGNETIC CONTROLLER SHALL BE UTILIZED TO START FULL VOLTAGE, NON-REVERSING, AC SINGLE SPEED MOTORS. THE CONTROLLERS SHALL BE SIZED FOR THE LOAD UNLESS OTHERWISE INDICATED.
   - c. REVERSING MAGNETIC CONTROLLER SHALL BE UTILIZED TO START FULL VOLTAGE REVERSING, AC SINGLE SPEED MOTORS. THE CONTROLLER SHALL BE SIZED FOR THE LOAD UNLESS OTHERWISE INDICATED. LOCATION OF REVERSING MAGNETIC CONTROLLERS IS INDICATED ON THE DRAWINGS.
   - d. WHERE MULTI-SPEED MOTORS ARE SCHEDULED ON THE DRAWINGS, THE MOTOR CONTROLS SHALL BE COMPATIBLE WITH THE TYPE MOTOR SHOWN.
   - e. OVERLOAD RELAYS SHALL BE SOLID STATE AND BE SUPPLIED IN EACH LEG. OVERLOAD RELAYS SHALL BE MATCHED TO LOAD AND SHALL BE ADJUSTABLE FROM 90% TO 110%. A SINGLE RESET BUTTON SHALL BE MOUNTED ON THE STARTER DOOR TO PERMIT EXTERNAL RESET. RELAYS SHALL BE CONVERTIBLE FROM MANUAL TO AUTOMATIC RESET BY A SIMPLE ADJUSTMENT.
   - f. CONTROL TRANSFORMERS SHALL BE PROVIDED, WHERE REQUIRED. BOTH LEGS OF THE PRIMARY AND ONE LEG OF THE SECONDARY OF THE CONTROL TRANSFORMER SHALL BE PROTECTED BY NEMA CLASS J FUSES. THE OTHER LEG OF THE SECONDARY SHALL BE GROUNDED. CONTROL TRANSFORMER CAPACITY SHALL BE ADEQUATE TO OPERATE ALL CONTROL DEVICES IN THE CIRCUIT. CONTROL VOLTAGE SHALL BE 120V AC UNLESS OTHERWISE SPECIFIED.
   - g. UNLESS OTHERWISE INDICATED, ALL MOTOR STARTERS SHALL BE PROVIDED WITH HAND-OFF-AUTOMATIC (H.O.A.) SWITCH IN THE DOOR. ENCLOSURES FOR MAGNETIC STARTERS SHALL BE NEMA TYPE 1 FOR INDOOR USE NEMA TYPE 4X FOR OUTDOOR USE AND NEMA TYPE 7 FOR EXPLOSION PROOF USE.
   - h. MOTOR CONTROLLERS SHALL BE PROVIDED WITH ALL CONTROL DEVICES, INCLUDING AUXILIARY CONTACTS, REQUIRED FOR EQUIPMENT TO OPERATE AS SPECIFIED.

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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NICELY
MECHANICAL
SPECIFICATIONS

DATE:	XX-XX-XX	DRAWN BY:	MAB
DWG SCALE:	AS SHOWN	CHECKED BY:	MAB
PROJECT NO:	2341083		
APPROVED BY:	DCP		

DRAWING NO.:
M-2002

5. COMBINATION MOTOR CONTROLLERS:
   a. COMBINATION MOTOR CONTROLLERS SHALL BE PROVIDED WITH MOLDED CASE MOTOR CIRCUIT PROTECTORS OR MOLDED CASE CIRCUIT BREAKERS AS INDICATED. MOTOR CIRCUIT PROTECTIVE DEVICES SHALL HAVE SHORT CIRCUIT CAPACITY AS REQUIRED. UNIT CONTROL CIRCUIT FUSING SHALL BE PROVIDED. THE MOTOR CIRCUIT PROTECTIVE DEVICE SHALL BE MOUNTED IN THE SAME ENCLOSURE AS THE MAGNETIC CONTROLLER AND SHALL BE OPERABLE BY HAND FROM OUTSIDE THE ENCLOSURE. THE HANDLE SHALL BE SO INTERLOCKED WITH THE DOOR THAT IT MUST BE RETURNED TO THE "OFF" POSITION BEFORE THE DOOR CAN BE OPENED, BUT A COIN-PROOF DEFEAT MECHANISM SHALL BE PROVIDED TO ALLOW AUTHORIZED PERSONNEL TO OPEN THE ENCLOSURE DOOR WITHOUT OPENING THE DISCONNECTING DEVICE. PROVISIONS FOR PADLOCKING THE DISCONNECT HANDLE IN THE "OFF" POSITION SHALL BE MADE. THE ENCLOSURE FOR COMBINATION STARTERS SHALL BE NEMA TYPE 1 FOR INDOOR USE AND NEMA TYPE 4X FOR OUTDOOR USE, AND NEMA TYPE 7 FOR EXPLOSION PROOF USE.
   b. MOTOR CIRCUIT PROTECTORS SHALL BE THE CONTINUOUSLY ADJUSTABLE, INSTANTANEOUS MAGNETIC TRIP TYPE CIRCUIT BREAKER AND SHALL BE SO CONSTRUCTED THAT ALL POLES OPEN, CLOSE AND TRIP SIMULTANEOUSLY.

6. OVERLOAD AND SHORT CIRCUIT PROTECTION:
   a. HEATER ELEMENTS SHALL BE PROVIDED FOR OVERLOAD PROTECTION. MOTOR CIRCUIT PROTECTOR SHALL BE PROVIDED FOR MOTOR SHORT CIRCUIT PROTECTION.

DISCONNECT SWITCHES (230514)

1. THIS CONTRACTOR SHALL FURNISH ALL SAFETY DISCONNECT SWITCHES (FUSED AND NON-FUSED) REQUIRED FOR EQUIPMENT FURNISHED UNDER THIS CONTRACT. IN ADDITION, THIS CONTRACTOR SHALL FURNISH A SAFETY DISCONNECT SWITCH FOR ALL MOTORS AND EQUIPMENT WHICH DO NOT HAVE COMBINATION STARTERS OR INTEGRAL DISCONNECTING MEANS. FUSIBLE DISCONNECT SWITCHES SHALL BE PROVIDED FOR ALL EQUIPMENT RATED FOR USE ONLY WITH FUSES (SUCH AS CONDENSING UNITS, COMPRESSORS, ETC.). SUCH SWITCHES SHALL BE ONE, TWO OR THREE POLE TYPE, WITH SOLID NEUTRAL FOR 4 WIRE SERVICE, AND SHALL HAVE THE PROPER CURRENT AND VOLTAGE RATING AS REQUIRED. INSTALLATION OF ALL DISCONNECT SWITCHES SHALL BE BY THE ELECTRICAL CONTRACTOR.

2. ALL SAFETY SWITCHES SHALL BE NEMA HEAVY DUTY TYPE AND SHALL CARRY THE UNDERWRITERS' LABORATORIES LABEL. FUSIBLE SWITCHES SHALL INCORPORATE CLASS "R" FUSE REJECTION FEATURE AND SHALL BE BRACED TO WITHSTAND 200,000 AMPERE RMS SYMMETRICAL FAULT CURRENT. SAFETY SWITCHES SHALL CONFORM TO FEDERAL SPECIFICATION W-S-865.

3. PROVIDE HEAVY-DUTY TYPE, SHEET ENCLOSED, SAFETY SWITCHES. THE TYPE, SIZE, AND RATING SHALL BE AS INDICATED ON THE DRAWINGS OR AS REQUIRED BY THE MOTOR OR EQUIPMENT SERVED. THE ENCLOSURE FOR DISCONNECT SWITCHES SHALL BE NEMA TYPE 1 FOR INDOOR USE, NEMA TYPE 4X FOR OUTDOOR USE AND NEMA TYPE 7 FOR EXPLOSION PROOF USE. DISCONNECTS SHALL BE MANUFACTURED BY ALLEN-BRADLEY, GENERAL ELECTRIC, CUTLER-HAMMER APPROVED EQUAL.

4. SWITCHES SHALL INCORPORATE QUICK-MAKE, QUICK-BREAK OPERATING HANDLES. THE MECHANISM SHALL BE AN INTEGRAL PART OF THE BOX, NOT THE COVER, AND SWITCHES SHALL HAVE A COVER INTERLOCK TO PREVENT UNAUTHORIZED OPENING OF THE SWITCH DOOR IN THE ON POSITION OR CLOSING OF THE SWITCH MECHANISM WITH THE DOOR OPEN. CURRENT CARRYING PARTS SHALL BE CONSTRUCTED OF HIGH-CONDUCTIVITY COPPER WITH SILVER-TUNGSTEN TYPE SWITCH CONTACT.

5. FUSE CLIPS SHALL BE POSITIVE PRESSURE TYPE REINFORCED FUSE CLIPS.

6. THE ELECTRICAL CONTRACTOR SHALL FURNISH, INSTALL AND CONNECT ALL POWER WIRING TO ALL MECHANICAL CONTRACTOR FURNISHED EQUIPMENT. THE MECHANICAL CONTRACTOR SHALL FURNISH, INSTALL AND CONNECT ALL CONTROL WIRING TO ALL FURNISHED EQUIPMENT, INCLUDING CONTROL DEVICES, STARTERS AND INTEGRAL DISCONNECT SWITCHES OF CONTRACTOR FURNISHED EQUIPMENT.

VARIABLE FREQUENCY DRIVES (230515)

1. PROVIDE VARIABLE FREQUENCY DRIVES (VFD) AS SPECIFIED HEREIN AND AS SHOWN ON THE CONTRACT DRAWINGS. BASIS OF DESIGN IS ABB MODEL ACH-550. THE ENCLOSURE FOR VFD SHALL BE NEMA TYPE 1 FOR INDOOR USE AND NEMA TYPE 3R FOR OUTDOOR USE. VFD SHALL PROVIDE MICROPROCESSOR-BASED CONTROL FOR THREE-PHASE INDUCTION MOTORS USING PULSE WIDTH MODULATED (PWM) DESIGN, WHICH CONVERTS THE UTILITY INPUT VOLTAGE AND FREQUENCY TO A VARIABLE VOLTAGE AND FREQUENCY OUTPUT VIA A TWO-STEP OPERATION. VFD SHALL HAVE AN EFFICIENCY AT FULL LOAD AND SPEED THAT EXCEEDS 97%.

2. VFD SHALL MAINTAIN A MINIMUM LINE SIDE DISPLACEMENT POWER FACTOR OF 0.96, REGARDLESS OF SPEED AND LOAD FOR VFD'S LESS THAN 75 HP. VFD SHALL MAINTAIN A MINIMUM LINE SIDE DISPLACEMENT POWER FACTOR OF .99, REGARDLESS OF SPEED AND LOAD FOR MOTORS GREATER THAN 75 HP. THE VFD'S SHALL HAVE A ONE (1) MINUTE OVERLOAD CURRENT RATING OF 110% FOR LOW OVERLOAD APPLICATIONS. VFD SHALL HAVE AN INTEGRAL EMI/RFI FILTER AND CIRCUIT BREAKER AS STANDARD. THE CURRENT WITHSTAND RATING OF THE OPEN VFD SHALL BE 65,000 AIC.

3. COMMUNICATION CAPABILITY OPTIONS SHALL BE BACNET/IP.

4. VFD SHALL HAVE A COOLING FAN(S) THAT IS FIELD REPLACEABLE.

5. VFD SHALL INCLUDE THE FOLLOWING PROTECTIVE FEATURES: OVERCURRENT, OVERVOLTAGE, SYSTEM FAULT, UNDER VOLTAGE, INPUT LINE SUPERVISION, OUTPUT PHASE SUPERVISION, UNDER TEMPERATURE, OVER TEMPERATURE, MOTOR STALLED, MOTOR OVER TEMPERATURE AND MOTOR UNDER LOAD. VFD SHALL PROVIDE GROUND FAULT PROTECTION DURING POWER-UP, STARTING, AND RUNNING.

6. VFD STARTUP SHALL BE BY A FACTORY TRAINED SERVICE TECHNICIAN. THE TECHNICIAN SHALL DOCUMENT THE STARTUP AND SUBMIT THE FORMS AS A CLOSEOUT SUBMITTAL.

7. WARRANTY SHALL BE TWENTY-FOUR (24) MONTHS FROM CERTIFIED START-UP DATE. THIS WARRANTY DURATION INCLUDES START-UP BY AN AUTHORIZED SERVICE REPRESENTATIVE AND PARTS, LABOR AND TRAVEL TIME.

CHECK, TEST, START, ADJUST, BALANCE AND INSTRUCTIONS (230593)

1. AFTER INSTALLATION, CHECK ALL EQUIPMENT, AND PERFORM START UP IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

2. ALL PIPING SHALL BE TESTED AND FREE OF LEAKS.

3. CONCEALED OR INSULATED WORK SHALL REMAIN UNCOVERED UNTIL REQUIRED TESTS HAVE BEEN COMPLETED, BUT IF CONSTRUCTION SCHEDULE REQUIRES IT, ARRANGE FOR PRIOR TESTS ON PARTS OF SYSTEM AS APPROVED BY THE TENANT.

4. BALANCE ALL SYSTEMS, CALIBRATE CONTROLS, CHECK FOR PROPER OPERATION AND SEQUENCE UNDER ALL CONDITIONS AND MAKE ALL NECESSARY ADJUSTMENTS.

5. AFTER INSTALLATION AND EQUIPMENT IS PLACED IN OPERATION, HVAC CONTRACTOR IS RESPONSIBLE FOR BALANCING SYSTEMS. BALANCING SHALL BE PERFORMED BY AN INDEPENDENT AABC CERTIFIED CONTRACTOR.

6. ADJUST AND BALANCE THE AIR SYSTEMS BEFORE HYDRONIC, STEAM, AND REFRIGERANT SYSTEMS. TESTING AND BALANCING SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT AABC NATIONAL STANDARDS FOR TOTAL SYSTEM BALANCE. GPM'S SHALL BE BALANCED WITHIN 10% OF DESIGN. AFTER ALL AIR SYSTEMS ARE INSTALLED, EACH SUPPLY AIR OUTLET SHALL BE AIR BALANCED TO WITHIN 10% OF THE CFM SHOWN WITH AIR PATTERNS SET AS INDICATED ON DRAWINGS (OR WITHIN 10 CFM WHEN BELOW 100 CFM). FAN RPMS AND ZONE DAMPERS SHALL BE ADJUSTED AND SHEAVES SHALL BE REPLACED AS REQUIRED TO ACHIEVE AIR BALANCE. ALL ZONES OR PORTIONS THEREOF SERVING OTHER SPACES AND WHICH MAY BE AFFECTED BY THE PROJECT SHALL BE TRAVERSED PRIOR TO CONSTRUCTION. THE FINAL AIR BALANCE SHALL RESTORE THESE AIR QUANTITIES. BEFORE AND AFTER AIR QUANTITIES SHALL BE LISTED IN THE AIR BALANCE REPORT

7. START UP AND PLACE ALL SYSTEMS IN OPERATION AND TAG ALL SWITCHES AND CONTROLS WITH PERMANENT LABELS.

5. INSTRUCT OWNER IN OPERATION OF SYSTEMS AND SUBMIT OPERATING AND MAINTENANCE MANUAL ON ALL EQUIPMENT AND SYSTEMS.

END OF SPECIFICATIONS.

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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A+S Project: 2341083

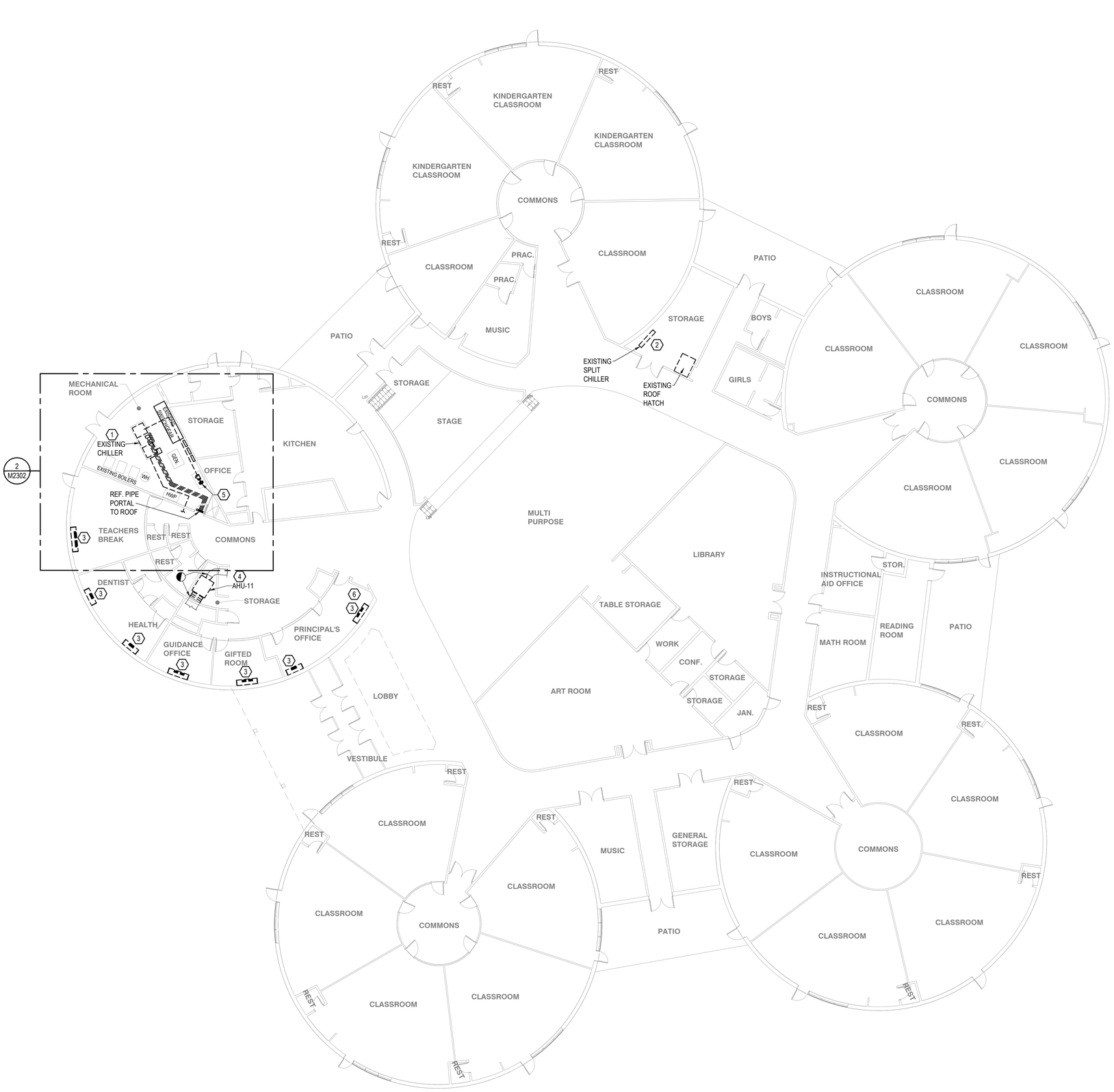
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER DAVID C. PRICE

NICELY MECHANICAL SPECIFICATIONS

DATE:	XX-XX-XX
DWG SCALE:	AS SHOWN
DRAWN BY:	MAB
CHECKED BY:	MAB
PROJECT NO:	2341083
APPROVED BY:	DCP

DRAWING NO.: M-2003

NORTH



1 M-2101 NICELY MECHANICAL FIRST FLOOR DEMOLITION PLAN
3/32" = 1' 0"

MECHANICAL DEMOLITION GENERAL NOTES:

1. DO NOT DISTURB ANY HARD CEILINGS THAT HAVE A TEXTURED SURFACE, AS THEY MAY CONTAIN ASBESTOS.
2. ALL REFRIGERANT IS TO BE RECOVERED AND DISPOSED OF IN A MANNER COMPLAINT WITH EPA GUIDELINES.
3. COORDINATE ALL DEMOLITION ACTIVITES WITH NEW WORK DRAWINGS.
4. ANY CONTROLS EQUIPMENT SHALL BE DEMOLISHED BY THE CONTROLS CONTRACTOR SO IT MAY BE TURNED OVER TO THE OWNER AS SPARES.

MECHANICAL DEMOLITION KEY NOTES: (#)

1. DEMOLISH CHILLER AND RELATED REFRIGERANT PIPING. UP TO AND INCLUDING ROOF PENETRATION. DEMOLISH PORTIONS OF CHILLED FLUID PIPING AS SHOWN. SALVAGE AND PROTECT DIVERTING VALVE FOR RE-USE IN NEW WORK.
2. DEMOLISH SPLIT CHILLER AND RELATED REFRIGERANT PIPING UP TO AND INCLUDING ROOF PENETRATION. DEMOLISH COLD WATER FEED PIPE AND BACK FLOW PREVENTER UP TO AND INCLUDING TEE. REMOVE TEE AND REPLACE WITH ELBOW TO ELIMINATE ANY PLUMBING DEAD LEG(S). DEMOLISH AS MUCH CHILLED WATER PIPING WITHIN THIS ROOM AND CAP ANY PIPES THAT LEAVE THE ROOM.
3. DEMOLISH UNIT VENTILATOR. MINIMIZE PIPING DEMOLITION AT THE UNIT AND IN THE WALL FOR REUSE IN NEW WORK. HORIZONTAL MAIN PIPING ABOVE THE CEILING SHALL BE DEMOLISHED.
4. DEMOLISH AHU. MINIMIZE PIPING DEMOLITION FOR USE IN NEW WORK.
5. DEMOLISH CHILLED WATER PUMP, CWP-1, AND VERTICAL PIPING AND APPURTENANCES.
6. PIPING FROM THE SPLIT CHILLER IS EXPECTED TO BEGIN IN THIS AREA FOR THE 7 UV UNITS + AHU-11 IN THIS AREA. DEMOLISH AS MUCH MAIN LINE PIPING WITHIN REACH OF THIS OFFICE AND CAP ANYTHING THAT MUST REMAIN.

REVISION RECORD

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	19 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
No. PE081577

NICELY
MECHANICAL
FIRST FLOOR DEMOLITION PLAN

DATE:	XX-XX-XX
DWG SCALE:	AS SHOWN
PROJECT NO:	2341083
DRAWN BY:	MAB
CHECKED BY:	MAB
APPROVED BY:	DCP

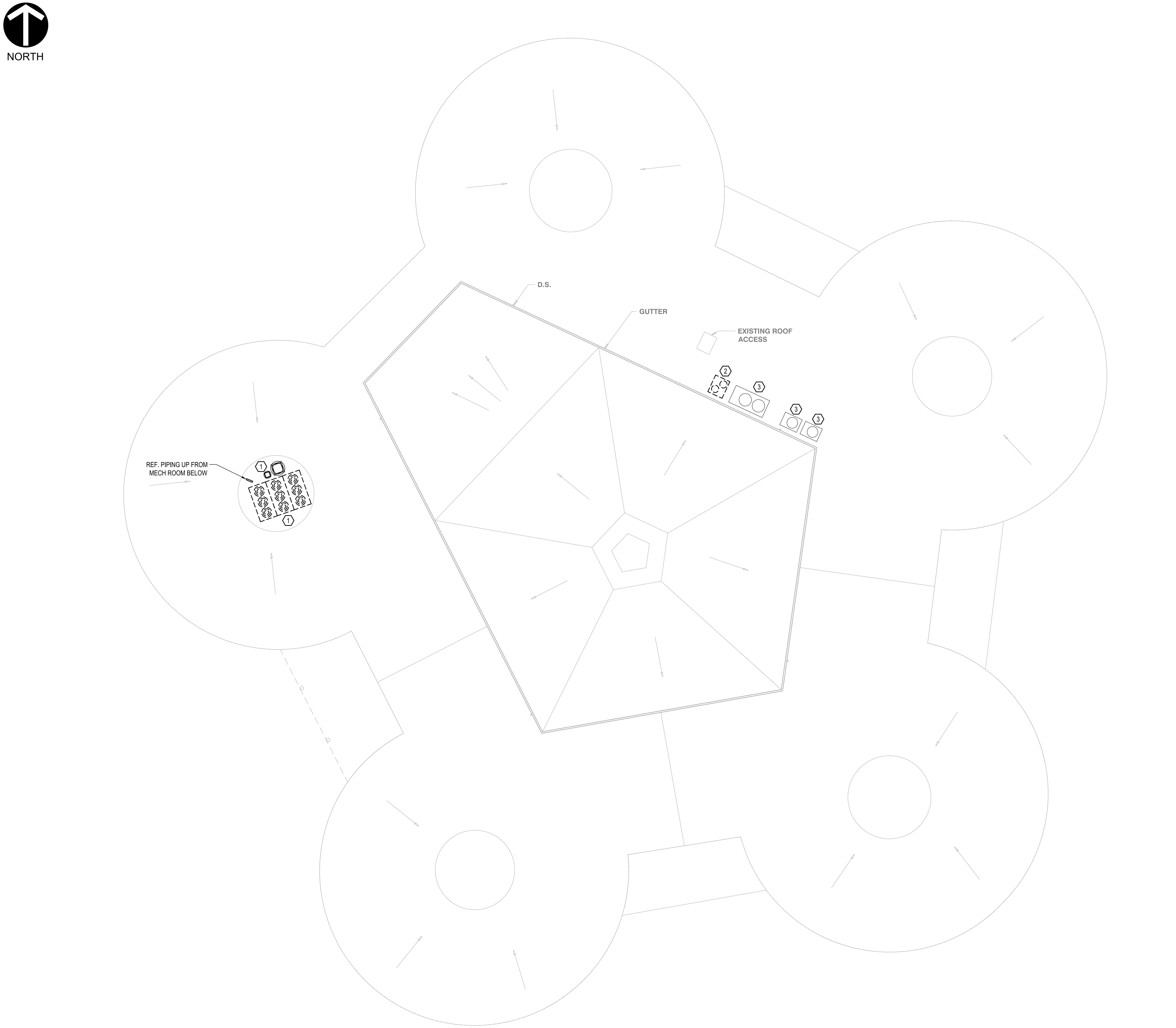
DRAWING NO.:
M-2101

MECHANICAL DEMOLITION GENERAL NOTES:

1. ALL REFRIGERANT IS TO BE RECOVERED AND DISPOSED OF IN A MANNER COMPLAINT WITH EPA GUIDELINES.

MECHANICAL DEMOLITION KEY NOTES:

1. DEMOLISH (3) CONDENSING UNIT SECTIONS. DEMOLISH ALL PIPING AND RELATED APPURTENANCES. DO NOT DISTURB THE (2) EXISTING EXHAUST FANS. THE FANS ARE EXISTING TO REMAIN IN OPERATION.
2. DEMOLISH 10-TON CONDENSING UNIT. DEMOLISH ALL PIPING AND RELATED APPURTENANCES. SUPPORT STEEL IS TO REMAIN AS IS.
3. EXISTING CONDENSING UNIT IS EXISTING TO REMAIN AS IS.



1 / M-2102 NICELY MECHANICAL ROOF DEMOLITION PLAN
3/32" = 1' 0"

REVISION RECORD				
NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER No. PE081572

NICELY MECHANICAL ROOF DEMOLITION PLAN

DATE:	XX-XX-XX	DRAWN BY:	MAB
DWG SCALE:	AS SHOWN	CHECKED BY:	MAB
PROJECT NO:			2341083
APPROVED BY:			DCP

DRAWING NO.:
M-2102

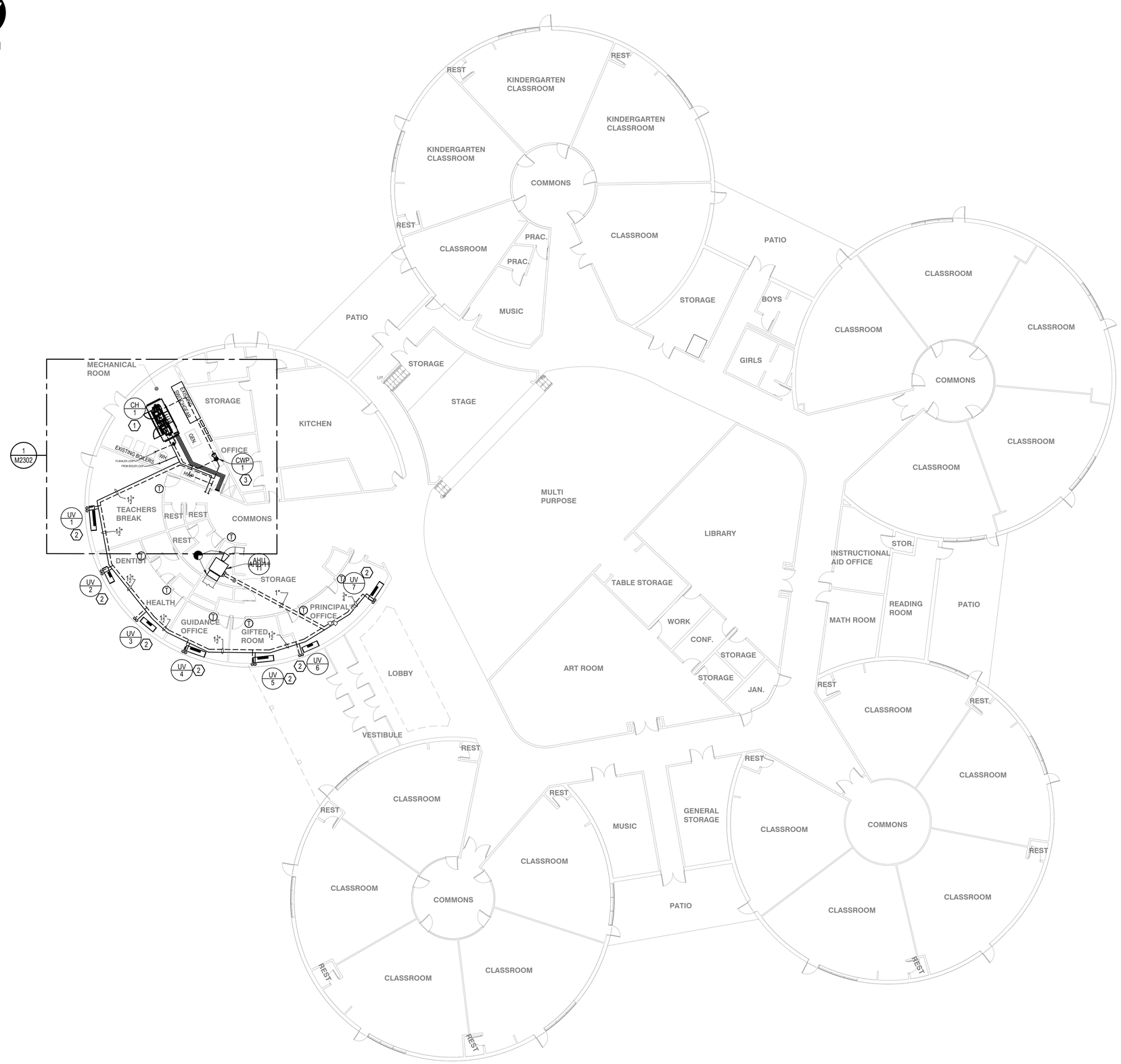
NORTH

MECHANICAL GENERAL NOTES:

1. NONE.

MECHANICAL KEY NOTES: (#)

1. INSTALL NEW CHILLER ON EXISTING HOUSEKEEPING PAD. JUSTIFY TO THE SIDE OF THE PAD OPPOSITE OF THE SWITCHGEAR. SOUND ENCLOSURE SHOULD GO AROUND ENTIRE CHILLER AND HOUSEKEEPING PAD SECURED TO FLOOR.
2. INSTALL NEW UNIT HEATERS IN THE SAME LOCATION AS THE DEMOLISHED UNIT. REUSE THE PIPING CONNECTIONS AND ELECTRICAL CONNECTIONS.
3. INSTALL NEW CHILLED WATER PUMP. INSTALL NEW PUMP TRIM PER PUMP DETAIL. SEE DETAIL SHEET. SEE ALSO, ENLARGED MECHANICAL ROOM PLAN.



1 M2302

1 M-2201 NICELY MECHANICAL FIRST FLOOR PLAN
3/32" = 1' 0"

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	15 SEP 2020	MAB	DCP	ISSUED FOR PERMITTING

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A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE ENGINEER

NICELY
MECHANICAL
FIRST FLOOR PLAN

DATE:	MAB
DWG SCALE:	AS SHOWN
DRAWN BY:	MAB
CHECKED BY:	DCP
PROJECT NO:	2341083
APPROVED BY:	

DRAWING NO.:
M-2201

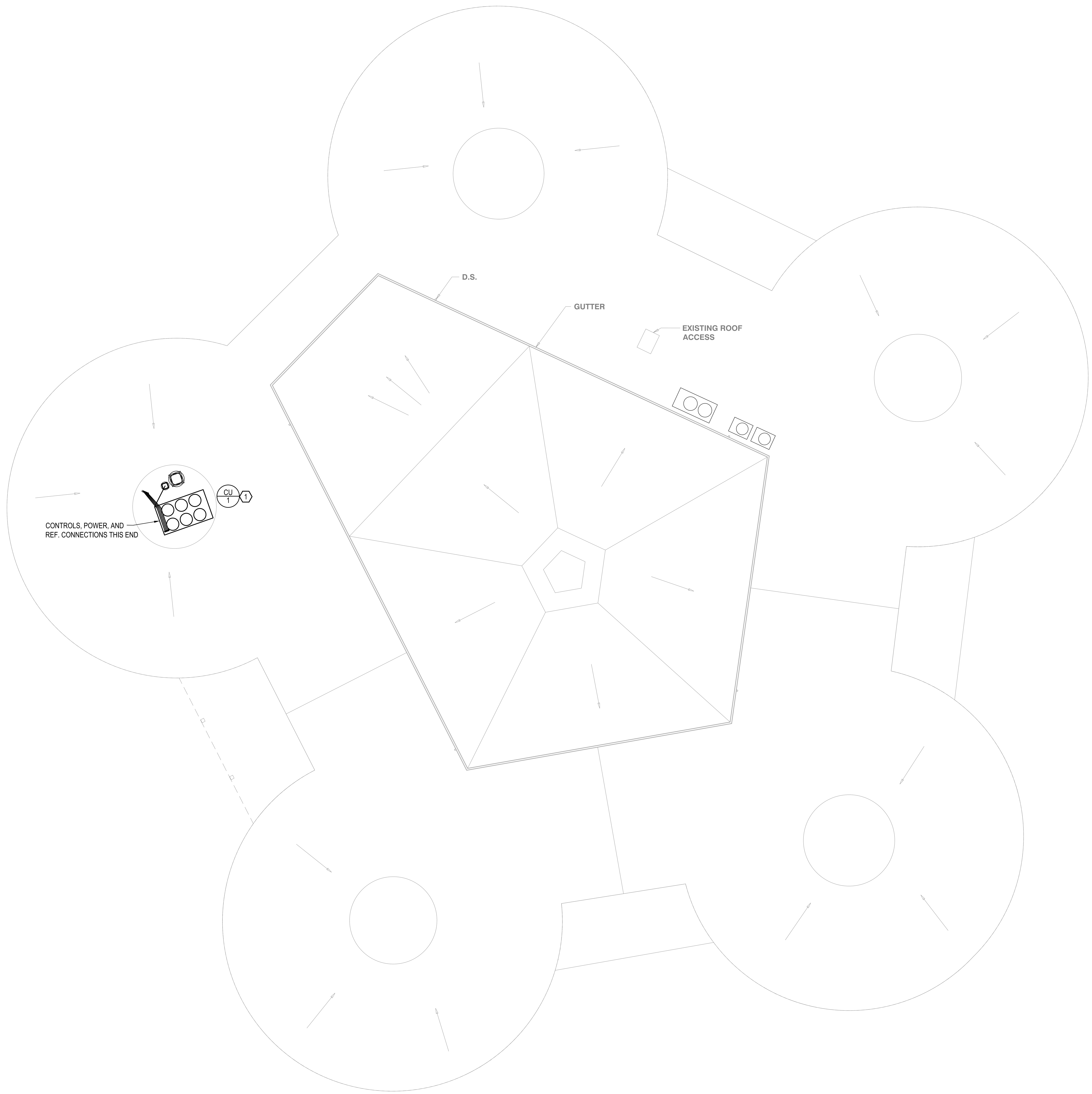
NORTH

MECHANICAL GENERAL NOTES:

1. NONE.

MECHANICAL KEY NOTES:

1. INSTALL CONDENSING UNIT USING EXISTING STEEL AND PROVIDE ANY ADDITIONAL MISCELLANEOUS STEEL NEEDED TO SUPPORT UNIT PER MANUFACTURER'S GUIDELINES. INCLUDE 1" DEFLECTION VIBRATION ISOLATORS FOR THE CONDENSING UNIT. PROVIDE NEW WATERPROOF PIPING PORTAL.



1 M-2202 NICELY MECHANICAL ROOF PLAN
3/32" = 1'-0"

REVISION RECORD

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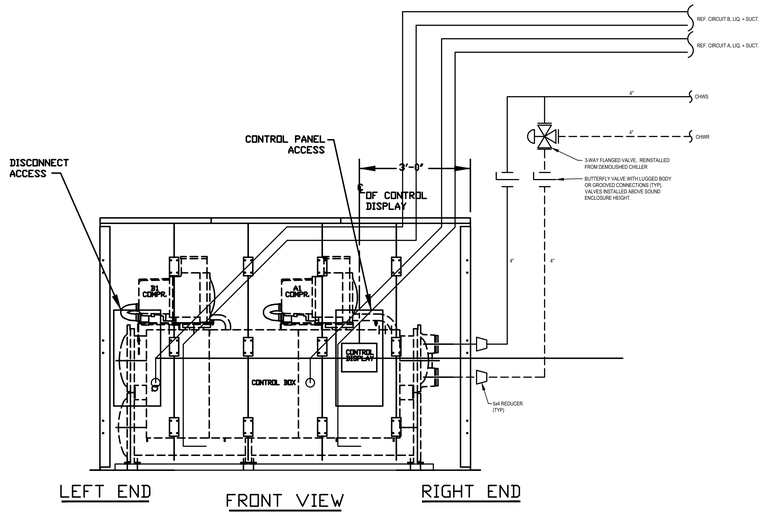
COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
ENGINEER

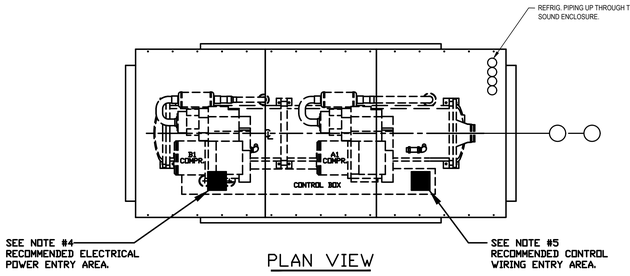
NICELY MECHANICAL ROOF PLAN

DATE:	XX-XX-XX	DRAWN BY:	MAB
DWG SCALE:	AS SHOWN	CHECKED BY:	MAB
PROJECT NO:	2341083	APPROVED BY:	DCP

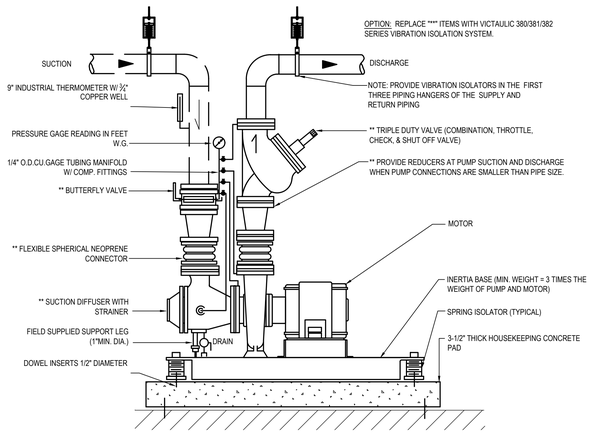
DRAWING NO.: M-2202



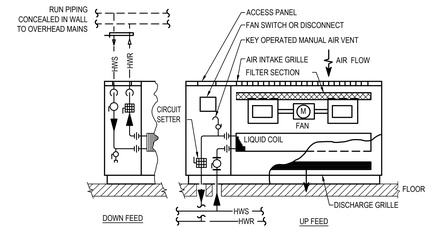
1 M2301 CHILLER SCHEMATIC SECTION VIEW
NONE.



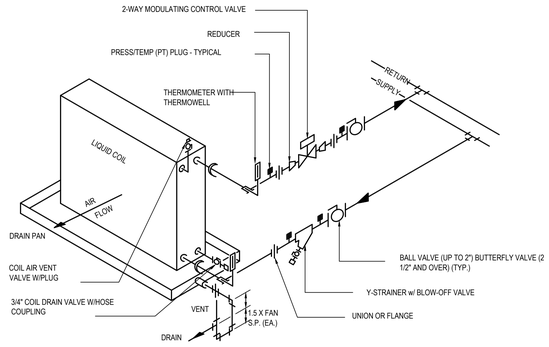
2 M2301 CHILLER SCHEMATIC PLAN VIEW
NONE.



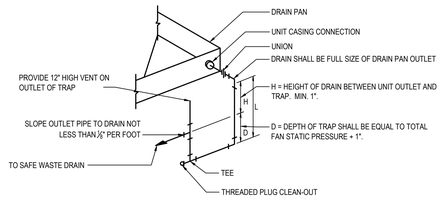
3 M2301 END SUCTION, BASE MOUNTED PUMP DETAIL
NONE.



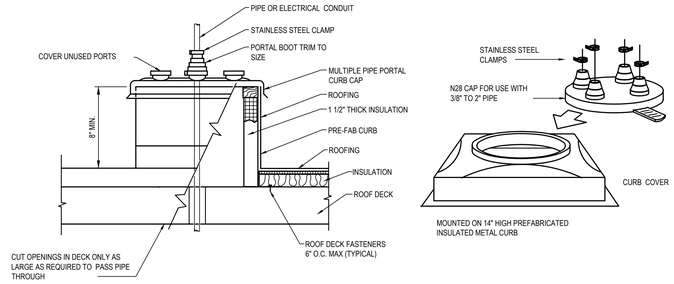
4 M2301 CABINET UNIT PIPING DIAGRAM
NOT TO SCALE



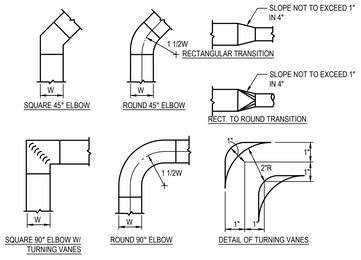
5 M2301 LIQUID COIL PIPING DETAIL
NO SCALE



6 M2301 CONDENSATE DRAIN TRAP DETAIL
NO SCALE



8 M2301 PIPE PORTAL DETAIL
NOT TO SCALE



7 M2301 LOW VELOCITY DUCTWORK DIAGRAMS
NO SCALE

NOTE:
PROVIDE RADIUS ELBOWS, 18" AND LARGER WITH TURNING BLADES AT 1/3 AND 1/2 THE WIDTH OF THE DUCT FROM THE INSIDE RADIUS. TURNING BLADES SHALL BE PROVIDED WITH HEMMED ENDS. (SEE SECTION 15840 OF MECHANICAL SPECIFICATIONS FOR ADDITIONAL DUCT CONSTRUCTION INFORMATION AND RESTRICTIONS.)

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GREENSBURG, PA 15601

NICELY MECHANICAL DETAILS

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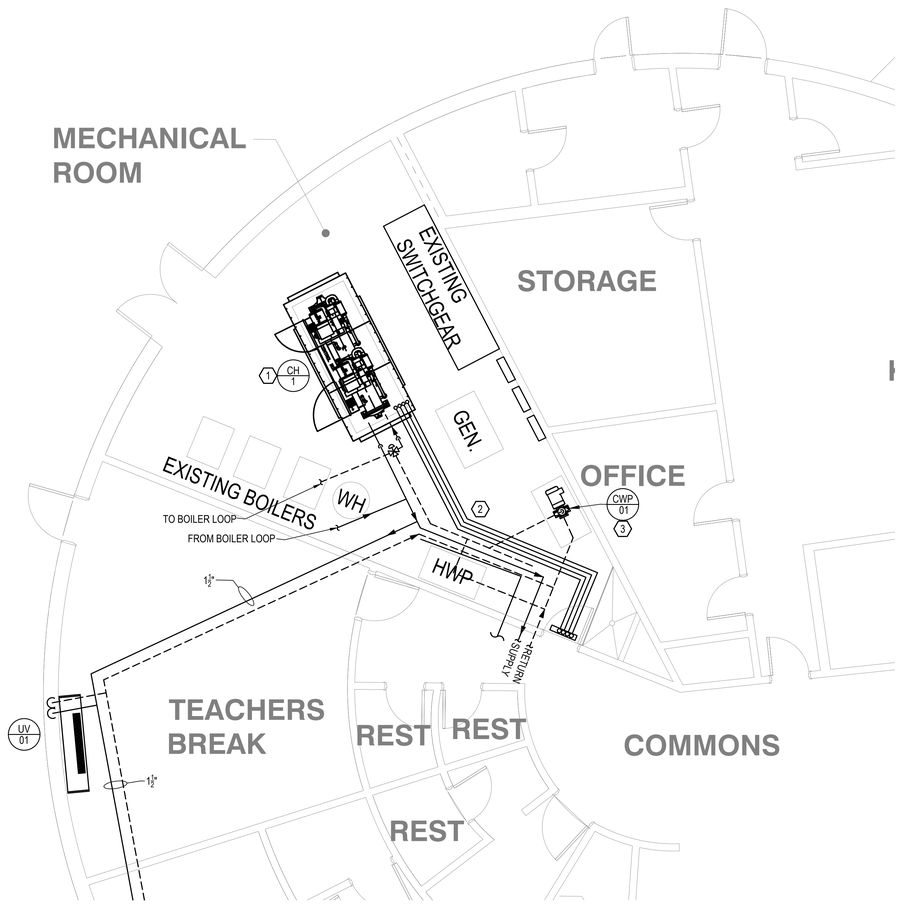
A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
No. PE081177
DRAWING NO.:
M-2301

NORTH



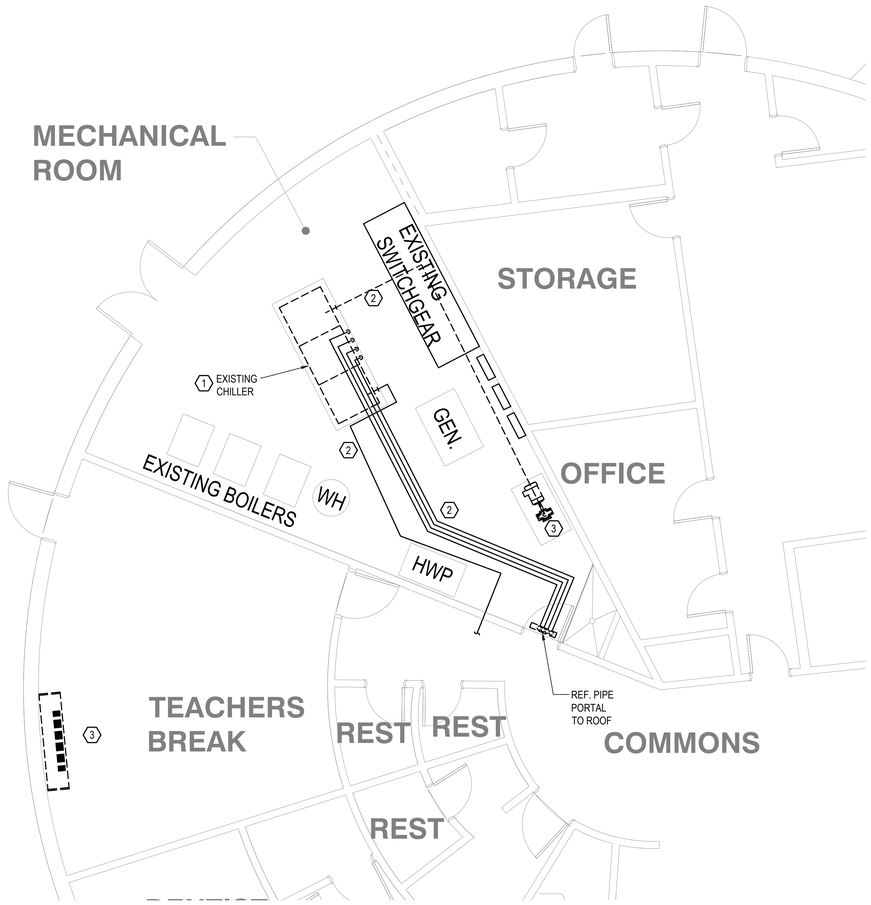
1 / M-2302 NICELY MECHANICAL ROOM ENLARGED MECHANICAL PLAN
3/16" = 1' 0"

MECHANICAL GENERAL NOTES:

1. SEE SCHEMATIC SHEET FOR LIQUID PIPING CONNECTIONS. NEW PIPING ROUTING SHALL NOT BE ABOVE ELECTRICAL PANELS OR SWITCHGEAR.
2. HOT WATER PUMP (GRUNDFOS) IS EXISTING TO REMAIN AS IS.
3. PIPING SIZES ARE BASED ON COPPER PIPE.

MECHANICAL KEY NOTES: ⟨#⟩

1. INSTALL NEW CHILLER ON EXISTING HOUSEKEEPING PAD. JUSTIFY TO THE SIDE OF THE PAD OPPOSITE OF THE SWITCHGEAR. SOUND ENCLOSURE SHOULD GO AROUND ENTIRE CHILLER AND HOUSEKEEPING PAD SECURED TO FLOOR.
2. ROUTE NEW REFRIGERATION PIPING AS SHOWN. REF. PIPING SHOULD BE THE HIGHEST PIPING IN THE SPACE. ALL REF. PIPES TO BE INSULATED WITH 3/4" ARMACELL INSULATION WITH A UV-RATED JACKET.
3. NEW CHILLED WATER PUMP. SEE DETAILS FOR TRIM AND PUMP CONNECTIONS.



1 / M-2302 NICELY MECHANICAL ROOM ENLARGED MECHANICAL DEMOLITION PLAN
3/16" = 1' 0"

MECHANICAL DEMOLITION GENERAL NOTES:

1. ALL REFRIGERANT IS TO BE RECOVERED AND DISPOSED OF IN A MANNER COMPLAINT WITH EPA GUIDELINES.
2. COORDINATE ALL DEMOLITION ACTIVITES WITH NEW WORK DRAWINGS.

MECHANICAL DEMOLITION KEY NOTES: ⟨#⟩

1. DEMOLISH CHILLER AND RELATED REFRIGERANT PIPING. UP TO AND INCLUDING ROOF PENETRATION. DEMOLISH PORTIONS OF CHILLED FLUID PIPING AS SHOWN. SALVAGE AND PROTECT DIVERTING VALVE FOR RE-USE IN NEW WORK.
2. DEMOLISH SPLIT CHILLER AND RELATED REFRIGERANT PIPING UP TO AND INCLUDING ROOF PENETRATION. DEMOLISH CHILLED WATER PIPING UP TO AREA SHOWN. DEMOLISH COLD WATER FEED PIPE AND BACK FLOW PREVENTER UP TO AND INCLUDING TEE. REMOVE TEE AND REPLACE WITH ELBOW TO ELIMINATE DEAD LEG.
3. DEMOLISH CHILLED WATER PUMP, CWP-1, AND VERTICAL PIPING AND APPURTENANCES.

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	19 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
No. PE081370

NICELY MECHANICAL ROOM ENLARGED MECHANICAL PLANS

DATE:	xx-xx-xx
DRAWN BY:	MAB
DWG SCALE:	AS SHOWN
CHECKED BY:	MAB
PROJECT NO:	2341083
APPROVED BY:	DCP

DRAWING NO.: M-2302

PIPE INSULATION THICKNESS SCHEDULE

FLUID OPERATING TEMPERATURE AND USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (IN)				
	CONDUCTIVITY BTU·IN.(h·ft²·°F)	MEAN RATING TEMPERATURE (°F)	< 1	1 to < 1 1/2	1 1/2 < 4	4 to < 8	≥ 8
> 350	0.32 - 0.34	250	4.5	5.0	5.0	5.0	5.0
251 - 350	0.29 - 0.32	200	3.0	4.0	4.5	4.5	4.5
201 - 250	0.27 - 0.30	150	2.5	2.5	2.5	3.0	3.0
141 - 200	0.25 - 0.29	125	1.5	1.5	2.0	2.0	2.0
105 - 140	0.21 - 0.28	100	1.0	1.0	1.5	1.5	1.5
40 - 60	0.21 - 0.27	75	0.5	0.5	1.0	1.0	1.0
40	0.20 - 0.26	50	0.5	1.0	1.0	1.0	1.5

REMARKS:

PIPING SERVING AS PART OF A HEATING OR COOLING SYSTEM SHALL BE THERMALLY INSULATED IN ACCORDANCE WITH TABLE ABOVE (IECC 2015 TABLE C403.2.10) WITH THE FOLLOWING EXCEPTIONS:
1. FACTORY-INSTALLED PIPING WITHIN HVAC EQUIPMENT TESTED AND RATED IN ACCORDANCE WITH A TEST PROCEDURE REFERENCED BY THIS CODE.
2. FACTORY-INSTALLED PIPING WITHIN ROOM FAN-COILS AND UNIT VENTILATORS TESTED AND RATED ACCORDING TO AHRI 330 (EXCEPT THAT THE SAMPLING AND VARIATION PROVISIONS OF SECTION 6.5 SHALL NOT APPLY) AND AHRI 840, RESPECTIVELY.
3. PIPING THAT CONVEYS FLUIDS THAT HAVE A DESIGN OPERATING TEMPERATURE RANGE BETWEEN 60°F AND 105°F.
4. PIPING THAT CONVEYS FLUIDS THAT HAVE NOT BEEN HEATED OR COOLED THROUGH THE USE OF FOSSIL FUELS OR ELECTRIC POWER.
5. STRAINERS, CONTROL VALVES, AND BALANCE VALVES ASSOCIATED WITH PIPING 1 INCH OR LESS IN DIAMETER.
6. DIRECT BURIED PIPING THAT CONVEYS FLUIDS AT OR BELOW 60°F.

THERMAL INSULATION SCHEDULE

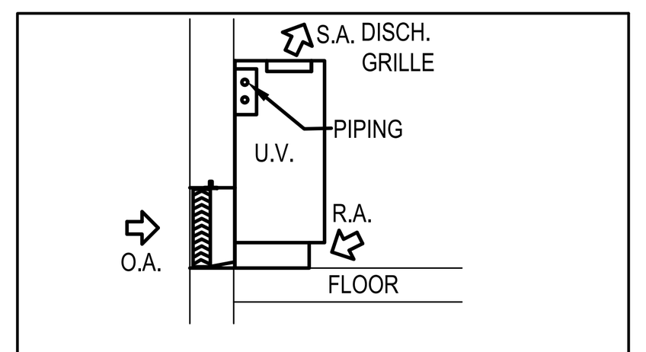
SYSTEM	SYSTEM- LOCATION	OPERATING TEMPERATURE	MATERIAL	SMACNA CLASS					REMARKS
				TYPE	THICKNESS IN.S	DENSITY LB/CU. FT.	INSTALLED "R" VALUE/ CONDUCTIVITY	JACKET	
DUCT	SUPPLY AIR DUCT - INDOOR CONCEALED, ACCESSIBLE	40-120	MINERAL-FIBER	BLANKET	2.5"	0.75	6.0	FSK	1, 4
DUCT	SUPPLY AIR DUCT - INDOOR EXPOSED	40-120	MINERAL-FIBER	BOARD	1.0	2.25	5.0	ASJ	1, 4

NOTES:
1. CONCEALED, ACCESSIBLE LOCATIONS - ABOVE LAY-IN OR ACCESSIBLE CEILINGS, ACCESSIBLE MECHANICAL SHAFTS.
2. CONCEALED, INACCESSIBLE LOCATIONS - ABOVE HARD CEILINGS, (DRY WALL, PLASTER), MECHANICAL SHAFTS, BEHIND WALLS.
3. DO NOT INSULATE:
   - MAKE-UP AIR DUCTWORK OPERATING AT SURROUNDING AMBIENT CONDITIONS
   - RETURN AND EXHAUST AIR DUCTWORK LOCATED INDOORS.
   - TRANSFER AIR DUCTWORK (ACOUSTICALLY LINE DUCT)
   - EXPOSED SUPPLY DUCTWORK LOCATED IN CONDITIONED SPACE. (DOES NOT INCLUDE RETURN AIR PLENUM)
4. MULTIPLE INSULATION METHODS MAY BE USED TO ACHIEVE THE TOTAL REQUIRED R-VALUE.

AIR HANDLING UNIT SCHEDULE

TAG	SERVICE/LOCATION	SUPPLY FAN					COOLING COIL											FILTER				WEIGHT (LB)	BASIS OF DESIGN/ MODEL	REMARKS
		CFM	E.S.P. (IN WG)	HP	FLA	VOLTS/PHASE	SENSIBLE MBH	TOTAL MBH	EAT DB/WB (°F)	LAT DB/WB (°F)	MAX AIR PD IN W.G.	EWT (°F)	LWT (°F)	WATER FLOW (GPM)	MAX WATER PD (FT)	COIL ROWS / FPI / CIRC	MAX WATER PD (FT)	DIMENSIONS WIDTH x LENGTH	THICK (IN.)	QUANTITY	%EFF MERV RATING			
AHU-11	OPEN OFFICE AREA	1200	0.5	0.75	1.6	460 / 3	23.7	27.9	77.0	57.7	0.18	45	55	6.4	3.1	6 / 10 / FULL	3.1	20x20	2"	2	13	335	39SH-04	ALL, SEE BELOW

REMARKS:
1. UNIT CAPACITIES ARE BASED ON 1000' ASL AND 50% PG AS COIL FLUID. OA CONNECTIONS SHALL REMAIN AS IS.
2. PROVIDE A VARIABLE FREQUENCY DRIVE FOR THE SUPPLY FAN. BASIS OF DESIGN ABB MODEL ACH 580 WITH BACNET IP COMMUNICATIONS.
3. HEATING CAPACITY IS EXPECTED TO EXCEED REQUIREMENTS SINCE THE COOLING COIL WILL ALSO ACT AS HEATING COIL IN A 2-PIPE CHANGE OVER SYSTEM.
4. CONTROLS TO BE PROVIDED BY THE INCUMBANT CONTROLS PROVIDER.



OPEN PIPE TUNNEL, FLOOR-LEVEL O.A. INTAKE

UNIT VENTILATORS

TAG	LOCATION	DESIGN CFM (HIGH SP.)	EXT. SP IN W.C.	COOLING CAP (MBTUH) @ 75F db/64F wb EAT & 45F EWT						HEATING CP. (HIGH SPEED) @70F EAT & 180F EWT				ELECTRICAL				MINIMUM OUTSIDE AIR (CFM)	BASIS OF DESIGN	MODEL	WEIGHT LB.S	REMARKS
				CLG. CFM	TOTAL CAP.	SENS.	GPM	P.D. FT. W.C.	ROWS	MBTUH	GPM	P.D. FT. W.C.	ROWS	FAN HP	UNIT MCA	UNIT MOCP	VOLTS/PH					
UV-1	TEACHERS	1000	0.1	700	25.5	17.7	7.0	15.5	5	65.7	5.0	5.8	5	0.33	2.0	15	277 / 1	125	CARRIER	40UVF	480	1,2,3,4,5
UV-2	DENTIST	500	0.1	336	7.7	6.1	2.0	1.3	5	26.2	2.0	0.7	5	0.33	1.8	15	115 / 1	30	CARRIER	40UVF	330	1,2,3,4,5
UV-3	HEALTH	500	0.1	336	7.7	6.1	2.0	1.3	5	26.2	2.0	0.7	5	0.33	1.8	15	115 / 1	30	CARRIER	40UVF	330	1,2,3,4,5
UV-4	GUIDENCE	750	0.1	484	13.5	10.5	3.0	2.8	5	44.5	3.0	1.9	5	0.33	4.6	15	115 / 1	50	CARRIER	40UVF	400	1,2,3,4,5
UV-5	GIFTED	750	0.1	484	13.5	10.5	3.0	2.8	5	44.5	3.0	1.9	5	0.33	4.6	15	115 / 1	50	CARRIER	40UVF	400	1,2,3,4,5
UV-6	PRINCIPAL 1	500	0.1	336	7.7	6.1	2.0	1.3	5	26.2	2.0	0.7	5	0.33	1.8	15	115 / 1	30	CARRIER	40UVF	330	1,2,3,4,5
UV-7	PRINCIPAL 2	750	0.1	484	13.5	10.5	3.0	2.8	5	44.5	3.0	1.9	5	0.33	4.6	15	115 / 1	30	CARRIER	40UVF	400	1,2,3,4,5

NOTES: *CONTRACTOR TO VERIFY PHYSICAL SIZE AND OA INLET DIMENSIONS TO MATCH EXISTING EQUIPMENT, PRIOR TO ORDERING EQUIPMENT.
1. ALL UNITS SHALL BE CONFIGURED WITH REAR BOTTOM OA INLET, FRONT BOTTOM RA INLET, TOP VERTICAL SA OUTLET, FRONT ACCESS PANEL, SIDE-END PANELS, AND NOMINAL 16.5" UNIT DEPTH.
2. ALL UNITS SHALL BE CONFIGURED WITH 3-SPEED ECM FAN MOTOR, STANDARD OA DAMPER ASSEMBLY, FACE AND BYPASS DAMPER, AND 2" MERV-08 FILTER.
3. ALL UNITS SHALL BE CONFIGURED WITH 5-ROW, 2-PIPE STANDARD CAPACITY HW/CHW COIL, AND STAINLESS STEEL DRAIN PAN.
4. UNITS WILL BE CONTROLLED BY THE EXISTING BUILDING BAS. CONTROL VALVES AND BACNET IP INTERFACE WILL BE PROVIDED BY CONTROLS CONTRACTOR.
5. ALL UNITS SHALL BE BEIGE IN COLOR.

PUMP SCHEDULE

TAG	SYSTEM	LOCATION	TYPE	DESIGN CAPACITY GPM	DESIGN HEAD FT.	NPSHA HEAD FT.	PUMP EFF.	SOLUTION	FLUID TEMP.	MOTOR				PUMP SIZE		WEIGHT	BASIS OF DESIGN MANUF./MODEL	REMARKS
										HP	RPM	ENCL.	VOLTS/PH/ HZ	SUCT. IN. DIA.	DISCH. IN. DIA.			
CWP-1	CHILLED WATER	MECH. RM.	END-SUCTION, CLOSE-COUPLED	170	70	4	75%	50% P.G.	55	5	1760	TEFC	460 / 3 /60	2.500	2.000	215	TACO / 2009D	ALL, SEE BELOW.

REMARKS:
1. PUMP SHALL BE CAST IRON BODY WITH BRONZE IMPELLER, STEEL SHAFT, BRONZE SLEEVE, AND CERAMIC/EPT SEALS.
2. PUMP SHALL BE FITTED WITH 125# FLANGES.
3. PUMP SPEED SHALL BE CONTROLLED WITH A VFD. VFD BASIS OF DESIGN: ABB MODEL ACH580 WITH BACNET IP COMMUNICATION.

SPLIT CHILLER SCHEDULE

TAG	LOCATION	NOMINAL CAPACITY TONS	REFRIG.	EER	EVAPORATOR (BASED ON 30% P.G. SOLUTION.)				ELECTRICAL				WEIGHT LB.S	BASIS OF DESIGN	REMARKS
					E.W.T. °F	L.W.T. °F	WATER FLOW GPM	WATER PD (FT)	MCA	MOCP	ICF	V/Ph/Hz			
CH-1	MECH RM	76	R-134A	11.8	55	45	169.9	12.9	146	200	206	460 / 3 / 60	4,717	CARRIER 30 HCA076	ALL, SEE BELOW.

NOTES:
1. PROVIDE NON-FUSED DISCONNECT, WYE-DELTA STARTER, AND CONTROLS TRANSFORMER FOR SINGLE POINT POWER.
2. PROVIDE MINIMUM LOAD CONTROL (HOT GAS BYPASS) FOR OPERATION DOWN TO 10% CAPACITY.
3. PROVIDE 2-PASS EVAPORATOR AND FULL EVAPORATOR INSULATION KIT.
4. PROVIDE VIBRATION ISOLATION SPRINGS WITH 2" DEFLECTION.
5. PROVIDE FULL SOUND ENCLOSURE.
6. PROVIDE NITROGEN HOLINDG CHARGE AND SUCTION SERVICE VALVES.

AIR COOLED CONDENSING UNIT SCHEDULE

TAG	SERVES	NOMINAL CAP. TONS	HEAT REJECTION @ 45f SUCT/95 F, O.A.	EER	REFR.	EAT MIN/MAX	SUCTION TEMP	ELECTRICAL			WEIGHT	MANUF./MODEL NUMBER	REMARKS
								VOLTS/ PH	MCA	MOCP			
CU-1	CH-1	95	45 TONS / 45 TONS	11.2	R-143a	0/95 F	45F	460 / 3	20.6	25	2,296	CARRIER / 09DP095	1,2,3,4,5

NOTES:
1. PROVIDE DUAL CIRCUIT MODEL WITH 50/50 SPLIT AND ROUND-TUBE PLATE FIN CONDENSER COILS.
2. RATINGS PROVIDED ARE BASED ON 119°F SATURATED CONDENSING TEMP, 95° AMBIENT TEMP, AND 15°F SUBCOOLING.
3. PROVIDE BOTTOM SKID, SECURITY GRILLES, AND LOUVERED HAIL GUARDS.
4. PROVIDE SINGLE POINT POWER TERMINAL BLOCK FROM THE FACTORY AND EXTERNAL 60-AMP FUSED DISCONNECT WITH 25 AMP FUSES.

COMBINATION CHEMICAL FEEDER-FLUID FILTER SCHEDULE

TAG	DESCRIPTION	SYSTEM SERVED	PIPE SIZE (IN)	FLOW (GPM)	PRESS. DROP (FT. HD.)	WEIGHT (LBS)	BASIS OF DESIGN		REMARKS
							MFG.	MODEL	
FF-1	FLUID FILTER	GLYCOL LOOP	2	10	6.5	188	SKIDMORE	X-POT XP	ALL, SEE BELOW

REMARKS:
1. PROVIDE PRESSURE DIFFERENTIAL SENSOR.
2. PROVIDE THE FOLLOWING FILTER BAGS TO CLIENT FOR EACH X-POT: (3) 50 μM, (3) 25 μM, (10) 5 μM. TOTAL 16 BAGS.

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DAVID C. PRICE — REGISTERED PROFESSIONAL ENGINEER — COMMONWEALTH OF PENNSYLVANIA

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
1	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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NICELY MECHANICAL SCHEDULES

DATE: XX-XX-XX | DRAWN BY: MAB
DWG SCALE: AS SHOWN | CHECKED BY: MAB
PROJECT NO: 2341083 | APPROVED BY: DCP

DRAWING NO.: M-2501

MECHANICAL SPECIFICATIONS

MECHANICAL GENERAL CONDITIONS (230010)

A. GENERAL

1. CONFORM TO ALL GENERAL AND SPECIAL CONDITIONS OF CONTRACT AS SPECIFIED BY ARCHITECT AND/OR OWNER.

2. PRODUCTS AND INSTALLATION SHALL COMPLY WITH ALL APPLICABLE LAWS, CODES, GOVERNMENT REGULATIONS, UTILITY COMPANY REQUIREMENTS, ETC. OF ALL AUTHORITIES HAVING JURISDICTION. WORK SHALL COMPLY WITH THE FOLLOWING CODES, STANDARDS AND ORGANIZATIONS: INTERNATIONAL MECHANICAL CODE (IMC), INTERNATIONAL PLUMBING CODE (IPC), INTERNATIONAL ENERGY CODE, NATIONAL ELECTRIC CODE, NFPA, UNDERWRITERS LABORATORY (UL), IRI, FM, SMACNA "HVAC DUCT CONSTRUCTION STANDARDS" GUIDELINES, DETAILS, & MODEL SPECIFICATION, ASHRAE. WHERE CONFLICTS EXIST BETWEEN CODES, STANDARDS OR THIS SPECIFICATION THE HIGHER REQUIREMENT SHALL APPLY. DEVIATIONS FROM THE CONTRACT DOCUMENTS REQUIRED BY THE ABOVE AUTHORITIES SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW. OBTAIN PERMITS AND PAY ALL FEES. ARRANGE FOR ALL REQUIRED INSPECTIONS AND APPROVALS. CONFIRM ALL UTILITY COMPANY REQUIREMENTS AND CONNECTION POINTS IN FIELD, PRIOR TO STARTING WORK.

3. ALL SPECIFICATIONS AND DRAWINGS, I.E., ARCHITECTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL ARE COMPLIMENTARY AND MUST BE USED IN COMBINATION TO OBTAIN COMPLETE CONSTRUCTION INFORMATION. ANY INFORMATION CONFLICTS WITHIN THE SPECIFICATIONS AND DRAWINGS SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION. DRAWINGS ARE DIAGRAMMATIC. CONFIRM ALL DIMENSIONS BY FIELD MEASUREMENT. THE EXACT LOCATIONS FOR APPARATUS, FIXTURES, EQUIPMENT AND PIPING WHICH IS NOT COVERED BY DRAWINGS, SHALL BE OBTAINED FROM THE ARCHITECT OR HIS REPRESENTATIVE IN THE FIELD, AND THE WORK SHALL BE LAID OUT ACCORDINGLY.

4. VISIT SITE, CHECK FACILITIES AND CONDITIONS MAKE ALL NECESSARY OBSERVATIONS, MEASUREMENTS, NOTE CONDITIONS UNDER WHICH WORK IS TO BE PERFORMED, AND TAKE ALL ITEMS INTO CONSIDERATION IN BID.

5. EACH CONTRACTOR SHALL PROVIDE FOR HIS OWN CLEAN-UP, REMOVAL AND LEGAL DISPOSAL OF ALL RUBBISH DAILY. CONTRACTOR SHALL PROTECT THEIR WORK AND EXISTING OR ADJACENT PROPERTY AGAINST WEATHER, TO MAINTAIN THEIR WORK, MATERIALS, APPARATUS AND FIXTURES FREE FROM INJURY OR DAMAGE. ANY WORK DAMAGED BY FAILURE TO PROVIDE PROTECTION REQUIRED, SHALL BE REMOVED AND REPLACED WITH NEW WORK AT THE CONTRACTOR'S EXPENSE.

6. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, SEQUENCES OF CONSTRUCTION AND THE SAFETY OF WORKMEN.

7. NO PIPING, DUCTWORK, CONTROLS, ETC., SHALL BE INSTALLED OR ROUTED ABOVE ELECTRICAL PANELS AND EQUIPMENT OR THROUGH ELEVATOR ROOMS.

8. THE CONTRACTOR SHALL COORDINATE AND OBTAIN A WRITTEN LISTING OF ELECTRICAL CHARACTERISTICS OF ALL MECHANICAL EQUIPMENT FROM ELECTRICAL CONTRACTOR PRIOR TO ORDERING OF EQUIPMENT. NO ADDITIONAL PAYMENT WILL BE MADE FOR LACK OF CONTRACTOR COORDINATION OF ELECTRICAL CHARACTERISTICS.

9. DURING THE BUILDING CONSTRUCTION SOME EXISTING INSTALLATION MAY BE EXPOSED THAT WILL HAVE TO BE CHANGED, ALTERED, REROUTED AND/OR ABANDONED. ANY SUCH WORK WHICH COMES UNDER THE JURISDICTION OF THIS CONTRACTOR SHALL BE DONE BY THIS CONTRACTOR WITHOUT EXTRA COST TO THE OWNER, AS THOUGH FULLY DETAILED ON PLANS AND/OR DESCRIBED IN THE SPECIFICATIONS.

10. WORK RELATED TO THE EXISTING BUILDING SHALL BE COORDINATED TO MINIMIZE INTERFERENCE OR INTERRUPTION OF NORMAL BUILDING USE BY OWNER. REFER TO ARCHITECTURAL PLANS FOR PHASING REQUIREMENTS.

11. IN CASES OF DOUBT AS TO THE WORK INTENDED, OR IN THE EVENT OF NEED FOR EXPLANATION THEREOF, THE CONTRACTOR SHALL REQUEST SUPPLEMENTARY INSTRUCTIONS FROM THE ENGINEER. NO CHANGES ARE TO BE MADE TO THE WORK OF THIS CONTRACT WITHOUT PRIOR KNOWLEDGE AND APPROVAL OF THE ENGINEER. THE CONTRACTOR SHALL HOLD THE OWNER AND ITS CONSULTANTS HARMLESS AGAINST ALL CLAIMS AND JUDGMENTS ARISING OUT OF THE CONTRACTORS PERFORMANCE OF THE WORK OF THIS CONTRACT. THE CONTRACTOR SHALL NOT PROCEED WITH ANY WORK, WHICH HE EXPECTS ADDITIONAL COMPENSATION BEYOND THE CONTRACT AMOUNT, WITHOUT WRITTEN AUTHORIZATION FROM THE APPROPRIATE AUTHORITY. FAILURE TO OBTAIN SUCH AUTHORIZATION SHALL INVALIDATE ANY CLAIM FOR EXTRA COMPENSATION.

12. IT SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR TO INSTALL THE HEATING, VENTILATION AND AIR CONDITIONING SYSTEM SO AS TO INSURE QUIET OPERATION. NO VIBRATION OR SOUND SHALL BE TRANSMITTED TO THE BUILDING, STRUCTURE OR OCCUPIED AREAS. THE DECISION OF THE ENGINEER AS TO THE QUIETNESS OF THE SYSTEM AND EQUIPMENT SHALL BE FINAL. IT SHALL BE THIS CONTRACTORS RESPONSIBILITY TO CORRECT OR REPLACE ANY NOISY SYSTEM OR EQUIPMENT AS REQUIRED.

13. OBTAIN PERMITS AND PAY ALL FEES. ARRANGE FOR ALL REQUIRED INSPECTIONS AND APPROVALS.

B. DEMOLITION

1. DISCONNECT, DISASSEMBLE, CAP, PLUG AND REMOVE ALL MEP ELEMENTS (PIPING, DUCTS, ELECTRICAL DEVICES, WIRING, CONDUIT, EQUIPMENT, HANGERS, SUPPORTS, ETC) INDICATED ON THE DRAWINGS OR NOT OTHERWISE REQUIRED FOR COMPLETED PRODUCT. NO MEP ELEMENTS ARE TO BE ABANDONED IN PLACE UNLESS SPECIFICALLY NOTED. NOT ALL ITEMS TO BE REMOVED ARE INDICATED ON DRAWING.

2. ALL OPENINGS ON PIPING AND DUCTS THAT REMAIN SHALL BE CAPPED AND PROPERLY SECURED. WIRING SHALL BE DISCONNECTED AT CIRCUIT BREAKERS AND REMOVED AND BREAKERS MARKED "SPARE." REMOVE AND RECLAIM ANY REFRIGERANT IN EXISTING SYSTEMS PRIOR TO DEMOLITION OF ANY EQUIPMENT ACCORDING TO FEDERAL REQUIREMENT.

3. ANY EQUIPMENT DESIGNATED BY OWNER TO BE SALVAGED SHALL BE PROTECTED AND DELIVERED TO AN OWNER DESIGNATED AREA ON SITE.

4. ALL ASBESTOS REMOVAL (IF REQUIRED) WILL BE HANDLED BY THE OWNER AND IS NOT A PART OF THIS WORK. IF MATERIALS SUSPECTED OF CONTAINING HAZARDOUS MATERIALS ARE ENCOUNTERED, DO NOT DISTURB; NOTIFY ARCHITECT AND OWNER IMMEDIATELY.

C. BASIS OF DESIGN AND SUBSTITUTIONS

1. WHEREVER THE WORDS "APPROVED BY", "APPROVED EQUAL", "AS DIRECTED" OR SIMILAR PHRASES ARE USED IN THE FOLLOWING SPECIFICATIONS, THEY SHALL BE UNDERSTOOD TO REFER TO THE OWNER AS THE APPROVING AGENCY. THE NAME OR MAKE OF ANY EQUIPMENT OR MATERIALS NAMED IN THE SPECIFICATION (WHETHER OR NOT THE WORDS "OR APPROVED EQUAL" ARE USED) SHALL BE KNOWN AS THE "STANDARD".

2. THESE SPECIFICATIONS ESTABLISH QUALITY STANDARDS OF MATERIALS AND EQUIPMENT TO BE PROVIDED. SPECIFIC ITEMS ARE IDENTIFIED BY MANUFACTURER, TRADE NAME OR CATALOG DESIGNATION. THE CONTRACTOR SHALL SUBMIT THE BASE BID PRICE BASED UPON STANDARD SPECIFIED EQUIPMENT DESCRIBED HEREIN AND AS DETAILED ON DRAWINGS AND ASSOCIATED CONTRACT DOCUMENTS. THE CONTRACTOR MAY SUBMIT INFORMATION ON MATERIALS AND MANUFACTURERS (OTHER THAN THOSE LISTED) FOR REVIEW BY THE OWNER, ARCHITECT, AND ENGINEER NO LATER THAN TEN (10) DAYS BEFORE BIDS ARE SUBMITTED. IN ADDITION, SAMPLES OF THE PROPOSED EQUIPMENT MAY BE REQUIRED TO BE SUBMITTED TO THE ENGINEER FOR REVIEW NO LATER THAN TEN (10) DAYS BEFORE BIDS ARE SUBMITTED. MANUFACTURERS OF PRODUCTS ACCEPTED BY THE OWNER, ARCHITECT, AND ENGINEER WILL BE LISTED IN AN ADDENDUM TO THE SPECIFICATIONS AS AN ACCEPTABLE SUBSTITUTION. EQUIPMENT ACCEPTED AS DETAILED BELOW SHALL BE SHOWN AS A SEPARATE ADD OR DEDUCT PRICE TO BE FACTORED INTO THE BASE PRICE BY THE ARCHITECT AND OWNER IF ACCEPTED.

3. SHOULD THE CONTRACTOR PROPOSE TO FURNISH MATERIALS AND EQUIPMENT OTHER THAN THOSE SPECIFIED OR APPROVED BY ADDENDUM, SUBMIT A WRITTEN REQUEST FOR SUBSTITUTION TO THE OWNER, ARCHITECT AND ENGINEER AT BID OPENING. THE REQUEST SHALL BE AN ALTERNATE TO THE ORIGINAL BID; BE ACCOMPANIED WITH COMPLETE DESCRIPTIVE (MANUFACTURER, BRAND NAME, CATALOG NUMBER, ETC.) AND TECHNICAL DATA FOR ALL ITEMS. FAILURE BY THIS CONTRACTOR TO SUBMIT THE REQUISITE DOCUMENTATION DETAILED ABOVE SHALL BE UNDERSTOOD BY THE OWNER, ARCHITECT, AND ENGINEER TO INDICATE THAT SUBSTITUTE EQUIPMENT WILL NOT BE PRESENTED BY THE CONTRACTOR FOR CONSIDERATION. SUCH SUBSTITUTIONS WILL NOT BE CONSIDERED AFTER THE BID OPENING DATE AND DELAY OF THE PROJECT WILL NOT BE PERMITTED FOR FURTHER INSPECTION AND EVALUATION AFTER THIS DATE.

4. WHERE SUCH SUBSTITUTIONS ALTER THE DESIGN OR SPACE REQUIREMENTS INDICATED ON THE DRAWINGS, INCLUDE ALL ITEMS OF COST FOR THE REVISED DESIGN AND CONSTRUCTION INCLUDING COST OF ALL ALLIED TRADES INVOLVED.

5. ACCEPTANCE OR REJECTION OF THE PROPOSED SUBSTITUTIONS SHALL BE SUBJECT TO APPROVAL OF THE OWNER, ARCHITECT, AND ENGINEER. IF REQUESTED, THE CONTRACTOR SHALL SUBMIT (AT THEIR COST) INSPECTION SAMPLES OF BOTH THE SPECIFIED AND PROPOSED SUBSTITUTE ITEMS.

6. IN ALL CASES WHERE SUBSTITUTIONS ARE PERMITTED, THE CONTRACTOR SHALL BEAR ANY EXTRA COST OF EVALUATING THE QUALITY OF THE MATERIAL AND EQUIPMENT TO BE PROVIDED.

7. ALL EQUIPMENT AND MATERIALS SHALL BE NEW, FREE OF DEFECTS AND U.L. LABELED.

D. CUTTING, PATCHING AND DRILLING

1. ALL CUTTING AND PATCHING OF THE BUILDING CONSTRUCTION REQUIRED FOR THIS WORK SHALL BE BY THIS CONTRACTOR UNLESS SHOWN ON ARCHITECTURAL DRAWINGS AND CONFIRMED AS TO SIZE AND LOCATION PRIOR TO NEW CONSTRUCTION. CUTTING SHALL BE IN A NEAT AND WORKMANLIKE MANNER. NEATLY SAW CUT ALL RECTANGULAR OPENINGS, SET SLEEVE THROUGH OPENING, AND FINISH PATCH OR PROVIDE TRIM FLANGE AROUND OPENING. CORE DRILL AND SLEEVE ALL ROUND OPENINGS. DO NOT CUT ANY STRUCTURAL COMPONENTS WITHOUT ARCHITECT'S APPROVAL.

2. PATCH AND FINISH TO MATCH ADJACENT AREAS THAT HAVE BEEN CUT, DAMAGED OR MODIFIED AS A RESULT OF THE INSTALLATION OF THE MECHANICAL OR ELECTRICAL EQUIPMENT. FIRE STOP ALL PENETRATIONS OF FIRE RATED CONSTRUCTION IN A CODE APPROVED MANNER.

3. ALL CONTRACTORS SHALL CONFIRM WITH OWNER, PRIOR TO BID, TIMES AVAILABLE FOR NOISE PRODUCING WORK SUCH AS CUTTING AND CORE DRILLING OF FLOORS, WALLS, ETC., AS WELL AS TIMES FOR WORK WHICH REQUIRE ACCESS INTO ADJOINING TENANT SPACES. INCLUDE ANY PREMIUM TIME IN BID.

4. EXACT LOCATION OF ROOFTOP EQUIPMENT SHALL BE APPROVED BY OWNER'S STRUCTURAL ENGINEER.

5. INFORMATION REGARDING REQUIRED PIPE OPENINGS IN WALLS, FLOORS, CHASES, ETC., AND CONCRETE EQUIPMENT PADS OR FOUNDATIONS SHALL BE GIVEN TO THE GENERAL CONTRACTOR BY THIS CONTRACTOR PRIOR TO THE CONSTRUCTION PERIOD. IF THIS CONTRACTOR FAILS TO COMPLY WITH THIS REQUEST, OR IF INCORRECT INFORMATION IS GIVEN, THE NECESSARY CUTTING AND PATCHING WILL BE PERFORMED BY THE GENERAL CONTRACTOR, AT THIS CONTRACTOR'S EXPENSE.

E. WARRANTY

1. FULLY WARRANT ALL MATERIALS, EQUIPMENT AND WORKMANSHIP FOR ONE (1) YEAR FROM DATE OF ACCEPTANCE.EXTEND ALL MANUFACTURER'S WARRANTIES TO OWNER, INCLUDING ALL EXTENDED WARRANTIES ON HVAC EQUIPMENT.

2. REPAIR OR REPLACE WITHOUT CHARGE TO THE OWNER ALL ITEMS FOUND DEFECTIVE DURING THE WARRANTY PERIOD. IN THE CASE OF REPLACEMENT OR REPAIR DUE TO FAILURE WITHIN THE WARRANTY PERIOD, THE WARRANTY ON THAT PORTION OF THE WORK SHALL BE EXTENDED FOR A MINIMUM PERIOD OF ONE (1) YEAR FROM THE DATE OF SUCH REPLACEMENT OR REPAIR.

F. SHOP DRAWING SUBMITTALS

1. SUBMIT SHOP DRAWINGS FOR MECHANICAL EQUIPMENT, FIRE PROTECTION SYSTEMS, DUCTWORK, AND PLUMBING FIXTURES AND EQUIPMENT WITH ADEQUATE DETAILS AND SCALES TO CLEARLY SHOW CONSTRUCTION. INDICATE THE OPERATING CHARACTERISTICS FOR EACH REQUIRED ITEM. CLEARLY IDENTIFY EACH ITEM ON THE SUBMITTAL AS TO MARK, LOCATION AND USE, USING SAME IDENTIFICATION AS PROVIDED ON DESIGN DRAWINGS.

2. DUCTWORK AND FIRE PROTECTION DRAWINGS SHALL BE FULLY DIMENSIONED BASED ON FIELD VERIFIED BUILDING CLEARANCES AND ARCHITECTURAL CEILING LAYOUTS, AND INDICATE STRUCTURAL, LIGHTING, DUCTWORK AND PIPING AT ALL CRITICAL LOCATIONS.

3. CONTRACTOR SHALL REVIEW AND INDICATE HIS APPROVAL OF EACH SHOP DRAWING PRIOR TO SUBMITTAL FOR REVIEW. DO NOT START WORK OR FABRICATION UNTIL SHOP DRAWINGS HAVE BEEN REVIEWED BY THE ENGINEER AND RETURNED TO THE CONTRACTOR.

4. SUBMITTALS WILL BE REVIEWED ONLY FOR GENERAL COMPLIANCE WITH THE CONTRACT DOCUMENTS AND NOT FOR DIMENSIONS OR QUANTITIES. THE SUBMITTAL REVIEW SHALL NOT RELIEVE THE CONTRACTOR OF RESPONSIBILITY FOR PURCHASE OF ANY ITEM IN FULL COMPLIANCE WITH THE CONTRACT DOCUMENTS OR ITS COMPLETE AND PROPER INSTALLATION.

5. WHERE SUBMITTALS VARY FROM THE CONTRACT REQUIREMENTS, THE CONTRACTOR SHALL CLEARLY INDICATE ON SUBMITTAL OR ACCOMPANYING DOCUMENTS THE NATURE AND REASON FOR VARIATIONS.

6. REFER TO VARIOUS SECTIONS FOR LISTING OF SHOP DRAWINGS REQUIRED ON THIS PROJECT.

7. EACH MANUFACTURER OR HIS REPRESENTATIVE MUST CHECK THE APPLICATION OF HIS EQUIPMENT AND CERTIFY AT TIME OF SHOP DRAWING SUBMITTAL THAT EQUIPMENT HAS BEEN PROPERLY APPLIED AND CAN BE INSTALLED, SERVICED AND MAINTAINED WHERE INDICATED ON DRAWINGS. ADVISE ENGINEER IN WRITING WITH SUBMITTAL DRAWINGS OF ANY POTENTIAL PROBLEMS. THE MANUFACTURER SHALL BE RESPONSIBLE FOR ANY CHANGES THAT MIGHT BE NECESSARY BECAUSE OF PHYSICAL CHARACTERISTICS OF EQUIPMENT THAT HAVE NOT BEEN CALLED TO THE ENGINEER'S ATTENTION AT THE TIME OF SUBMITTAL.

G. RECORD DRAWINGS

1. EACH CONTRACTOR OR SUBCONTRACTOR SHALL KEEP ONE (1) COMPLETE SET OF THE CONTRACT WORKING DRAWINGS ON THE JOB SITE ON WHICH HE SHALL REGULARLY RECORD ANY DEVIATIONS OR CHANGES FROM SUCH CONTRACT DRAWINGS MADE DURING CONSTRUCTION.

2. THESE DRAWINGS SHALL RECORD THE LOCATION OF ALL CONCEALED EQUIPMENT, PIPING, ELECTRIC SERVICE, SEWERS, WASTES, VENTS, DUCTS, CONDUIT AND OTHER PIPING, BY MEASURED DIMENSIONS TO EACH SUCH ITEM FROM READILY IDENTIFIABLE AND ACCESSIBLE WALLS OR CORNERS OF THE BUILDING. PLANS ALSO SHALL SHOW INVERT ELEVATION OF SEWERS AND TOP ELEVATION OF ALL OTHER BELOW-GRADE LINES.

3. RECORD DRAWINGS SHALL BE KEPT CLEAN AND UNDAMAGED AND SHALL NOT BE USED FOR ANY PURPOSE OTHER THAN RECORDING DEVIATIONS FROM WORKING DRAWINGS AND EXACT LOCATIONS OF CONCEALED WORK.

4. AFTER THE PROJECT IS COMPLETED, THESE SETS OF DRAWINGS SHALL BE DELIVERED TO THE ARCHITECT IN GOOD CONDITION, AS A PERMANENT RECORD OF THE INSTALLATION AS ACTUALLY CONSTRUCTED.

H. FIRESTOPPING

1. ALL SERVICES THAT PASS THRU FIRE OR SMOKE RATED PARTITIONS, WALLS, FLOORS, SHALL BE FIRESTOPPED. FIRE STOPPING RATING SHALL MATCH PARTITION RATING. ALL FIRE STOPPING SYSTEM SHALL MEET THE REQUIREMENTS OF ASTM E 814,UL 1479, AND BE FACTORY MUTUAL APPROVED.

2. ALL FIRESTOPPING AND/OR SMOKE STOPPING MATERIAL AND INSTALLATION SHALL BE AS MANUFACTURED BY HILTI OR APPROVED EQUAL.

I. ACCESS DOORS & PANELS

1. ACCESS DOORS SHALL BE PROVIDED IN WALLS AND CEILINGS WHERE REQUIRED TO PERMIT PROPER ACCESS TO VALVES AND ANY OTHER SUCH DEVICES WHICH REQUIRE MAINTENANCE OR SERVICE. DOORS PLACED IN WALLS, PARTITIONS OR OTHER FIRE-RATED CONSTRUCTION SHALL HAVE A LABEL SIGNIFYING THAT THE DOOR HAS THE SAME FIRE RATING AS THE FIRE-RATED CONSTRUCTION.

2. THIS CONTRACTOR SHALL FURNISH ACCESS PANELS TO THE GENERAL CONTRACTOR FOR INSTALLATION.

3. ACCESS PANELS SHALL BE CONSTRUCTED OF 14 GAUGE STEEL, WITH 16 GAUGE STEEL FRAMES. DOORS SHALL FINISH FLUSH WITH THE SURROUNDING SURFACE. FRAMES SHALL HAVE 3 INCH WIDE EXPANDED METAL FOR PLASTERED SURFACES AND PLAIN FLANGED TYPE FRAME FOR TILE, MASONRY OR GYPSUM BOARD SURFACES. DOORS AND FRAMES SHALL BE FURNISHED PRIME COATED. DOORS INSTALLED IN CERAMIC TILE OR OTHER NON-PAINTED SURFACES SHALL BE STAINLESS STEEL. HINGES SHALL BE CONCEALED SPRING TYPE, TO ALLOW DOORS TO BE OPENED 175 DEGREES. LOCKS SHALL BE FLUSH SCREWDRIVER TYPE WITH STEEL CAMS. ACCESS PANELS SHALL BE 16 INCHES BY 16 INCHES OR LARGER AS MAY BE REQUIRED FOR PROPER ACCESS TO THE DEVICE BEING SERVED.

4. ACCESS PANELS ARE NOT REQUIRED IN COMPLETELY ACCESSIBLE LIFT OUT TILE CEILINGS. CONTRACTOR SHALL REVIEW THE ROOM FINISH SCHEDULE ON THE ARCHITECTURAL DRAWINGS IN ORDER TO VERIFY THE NEED FOR ACCESS PANEL

J. PAINTING

1. IN FINISHED SPACES, PAINTING OF ALL MECHANICAL EQUIPMENT, APPARATUS, AND PIPING SHALL BE DONE BY THE PAINTING TRADE UNDER THE GENERAL CONTRACTOR SPECIFICATION, EXCEPT WHERE SPECIFIED TO BE DONE BY THE MECHANICAL CONTRACTOR.

K. TEMPORARY HEAT

1. THE COSTS OF TEMPORARY HEAT, INCLUDING UTILITY COSTS, SHALL BE AT THE EXPENSE OF THE HEATING TRADE (MECHANICAL CONTRACTOR). THE HEATING TRADE SHALL PROVIDE THE MEANS OF TEMPORARY HEAT. EXISTING HEATING EQUIPMENT AND SYSTEMS MAY NOT BE USED DURING CONSTRUCTION AS THE SYSTEMS SERVE OTHER OCCUPIED SPACES WITHIN THE BUILDING.

2. THE PERMANENT MECHANICAL SYSTEM SHALL NOT BE USED UNDER ANY EXCEPTIONS TO PROVIDE TEMPORARY HEATING, VENTILATING, EXHAUST OR AIR CONDITIONING UNTIL THE BUILDING IS CLEAN, WITHOUT ANY DUST OR DEBRIS THAT CAN ENTER THE MECHANICAL SYSTEM AND IS READY FOR OCCUPANCY. COVERING THE RETURN/EXHAUST AIR INLETS WITH FILTER MEDIA IS NOT AN ACCEPTABLE ALTERNATIVE TO HAVING AN ENCLOSED, DUST-FREE ENVIRONMENT FOR THE SYSTEMS TO OPERATE IN. IN NO EVENT SHALL THE MECHANICAL CONTRACTOR'S ONE YEAR WARRANTY BE SHORTENED BY THE USE OF PERMANENT EQUIPMENT FOR TEMPORARY HEAT.

HYDRONIC PIPING (232113)

1. PIPE AND FITTINGS -- HYDRONIC PIPING 2" AND SMALLER SHALL BE:
   - 1.1. 1) TYPE "L" HARD COPPER TUBING ASTM B 88-832 WITH SWEATED JOINTS PER ASTM B 16.22 USING 95/5 OR ANTIMONY SOLDER OR "PRESS-FIT" MECHANICAL JOINTING. ALL FITTINGS SHALL BE MADE FROM WROUGHT COPPER.
   - 1.2. 2) SCHEDULE 40 STEEL PIPING WITH VICTAULIC PLAIN END QUICKVIC SD (R) FITTINGS. FITTINGS SHALL BE MADE FROM DUCTILE IRON. PROVIDE SCREWED UNIONS OR GROOVED FITTINGS AT FINAL CONNECTIONS TO EQUIPMENT TO ALLOW DISCONNECTION FOR REPAIR OR SERVICING.

2. PIPING 2 -1/2" AND LARGER SHALL BE SCHEDULE 40, WELDED BLACK STEEL (ASTM A53) WITH BLACK WROUGHT STEEL, BUTT WELDING TYPE (ASTM B16.9) FITTINGS, OR SCHEDULE 40 GROOVED BLACK STEEL (ASTM A53) WITH GROOVED FITTINGS MADE BY VICTAULIC, OR APPROVED EQUAL, MAY BE USED.

3. GROOVED JOINTS QUALITY ASSURANCE: GROOVED JOINTS SHALL BE VISUALLY VERIFIABLE TO ENSURE PROPER INSTALL PER MANUFACTURER'S INSTALLATION INSTRUCTIONS. IF WRITTEN MANUFACTURER'S INSTRUCTIONS REQUIRE A VERIFIED TORQUE RATHER THAN A VISUAL VERIFICATION, A TORQUE LOG OF EVERY COUPLING SHALL BE PROVIDED FOR APPROVAL TO THE ENGINEER AND OWNER TO VERIFY PROPER INSTALL.

4. BALL VALVES --- UP TO 2": BRONZE TWO PIECE BODY, STAINLESS STEEL BALL, TEFLON SEATS AND BLOW-OUT PROOF STUFFING BOX RING, LEVER HANDLE, AND BALANCING STOPS, UNION SOLDER ENDS. ACCEPTABLE MANUFACTURERS: APOLLO, LEGEND VALVE, VICTAULIC, OR WATTS.

5. BUTTERFLY VALVES -- BUTTERFLY VALVES SHALL BE BRAY MODEL 31 OR EQUAL WITH DUCTILE IRON LUG STYLE BODY, OR VICTAULIC WITH GROOVED CONNECTIONS, BRONZE DISC, 416 STAINLESS STEEL SHAFT, BRONZE BEARINGS, "EPDM" RUBBER SEAT, LEVER HANDLE OPERATORS AND SHALL BE RATED AT 175 POUNDS CWP. VALVES SHALL PROVIDE DEAD TIGHT SHUTOFF CAPABILITY IN EITHER DIRECTION UP TO 150 PSI WHEN THE DOWNSTREAM FLANGES ARE REMOVED.

6. VENT AND DRAIN VALVES -- ALL WATER PIPING SYSTEMS SHALL BE INSTALLED IN SUCH A MANNER THAT THEY CAN BE COMPLETELY VENTED AND DRAINED. UNLESS OTHERWISE NOTED, PROVIDE AT ALL HIGH POINTS WHERE AIR CAN COLLECT 1/4" BRASS COMPRESSION VENT COCKS, AND AT ALL LOW POINTS ½" BALL VALVES WITH HOSE BIB ENDS AND CAPS.

7. PRESSURE/TEMPERATURE PLUGS -- PROVIDE SISCO OR PETERSON 1/4_INCH NPT FITTING OF SOLID BRASS, FOR 1/8" O.D. PROBE. VALVE CORE SHALL BE NEOPRENE FOR TEMPERATURE TO 200 F, AND RATED FOR ZERO LEAKAGE FROM VACUUM TO 1,000 PSIG. PROVIDE TEST KIT CONSISTING OF TWO PRESSURE GAGES WITH PROBES AND 2 DIAL THERMOMETERS WITH CARRYING CASE.

8. STRAINERS -- Y-PATTERN, BODY: ASTM A 126, CLASS B CAST IRON, WITH BOLTED OR SCREWED COVER AND BOTTOM DRAIN CONNECTION. END CONNECTIONS: THREADED ENDS FOR STRAINERS NPS 2 AND SMALLER; FLANGED ENDS FOR STRAINERS NPS 2-1/2 AND LARGER. STRAINER SCREEN: STAINLESS-STEEL, 20-MESH STRAINER, OR PERFORATED STAINLESS-STEEL BASKET. WITH TAPPED BLOWOFF PLUG. RATING: 150-PSIG WORKING PRESSURE.

9. BALANCING VALVES -- PROVIDE VICTAULIC MULTI-TURN BALANCING VALVES WHERE SHOWN IN PIPING DETAILS ON THE DRAWINGS. VALVES SHALL BE OF BRONZE CONSTRUCTION (½" TO 2" SIZES) WITH EPDM SEATS/SEALS. VALVES SHALL HAVE DIFFERENTIAL PRESSURE READOUT PORTS, CONCEALED LOCKABLE MEMORY STOP, CALIBRATED NAMEPLATE AND DRAIN PORT. EACH VALVE SHALL HAVE POSITIVE SHUTOFF AND SHALL BE CONSTRUCTED FOR 300 PSIG RATED PRESSURE.

10. AUTOMATIC BALANCING VALVES -- PROVIDE VICTAULIC AUTOMATIC BALANCING VALVES, OR APPROVED EQUAL, WHERE SHOWN IN PIPING DETAILS ON DRAWINGS. VALVES SHALL HAVE BRASS BODIES AND CHANGEABLE FLOW CARTRIDGES.

11. PROVIDE VALVES AND UNIONS WHERE NEEDED TO PERMIT DISCONNECTIONS OF EACH PIECE OF EQUIPMENT FOR REPAIRS. MAKE CONNECTIONS TO EQUIPMENT WITH SHUT-OFF VALVES ON SUPPLY AND BALANCE VALVES ON RETURNS. INSTALL UNIONS IN PIPES 2" AND SMALLER, ADJACENT TO EACH VALVE, AT FINAL CONNECTIONS EACH PIECE OF EQUIPMENT, AND ELSEWHERE AS INDICATED. UNIONS ARE NOT REQUIRED ON FLANGED DEVICES.

12. CONNECTIONS BETWEEN DISSIMILAR PIPING MATERIALS SHALL BE MADE WITH SUITABLE DIELECTRIC INSULATING UNIONS. ISOLATE COPPER PIPING FROM DISSIMILAR METALS, SUCH AS METAL STUDS AND VENT PIPING.

13. CLOSED SYSTEM WATER TREATMENT -- FILL SYSTEM WITH WATER AND LOW FOAM DETERGENT TO REMOVE DIRT AND SCALE, CIRCULATE UNTIL SYSTEM IS CLEAN AND FLUSH UNTIL WATER IS CLEAR AND REFILL WITH CLEAN WATER . ADD CORROSION AND RUST INHIBITORS. CHECK PH AND ADD CHEMICALS TO ADJUST PH PER MANUFACTURER'S INSTRUCTIONS. PROVIDE CHEMICAL POT FEEDER AND PIPE ACROSS SYSTEM. PROVIDE CHEMICAL TO TREAT SYSTEM FOR ONE YEAR. RECHECK AFTER ONE YEAR AND ADD CHEMICAL AS NEEDED FOR PROPER CHEMICAL TREATMENT.

14. PROVIDE CONDENSATE DRAIN FOOR ALL COOLING COILS. ALL CONDENSATE DRAINS SHALL BE TRAPPED PER THE COOLING COIL TRAP DETAIL OR MANUFACTURERS RECOMMENDATIONS, WHICH EVER IS MORE STRINGENT/DEEPER. PROVIDE CLEANOUT.

15. CONDENSATE DRAIN PIPING IN RETURN AIR RATED PLENUMS SHALL BE TYPE L COPPER WITH 1/2" FIBERGLASS INSULATION (MIN. R-VALUE = 3). SCHEDULE 40 PVC WITHOUT INSULATION MAY BE USED IN ALL OTHER LOCATIONS.

16. WHERE DAMAGE TO ANY BUILDING COMPONENT COULD OCCUR AS A RESULT OF OVERFLOW OR STOPPAGE OF THE PRIMARY CONDENSATE DRAIN SYSTEM, PROVIDE UL 508 WATER-LEVEL DETECTION DEVICE IN THE PRIMARY DRAIN PAN, OVERFLOW OUTLET OR IN A SECONDARY DRAIN PAN PER IMC REQUIREMENTS. COOLING SYSTEM SHALL DISABLE UPON DETECTION OF WATER AND GENERATE A BAS ALARM(IF APPLICABLE).

REFRIGERANT PIPING (232300)

1. INSTALL REFRIGERANT PIPING BETWEEN CONDENSING UNIT AND DX COIL. PIPING SHALL BE REFRIGERANT GRADE TYPE ACR COPPER WITH BRAZED JOINTS. PIPE PER MANUFACTURER'S PIPING DIAGRAMS AND RECOMMENDATIONS.

2. ISOLATE PIPING FROM STRUCTURE WITH ONE (1) INCH INSULATION BETWEEN ALL PIPING AND SUPPORT POINTS.

3. AFTER COMPLETION, PRESSURE TEST PIPING, PURGE WITH NITROGEN AND EVACUATE SYSTEM TWICE AND CHARGE SYSTEM WITH REFRIGERANT AND OIL.

4. INSTALL PIPING IN AS SHORT AND DIRECT ARRANGEMENT AS POSSIBLE TO MINIMIZE PRESSURE DROP. PROVIDE OIL TRAP AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER.

5. INSTALL UNIONS TO ALLOW REMOVAL OF SOLENOID VALVES, PRESSURE REDUCING VALVES, EXPANSION VALVES, AND AT CONNECTIONS TO COMPRESSORS AND EVAPORATORS.

6. FILL THE PIPE AND FITTINGS DURING BRAZING, WITH NITROGEN TO PREVENT FORMATION OF SCALE.

PIPE WALL SEALS (230517)

1. WALL PIPE SEALS WITH RUBBER LINKS SHALL BE THUNDERLINE LINK SEAL, OR APPROVED EQUAL. WALL PIPE SEALS WITH INORGANIC MATERIAL LINKS THE PENETRATIONS OF FIRE RATED WALLS SHALL BE THUNDERLINE PYRO-PAC, OR APPROVED EQUAL.

2. SEALS SHALL BE MODULAR MECHANICAL TYPE CONSISTING OF INTERLOCKING SYNTHETIC RUBBER OR INORGANIC MATERIAL LINKS SHAPED TO CONTINUOUSLY FILL THE ANNULAR SPACE BETWEEN THE PIPE AND WALL OPENING. LINKS SHALL BE LOOSELY ASSEMBLED WITH BOLTS TO FORM A CONTINUOUS BELT AROUND THE PIPE. A PRESSURE PLATE SHALL BE PROVIDED UNDER THE BOLT HEAD AND NUT OF EACH LINK. SEALS SHALL BE CONSTRUCTED TO PROVIDE ELECTRICAL INSULATION BETWEEN THE PIPE AND SLEEVE, THUS REDUCING CHANCES OF CATHODIC REACTION BETWEEN THESE TWO MEMBERS.

3. AFTER THE SEAL ASSEMBLY IS POSITIONED IN THE SLEEVE, THE TIGHTENING OF THE BOLTS SHALL CAUSE THE SEALING ELEMENTS TO EXPAND AND PROVIDE AN ABSOLUTELY WATER-TIGHT SEAL BETWEEN THE PIPE AND SLEEVE.

4. SLEEVES SHALL BE MANUFACTURED FROM HEAVY-WALL, WELDED OR SEAMLESS STEEL PIPE. A FULL CIRCLE CONTINUOUSLY WELDED WATER STOP PLATE SHALL BE PROVIDED TO ASSURE POSITIVE WATER SEALING OF THE SLEEVE. SLEEVE SHALL BE PROTECTED BY A COATING OF ENRICHED RED PRIMER.

DUCTWORK (233113)

1. FABRICATE AND ERECT ALL DUCTWORK TO ASHRAE AND SMACNA STANDARDS FROM G90 GALVANIZED STEEL. COMPLY WITH NFPA BULLETIN 90A REQUIREMENTS.

2. SUPPLY DUCTWORK UPSTREAM OF TERMINAL UNITS AND WITHIN 15' OF ANY AHU FAN OUTLET SHALL HAVE A SMACNA 3" STATIC PRESSURE RATING WITH SEAL CLASS A SEAMS AND JOINTS.

3. GENERAL SUPPLY AND RETURN DUCTWORK HAVE A SMACNA 2" STATIC PRESSURE RATING WITH SEAL CLASS B SEAMS AND JOINTS.

4. OUTDOOR AIR INTAKE DUCTWORK SHALL HAVE A SMACNA 2" STATIC PRESSURE RATING WITH SEAL CLASS A SEAMS AND JOINTS.

5. ALL EXPOSED ROUND AND OVAL DUCTWORK IN SHALL HAVE SPIRAL LOCKSEAM CONSTRUCTION.

6. ALL RECTANGULAR TRANSFER DUCTWORK SHALL HAVE 1" THICK ACOUSTICAL LINER. LINER SHALL BE FLEXIBLE AND CONSTRUCTED OF GLASS FIBERS BONDED WITH A THERMOSETTING RESIN. THE SURFACE OF THE LINER SHALL HAVE AN ANTIMICROBIAL EROSION RESISTANCE COATING TESTED BY NRTL AND REGISTERED BY THE EPA FOR USE IN HVAC SYSTEMS. MINIMUM R-VALUE SHALL BE 4.2.

7. INCLUDE ALL ACOUSTIC, DOUBLE RADIUS AIRFOIL SHAPED PERFORATED ALUMINUM TURNING VANES, MANUAL DAMPERS, FLEXIBLE CONNECTORS, GRILLES AND DIFFUSERS, ACOUSTIC LINING, AND OTHER SHEET METAL ACCESSORIES FOR THE PROJECT. VOLUME DAMPERS TO BE OF OPPOSED BLADE TYPE CONSTRUCTED IN ACCORDANCE WITH "SMACNA" STANDARDS.

8. ALL BRANCH CONNECTION FITTINGS IN RECTANGULAR DUCTWORK SHALL BE 45 DEGREE TRANSITION TYPE, CONICAL FITTINGS OR SPIN-IN FITTINGS. BUTT FITTINGS ARE NOT ACCEPTABLE.

9. PROVIDE FIRE DAMPERS WITH ACCESS DOORS AT ALL FIRE RATED WALLS, PARTITIONS AND CEILINGS. DAMPERS SHALL HAVE RATING EQUIVALENT TO BARRIER. DAMPER SHALL BE THE DYNAMIC TYPE AND SHALL BE ABLE TO CLOSE AGAINST AN AIRSTREAM. DAMPERS SHALL MEET ALL NFPA, IBC, AND UL 555 REQUIREMENTS.

10. PROVIDE COMBINATION FIRE/SMOKE DAMPERS AT ALL FIRE AND/OR SMOKE RATED SHAFT AND WALL LOCATIONS. EACH COMBINATION FIRE SMOKE DAMPER SHALL HAVE 16 GA. GALVANIZED BLADES STRENGTHENED WITH GROOVES MEETING REQUIREMENTS OF UL STANDARD 555 & 555S AND HAVE AN 1-1/2 HOUR RATING. BASIS OF DESIGN SHALL BE GREENHECK MODEL FSD 200 SERIES. DAMPERS SHALL BE EQUIPPED STANDARD WITH AN ELECTRIC HEAT-RESPONSIVE DEVICE THAT PERFORMS THE SAME FUNCTION AS A FUSIBLE LINK TO CLOSE DAMPER AT 350 °F. THE DAMPER OPERATION AND CONSTRUCTION SHALL MEET UL 555 REQUIREMENTS.

11. PROVIDE CURBS FOR ALL ROOF OPENINGS FOR DUCTS, FLUES, PIPING AND EQUIPMENT. CURBS SHALL BE FURNISHED AS ACCESSORIES TO THE EQUIPMENT OR 8" HIGH PATE OR EQUAL EQUIPMENT SUPPORTS SPANNING STRUCTURE AND FLASHED INTO ROOFING. ALL CUTTING, FLASHING, AND PATCHING OF ROOF SHALL BE BY OWNER'S ROOFING CONTRACTOR AND PAID FOR BY MECHANICAL CONTRACTOR.

DUCTWORK EXTERNAL INSULATION & PIPE INSULATION (230713, 230719)

1. INSULATE DUCTWORK AS DESCRIBED IN DUCTWORK INSULATION SCHEDULE. FIBERGLASS DUCT WRAP SHALL BE FULLY SECURED TO DUCT. LAP AND TAPE SEAMS AND SECURE TIGHTLY TO THE DUCTS WITH WIRE OR STICK PINS.

2. DO NOT INSULATE:
   - 2.1. MAKE-UP AIR DUCTWORK OPERATING AT SURROUNDING AMBIENT CONDITIONS.
   - 2.2. RETURN AND EXHAUST AIR DUCTWORK LOCATED WITHIN THE BUILDING ENVELOPE. (DOES NOT INCLUDE BUILDING SHAFTS.)
   - 2.3. TRANSFER AIR DUCTWORK (ACOUSTICALLY LINE DUCT, CLEAR INSIDE DIMENSIONS SHOWN ON PLANS)
   - 2.4. EXPOSED SUPPLY DUCTWORK LOCATED IN CONDITIONED SPACE. (DOES NOT INCLUDE RETURN AIR PLENUM)
   - 2.5. PHENOLIC DUCTWORK

3. INTERNAL DUCT INSULATION -- DUCTWORK INDICATED TO HAVE INTERNAL INSULATION SHALL BE INTERNALLY COVERED WITH 1" THICK FIBERGLASS INSULATION MANUFACTURED FROM A ROTARY PROCESS WITH A NON-WOVEN HYDROPHOBIC FACING. FOR DUCTWORK LOCATED OUTDOORS USE INSULATION AS ABOVE THAT IS 2" THICK. INSULATION SHALL HAVE AN "R" RATING OF 4.2 FOR 1" THICK INSULATION AND R-8 FOR 2" THICK INSULATION. INSULATION SHALL HAVE FLAME/SMOKE RATING OF 25/50. INSULATION SHALL WITHSTAND DUCT VELOCITIES OF 4000 FPM MINIMUM. DUCT SIZES SHOWN ON DRAWINGS ARE CLEAR INTERNAL DIMENSIONS. WHERE LINER IS USED, INCREASE OUTSIDE DIMENSIONS OF DUCT TO MAINTAIN INTERNAL DIMENSIONS. INSTALL LINER PER SMACNA OR NAIMA STANDARDS.

4. HYDRONIC PIPING TO BE INSULATED AS DESCRIBED IN PIPING INSULATION SCHEDULE. PROVIDE SECTIONAL GLASS FIBER PIPE INSULATION HAVING FACTORY APPLIED WHITE "ALL SERVICE" JACKET. LONGITUDINAL FLAPS SHALL BE SELF-SEALING TYPE ADDITIONALLY SECURED WITH NONFERROUS FLARE DOOR STAPLES SPACED 6" ON CENTERS. END JOINTS SHALL BE CLOSED WITH 4" WIDE SELF-SEALING TAPE STAPLED IN PLACE. ALL FITTINGS TO BE FINISHED WITH PRE_MOLDED ONE-PIECE ZESTON TYPE PVC COVERS WITH FIBERGLASS INSULATION INSIDE. SEAL ALL VISIBLE RAW FIBERGLASS WITH BENJAMIN FOSTER #3036 WHITE MASTIC.

5. INSULATE REFRIGERANT PIPING LINES AS DESCRIBED IN PIPING INSULATION SCHEDULE WITH ELASTOMERIC FOAM INSULATION WITH SELF-SEALING SEAM. ARMACELL - AP ARMAFLEX SS INSULATION. PAINT CLOSED CELL INSULATION OUTDOORS WITH TWO COATS OF UV RESISTANT PAINT PER MANUFACTURER'S RECOMMENDATIONS. USE PRE-MOLDED COVERS OVER FITTINGS, VALVES, ELBOWS AND CONTROL DEVICES SEALED VAPOR TIGHT.

6. INSULATION SHALL BE OMITTED FROM HOT SYSTEM VALVE BODIES STRAINERS AND UNIONS. SYSTEMS OPERATING BELOW AMBIENT TEMPERATURE SHALL HAVE ALL VALVE BODIES AND PIPING SPECIALTIES FULLY INSULATED. ALL VALVE BODIES, STRAINERS, UNIONS, PUMP CASING, WATER SEPARATORS, ETC. IN COLD PIPING SHALL BE COVERED SAME AS PIPING SYSTEM. PIPE HANGERS ON INSULATED PIPE SHALL BE OUTSIDE OF THE INSULATION, SIZED ACCORDINGLY AND WITH SADDLE INSERT SUFFICIENT TO PROTECT INSULATION FROM CRUSHING.

7. ALL INSULATION TO BE APPLIED IN FULL ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. ALL INSULATION SHALL COMPLY WITH 25/50 FLAME AND SMOKE HAZARD RATINGS PER ASTM E-84, NFPA 255 AND UL 723.

8. PROVIDE REMOVABLE INSULATION SECTIONS TO COVER PARTS OF EQUIPMENT WHICH MUST BE OPENED PERIODICALLY FOR MAINTENANCE; INCLUDE METAL VESSEL COVERS, FASTENERS, FLANGES, CHILLED WATER PUMPS, FRAMES AND ACCESSORIES.

9. REPLACE DAMAGED INSULATION WHICH CANNOT BE REPAIRED SATISFACTORILY, INCLUDING UNITS WITH VAPOR BARRIER DAMAGE AND MOISTURE SATURATED UNITS.

10. CONDENSATE DRAIN PIPING IN RETURN AIR RATED PLENUMS SHALL BE TYPE L COPPER WITH 1/2" FIBERGLASS INSULATION (MIN. R-VALUE = 3). SCHEDULE 40 PVC WITHOUT INSULATION MAY BE USED IN ALL OTHER LOCATIONS.

HANGERS AND SUPPORTS (230529)

1. SUPPORT ALL PIPING FROM STRUCTURE WITH UL LISTED HANGERS AND SUPPORTS SUITABLE FOR THE INTENDED INSTALLATION. DESIGN, SELECTION, SPACING, AND APPLICATION OF HANGERS AND SUPPORTS SHALL COMPLY WITH ANSI B31.1 AND MSS SP-69. HANGERS SHALL BE MANUFACTURED BY PENTAIR., OR APPROVED EQUAL. BLACK OR GALVANIZED STEEL PIPE = MODEL NO. 100, CAST IRON PIPE = MODEL NO. 400, COPPER TUBING = MODEL NO. 102-A.

2. CONTRACTOR SHALL PROVIDE INSULATION HANGER WITH PROTECTIVE SHIELDS, SUCH AS PENTAIR, MODEL NO. 125, OR APPROVED EQUAL FOR ALL INSULATED PIPING.

3. CONTRACTOR SHALL PROVIDE RISER CLAMPS FOR VERTICAL PIPING AT EACH LEVEL. RISER CLAPS SHALL BE PENTAIR MODEL NO. 510 FOR STEEL PIPING AND MODEL NO. 511 FOR COPPER TUBING OR APPROVED EQUAL. USE "SHORT-END" RISER CLAMPS WHERE SPACE IS LIMITED.

4. CONTRACTOR SHALL PROVIDE SIDE BEAM CLAMPS FOR SUPPORTING PIPING FROM STRUCTURAL STEEL MEMBERS. BEAM CLAMPS SHALL BE MANUFACTURED BY PENTAIR, MODEL 300 OR APPROVED EQUAL.

5. WHERE OTHER MEANS OF SUPPORT PIPING ARE REQUIRED OR DESIRED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE ENGINEER'S APPROVAL PRIOR TO INSTALLING THOSE SUPPORTS.

6. HANGERS AND SUPPORTS SHALL BE SPACED AT INTERVALS WHICH WILL PREVENT SAGGING AND REDUCE STRAIN ON VALVES AND SPECIALTIES. HANGER SPACING SHALL BE NO GREATER AND ROD SIZE SHALL BE NO SMALLER THAN THAT SHOWN IN THE FOLLOWING TABLE. HANGERS SHALL ALLOW FOR EXPANSION AND CONTRACTION. HANGER SHALL BE PROVIDED AT EACH CHANGE OF DIRECTION.

7. RISER CLAMPS SHALL BE INSTALLED ABOVE THE FLOOR AT EACH LEVEL. RISER CLAMPS MAY BE SUSPENDED BELOW FLOOR LEVEL, WITH HANGER RODS AND INSERTS, WHERE THE INSTALLATION OF ESCUTCHEON PLATES IS REQUIRED.

EQUIPMENT (235000)

1. MAKE ALL FINAL EQUIPMENT CONNECTIONS AND PROVIDE THE NECESSARY ADAPTORS, FITTINGS, VALVES, DEVICES, ETC. FOR A COMPLETE AND OPERABLE SYSTEM. PROVIDE COMPLETE WITH BASES, ISOLATORS, SUPPORTS AND OTHER REQUIRED ACCESSORIES.

2. EQUIPMENT SHALL BE INSTALLED IN FULL ACCORDANCE WITH THE MANUFACTURER'S DATA AND INSTALLATION INSTRUCTIONS, INCLUDING CLEARANCES; LUBRICATE AND ADJUST AS REQUIRED. IT IS THIS CONTRACTOR'S RESPONSIBILITY TO CHECK AND CONFORM TO THESE REQUIREMENTS PRIOR TO STARTING WORK. FURNISH AND INSTALL CLEAN SET OF FILTERS PRIOR TO BALANCING.

3. THE CONTRACTOR SHALL COORDINATE ELECTRICAL CHARACTERISTICS OF ALL MECHANICAL EQUIPMENT PRIOR TO ORDERING OF EQUIPMENT. COORDINATE REQUIREMENT FOR PROVISION OF MOTOR STARTERS, DISCONNECTS, CONTACTORS, CONTROL WIRING, ETC. AS REQUIRED FOR PROPER FUNCTIONING SYSTEM WITH ELECTRICAL CONTRACTOR. NO ADDITIONAL PAYMENT WILL BE MADE FOR LACK OF CONTRACTOR COORDINATION OF ELECTRICAL CHARACTERISTICS.

4. ALL FLOOR MOUNTED EQUIPMENT SHALL BE INSTALLED ON CONCRETE HOUSEKEEPING PADS. MINIMUM PAD THICKNESS SHALL BE NOMINAL 4". PAD SHALL EXTEND BEYOND THE EQUIPMENT A MINIMUM OF 4" ON EACH SIDE. CONCRETE PADS SHALL BE PROVIDED BY THIS CONTRACTOR. IT SHALL BE THE RESPONSIBILITY OF THE THIS CONTRACTOR TO COORDINATE THE SIZE AND LOCATION OF THE CONCRETE HOUSEKEEPING PADS WITH THE GENERAL CONTRACTOR.

5. ALL EQUIPMENT SHALL BE MOUNTED ON VIBRATION ISOLATORS TO PREVENT THE TRANSMISSION OF VIBRATION AND MECHANICALLY TRANSMITTED SOUND TO THE BUILDING STRUCTURE.

6. ISOLATION EQUIPMENT SHALL BE THE PRODUCT OF A SINGLE MANUFACTURER, AND SHALL BE DESIGNED SPECIFICALLY FOR THE APPLICATION REQUIRED. THIS INCLUDES, BUT IS NOT LIMITED TO, PIPING DUCTWORK, PUMPS, COMPRESSORS. VIBRATION ISOLATORS SHALL BE RATED FOR THE WEIGHT AND SPACING REQUIRED FOR THE EQUIPMENT REQUIRING ISOLATION.

7. PROVIDE CURBS FOR ALL ROOF OPENINGS FOR DUCTS, FLUES, PIPING AND EQUIPMENT. CURBS SHALL BE FURNISHED AS ACCESSORIES TO THE EQUIPMENT OR 8" HIGH PATE OR EQUAL EQUIPMENT SUPPORTS SPANNING STRUCTURE AND FLASHED INTO ROOFING. ALL CUTTING, FLASHING, AND PATCHING OF ROOF SHALL BE BY OWNER'S ROOFING CONTRACTOR AND PAID FOR BY MECHANICAL CONTRACTOR.

CONTROLS (230910)

1. PROVIDE COMPLETE TEMPERATURE CONTROLS FOR ALL HVAC SYSTEMS. PROVIDE NEW CONTROL DEVICES INCLUDING DAMPER OPERATORS, TEMPERATURE SENSORS, STAGING RELAYS AND OTHER REQUIRED DEVICES TO PROVIDE A COMPLETE OPERATIONAL SYSTEM PER THE FOLLOWING OPERATING SEQUENCE. MOUNT ALL CONTROLS FURNISHED AS ACCESSORIES TO EQUIPMENT AND PROVIDE ALL CONTROL WIRING REQUIRED FOR PROPER OPERATION WHERE NOT SPECIFICALLY SHOWN ON ELECTRICAL PLANS. ALL WIRING SHALL BE IN CONDUIT OR PER N.E.C. AND LOCAL CODE REQUIREMENTS. STANDARD MOUNTING HEIGHT TO TOP OF THERMOSTAT IS 48" ABOVE FINISHED FLOOR OR AS INDICATED ON THE ARCHITECTURAL DRAWINGS. DO NOT INSTALL THERMOSTATS NEAR DIMMER SWITCHES. WIRING OF ALL MOTORIZED OPERATORS AND THERMOSTATS (REGARDLESS OF VOLTAGE) ARE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR.

2. IT SHALL BE THE RESPONSIBILITY OF THE BAS CONTRACTOR TO PROVIDE ALL THE REQUIRED LABOR AND PROGRAMMING TO SEAMLESSLY INTEGRATE THE NEW BAS BACNET SYSTEM AND ITS DDC POINTS, GRAPHICS, ALARMS, ETC. INTO AN EXISTING BAS IF PRESENT.

3. THE CONTROLS CONTRACTOR SHALL WARRANT THE SYSTEM FOR 24 MONTHS AFTER SUBSTANTIAL COMPLETION. DURING THE WARRANTY PERIOD, THE BUILDING SYSTEM CONTRACTOR SHALL BE RESPONSIBLE FOR ALL NECESSARY REVISIONS TO THE SOFTWARE AS REQUIRED TO PROVIDE A COMPLETE AND WORKABLE SYSTEM CONSISTENT WITH THE LETTER AND INTENT OF THE SEQUENCE OF OPERATION SECTION OF THE SPECIFICATION.

4. THE FOLLOWING ARE THE APPROVED BAS MANUFACTURERS:
   - DISTECH CONTROLS BY TRINITY AUTOMATED SOLUTIONS (INCUMBENT CONTROLS PROVIDER)

5. THE CONTROL SYSTEM SHALL BE PROGRAMMED WITH THE FOLLOWING SEQUENCES AND FEATURES:
   - 5.1. THE NEW EQUIPMENT SHALL USE THE EXISTING SEQUENCES, SCHEDULES, ETC FOR THE EQUIPMENT IT HAS REPLACED.
   - 5.2. IF THERE ARE ANY MISSING OR OBSOLETED SEQUENCES, PLEASE PRESENT AN RFI TO ADDRESS THEM.

IDENTIFICATION (230593)

1. CONTRACTOR SHALL PROVIDE IDENTIFICATION LABELS, TAGS, ETC. AS INDICATED ON THE DRAWINGS AND AS SPECIFIED HEREIN.THE IDENTIFICATION SHALL BE IN ACCORDANCE WITH ANSI STANDARD A13.1. PRESSURE SENSITIVE MARKERS SHALL BE MANUFACTURED BY THE BRADY CO., OR APPROVED EQUAL. MARKERS SHALL BE MANUFACTURER'S STANDARD PRODUCT. PRESSURE SENSITIVE PIPE MARKERS SHALL BE MANUFACTURED BY THE BRADY CO., OR APPROVED EQUAL. PIPE MARKERS SHALL BE MANUFACTURER'S STANDARD PRODUCT.

MOTOR CONTROLLERS (230513)

1. UNLESS OTHERWISE INDICATED, EVERY MOTOR NOT SPECIFIED TO BE PROVIDED WITH A CONTROLLER AT THE FACTORY SHALL BE PROVIDED WITH A CONTROLLER AS SPECIFIED HEREIN. CONTROLLERS SHALL BE FURNISHED BY THIS CONTRACTOR. INSTALLATION OF ALL CONTROLLERS SHALL BE BY THE ELECTRICAL CONTRACTOR.

2. MOTOR CONTROLLERS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF NEMA STANDARD IC-1, INDUSTRIAL CONTROL AND BE HEAVY DUTY CONSTRUCTION. CONTROLLER SIZES SHALL BE VERIFIED TO BE COMPATIBLE WITH HORSEPOWER OF THE MOTOR. CONTROLLERS SHALL BE MANUFACTURED BY ALLEN-BRADLEY CO., GENERAL ELECTRIC, CUTLER-HAMMER OR APPROVED EQUAL.

3. MANUAL MOTOR STARTERS:
   - a. SWITCHES SHALL BE TUMBLER-SWITCH STYLE. THE MANUAL MOTOR STARTERS SHALL PROVIDE OVERLOAD PROTECTION WHICH CLOSELY FOLLOWS THE MOTOR LOAD. MANUAL MOTOR STARTERS FOR OUTDOOR USE SHALL BE NEMA TYPE 4X, INDOOR USE SHALL BE NEMA TYPE 1, EXPLOSION PROOF USE SHALL BE NEMA TYPE 7.

4. MAGNETIC MOTOR CONTROLLERS:
   - a. MAGNETIC MOTOR CONTROLLERS SHALL BE PROVIDED AS INDICATED. THEY SHALL NOT BE SMALLER THAN NEMA SIZE 1.
   - b. NON-REVERSING MAGNETIC CONTROLLER SHALL BE UTILIZED TO START FULL VOLTAGE, NON-REVERSING, AC SINGLE SPEED MOTORS. THE CONTROLLERS SHALL BE SIZED FOR THE LOAD UNLESS OTHERWISE INDICATED.
   - c. REVERSING MAGNETIC CONTROLLER SHALL BE UTILIZED TO START FULL VOLTAGE REVERSING, AC SINGLE SPEED MOTORS. THE CONTROLLER SHALL BE SIZED FOR THE LOAD UNLESS OTHERWISE INDICATED. LOCATION OF REVERSING MAGNETIC CONTROLLERS IS INDICATED ON THE DRAWINGS.
   - d. WHERE MULTI-SPEED MOTORS ARE SCHEDULED ON THE DRAWINGS, THE MOTOR CONTROLS SHALL BE COMPATIBLE WITH THE TYPE MOTOR SHOWN.
   - e. OVERLOAD RELAYS SHALL BE SOLID STATE AND BE SUPPLIED IN EACH LEG. OVERLOAD RELAYS SHALL BE MATCHED TO LOAD AND SHALL BE ADJUSTABLE FROM 90% TO 110%. A SINGLE RESET BUTTON SHALL BE MOUNTED ON THE STARTER DOOR TO PERMIT EXTERNAL RESET. RELAYS SHALL BE CONVERTIBLE FROM MANUAL TO AUTOMATIC RESET BY A SIMPLE ADJUSTMENT.
   - f. CONTROL TRANSFORMERS SHALL BE PROVIDED, WHERE REQUIRED. BOTH LEGS OF THE PRIMARY AND ONE LEG OF THE SECONDARY OF THE CONTROL TRANSFORMER SHALL BE PROTECTED BY NEMA CLASS J FUSES. THE OTHER LEG OF THE SECONDARY SHALL BE GROUNDED. CONTROL TRANSFORMER CAPACITY SHALL BE ADEQUATE TO OPERATE ALL CONTROL DEVICES IN THE CIRCUIT. CONTROL VOLTAGE SHALL BE 120V AC UNLESS OTHERWISE SPECIFIED.
   - g. UNLESS OTHERWISE INDICATED, ALL MOTOR STARTERS SHALL BE PROVIDED WITH HAND-OFF-AUTOMATIC (H.O.A.) SWITCH IN THE DOOR. ENCLOSURES FOR MAGNETIC STARTERS SHALL BE NEMA TYPE 1 FOR INDOOR USE NEMA TYPE 4X FOR OUTDOOR USE AND NEMA TYPE 7 FOR EXPLOSION PROOF USE.
   - h. MOTOR CONTROLLERS SHALL BE PROVIDED WITH ALL CONTROL DEVICES, INCLUDING AUXILIARY CONTACTS, REQUIRED FOR EQUIPMENT TO OPERATE AS SPECIFIED.

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HIGH SCHOOL
MECHANICAL
SPECIFICATIONS

DATE:	XX-XX-XX	DRAWN BY:	MAB
DWG SCALE:	AS SHOWN	CHECKED BY:	MAB
PROJECT NO:	2341083		
APPROVED BY:	DCP		

DRAWING NO.:
M-3002

5. COMBINATION MOTOR CONTROLLERS:
   a. COMBINATION MOTOR CONTROLLERS SHALL BE PROVIDED WITH MOLDED CASE MOTOR CIRCUIT PROTECTORS OR MOLDED CASE CIRCUIT BREAKERS AS INDICATED. MOTOR CIRCUIT PROTECTIVE DEVICES SHALL HAVE SHORT CIRCUIT CAPACITY AS REQUIRED. UNIT CONTROL CIRCUIT FUSING SHALL BE PROVIDED. THE MOTOR CIRCUIT PROTECTIVE DEVICE SHALL BE MOUNTED IN THE SAME ENCLOSURE AS THE MAGNETIC CONTROLLER AND SHALL BE OPERABLE BY HAND FROM OUTSIDE THE ENCLOSURE. THE HANDLE SHALL BE SO INTERLOCKED WITH THE DOOR THAT IT MUST BE RETURNED TO THE "OFF" POSITION BEFORE THE DOOR CAN BE OPENED, BUT A COIN-PROOF DEFEAT MECHANISM SHALL BE PROVIDED TO ALLOW AUTHORIZED PERSONNEL TO OPEN THE ENCLOSURE DOOR WITHOUT OPENING THE DISCONNECTING DEVICE. PROVISIONS FOR PADLOCKING THE DISCONNECT HANDLE IN THE "OFF" POSITION SHALL BE MADE. THE ENCLOSURE FOR COMBINATION STARTERS SHALL BE NEMA TYPE 1 FOR INDOOR USE AND NEMA TYPE 4X FOR OUTDOOR USE, AND NEMA TYPE 7 FOR EXPLOSION PROOF USE.
   b. MOTOR CIRCUIT PROTECTORS SHALL BE THE CONTINUOUSLY ADJUSTABLE, INSTANTANEOUS MAGNETIC TRIP TYPE CIRCUIT BREAKER AND SHALL BE SO CONSTRUCTED THAT ALL POLES OPEN, CLOSE AND TRIP SIMULTANEOUSLY.

6. OVERLOAD AND SHORT CIRCUIT PROTECTION:
   a. HEATER ELEMENTS SHALL BE PROVIDED FOR OVERLOAD PROTECTION. MOTOR CIRCUIT PROTECTOR SHALL BE PROVIDED FOR MOTOR SHORT CIRCUIT PROTECTION.

DISCONNECT SWITCHES (230514)

1. THIS CONTRACTOR SHALL FURNISH ALL SAFETY DISCONNECT SWITCHES (FUSED AND NON-FUSED) REQUIRED FOR EQUIPMENT FURNISHED UNDER THIS CONTRACT. IN ADDITION, THIS CONTRACTOR SHALL FURNISH A SAFETY DISCONNECT SWITCH FOR ALL MOTORS AND EQUIPMENT WHICH DO NOT HAVE COMBINATION STARTERS OR INTEGRAL DISCONNECTING MEANS. FUSIBLE DISCONNECT SWITCHES SHALL BE PROVIDED FOR ALL EQUIPMENT RATED FOR USE ONLY WITH FUSES (SUCH AS CONDENSING UNITS, COMPRESSORS, ETC.). SUCH SWITCHES SHALL BE ONE, TWO OR THREE POLE TYPE, WITH SOLID NEUTRAL FOR 4 WIRE SERVICE, AND SHALL HAVE THE PROPER CURRENT AND VOLTAGE RATING AS REQUIRED. INSTALLATION OF ALL DISCONNECT SWITCHES SHALL BE BY THE ELECTRICAL CONTRACTOR.

2. ALL SAFETY SWITCHES SHALL BE NEMA HEAVY DUTY TYPE AND SHALL CARRY THE UNDERWRITERS' LABORATORIES LABEL. FUSIBLE SWITCHES SHALL INCORPORATE CLASS "R" FUSE REJECTION FEATURE AND SHALL BE BRACED TO WITHSTAND 200,000 AMPERE RMS SYMMETRICAL FAULT CURRENT. SAFETY SWITCHES SHALL CONFORM TO FEDERAL SPECIFICATION W-S-865.

3. PROVIDE HEAVY-DUTY TYPE, SHEET ENCLOSED, SAFETY SWITCHES. THE TYPE, SIZE, AND RATING SHALL BE AS INDICATED ON THE DRAWINGS OR AS REQUIRED BY THE MOTOR OR EQUIPMENT SERVED. THE ENCLOSURE FOR DISCONNECT SWITCHES SHALL BE NEMA TYPE 1 FOR INDOOR USE, NEMA TYPE 4X FOR OUTDOOR USE AND NEMA TYPE 7 FOR EXPLOSION PROOF USE. DISCONNECTS SHALL BE MANUFACTURED BY ALLEN-BRADLEY, GENERAL ELECTRIC, CUTLER-HAMMER APPROVED EQUAL.

4. SWITCHES SHALL INCORPORATE QUICK-MAKE, QUICK-BREAK OPERATING HANDLES. THE MECHANISM SHALL BE AN INTEGRAL PART OF THE BOX, NOT THE COVER, AND SWITCHES SHALL HAVE A COVER INTERLOCK TO PREVENT UNAUTHORIZED OPENING OF THE SWITCH DOOR IN THE ON POSITION OR CLOSING OF THE SWITCH MECHANISM WITH THE DOOR OPEN. CURRENT CARRYING PARTS SHALL BE CONSTRUCTED OF HIGH-CONDUCTIVITY COPPER WITH SILVER-TUNGSTEN TYPE SWITCH CONTACT.

5. FUSE CLIPS SHALL BE POSITIVE PRESSURE TYPE REINFORCED FUSE CLIPS.

6. THE ELECTRICAL CONTRACTOR SHALL FURNISH, INSTALL AND CONNECT ALL POWER WIRING TO ALL MECHANICAL CONTRACTOR FURNISHED EQUIPMENT. THE MECHANICAL CONTRACTOR SHALL FURNISH, INSTALL AND CONNECT ALL CONTROL WIRING TO ALL FURNISHED EQUIPMENT, INCLUDING CONTROL DEVICES, STARTERS AND INTEGRAL DISCONNECT SWITCHES OF CONTRACTOR FURNISHED EQUIPMENT.

VARIABLE FREQUENCY DRIVES (230515)

1. PROVIDE VARIABLE FREQUENCY DRIVES (VFD) AS SPECIFIED HEREIN AND AS SHOWN ON THE CONTRACT DRAWINGS. BASIS OF DESIGN IS ABB MODEL ACH-550. THE ENCLOSURE FOR VFD SHALL BE NEMA TYPE 12 FOR INDOOR USE AND NEMA TYPE 3R FOR OUTDOOR USE. VFD SHALL PROVIDE MICROPROCESSOR-BASED CONTROL FOR THREE-PHASE INDUCTION MOTORS USING PULSE WIDTH MODULATED (PWM) DESIGN, WHICH CONVERTS THE UTILITY INPUT VOLTAGE AND FREQUENCY TO A VARIABLE VOLTAGE AND FREQUENCY OUTPUT VIA A TWO-STEP OPERATION. VFD SHALL HAVE AN EFFICIENCY AT FULL LOAD AND SPEED THAT EXCEEDS 97%. THE EFFICIENCY SHALL EXCEED 90% AT 50% SPEED.

2. VFD SHALL MAINTAIN A MINIMUM LINE SIDE DISPLACEMENT POWER FACTOR OF 0.96, REGARDLESS OF SPEED AND LOAD FOR VFD'S LESS THAN 75 HP. VFD SHALL MAINTAIN A MINIMUM LINE SIDE DISPLACEMENT POWER FACTOR OF .99, REGARDLESS OF SPEED AND LOAD FOR MOTORS GREATER THAN 75 HP. THE VFD'S SHALL HAVE A ONE (1) MINUTE OVERLOAD CURRENT RATING OF 110% FOR LOW OVERLOAD APPLICATIONS. VFD SHALL HAVE AN INTEGRAL EMI/RFI FILTER AND CIRCUIT BREAKER AS STANDARD. THE CURRENT WITHSTAND RATING OF THE OPEN VFD SHALL BE 65,000 AIC.

3. COMMUNICATION CAPABILITY OPTIONS SHALL INCLUDE MODBUS RTU, JOHNSON CONTROLS METASYS N2, BACNET MSTP, BACNET/IP. MODBUS/TCP AND EXPANSION CARD COMMUNICATIONS SHALL INCLUDE LONWORKS. THE EXACT PROTOCOL NEEDED IS THAT WHICH WILL COMMUNICATE WITH THE BAS COMMUNICATION SYSTEM PROVIDED.

4. VFD SHALL HAVE A COOLING FAN(S) THAT IS FIELD REPLACEABLE.

5. VFD SHALL INCLUDE THE FOLLOWING PROTECTIVE FEATURES: OVERCURRENT, OVERVOLTAGE, SYSTEM FAULT, UNDER VOLTAGE, INPUT LINE SUPERVISION, OUTPUT PHASE SUPERVISION, UNDER TEMPERATURE, OVER TEMPERATURE, MOTOR STALLED, MOTOR OVER TEMPERATURE AND MOTOR UNDER LOAD. VFD SHALL PROVIDE GROUND FAULT PROTECTION DURING POWER-UP, STARTING, AND RUNNING.

6. WARRANTY SHALL BE TWENTY-FOUR (24) MONTHS FROM CERTIFIED START-UP DATE. THIS WARRANTY DURATION INCLUDES START-UP BY AN AUTHORIZED SERVICE REPRESENTATIVE AND PARTS, LABOR AND TRAVEL TIME.

CHECK, TEST, START, ADJUST, BALANCE AND INSTRUCTIONS (230593)

1. ALL EQUIPMENT THAT IS DISTURBED OR REPACED UNDER THIS CONTRACT SHALL BE REBALANCED FOR BOTH AIRSIDE AND LIQUID SIDE.

2. AFTER INSTALLATION, CHECK ALL EQUIPMENT, AND PERFORM START UP IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

3. ALL PIPING SHALL BE TESTED AND FREE OF LEAKS.

4. CONCEALED OR INSULATED WORK SHALL REMAIN UNCOVERED UNTIL REQUIRED TESTS HAVE BEEN COMPLETED, BUT IF CONSTRUCTION SCHEDULE REQUIRES IT, ARRANGE FOR PRIOR TESTS ON PARTS OF SYSTEM AS APPROVED BY THE TENANT.

5. BALANCE ALL SYSTEMS, CALIBRATE CONTROLS, CHECK FOR PROPER OPERATION AND SEQUENCE UNDER ALL CONDITIONS AND MAKE ALL NECESSARY ADJUSTMENTS.

6. AFTER INSTALLATION AND EQUIPMENT IS PLACED IN OPERATION, HVAC CONTRACTOR IS RESPONSIBLE FOR BALANCING SYSTEMS. BALANCING SHALL BE PERFORMED BY AN INDEPENDENT AABC CERTIFIED CONTRACTOR.

7. ADJUST AND BALANCE THE AIR SYSTEMS BEFORE HYDRONIC, STEAM, AND REFRIGERANT SYSTEMS. TESTING AND BALANCING SHALL BE DONE IN ACCORDANCE WITH THE MOST RECENT AABC NATIONAL STANDARDS FOR TOTAL SYSTEM BALANCE. GPM'S SHALL BE BALANCED WITHIN 10% OF DESIGN. AFTER ALL AIR SYSTEMS ARE INSTALLED, EACH SUPPLY AIR OUTLET SHALL BE AIR BALANCED TO WITHIN 10% OF THE CFM SHOWN WITH AIR PATTERNS SET AS INDICATED ON DRAWINGS (OR WITHIN 10 CFM WHEN BELOW 100 CFM). FAN RPMS AND ZONE DAMPERS SHALL BE ADJUSTED AND SHEAVES SHALL BE REPLACED AS REQUIRED TO ACHIEVE AIR BALANCE. ALL ZONES OR PORTIONS THEREOF SERVING OTHER SPACES AND WHICH MAY BE AFFECTED BY THE PROJECT SHALL BE TRAVERSED PRIOR TO CONSTRUCTION. THE FINAL AIR BALANCE SHALL RESTORE THESE AIR QUANTITIES. BEFORE AND AFTER AIR QUANTITIES SHALL BE LISTED IN THE AIR BALANCE REPORT

8. START UP AND PLACE ALL SYSTEMS IN OPERATION AND TAG ALL SWITCHES AND CONTROLS WITH PERMANENT LABELS.

9. INSTRUCT OWNER IN OPERATION OF SYSTEMS AND SUBMIT OPERATING AND MAINTENANCE MANUAL ON ALL EQUIPMENT AND SYSTEMS.

END OF SPECIFICATIONS.

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HIGHSCHOOL
65 MENNEL DRIVE
GREENSBURG, PA 15601

HIGH SCHOOL
MECHANICAL
SPECIFICATIONS

DATE:	MAB
DWG SCALE:	xx-xx-xx
PROJECT NO:	AS SHOWN
APPROVED BY:	2341083
DRAWN BY:	MAB
CHECKED BY:	DCP

DRAWING NO.:
M-3003

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A+S Project: 2341083

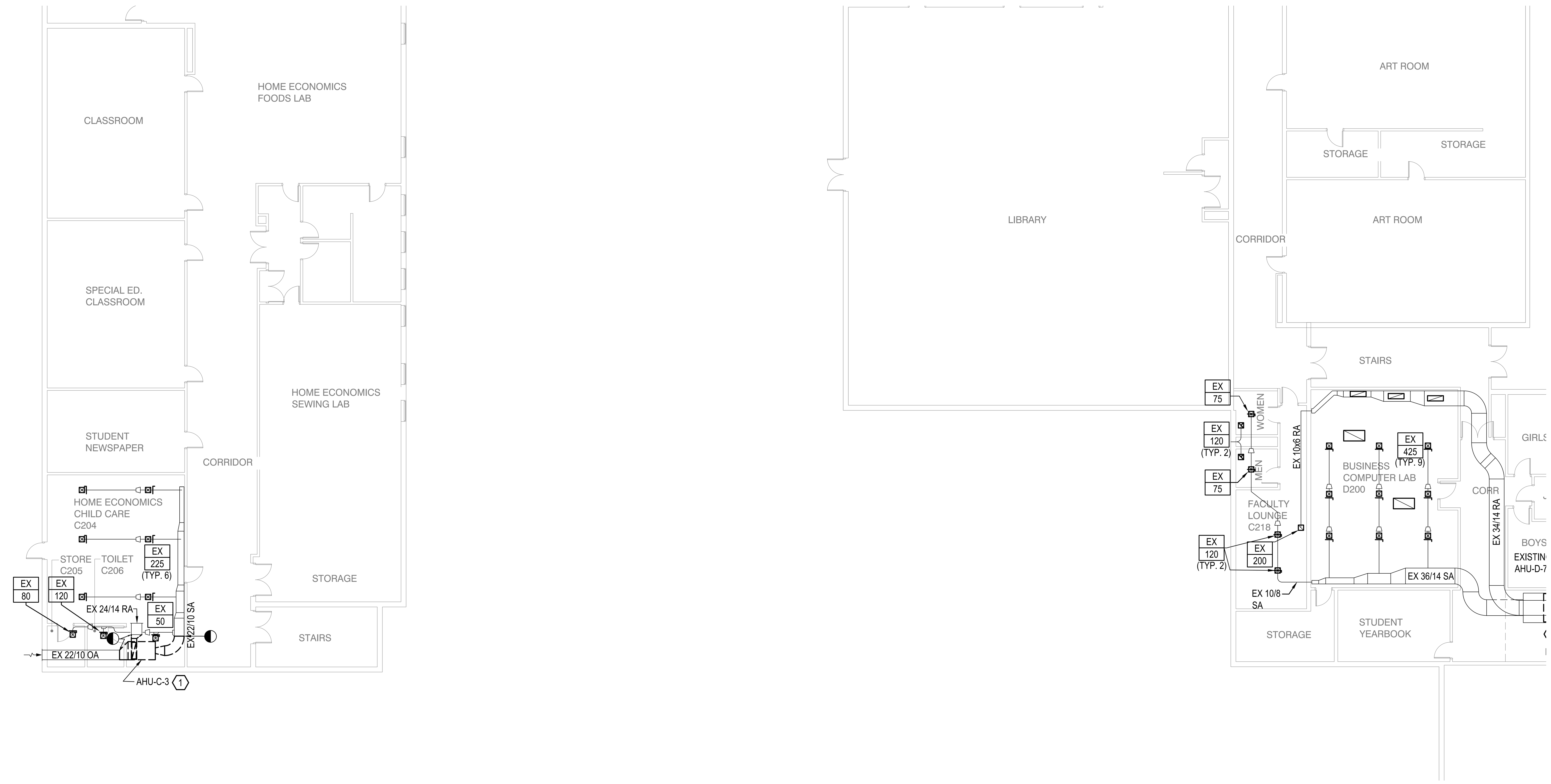
COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
No. PE081377

MECHANICAL DEMOLITION GENERAL NOTES:

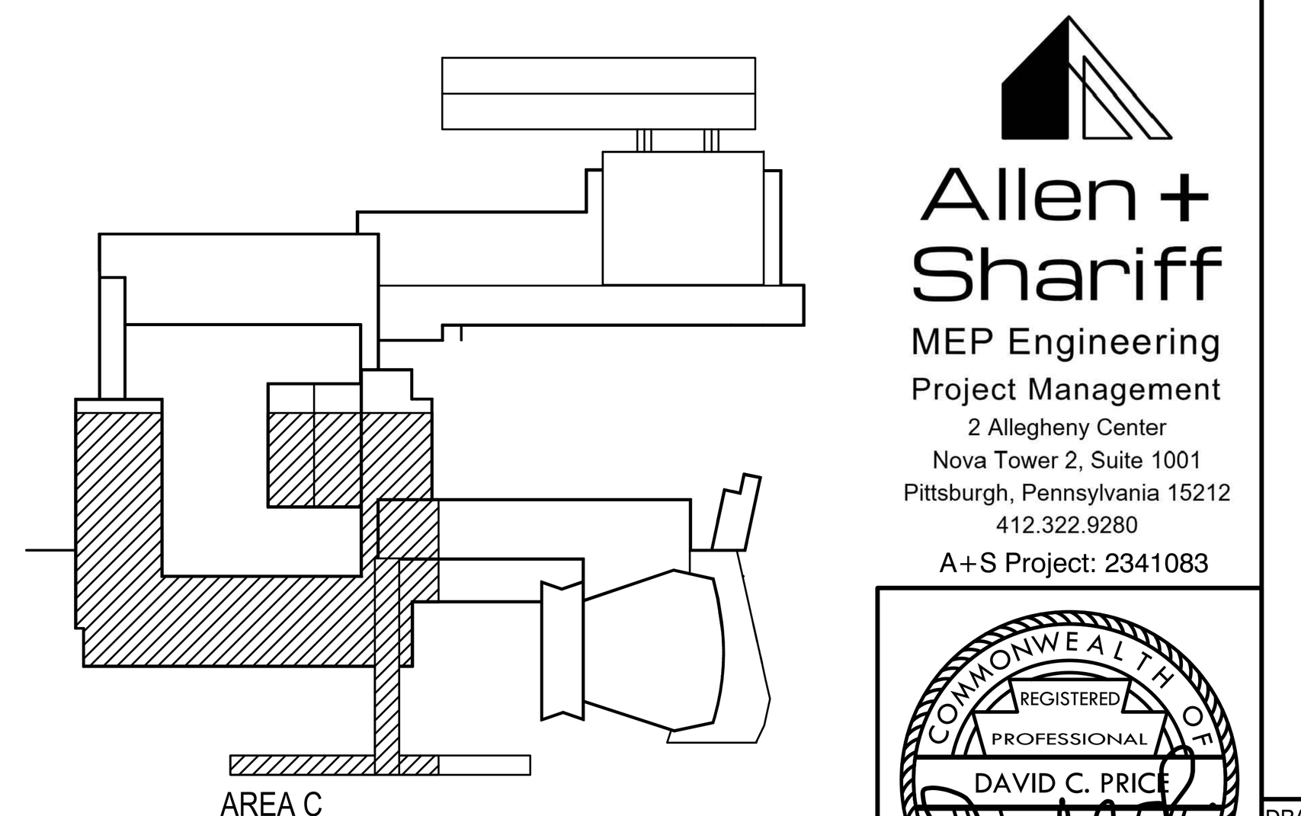
1. NONE.

MECHANICAL DEMOLITION KEY NOTES: (#)

1. DEMOLISH AHU-3-C AND ENOUGH DUCTWORK TO ALLOW FOR INSTALLATION OF NEW AHU IN SAME LOCATION. DEMOLISH ENOUGH HOT WATER PIPING TO ALLOW NEW EQUIPMENT INSTALLATION.
2. DEMOLISH COOLING COIL AND RELATED REFRIGERANT PIPING AND APPURTENANCES.
3. DEMOLISH UNIT VENTILATOR. DEMOLISH ENOUGH DUCTWORK TO ALLOW FOR INSTALLATION OF NEW UV IN THE SAME LOCATION. DEMOLISH ENOUGH HOT WATER PIPING TO ALLOW NEW EQUIPMENT INSTALLATION.



1 HIGH SCHOOL MECHANICAL DEMOLITION SECOND FLOOR PLAN - AREA C
M-3102C 3/32" = 1' 0"



KEYPLAN

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COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER DAVID C. PRICE

HIGH SCHOOL
MECHANICAL DEMOLITION
SECOND FLOOR PLAN - AREA C

DATE:	XX-XX-XX	DRAWN BY:	MAB
DWG SCALE:	AS SHOWN	CHECKED BY:	MAB
PROJECT NO:	2341083	APPROVED BY:	DCP

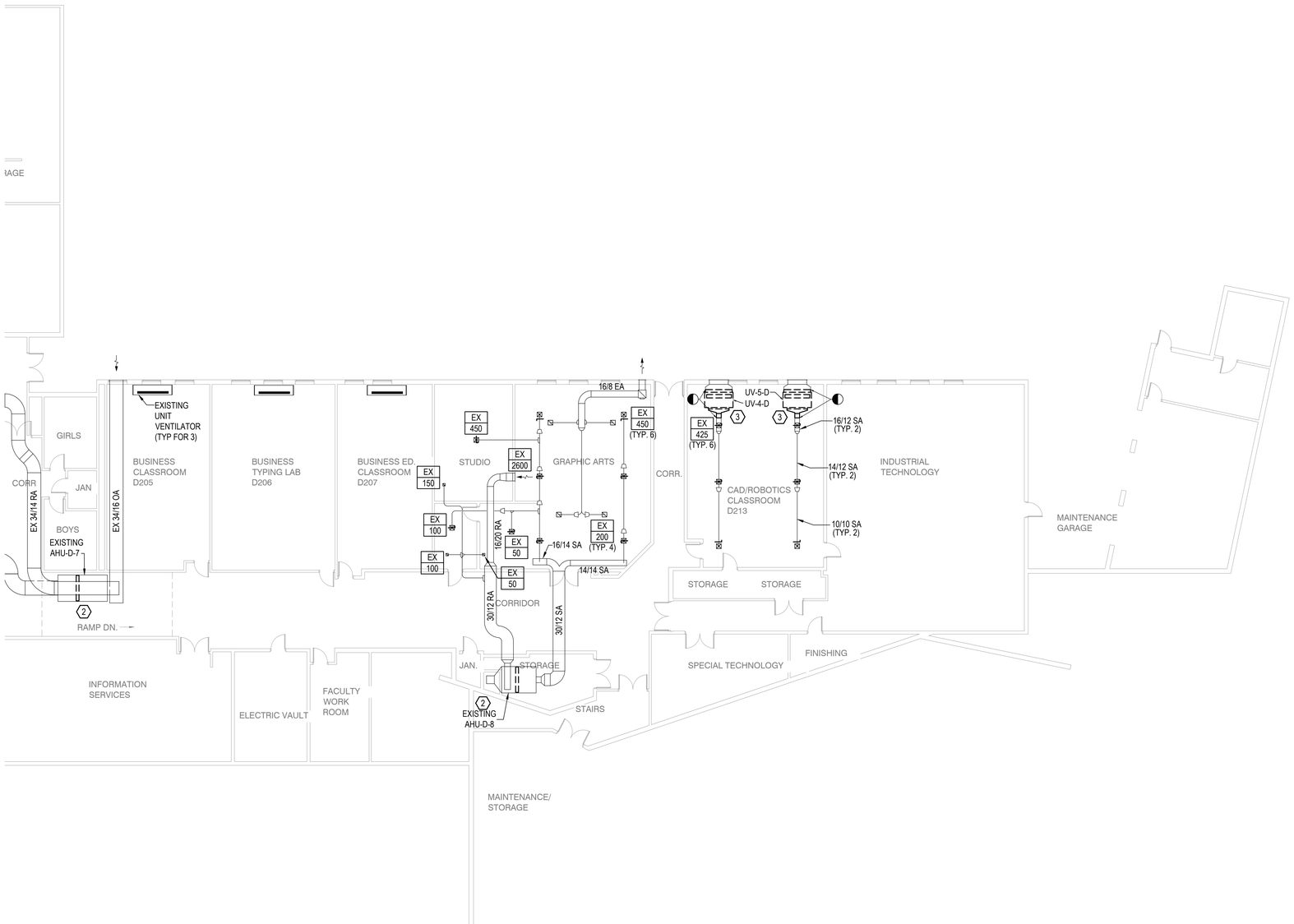
DRAWING NO.:
M-3102C

MECHANICAL DEMOLITION GENERAL NOTES:

1. NONE.

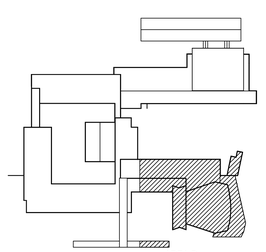
MECHANICAL DEMOLITION KEY NOTES: (#)

1. DEMOLISH AHU-3-C AND ENOUGH DUCTWORK TO ALLOW FOR INSTALLATION OF NEW AHU IN SAME LOCATION. DEMOLISH ENOUGH HOT WATER PIPING TO ALLOW NEW EQUIPMENT INSTALLATION.
2. DEMOLISH COOLING COIL AND RELATED REFRIGERANT PIPING AND APPURTENANCES.
3. DEMOLISH UNIT VENTILATOR. DEMOLISH ENOUGH DUCTWORK TO ALLOW FOR INSTALLATION OF NEW UV IN THE SAME LOCATION. DEMOLISH ENOUGH HOT WATER PIPING TO ALLOW NEW EQUIPMENT INSTALLATION.



1 / M-3102D HIGH SCHOOL MECHANICAL DEMOLITION SECOND FLOOR PLAN - AREA D

3/32" = 1' 0"



KEYPLAN

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HIGH SCHOOL
MECHANICAL DEMOLITION
SECOND FLOOR PLAN - AREA D

DATE:	xx-xx-xx
DRAWN BY:	MAB
DWG SCALE:	AS SHOWN
CHECKED BY:	MAB
PROJECT NO:	2341083
APPROVED BY:	DCP

DRAWING NO.:
M-3102D

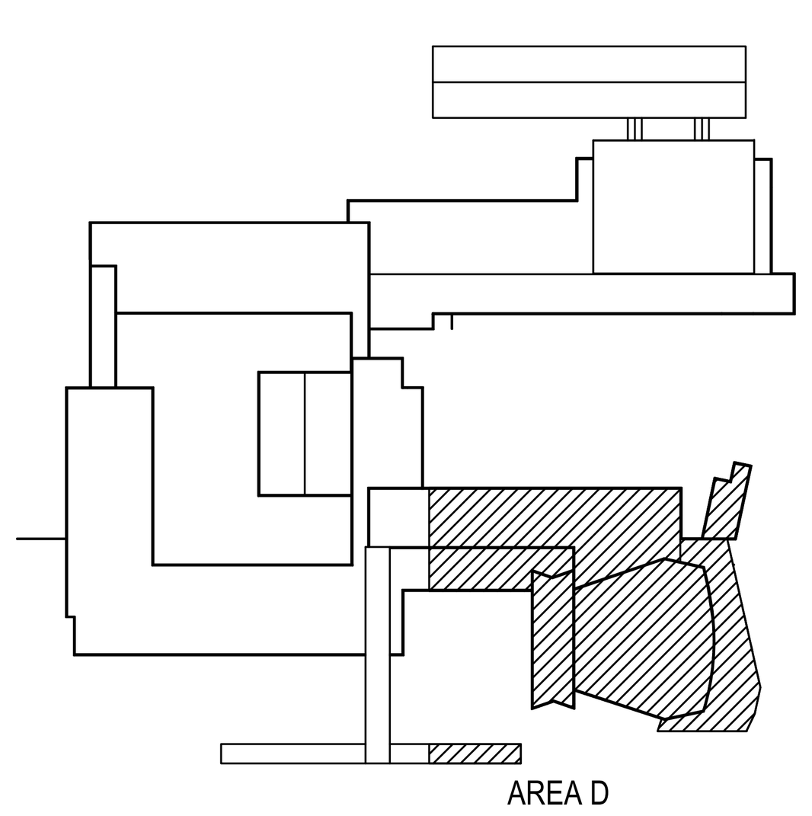
MECHANICAL DEMOLITION GENERAL NOTES:

1. NONE.

MECHANICAL DEMOLITION KEY NOTES: (#)

1. DEMOLISH FIRST FEW PEICES OF DUCT LEADING TO AND FROM THE ROOF MOUNTED AHU. DO NOT DISTURB THE HOT WATER COIL. COVER DUCT OPENINGS UNTIL NEW UNIT IS READY TO BE CONNECTED.
2. DISCONNECT RETURN AIR DUCT AT TOP OF HORIZONTAL DUCT. COVER DUCT OPENINGS UNTIL NEW UNIT IS READY TO BE CONNECTED.
3. UP TO AHU-2-D ON ROOF
4. UP TO AHU-3-D ON ROOF

1 M-3103D HIGH SCHOOL MECHANICAL DEMOLITION THIRD FLOOR PLAN - AREA D
3/32" = 1' 0"



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HIGH SCHOOL
MECHANICAL DEMOLITION
THIRD FLOOR PLAN - AREA D

DATE:	XX-XX-XX
DWG SCALE:	AS SHOWN
PROJECT NO:	2341083
DRAWN BY:	MAB
CHECKED BY:	MAB
APPROVED BY:	DCP

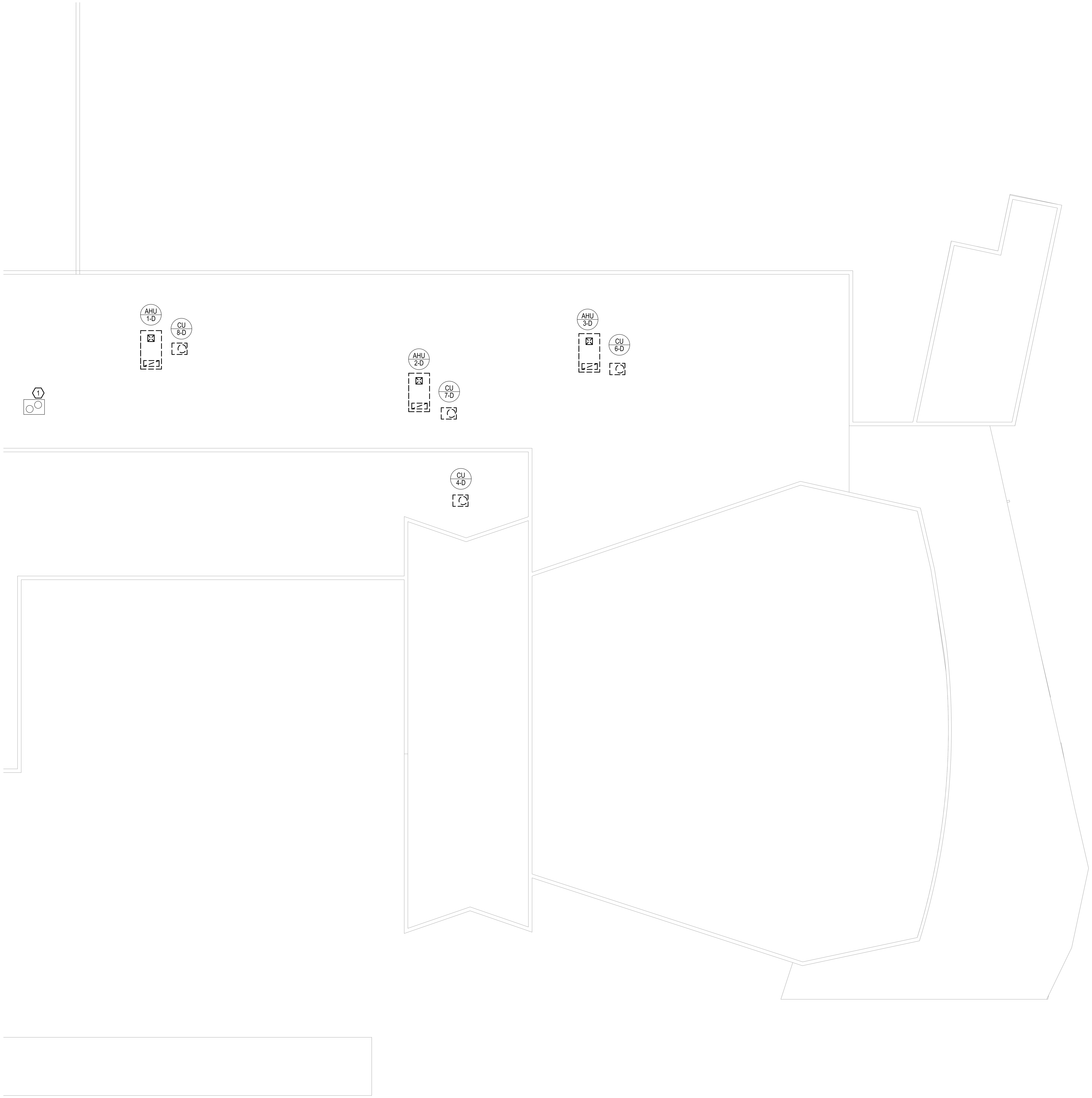
DRAWING NO.:
M-3103D

MECHANICAL DEMOLITION GENERAL NOTES:

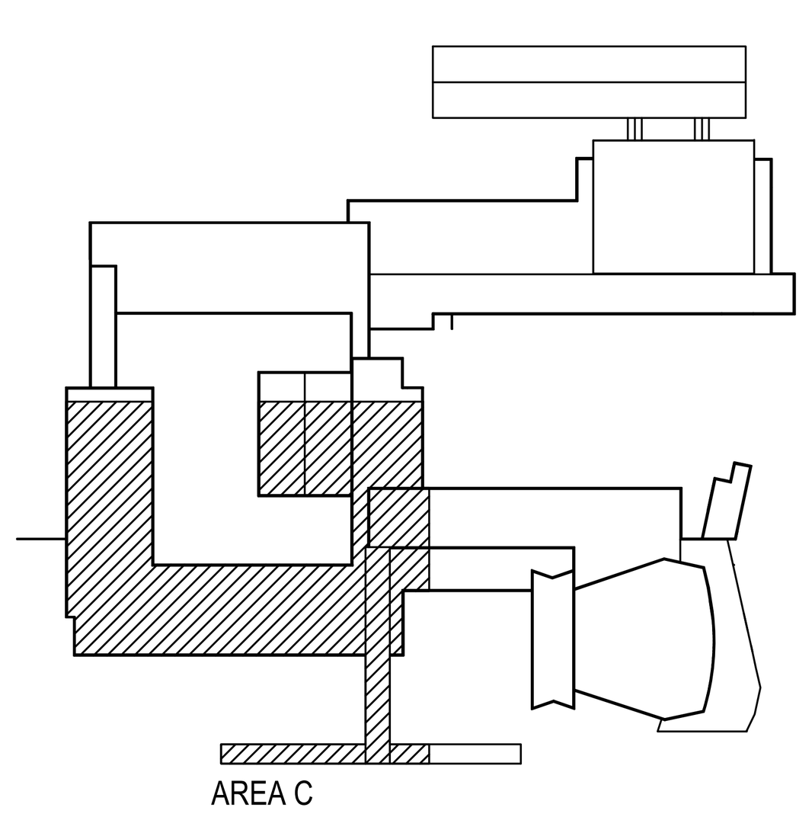
1. ANY EQUIPMENT DEMOLISHED SHALL HAVE TEMPORARY WATERPROOFING APPLIED SO THE BUILDING IS PROTECTED FROM WATER INGRESS AT ALL TIMES.
2. EQUIPMENT SHOWN WITH DASHED LINES SHALL BE DEMOLISHED AS WELL AS RELATED APPURTENANCES INCLUDING CURBS, PIPE SUPPORTS, ETC.
3. ALL ROOF WORK MUST BE DONE TO MAINTAIN THE EXISING ROOF WARRANTY THROUGH GARLAND ROOFING. TMR ROOFING WAS THE INSTALLING CONTRACTOR.

MECHANICAL DEMOLITION KEY NOTES:

1. THIS CONDENSING UNIT IS EXISTING AND IS TO REMAIN IN PLACE AS IS.



1 M-3104D HIGH SCHOOL MECHANICAL DEMOLITION ROOF PLAN - AREA D
3/32" = 1' 0"



KEYPLAN

REVISION RECORD				
NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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HIGHSCHOOL
65 MENNEL DRIVE
GREENSBURG, PA 15601

HIGH SCHOOL
MECHANICAL DEMOLITION
ROOF PLAN - AREA D

DATE: XX-XX-XX	DRAWN BY: MAB
DWG SCALE: AS SHOWN	CHECKED BY: MAB
PROJECT NO: 2341083	APPROVED BY: DCP

Allen + Shariff
MEP Engineering
Project Management
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Pittsburgh, Pennsylvania 15212
412.322.9280
A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER DAVID C. PRICE

DRAWING NO.:
M-3104D

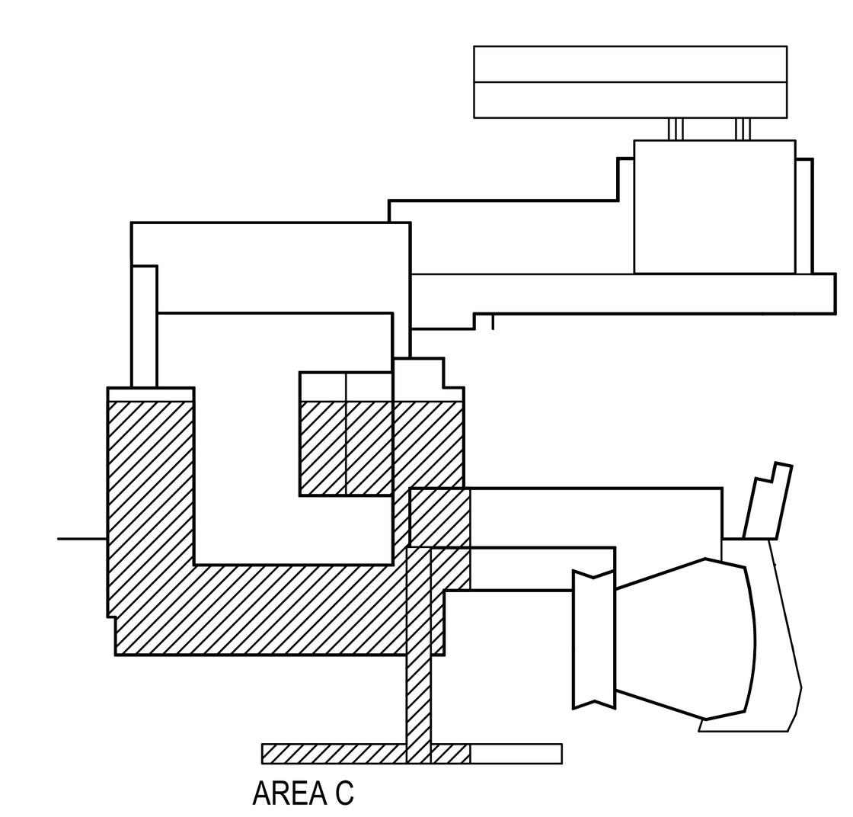
MECHANICAL GENERAL NOTES:

1. ALL NEW EQUIPMENT AND ACCESSORIES MUST BE CONNECTED INTO THE EXISTING BUILDING CONTROLS SYSTEM.
2. ANY EQUIPMENT MODIFIED OR REPLACED, MUST BE REBALANCED AIRSIDE AND LIQUID SIDE TO VERIFY PERFORMANCE.

MECHANICAL KEY NOTES: (#)

1. INSTALL NEW AHU-3-C. TRANSITION DUCTS TO CONNECT NEW UNIT. CONNECT UNIT TO EXISTING HOT WATER PIPING. INSTALL NEW REFRIGERANT PIPING AND CONDENSING UNIT AS SHOWN.
2. INSTALL NEW HIGH-WALL TYPE DUCTLESS SPLIT. INSTALL REFRIGERATION PIPING TO NEW CONDENSING UNIT SHOWN.
3. INSTALL NEW COOLING COIL IN AHU-7-D. CONNECT NEW COIL TO CLEANED EXISING REFRIGERANT RISER PIPES TO NEW CONDENSING UNIT LOCATION SHOWN ON ROOF PLAN.
4. INSTALL NEW DX COOLING COIL IN UNIT VENTILATORS. INSTALL NEW REFRIGERATION PIPE TO NEW CONDENSING UNIT LOCATION SHOWN. ADAPT CONTROLS TO MODULATE COOLING CAPACITY TO SUIT UNIT LAT.
5. INSTALL NEW UNIT VENTILATOR EQUIPMENT. RECONNECT HOT WATER PIPING TO NEW EQUIPMENT. CONNECT NEW REFRIGERATION LINES TO NEW CONDENSING UNITS. RECONNECT DUCTS WITH NEW TRANSITION PEICES AS NEEDED.

1 HIGH SCHOOL MECHANICAL SECOND FLOOR PLAN - AREA C
M-3202C 3/32" = 1' 0"



KEYPLAN

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COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
DAVID C. PRICE

HIGH SCHOOL
MECHANICAL
SECOND FLOOR PLAN - AREA C

DATE:	XX-XX-XX	DRAWN BY:	MAB
DWG SCALE:	AS SHOWN	CHECKED BY:	MAB
PROJECT NO.:	2341083	APPROVED BY:	DCP

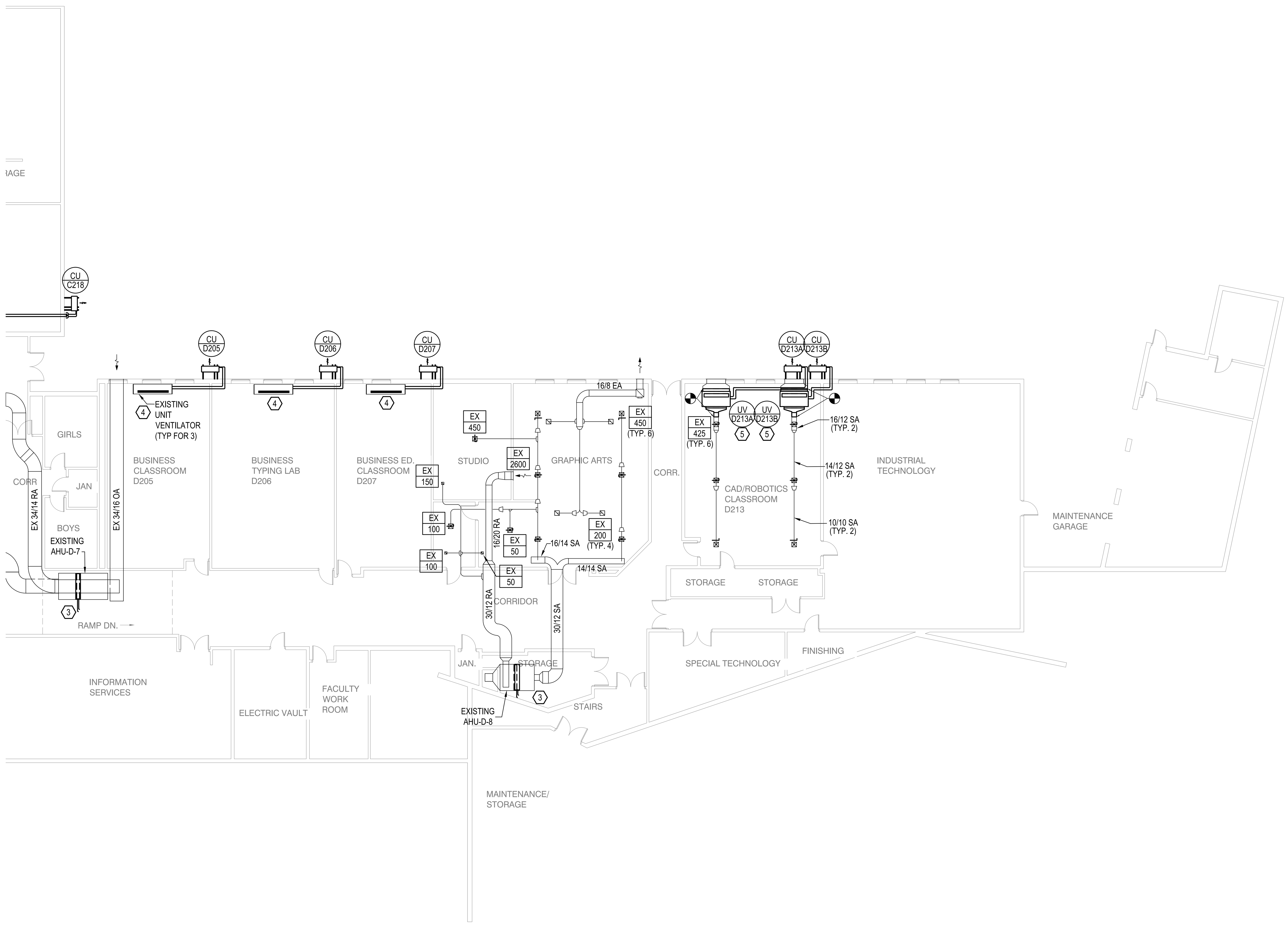
DRAWING NO.:
M-3202C

MECHANICAL GENERAL NOTES:

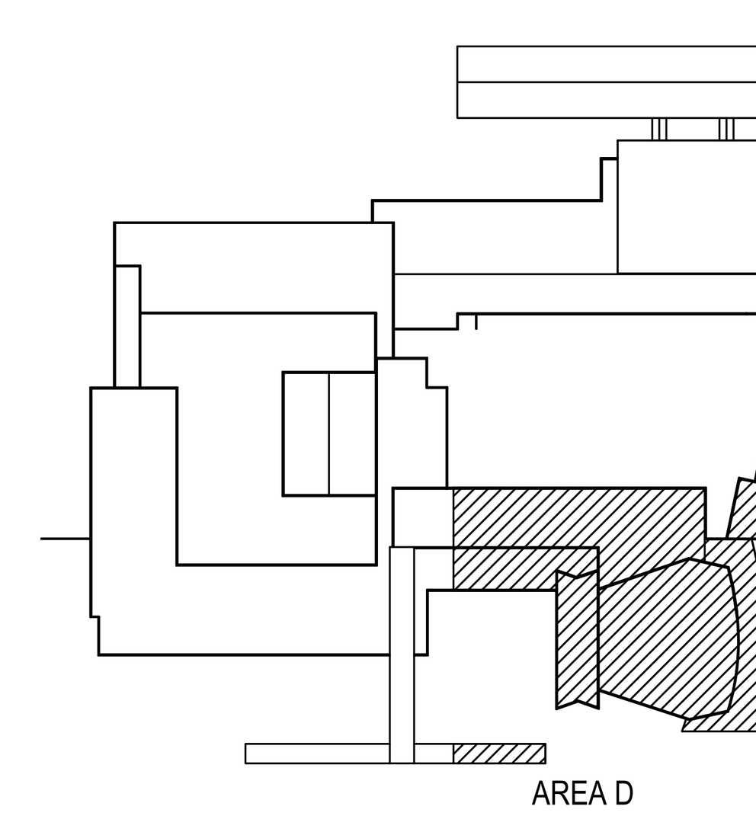
1. ALL NEW EQUIPMENT AND ACCESSORIES MUST BE CONNECTED INTO THE EXISTING BUILDING CONTROLS SYSTEM.
2. ANY EQUIPMENT MODIFIED OR REPLACED, MUST BE REBALANCED AIRSIDE AND LIQUID SIDE TO VERIFY PERFORMANCE.

MECHANICAL KEY NOTES:

1. INSTALL NEW AHU-3-C. TRANSITION DUCTS TO CONNECT NEW UNIT. CONNECT UNIT TO EXISTING HOT WATER PIPING. INSTALL NEW REFRIGERANT PIPING AND CONDENSING UNIT AS SHOWN.
2. INSTALL NEW HIGH-WALL TYPE DUCTLESS SPLIT. INSTALL REFRIGERATION PIPING TO NEW CONDENSING UNIT SHOWN.
3. INSTALL NEW COOLING COIL IN AHU-7-D. CONNECT NEW COIL TO CLEANED EXISING REFRIGERANT RISER PIPES TO NEW CONDENSING UNIT LOCATION SHOWN ON ROOF PLAN.
4. INSTALL NEW DX COOLING COIL IN UNIT VENTILATORS. INSTALL NEW REFRIGERATION PIPE TO NEW CONDENSING UNIT LOCATION SHOWN. ADAPT CONTROLS TO MODULATE COOLING CAPACITY TO SUIT UNIT LAT.
5. INSTALL NEW UNIT VENTILATOR EQUIPMENT. RECONNECT HOT WATER PIPING TO NEW EQUIPMENT. CONNECT NEW REFRIGERATION LINES TO NEW CONDENSING UNITS. RECONNECT DUCTS WITH NEW TRANSITION PEICES AS NEEDED.



1 M-3202D HIGH SCHOOL MECHANICAL SECOND FLOOR PLAN - AREA D
3/32" = 1' 0"



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412.322.9280
A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
DAVID C. PRICE

HIGH SCHOOL
MECHANICAL
SECOND FLOOR PLAN - AREA D

DATE:	XX-XX-XX	
DWG SCALE:	AS SHOWN	
PROJECT NO:	2341083	
APPROVED BY:	DCP	
DRAWN BY:	MAB	
CHECKED BY:	MAB	

DRAWING NO.:
M-3202D

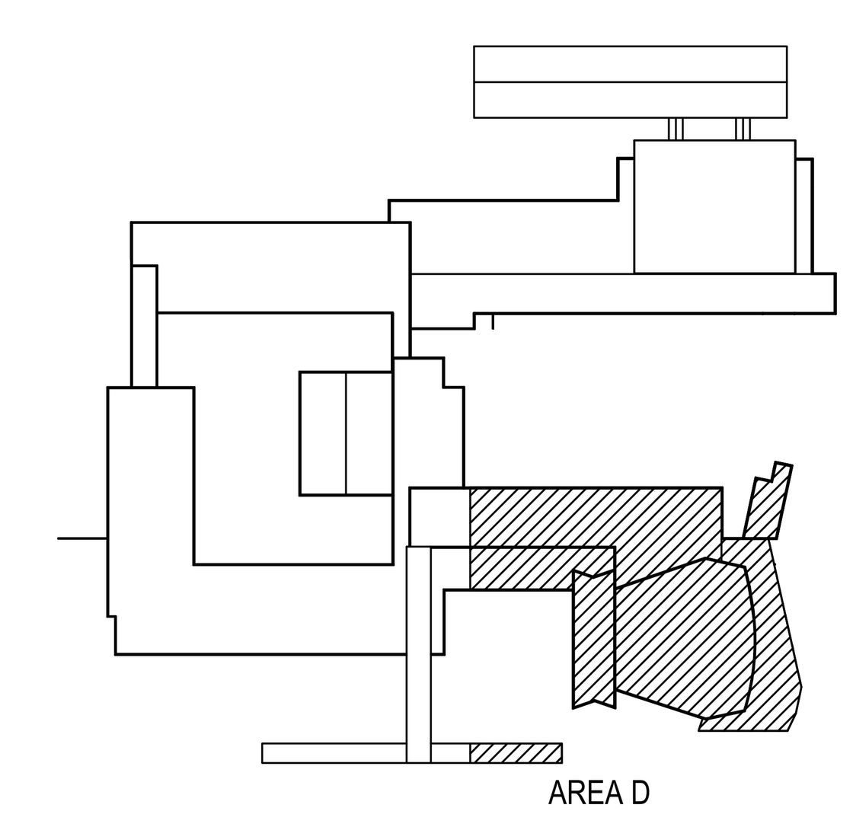
MECHANICAL GENERAL NOTES:

1. CONTRACTOR TO VERIFY DUCT SIZES AND PLACEMENT PRIOR TO ORDERING DUCT.

MECHANICAL KEY NOTES:

1. CONNECT TO RETURN DUCT IN THE VERTICAL.

1 HIGH SCHOOL MECHANICAL THIRD FLOOR PLAN - AREA D
M-3203D 3/32" = 1' 0"



KEYPLAN

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COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
ENGINEER

REVISION RECORD

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HIGH SCHOOL
MECHANICAL
THIRD FLOOR PLAN - AREA D

DATE:	XX-XX-XX
DRAWN BY:	MAB
DWG SCALE:	AS SHOWN
CHECKED BY:	MAB
PROJECT NO:	2341083
APPROVED BY:	DCP

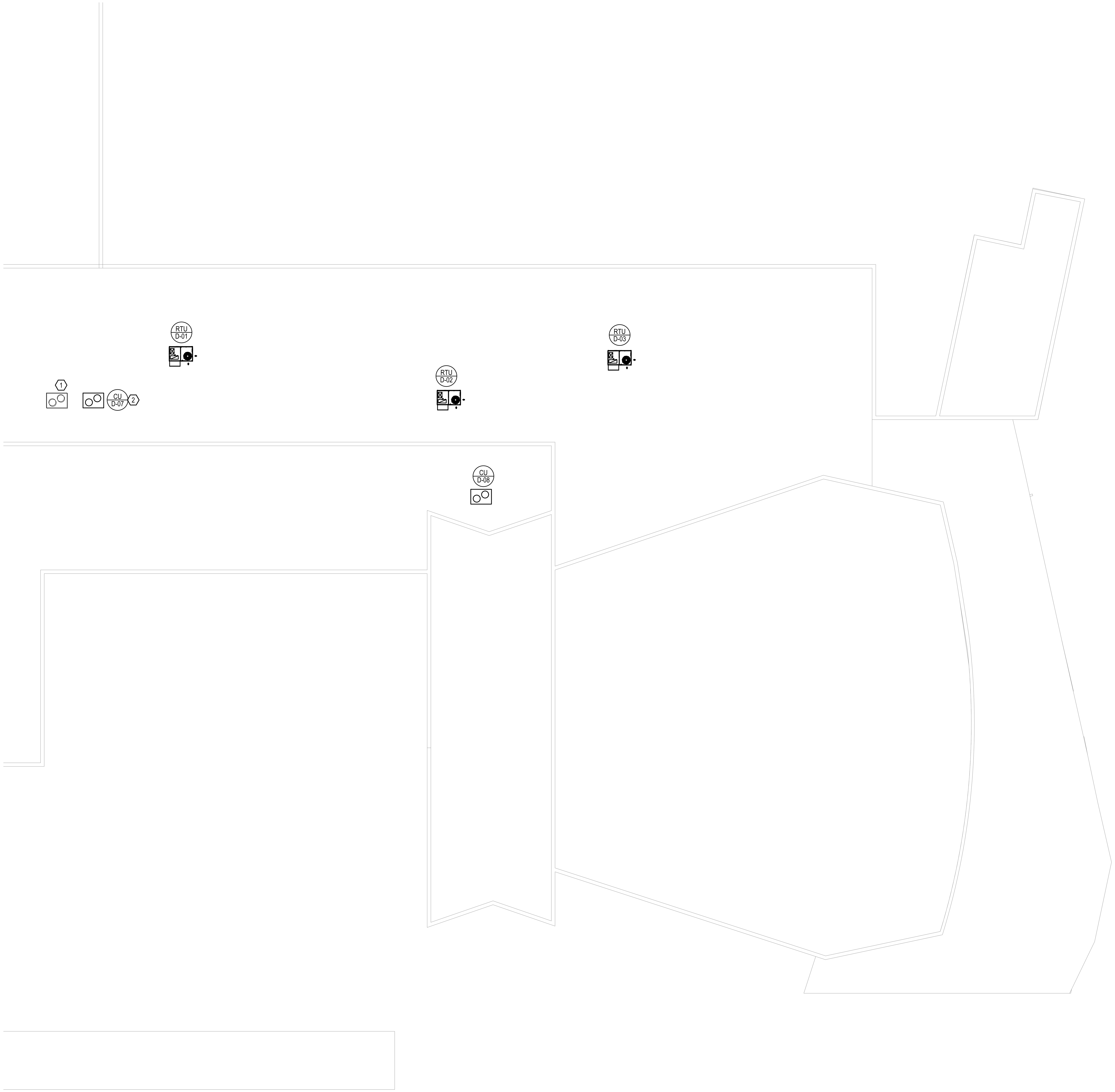
DRAWING NO.:
M-3203D

MECHANICAL GENERAL NOTES:

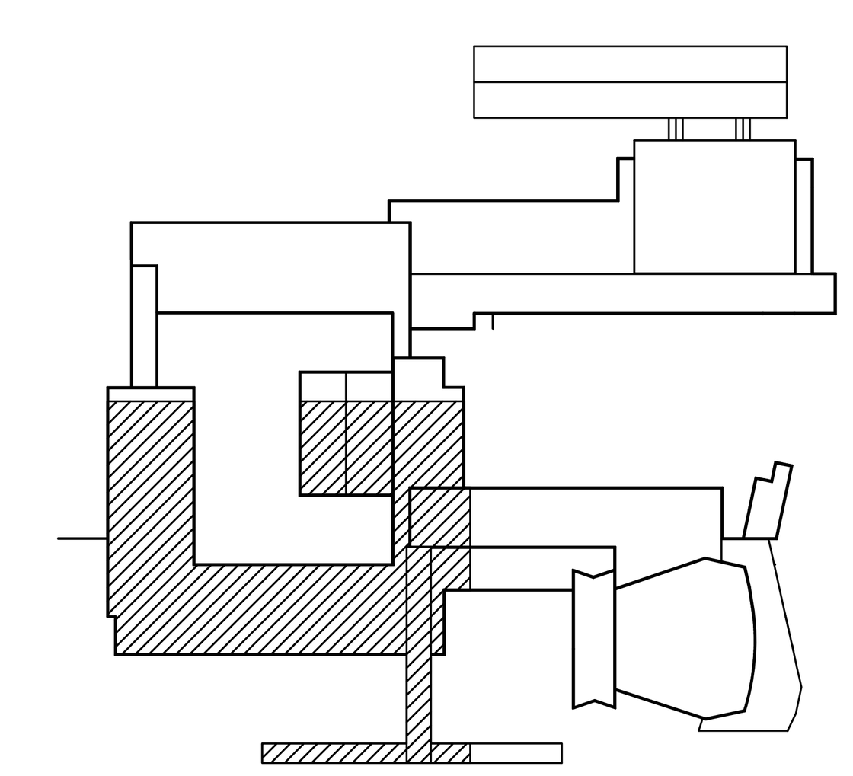
1. NEW ROOF CURBS SHALL BE WATERPROOFED TO THE EXISTING ROOFING MEMBRANE.
2. ALL ROOF WORK MUST BE DONE TO MAINTAIN THE EXISING ROOF WARRANTY THROUGH GARLAND ROOFING. TMR ROOFING WAS THE INSTALLING CONTRACTOR.

MECHANICAL KEY NOTES: ⟨#⟩

1. THIS UNIT IS EXISTING AND SHALL REMAIN AS IS.
2. THIS NEW UNIT SHALL BE LOCATED WHERE A PREVIOUSLY DEMOLISHED UNIT WAS LOCATED. REVIEW THE UNDERSIDE OF THE ROOF STRUCTURE TO FIND THE ORIGINAL CONDENSING UNIT LOCATION AND PIPING CHASE TO THE 2ND FL. LOCATION SHOWN IS APPROXIMATED OR TO BE LOCATION IF OLD LOCATION IS NOT DISCOVERED.



1 M-3204D HIGH SCHOOL MECHANICAL ROOF PLAN - AREA D
3/32" = 1'-0"



KEYPLAN

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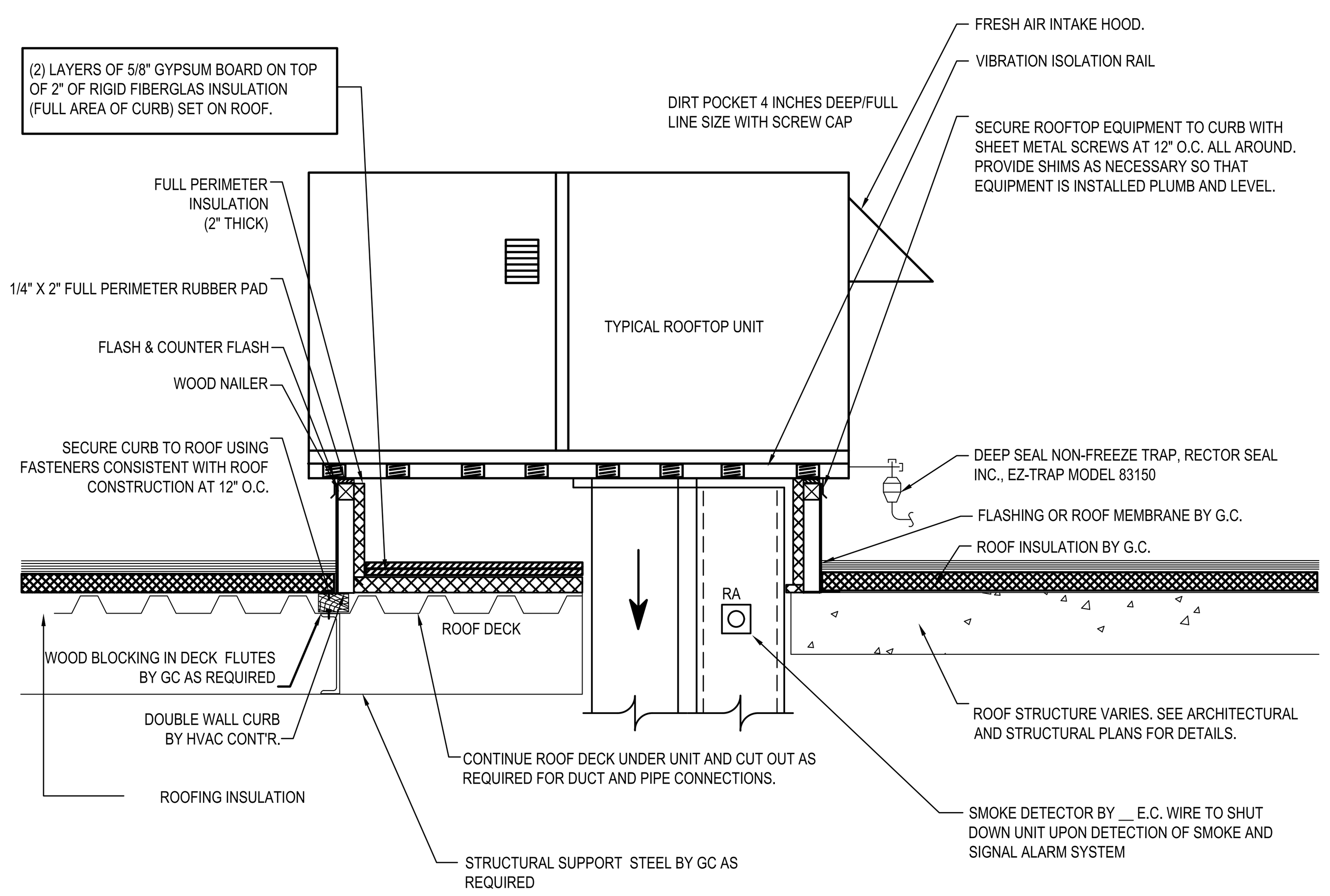
COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
ENGINEER
No. PE081572

HIGH SCHOOL
MECHANICAL DEMOLITION
ROOF PLAN - AREA D

DATE:	XX-XX-XX	DRAWN BY:	MAB
DWG SCALE:	AS SHOWN	CHECKED BY:	MAB
PROJECT NO:	2341083		
APPROVED BY:	DCP		

DRAWING NO.:
M-3204D



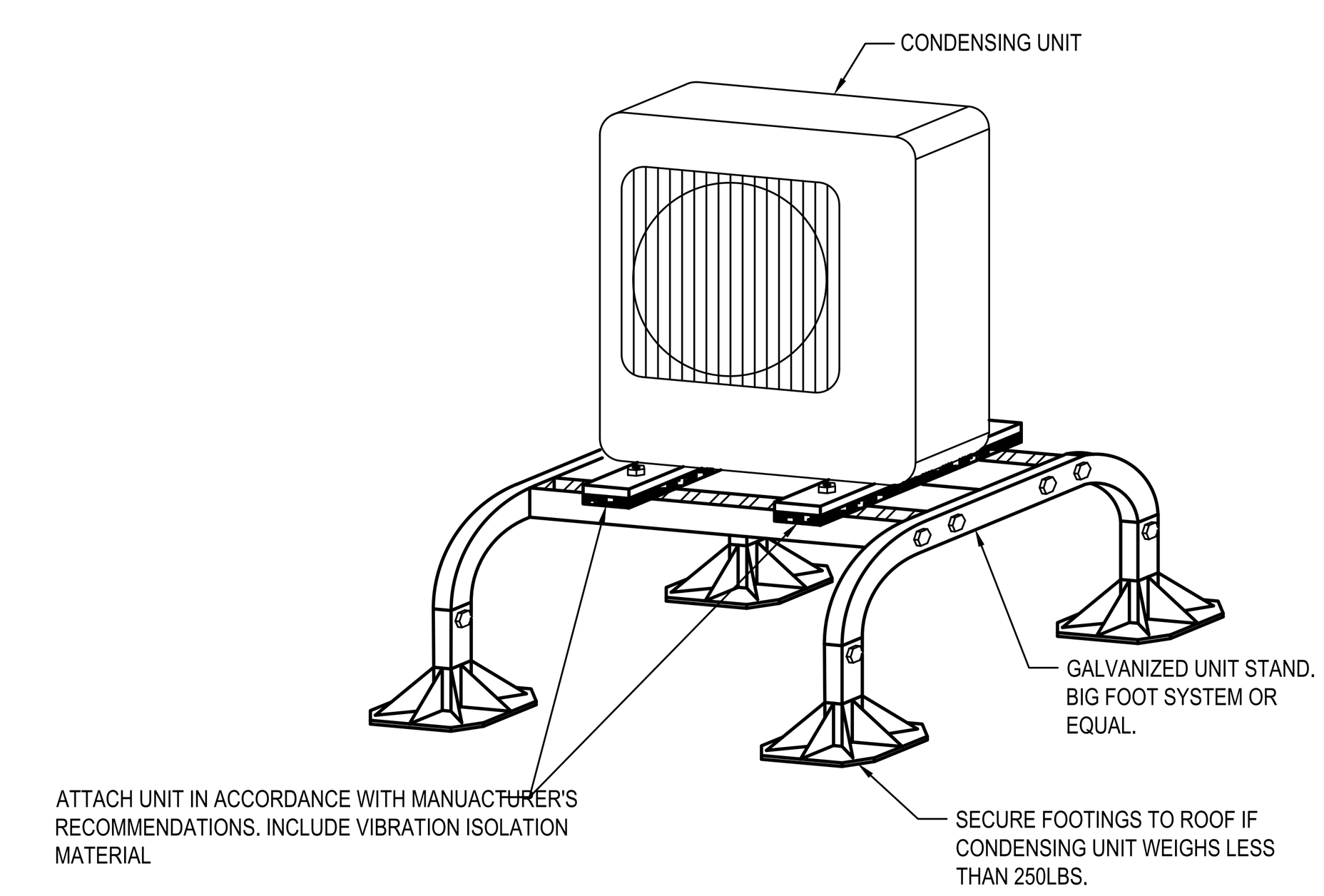
ROOF CURB INSTALLATION NOTES:

1) THIS DETAIL IS DIAGRAMMATIC IN THAT IT ILLUSTRATES AN INSTALLATION ON A FLAT ROOF. ACTUAL CONSTRUCTION AND PITCH MAY VARY. CONTRACTORS SHALL SHIM CURB AS NECESSARY TO PROVIDE PLUMB AND LEVEL EQUIPMENT INSTALLATION.

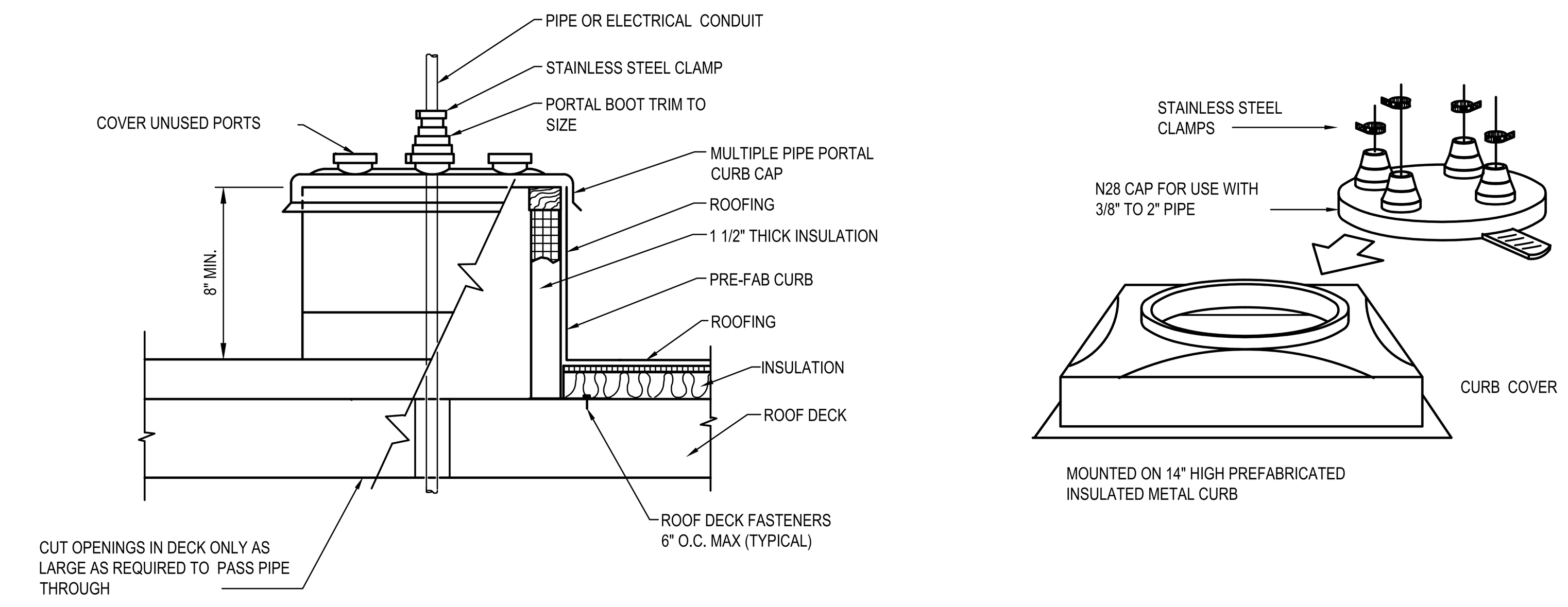
2) ROOF CURBS SHALL BE INSTALLED SQUARE WITH BUILDING LINES. COORDINATE UNIT LOCATION WITH STRUCTURAL ELEMENTS.

3) CONTRACTOR SHALL SEAL, FLASH, AND COUNTER FLASH ROOF CURB TO PROVIDE A COMPLETE WEATHERTIGHT INSTALLATION.

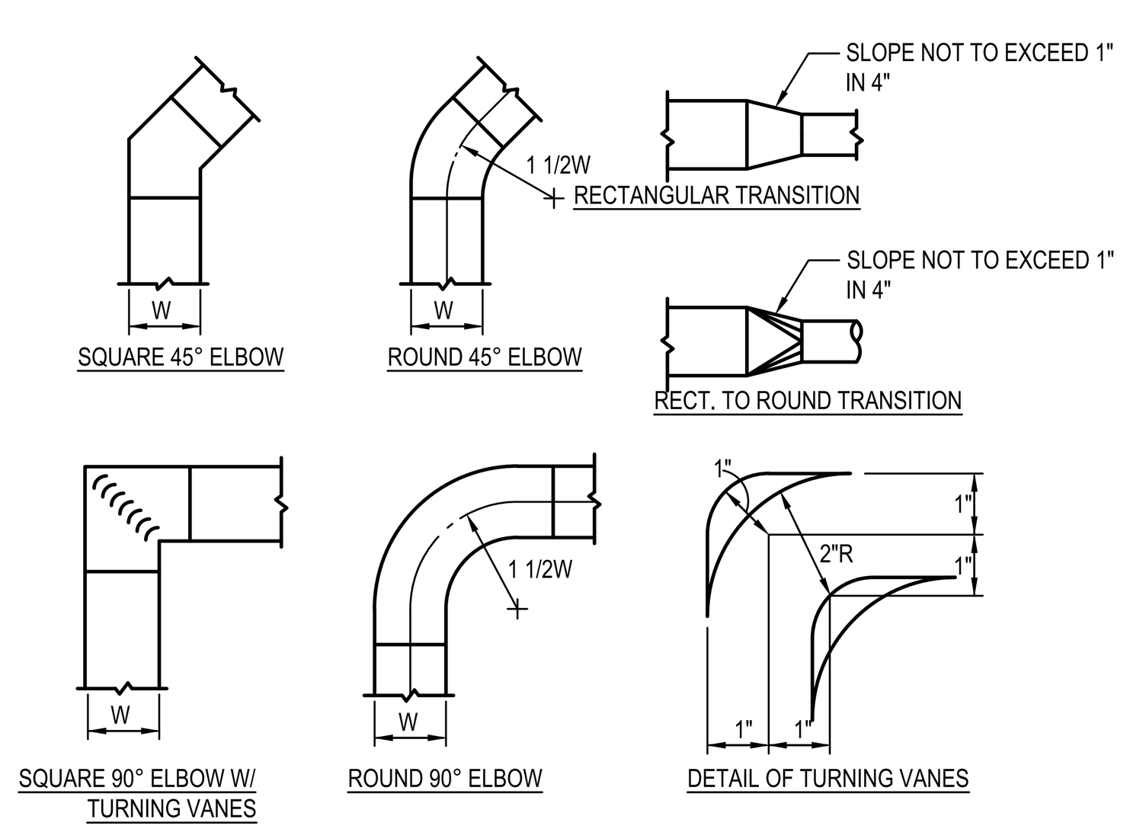
1 / M3301 ROOF TOP UNIT INSTALLATION DETAIL
NO SCALE



2 / M3301 CONDENSING UNIT STAND DETAIL
NO SCALE

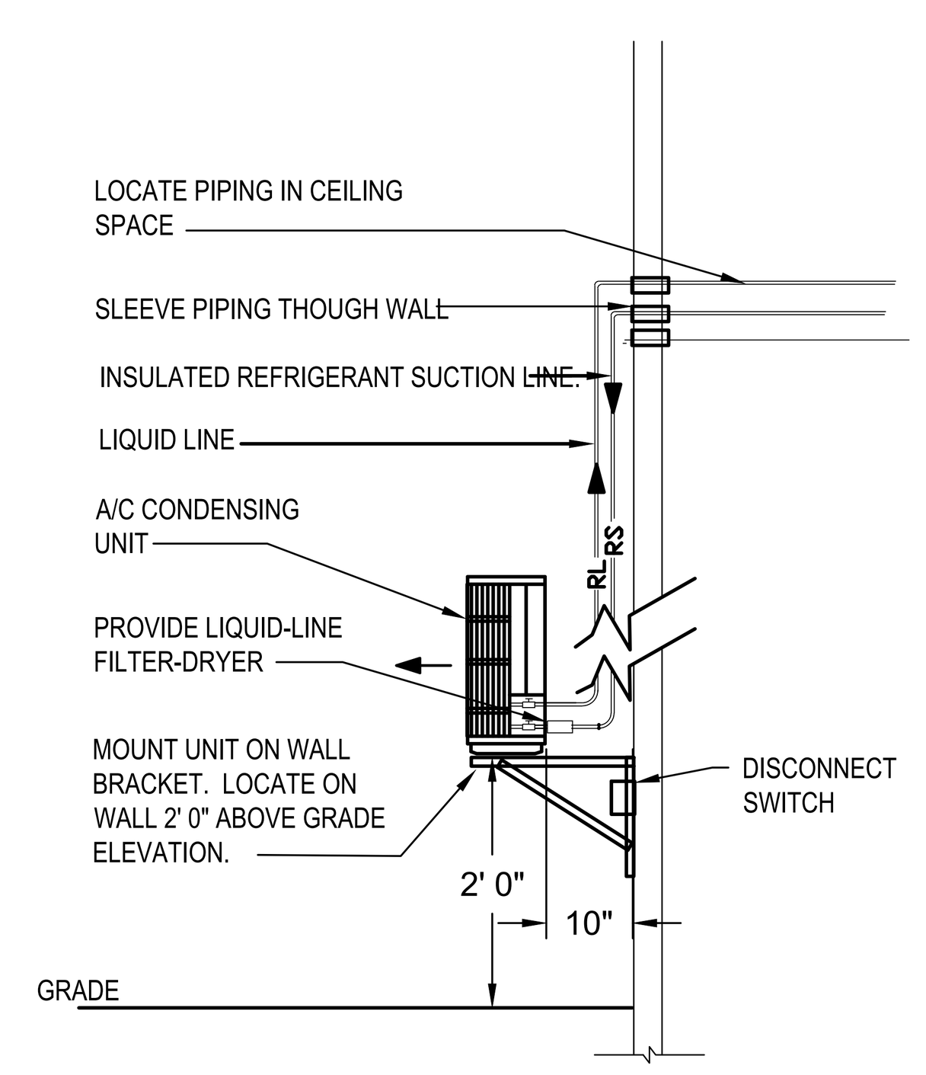


3 / M3301 PIPE PORTAL DETAIL
NOT TO SCALE

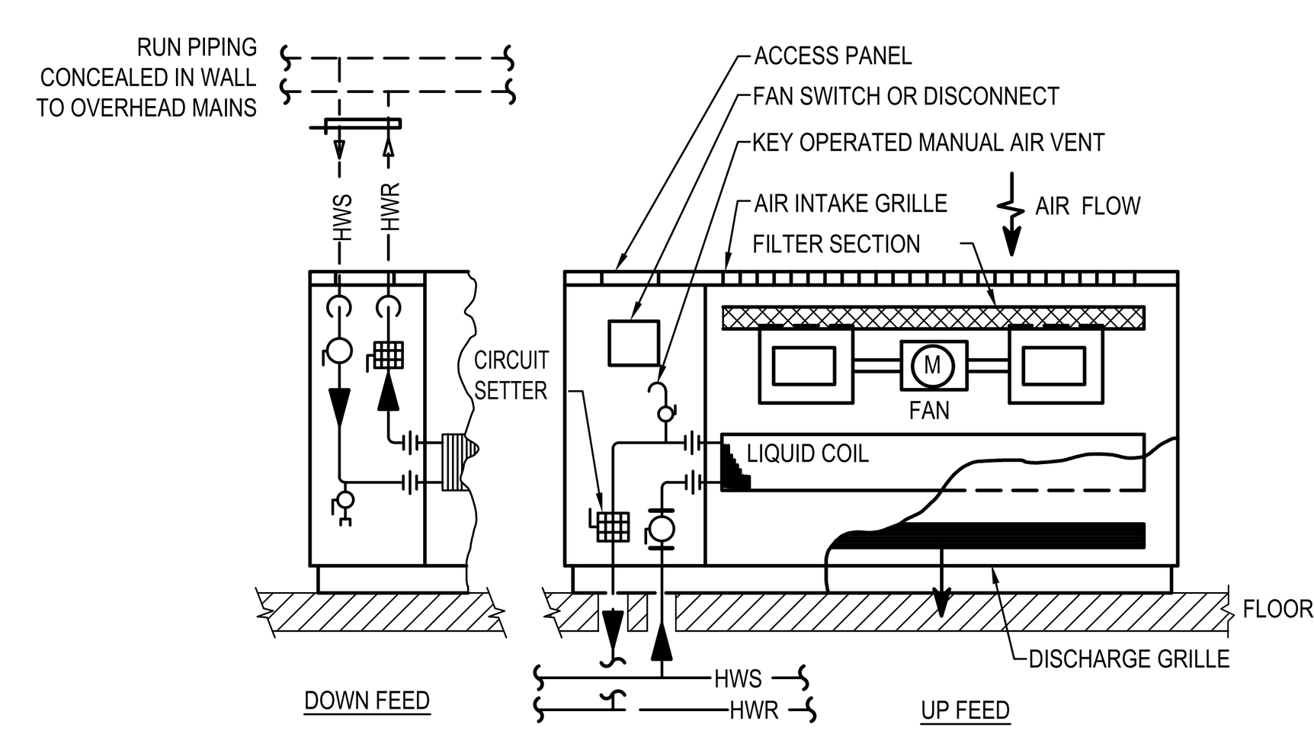


4 / M3301 LOW VELOCITY DUCTWORK DIAGRAMS
NO SCALE

NOTE:
PROVIDE RADIUS ELBOWS, 18" AND LARGER WITH TURNING BLADES AT 1/3 AND 1/2 THE WIDTH OF THE DUCT FROM THE INSIDE RADIUS. TURNING BLADES SHALL BE PROVIDED WITH HEMMED ENDS. (SEE SECTION 15840 OF MECHANICAL SPECIFICATIONS FOR ADDITIONAL DUCT CONSTRUCTION INFORMATION AND RESTRICTIONS.)



5 / M3301 CONDENSING UNIT STAND DETAIL
NO SCALE



NOTE:
LOOK AT PLANS AND SCHEDULES, FOR MOUNTING OF UNITS EITHER AS WALL HUNG, FLOOR MOUNT OR RECESSED.

HORIZONTAL UNIT EQUIPMENT SIMILAR.

6 / M3301 CABINET UNIT PIPING DIAGRAM
NOT TO SCALE

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COMMONWEALTH OF PENNSYLVANIA — REGISTERED PROFESSIONAL ENGINEER — DAVID C. PRICE

HIGH SCHOOL
MECHANICAL
DETAILS

DATE:	XX-XX-XX	DRAWN BY:	MAB
DWG SCALE:	AS SHOWN	CHECKED BY:	MAB
PROJECT NO.:	2341083	APPROVED BY:	DCP

DRAWING NO.:
M-3301

AIR HANDLING UNIT SCHEDULE

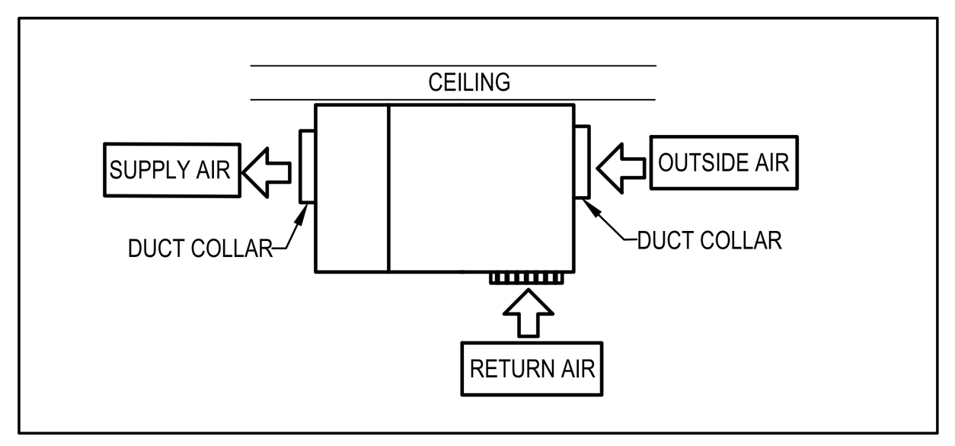
TAG	SERVICE/LOCATION	SUPPLY FAN					HEATING COIL							COOLING COIL								FILTER				WEIGHT (LB)	BASIS OF DESIGN/ MODEL	REMARKS
		CFM	E.S.P. (IN WG)	HP	FLA	VOLTS/PHASE	HEATING CAPACITY MBH	TYPE	GPM	HOT WATER/ELEC. DATA				SENSIBLE MBH	TOTAL MBH	EAT DB/WB (°F)	LAT DB/WB (°F)	MAX AIR PD IN W.G.	SUPER HEAT (°F)	SUCTION LOSS (°F)	REFRIG.	DIMENSIONS LENGTH x WIDTH	THICK (IN.)	(QUANTITY) SIZE	%EFF MERV RATING			
										EWT	LWT	WPD (FT.)	APD/IN. W.C.															
AHU-C-3	ROOM C204	1600	0.5	1.5	2.6	208 / 3	62.8	HW	6.4	180	160	0.3	0.27	36.5	53.3	77 / 65	55.3/53.7	0.48	15	2.7	R-410A	6' 6" X 3' 7"	2"	(2) 16X25	13	549	CARRIER 39L	ALL, SEE BELOW

REMARKS:
1. ALL CONTROLS, VALVES, SENSORS, AND ACTUATORS SHALL BE PROVIDED BY THE CONTROLS CONTRACTOR.
2. PROVIDE COMBINATION DISCONNECT+ MOTOR STARTER PROTECTOR WITH AUXILIARY CONTACTS.
3. PROVIDE UV-C LAMPS FOR THE COOLING COIL AND DRAIN PAN.
4. PROVIDE IN RETURN AIR PHOTOELECTRIC TYPE DUCT SMOKE DETECTOR INTERLOCKED WITH UNIT TO PROVIDE IMMEDIATE SHUTDOWN AND SOUND BUILDING ALARM SYSTEM.

ROOFTOP UNIT SCHEDULE

UNIT DES.	UNIT TONS	MIN. O/A CFM	SUPPLY FAN DATA (7)					DX COOLING COIL DATA				FILTERS		COMPRESSOR/CONDENSER SECTION			ELECTRICAL DATA			UNIT WEIGHT	BASIS OF DESIGN MANF./ MODEL	REMARKS
			CFM	E.S.P. IN. WG	T.S.P. IN. WG	RPM	HP	E.A.T. DB/WB	L.A.T. DB/WB	TOTAL MBH	SENSIBLE MBH	THICK-NESS	MERV RATING	QTY COMPRESSORS	QTY/HP CONDENSER FANS	SEER	VOLTS/PH	MCA	MOPD			
RTU-D-01	5.0	150	2000	0.75	1.25	2090	1.5	78 / 65	57 / 55	59.1	43.5	4"	13	1	1	19	460 / 3	14	20	876	CARRIER / 50JC-W06	ALL, SEE BELOW
RTU-D-02	5.0	250	2000	0.75	1.25	2090	1.5	78 / 65	57 / 55	59.1	43.5	4"	14	1	1	19	460 / 3	14	20	876	CARRIER / 50JC-W06	ALL, SEE BELOW
RTU-D-03	5.0	300	2000	0.75	1.25	2090	1.5	78 / 65	57 / 55	59.1	43.5	4"	15	1	1	19	460 / 3	14	20	876	CARRIER / 50JC-W06	ALL, SEE BELOW

NOTES:
1. PROVIDE VARIABLE SPEED COOLING WITH 2-STAGE DEHUMIDIFICATION.
2. PROVIDE RETURN DUCT MOUNTED DUCT SMOKE DETECTOR INTERLOCKED WITH UNIT TO PROVIDE UNIT SHUT DOWN AND TIED INTO BUILDING FIRE ALARM SYSTEM.
3. PROVIDE VERTICAL DISCHARGE UNIT, 24" ROOF CURB, AND HAIL GUARDS.
4. PROVIDE UNIT HACR CIRCUIT BREAKER, THRU-THE-BASE ELECTRICAL CONNECTIONS, AND NON-POWERED CONVENIENCE RECEPTACLE.
5. PROVIDE DIFFERENTIAL ENTHALPY ECONOMIZER WITH ALL SENSORS, BAROMETRIC RELIEF, AND CO2 SENSOR IN THE RETURN AIR STREAM.
6. PROVIDE RTU-OPEN BACNET CONTROL.
7. PROVIDE 4" FILTER TRACK AND MERV-13 FILTERS WITH ADDITIONAL SET OF FILTERS AT EQUIPMENT TURNOVER.
8. PROVIDE UV-C LAMP SYSTEM FOR COOLING COIL AND DRAIN PAN.



UNIT VENTILATORS

TAG	LOCATION	DESIGN CFM (HIGH SP.)	EXT. SP IN W.C.	COOLING CAP (MBTUH) @ 75F db/64F wb DX CLG. @ 40°F SST.				HEATING CP. (HIGH SPEED) @70F EAT & 180F EWT				ELECTRICAL				MINIMUM OUTSIDE AIR (CFM)	BASIS OF DESIGN	MODEL	WEIGHT LB.S	REMARKS
				CLG. CFM	TOTAL CAP.	SENS.	ROWS	MBTUH	GPM	P.D. FT. W.C.	ROWS	FAN HP	UNIT MCA	UNIT MOCP	VOLTS/PH					
UV-D-4	D213 TECH DWG RM NORTH	1250	0.1	1250	36	22	4	43.5	5.0	1.1	1	0.40	5.9	15	115 / 1	125	CARRIER	40UHF	740	1,2,3,4,5
UV-D-5	D213 TECH DWG RM SOUTH	1250	0.1	1250	36	22	4	43.5	5.0	1.1	1	0.40	5.9	15	115 / 1	125	CARRIER	40UHF	740	1,2,3,4,5

NOTES:
1. ALL UNITS SHALL BE CONFIGURED WITH EXPOSED UNIT, REAR OA INLET, BOTTOM RA INLET, TOP HORIZ DUCT COLLAR SA OUTLET, BOTTOM ACCESS PANEL, AND SIDE-END PANELS.
2. ALL UNITS SHALL BE CONFIGURED WITH 3-SPEED ECM FAN MOTOR, STANDARD OA DAMPER ASSEMBLY, FACE AND BYPASS DAMPER, AND 2" MERV-08 FILTER.
3. ALL UNITS SHALL BE CONFIGURED WITH 4-ROW, DX COOLING COIL, AND STAINLESS STEEL DRAIN PAN.
4. UNITS WILL BE CONTROLLED BY THE EXISTING BUILDING BAS. CONTROL VALVES AND BACNET IP INTERFACE SHALL BE PROVIDED BY CONTROLS CONTRACTOR.
5. ALL UNITS SHALL BE BEIGE IN COLOR.

DX COOLING COIL SCHEDULE

TAG	AIR QTY. (CFM)	MIN. FACE AREA (SQ. FT.)	MAX. FACE VEL. (FPM)	MAX. AIR P.D. (IN H_2O)	FINNED WIDTH (IN.)	FINNED HGHT. (IN.)	COOLING CAPACITY		ENTERING/LEAVING AIR CONDITIONS				REFRIGERANT INFO					ROWS /FPI	MANUF./MODEL	REMARKS
							TOTAL (MBH)	SENSE (MBH)	ENT. AIR TEMP. db (F)	ENT. AIR TEMP. wb (F)	LVG. AIR TEMP. db (F)	LVG. AIR TEMP. wb (F)	COOLING MEDIA	COND. TEMP. (F)	SAT. SUCT. TEMP. (F)	CIRCUIT	REF. P. D. (PSI)			
CC-AHU-D-7	4500	9.4	500	0.5	45	31.25	140	109	79	65	55	54	R-401A	110	45	1	7.7	4 / 12	CARRIER	ALL, SEE BELOW
CC-AHU-D-8	3000	7.5	500	0.5	42	25	104	77	79	65	53	52	R-401A	110	45	1	5.7	4 / 12	CARRIER	ALL, SEE BELOW

REMARKS:
1. COIL SIZES ARE ESTIMATED BASED ON EXTERIOR UNIT DIMENSIONS. CONTRACTOR TO VERIFY INTERIOR DIMENSIONS OF AHU PRIOR TO SELECTION AND ORDERING COILS.
2. COILS SHALL BE MADE OF COPPER TUBE, ALUMINUM FIN, AND STAINLESS STEEL CASING.
3. CONTRACTOR TO REPLACE DRAIN PAN WITH PAN THAT FITS NEW COIL. PAN TO BE MADE FROM 304 SS.
4. COILS TO BE CONNECTED TO 10-TON CONDENSING UNITS. COIL CAPACITIES MAY EXCEED 120 MBH. VARIATION FROM THE SCHEDULED CAPACITY VALUES ABOVE WITHIN 10% WILL BE PERMITTED.
5. COILS TO INCLUDE TXV(S), LIQUID LINE DRYER(S),AND ALL OTHER REFRIGERATION ACCESSORIES NEEDED TO PROVIDE A COMPLETE FUNCTIONING SYSTEM.

FAN COIL UNITS

TAG	DESCRIPTION	ACTUAL CFM (HIGH SP.)	EXT. SP IN W.C.	COOLING CAP (MBTUH) @ 75F db/64F wb EAT & 45F EWT		HEATING CP. (HIGH SPEED) @70F EAT & 180F EWT	ELECTRICAL		BASIS OF DESIGN	MODEL	REMARKS
				TOTAL	SENS.	MBH	MCA	VOLTS/PH			
FC-C218	HIGH WALL	635	0.1	18		18	0.5	208 / 1	CARRIER	40MAHBQ18	1, 2

NOTES:
1. PROVIDE WIRED 24VAC INTERFACE FOR 3RD PARTY THERMOSTAT CONTROL. THERMOSTAT INPUT FROM CONTROLS CONTRACTOR.
2. INDOOR UNIT IS POWERED FROM OUTDOOR UNIT.

AIR COOLED CONDENSING UNIT SCHEDULE

UNIT DES.	SERVES	NOMINAL CAPACITY	COOLING EFF.	ELECTRICAL			WEIGHT (LBS)	MANUF.	MODEL	REMARKS
		COOL TONS	EER {SEER} (SEER2)	VOLTS/PH.	MCA	MOCP				
CU-C218	TEACHERS C218	1.5	(21.5)	208 / 1	16	25	101	CARRIER	38MARB018	1,2,4
CU-D205	BUIS. CLASS D205	4.0	15.0	460 / 3	11	15	404	AAON	CFA-004	1,2,3
CU-D206	BUIS. CLASS D206	5.0	14.2	460 / 3	12	15	413	AAON	CFA-005	1,2,3
CU-D207	BUIS. CLASS D207	4.0	15.0	460 / 3	11	15	404	AAON	CFA-004	1,2,3
CU-C-3	AHU-C-3	5.0	{14.0}	208 / 3	21.4	35	245	CARRIER	24AHA4	1,2,3
CU-D-3	AHU-D-3	10.0	11.2	460 / 3	21	30	490	CARRIER	38AUZ-12	1,2,3,5
CU-D-8	AHU-D-8	10.0	11.2	460 / 3	21	30	490	CARRIER	38AUZ-12	1,2,3,5
CU-D213A	UV-D-4	3.0	{14.0}	460 / 3	7.6	15	184	CARRIER	24AHA4	1,2,3
CU-D213B	UV-D-5	3.0	{14.0}	460 / 3	7.6	15	184	CARRIER	24AHA4	1,2,3

NOTES: MCA - MINIMUM CIRCUIT AMPACITY, MOCP- MAXIMUM OVER-CURRENT PROTECTION RATING.
1. PROVIDE FUSED DISCONNECT WITH LOCKABLE HANDLE.
2. MOUNT UNIT WITH EQUIPMENT SUPPORT WALL BRACKET. BASIS OF DESIGN: (3) 48" LONG, ALUMINUM BRACKETS FROM DIVERSITECH. ANCHOR WITH APPROPRIATE STAINLESS STEEL ANCHORS FROM HILTI OR APPROVED EQUAL. BRACKET SHALL BE HUNG SO THAT THE TOP OF THE CONDENSING UNIT SHALL BE AT THE BOTTOM OF THE WINDOW OPENINGS.
3. PROVIDE PROPERLY SIZED RAWAL DEVICE FOR CAPACITY AND MOISTURE CONTROL.
4. HEAT PUMP UNIT, INDOOR UNIT TO BE POWERED FROM THE OUTDOOR UNIT.
5. PROVIDE EITHER ROOF CURB OR BIG-FOOT TYPE ROOF SUPPORT ANCHORED TO ROOF. IN EITHER CASE, ANY PENETRATIONS INTO THE ROOF SHALL BE MADE WATERPROOF.
6. THIS UNIT IS PART OF THE ADD-ALTERNATE SCOPE OF WORK.

PIPE INSULATION THICKNESS SCHEDULE

FLUID OPERATING TEMPERATURE AND USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (IN)				
	CONDUCTIVITY BTU·IN.(h·ft²·°F)	MEAN RATING TEMPERATURE (°F)	< 1	1 to < 1 1/2	1 1/2 < 4	4 to < 8	≥ 8
> 350	0.32 - 0.34	250	4.5	5.0	5.0	5.0	5.0
251 - 350	0.29 - 0.32	200	3.0	4.0	4.5	4.5	4.5
201 - 250	0.27 - 0.30	150	2.5	2.5	2.5	3.0	3.0
141 - 200	0.25 - 0.29	125	1.5	1.5	2.0	2.0	2.0
105 - 140	0.21 - 0.28	100	1.0	1.0	1.5	1.5	1.5
40 - 60	0.21 - 0.27	75	0.5	0.5	1.0	1.0	1.0
40	0.20 - 0.26	50	0.5	1.0	1.0	1.0	1.5

REMARKS:

PIPING SERVING AS PART OF A HEATING OR COOLING SYSTEM SHALL BE THERMALLY INSULATED IN ACCORDANCE WITH TABLE ABOVE (IECC 2015 TABLE C403.2.10) WITH THE FOLLOWING EXCEPTIONS:
1. FACTORY-INSTALLED PIPING WITHIN HVAC EQUIPMENT TESTED AND RATED IN ACCORDANCE WITH A TEST PROCEDURE REFERENCED BY THIS CODE.
2. FACTORY-INSTALLED PIPING WITHIN ROOM FAN-COILS AND UNIT VENTILATORS TESTED AND RATED ACCORDING TO AHRI 330 (EXCEPT THAT THE SAMPLING AND VARIATION PROVISIONS OF SECTION 6.5 SHALL NOT APPLY) AND AHRI 840, RESPECTIVELY.
3. PIPING THAT CONVEYS FLUIDS THAT HAVE A DESIGN OPERATING TEMPERATURE RANGE BETWEEN 60°F AND 105°F.
4. PIPING THAT CONVEYS FLUIDS THAT HAVE NOT BEEN HEATED OR COOLED THROUGH THE USE OF FOSSIL FUELS OR ELECTRIC POWER.
5. STRAINERS, CONTROL VALVES, AND BALANCE VALVES ASSOCIATED WITH PIPING 1 INCH OR LESS IN DIAMETER.
6. DIRECT BURIED PIPING THAT CONVEYS FLUIDS AT OR BELOW 60°F.

THERMAL INSULATION SCHEDULE

SYSTEM	SYSTEM- LOCATION	OPERATING TEMPERATURE	MATERIAL	SMACNA CLASS					REMARKS
				TYPE	THICKNESS IN.S	DENSITY LB/CU. FT.	INSTALLED "R" VALUE/ CONDUCTIVITY	JACKET	
DUCT	SUPPLY AIR DUCT - INDOOR CONCEALED, ACCESSIBLE	40-120	MINERAL-FIBER	BLANKET	2.5"	0.75	6.0	FSK	1, 4
DUCT	SUPPLY AIR DUCT - INDOOR EXPOSED	40-120	MINERAL-FIBER	BOARD	1.0	2.25	5.0	ASJ	1, 4

NOTES:
1. CONCEALED, ACCESSIBLE LOCATIONS - ABOVE LAY-IN OR ACCESSIBLE CEILINGS, ACCESSIBLE MECHANICAL SHAFTS.
2. CONCEALED, INACCESSIBLE LOCATIONS - ABOVE HARD CEILINGS, (DRY WALL, PLASTER), MECHANICAL SHAFTS, BEHIND WALLS.
3. DO NOT INSULATE:
   - MAKE-UP AIR DUCTWORK OPERATING AT SURROUNDING AMBIENT CONDITIONS
   - RETURN AND EXHAUST AIR DUCTWORK LOCATED INDOORS.
   - TRANSFER AIR DUCTWORK (ACOUSTICALLY LINE DUCT)
   - EXPOSED SUPPLY DUCTWORK LOCATED IN CONDITIONED SPACE. (DOES NOT INCLUDE RETURN AIR PLENUM)
4. MULTIPLE INSULATION METHODS MAY BE USED TO ACHIEVE THE TOTAL REQUIRED R-VALUE.

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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A+S Project: 2341083

HIGH SCHOOL MECHANICAL SCHEDULES

DATE: XX-XX-XX
DWG SCALE: AS SHOWN
PROJECT NO: 2341083
APPROVED BY: DCP
DRAWN BY: MAB
CHECKED BY: MAB

DRAWING NO.: M-3501

GENERAL ELECTRICAL NOTES:

GENERAL: UNLESS SPECIFICALLY INDICATED OTHERWISE, ALL WORK SHOWN ON THE ELECTRICAL DRAWINGS IS NEW WORK TO BE PROVIDED UNDER THIS CONTRACT.

DEMOLITION: SEE "ELECTRICAL GENERAL DEMOLITION NOTES FOR ADDITIONAL DEMOLITION REQUIREMENTS.

COORDINATION: COORDINATE AND COOPERATE WITH ALL TRADES ON THE PROJECT.

RECORD DRAWINGS: SECURE AN EXTRA SET OF ELECTRICAL DRAWINGS TO BE KEPT ON SITE AND MARK DAILY, THE DRAWINGS IN RED AS THE PROJECT PROGRESSES IN ORDER TO KEEP AN ACCURATE RECORD OF ALL DEVIATIONS BETWEEN THE WORK SHOWN ON THE DRAWINGS AND THE WORK WHICH IS ACTUALLY INSTALLED. THESE MARKED DRAWINGS SHALL REFLECT ANY AND ALL CHANGES AND REVISIONS TO THE ORIGINAL DESIGN WHICH EXISTS IN THE COMPLETED WORK. DELIVER THE MARKED DRAWINGS TO THE ARCHITECT OR ENGINEER AT PROJECT CLOSE-OUT.

TESTS: TEST ALL WIRING FOR CONTINUITY AND GROUNDS BEFORE CONNECTING ANY FIXTURES OR DEVICES. PERFORM INSULATION RESISTANCE TESTS ON ALL WIRING #8 OR LARGER TO ENSURE THAT ALL PORTIONS ARE FREE FROM SHORT-CIRCUITS AND GROUNDS.

INSPECTIONS: ARRANGE ALL NECESSARY INSPECTIONS. DELIVER ALL REQUIRED INSPECTION CERTIFICATES TO THE OWNER.

GROUNDING: PROVIDE GROUNDING IN ACCORDANCE WITH THE NEC FOR THE ELECTRICAL SYSTEM, INCLUDING EQUIPMENT FRAMES CONDUITS, SWITCHES, CONTROLLERS, WIRE-WAYS, NEUTRAL CONDUCTORS AND OTHER EQUIPMENT. PROVIDE A GROUNDING CONDUCTOR IN ALL CIRCUITS.

LABELS: PROVIDE LABELS FOR ALL PANELBOARDS, CABINETS, SAFETY SWITCHES, MOTOR-DISCONNECT SWITCHES, AND MOTOR CONTROLLERS. LABELS SHALL BE MACHINE ENGRAVED, LAMINATED PLASTIC.

J-BOX LABELING: LABEL ALL JUNCTION BOXES WITH PERMANENT MARKER IDENTIFYING CIRCUIT NUMBER AND PANELBOARD OF CIRCUITS WITHIN.

PANEL DIRECTORY: PROVIDE TYPEWRITTEN PANELBOARD DIRECTORY CARD IN EACH PANELBOARD, INCLUDING EXISTING PANELBOARDS MODIFIED FOR THIS PROJECT, WITH CIRCUIT LOAD INFORMATION AND ROOM NUMBER CLEARLY IDENTIFIED. USE ACTUAL ROOM NUMBERS IN THE BUILDING, NOT THE ROOM NUMBERS SHOWN ON THE CONTRACT DRAWINGS, AS THEY ARE OFTEN DIFFERENT.

MOTOR COORDINATION: MOTORS, MOTOR STARTERS, CONTROLLERS, INTEGRAL DISCONNECT SWITCHES, AND CONTACTORS SHALL BE PROVIDED WITH THEIR RESPECTIVE PIECES OF EQUIPMENT BY THE EQUIPMENT SUPPLIER. COMMUNICATE WITH THE TRADES PROVIDING THE EQUIPMENT, VERIFYING ALL REQUIREMENTS. PROVIDE ALL ELECTRICAL CONNECTIONS REQUIRED THEREIN AND INSTALL MOTOR STARTERS.

MOTOR DISCONNECTS: ALL MOTORS SHALL HAVE DISCONNECTING MEANS.

MOTOR FUSE PROTECTION: WHERE FUSE PROTECTION IS SPECIFICALLY REQUIRED BY THE EQUIPMENT MANUFACTURER, PROVIDE FUSIBLE SWITCHES IN LIEU OF NON-FUSIBLE SWITCHES OR FUSIBLE ENCLOSED CIRCUIT BREAKERS OR OTHER DEVICES INDICATED.

CONNECTION DETAILS: SECURE APPROVED SHOP DRAWINGS SHOWING WIRING DIAGRAMS, ROUGH-IN AND HOOK UP DETAILS FOR EQUIPMENT WHICH MUST BE CONNECTED ELECTRICALLY.

EQUIPMENT DETAILS: MECHANICAL EQUIPMENT WILL BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR. THE LOCATIONS SHOWN ON THE ELECTRICAL DRAWINGS ARE APPROXIMATE. COORDINATE WITH THE MECHANICAL CONTRACTOR TO DETERMINE THE EXACT LOCATION OF EACH PIECE OF EQUIPMENT AND DETERMINE THE EXACT ROUGH-IN AND CONNECTION REQUIREMENTS.

STARTER MOUNTING: WHERE AN INDIVIDUALLY MOUNTED SAFETY SWITCH, STARTER OR CIRCUIT BREAKER IS SHOWN ADJACENT TO ITS RESPECTIVE LOAD AND NOT MOUNTED ON A WALL, PROVIDE ALL SUPPORTS, BRACKETS, ANCHORING, ETC. NECESSARY TO PROPERLY SUPPORT THE DEVICE.

LIGHTING ARRANGEMENT: ARRANGE LIGHTING FIXTURES IN ACCORDANCE WITH THE ARCHITECTURAL REFLECTED CEILING PLANS.

LIGHTING COORDINATION: COORDINATE LIGHTING FIXTURES WITH GRILLES, DIFFUSERS, SPRINKLER HEADS, ACCESS PANELS, ETC.

MATERIAL COORDINATION: VERIFY CEILING AND WALL CONSTRUCTION AND MATERIAL PRIOR TO ORDERING LIGHT FIXTURES OR OTHER DEVICES TO ENSURE PROPER FIXTURES OR DEVICES ARE FURNISHED TO MATCH CONSTRUCTION.

MOUNTING HEIGHTS: MOUNTING HEIGHTS INDICATED ARE FROM THE FINISHED FLOOR TO THE CENTERLINE OF THE WIRING DEVICE UNLESS OTHERWISE NOTED. MOUNTING HEIGHTS OF LIGHTING FIXTURES AND FIRE ALARM DEVICES ARE TO THE BOTTOM OF THE FIXTURE OR DEVICE UNLESS OTHERWISE NOTED.

DEVICE LOCATIONS: COORDINATE LOCATIONS OF SWITCHES, RECEPTACLES, AND TELE/DATA OUTLETS WITH OTHER WALL MOUNTED DEVICES SUCH AS THERMOSTATS AND CONTROL STATIONS. DO NOT MOUNT WIRING DEVICES BACK TO BACK.

EWC RECEPTACLES: RECEPTACLES FOR ELECTRIC WATER COOLERS (EWC) SHALL BE INSTALLED OUT OF VIEW AND BEHIND THE EWC ENCLOSURE. VERIFY THE MOUNTING HEIGHT WITH THE EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN.

DEVICE COORDINATION: THOROUGHLY REVIEW AND COORDINATE ALL CASEWORK, DOOR SWINGS, AND CABINET DRAWINGS AND ARCHITECTURAL ELEVATIONS WITH DEVICE LOCATIONS PRIOR TO ROUGH-IN OF OUTLET BOXES.

BARRIERS: WHERE A MULTIPLE GANG BOX HAS CIRCUITS OF DIFFERENT VOLTAGES OR SYSTEMS WHICH ARE REQUIRED TO BE SEPARATED, PROVIDE THE CODE-REQUIRED SEPARATION, USING A FULL HEIGHT AND DEPTH BARRIER PLATE.

FIRE PROOFING: FOR ANY WALL OR FLOOR PENETRATIONS THROUGH FIRE RATED STRUCTURES, PROVIDE FIRE-PROOFING TO SEAL ALL THE PENETRATIONS AFTER THE CONDUIT HAS BEEN INSTALLED. FIRE PROOFING FOR PENETRATIONS SHALL BE UL APPROVED PER THE THE PENETRATION MADE IN ORDER TO MAINTAIN FIRE RATED INTEGRITY OF THE STRUCTURE.

CLEAN UP: ON PROJECT CLOSE-OUT, CLEAN ALL ELECTRICAL DEVICES, LIGHTING FIXTURES, LAMPS AND LENSES, AND REMOVE ALL PAINT SPATTERS FROM DEVICES, FIXTURES, AND PLATES. REPLACE ALL INOPERATIVE LAMPS.

OWNER FURNISHED EQUIPMENT: CONTRACTOR SHALL OBTAIN CUT SHEETS, INSTALLATION DATA, AND ROUGH-IN REQUIREMENTS FOR OWNER FURNISHED, CONTRACTOR INSTALLED EQUIPMENT AND COORDINATE ROUGH-IN AND POWER REQUIREMENTS WITH THE OWNER'S REPRESENTATIVE PRIOR TO STARTING ANY ASSOCIATED WORK.

CONDUIT ROUTING: ALL CONDUIT RUN OVERHEAD SHALL BE RUN AT THE BOTTOM OF THE FLOOR, ROOF STRUCTURE, OR LOWEST CHORD OF JOIST SPACE (AS APPLICABLE) ABOVE IN ORDER TO AVOID CONFLICTS WITH OTHER TRADES.

WIRING DEVICES: ALL RECEPTACLES AND SWITCHES SHALL BE LABELED WITH CLEAR PLASTIC LAMINATED LABEL WITH BLACK TEXT, NOTING PANELBOARD DESIGNATION AND CIRCUIT NUMBER FROM WHICH IT IS FED.

EQUIPMENT DEMONSTRATION: PROVIDE A DEMONSTRATION OF THE OPERATION OF ALL ELECTRICAL COMPONENTS.

CEILING AND MECHANICAL ROOM PLENUM: ALL WIRING THAT WILL NOT BE RUN IN METAL CONDUIT SHALL BE PLENUM RATED.

ELECTRICAL GENERAL DEMOLITION NOTES:

GENERAL: DEMOLITION DRAWINGS ARE BASED ON EXISTING PLANS AND FIELD INVESTIGATION PRIOR TO DEMOLITION. VISIT THE EXISTING BUILDING PRIOR TO BID IN ORDER TO BECOME FAMILIAR WITH THE EXISTING CONDITIONS AND IN ORDER TO AVOID CONFLICTS.

DASHED ITEMS: ALL ITEMS SHOWN DASHED ON DEMOLITION PLANS ARE EXISTING AND SHALL BE REMOVED COMPLETE INCLUDING BOXES, CONDUIT, WIRE, FASTENERS, AND ASSOCIATED APPURTENANCES UON.

SOLID ITEMS: ALL ITEMS SHOWN SOLID ON DEMOLITION PLANS ARE EXISTING TO REMAIN.

CIRCUITING TO REMAIN: WHERE AFFECTED BY NEW WORK, EXISTING CIRCUITING TO REMAIN SHALL BE REROUTED OR RECONNECTED AS REQUIRED, IN ORDER TO MAINTAIN CONTINUITY OF CIRCUIT.

REUSE OF EXISTING CIRCUITRY: EXISTING CIRCUITS SHALL BE REUSED WHERE CONVENIENT TO SERVE THE NEW LAYOUT. PROVIDE CIRCUIT MODIFICATIONS INDICATED OR REQUIRED TO MAINTAIN CONTINUITY OF EXISTING CIRCUITS THAT REMAIN.

EXISTING CONDUIT: ALL EXISTING CONDUITS AND WIRING THAT WILL NOT BE REUSED SHALL BE REMOVED. EXISTING CONDUIT TO REMAIN CONCEALED IN WALLS SHALL BE ABANDONED. EXISTING CONDUIT TO REMAIN BELOW FLOOR SLAB SHALL BE CUT OFF ONE INCH BELOW ROUGH FLOOR AND GROUTED FLUSH. ALL EXISTING WIRING IN CONDUITS TO BE ABANDONED SHALL BE DISCONNECTED FROM POWER SOURCE AND REMOVED.

REPAIR DAMAGE: EXERCISE CARE IN REMOVAL OF DEMOLITION ITEMS. REPAIR, AT NO ADDITIONAL COST TO OWNER, ANY DAMAGE CAUSED TO EXISTING CONSTRUCTION AND/OR EQUIPMENT TO REMAIN.

ASSOCIATED APPURTENANCES: REMOVE ALL ELECTRICAL APPURTENANCES (DISCONNECTS, STARTERS, WIRING, CONDUIT, ETC.) ASSOCIATED WITH EQUIPMENT TO BE REMOVED BY OTHERS.

KNOCKOUT PLUGS AND COVERS: ALL CONDUIT REMOVED SHALL BE REMOVED IN ITS ENTIRETY, INCLUDING FITTINGS, MOUNTING DEVICES, MOUNTING HARDWARE, ETC. PROVIDE CONDUIT PLUGS AND BLANKS FOR ALL OPENINGS CREATED BY THE REMOVAL OF CONDUIT. PROVIDE BLANK COVER PLATES FOR ALL OPENED OUTLET BOXES CREATED BY THE REMOVAL OF THE EQUIPMENT AND/OR DEVICES.

DEMOLISHED MATERIALS: ALL MATERIALS REMOVED UNDER DEMOLITION, NOT TO BE RELOCATED OR DESIGNATED TO BE TURNED OVER TO THE OWNER, SHALL BECOME PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED COMPLETELY FROM THE SITE.

SCHEDULE OUTAGES: ALL WORK AND ALL POWER OUTAGES SHALL BE SCHEDULED AT TIMES CONVENIENT TO THE OWNER.

NOTIFICATION: NOTIFY THE OWNER PRIOR TO TURNING OFF ANY CIRCUITS.

EXISTING CIRCUITS: IF DURING THE COURSE OF CONSTRUCTION, IT IS DETERMINED BY THE CONTRACTOR THAT AN EXISTING CIRCUIT BECOMES SPARE, THE CONTRACTOR SHALL UPDATE THE PANELBOARD DIRECTORY TO INDICATE SUCH, EVEN IF IT IS NOT EXPLICITLY MARKED ON THE ELECTRICAL PLANS.

POWER

⦶	SINGLE RECEPTACLE, 20A, 120V, 18"AFF, UON.
⦶	DUPLEX RECEPTACLE, 20A, 120V, 18"AFF, UON.
⦶	DUPLEX RECEPTACLE, GROUND FAULT INTERRUPTING TYPE, 20A, 120V, 18"AFF, UON.
⦶ WP	DUPLEX RECEPTACLE, GROUND FAULT INTERRUPTING TYPE, 20A, 120V, WITH COOPER MODEL WIU-1D (OR EQUAL) "WHILE-IN-USE" WEATHERPROOF COVER, 18"AFG UON.
⊽	SPECIAL RECEPTACLE. NEMA CONFIGURATION AS NOTED. MOUNT 18"AFF UON.
Ⓙ J	JUNCTION BOX - ABOVE CEILINGS OR FLUSH IN WALLS.
☐	DISCONNECT SWITCH - SIZE AS INDICATED ON PLANS 30/2/20/3R — NEMA RATING (IF OTHER THAN 1) FUSE SIZE (AMPS), N.F. INDICATES NON-FUSED No. OF POLES SIZE (AMPS)
$M	HORSEPOWER RATED MOTOR SWITCH
	MOTOR CONNECTION.
	COMBINATION MOTOR STARTER AND DISCONNECT SWITCH, MOUNT WITHIN SITE OF MOTOR 5'-0"AFF, MAXIMUM, UON.
	ELECTRICAL PANELBOARD
↗	ELECTRICAL CIRCUIT RUN IN CONDUIT AND CIRCUIT HOMERUN TO PANELBOARD (PANEL AND CIRCUIT DESIGNATION AS INDICATED). AS A MINIMUM CONDITION, EACH SINGLE PHASE CIRCUIT SHALL HAVE 1 #12 PHASE CONDUCTOR, 1 #12 NEUTRAL CONDUCTOR, AND 1 #12 GROUNDING CONDUCTOR IN 3/4" CONDUIT. PROVIDE ADDITIONAL PHASE CONDUCTORS AS REQUIRED FOR "MULTIPLE PHASED" ELECTRICAL LOADS. PROVIDE ADDITIONAL "SWITCH LEG" CONDUCTORS TO PROVIDE THE LIGHT FIXTURE CONTROL INDICATED. MULTIPLE SINGLE PHASE CONDUCTORS SHALL BE GROUPED TOGETHER IN A COMMON CONDUIT IN ACCORDANCE WITH THE NEC AND AT THE CONTRACTOR'S DISCRETION. NEUTRAL AND GROUNDING CONDUCTORS SHALL BE SHARED AS ALLOWED BY THE NEC. CONDUIT LARGER THAN 3/4" AND CONDUCTORS LARGER THAN #12 SHALL BE AS INDICATED.

LINEWEIGHTS

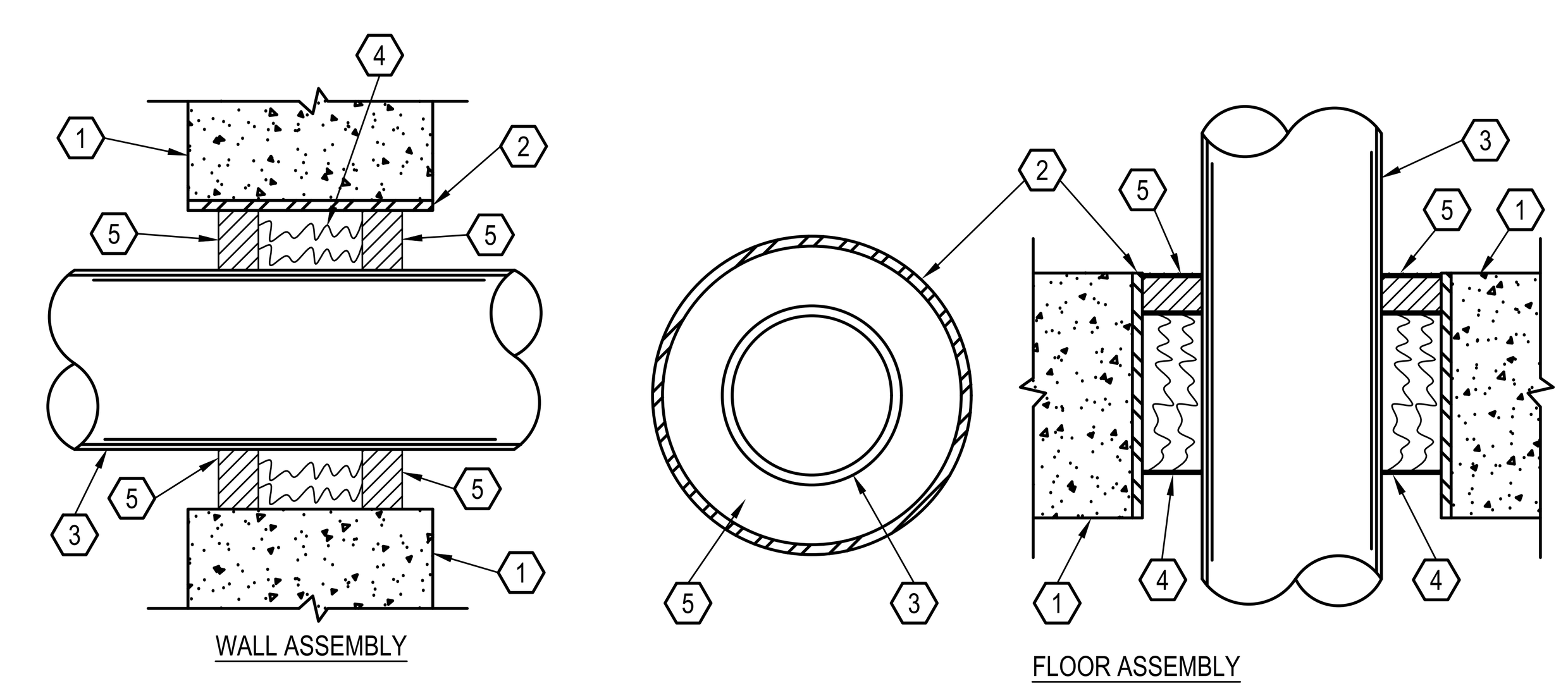
———	NEW
———	EXISTING
– – – –	REMOVE EXISTING

GENERAL

⓵	KEYNOTE.
◐	LIMIT OF DEMOLITION WORK.
◕	POINT OF CONNECTION, NEW TO EXISTING.

ELECTRICAL ABBREVIATIONS

A	AMPERE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AIC	AMPERE INTERRUPTING CURRENT
ATS	AUTOMATIC TRANSFER SWITCH
AV	AUDIO/VISUAL
BFG	BELOW FINISHED GRADE
C	CONDUIT
CATV	CABLE ANTENNA TELEVISION
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CFL	COMPACT FLUORESCENT
CKT	CIRCUIT
EBU	EMERGENCT BATTERY UNIT
EC	EMPTY CONDUIT
EC	ELECTRICAL CONTRACTOR
ECB	ENCLOSED CIRCUIT BREAKER
EF	EXHAUST FAN
ERU	ENERGY RECOVERY UNIT
EQUIP	EQUIPMENT
ETR	EXISTING TO REMAIN
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EX	EXISTING
FLA	FULL LOAD AMPS
FPC	FIRE PROTECTION CONTRACTOR
FPVAV	FAN POWERED VARIABLE AIR VOLUME
GC	GENERAL CONTRACTOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GND	GROUND
HID	HIGH INTENSITY DISCHARGE
HP	HORSE POWER/HEAT PUMP
HVAC	HEATING, VENTILATING, AND AIR CONDITIONING
IG	ISOLATED GROUND
JB	JUNCTION BOX
KVA	KILO-VOLT AMPERE
KW	KILO-WATT
LC	LIGHTING CONTACTOR
LTG	LIGHTING
MAU	MAKE UP AIR UNIT
MCA	MINIMUM CIRCUIT AMPACITY
MC	MECHANICAL CONTRACTOR
MC	METAL CLAD
MCB	MAIN CIRCUIT BREAKER
MFR	MANUFACTURER
MLO	MAIN LUGS ONLY
MOCP	MAXIMUM OVERCURRENT PROTECTION
MTD	MOUNTED
NEC	NATIONAL ELECTRICAL CODE
NF	NON-FUSED
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NTS	NOT TO SCALE
OC	ON CENTER
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
P	POLE
PC	PLUMBING CONTRACTOR
PCP	PUMP CONTROL PANEL
PF	POWER FACTOR
PL	PROPERTY LINE
PNL	PANEL
PNLBD	PANELBOARD
Ø	PHASE
PRI	PRIMARY
RECP	RECEPTACLE
RL	RELOCATE EXISTING
RTU	ROOF TOP UNIT
SE	SERVICE ENTRANCE
SEC	SECONDARY
TBB	TELEPHONE BACKBOARD
TR	TAMPER RESISTANT
TRT	TRIPLE TUBE FLUORESCENT LAMP
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSER
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
V	VOLTS
VAC	VOLTS ALTERNATING CURRENT
VAV	VARIABLE AIR VOLUME
VDC	VOLTS DIRECT CURRENT
VFD	VARIABLE REQUENCY DRIVE
W	WATTS/WIRE
WG	WIRE GUARD
WP	WEATHERPROOF
XFMR	TRANSFORMER



1 / E-0001 FIRE STOP DETAIL
NOT TO SCALE

KEYED NOTES:

1. FLOOR OR WALL ASSEMBLY MINIMUM 5" THICK NORMAL WEIGHT CONCRETE FLOOR OR WALL OR MINIMUM 7-5/8" THICK MASONRY WALL HAVING A MINIMUM 2 HOUR FIRE RESISTIVE RATING WITH A NOMINAL 6" DIAMETER OPENING.
2. STEEL PIPE SLEEVE (OPTIONAL) NOMINAL 6" DIAMETER SCHEDULE 40 OR HEAVIER STEEL PIPE SLEEVE. (2 TRADE SIZES LARGER THAN CONDUIT).
3. STEEL OR EMT CONDUIT NOMINAL 4" DIAMETER CENTERED THROUGH THE OPENING.
4. FORMING MATERIAL MINERAL WOOL, MINIMUM DENSITY OF 4.4 PCF FIRMLY PACKED WITHIN THE OPENING TO A NOMINAL THICKNESS OF 3" FOR FLOORS. FOR WALLS, THE MINERAL WOOL SHALL BE CENTERED IN THE OPENING.
5. FILL, VOID OR CAVITY MATERIAL* - FILL MATERIAL THAT IS TROWELED INTO THE OPENING TO A MINIMUM THICKNESS OF 1/2" IN ACCORDANCE WITH THE ACCOMPANYING INSTALLATION INSTRUCTIONS. IN WALLS, THE FILL MATERIAL SHALL BE INSTALLED ON BOTH SURFACES OF THE OPENING.

* BEARING THE "UL" CLASSIFICATION MARKING

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REGISTERED PROFESSIONAL
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ENGINEER
No. PE081572

ELECTRICAL DATA SHEET

DATE:	XX-XX-XX	DRAWN BY:	ETC
DWG SCALE:	AS SHOWN	CHECKED BY:	ETC
PROJECT NO.:	2341083		
APPROVED BY:	DEB		

DRAWING NO.: E-0001

ELECTRICAL SPECIFICATIONS

GENERAL

CODES AND STANDARDS - THE LATEST EFFECTIVE PUBLICATIONS OF ALL APPLICABLE STANDARDS, CODES, ETC., AS ADOPTED BY THE AUTHORITY HAVING JURISDICTION, STATE AND LOCAL GOVERNMENTS, AS THEY APPLY, FORM PART OF THESE SPECIFICATIONS AS IF WERE WRITTEN FULLY HEREIN AND CONSTITUTE MINIMUM REQUIREMENTS. THE FOLLOWING WILL BE REFERRED TO THROUGHOUT IN ABBREVIATED FORMS.

NATIONAL ELECTRICAL CODE, (NFPA 70) (NEC).
INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE).
NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA).
AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) / COMAR IN MARYLAND.
APPLICABLE STATE AND LOCAL CODES.
APPLICABLE STANDARDS OF UNDERWRITER'S LABORATORIES, INC. (UL).
APPLICABLE STANDARDS OF NATIONAL FIRE PROTECTION ASSOCIATION (NFPA).
THE INTERNATIONAL BUILDING CODE (IBC).
THE INTERNATIONAL FIRE CODE (IFC)
THE AMERICANS WITH DISABILITIES ACT (ADA).
INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA).
THE INTERNATIONAL ENERGY CONSERVATION CODE (IECC).
ASHRAE 90.1

A. SCOPE OF WORK - PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, APPURTENANCES AND SERVICES TO PROVIDE A COMPLETE ELECTRICAL INSTALLATION AS SHOWN ON THE DRAWINGS AND AS DESCRIBED IN THESE SPECIFICATIONS.
B. SITE VISIT - THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING HIS BID TO BECOME FAMILIAR WITH THE EXISTING CONDITIONS AND DETERMINE THE EXTENT OF WORK. LACK OF KNOWLEDGE OF EXISTING CONDITIONS WILL NOT BE CONSIDERED A BASIS FOR CHANGE ORDERS. PRIOR TO ORDERING EQUIPMENT, CONTRACTOR SHALL VERIFY THAT EQUIPMENT TO BE PROVIDED UNDER THIS CONTRACT IS ACCEPTABLE AND CAN FIT INTO BUILDING AND ROOM. EXPENSE INCURRED BY THE CONTRACTOR, WHICH IN THE ENGINEER'S OPINION COULD HAVE BEEN AVOIDED BY THIS STEP, SHALL NOT BE A BASIS FOR CHANGE ORDERS.
C. DRAWINGS AND SPECIFICATIONS - THE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT, CHARACTER AND ARRANGEMENT OF EQUIPMENT, FIXTURES AND CONDUIT AND WIRING SYSTEMS. IT IS THE INTENTION OF THESE SPECIFICATIONS AND DRAWINGS TO FULLY COVER ALL WORK AND MATERIALS FOR A COMPLETE, FIRST-CLASS ELECTRICAL INSTALLATION, AND ANY DEVICES SUCH AS PULL BOXES, STARTERS, AND DISCONNECT SWITCHES, USUALLY EMPLOYED IN THIS CLASS OF WORK THOUGH NOT SPECIFICALLY MENTIONED OR SHOWN ON THE DRAWINGS OR IN THIS SPECIFICATION, BUT WHICH MAY BE NECESSARY FOR THE SATISFACTORY COMPLETION OF THE WORK, SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR AS A PART OF HIS TOTAL WORK UNDER THIS DIVISION. CONSULT THE SPECIFICATIONS AND DRAWINGS OF ALL OTHER TRADES AND PERFORM ALL ELECTRICAL WORK REQUIRED THEREIN. COOPERATE WITH ALL OTHER CONTRACTORS OR SUBCONTRACTORS TO FURNISH COMPLETE WORKABLE SYSTEMS.
D. DURING CONSTRUCTION - KEEP AN ACCURATE RECORD OF ALL DEVIATIONS BETWEEN THE WORK AS SHOWN ON THE CONTRACT DRAWINGS AND THAT WHICH IS ACTUALLY INSTALLED ON A SET OF PRINTS OF THE ELECTRICAL DRAWINGS, AND NOTE CHANGES THEREON WITH RED MARKS, IN A NEAT AND ACCURATE MANNER. WHEN ALL REVISIONS HAVE BEEN SHOWN ON THESE PRINTS TO INDICATE THE WORK AS FINALLY INSTALLED, THE PRINTS SHALL BE DELIVERED TO THE ENGINEER, BEFORE FINAL PAYMENT.
E. PERMITS, INSPECTION AND TESTS - THE RIGHT IS RESERVED TO INSPECT AND TEST ANY PORTION OF THE INSTALLATION/EQUIPMENT DURING THE PROGRESS OF ITS ERECTION. THIS CONTRACTOR SHALL TEST ALL WIRING FOR CONTINUITY AND GROUNDS BEFORE CONNECTING ANY FIXTURES OR DEVICES. THIS CONTRACTOR SHALL TEST THE ENTIRE SYSTEM WHEN THE WORK IS FINALLY COMPLETED TO INSURE THAT ALL PORTIONS ARE FREE FROM SHORT CIRCUITS AND GROUNDS.
F. SECURE AND PAY - FOR ALL REQUIRED PERMITS AND INSPECTIONS. INSPECTION CERTIFICATES FROM LOCAL AUTHORITIES HAVING JURISDICTION SHALL BE DELIVERED TO THE OWNER BEFORE FINAL PAYMENT.
G. SUBMITTALS - SUBMIT SHOP DRAWINGS, PRODUCT DATA AND SAMPLES WITHIN THIRTY (30) DAYS OF AWARD OF CONTRACT AND IN ACCORDANCE WITH THE GENERAL CONDITIONS AND SUPPLEMENTARY CONDITIONS. SUBMITTALS ARE REQUIRED FOR ALL SAFETY SWITCHES, ENCLOSED CIRCUIT BREAKERS, PANELBOARDS, TRANSIENT VOLTAGE SURGE SUPPRESSORS, SURGE PROTECTIVE DEVICE (SPD), TRANSFORMERS, LIGHTING FIXTURES, FIRE ALARM SYSTEM, AND SPECIALTY DEVICES PROVIDED UNDER THIS SPECIFICATION. REVIEW OF SUBMITTALS BY THE ENGINEER AND ANY ASSOCIATED ACTION TAKEN BY THE ENGINEER DOES NOT RELIEVE THE CONTRACTOR OF ANY REQUIREMENTS SET FORTH BY THE CONTRACT DOCUMENTS.
H. PROVIDE ALL CUTTING, PATCHING, PAINTING AND REFINISHING REQUIRED FOR INSTALLATION OF THE ELECTRICAL WORK.
I. DAILY AND WHEN DIRECTED BY THE OWNER OR ENGINEER REMOVE ALL DEBRIS FROM THE PREMISES.
J. DEFINITIONS:
K. "FURNISH" SHALL MEAN TO PURCHASE, DELIVER TO JOB SITE, AND UNLOAD FROM TRUCK AT JOB SITE. "INSTALL" SHALL MEAN TO MOUNT IN PLACE, MAKE ALL NECESSARY CONNECTIONS AS SPECIFIED ON PLANS, AND ON SHOP DRAWINGS.
L. "PROVIDE" SHALL MEAN TO FURNISH AND INSTALL.
M. ELECTRICAL CONTRACTOR SHALL COORDINATE ALL EQUIPMENT VOLTAGES WITH MECHANICAL CONTRACTORS AND/OR OWNER'S/ARCHITECT'S PROVIDED EQUIPMENT PRIOR TO EQUIPMENT ORDER.

PRODUCTS

A. MANUFACTURING STANDARDS - MATERIAL SHALL BE NEW AND APPROVED AND LABELED BY UL WHEREVER STANDARDS HAVE BEEN ESTABLISHED BY THAT AGENCY. DEFECTIVE EQUIPMENT OR EQUIPMENT DAMAGED IN THE COURSE OF INSTALLATION OR TEST SHALL BE REPLACED OR REPAIRED IN A MANNER MEETING THE APPROVAL OF THE OWNER. ALL ITEMS OF THE SAME TYPE AND RATING SHALL BE IDENTICAL.
B. TRADE NAMES - UNLESS SPECIFICALLY IDENTIFIED OTHERWISE, MANUFACTURERS' NAMES AND CATALOG NUMBERS INDICATED HEREIN AND ON THE DRAWINGS ARE NOT INTENDED TO BE PROPRIETARY DESIGNATIONS. THEY ARE TO INDICATE GENERAL TYPE AND QUALITY OF MATERIALS AND EQUIPMENT REQUIRED. EQUIPMENT AND MATERIAL BY OTHER MANUFACTURERS WHICH IN THE OPINION OF THE ENGINEER ARE OF EQUAL QUALITY AND WHICH WILL PRODUCE THE SAME RESULTS WILL BE CONSIDERED ACCEPTABLE.
C. MOTORS - MOTORS SHALL BE PROVIDED WITH DISCONNECTING MEANS.
D. POWER WIRING - UP TO AND INCLUDING MOTOR CONNECTIONS FOR ALL EQUIPMENT PROVIDED UNDER OTHER DIVISIONS OF THIS SPECIFICATION SHALL BE INCLUDED IN THIS DIVISION. WHERE MANUAL MOTOR CONTROL SWITCHES FOR SINGLE PHASE MOTORS ARE INDICATED, THEY SHALL BE PROVIDED AND WIRED COMPLETE UNDER THIS DIVISION. MOTOR CONTROLLERS AND MOTOR STARTERS FURNISHED UNDER OTHER DIVISIONS SHALL BE SET IN PLACE AND CONNECTED TO SOURCE AND LOAD UNDER THIS DIVISION. IN GENERAL, MOTORS WILL BE PROVIDED WITH THE EQUIPMENT THEY DRIVE AND ARE NOT PART OF THIS WORK UNDER THIS DIVISION, EXCEPT THAT THEY SHALL BE CONNECTED HEREUNDER.
E. OBTAIN APPROVED SHOP DRAWINGS - SHOWING WIRING DIAGRAMS, CONNECTION DIAGRAMS, ROUGH-IN AND HOOKUP DETAILS, FROM ALL CONTRACTORS FOR ALL EQUIPMENT AND COMPLY THEREWITH.
F. CONTROL, INTERLOCK AND INTERNAL EQUIPMENT - WIRING REGARDLESS OF VOLTAGE SHALL BE PROVIDED BY OTHERS UNLESS SPECIFICALLY SHOWN HERE.
G. TEMPORARY ELECTRICAL SERVICE - TEMPORARY ELECTRICAL SERVICE AT 120/240V, 1-PHASE AND OR 120/208V, 3-PHASE WITH GROUND FAULT INTERRUPTER WITH SOLIDLY GROUNDED NEUTRAL SHALL BE PROVIDED. AMPERAGE AND VOLTAGE SHALL BE COORDINATED WITH SITE AND PROJECT SPECIFIC REQUIREMENTS. PROVIDE ALL NECESSARY TEMPORARY LIGHTING AND RECEPTACLES. GENERAL CONTRACTOR WILL PAY ALL CHARGES, WHICH MAY BE MADE BY THE POWER COMPANY FOR TEMPORARY SERVICE.
H. GROUNDING - THE ENTIRE ELECTRICAL SYSTEM, INCLUDING EQUIPMENT FRAMES, CONDUIT, SWITCHES, CONTROLLERS, WIREWAYS, AND ALL OTHER SUCH EQUIPMENT SHALL BE PERMANENTLY AND EFFECTIVELY GROUNDED IN ACCORDANCE WITH THE NEC. GROUNDING OF EACH TRANSFORMER SECONDARY SHALL BE PROVIDED AND EACH SHALL BE CONSIDERED AS A SEPARATE SERVICE GROUND. PROVIDE A SEPARATE GROUND CONDUCTOR IN ALL BRANCH CIRCUIT CONDUITS SIZED IN ACCORDANCE WITH THE NEC.
I. SCHEDULE OF WORK - THE SCHEDULE OF THE ELECTRICAL WORK SHALL BE ARRANGED TO SUIT THE PROGRESS OF WORK BY THE OTHER TRADES AND SHALL IN NO WAY RETARD PROGRESS OF CONSTRUCTION OF THE PROJECT.
J. WORK UNDER THIS DIVISION - SHALL PROCEED IN ADVANCE OF THE WORK OF OTHERS WHENEVER POSSIBLE, ELIMINATING ALL CUTTING AND PATCHING. WHEN SUCH PROCEDURE IS IMPOSSIBLE, CUTTING AND PATCHING SHALL BE DONE IN AN APPROVED MANNER. CUTTING SHALL NOT ENDANGER STRUCTURAL INTEGRITY IN ANY WAY. PATCHING SHALL EXACTLY MATCH CONTIGUOUS WORK. ACTUAL WORK OF CUTTING AND PATCHING OF EXISTING SURFACES SHALL BE PERFORMED BY THE SUBCONTRACTOR WHO ORIGINALLY PREPARED THESE SURFACES, E.G., CUTTING AND PATCHING OF MASONRY WALL WILL BE PERFORMED BY THE MASONRY SUBCONTRACTOR. COSTS OF SUCH CUTTING AND PATCHING SHALL BE BORNE BY THE ELECTRICAL SUBCONTRACTOR. CUTTING SHALL BE CAREFULLY DONE AND DAMAGE TO BUILDING, PIPING, WIRING OR EQUIPMENT AS A RESULT OF CUTTING SHALL BE REPAIRED BY SKILLED MECHANICS OF TRADE INVOLVED.
K. STORAGE AND MATERIALS - SPACE WILL BE ASSIGNED TO THE CONTRACTOR BY THE OWNER FOR THE STORAGE OF MATERIAL. THIS CONTRACTOR WILL BE RESPONSIBLE FOR THE PROTECTION AND SAFEKEEPING OF MATERIALS, TOOLS, AND EQUIPMENT. ALL MATERIALS AND EQUIPMENT SHALL BE KEPT IN ITS ASSIGNED PLACE UNTIL THE TIME OF ITS INSTALLATION. EXCESS MATERIALS, DIRT AND REFUSE SHALL BE PROMPTLY REMOVED FROM THE WORK SITE.
L. LABELING OF EQUIPMENT - ALL PANELBOARDS, CABINETS, SAFETY SWITCHES, MOTOR DISCONNECT SWITCHES, AND MOTOR CONTROLLERS SHALL BE IDENTIFIED BY MACHINE ENGRAVED LAMINATED PLASTIC DESIGNATION PLATES PERMANENTLY ATTACHED THERETO WITH SELF-TAPPING SCREWS OR RIVETS. ALL COMPONENT PARTS OF EACH ITEM OF EQUIPMENT OR DEVICE SHALL BEAR THE MANUFACTURER'S NAMEPLATE, GIVING NAME OF MANUFACTURER, DESCRIPTION, SIZE TYPE, SERIAL AND MODEL NUMBER AND ELECTRICAL CHARACTERISTICS IN ORDER TO FACILITATE MAINTENANCE OR REPLACEMENT. PROVIDE UPDATED PANEL DIRECTORIES FOR ALL NEW AND MODIFIED EXISTING PANELS TO INDICATE CORRECT CIRCUITING DESIGNATIONS.
M. COORDINATION - COOPERATE AND COORDINATE EFFORTS WITH ALL CONTRACTORS ON THE PROJECT. THIS IS ESPECIALLY IMPORTANT IN DETERMINING EXACT LOCATIONS OF ALL SWITCHES, RECEPTACLES AND LIGHTING FIXTURES. ARRANGE LIGHTING FIXTURES IN ACCORDANCE WITH THE ARCHITECTURAL REFLECTED CEILING PLANS UNLESS OTHERWISE INDICATED. COORDINATE LIGHTING FIXTURE LOCATIONS WITH GRILLES, DIFFUSERS, ACCESS PANELS, ETC. VERIFY CEILING AND WALL CONSTRUCTION AND MATERIAL PRIOR TO ORDERING LIGHTING FIXTURES OR OTHER DEVICES TO ENSURE PROPER FIXTURE OR DEVICE IS FURNISHED TO MATCH CONSTRUCTION. THIS VERIFICATION MUST BE EXECUTED REGARDLESS OF INFORMATION PLACED ON THE DRAWINGS. ANY COST INCURRED WHICH IN THE OPINION OF THE OWNER, COULD HAVE BEEN AVOIDED BY THIS STEP SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.
N. GUARANTEE OF WORK - CONTRACTOR GUARANTEES BY HIS ACCEPTANCE OF THE CONTRACT THAT ALL WORK INSTALLED IS FREE FROM ANY AND ALL DEFECTS IN WORKMANSHIP AND/OR MATERIALS, AND THAT THE APPARATUS WILL DEVELOP CAPACITIES AND CHARACTERISTICS SPECIFIED, AND THAT IF, DURING THE PERIOD OF ONE YEAR OR AS OTHERWISE SPECIFIED, FROM DATE OF CERTIFICATE OF COMPLETION AND ACCEPTANCE OF THE WORK ANY SUCH DEFECTS IN WORKMANSHIP, MATERIAL OR PERFORMANCE APPEAR, HE WILL, WITHOUT COST TO THE OWNER, REMEDY SUCH DEFECTS WITHIN A REASONABLE TIME TO BE SPECIFIED IN NOTICE. IN DEFAULT THEREOF, THE OWNER MAY HAVE SUCH WORK DONE AND CHARGE COST TO CONTRACTOR. EQUIPMENT GUARANTEES FROM DATE OF "START-UP" WILL NOT BE RECOGNIZED.
O. ALL ELECTRICAL WORK SHALL BE INSTALLED TO MAINTAIN ALL CLEARANCES AS DEFINED IN ARTICLE NEC 110.26 AND ITS SUBSEQUENT SUBSECTIONS. NO DUCT, CONDUIT, PIPE, ETC. NOT DIRECTLY ASSOCIATED WITH THAT PIECE OF ELECTRICAL EQUIPMENT SHALL BE LOCATED IN THE CLEARANCE SPACE AS DEFINED BY THE NEC. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF OTHER TRADES TO MAINTAIN THESE CLEARANCES.

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

GENERAL

A. SUBMITTALS
1. PRODUCT DATA: FOR EACH TYPE OF PRODUCT.

PRODUCTS

A. COPPER BUILDING WIRE
1. DESCRIPTION: FLEXIBLE, INSULATED AND UNINSULATED, DRAWN COPPER CURRENT-CARRYING CONDUCTOR WITH AN OVERALL INSULATION LAYER OR JACKET, OR BOTH, RATED 600 V OR LESS.
2. CONDUCTOR INSULATION:
a. TYPE THHN AND TYPE THWN-2: COMPLY WITH UL 83.
b. TYPE XHHW-2: COMPLY WITH UL 44.

B. METAL-CLAD CABLE, TYPE MC
1. DESCRIPTION: A FACTORY ASSEMBLY OF ONE OR MORE CURRENT-CARRYING INSULATED CONDUCTORS IN AN OVERALL METALLIC SHEATH.
2. STANDARDS:
a. LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND USE.
b. COMPLY WITH UL 1569.
3. GROUND CONDUCTOR SHALL BE INSULATED. CONDUCTOR INSULATION TYPE THHN/THWN-2 SHALL COMPLY WITH UL 83. CONDUCTOR INSULATION TYPE XHHW-2 SHALL COMPLY WITH UL 44.
4. ARMOR SHALL BE STEEL OR ALUMINUM, INTERLOCKED. JACKET SHALL BE PVC APPLIED OVER ARMOR.

C. CONNECTORS AND SPLICES
1. DESCRIPTION: FACTORY-FABRICATED CONNECTORS, SPLICES, AND LUGS OF SIZE, AMPACITY RATING, MATERIAL, TYPE, AND CLASS FOR APPLICATION AND SERVICE INDICATED; LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND USE.
2. JACKETED CABLE CONNECTORS: FOR STEEL AND ALUMINUM JACKETED CABLES, ZINC DIE-CAST WITH SET SCREWS, DESIGNED TO CONNECT CONDUCTORS SPECIFIED IN THIS SECTION.
3. LUGS: ONE PIECE, SEAMLESS, DESIGNED TO TERMINATE CONDUCTORS SPECIFIED IN THIS SECTION. MATERIAL SHALL BE COPPER. TYPE SHALL BE ONE OR TWO HOLE WITH STANDARD OR LONG BARRELS. TERMINATIONS SHALL BE COMPRESSION.

EXECUTION

A. CONDUCTOR MATERIAL APPLICATIONS
1. FEEDERS: COPPER. CONDUCTORS SHALL BE SOLID OR STRANDED FOR NO. 10 AWG AND SMALLER; STRANDED FOR NO. 8 AWG AND LARGER.
2. BRANCH CIRCUITS: COPPER. SOLID OR STRANDED FOR NO. 10 AWG AND SMALLER; STRANDED FOR NO. 8 AWG AND LARGER. WIRE SMALLER THAN NO. 12 AWG SHALL NOT BE USED FOR LIGHTING AND POWER CIRCUITS.
3. POWER-LIMITED FIRE ALARM AND CONTROL: SOLID FOR NO. 12 AWG AND SMALLER.

B. CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS
1. SERVICE ENTRANCE: TYPE THHN-THWN OR XHHW-2, SINGLE CONDUCTORS IN RACEWAY.
2. FEEDERS AND BRANCH CIRCUITING: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.
3. METAL-CLAD CABLE, TYPE MC, SHALL BE PERMISSIBLE WHERE INSTALLED AS BRANCH CIRCUITING CONCEALED IN ACCESSIBLE CEILINGS, WALLS, AND PARTITIONS, OR WHERE INSTALLED BELOW RAISED FLOORING.

C. INSTALLATION OF CONDUCTORS AND CABLES
1. CONCEAL CABLES IN FINISHED WALLS, CEILINGS, AND FLOORS UNLESS OTHERWISE INDICATED.
2. USE MANUFACTURER-APPROVED PULLING COMPOUND OR LUBRICANT WHERE NECESSARY; COMPOUND USED MUST NOT DETERIORATE CONDUCTOR OR INSULATION. DO NOT EXCEED MANUFACTURER'S RECOMMENDED MAXIMUM PULLING TENSIONS AND SIDEWALL PRESSURE VALUES.
3. INSTALL EXPOSED CABLES PARALLEL AND PERPENDICULAR TO SURFACES OF EXPOSED STRUCTURAL MEMBERS, AND FOLLOW SURFACE CONTOURS WHERE POSSIBLE.
4. METAL CLAD CABLING SHALL BE SECURED EVERY SIX FEET AND WITHIN 12 INCHES OF EVERY BOX OR TERMINATION AS REQUIRED BY CODE. INSTALLATION OF METAL CLAD CABLING SHALL BE DONE IN A NEAT AND WORKMANLIKE MANNER AND FOLLOW OR BE PERPENDICULAR TO BUILDING LINES.
5. EACH DESIGNED CIRCUIT HOMERUN SHALL HAVE ITS OWN INDIVIDUAL GROUND CONDUCTOR. CONDUIT SHALL NOT BE USED A GROUND CONDUCTOR.

D. CONNECTIONS
1. TIGHTEN ELECTRICAL CONNECTORS AND TERMINALS ACCORDING TO MANUFACTURER'S PUBLISHED TORQUE-TIGHTENING VALUES. IF MANUFACTURER'S TORQUE VALUES ARE NOT INDICATED, USE THOSE SPECIFIED IN UL 486A-486B.
2. MAKE SPLICES, TERMINATIONS, AND TAPS THAT ARE COMPATIBLE WITH CONDUCTOR MATERIAL AND THAT POSSESS EQUIVALENT OR BETTER MECHANICAL STRENGTH AND INSULATION RATINGS THAN UNSPLICED CONDUCTORS.
3. WIRING AT OUTLETS: INSTALL CONDUCTOR AT EACH OUTLET, WITH AT LEAST 6 INCHES OF SLACK.
4. PUSH-ON WIRE CONNECTORS, OTHER THAN FOR LUMINAIRE DISCONNECTS, ARE NOT PERMITTED.
5. ALL EXTERIOR WIRING CONNECTIONS, AND THOSE MADE AT OR BELOW GRADE SHALL BE WATERPROOF WITH UL LISTED WATERPROOF CONNECTORS.
6. COPPER CONDUCTORS #10 AWG AND SMALLER SHALL BE TERMINATED AND SPLICED WITH WIRE NUT CONNECTORS. THE NYLON SELF_INSULATED TYPE SHALL BE USED TO ISOLATE THE TERMINATION FROM OTHER METAL PARTS AND EQUIPMENT.
7. COPPER CONDUCTORS #8 AWG AND LARGER SHALL BE TERMINATED, SPLICED, AND TAPPED WITH COLOR_KEYED COMPRESSION CONNECTORS. THE MANUFACTURERS RECOMMENDED TOOLS AND DIES SHALL BE USED.
8. COPPER CABLE LUG CONNECTIONS #8 AND LARGER TO COPPER BUS BAR MAINS AND BRANCHES SHALL USE COPPER SOLDERLESS CONNECTORS HAVING EITHER 2_BOLT CAST COPPER CLAMPS OR COMPRESSION CONNECTORS, WITH MANUFACTURER'S RECOMMENDED HEXAGONAL DIES AND HYDRAULIC COMPRESSION TOOLS.
9. PLENUM RATED CABLE OR WIRING IN METAL CONDUIT SHALL BE UTILIZED IN ALL PLENUM RATED SPACES.
10. WHERE AC CABLE IS PERMITTED FOR INSTALL AND INSTALLED IN ACCESSIBLE ATTICS, THE INSTALLATION SHALL FOLLOW ALL GUIDELINES OF NEC 320.23.

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

GENERAL

A. SUBMITTALS
1. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.

PRODUCTS

A. SYSTEM DESCRIPTION
1. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.
2. COMPLY WITH UL 467 FOR GROUNDING AND BONDING MATERIALS AND EQUIPMENT.

B. CONDUCTORS
1. INSULATED CONDUCTORS: COPPER OR TINNED-COPPER WIRE OR CABLE INSULATED FOR 600 V UNLESS OTHERWISE REQUIRED BY APPLICABLE CODE OR AUTHORITIES HAVING JURISDICTION.
2. GROUNDING BUS: PREDRILLED RECTANGULAR BARS OF ANNEALED COPPER, 1/4 BY 4 INCHES IN CROSS SECTION, WITH 9/32-INCH HOLES SPACED 1-1/8 INCHES APART. STAND-OFF INSULATORS FOR MOUNTING SHALL COMPLY WITH UL 891 FOR USE IN SWITCHBOARDS, 600 V AND SHALL BE LEXAN OR PVC, IMPULSE TESTED AT 5000 V. MINIMUM SIZE SHALL BE 24" IN LENGTH.

C. CONNECTORS
1. LISTED AND LABELED BY AN NRTL ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION FOR APPLICATIONS IN WHICH USED AND FOR SPECIFIC TYPES, SIZES, AND COMBINATIONS OF CONDUCTORS AND OTHER ITEMS CONNECTED.

D. GROUNDING ELECTRODES
1. GROUND RODS: COPPER-CLAD STEEL; 3/4 INCH BY 10 FEET.
2. GROUND PLATES: 1/4 INCH THICK, HOT-DIP GALVANIZED.

EXECUTION

A. APPLICATIONS
1. CONDUCTORS: INSTALL SOLID CONDUCTOR FOR NO. 8 AWG AND SMALLER, AND STRANDED CONDUCTORS FOR NO. 6 AWG AND LARGER UNLESS OTHERWISE INDICATED.
2. UNDERGROUND GROUNDING CONDUCTORS: INSTALL BARE COPPER CONDUCTOR, NO. 3/0 AWG MINIMUM. BURY AT LEAST 24 INCHES BELOW GRADE.
3. ISOLATED GROUNDING CONDUCTORS: GREEN-COLORED INSULATION WITH CONTINUOUS YELLOW STRIPE. ON FEEDERS WITH ISOLATED GROUND, IDENTIFY GROUNDING CONDUCTOR WHERE VISIBLE TO NORMAL INSPECTION, WITH ALTERNATING BANDS OF GREEN AND YELLOW TAPE, WITH AT LEAST THREE BANDS OF GREEN AND TWO BANDS OF YELLOW.
4. GROUNDING BUS: INSTALL IN ELECTRICAL EQUIPMENT ROOMS, IN ROOMS HOUSING SERVICE EQUIPMENT, IN ALL IDF AND MDF ROOMS, AND ELSEWHERE AS INDICATED.
a. INSTALL BUS HORIZONTALLY, ON INSULATED SPACERS 2 INCHES MINIMUM FROM WALL, 6 INCHES ABOVE FINISHED FLOOR UNLESS OTHERWISE INDICATED.
b. WHERE INDICATED ON BOTH SIDES OF DOORWAYS, ROUTE BUS UP TO TOP OF DOOR FRAME, ACROSS TOP OF DOORWAY, AND DOWN; CONNECT TO HORIZONTAL BUS.
5. CONDUCTOR TERMINATIONS AND CONNECTIONS:
a. PIPE AND EQUIPMENT GROUNDING CONDUCTOR TERMINATIONS: BOLTED CONNECTORS.
b. UNDERGROUND CONNECTIONS: WELDED CONNECTORS EXCEPT AT TEST WELLS AND AS OTHERWISE INDICATED.
c. CONNECTIONS TO GROUND RODS AT TEST WELLS: BOLTED CONNECTORS.
d. CONNECTIONS TO STRUCTURAL STEEL: WELDED CONNECTORS.

B. GROUNDING AT THE SERVICE
1. EQUIPMENT GROUNDING CONDUCTORS AND GROUNDING ELECTRODE CONDUCTORS SHALL BE CONNECTED TO THE GROUND BUS. INSTALL A MAIN BONDING JUMPER BETWEEN THE NEUTRAL AND GROUND BUSES.

C. EQUIPMENT GROUNDING
1. INSTALL INSULATED EQUIPMENT GROUNDING CONDUCTORS WITH ALL FEEDERS AND BRANCH CIRCUITS.
2. INSTALL INSULATED EQUIPMENT GROUNDING CONDUCTORS WITH THE FOLLOWING ITEMS, IN ADDITION TO THOSE REQUIRED BY NFPA 70:
a. FEEDERS AND BRANCH CIRCUITS.
b. LIGHTING CIRCUITS.
c. RECEPTACLE CIRCUITS.
d. SINGLE-PHASE MOTOR AND APPLIANCE BRANCH CIRCUITS.
e. THREE-PHASE MOTOR AND APPLIANCE BRANCH CIRCUITS.
f. FLEXIBLE RACEWAY RUNS.
g. METAL-CLAD CABLE RUNS.
h. COMPUTER AND RACK-MOUNTED ELECTRONIC EQUIPMENT CIRCUITS: INSTALL INSULATED EQUIPMENT GROUNDING CONDUCTOR IN BRANCH-CIRCUIT RUNS FROM EQUIPMENT-AREA POWER PANELS AND POWER-DISTRIBUTION UNITS.
3. WHERE UNGROUNDED CONDUCTORS ARE INCREASED IN SIZE FROM THE MINIMUM SIZE THAT HAS SUFFICIENT AMPACITY FOR THE INTENDED INSTALLATION, THE EQUIPMENT GROUNDING CONDUCTOR SHALL BE INCREASED PER NEC 250.122(B).

D. INSTALLATION
1. GROUNDING CONDUCTORS: ROUTE ALONG SHORTEST AND STRAIGHTEST PATHS POSSIBLE UNLESS OTHERWISE INDICATED OR REQUIRED BY CODE. AVOID OBSTRUCTING ACCESS OR PLACING CONDUCTORS WHERE THEY MAY BE SUBJECTED TO STRAIN, IMPACT, OR DAMAGE.
2. GROUND RODS: DRIVE RODS UNTIL TOPS ARE 6 INCHES BELOW FINISHED FLOOR OR FINAL GRADE UNLESS OTHERWISE INDICATED.
a. INTERCONNECT GROUND RODS WITH GROUNDING ELECTRODE CONDUCTOR BELOW GRADE AND AS OTHERWISE INDICATED. MAKE CONNECTIONS WITHOUT EXPOSING STEEL OR DAMAGING COATING IF ANY.
b. USE EXOTHERMIC WELDS FOR ALL BELOW-GRADE CONNECTIONS.
c. FOR GROUNDING ELECTRODE SYSTEM, INSTALL AT LEAST THREE RODS SPACED AT LEAST ONE-ROD LENGTH FROM EACH OTHER AND LOCATED AT LEAST THE SAME DISTANCE FROM OTHER GROUNDING ELECTRODES, AND CONNECT TO THE SERVICE GROUNDING ELECTRODE CONDUCTOR. SYSTEM SHALL MEET REQUIREMENTS OF NEC 250.52 AND 250.53.
3. TEST WELLS: GROUND ROD DRIVEN THROUGH DRILLED HOLE IN BOTTOM OF HANDHOLE. HANDHOLES SHALL BE AT LEAST 12 INCHES DEEP, WITH COVER.
a. INSTALL AT LEAST ONE TEST WELL FOR EACH SERVICE UNLESS OTHERWISE INDICATED. INSTALL AT THE GROUND ROD ELECTRICALLY CLOSEST TO SERVICE ENTRANCE. SET TOP OF TEST WELL FLUSH WITH FINISHED GRADE OR FLOOR.
4. BONDING STRAPS AND JUMPERS: INSTALL IN LOCATIONS ACCESSIBLE FOR INSPECTION AND MAINTENANCE EXCEPT WHERE ROUTED THROUGH SHORT LENGTHS OF CONDUIT.
a. BONDING TO STRUCTURE: BOND STRAPS DIRECTLY TO BASIC STRUCTURE, TAKING CARE NOT TO PENETRATE ANY ADJACENT PARTS.
b. BONDING TO EQUIPMENT MOUNTED ON VIBRATION ISOLATION HANGERS AND SUPPORTS: INSTALL BONDING SO VIBRATION IS NOT TRANSMITTED TO RIGIDLY MOUNTED EQUIPMENT.
c. USE EXOTHERMIC-WELDED CONNECTORS FOR OUTDOOR LOCATIONS; IF A DISCONNECT-TYPE CONNECTION IS REQUIRED, USE A BOLTED CLAMP.
5. GROUNDING AND BONDING FOR PIPING:
a. METAL WATER SERVICE PIPE: INSTALL INSULATED COPPER GROUNDING CONDUCTORS, IN PVC CONDUIT OR METAL CONDUIT WHERE GROUND WIRE IS TIED TO CONDUIT, FROM BUILDING'S MAIN SERVICE EQUIPMENT, OR GROUNDING BUS, TO MAIN METAL WATER SERVICE ENTRANCES TO BUILDING. CONNECT GROUNDING CONDUCTORS TO MAIN METAL WATER SERVICE PIPES; USE A BOLTED CLAMP CONNECTOR OR BOLT A LUG-TYPE CONNECTOR TO A PIPE FLANGE BY USING ONE OF THE LUG BOLTS OF THE FLANGE. WHERE A DIELECTRIC MAIN WATER FITTING IS INSTALLED, CONNECT GROUNDING CONDUCTOR ON STREET SIDE OF FITTING. BOND METAL GROUNDING CONDUCTOR CONDUIT OR SLEEVE TO CONDUCTOR AT EACH END.
b. WATER METER PIPING: USE BRAIDED-TYPE BONDING JUMPERS TO ELECTRICALLY BYPASS WATER METERS. CONNECT TO PIPE WITH A BOLTED CONNECTOR.
c. BOND EACH ABOVEGROUND PORTION OF GAS PIPING SYSTEM DOWNSTREAM FROM EQUIPMENT SHUTOFF VALVE.
6. BONDING INTERIOR METAL DUCTS: BOND METAL AIR DUCTS TO EQUIPMENT GROUNDING CONDUCTORS OF ASSOCIATED FANS, BLOWERS, ELECTRIC HEATERS, AND AIR CLEANERS. INSTALL TINNED BONDING JUMPER TO BOND ACROSS FLEXIBLE DUCT CONNECTIONS TO ACHIEVE CONTINUITY.
7. GROUNDING FOR STEEL BUILDING STRUCTURE: INSTALL A DRIVEN GROUND ROD AT BASE OF EACH CORNER COLUMN AND AT INTERMEDIATE EXTERIOR COLUMNS AT DISTANCES NOT MORE THAN 60 FEET APART.
8. CONNECTIONS: MAKE CONNECTIONS SO POSSIBILITY OF GALVANIC ACTION OR ELECTROLYSIS IS MINIMIZED. SELECT CONNECTORS, CONNECTION HARDWARE, CONDUCTORS, AND CONNECTION METHODS SO METALS IN DIRECT CONTACT ARE GALVANICALLY COMPATIBLE.
a. USE ELECTROPLATED OR HOT-TIN-COATED MATERIALS TO ENSURE HIGH CONDUCTIVITY AND TO MAKE CONTACT POINTS CLOSER IN ORDER OF GALVANIC SERIES.
b. MAKE CONNECTIONS WITH CLEAN, BARE METAL AT POINTS OF CONTACT.
c. MAKE ALUMINUM-TO-STEEL CONNECTIONS WITH STAINLESS-STEEL SEPARATORS AND MECHANICAL CLAMPS.
d. MAKE ALUMINUM-TO-GALVANIZED-STEEL CONNECTIONS WITH TIN-PLATED COPPER JUMPERS AND MECHANICAL CLAMPS.
e. COAT AND SEAL CONNECTIONS HAVING DISSIMILAR METALS WITH INERT MATERIAL TO PREVENT FUTURE PENETRATION OF MOISTURE TO CONTACT SURFACES.

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

GENERAL

A. ACTION SUBMITTALS
1. PRODUCT DATA: FOR SURFACE RACEWAYS, WIREWAYS AND FITTINGS, FLOOR BOXES, HINGED-COVER ENCLOSURES, AND CABINETS.

PRODUCTS

A. METAL CONDUITS AND FITTINGS
1. METAL CONDUIT:
a. LISTING AND LABELING: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.
b. GRC: COMPLY WITH ANSI C80.1.
c. IMC: COMPLY WITH ANSI C80.6.
d. PVC-COATED STEEL CONDUIT: PVC-COATED RIGID STEEL CONDUIT IMC. COMPLY WITH NEMA RN 1.
e. EMT: COMPLY WITH ANSI C80.3.
f. FMC: COMPLY WITH UL 1; ZINC-COATED STEEL OR ALUMINUM.
g. LFMC: FLEXIBLE STEEL CONDUIT WITH PVC JACKET AND COMPLYING WITH UL 360.
2. METAL FITTINGS:
a. COMPLY WITH NEMA FB 1 AND UL 514B.
b. LISTING AND LABELING: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.
c. FITTINGS, GENERAL: LISTED AND LABELED FOR TYPE OF CONDUIT, LOCATION, AND USE.
d. CONDUIT FITTINGS FOR HAZARDOUS (CLASSIFIED) LOCATIONS: COMPLY WITH UL 1203 AND NFPA 70.
e. FITTINGS FOR EMT: MATERIAL: STEEL OR DIE CAST. TYPE: COMPRESSION.
f. EXPANSION FITTINGS: PVC OR STEEL TO MATCH CONDUIT TYPE, COMPLYING WITH UL 651, RATED FOR ENVIRONMENTAL CONDITIONS WHERE INSTALLED, AND INCLUDING FLEXIBLE EXTERNAL BONDING JUMPER.
g. COATING FOR FITTINGS FOR PVC-COATED CONDUIT: MINIMUM THICKNESS OF 0.040 INCH, WITH OVERLAPPING SLEEVES PROTECTING THREADED JOINTS.
3. JOINT COMPOUND FOR IMC, GRC, OR ARC: APPROVED, AS DEFINED IN NFPA 70, BY AUTHORITIES HAVING JURISDICTION FOR USE IN CONDUIT ASSEMBLIES, AND COMPOUNDED FOR USE TO LUBRICATE AND PROTECT THREADED CONDUIT JOINTS FROM CORROSION AND TO ENHANCE THEIR CONDUCTIVITY.

B. NONMETALLIC CONDUITS AND FITTINGS
1. NONMETALLIC CONDUIT:
a. LISTING AND LABELING: NONMETALLIC CONDUIT SHALL BE LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.
b. FIBERGLASS: COMPLY WITH NEMA TC 14. COMPLY WITH UL 2515 FOR ABOVEGROUND RACEWAYS. COMPLY WITH UL 2420 FOR BELOWGROUND RACEWAYS.
c. ENT: COMPLY WITH NEMA TC 13.
d. RNC: TYPE EPC-80-PVC, COMPLYING WITH NEMA TC 2 AND UL 651 UNLESS OTHERWISE INDICATED.
e. LFNC: COMPLY WITH UL 1660.
2. NONMETALLIC FITTINGS:
a. FITTINGS, GENERAL: LISTED AND LABELED FOR TYPE OF CONDUIT, LOCATION, AND USE.
b. FITTINGS FOR ENT AND RNC: COMPLY WITH NEMA TC 3; MATCH TO CONDUIT OR TUBING TYPE AND MATERIAL. FITTINGS FOR LFNC: COMPLY WITH UL 514B.

C. METAL WIREWAYS AND AUXILIARY GUTTERS
1. DESCRIPTION: SHEET METAL, COMPLYING WITH UL 870 AND NEMA 250, TYPE 1, TYPE 3R, OR TYPE 4 UNLESS OTHERWISE INDICATED, AND SIZED ACCORDING TO NFPA 70.
a. METAL WIREWAYS INSTALLED OUTDOORS SHALL BE LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.
2. FITTINGS AND ACCESSORIES: INCLUDE COVERS, COUPLINGS, OFFSETS, ELBOWS, EXPANSION JOINTS, ADAPTERS, HOLD-DOWN STRAPS, END CAPS, AND OTHER FITTINGS TO MATCH AND MATE WITH WIREWAYS AS REQUIRED FOR COMPLETE SYSTEM.
3. WIREWAY COVERS: HINGED TYPE SCREW-COVER TYPE FLANGED-AND-GASKETED TYPE UNLESS OTHERWISE INDICATED.
4. FINISH: MANUFACTURER'S STANDARD ENAMEL FINISH.

D. SURFACE RACEWAYS
1. LISTING AND LABELING: SURFACE RACEWAYS AND TELE-POWER POLES SHALL BE LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.
2. SURFACE METAL RACEWAYS: GALVANIZED STEEL WITH SNAP-ON COVERS COMPLYING WITH UL 5. MANUFACTURER'S STANDARD ENAMEL FINISH IN COLOR SELECTED BY ARCHITECT.

E. BOXES, ENCLOSURES, AND CABINETS
1. GENERAL REQUIREMENTS FOR BOXES, ENCLOSURES, AND CABINETS: BOXES, ENCLOSURES, AND CABINETS INSTALLED IN WET LOCATIONS SHALL BE LISTED FOR USE IN WET LOCATIONS.
2. BOXES FOR CEILING FANS SHALL MEET NEC 314.27(C).
3. SHEET METAL OUTLET AND DEVICE BOXES: COMPLY WITH NEMA OS 1 AND UL 514A.
4. CAST-METAL OUTLET AND DEVICE BOXES: COMPLY WITH NEMA FB 1, FERROUS ALLOY ALUMINUM, TYPE FD, WITH GASKETED COVER.
5. NONMETALLIC OUTLET AND DEVICE BOXES: COMPLY WITH NEMA OS 2 AND UL 514C.
6. METAL FLOOR BOXES: MATERIAL: CAST METAL OR SHEET METAL. TYPE: FULLY ADJUSTABLE. SHAPE: RECTANGULAR.
7. LUMINAIRE OUTLET BOXES: NONADJUSTABLE, DESIGNED FOR ATTACHMENT OF LUMINAIRE WEIGHING 50 LB. OUTLET BOXES DESIGNED FOR ATTACHMENT OF LUMINAIRES WEIGHING MORE THAN 50 LB SHALL BE LISTED AND MARKED FOR THE MAXIMUM ALLOWABLE WEIGHT.
8. SMALL SHEET METAL PULL AND JUNCTION BOXES: NEMA OS 1.
9. CAST-METAL ACCESS, PULL, AND JUNCTION BOXES: COMPLY WITH NEMA FB 1 AND UL 1773, CAST ALUMINUM OR GALVANIZED, CAST IRON WITH GASKETED COVER. PULL BOXES SHALL BE SIZED PER 314.28.
10. BOX EXTENSIONS USED TO ACCOMMODATE NEW BUILDING FINISHES SHALL BE OF SAME MATERIAL AS RECESSED BOX.
11. DEVICE BOX DIMENSIONS: 4 INCHES SQUARE BY 2-1/8 INCHES DEEP OR 4 INCHES BY 2-1/8 INCHES BY 2-1/8 INCHES DEEP.
12. GANGABLE BOXES ARE PROHIBITED.
13. HINGED-COVER ENCLOSURES: COMPLY WITH UL 50 AND NEMA 250, TYPE 1 TYPE 3R TYPE 4 WITH CONTINUOUS-HINGE COVER WITH FLUSH LATCH UNLESS OTHERWISE INDICATED.
a. METAL ENCLOSURES: STEEL, FINISHED INSIDE AND OUT WITH MANUFACTURER'S STANDARD ENAMEL.
b. NONMETALLIC ENCLOSURES: FIBERGLASS.
c. INTERIOR PANELS: STEEL; ALL SIDES FINISHED WITH MANUFACTURER'S STANDARD ENAMEL.
14. CABINETS:
NEMA 250, TYPE 1 TYPE 3R TYPE 12 GALVANIZED-STEEL BOX WITH REMOVABLE INTERIOR PANEL AND REMOVABLE FRONT, FINISHED INSIDE AND OUT WITH MANUFACTURER'S STANDARD ENAMEL. HINGED DOOR IN FRONT COVER WITH FLUSH LATCH AND CONCEALED HINGE. KEY LATCH TO MATCH PANELBOARDS. METAL BARRIERS TO SEPARATE WIRING OF DIFFERENT SYSTEMS AND VOLTAGE. ACCESSORY FEET WHERE REQUIRED FOR FREESTANDING EQUIPMENT.
NONMETALLIC CABINETS SHALL BE LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.
15. PROVIDE SUPPORT FOR ALL BOXES AND CONDUIT PER NEC TABLE 300.19.

F. HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING
1. GENERAL REQUIREMENTS FOR HANDHOLES AND BOXES:
a. BOXES AND HANDHOLES FOR USE IN UNDERGROUND SYSTEMS SHALL BE DESIGNED AND IDENTIFIED AS DEFINED IN NFPA 70, FOR INTENDED LOCATION AND APPLICATION.
b. BOXES INSTALLED IN WET AREAS SHALL BE LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.

EXECUTION

A. RACEWAY APPLICATION
1. OUTDOORS: APPLY RACEWAY PRODUCTS AS SPECIFIED BELOW UNLESS OTHERWISE INDICATED:
a. EXPOSED CONDUIT: GRC, IMC, RNC, TYPE EPC-80-PVC.
b. CONCEALED CONDUIT, ABOVEGROUND: GRC, IMC AND EMT.
c. UNDERGROUND CONDUIT: RNC, TYPE EPC-80-PVC, DIRECT BURIED AND CONCRETE ENCASED WHERE UNDER DRIVES AND PARKING AREAS.
d. CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND HYDRAULIC, PNEUMATIC, ELECTRIC SOLENOID, OR MOTOR-DRIVEN EQUIPMENT): LFMC AND LFNC.
e. BOXES AND ENCLOSURES, ABOVEGROUND: NEMA 250, TYPE 3R AND TYPE 4 OR 4X.
2. INDOORS: APPLY RACEWAY PRODUCTS AS SPECIFIED BELOW UNLESS OTHERWISE INDICATED:
a. EXPOSED, NOT SUBJECT TO PHYSICAL DAMAGE: EMT.
b. EXPOSED, NOT SUBJECT TO SEVERE PHYSICAL DAMAGE: EMT.
c. EXPOSED AND SUBJECT TO SEVERE PHYSICAL DAMAGE: GRC. RACEWAY LOCATIONS INCLUDE THE FOLLOWING: LOADING DOCK, CORRIDORS USED FOR TRAFFIC OF MECHANIZED CARTS, FORKLIFTS, AND PALLET-HANDLING UNITS, MECHANICAL ROOMS.
d. CONCEALED IN CEILINGS AND INTERIOR WALLS AND PARTITIONS: EMT.
e. CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND HYDRAULIC, PNEUMATIC, ELECTRIC SOLENOID, OR MOTOR-DRIVEN EQUIPMENT): FMC, EXCEPT USE LFMC IN DAMP OR WET LOCATIONS.
f. DAMP OR WET LOCATIONS: GRC.
g. BOXES AND ENCLOSURES: NEMA 250, TYPE 1, EXCEPT USE NEMA 250, TYPE 4 STAINLESS STEEL IN INSTITUTIONAL AND COMMERCIAL KITCHENS AND DAMP OR WET LOCATIONS.
3. MINIMUM RACEWAY SIZE: 3/4-INCH TRADE SIZE.
4. RACEWAY FITTINGS: COMPATIBLE WITH RACEWAYS AND SUITABLE FOR USE AND LOCATION.
a. RIGID AND INTERMEDIATE STEEL CONDUIT: USE THREADED RIGID STEEL CONDUIT FITTINGS UNLESS OTHERWISE INDICATED. COMPLY WITH NEMA FB 2.10.
b. PVC EXTERNALLY COATED, RIGID STEEL CONDUITS: USE ONLY FITTINGS LISTED FOR USE WITH THIS TYPE OF CONDUIT. PATCH AND SEAL ALL JOINTS, NICKS, AND SCRAPES IN PVC COATING AFTER INSTALLING CONDUITS AND FITTINGS. USE SEALANT RECOMMENDED BY FITTING MANUFACTURER AND APPLY IN THICKNESS AND NUMBER OF COATS RECOMMENDED BY MANUFACTURER.
c. EMT: USE SETSCREW, STEEL FITTINGS. COMPLY WITH NEMA FB 2.10.
d. FLEXIBLE CONDUIT: USE ONLY FITTINGS LISTED FOR USE WITH FLEXIBLE CONDUIT. COMPLY WITH NEMA FB 2.20.
5. DO NOT INSTALL ALUMINUM CONDUITS, BOXES, OR FITTINGS IN CONTACT WITH CONCRETE OR EARTH.
6. INSTALL SURFACE RACEWAYS ONLY WHERE INDICATED ON DRAWINGS.

B. INSTALLATION
1. COMPLY WITH NECA 1 AND NECA 101 FOR INSTALLATION REQUIREMENTS EXCEPT WHERE REQUIREMENTS ON DRAWINGS OR IN THIS ARTICLE ARE STRICTER. COMPLY WITH NECA 102 FOR ALUMINUM CONDUITS. COMPLY WITH NFPA 70 LIMITATIONS FOR TYPES OF RACEWAYS ALLOWED IN SPECIFIC OCCUPANCIES AND NUMBER OF FLOORS.
2. KEEP RACEWAYS AT LEAST 6 INCHES AWAY FROM PARALLEL RUNS OF FLUES AND STEAM OR HOT-WATER PIPES. INSTALL HORIZONTAL RACEWAY RUNS ABOVE WATER AND STEAM PIPING.
3. ARRANGE STUB-UPS SO CURVED PORTIONS OF BENDS ARE NOT VISIBLE ABOVE FINISHED SLAB.
4. INSTALL NO MORE THAN THE EQUIVALENT OF THREE 90-DEGREE BENDS IN ANY CONDUIT RUN EXCEPT FOR CONTROL WIRING CONDUITS, FOR WHICH FEWER BENDS ARE ALLOWED. SUPPORT WITHIN 12 INCHES OF CHANGES IN DIRECTION.
5. CONCEAL CONDUIT AND EMT WITHIN FINISHED WALLS, CEILINGS, AND FLOORS UNLESS OTHERWISE INDICATED. INSTALL CONDUITS PARALLEL OR PERPENDICULAR TO BUILDING LINES.
6. SUPPORT CONDUIT WITHIN 12 INCHES OF ENCLOSURES TO WHICH ATTACHED.
7. ALL JUNCTION BOXES SHALL REMAIN ACCESSIBLE PER NEC REQUIREMENTS.
8. RACEWAYS EMBEDDED IN SLABS:
RUN CONDUIT LARGER THAN 1-INCH TRADE SIZE, PARALLEL OR AT RIGHT ANGLES TO MAIN REINFORCEMENT. WHERE AT RIGHT ANGLES TO REINFORCEMENT, PLACE CONDUIT CLOSE TO SLAB SUPPORT. SECURE RACEWAYS TO REINFORCEMENT AT MAXIMUM 10-FOOTINTERVALS. ARRANGE RACEWAYS TO CROSS BUILDING EXPANSION JOINTS AT RIGHT ANGLES WITH EXPANSION FITTINGS. ARRANGE RACEWAYS TO KEEP A MINIMUM OF 3 INCHES OF CONCRETE COVER IN ALL DIRECTIONS.
DO NOT EMBED THREADLESS FITTINGS IN CONCRETE UNLESS SPECIFICALLY APPROVED BY ARCHITECT FOR EACH SPECIFIC LOCATIONS. SOME AUTHORITIES HAVING JURISDICTION MAY NOT PERMIT NONMETALLIC TUBING IN FIRE-RATED SLABS IN SUBPARAGRAPH BELOW. CHANGE FROM ENT TO GRC OR IMC BEFORE RISING ABOVE FLOOR.
9. STUB-UPS TO ABOVE RECESSED CEILINGS: USE EMT, IMC, OR RMC FOR RACEWAYS.
USE A CONDUIT BUSHING OR INSULATED FITTING TO TERMINATE STUB-UPS NOT TERMINATED IN HUBS OR IN AN ENCLOSURE.
10. THREADED CONDUIT JOINTS, EXPOSED TO WET, DAMP, CORROSIVE, OR OUTDOOR CONDITIONS: APPLY LISTED COMPOUND TO THREADS OF RACEWAY AND FITTINGS BEFORE MAKING UP JOINTS. FOLLOW COMPOUND MANUFACTURER'S WRITTEN INSTRUCTIONS.
11. COAT FIELD-CUT THREADS ON PVC-COATED RACEWAY WITH A CORROSION-PREVENTING CONDUCTIVE COMPOUND PRIOR TO ASSEMBLY.
12. RACEWAY TERMINATIONS AT LOCATIONS SUBJECT TO MOISTURE OR VIBRATION: USE INSULATING BUSHINGS TO PROTECT CONDUCTORS INCLUDING CONDUCTORS SMALLER THAN NO. 4 AWG.
13. TERMINATE THREADED CONDUITS INTO THREADED HUBS OR WITH LOCKNUTS ON INSIDE AND OUTSIDE OF BOXES OR CABINETS. INSTALL BUSHINGS ON CONDUITS UP TO 1-1/4-INCH TRADE SIZE AND INSULATED THROAT METAL BUSHINGS ON 1-1/2-INCH TRADE SIZE AND LARGER CONDUITS TERMINATED WITH LOCKNUTS. INSTALL INSULATED THROAT METAL GROUNDING BUSHINGS ON SERVICE CONDUITS.
14. INSTALL RACEWAYS SQUARE TO THE ENCLOSURE AND TERMINATE AT ENCLOSURES WITH LOCKNUTS. INSTALL LOCKNUTS HAND TIGHT PLUS 1/4 TURN MORE.
15. DO NOT RELY ON LOCKNUTS TO PENETRATE NONCONDUCTIVE COATINGS ON ENCLOSURES. REMOVE COATINGS IN THE LOCKNUT AREA PRIOR TO ASSEMBLING CONDUIT TO ENCLOSURE TO ASSURE A CONTINUOUS GROUND PATH.
16. CUT CONDUIT PERPENDICULAR TO THE LENGTH. FOR CONDUITS 2-INCH TRADE SIZE AND LARGER, USE ROLL CUTTER OR A GUIDE TO MAKE CUT STRAIGHT AND PERPENDICULAR TO THE LENGTH.
17. INSTALL PULL WIRES IN EMPTY RACEWAYS.
18. FLEXIBLE CONDUIT CONNECTIONS: COMPLY WITH NEMA RV 3. USE A MAXIMUM OF 72 INCHES OF FLEXIBLE CONDUIT FOR EQUIPMENT SUBJECT TO VIBRATION, NOISE TRANSMISSION, OR MOVEMENT; AND FOR TRANSFORMERS AND MOTORS.
a. USE LFMC IN DAMP OR WET LOCATIONS SUBJECT TO SEVERE PHYSICAL DAMAGE.
b. USE LFMC OR LFNC IN DAMP OR WET LOCATIONS NOT SUBJECT TO SEVERE PHYSICAL DAMAGE.
19. MOUNT BOXES AT HEIGHTS INDICATED ON DRAWINGS. IF MOUNTING HEIGHTS OF BOXES ARE NOT INDIVIDUALLY INDICATED, GIVE PRIORITY TO ADA REQUIREMENTS. INSTALL BOXES WITH HEIGHT MEASURED TO CENTER OF BOX UNLESS OTHERWISE INDICATED.
20. RECESSED BOXES IN MASONRY WALLS: SAW-CUT OPENING FOR BOX IN CENTER OF CELL OF MASONRY BLOCK, AND INSTALL BOX FLUSH WITH SURFACE OF WALL. PREPARE BLOCK SURFACES TO PROVIDE A FLAT SURFACE FOR A RAINTIGHT CONNECTION BETWEEN BOX AND COVER PLATE OR SUPPORTED EQUIPMENT AND BOX.
21. HORIZONTALLY SEPARATE BOXES MOUNTED ON OPPOSITE SIDES OF WALLS SO THEY ARE NOT IN THE SAME VERTICAL CHANNEL.
22. LOCATE BOXES SO THAT COVER OR PLATE WILL NOT SPAN DIFFERENT BUILDING FINISHES.
23. SUPPORT BOXES OF THREE GANGS OR MORE FROM MORE THAN ONE SIDE BY SPANNING TWO FRAMING MEMBERS OR MOUNTING ON BRACKETS SPECIFICALLY DESIGNED FOR THE PURPOSE.
24. FASTEN JUNCTION AND PULL BOXES TO OR SUPPORT FROM BUILDING STRUCTURE. DO NOT SUPPORT BOXES BY CONDUITS.

WIRING DEVICES

GENERAL

A. SUBMITTALS
1. PRODUCT DATA: FOR EACH TYPE OF PRODUCT.

PRODUCTS

A. GENERAL WIRING-DEVICE REQUIREMENTS
1. WIRING DEVICES, COMPONENTS, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.
2. DEVICES THAT ARE MANUFACTURED FOR USE WITH MODULAR PLUG-IN CONNECTORS MAY BE SUBSTITUTED UNDER THE FOLLOWING CONDITIONS:
3. CONNECTORS SHALL COMPLY WITH UL 2459 AND SHALL BE MADE WITH STRANDING BUILDING WIRE.
4. DEVICES SHALL COMPLY WITH THE REQUIREMENTS IN THIS SECTION.
5. DEVICES FOR OWNER-FURNISHED EQUIPMENT: RECEPTACLES: MATCH PLUG CONFIGURATIONS. CORD AND PLUG SETS: MATCH EQUIPMENT REQUIREMENTS.
6. SOURCE LIMITATIONS: OBTAIN EACH TYPE OF WIRING DEVICE AND ASSOCIATED WALL PLATE FROM SINGLE SOURCE FROM SINGLE MANUFACTURER. ACCEPTABLE MANUFACTURERS ARE EATON, HUBBELL, PASS & SEYMOUR, AND LEVITON, UNLESS OTHERWISE NOTED.

B. STRAIGHT-BLADE RECEPTACLES
1. DUPLEX CONVENIENCE RECEPTACLES: 125 V, 20 A; COMPLY WITH NEMA WD 1, NEMA WD 6 CONFIGURATION 5-20R, UL 498, AND FS W-C-596.
2. ISOLATED-GROUND, DUPLEX CONVENIENCE RECEPTACLES: 125 V, 20 A; COMPLY WITH NEMA WD 1, NEMA WD 6 CONFIGURATION 5-20R, UL 498, AND FS W-C-596.
a. DESCRIPTION: STRAIGHT BLADE; EQUIPMENT GROUNDING CONTACTS SHALL BE CONNECTED ONLY TO THE GREEN GROUNDING SCREW TERMINAL OF THE DEVICE AND WITH INHERENT ELECTRICAL ISOLATION FROM MOUNTING STRAP. ISOLATION SHALL BE INTEGRAL TO RECEPTACLE CONSTRUCTION AND NOT DEPENDENT ON REMOVABLE PARTS.

C. USB CHARGER DEVICES
1. TAMPER-RESISTANT, USB CHARGER RECEPTACLES: 12 V DC, 2.0 A, USB DUAL TYPE A; COMPLY WITH NEMA WD 1, NEMA WD 6 CONFIGURATION 5-20R, UL 498, UL 1310, AND FS W-C-596.
a. DESCRIPTION: SINGLE-PIECE, RIVETLESS, NICKEL-PLATED, ALL-BRASS GROUNDING SYSTEM. NICKEL-PLATED, BRASS MOUNTING STRAP.

D. GFCI RECEPTACLES
1. DUPLEX RECEPTACLE, 125 V, 20 A, STRAIGHT BLADE, NON-FEED-THROUGH TYPE.
COMPLY WITH NEMA WD 1, NEMA WD 6 CONFIGURATION 5-20R, UL 498, UL 943 CLASS A, AND FS W-C-596.
INCLUDE INDICATOR LIGHT THAT SHOWS WHEN THE GFCI HAS MALFUNCTIONED AND NO LONGER PROVIDES PROPER GFCI PROTECTION.

E. TWIST-LOCKING RECEPTACLES
1. TWIST-LOCK, SINGLE CONVENIENCE RECEPTACLES: 125 V, 20 A; COMPLY WITH NEMA WD 1, NEMA WD 6 CONFIGURATION L5-20R, AND UL 498.

F. SPECIALTY AND CONTROLLED RECEPTACLES
1. REFER TO DRAWING FOR NEMA CONFIGURATION OF ALL SPECIALTY RECEPTACLES.
2. CONTROLLED RECEPTACLES SHALL BE SPLIT CONTROLLED (UNLESS OTHERWISE NOTED ON DRAWINGS.) ALL MARKINGS FOR CONTROL SHALL MEET NEC 406.3 AND BE UL498B LISTED. RATING SHALL BE 20A UNLESS OTHERWISE NOTED ON DRAWINGS.

G. PENDANT CORD-CONNECTOR DEVICES
1. DESCRIPTION:
a. MATCHING, LOCKING-TYPE PLUG AND RECEPTACLE BODY CONNECTOR.
b. NEMA WD 6 CONFIGURATIONS L5-20P AND L5-20R, HEAVY-DUTY GRADE, AND FS W-C-596.
c. BODY: NYLON, WITH SCREW-OPEN, CABLE-GRIPPING JAWS AND PROVISION FOR ATTACHING EXTERNAL CABLE GRIP.
d. EXTERNAL CABLE GRIP: WOVEN WIRE-MESH TYPE MADE OF HIGH-STRENGTH, GALVANIZED-STEEL WIRE STRAND, MATCHED TO CABLE DIAMETER, AND WITH ATTACHMENT PROVISION DESIGNED FOR CORRESPONDING CONNECTOR.

H. CORD AND PLUG SETS
1. DESCRIPTION:
a. MATCH VOLTAGE AND CURRENT RATINGS AND NUMBER OF CONDUCTORS TO REQUIREMENTS OF EQUIPMENT BEING CONNECTED.
b. CORD: RUBBER-INSULATED, STRANDED-COPPER CONDUCTORS, WITH TYPE SOW-A JACKET; WITH GREEN-INSULATED GROUNDING CONDUCTOR AND AMPACITY OF AT LEAST 130 PERCENT OF THE EQUIPMENT RATING.
c. PLUG: NYLON BODY AND INTEGRAL CABLE-CLAMPING JAWS. MATCH CORD AND RECEPTACLE TYPE FOR CONNECTION.

I. TOGGLE SWITCHES
1. COMPLY WITH NEMA WD 1, UL 20, AND FS W-S-896.
2. SWITCHES, 120/277 V, 20 A:
3. PILOT-LIGHT SWITCHES: 120/277 V, 20 A.
a. DESCRIPTION: SINGLE POLE, WITH LED-LIGHTED HANDLE, ILLUMINATED WHEN SWITCH IS OFF.
b. KEY-OPERATED SWITCHES: 120/277 V, 20 A.
c. `DESCRIPTION: SINGLE POLE, WITH FACTORY-SUPPLIED KEY IN LIEU OF SWITCH HANDLE.

J. WALL SWITCH SENSOR LIGHT SWITCH, DUAL TECHNOLOGY
1. DESCRIPTION: SWITCHBOX-MOUNTED, COMBINATION LIGHTING-CONTROL SENSOR AND CONVENTIONAL SWITCH LIGHTING-CONTROL UNIT USING DUAL TECHNOLOGY. ADJUSTABLE TIME DELAY OF 20 MINUTES. ABLE TO BE LOCKED TO AUTOMATIC-ON OR MANUAL-ON MODE. COMPLY WITH NEMA WD 1, UL 20, AND FS W-S-896.

K. WALL-BOX DIMMERS
1. DESCRIPTION: MODULAR, FULL-WAVE, SOLID-STATE DIMMER SWITCH WITH INTEGRAL, QUIET ON-OFF SWITCHES, WITH AUDIBLE FREQUENCY AND EMI/RFI SUPPRESSION FILTERS.
2. CONTROL: CONTINUOUSLY ADJUSTABLE SLIDER WITH SINGLE-POLE OR THREE-WAY SWITCHING.
3. STANDARDS: COMPLY WITH UL 1472.
4. INCANDESCENT LAMP DIMMERS: 120 V; CONTROL SHALL FOLLOW SQUARE-LAW DIMMING CURVE. ON-OFF SWITCH POSITIONS SHALL BYPASS DIMMER MODULE.
5. LED LAMP DIMMER SWITCHES: MODULAR; COMPATIBLE WITH LED LAMPS; TRIM POTENTIOMETER TO ADJUST LOW-END DIMMING; CAPABLE OF CONSISTENT DIMMING WITH LOW END NOT GREATER THAN 20 PERCENT OF FULL BRIGHTNESS.

L. WALL PLATES
1. SINGLE AND COMBINATION TYPES SHALL MATCH CORRESPONDING WIRING DEVICES.
2. PLATE-SECURING SCREWS: METAL WITH HEAD COLOR TO MATCH PLATE FINISH.
3. MATERIAL FOR FINISHED SPACES: SMOOTH, HIGH-IMPACT THERMOPLASTIC.
4. MATERIAL FOR UNFINISHED SPACES: SMOOTH, HIGH-IMPACT THERMOPLASTIC.
5. MATERIAL FOR DAMP LOCATIONS: THERMOPLASTIC WITH SPRING-LOADED LIFT COVER, AND LISTED AND LABELED FOR USE IN WET AND DAMP LOCATIONS.
6. WET-LOCATION, WEATHERPROOF COVER PLATES: NEMA 250, COMPLYING WITH TYPE 3R, WEATHER-RESISTANT THERMOPLASTIC WITH LOCKABLE COVER.

M. FLOOR SERVICE FITTINGS
1. TYPE: MODULAR, DUAL-SERVICE UNITS SUITABLE FOR WIRING METHOD USED. TYPE AS INDICATED ON DRAWINGS.
2. COMPARTMENTS: BARRIER SEPARATES POWER FROM VOICE AND DATA COMMUNICATION CABLING.
3. SERVICE PLATE: AS INDICATED BY ARCHITECT WITH SATIN FINISH.
4. POWER RECEPTACLE: NEMA WD 6 CONFIGURATION 5-20R, GRAY FINISH, UNLESS OTHERWISE INDICATED.
5. DATA COMMUNICATION OUTLET: AS DIRECTED BY THE OWNER.

N. POKE-THROUGH ASSEMBLIES
1. DESCRIPTION:
a. FACTORY-FABRICATED AND -WIRED ASSEMBLY OF BELOW-FLOOR JUNCTION BOX WITH MULTICHANNELED, THROUGH-FLOOR RACEWAY/FIRESTOP UNIT AND DETACHABLE MATCHING FLOOR SERVICE-OUTLET ASSEMBLY.
b. COMPLY WITH UL 514 SCRUB WATER EXCLUSION REQUIREMENTS.
c. SERVICE-OUTLET ASSEMBLY: TYPE AS INDICATED ON DRAWINGS.
d. SIZE: SELECTED TO FIT NOMINAL CORED HOLES IN FLOOR AND MATCHED TO FLOOR THICKNESS.
e. FIRE RATING: UNIT IS LISTED AND LABELED FOR FIRE RATING OF FLOOR-CEILING ASSEMBLY.
f. CLOSURE PLUG: ARRANGED TO CLOSE UNUSED CORED OPENINGS AND REESTABLISH FIRE RATING OF FLOOR.

O. FINISHES
1. DEVICE COLOR:
a. WIRING DEVICES CONNECTED TO NORMAL POWER SYSTEM: AS SELECTED BY ARCHITECT UNLESS OTHERWISE INDICATED OR REQUIRED BY NFPA 70 OR DEVICE LISTING.
b. WIRING DEVICES CONNECTED TO EMERGENCY POWER SYSTEM: RED
c. ISOLATED-GROUND RECEPTACLES: AS SPECIFIED ABOVE, WITH ORANGE TRIANGLE ON FACE.
2. WALL PLATE COLOR: FOR PLASTIC COVERS, MATCH DEVICE COLOR.

EXECUTION

A. INSTALLATION
1. COMPLY WITH NECA 1, INCLUDING MOUNTING HEIGHTS LISTED IN THAT STANDARD, UNLESS OTHERWISE INDICATED.
2. COORDINATION WITH OTHER TRADES:
a. PROTECT INSTALLED DEVICES AND THEIR BOXES. DO NOT PLACE WALL FINISH MATERIALS OVER DEVICE BOXES AND DO NOT CUT HOLES FOR BOXES WITH ROUTERS THAT ARE GUIDED BY RIDING AGAINST OUTSIDE OF BOXES.
b. KEEP OUTLET BOXES FREE OF PLASTER, DRYWALL JOINT COMPOUND, MORTAR, CEMENT, CONCRETE, DUST, PAINT, AND OTHER MATERIAL THAT MAY CONTAMINATE THE RACEWAY SYSTEM, CONDUCTORS, AND CABLES.
c. INSTALL DEVICE BOXES IN BRICK OR BLOCK WALLS SO THAT THE COVER PLATE DOES NOT CROSS A JOINT UNLESS THE JOINT IS TROWELED FLUSH WITH THE FACE OF THE WALL.
d. INSTALL WIRING DEVICES AFTER ALL WALL PREPARATION, INCLUDING PAINTING, IS COMPLETE.
3. CONDUCTORS:
a. DO NOT STRIP INSULATION FROM CONDUCTORS UNTIL RIGHT BEFORE THEY ARE SPLICED OR TERMINATED ON DEVICES.
b. STRIP INSULATION EVENLY AROUND THE CONDUCTOR USING TOOLS DESIGNED FOR THE PURPOSE. AVOID SCORING OR NICKING OF SOLID WIRE OR CUTTING STRANDS FROM STRANDED WIRE.
c. THE LENGTH OF FREE CONDUCTORS AT OUTLETS FOR DEVICES SHALL MEET PROVISIONS OF NFPA 70, ARTICLE 300,

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A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
ENGINEER
No. PE081572

METZGAR ELECTRICAL SPECIFICATIONS

DATE:	XX-XX-XX	DRAWN BY:	ETC
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APPROVED BY:	DEB		

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WITHOUT PIGTAILS.

4. EXISTING CONDUCTORS:
   a. CUT BACK AND PIGTAIL, OR REPLACE ALL DAMAGED CONDUCTORS.
   b. STRAIGHTEN CONDUCTORS THAT REMAIN AND REMOVE CORROSION AND FOREIGN MATTER.
   c. PIGTAILING EXISTING CONDUCTORS IS PERMITTED, PROVIDED THE OUTLET BOX IS LARGE ENOUGH.
5. DEVICE INSTALLATION:
   a. REPLACE DEVICES THAT HAVE BEEN IN TEMPORARY USE DURING CONSTRUCTION AND THAT WERE INSTALLED BEFORE BUILDING FINISHING OPERATIONS WERE COMPLETE.
   b. KEEP EACH WIRING DEVICE IN ITS PACKAGE OR OTHERWISE PROTECTED UNTIL IT IS TIME TO CONNECT CONDUCTORS.
   c. DO NOT REMOVE SURFACE PROTECTION, SUCH AS PLASTIC FILM AND SMUDGE COVERS, UNTIL THE LAST POSSIBLE MOMENT.
   d. CONNECT DEVICES TO BRANCH CIRCUITS USING PIGTAILS THAT ARE NOT LESS THAN 6 INCHES (152 MM) IN LENGTH.
   e. WHEN THERE IS A CHOICE, USE SIDE WIRING WITH BINDING-HEAD SCREW TERMINALS. WRAP SOLID CONDUCTOR TIGHTLY CLOCKWISE, TWO-THIRDS TO THREE-FOURTHS OF THE WAY AROUND TERMINAL SCREW.
   f. USE A TORQUE SCREWDRIVER WHEN A TORQUE IS RECOMMENDED OR REQUIRED BY MANUFACTURER.
   g. WHEN CONDUCTORS LARGER THAN NO. 12 AWG ARE INSTALLED ON 15- OR 20-A CIRCUITS, SPLICE NO. 12 AWG PIGTAILS FOR DEVICE CONNECTIONS.
   h. TIGHTEN UNUSED TERMINAL SCREWS ON THE DEVICE.
   i. WHEN MOUNTING INTO METAL BOXES, REMOVE THE FIBER OR PLASTIC WASHERS USED TO HOLD DEVICE-MOUNTING SCREWS IN YOKES, ALLOWING METAL-TO-METAL CONTACT.
6. RECEPTACLE ORIENTATION:
   a. INSTALL GROUND PIN OF VERTICALLY MOUNTED RECEPTACLES UP, AND ON HORIZONTALLY MOUNTED RECEPTACLES TO THE RIGHT.
7. ALL RECEPTACLES AND LIGHT SWITCHES IN PLENUM SPACES OR ROOMS SHALL BE IN A METAL ENCLOSURE PER NEC 300.22 (C)(3).
8. DEVICE PLATES: DO NOT USE OVERSIZED OR EXTRA-DEEP PLATES. REPAIR WALL FINISHES AND REMOUNT OUTLET BOXES WHEN STANDARD DEVICE PLATES DO NOT FIT FLUSH OR DO NOT COVER ROUGH WALL OPENING.
9. ARRANGEMENT OF DEVICES: UNLESS OTHERWISE INDICATED, MOUNT FLUSH, WITH LONG DIMENSION VERTICAL AND WITH GROUNDING TERMINAL OF RECEPTACLES ON TOP. GROUP ADJACENT SWITCHES UNDER SINGLE, MULTIGANG WALL PLATES.
10. ADJUST LOCATIONS OF FLOOR SERVICE OUTLETS AND SERVICE POLES TO SUIT ARRANGEMENT OF PARTITIONS AND FURNISHINGS.
11. 3.2 IDENTIFICATION
12. IDENTIFY EACH RECEPTACLE WITH PANELBOARD IDENTIFICATION AND CIRCUIT NUMBER. USE HOT, STAMPED, OR ENGRAVED MACHINE PRINTING WITH BLACK-FILLED LETTERING ON FACE OF PLATE, AND DURABLE WIRE MARKERS OR TAGS INSIDE OUTLET BOXES.

FUSES

GENERAL

A. SUBMITTALS
   1. PRODUCT DATA: FOR EACH TYPE OF PRODUCT. INCLUDE CONSTRUCTION DETAILS, MATERIAL DESCRIPTIONS, DIMENSIONS OF INDIVIDUAL COMPONENTS AND PROFILES, AND FINISHES FOR SPARE-FUSE CABINETS.

B. MAINTENANCE MATERIAL SUBMITTALS
   1. FURNISH EXTRA MATERIALS THAT MATCH PRODUCTS INSTALLED AND THAT ARE PACKAGED WITH PROTECTIVE COVERING FOR STORAGE AND IDENTIFIED WITH LABELS DESCRIBING CONTENTS.
      a. FUSES: EQUAL TO 10 PERCENT OF QUANTITY INSTALLED FOR EACH SIZE AND TYPE, BUT NO FEWER THAN THREE OF EACH SIZE AND TYPE.

PRODUCTS

A. MANUFACTURERS
   1. SOURCE LIMITATIONS: OBTAIN FUSES, FOR USE WITHIN A SPECIFIC PRODUCT OR CIRCUIT, FROM SINGLE SOURCE FROM SINGLE MANUFACTURER.

B. CARTRIDGE FUSES
   1. CHARACTERISTICS: NEMA FU 1, CURRENT-LIMITING, NONRENEWABLE CARTRIDGE FUSES WITH VOLTAGE RATINGS CONSISTENT WITH CIRCUIT VOLTAGES.
   2. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, AND MARKED FOR INTENDED LOCATION AND APPLICATION.
   3. COMPLY WITH NEMA FU 1 FOR CARTRIDGE FUSES.
   4. COORDINATE FUSE RATINGS WITH UTILIZATION EQUIPMENT NAMEPLATE LIMITATIONS OF MAXIMUM FUSE SIZE AND WITH SYSTEM SHORT-CIRCUIT CURRENT LEVELS.

C. SPARE-FUSE CABINET
   1. CHARACTERISTICS: WALL-MOUNTED STEEL UNIT WITH FULL-LENGTH, RECESSED PIANO-HINGED DOOR AND KEY-CODED CAM LOCK AND PULL.
      a. SIZE: ADEQUATE FOR STORAGE OF SPARE FUSES SPECIFIED WITH 15 PERCENT SPARE CAPACITY MINIMUM.
      b. FINISH: GRAY, BAKED ENAMEL.
      c. IDENTIFICATION: "SPARE FUSES" IN 1-1/2-INCH- (38-MM-) HIGH LETTERS ON EXTERIOR OF DOOR.
      d. FUSE PULLERS: FOR EACH SIZE OF FUSE, WHERE APPLICABLE AND AVAILABLE, FROM FUSE MANUFACTURER.

EXECUTION

A. FUSE APPLICATIONS
   1. CARTRIDGE FUSES:
      a. SERVICE ENTRANCE: CLASS L, FAST ACTING
      b. FEEDERS: CLASS RK1, FAST ACTING
      c. MOTOR BRANCH CIRCUITS: CLASS RK1, TIME DELAY.
      d. LARGE MOTOR BRANCH (601-4000 A): CLASS L, TIME DELAY.
      e. OTHER BRANCH CIRCUITS: CLASS RK1, TIME DELAY
      f. ELEVATOR POWER MODULES: CLASS J

B. INSTALLATION
   1. INSTALL FUSES IN FUSIBLE DEVICES. ARRANGE FUSES SO RATING INFORMATION IS READABLE WITHOUT REMOVING FUSE.
   2. INSTALL SPARE-FUSE CABINET(S) IN LOCATION SHOWN ON THE DRAWINGS OR AS INDICATED IN THE FIELD BY OWNER.

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

GENERAL

A. SUBMITTALS
   1. PRODUCT DATA: FOR EACH TYPE OF ENCLOSED SWITCH, CIRCUIT BREAKER, ACCESSORY, AND COMPONENT INDICATED. INCLUDE NAMEPLATE RATINGS, DIMENSIONED ELEVATIONS, SECTIONS, WEIGHTS, AND MANUFACTURERS' TECHNICAL DATA ON FEATURES, PERFORMANCE, ELECTRICAL CHARACTERISTICS, RATINGS, ACCESSORIES, AND FINISHES.

B. MAINTENANCE MATERIAL SUBMITTALS
   1. FURNISH EXTRA MATERIALS THAT MATCH PRODUCTS INSTALLED AND THAT ARE PACKAGED WITH PROTECTIVE COVERING FOR STORAGE AND IDENTIFIED WITH LABELS DESCRIBING CONTENTS.
      a. FUSES: EQUAL TO 10 PERCENT OF QUANTITY INSTALLED FOR EACH SIZE AND TYPE, BUT NO FEWER THAN THREE OF EACH SIZE AND TYPE.

PRODUCTS

A. GENERAL REQUIREMENTS
   1. SOURCE LIMITATIONS: OBTAIN ENCLOSED SWITCHES AND CIRCUIT BREAKERS, OVERCURRENT PROTECTIVE DEVICES, COMPONENTS, AND ACCESSORIES, WITHIN SAME PRODUCT CATEGORY, FROM SINGLE MANUFACTURER.
   2. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY AN NRTL, AND MARKED FOR INTENDED LOCATION AND APPLICATION.
   3. ACCEPTABLE MANUFACTURERS ARE EATON, SIEMENS, SQUARE D, AND GE.

B. FUSIBLE SWITCHES
   1. FUSIBLE SWITCH, 800 A AND SMALLER: NEMA KS 1, TYPE HD, WITH CLIPS OR BOLT PADS TO ACCOMMODATE SPECIFIED FUSES, LOCKABLE HANDLE WITH CAPABILITY TO ACCEPT TWO PADLOCKS, AND INTERLOCKED WITH COVER IN CLOSED POSITION.
   2. ACCESSORIES:
      a. EQUIPMENT GROUND KIT: INTERNALLY MOUNTED AND LABELED FOR COPPER AND ALUMINUM GROUND CONDUCTORS.
      b. NEUTRAL KIT: INTERNALLY MOUNTED; INSULATED, CAPABLE OF BEING GROUNDED, AND BONDED; AND LABELED FOR COPPER AND ALUMINUM NEUTRAL CONDUCTORS.
      c. AUXILIARY CONTACT KIT: AUXILIARY SET OF CONTACTS ARRANGED TO OPEN BEFORE SWITCH BLADES OPEN. PROVIDE WHEN USED AS REMOTE DISCONNECT FOR VARIABLE FREQUENCY MOTOR CONTROLLER CIRCUITS.
      d. SERVICE-RATED SWITCHES: LABELED FOR USE AS SERVICE EQUIPMENT.

C. NONFUSIBLE SWITCHES
   1. NONFUSIBLE SWITCH, 800 A AND SMALLER: NEMA KS 1, TYPE HD, LOCKABLE HANDLE WITH CAPABILITY TO ACCEPT TWO PADLOCKS, AND INTERLOCKED WITH COVER IN CLOSED POSITION.
   2. ACCESSORIES:
      a. EQUIPMENT GROUND KIT: INTERNALLY MOUNTED AND LABELED FOR COPPER AND ALUMINUM GROUND CONDUCTORS.
      b. NEUTRAL KIT: INTERNALLY MOUNTED; INSULATED, CAPABLE OF BEING GROUNDED, AND BONDED; AND LABELED FOR COPPER AND ALUMINUM NEUTRAL CONDUCTORS.
      c. AUXILIARY CONTACT KIT: AUXILIARY SET OF CONTACTS ARRANGED TO OPEN BEFORE SWITCH BLADES OPEN. PROVIDE WHEN USED AS REMOTE DISCONNECT FOR VARIABLE FREQUENCY MOTOR CONTROLLER CIRCUITS.
      d. SERVICE-RATED SWITCHES: LABELED FOR USE AS SERVICE EQUIPMENT.

D. MOLDED-CASE CIRCUIT BREAKERS
   1. MOLDED-CASE CIRCUIT BREAKER: NEMA AB 1, WITH INTERRUPTING CAPACITY TO MEET AVAILABLE FAULT CURRENTS.
      a. THERMAL-MAGNETIC CIRCUIT BREAKERS: INVERSE TIME-CURRENT ELEMENT FOR LOW-LEVEL OVERLOADS AND INSTANTANEOUS MAGNETIC TRIP ELEMENT FOR SHORT CIRCUITS. ADJUSTABLE MAGNETIC TRIP SETTING FOR CIRCUIT-BREAKER FRAME SIZES 250 A AND LARGER.
      b. ADJUSTABLE INSTANTANEOUS-TRIP CIRCUIT BREAKERS: MAGNETIC TRIP ELEMENT WITH FRONT-MOUNTED, FIELD-ADJUSTABLE TRIP SETTING.
      c. ELECTRONIC TRIP-UNIT CIRCUIT BREAKERS: RMS SENSING; FIELD-REPLACEABLE RATING PLUG; WITH THE FOLLOWING FIELD-ADJUSTABLE SETTINGS:
         - INSTANTANEOUS TRIP.
         - LONG- AND SHORT-TIME PICKUP LEVELS.
         - LONG- AND SHORT-TIME TIME ADJUSTMENTS.
         - GROUND-FAULT PICKUP LEVEL, TIME DELAY, AND I2T RESPONSE.
   2. MOLDED-CASE CIRCUIT-BREAKER FEATURES AND ACCESSORIES:
      a. STANDARD FRAME SIZES, TRIP RATINGS, AND NUMBER OF POLES.
      b. LUGS: MECHANICAL STYLE SUITABLE FOR NUMBER, SIZE, TRIP RATINGS, AND CONDUCTOR MATERIAL.
      c. APPLICATION LISTING: HACR FOR HEATING, AIR-CONDITIONING, AND REFRIGERATING EQUIPMENT.
      d. GROUND-FAULT PROTECTION: INTEGRALLY MOUNTED RELAY AND TRIP UNIT WITH ADJUSTABLE PICKUP AND TIME-DELAY SETTINGS, PUSH-TO-TEST FEATURE, AND GROUND-FAULT INDICATOR.
      e. SHUNT TRIP: 120-V TRIP COIL ENERGIZED FROM SEPARATE CIRCUIT, SET TO TRIP AT 55 PERCENT OF RATED VOLTAGE.
      f. UNDERVOLTAGE TRIP: SET TO OPERATE AT 35 TO 75 PERCENT OF RATED VOLTAGE WITHOUT INTENTIONAL OR WITH FIELD-ADJUSTABLE 0.1- TO 0.6-SECOND TIME DELAY.
      g. AUXILIARY SWITCH: ONE SPDT SWITCH OR TWO SPDT SWITCHES WITH "A" AND "B" CONTACTS; "A" CONTACTS MIMIC CIRCUIT-BREAKER CONTACTS, "B" CONTACTS OPERATE IN REVERSE OF CIRCUIT-BREAKER CONTACTS.

E. ENCLOSURES
   1. NEMA AB 1 AND NEMA KS 1 TO MEET ENVIRONMENTAL CONDITIONS OF INSTALLED LOCATION.
      a. INDOOR LOCATIONS: NEMA 250, TYPE 1.
      b. OUTDOOR LOCATIONS: NEMA 250, TYPE 3R.
      c. OTHER WET OR DAMP INDOOR LOCATIONS: NEMA 250, TYPE 4.
   2. CONDUIT ENTRY: NEMA 250 TYPES 4, 4X, AND 12 ENCLOSURES SHALL CONTAIN NO KNOCKOUTS. NEMA 250 TYPES 7 AND 9 ENCLOSURES SHALL BE PROVIDED WITH THREADED CONDUIT OPENINGS IN BOTH ENDWALLS.
   3. ENCLOSURES DESIGNATED AS NEMA 250 TYPE 4, 4X STAINLESS STEEL, 12, OR 12K SHALL HAVE A DUAL COVER INTERLOCK MECHANISM TO PREVENT UNINTENTIONAL OPENING OF THE ENCLOSURE COVER WHEN THE CIRCUIT BREAKER IS ON AND TO PREVENT TURNING THE CIRCUIT BREAKER ON WHEN THE ENCLOSURE COVER IS OPEN.
   4. ALL ENCLOSURES SHALL INCLUDE A BONDED EQUIPMENT BUS.

EXECUTION

A. INSTALLATION
   1. COORDINATE LAYOUT AND INSTALLATION OF SWITCHES, CIRCUIT BREAKERS, AND COMPONENTS WITH EQUIPMENT SERVED AND ADJACENT SURFACES. MAINTAIN REQUIRED WORKSPACE CLEARANCES AND REQUIRED CLEARANCES FOR EQUIPMENT ACCESS DOORS AND PANELS.
   2. INSTALL INDIVIDUAL WALL-MOUNTED SWITCHES AND CIRCUIT BREAKERS WITH TOPS AT UNIFORM HEIGHT UNLESS OTHERWISE INDICATED.
   3. INSTALL FUSES IN FUSIBLE DEVICES.
   4. COMPLY WITH NFPA 70 AND NECA 1.

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COMMONWEALTH OF PENNSYLVANIA
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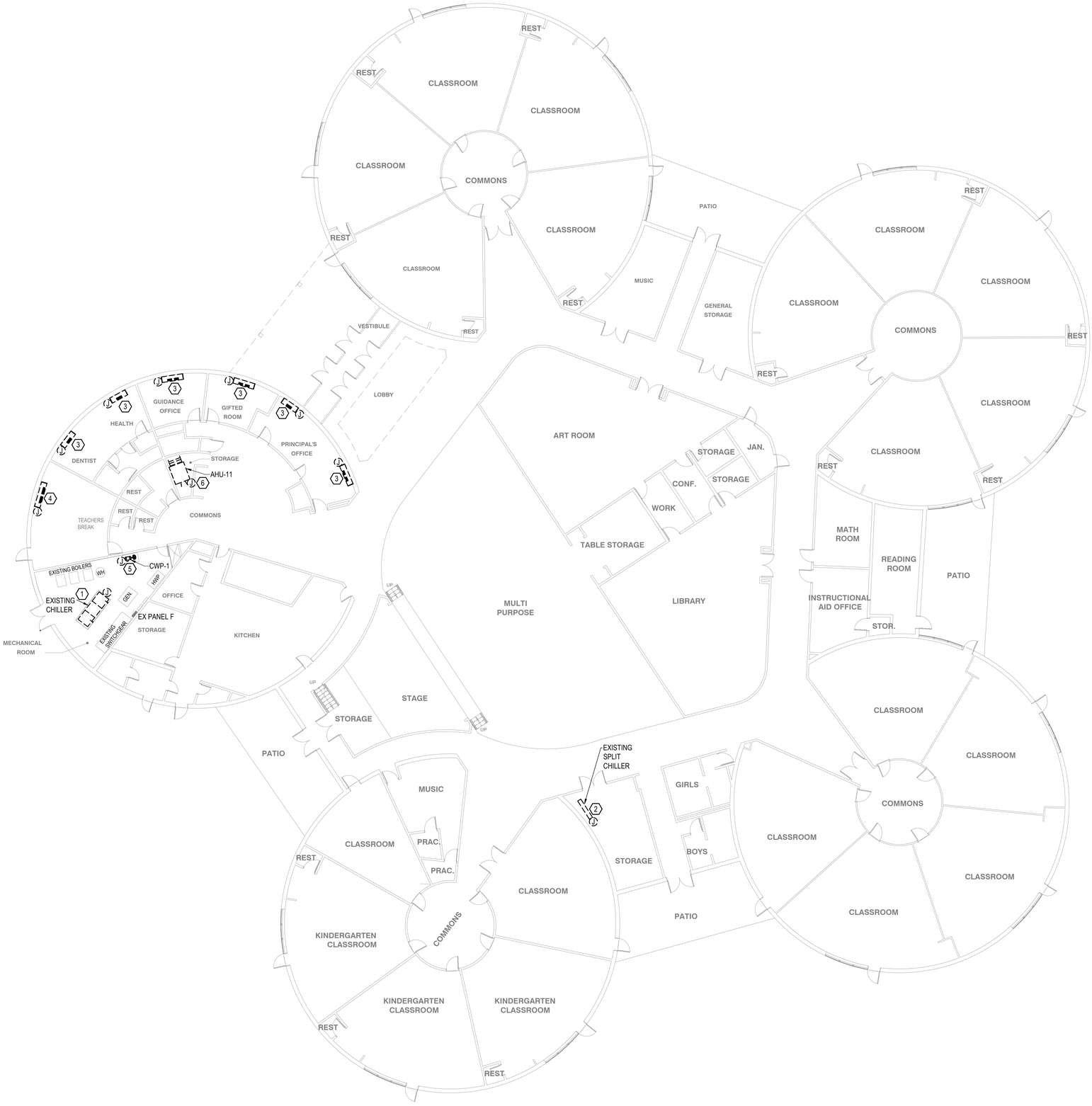
METZGAR ELECTRICAL SPECIFICATIONS

DATE:	XX-XX-XX	DRAWN BY:	ETC
DWG SCALE:	AS SHOWN	CHECKED BY:	ETC
PROJECT NO:	2341083		
APPROVED BY:	DEB		

DRAWING NO.:
E-1003

NORTH



1 E-1101 METZGAR ELECTRICAL FIRST FLOOR DEMOLITION PLAN
3/32" = 1' 0"

ELECTRICAL DEMOLITION GENERAL NOTES:

1. ELECTRICAL DISTRIBUTION EQUIPMENT IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
2. FIXTURES AND DEVICES NOTED WITH "EX" ARE EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUITRY UNLESS OTHERWISE NOTED ON NEW WORK PLANS.
3. ALL HOLES IN WALLS, COLUMN ENCLOSURES, CEILINGS AND FLOORS FROM CONDUIT PENETRATIONS, JUNCTION BOXES, OR WIRING DEVICES SHALL BE PATCHED AND PAINTED PER THE ARCHITECT. RATED PARTITIONS SHALL BE FIREPROOFED TO MAINTAIN THE EXISTING FIRE RATING.

ELECTRICAL DEMOLITION KEY NOTES: (#)

1. REMOVE ELECTRICAL CONNECTION TO DEMOLISHED CHILLER. MAINTAIN CIRCUIT AND WIRING AT LOCATION FOR RECONNECTION TO NEW UNIT. EXISTING CAPACITY OF CIRCUIT (200A) IS ADEQUATE TO SERVE NEW UNIT. REFER TO NEW WORK PLANS.
2. REMOVE ELECTRICAL CONNECTION TO SPLIT CHILLER BEING DEMOLISHED. DEMOLISH CIRCUIT BACK TO SOURCE.
3. REMOVE ELECTRICAL CONNECTION TO UNIT VENTILATOR BEING DEMOLISHED. MAINTAIN CIRCUIT IN THIS LOCATION FOR RECONNECTION TO NEW UNIT VENTILATOR UNDER NEW WORK.
4. REMOVE ELECTRICAL CONNECTION TO UNIT VENTILATOR BEING DEMOLISHED. DEMOLISH CIRCUIT BACK TO SOURCE.
5. REMOVE ELECTRICAL CONNECTION TO CHILLED WATER PUMP BEING DEMOLISHED. MAINTAIN CIRCUIT IN THIS LOCATION FOR RECONNECTION TO NEW CHILLED WATER PUMP UNDER NEW WORK.
6. REMOVE ELECTRICAL CONNECTION TO AIR HANDLING UNIT BEING DEMOLISHED. MAINTAIN CIRCUIT IN THIS LOCATION FOR RECONNECTION TO NEW AIR HANDLING UNIT UNDER NEW WORK.

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METZGAR
ELECTRICAL
FIRST FLOOR DEMOLITION PLAN

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COMMONWEALTH OF PENNSYLVANIA
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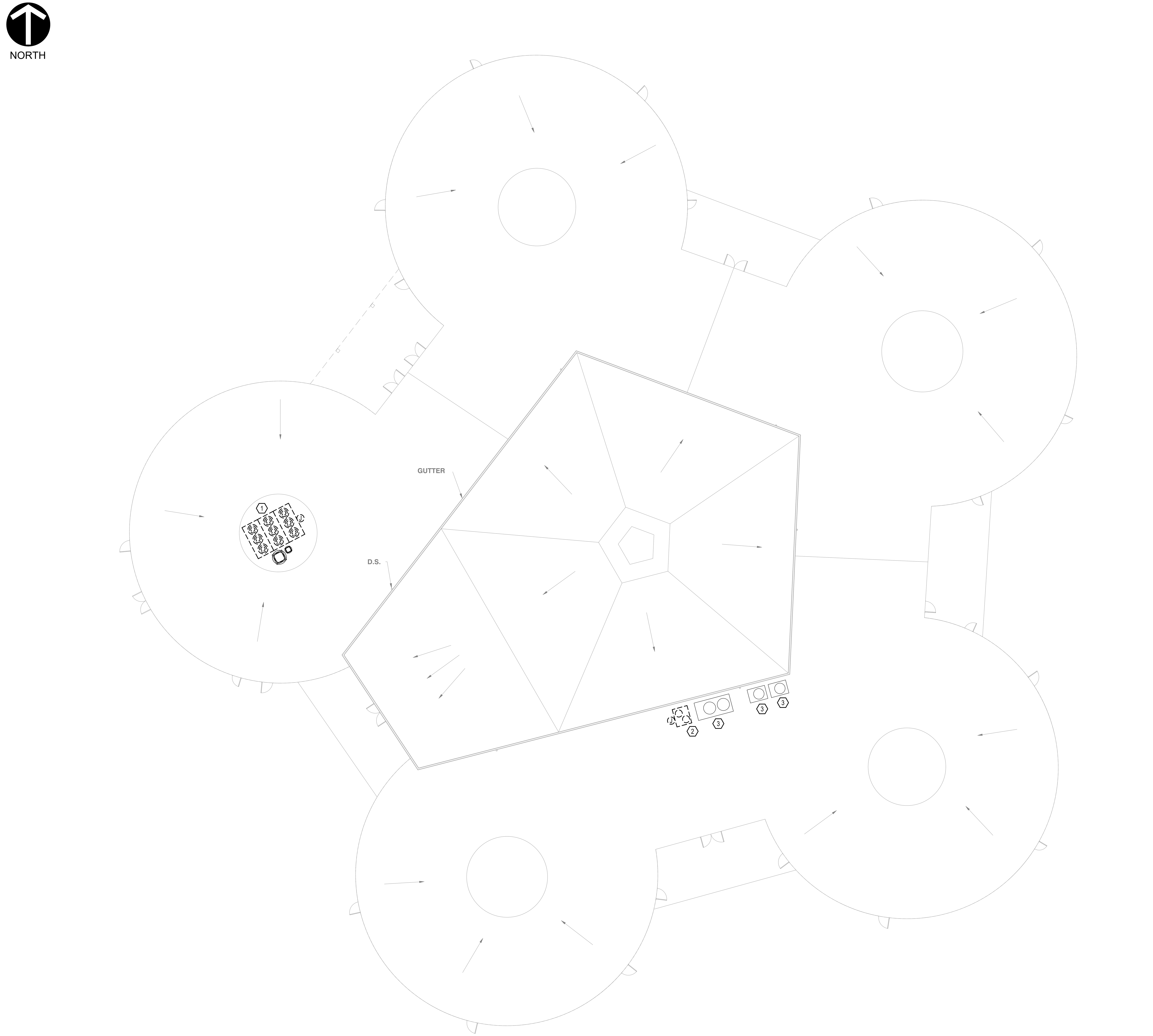
DRAWING NO.
E-1101



1 E-1102 METZGAR ELECTRICAL ROOF DEMOLITION PLAN
3/32" = 1' 0"

ELECTRICAL DEMOLITION GENERAL NOTES:

1. ELECTRICAL DISTRIBUTION EQUIPMENT IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
2. FIXTURES AND DEVICES NOTED WITH "EX" ARE EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUITRY UNLESS OTHERWISE NOTED ON NEW WORK PLANS.
3. ALL HOLES IN WALLS, COLUMN ENCLOSURES, CEILINGS AND FLOORS FROM CONDUIT PENETRATIONS, JUNCTION BOXES, OR WIRING DEVICES SHALL BE PATCHED AND PAINTED PER THE ARCHITECT. RATED PARTITIONS SHALL BE FIREPROOFED TO MAINTAIN THE EXISTING FIRE RATING.

ELECTRICAL DEMOLITION KEY NOTES:

1. REMOVE ELECTRICAL CONNECTION TO (3) CONDENSING UNIT SECTIONS BEING DEMOLISHED. MAINTAIN CIRCUIT AND WIRING AT LOCATION FOR RECONNECTION TO NEW UNIT. DO NOT DISTURB THE (2) EXISTING EXHAUST FANS. THE FANS ARE EXISTING TO REMAIN IN OPERATION. REFER TO NEW WORK PLANS.
2. REMOVE ELECTRICAL CONNECTION TO 10-TON CONDENSING UNIT BEING DEMOLISHED.
3. EXISTING CONDENSING UNIT IS EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUIT.

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DAVID C. PRICE
No. PE081572

REVISION RECORD

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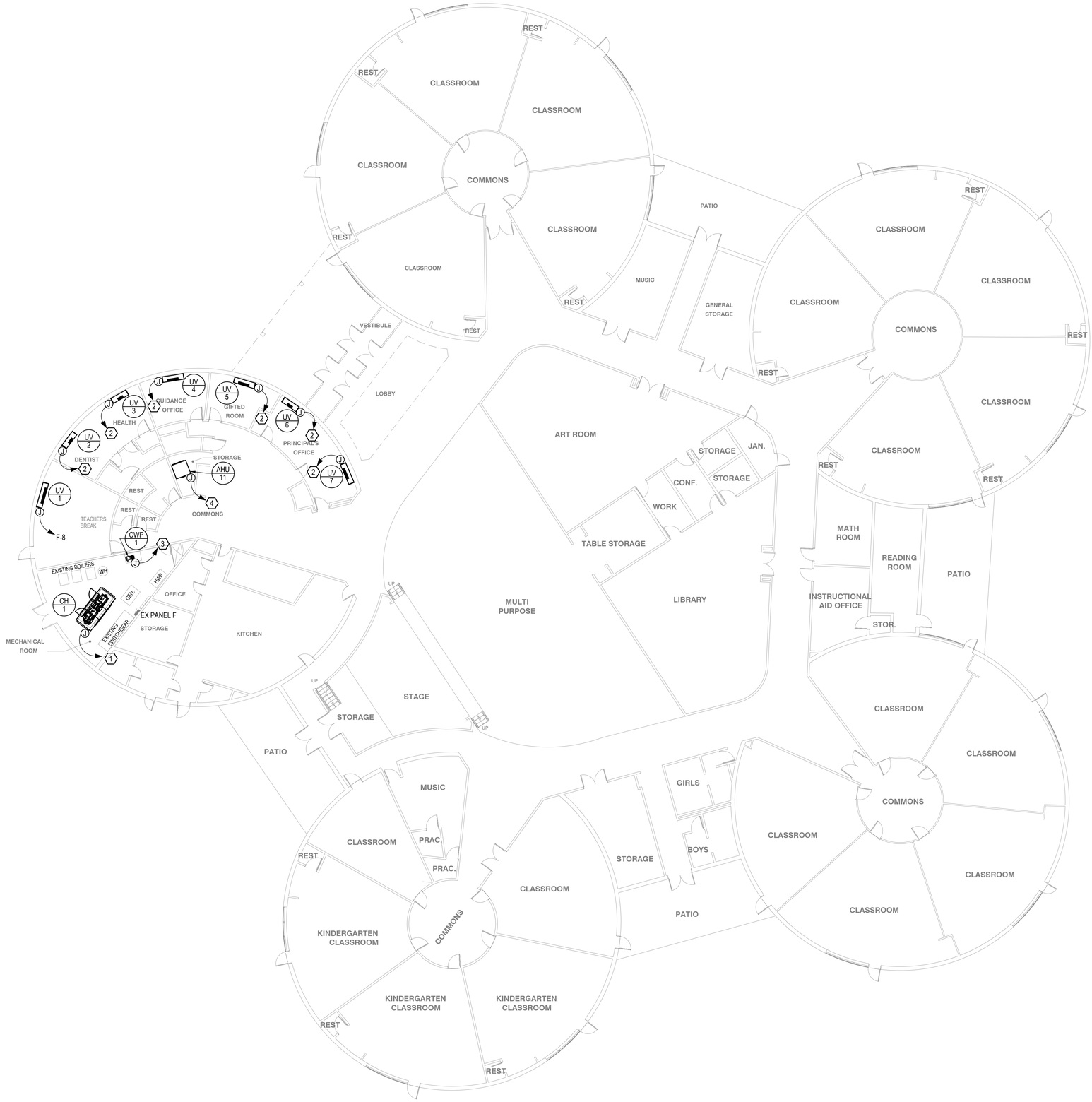
METZGAR
ELECTRICAL
ROOF DEMOLITION PLAN

DATE:	XX-XX-XX	DRAWN BY:	ETC
DWG SCALE:	AS SHOWN	CHECKED BY:	ETC
PROJECT NO:	2341083		
APPROVED BY:	DEB		

DRAWING NO.:
E-1102

NORTH



ELECTRICAL GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS, CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL DRAWINGS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER THE ARCHITECTURAL DRAWINGS.
4. COORDINATE EXACT LOCATIONS OF MECHANICAL EQUIPMENT WITH DIVISION 23. UNLESS NOTED OTHERWISE, MECHANICAL EQUIPMENT DISCONNECTS AND VARIABLE FREQUENCY DRIVES SHALL BE FURNISHED BY DIVISION 23, INSTALLED AND WIRED BY EC. THESE DISCONNECTS HAVE NOT BEEN SHOWN ON THIS PLAN.
5. EC SHALL NOT HAVE MORE THAN THREE CURRENT CARRYING CONDUCTORS IN A CONDUIT WITHOUT DERATING AMPACITIES PER THE NEC.

ELECTRICAL KEY NOTES: (#)

1. PROVIDE POWER TO NEW CHILLER VIA EXISTING 200A CIRCUIT THAT HAS BEEN MAINTAINED FROM DEMOLITION. EXTEND CIRCUIT AS NECESSARY FOR A FULL INSTALLATION.
2. RECONNECT NEW UNIT HEATERS TO EXISTING CIRCUIT THAT HAS BEEN MAINTAINED FROM DEMOLITION. EXTEND CIRCUIT AS NECESSARY FOR A FULL INSTALLATION.
3. RECONNECT NEW CHILLED WATER PUMP TO EXISTING CIRCUIT THAT HAS BEEN MAINTAINED FROM DEMOLITION. EXTEND CIRCUIT AS NECESSARY FOR A FULL INSTALLATION.
4. RECONNECT NEW AIR HANDLING UNIT TO EXISTING CIRCUIT THAT HAS BEEN MAINTAINED FROM DEMOLITION. EXTEND CIRCUIT AS NECESSARY FOR A FULL INSTALLATION.

1 E-1201 METZGAR ELECTRICAL FIRST FLOOR PLAN
3/32" = 1'-0"

REVISION RECORD

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METZGAR
ELECTRICAL
FIRST FLOOR PLAN

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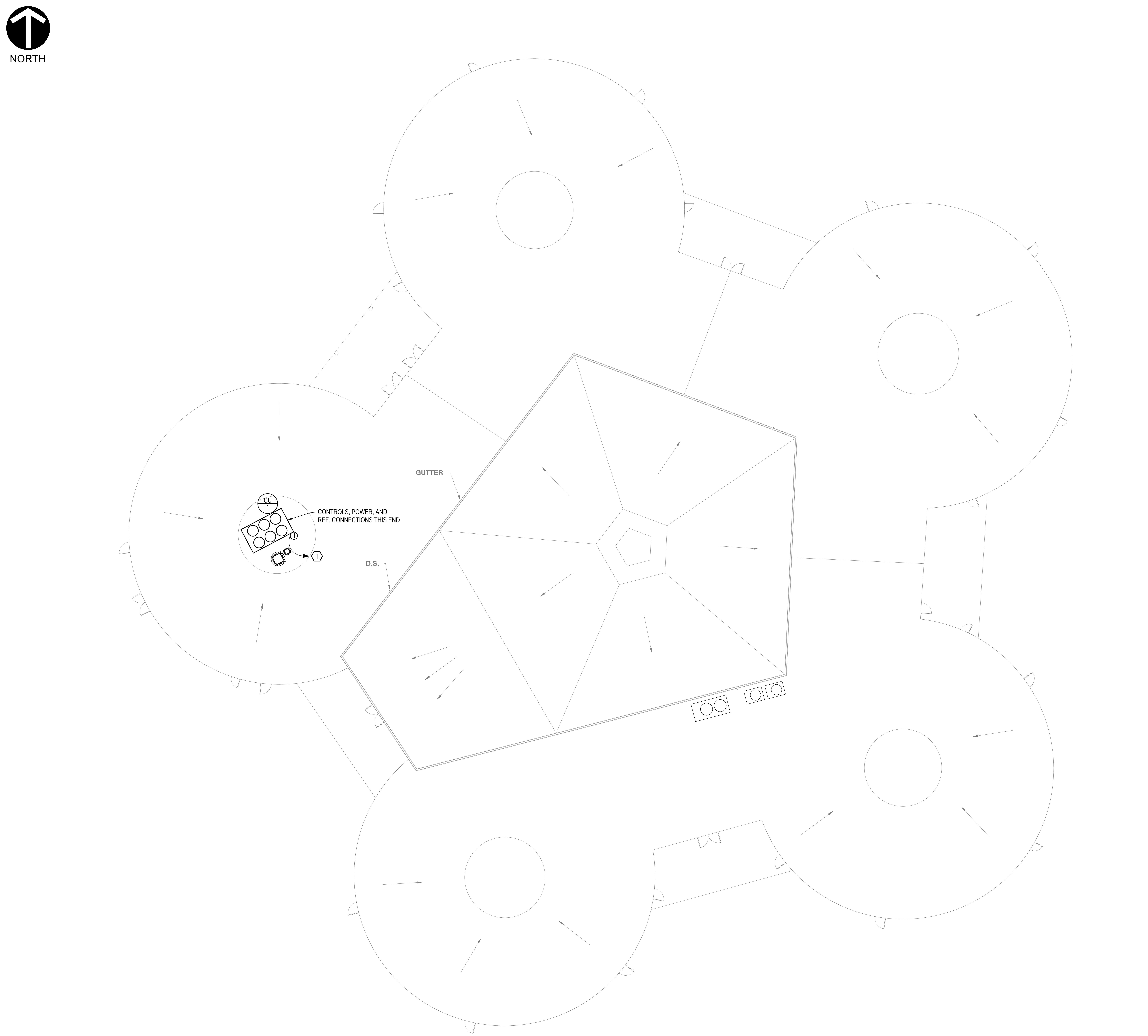
DRAWING NO.:
E-1201



1 / E-1202 METZGAR ELECTRICAL ROOF PLAN
3/32" = 1' 0"

ELECTRICAL GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS, CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL DRAWINGS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER THE ARCHITECTURAL DRAWINGS.
4. COORDINATE EXACT LOCATIONS OF MECHANICAL EQUIPMENT WITH DIVISION 23. UNLESS NOTED OTHERWISE, MECHANICAL EQUIPMENT DISCONNECTS AND VARIABLE FREQUENCY DRIVES SHALL BE FURNISHED BY DIVISION 23, INSTALLED AND WIRED BY EC. THESE DISCONNECTS HAVE NOT BEEN SHOWN ON THIS PLAN.
5. EC SHALL NOT HAVE MORE THAN THREE CURRENT CARRYING CONDUCTORS IN A CONDUIT WITHOUT DERATING AMPACITIES PER THE NEC.

ELECTRICAL KEY NOTES:

1. PROVIDE POWER TO NEW CONDENSING UNIT VIA EXISTING CIRCUIT THAT HAS BEEN MAINTAINED FROM DEMOLITION. EC SHALL CONNECT EXISTING CIRCUIT TO 25A FUSED DISCONNECT SWITCH PROVIDED BY MC. CONFIRM THAT EXISTING WIRE CAN LAND ON LUGS OF DISCONNECT. PROVIDE 4#10, 1#10G - 3/4"C FROM DISCONNECT TO NEW UNIT FOR A FULL INSTALLATION AND PROVIDE SPLICE BOX AS REQUIRED.

Allen + Shariff
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Project Management
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Nova Tower 2, Suite 1001
Pittsburgh, Pennsylvania 15212
412.322.9280
A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
ENGINEER
PE081572

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

Civil & Environmental Consultants, Inc.
700 Cherrington Parkway • Moon Township, Pa 15108
Ph: 412.429.2324 • Fax: 800.365.2324
www.cecinc.com

GREENSBURG SALEM SCHOOL DISTRICT
JAMES H. METZGAR ELEMENTARY SCHOOL
140 CC HALL DR, NEW ALEXANDRIA, PA 15670

METZGAR ELECTRICAL ROOF PLAN

DATE:	XX-XX-XX	DRAWN BY:	ETC
DWG SCALE:	AS SHOWN	CHECKED BY:	ETC
PROJECT NO:	2341083		
APPROVED BY:	DEB		

DRAWING NO.:
E-1202

Existing Branch Panel: F

Location: REFER TO PLAN
Supply From: EXISTING
Mounting: SURFACE
Enclosure: TYPE 1

Volts: 480/277V
Phases: 3
Wires: 4

A.I.C. Rating: EX KAIC
Mains Type: MLO
Mains Rating:
MCB Rating: -

CKT	Circuit Description	Notes	Wire Size	Trip	Pole	LOAD (VA) A		LOAD (VA) B		LOAD (VA) C		Pole	Trip	Wire Size	Notes	Circuit Description	CKT
1	EX HEAT SIDE ENTRY		EXISTING	20	1							1	20	EXISTING		EX HEAT RM 48	2
3	EX POLE LITES		EXISTING	20	1							1	20	EXISTING		EX HEAT RM 52	4
5	EX HEAT STAGE		EXISTING	20	1							1	20	EXISTING		EX RM 53	6
7	EX HEAT RM 54		EXISTING	20	1		**554**					1	20	**2#12, 1#12G - 3/4"C**		**UV-1**	8
9	EX HEAT RM 55		EXISTING	20	1							1	20			EX SPARE	10
11	EX PROVISION				1							1				EX PROVISION	12
13																	14
15	EX KITCHEN HEATER		EXISTING	20	3							3	20	EXISTING		EX AHU-11 HEAT OFFICE AREA	16
17																	18
19																	20
21	EX VESTIBULE HEAT OFFICE SIDE		EXISTING	20	3							3	20	EXISTING		EX VESTIBULE HEAT FAR SIDE	22
23																	24
25																	26
27	EX TEACHERS LOUNGE RM 47		EXISTING	20	3							3	20	EXISTING		EX CHILLED WATER PUMP LARGE CHILLER	28
29																	30
31																	32
33	EX TEMP CONTROL COMPRESSOR		EXISTING	20	3							3	20	EXISTING		EX MP STORAGE RM CHILLED WATER PUMP	34
35																	36
37																	38
39	EX MAKE UP AIR FOR KITCHEN		EXISTING	20	3							3	20	EXISTING		EX CONDENSATION UNIT FOR LARGE CHILLER	40
41																	42
43																	44
45	EX SEWAGE PLANT		EXISTING	20	3							3				EX PROVISION	46
47																	48
					Total Load:	**554**		**0**		**0**							
					Amps:			**0.7**									

NOTES:
1. UNLESS OTHERWISE NOTED, ALL BRANCH CIRCUIT BREAKERS ARE EXISTING TO REMAIN.
2. (WHERE NOTED) PROVIDE NEW CIRCUIT BREAKER; SIZED AS SHOWN. MATCH MANUFACTURER, MODEL, AND AIC RATING OF EXISTING CIRCUIT BREAKERS.

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

Civil & Environmental Consultants, Inc.
700 Cherrington Parkway • Moon Township, Pa 15108
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GREENSBURG SALEM SCHOOL DISTRICT
JAMES H. METZGAR ELEMENTARY SCHOOL
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Allen + Shariff
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Nova Tower 2, Suite 1001
Pittsburgh, Pennsylvania 15212
412.322.9280
A+S Project: 2341083

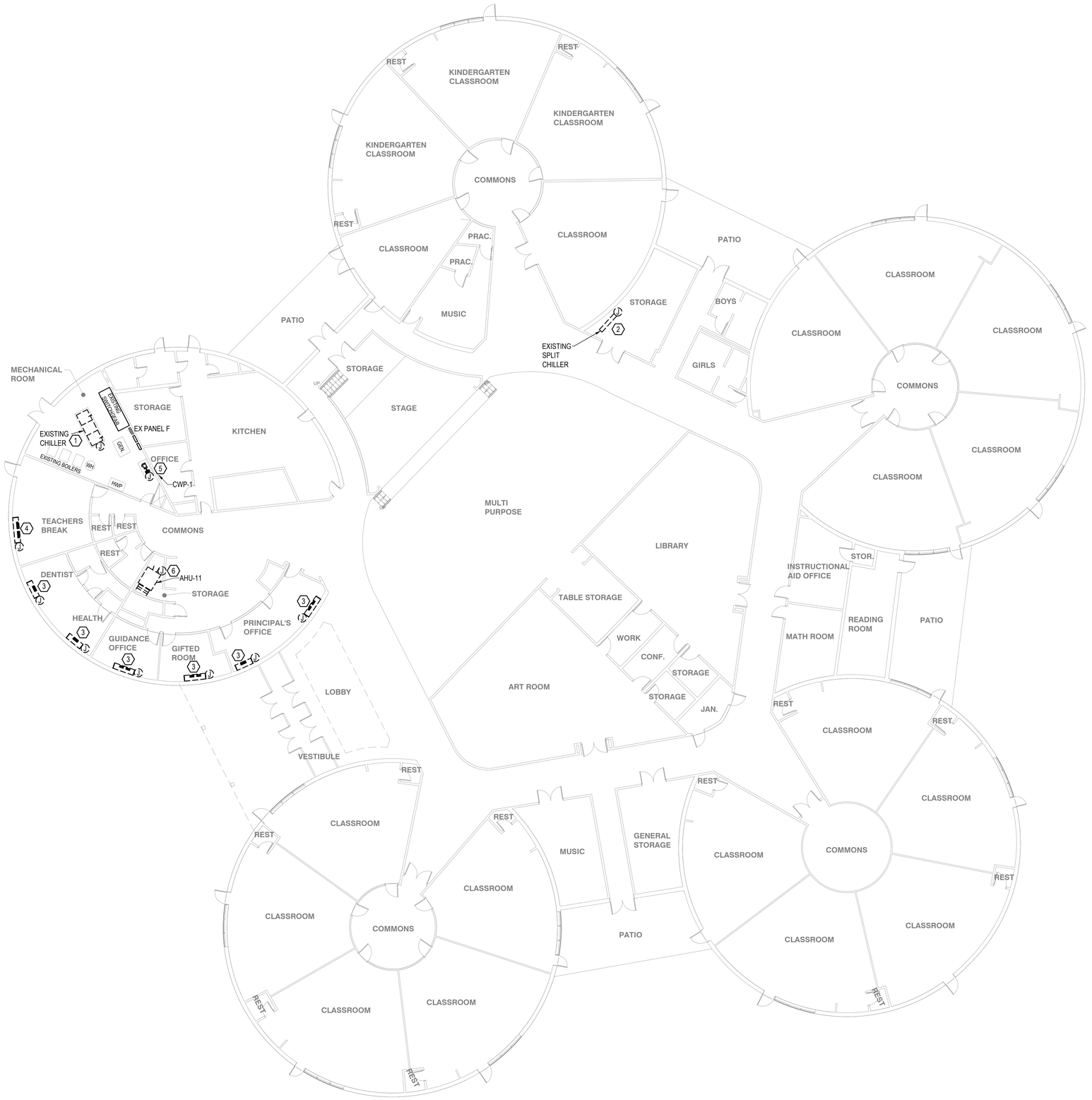
COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
ENGINEER
No. PE081572

METZGAR ELECTRICAL SCHEDULES

DATE:	XX-XX-XX	DRAWN BY:	ETC
DWG SCALE:	AS SHOWN	CHECKED BY:	ETC
PROJECT NO:	2341083		
APPROVED BY:	DEB		

DRAWING NO.:
E-1501

NORTH



1 E-2101 NICELY ELECTRICAL FIRST FLOOR DEMOLITION PLAN
3/32" = 1' 0"

ELECTRICAL DEMOLITION GENERAL NOTES:

1. ELECTRICAL DISTRIBUTION EQUIPMENT IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
2. FIXTURES AND DEVICES NOTED WITH "EX" ARE EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUITRY UNLESS OTHERWISE NOTED ON NEW WORK PLANS.
3. ALL HOLES IN WALLS, COLUMN ENCLOSURES, CEILINGS AND FLOORS FROM CONDUIT PENETRATIONS, JUNCTION BOXES, OR WIRING DEVICES SHALL BE PATCHED AND PAINTED PER THE ARCHITECT. RATED PARTITIONS SHALL BE FIREPROOFED TO MAINTAIN THE EXISTING FIRE RATING.

ELECTRICAL DEMOLITION KEY NOTES: (#)

1. REMOVE ELECTRICAL CONNECTION TO DEMOLISHED CHILLER. MAINTAIN CIRCUIT AND WIRING AT LOCATION FOR RECONNECTION TO NEW UNIT. EXISTING CAPACITY OF CIRCUIT (200A) IS ADEQUATE TO SERVE NEW UNIT. REFER TO NEW WORK PLANS.
2. REMOVE ELECTRICAL CONNECTION TO SPLIT CHILLER BEING DEMOLISHED. DEMOLISH CIRCUIT BACK TO SOURCE.
3. REMOVE ELECTRICAL CONNECTION TO UNIT VENTILATOR BEING DEMOLISHED. MAINTAIN CIRCUIT IN THIS LOCATION FOR RECONNECTION TO NEW UNIT VENTILATOR UNDER NEW WORK.
4. REMOVE ELECTRICAL CONNECTION TO UNIT VENTILATOR BEING DEMOLISHED. DEMOLISH CIRCUIT BACK TO SOURCE.
5. REMOVE ELECTRICAL CONNECTION TO CHILLED WATER PUMP BEING DEMOLISHED. MAINTAIN CIRCUIT IN THIS LOCATION FOR RECONNECTION TO NEW CHILLED WATER PUMP UNDER NEW WORK.
6. REMOVE ELECTRICAL CONNECTION TO AIR HANDLING UNIT BEING DEMOLISHED. MAINTAIN CIRCUIT IN THIS LOCATION FOR RECONNECTION TO NEW AIR HANDLING UNIT UNDER NEW WORK.

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

Civil & Environmental Consultants, Inc.
700 Cherrington Parkway • Moon Township, Pa 15108
Ph: 412.429.2324 • Fax: 800.365.2324
www.cecinc.com

GREENSBURG SALEM SCHOOL DISTRICT
DR. ROBERT F. NICELY ELEMNTARY SCHOOL
55 MCLAUGHLIN DR, GREENSBURG, PA 15601

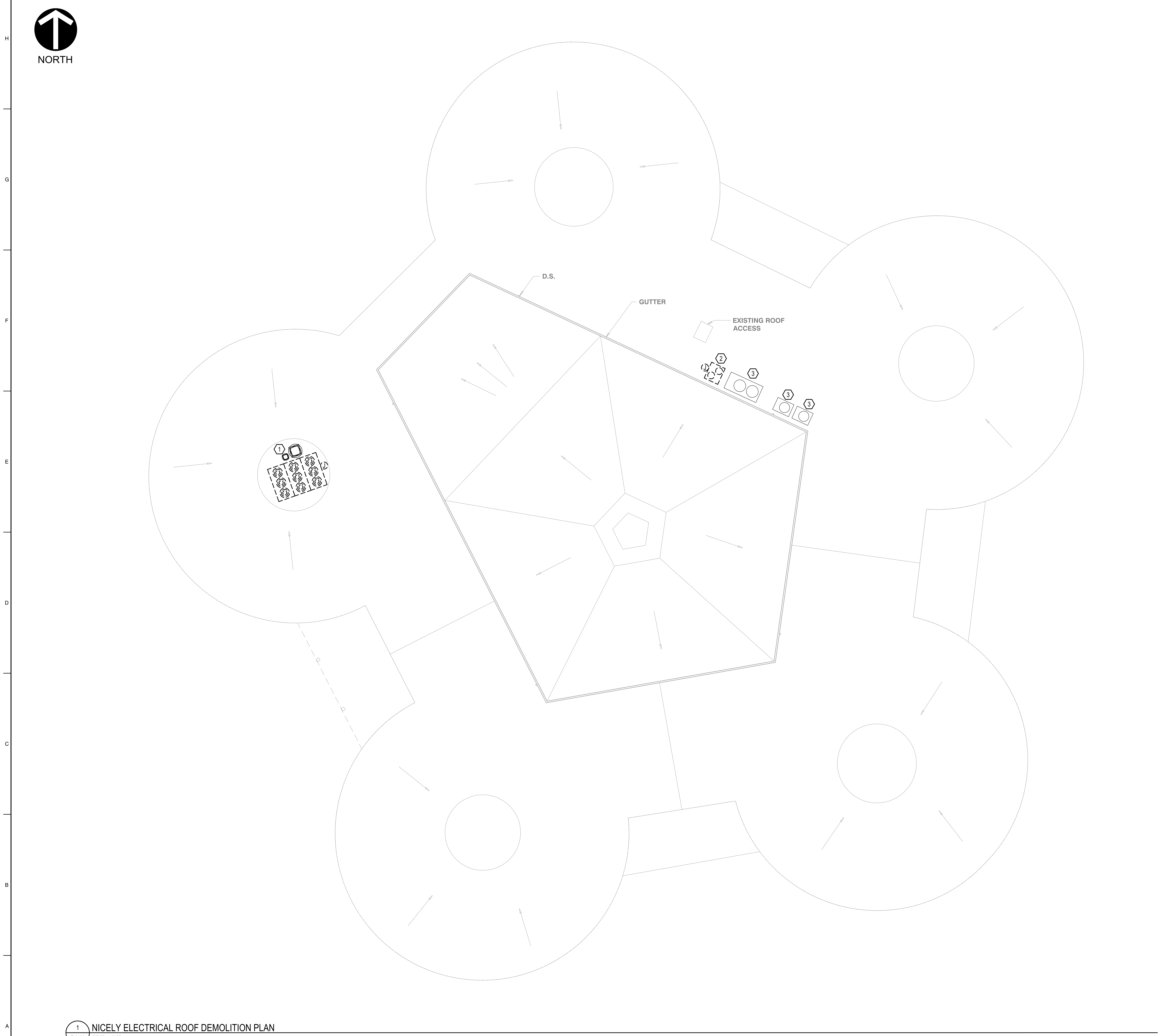
NICELY ELECTRICAL FIRST FLOOR DEMOLITION PLAN

DATE:	XX-XX-XX
DWG SCALE:	AS SHOWN
PROJECT NO:	2341083
APPROVED BY:	DEB
DRAWN BY:	ETC
CHECKED BY:	ETC

Allen + Shariff
MEP Engineering
Project Management
2 Allegheny Center
Nova Tower 2, Suite 1001
Pittsburgh, Pennsylvania 15212
412.322.9280
A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE No. PE081172

DRAWING NO.:
E-2101



1 E-2102 NICELY ELECTRICAL ROOF DEMOLITION PLAN
3/32" = 1' 0"

ELECTRICAL DEMOLITION GENERAL NOTES:

1. ELECTRICAL DISTRIBUTION EQUIPMENT IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
2. FIXTURES AND DEVICES NOTED WITH "EX" ARE EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUITRY UNLESS OTHERWISE NOTED ON NEW WORK PLANS.
3. ALL HOLES IN WALLS, COLUMN ENCLOSURES, CEILINGS AND FLOORS FROM CONDUIT PENETRATIONS, JUNCTION BOXES, OR WIRING DEVICES SHALL BE PATCHED AND PAINTED PER THE ARCHITECT. RATED PARTITIONS SHALL BE FIREPROOFED TO MAINTAIN THE EXISTING FIRE RATING.

ELECTRICAL DEMOLITION KEY NOTES:

1. REMOVE ELECTRICAL CONNECTION TO (3) CONDENSING UNIT SECTIONS BEING DEMOLISHED. MAINTAIN CIRCUIT AND WIRING AT LOCATION FOR RECONNECTION TO NEW UNIT. DO NOT DISTURB THE (2) EXISTING EXHAUST FANS. THE FANS ARE EXISTING TO REMAIN IN OPERATION. REFER TO NEW WORK PLANS.
2. REMOVE ELECTRICAL CONNECTION TO 10-TON CONDENSING UNIT BEING DEMOLISHED.
3. EXISTING CONDENSING UNIT IS EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUIT.

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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GREENSBURG SALEM SCHOOL DISTRICT
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Allen + Shariff
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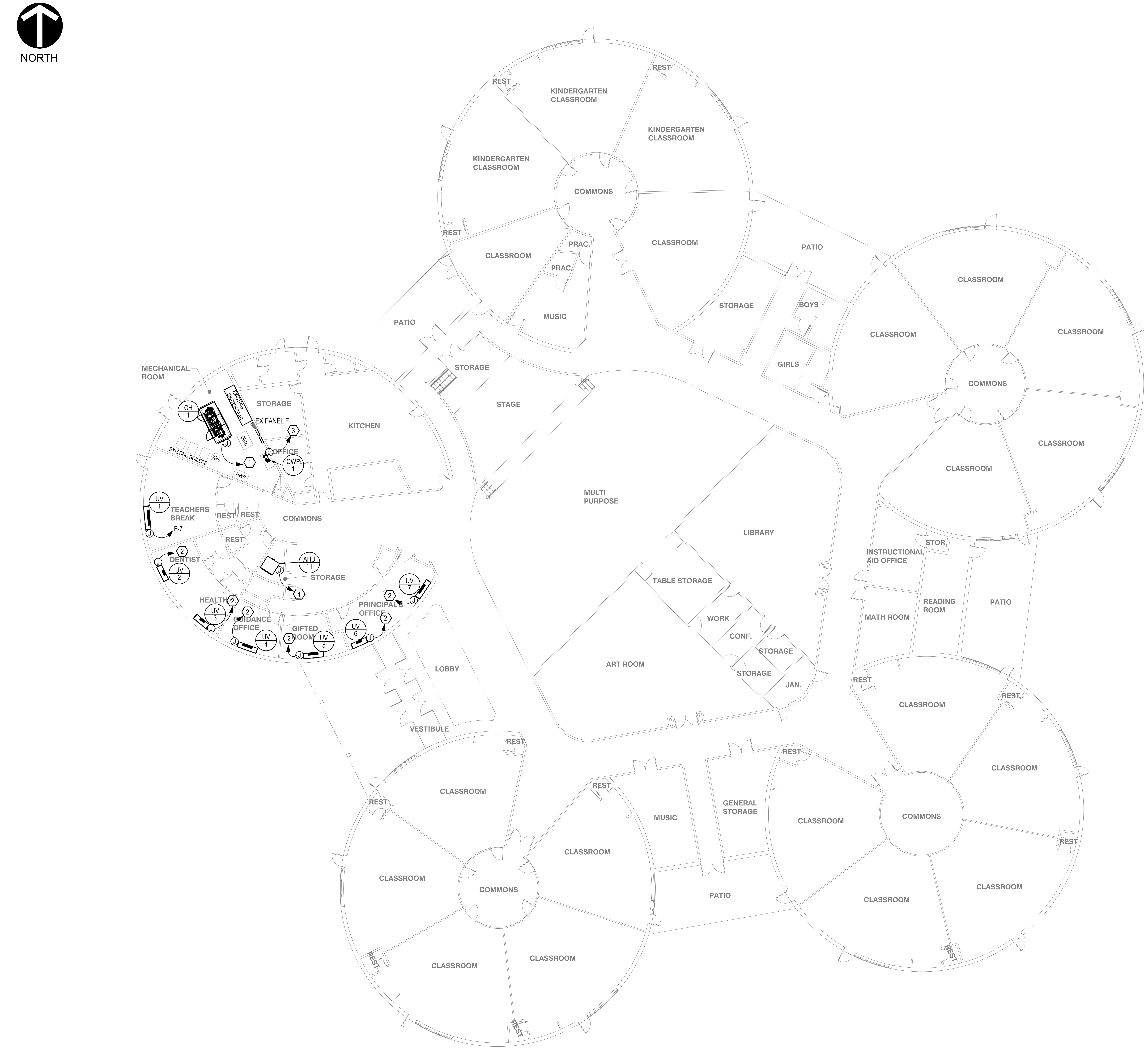
2 Allegheny Center
Nova Tower 2, Suite 1001
Pittsburgh, Pennsylvania 15212
412.322.9280
A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER DAVID C. PRICE No. PE081572

NICELY ELECTRICAL ROOF DEMOLITION PLAN

DATE:	XX-XX-XX	DRAWN BY:	ETC
DWG SCALE:	AS SHOWN	CHECKED BY:	ETC
PROJECT NO:	2341083		
APPROVED BY:	DEB		

DRAWING NO.: **E-2102**



1 NICELY ELECTRICAL FIRST FLOOR PLAN
E-2201 3/32" = 1'-0"

ELECTRICAL GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS, CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL DRAWINGS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER THE ARCHITECTURAL DRAWINGS.
4. COORDINATE EXACT LOCATIONS OF MECHANICAL EQUIPMENT WITH DIVISION 23. UNLESS NOTED OTHERWISE, MECHANICAL EQUIPMENT DISCONNECTS AND VARIABLE FREQUENCY DRIVES SHALL BE FURNISHED BY DIVISION 23, INSTALLED AND WIRED BY EC. THESE DISCONNECTS HAVE NOT BEEN SHOWN ON THIS PLAN.
5. EC SHALL NOT HAVE MORE THAN THREE CURRENT CARRYING CONDUCTORS IN A CONDUIT WITHOUT DERATING AMPACITIES PER THE NEC.

ELECTRICAL KEY NOTES:

1. PROVIDE POWER TO NEW CHILLER VIA EXISTING 200A CIRCUIT THAT HAS BEEN MAINTAINED FROM DEMOLITION. EXTEND CIRCUIT AS NECESSARY FOR A FULL INSTALLATION.
2. RECONNECT NEW UNIT HEATERS TO EXISTING CIRCUIT THAT HAS BEEN MAINTAINED FROM DEMOLITION. EXTEND CIRCUIT AS NECESSARY FOR A FULL INSTALLATION.
3. RECONNECT NEW CHILLED WATER PUMP TO EXISTING CIRCUIT THAT HAS BEEN MAINTAINED FROM DEMOLITION. EXTEND CIRCUIT AS NECESSARY FOR A FULL INSTALLATION.
4. RECONNECT NEW AIR HANDLING UNIT TO EXISTING CIRCUIT THAT HAS BEEN MAINTAINED FROM DEMOLITION. EXTEND CIRCUIT AS NECESSARY FOR A FULL INSTALLATION.

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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700 Cherrington Parkway • Moon Township, Pa 15108
Ph: 412.429.2324 Fax: 800.365.2324
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GREENSBURG SALEM SCHOOL DISTRICT
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Allen + Shariff
MEP Engineering
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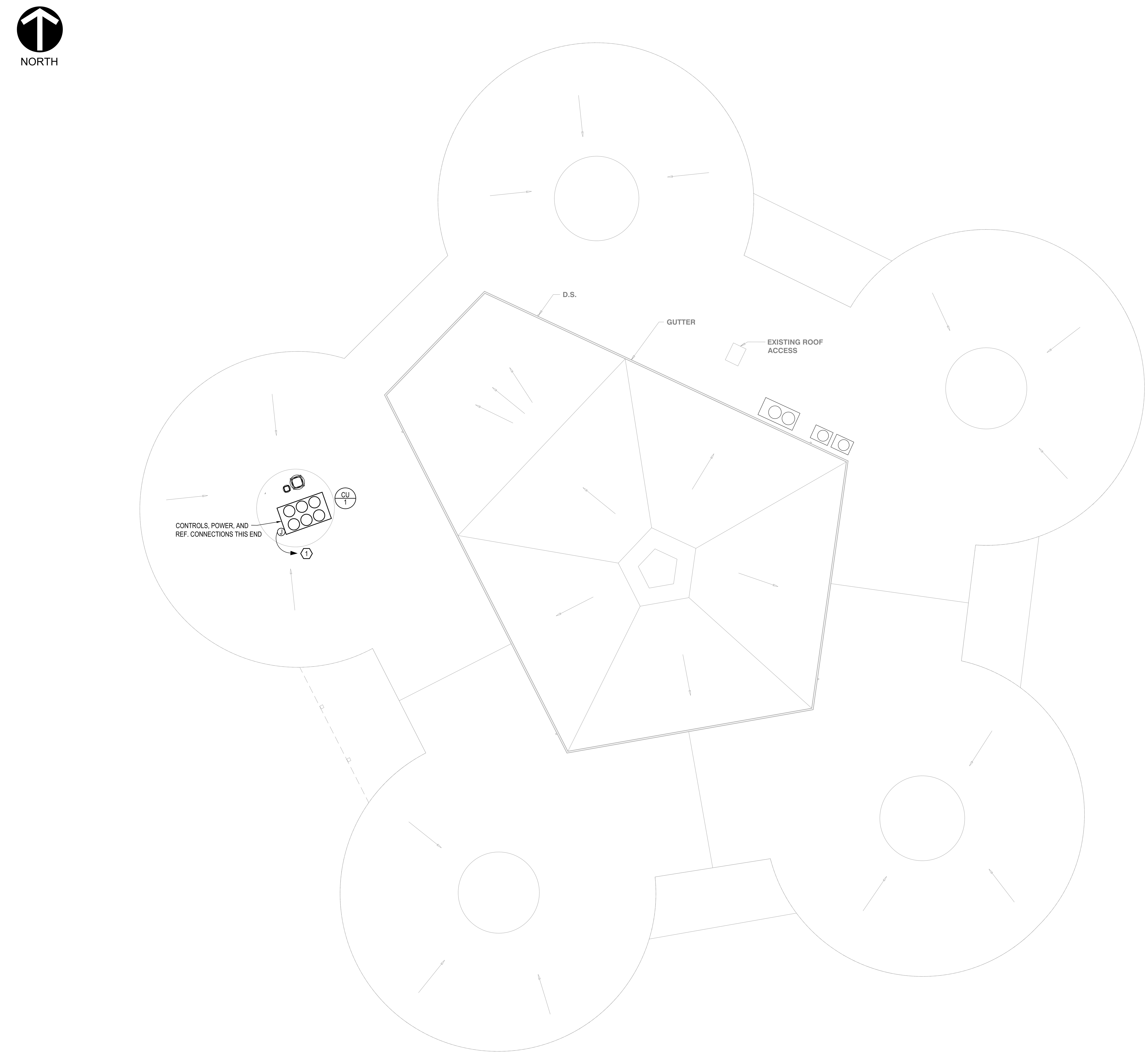
Nova Tower 2, Suite 1001
Pittsburgh, Pennsylvania 15212
412.322.9280
A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER DAVID C. PRICE

NICELY ELECTRICAL FIRST FLOOR PLAN

DATE:	XX-XX-XX	DRAWN BY: ETC
DWG SCALE:	AS SHOWN	CHECKED BY: ETC
PROJECT NO:	2341083	APPROVED BY: DEB

DRAWING NO.:
E-2201



1 / E-2202 NICELY ELECTRICAL ROOF PLAN
3/32" = 1'-0"

ELECTRICAL GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS, CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL DRAWINGS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER THE ARCHITECTURAL DRAWINGS.
4. COORDINATE EXACT LOCATIONS OF MECHANICAL EQUIPMENT WITH DIVISION 23. UNLESS NOTED OTHERWISE, MECHANICAL EQUIPMENT DISCONNECTS AND VARIABLE FREQUENCY DRIVES SHALL BE FURNISHED BY DIVISION 23, INSTALLED AND WIRED BY EC. THESE DISCONNECTS HAVE NOT BEEN SHOWN ON THIS PLAN.
5. EC SHALL NOT HAVE MORE THAN THREE CURRENT CARRYING CONDUCTORS IN A CONDUIT WITHOUT DERATING AMPACITIES PER THE NEC.

ELECTRICAL KEY NOTES:

1. PROVIDE POWER TO NEW CONDENSING UNIT VIA EXISTING CIRCUIT THAT HAS BEEN MAINTAINED FROM DEMOLITION. EC SHALL CONNECT EXISTING CIRCUIT TO 25A FUSED DISCONNECT SWITCH PROVIDED BY MC. CONFIRM THAT EXISTING WIRE CAN LAND ON LUGS OF DISCONNECT. PROVIDE 4#10, 1#10G - 3/4"C FROM DISCONNECT TO NEW UNIT FOR A FULL INSTALLATION AND PROVIDE SPLICE BOX AS REQUIRED.

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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GREENSBURG SALEM SCHOOL DISTRICT
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55 MCLAUGHLIN DR, GREENSBURG, PA 15601

Allen + Shariff
MEP Engineering
Project Management
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Nova Tower 2, Suite 1001
Pittsburgh, Pennsylvania 15212
412.322.9280
A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
ENGINEER
No. PE081572

NICELY ELECTRICAL ROOF PLAN

DATE:	XX-XX-XX	DRAWN BY:	ETC
DWG SCALE:	AS SHOWN	CHECKED BY:	ETC
PROJECT NO:	2341083		
APPROVED BY:	DEB		

DRAWING NO.:
E-2202

Existing Branch Panel: F

Location: REFER TO PLAN
Supply From: EXISTING
Mounting: SURFACE
Enclosure: TYPE 1

Volts: 480/277V
Phases: 3
Wires: 4

A.I.C. Rating: EX KAIC
Mains Type: MLO
Mains Rating:
MCB Rating: -

CKT	Circuit Description	Notes	Wire Size	Trip	Pole	LOAD (VA) A	LOAD (VA) B	LOAD (VA) C	Pole	Trip	Wire Size	Notes	Circuit Description	CKT
1	EX LOAD		EXISTING	20	1				1	20	EXISTING		EX LOAD	2
3	EX LOAD		EXISTING	20	1				1	20	EXISTING		EX LOAD	4
5	EX LOAD		EXISTING	20	1				1	20	EXISTING		EX LOAD	6
7	**UV-1**		**2#12, 1#12G - 3/4"C**	20	1	**554**			1	20	EXISTING		EX LOAD	8
9	EX SPARE			20	1				1				EX PROVISION	10
11	EX PROVISION				1				1				EX PROVISION	12
13														14
15	EX SPARE			20	3				3	20	EXISTING		EX ENTRY CABINET HEAT	16
17														18
19														20
21	EX AHU THIS ROOM		EXISTING	20	3				3	20	EXISTING		EX KITCHEN CABINET HEAT	22
23														24
25														26
27	EX UNIT VENT HEAT TEACHERS LOUNGE		EXISTING	20	3				3	20	EXISTING		EX MP STORAGE RM CHILLED WATER PUMP	28
29														30
31														32
33	EX UNIVENT OFFICE RM 50		EXISTING	20	3				3	30	EXISTING		EX CHILLED WATER PUMP LARGE CHILLER	34
35														36
37														38
39	EX ROOF COND. UNIT FOR LARGE CHILLER		EXISTING	60	3				3	60	EXISTING		EX LOAD	40
41														42
43														44
45	EX PROVISION				3				3	60	EXISTING		EX SNOW MELT	46
47														48
					Total Load:	554	0	0						
					Amps:		0.7							

NOTES:
1. UNLESS OTHERWISE NOTED, ALL BRANCH CIRCUIT BREAKERS ARE EXISTING TO REMAIN.
2. (WHERE NOTED) PROVIDE NEW CIRCUIT BREAKER; SIZED AS SHOWN. MATCH MANUFACTURER, MODEL, AND AIC RATING OF EXISTING CIRCUIT BREAKERS.

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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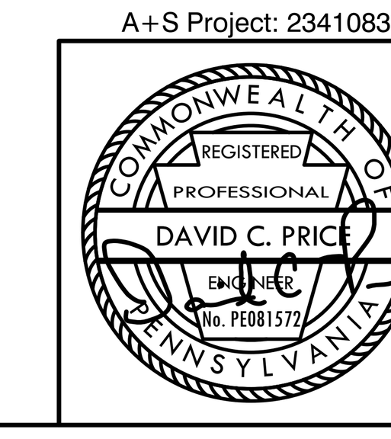
412.322.9280
A+S Project: 2341083



NICELY ELECTRICAL SCHEDULES

DATE:	XX-XX-XX	DRAWN BY:	ETC
DWG SCALE:	AS SHOWN	CHECKED BY:	ETC
PROJECT NO:	2341083		
APPROVED BY:	DEB		

DRAWING NO.:
E-2501

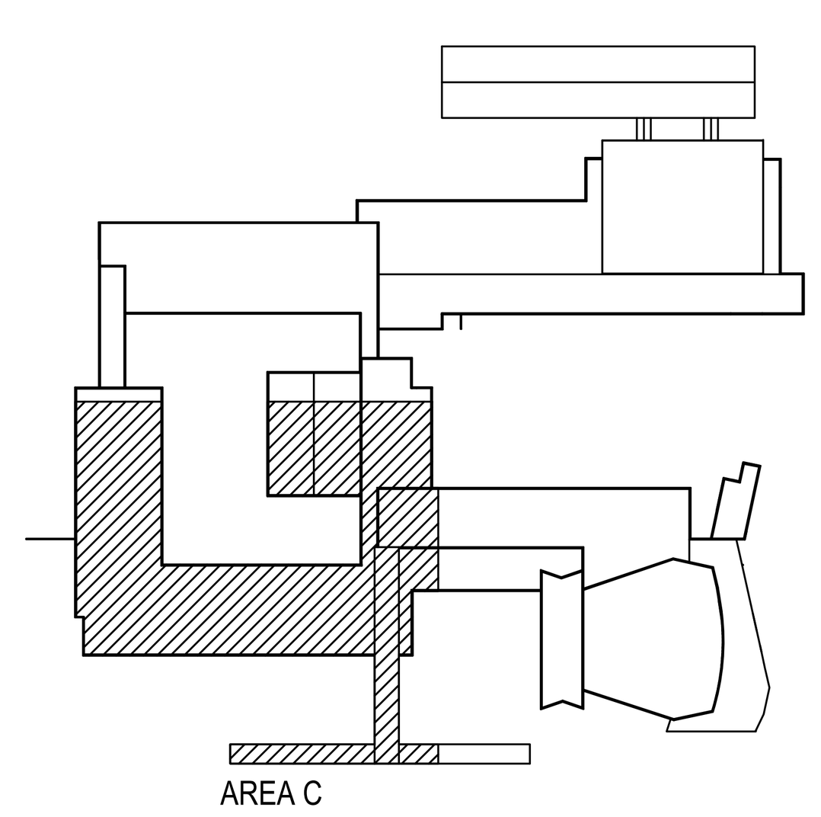
ELECTRICAL DEMOLITION GENERAL NOTES:

1. ELECTRICAL DISTRIBUTION EQUIPMENT IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
2. FIXTURES AND DEVICES NOTED WITH "EX" ARE EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUITRY UNLESS OTHERWISE NOTED ON NEW WORK PLANS.
3. ALL HOLES IN WALLS, COLUMN ENCLOSURES, CEILINGS AND FLOORS FROM CONDUIT PENETRATIONS, JUNCTION BOXES, OR WIRING DEVICES SHALL BE PATCHED AND PAINTED PER THE ARCHITECT. RATED PARTITIONS SHALL BE FIREPROOFED TO MAINTAIN THE EXISTING FIRE RATING.

ELECTRICAL DEMOLITION KEY NOTES: (#)

1. REMOVE ELECTRICAL CONNECTION TO DEMOLISHED AHU-3-C. MAINTAIN CIRCUIT AND WIRING AT LOCATION FOR RECONNECTION TO NEW UNIT. EXISTING CAPACITY OF CIRCUIT (20A) IS ADEQUATE TO SERVE NEW UNIT. REFER TO NEW WORK PLANS.
2. REMOVE ELECTRICAL CONNECTION TO UNIT VENTILATOR BEING DEMOLISHED. MAINTAIN CIRCUIT IN THIS LOCATION FOR RECONNECTION TO NEW UNIT VENTILATOR UNDER NEW WORK.

1 / E-3102C — HIGH SCHOOL ELECTRICAL DEMOLITION SECOND FLOOR PLAN - AREA C
3/32" = 1' 0"



KEYPLAN

Allen + Shariff
MEP Engineering
Project Management
2 Allegheny Center
Nova Tower 2, Suite 1001
Pittsburgh, Pennsylvania 15212
412.322.9280
A+S Project: 2341083

Civil & Environmental Consultants, Inc.
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Ph: 412.429.2324 • Fax: 800.365.2324
www.cecinc.com

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

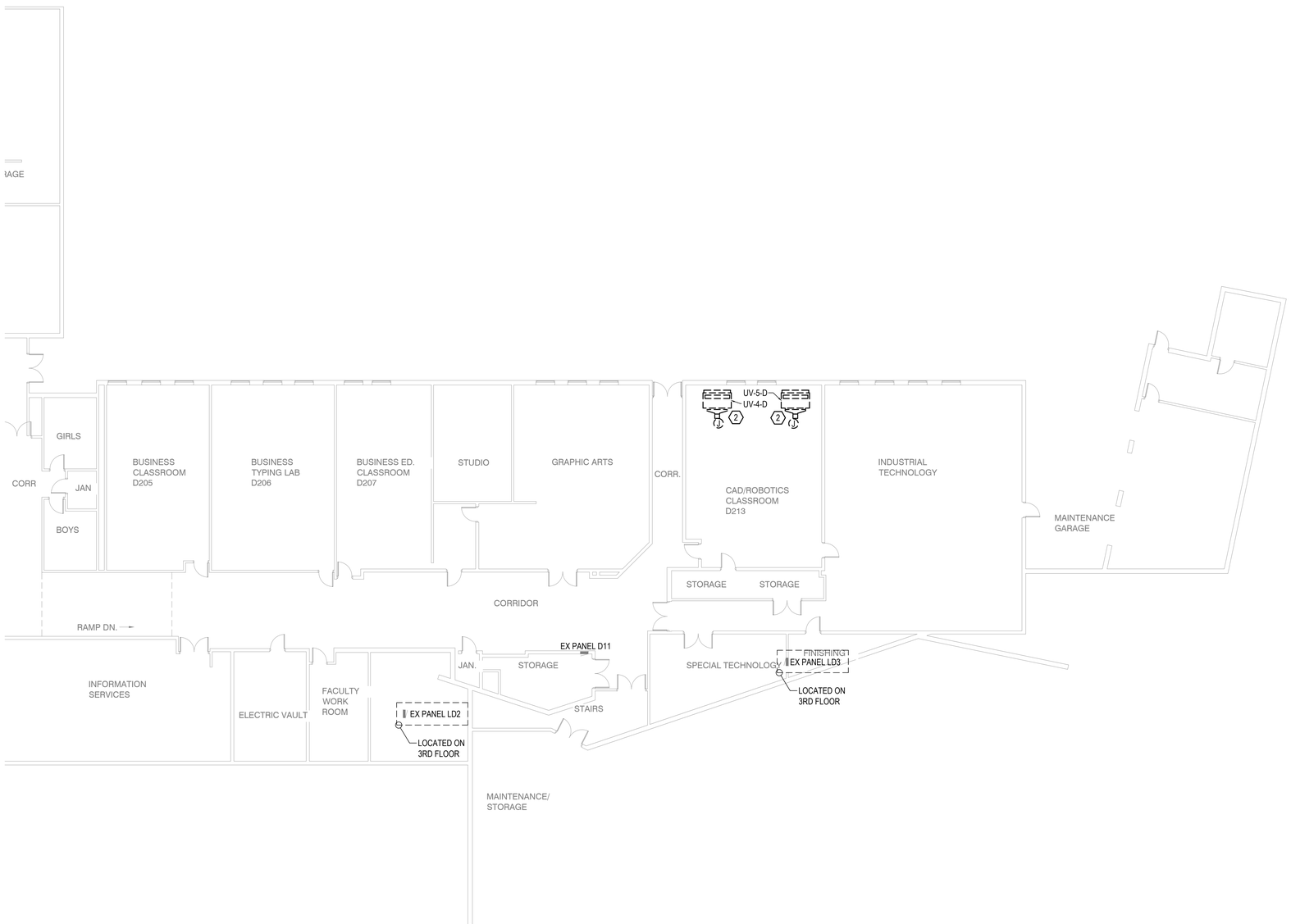
GREENSBURG SALEM SCHOOL DISTRICT
HIGHSCHOOL
65 MENNEL DRIVE
GREENSBURG, PA 15601

HIGH SCHOOL
ELECTRICAL DEMOLITION
SECOND FLOOR PLAN - AREA C

DATE:	XX-XX-XX	DRAWN BY:	ETC
DWG SCALE:	AS SHOWN	CHECKED BY:	ETC
PROJECT NO:			2341083
APPROVED BY:			DEB

DAVID C. PRICE — REGISTERED PROFESSIONAL ENGINEER — COMMONWEALTH OF PENNSYLVANIA

DRAWING NO.:
E-3102C



1 / E-3102D HIGH SCHOOL ELECTRICAL DEMOLITION SECOND FLOOR PLAN - AREA D

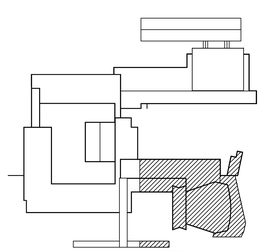
3/32" = 1' 0"

ELECTRICAL DEMOLITION GENERAL NOTES:

1. ELECTRICAL DISTRIBUTION EQUIPMENT IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
2. FIXTURES AND DEVICES NOTED WITH "EX" ARE EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUITRY UNLESS OTHERWISE NOTED ON NEW WORK PLANS.
3. ALL HOLES IN WALLS, COLUMN ENCLOSURES, CEILINGS AND FLOORS FROM CONDUIT PENETRATIONS, JUNCTION BOXES, OR WIRING DEVICES SHALL BE PATCHED AND PAINTED PER THE ARCHITECT. RATED PARTITIONS SHALL BE FIREPROOFED TO MAINTAIN THE EXISTING FIRE RATING.

ELECTRICAL DEMOLITION KEY NOTES: (#)

1. REMOVE ELECTRICAL CONNECTION TO DEMOLISHED AHU-3-C. MAINTAIN CIRCUIT AND WIRING AT LOCATION FOR RECONNECTION TO NEW UNIT. EXISTING CAPACITY OF CIRCUIT (20A) IS ADEQUATE TO SERVE NEW UNIT. REFER TO NEW WORK PLANS.
2. REMOVE ELECTRICAL CONNECTION TO UNIT VENTILATOR BEING DEMOLISHED. MAINTAIN CIRCUIT IN THIS LOCATION FOR RECONNECTION TO NEW UNIT VENTILATOR UNDER NEW WORK.



AREA D

KEYPLAN

Allen + Shariff
MEP Engineering
Project Management
2 Allegheny Center
Nova Tower 2, Suite 1001
Pittsburgh, Pennsylvania 15212
412.322.9280
A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE No. PE081177

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	19 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

Civil & Environmental Consultants, Inc.
700 Cherrington Parkway • Moon Township, Pa. 15108
Ph: 412.429.2324 • Fax: 800.365.2324
www.cecinc.com

GREENSBURG SALEM SCHOOL DISTRICT
HIGHSCHOOL
65 MENNEL DRIVE
GREENSBURG, PA 15601

HIGH SCHOOL
ELECTRICAL DEMOLITION
SECOND FLOOR PLAN - AREA D

DATE:	xx-xx-xx
DWG SCALE:	AS SHOWN
PROJECT NO:	2341083
APPROVED BY:	DEB
DRAWN BY:	ETC
CHECKED BY:	ETC

DRAWING NO.:
E-3102D

ELECTRICAL DEMOLITION GENERAL NOTES:

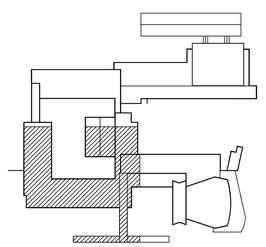
1. ELECTRICAL DISTRIBUTION EQUIPMENT IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
2. FIXTURES AND DEVICES NOTED WITH "EX" ARE EXISTING TO REMAIN. MAINTAIN EXISTING CIRCUITRY UNLESS OTHERWISE NOTED ON NEW WORK PLANS.
3. ALL HOLES IN WALLS, COLUMN ENCLOSURES, CEILINGS AND FLOORS FROM CONDUIT PENETRATIONS, JUNCTION BOXES, OR WIRING DEVICES SHALL BE PATCHED AND PAINTED PER THE ARCHITECT. RATED PARTITIONS SHALL BE FIREPROOFED TO MAINTAIN THE EXISTING FIRE RATING.

ELECTRICAL DEMOLITION KEY NOTES: (#)

1. REMOVE ELECTRICAL CONNECTION TO HVAC UNIT AS INDICATED. DEMOLISH CIRCUIT BACK TO SOURCE.

AHU 1-D
CU 8-D
AHU 2-D
CU 7-D
AHU 3-D
CU 6-D
CU 4-D

1 / E-3104D HIGH SCHOOL ELECTRICAL DEMOLITION ROOF PLAN - AREA D
3/32" = 1' 0"



KEYPLAN

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412.322.9280
A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID C. PRICE
No. PE081577

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	19 SEP 2003	MAB	DCP	ISSUED FOR PERMIT/BID

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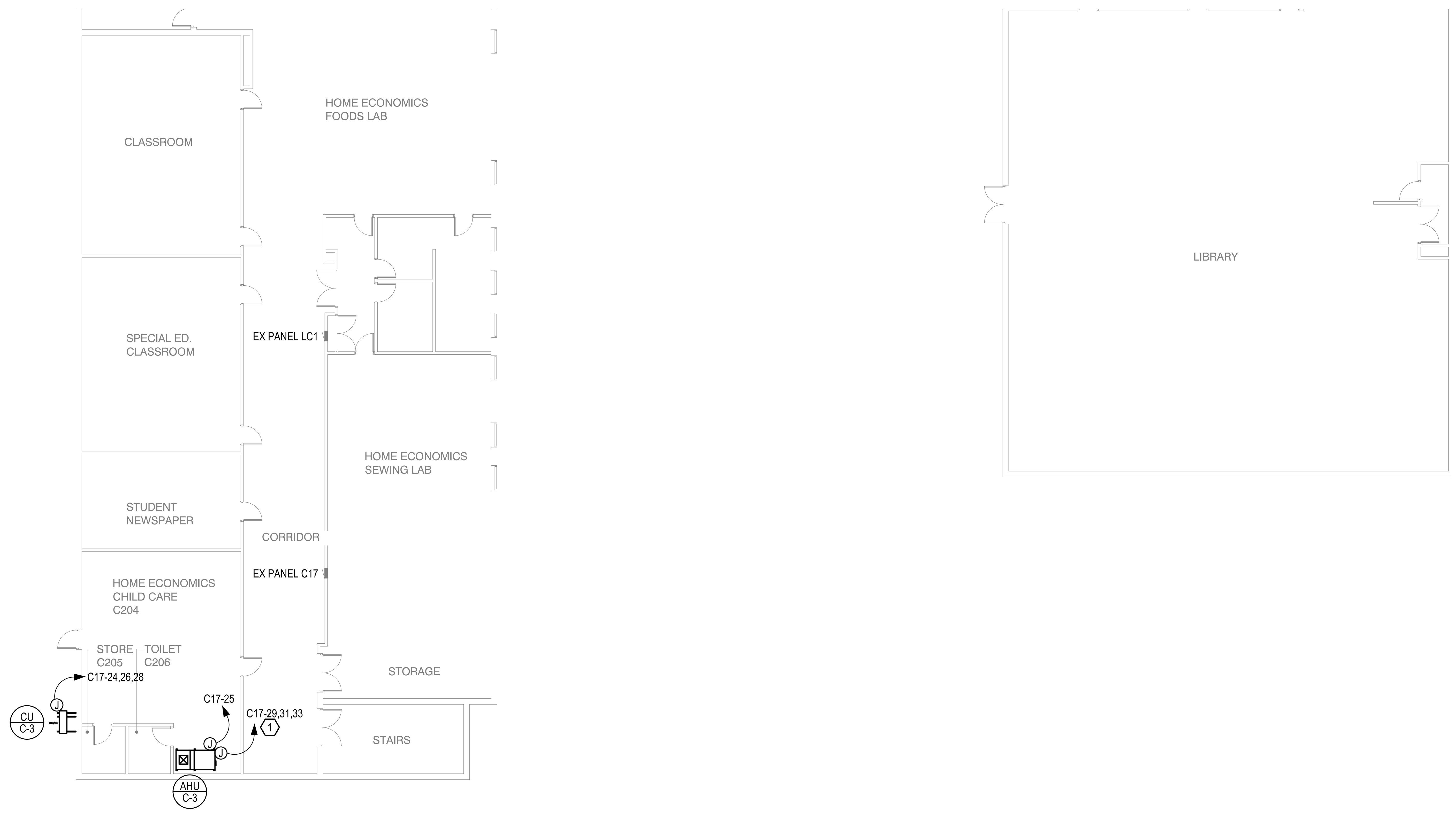
GREENSBURG SALEM SCHOOL DISTRICT
HIGHSCHOOL
65 MENNEL DRIVE
GREENSBURG, PA 15601

HIGH SCHOOL
ELECTRICAL DEMOLITION
ROOF PLAN - AREA D

DATE:	XX-XX-XX
DRAWN BY:	ETC
DWG SCALE:	AS SHOWN
CHECKED BY:	ETC
PROJECT NO:	2341083
APPROVED BY:	DEB

DRAWING NO.:
E-3104D



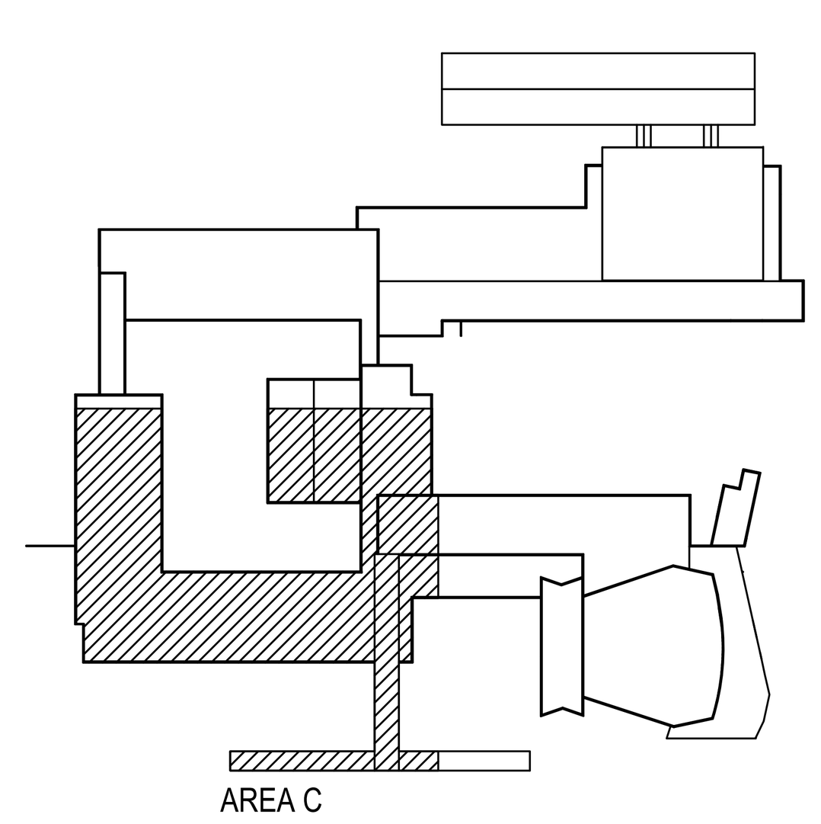
1 HIGH SCHOOL ELECTRICAL SECOND FLOOR PLAN - AREA C
E-3202C 3/32" = 1' 0"

ELECTRICAL GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS, CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL DRAWINGS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER THE ARCHITECTURAL DRAWINGS.
4. COORDINATE EXACT LOCATIONS OF MECHANICAL EQUIPMENT WITH DIVISION 23. UNLESS NOTED OTHERWISE, MECHANICAL EQUIPMENT DISCONNECTS AND VARIABLE FREQUENCY DRIVES SHALL BE FURNISHED BY DIVISION 23, INSTALLED AND WIRED BY EC. THESE DISCONNECTS HAVE NOT BEEN SHOWN ON THIS PLAN.
5. EC SHALL NOT HAVE MORE THAN THREE CURRENT CARRYING CONDUCTORS IN A CONDUIT WITHOUT DERATING AMPACITIES PER THE NEC.

ELECTRICAL KEY NOTES:

1. PROVIDE POWER TO NEW AHU-C-3 VIA EXISTING 20A CIRCUIT THAT HAS BEEN MAINTAINED FROM DEMOLITION. EXTEND CIRCUIT AS NECESSARY FOR A FULL INSTALLATION. CIRCUIT DESIGNATION IS SHOWN FOR CONVENIENCE.
2. PROVIDE POWER TO NEW HIGH-WALL TYPE DUCTLESS SPLIT VIA OUTDOOR UNIT. INDOOR UNIT SHALL BE POWERED FROM ASSOCIATED OUTDOOR UNIT. PROVIDE INTERCONNECTING WIRING PER EQUIPMENT SPECIFICATIONS.
3. PROVIDE POWER TO NEW HVAC UNIT. PROVIDE INTERCONNECTION WIRING AS NOTED TO INDOOR UNIT.
4. PROVIDE POWER TO NEW HVAC UNIT AS NOTED. CIRCUIT SHALL BE TAPPED TO SERVE ALL (3) UNITS AS INDICATED. FUSED DISCONNECTS SHALL BE PROVIDED BY MECHANICAL CONTRACTOR, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.
5. RECONNECT NEW UNIT VENTILATORS TO EXISTING CIRCUIT THAT HAS BEEN MAINTAINED FROM DEMOLITION. EXTEND CIRCUIT AS NECESSARY FOR A FULL INSTALLATION.
6. PROVIDE POWER TO NEW HVAC UNIT AS NOTED. CIRCUIT SHALL BE TAPPED TO SERVE ALL (2) UNITS AS INDICATED. FUSED DISCONNECTS SHALL BE PROVIDED BY MECHANICAL CONTRACTOR, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.



KEYPLAN

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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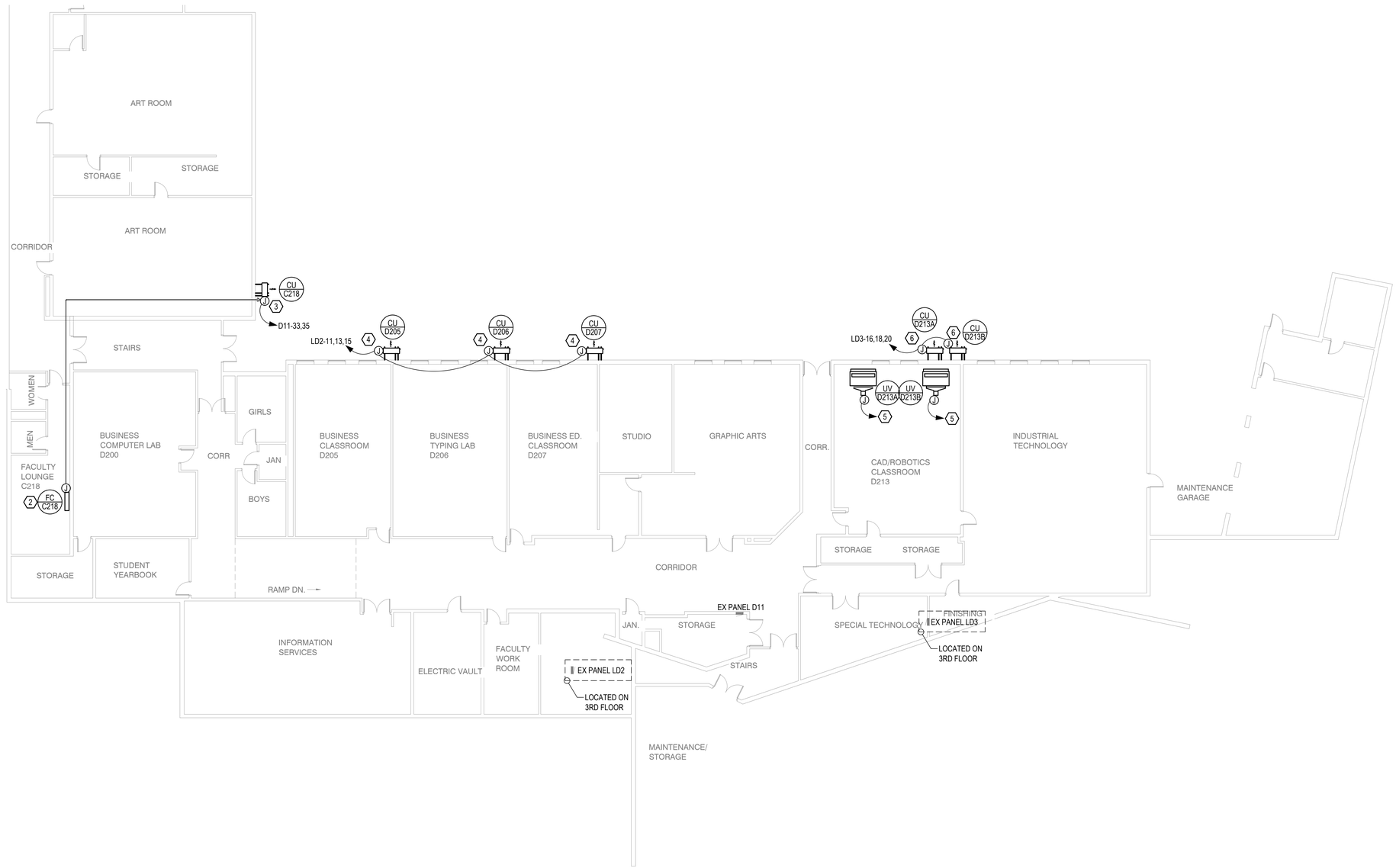
Pittsburgh, Pennsylvania 15212
412.322.9280
A+S Project: 2341083

HIGH SCHOOL
ELECTRICAL
SECOND FLOOR PLAN - AREA C

DATE:	XX-XX-XX	
DRAWN BY:		ETC
DWG SCALE:	AS SHOWN	
CHECKED BY:		ETC
PROJECT NO:		2341083
APPROVED BY:		DEB

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER DAVID C. PRICE

DRAWING NO.:
E-3202C



1 E-3202D HIGH SCHOOL ELECTRICAL SECOND FLOOR PLAN - AREA D
3/32" = 1' 0"

ELECTRICAL GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS, CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
2. PROVIDE EXPANSION FITTINGS AS REQUIRED AT ALL EXPANSION JOINTS. COORDINATE WITH ARCHITECTURAL DRAWINGS.
3. WHERE EXPOSED, BRANCH CIRCUITS SHALL BE RUN IN EMT CONDUIT ROUTED PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE. WHERE CONCEALED WITHIN WALLS OR ABOVE CEILING, MC CABLE IS PERMISSIBLE. EXPOSED CONDUIT SHALL BE PAINTED PER THE ARCHITECTURAL DRAWINGS.
4. COORDINATE EXACT LOCATIONS OF MECHANICAL EQUIPMENT WITH DIVISION 23. UNLESS NOTED OTHERWISE, MECHANICAL EQUIPMENT DISCONNECTS AND VARIABLE FREQUENCY DRIVES SHALL BE FURNISHED BY DIVISION 23, INSTALLED AND WIRED BY EC. THESE DISCONNECTS HAVE NOT BEEN SHOWN ON THIS PLAN.
5. EC SHALL NOT HAVE MORE THAN THREE CURRENT CARRYING CONDUCTORS IN A CONDUIT WITHOUT DERATING AMPACITIES PER THE NEC.

ELECTRICAL KEY NOTES: (#)

1. PROVIDE POWER TO NEW AHU-C-3 VIA EXISTING 20A CIRCUIT THAT HAS BEEN MAINTAINED FROM DEMOLITION. EXTEND CIRCUIT AS NECESSARY FOR A FULL INSTALLATION. CIRCUIT DESIGNATION IS SHOWN FOR CONVENIENCE.
2. PROVIDE POWER TO NEW HIGH-WALL TYPE DUCTLESS SPLIT VIA OUTDOOR UNIT. INDOOR UNIT SHALL BE POWERED FROM ASSOCIATED OUTDOOR UNIT. PROVIDE INTERCONNECTING WIRING PER EQUIPMENT SPECIFICATIONS.
3. PROVIDE POWER TO NEW HVAC UNIT. PROVIDE INTERCONNECTION WIRING AS NOTED TO INDOOR UNIT.
4. PROVIDE POWER TO NEW HVAC UNIT AS NOTED. CIRCUIT SHALL BE TAPPED TO SERVE ALL (3) UNITS AS INDICATED. FUSED DISCONNECTS SHALL BE PROVIDED BY MECHANICAL CONTRACTOR, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.
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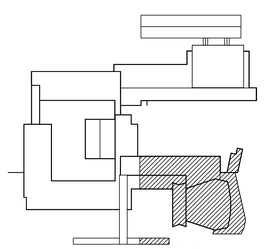
6. PROVIDE POWER TO NEW HVAC UNIT AS NOTED. CIRCUIT SHALL BE TAPPED TO SERVE ALL (2) UNITS AS INDICATED. FUSED DISCONNECTS SHALL BE PROVIDED BY MECHANICAL CONTRACTOR, INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.



KEYPLAN

Allen + Shariff
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Nova Tower 2, Suite 1001
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412.322.9280
A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL DAVID C. PRICE No. PE081173

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	16 SEP 2022	MAB	DCP	ISSUED FOR PERMIT/BID

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HIGHSCHOOL
65 MENNEL DRIVE
GREENSBURG, PA 15601

HIGH SCHOOL
ELECTRICAL
SECOND FLOOR PLAN - AREA D

DATE:	XX-XX-XX
DRAWN BY:	ETC
DWG SCALE:	AS SHOWN
CHECKED BY:	ETC
PROJECT NO:	2341083
APPROVED BY:	DEB

DRAWING NO.:
E-3202D

ELECTRICAL GENERAL NOTES:

1. FIRE STOP ALL FIRE RATED FLOORS, CEILINGS, AND WALLS AS REQUIRED BY CODE. PENETRATIONS INTO OR THROUGH FIRE RESISTANCE RATED WALLS SHALL COMPLY WITH IBC CHAPTER 7.
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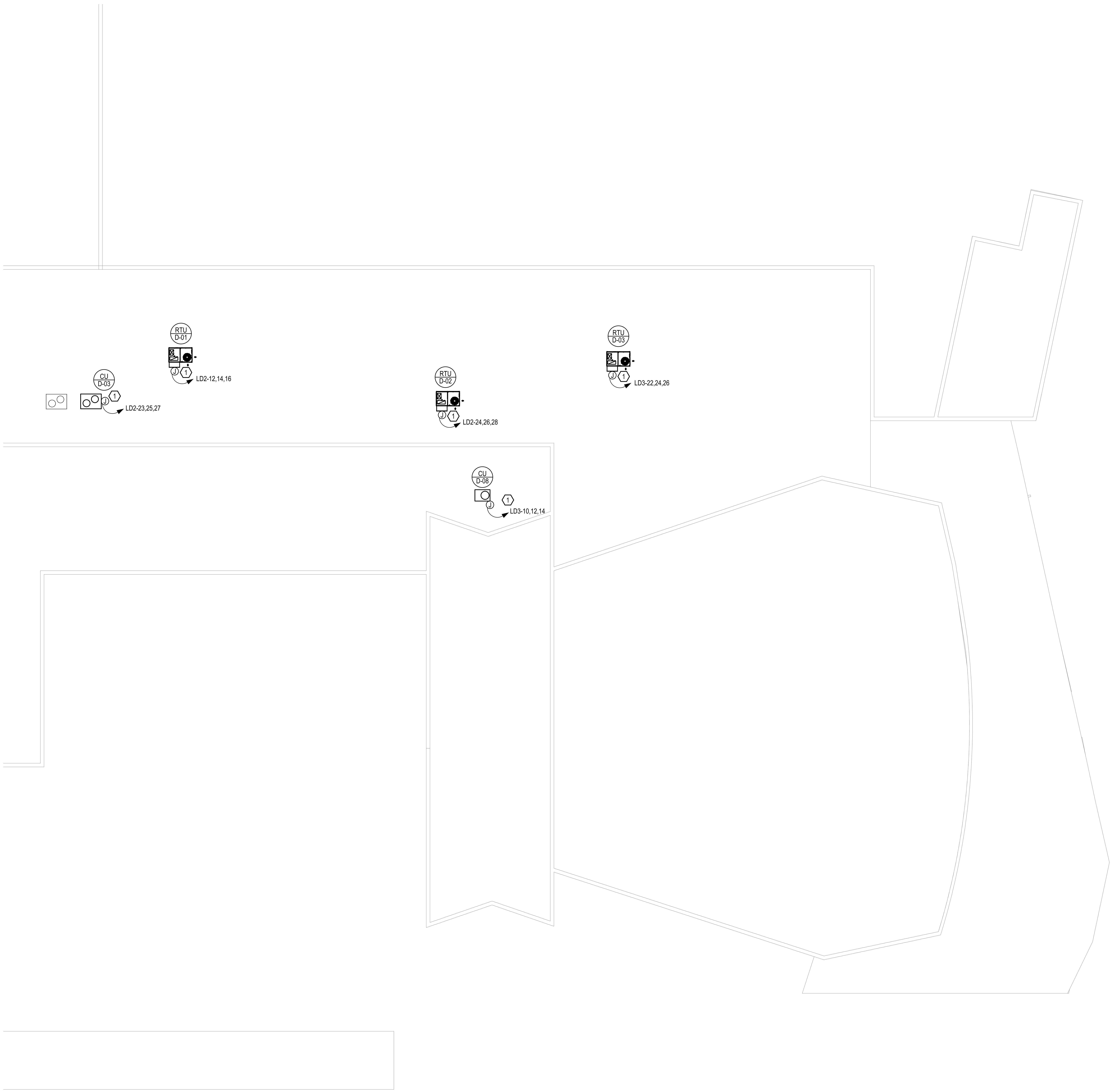
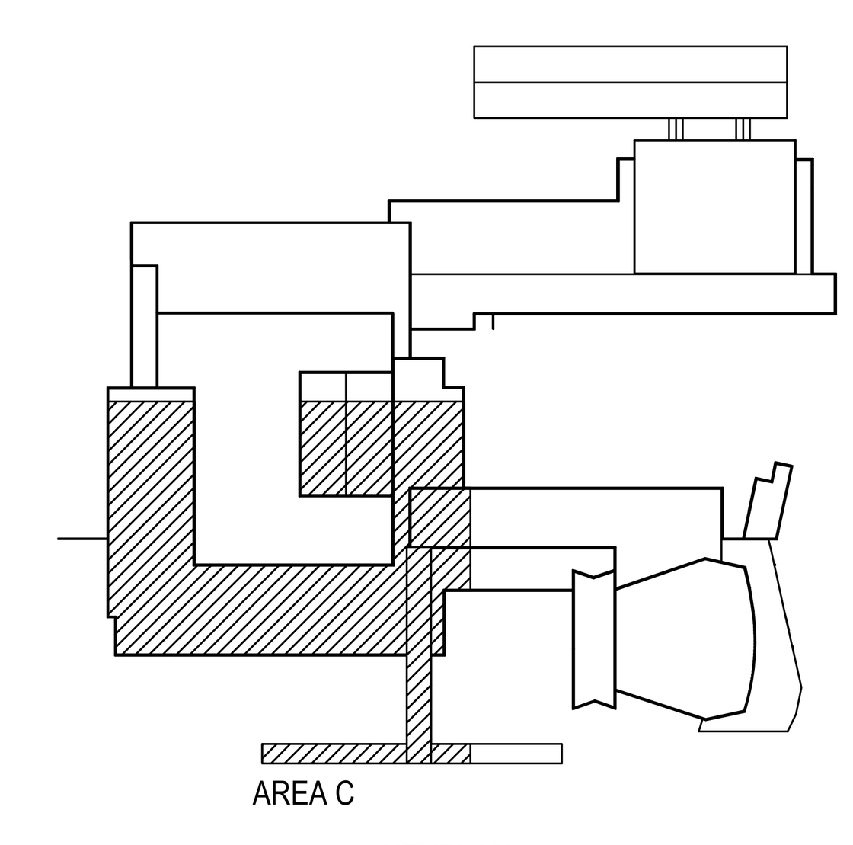
5. EC SHALL NOT HAVE MORE THAN THREE CURRENT CARRYING CONDUCTORS IN A CONDUIT WITHOUT DERATING AMPACITIES PER THE NEC.

ELECTRICAL KEY NOTES:

1. PROVIDE POWER TO NEW HVAC UNIT AS INDICATED.



1 E-3204D HIGH SCHOOL ELECTRICAL ROOF PLAN - AREA D
3/32" = 1' 0"



KEYPLAN

REVISION RECORD				
NO	DATE	DRAWN	CHECK	DESCRIPTION
	18 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

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A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER DAVID C. PRICE

HIGH SCHOOL
ELECTRICAL DEMOLITION
ROOF PLAN - AREA D

DATE:	XX-XX-XX	DRAWN BY:	ETC
DWG SCALE:	AS SHOWN	CHECKED BY:	ETC
PROJECT NO:	2341083	APPROVED BY:	DEB

DRAWING NO.:
E-3204D

Existing Branch Panel: C17

Location: REFER TO PLAN
Supply From: EXISTING
Mounting: RECESSED
Enclosure: TYPE 1

Volts: 208/120V
Phases: 3
Wires: 4

A.I.C. Rating: EX KAIC
Mains Type: MLO
Mains Rating: 100
MCB Rating: -

CKT	Circuit Description	Notes	Wire Size	Trip	Pole	LOAD (VA) A	LOAD (VA) B	LOAD (VA) C	Pole	Trip	Wire Size	Notes	Circuit Description	CKT
	EX PROVISION				1				1	20			EX SPARE	
1	EX RECEPTACLES		EXISTING	20	1				1	20	EXISTING		EX RECEPTACLES	2
3	EX RECEPTACLES		EXISTING	20	1				1	20	EXISTING		EX RECEPTACLES	4
5	EX RECEPTACLES		EXISTING	20	1				1	20	EXISTING		EX RECEPTACLES	6
7	EX RECEPTACLES		EXISTING	20	1				1	20	EXISTING		EX RECEPTACLES	8
9	EX RECEPTACLES		EXISTING	20	1				1	20	EXISTING		EX RECEPTACLES	10
11	EX RECEPTACLES		EXISTING	20	1				1	20	EXISTING		EX RECEPTACLES	12
13	EX UNIT VENT		EXISTING	20	1				1	20	EXISTING		EX REFRIGERATOR	14
15	EX CAB HTRS		EXISTING	20	1				1	20	EXISTING		EX EF'S-2C, 3C	16
17	EX COURTYARD RECEPT		EXISTING	20	1				1	20	EXISTING		EX OUTSIDE RECEPT	18
19	EX COURTYARD RECEPT		EXISTING	20	1				1	20	EXISTING		EX CHILDCARE	20
21	EX COURTYARD RECEPT		EXISTING	20	1				1	20	EXISTING		EX RANGE CIR	22
23	EX COURTYARD RECEPT		EXISTING	20	1	**2570**								24
25	**AHU-C-3 CONTROLS**		**2#12, 1#12G - 3/4"C**	20	1		**500**	**2570**	**3**	**35**	**4#8, 1#10G - 1"C**	**2**	**CU-C-3**	26
27	EX SPARE			20	1									28
29						**697**								30
31	**AHU-C-3**		**4#12, 1#12G - 3/4"C**	20	3		**697**		3	20	EXISTING		EX AHU-2C	32
33								**697**						34
					Total Load:	**3267**	**3767**	**3267**						
					Amps:		**28.6**							

NOTES:
1. UNLESS OTHERWISE NOTED, ALL BRANCH CIRCUIT BREAKERS ARE EXISTING TO REMAIN.
2. (WHERE NOTED) PROVIDE NEW CIRCUIT BREAKER; SIZED AS SHOWN. MATCH MANUFACTURER, MODEL, AND AIC RATING OF EXISTING CIRCUIT BREAKERS.

Existing Branch Panel: D11

Location: REFER TO PLAN
Supply From: EXISTING
Mounting: RECESSED
Enclosure: TYPE 1

Volts: 208/120V
Phases: 3
Wires: 4

A.I.C. Rating: EX KAIC
Mains Type: MLO
Mains Rating: 150
MCB Rating: -

CKT	Circuit Description	Notes	Wire Size	Trip	Pole	LOAD (VA) A	LOAD (VA) B	LOAD (VA) C	Pole	Trip	Wire Size	Notes	Circuit Description	CKT
1	EX SPARE			20	1				1	20	EXISTING		EX RECEPTACLES	2
3	EX SPARE			20	1				1	20	EXISTING		EX RECEPTACLES	4
5	EX SPARE			20	1				1	20	EXISTING		EX RECEPTACLES	6
7	EX SPARE			20	1				1	20	EXISTING		EX RECEPTACLES	8
9	EX EWC		EXISTING	20	1				1	20	EXISTING		EX RECEPTACLES	10
11	EX SPARE			20	1				1	20	EXISTING		EX RECEPTACLES	12
13	EX RECEPTACLES		EXISTING	20	1				1	20	EXISTING		EX CAB HTRS	14
15	EX RECEPTACLES		EXISTING	20	1				1	20	EXISTING		EX EF-16D	16
17	EX RECEPTACLES		EXISTING	20	1				1	20	EXISTING		EX EF-15D	18
19	EX RECEPTACLES		EXISTING	20	1				1	20	EXISTING		EX UNIT VENTS	20
21	EX RECEPTACLES		EXISTING	20	1				1	20	EXISTING		EX UNIT VENTS	22
23	EX DISPLAY CASE		EXISTING	20	1				1	20			EX SPARE	24
25	EX RECEPTACLES		EXISTING	20	1				1	20	EXISTING		EX RECEPTACLES	26
27	EX RECEPTACLES		EXISTING	20	1				1	20	EXISTING		EX PHOTO LAB TAB	28
29	EX RECEPTACLES		EXISTING	20	1				1	20	EXISTING		EX PHOTO LAB EQ	30
31	EX FILM DRYER		EXISTING	20	1									32
33	**CU-C218, FC-C218**	**2**	**3#10, 1#10G - 3/4"C**	**25**	**1**		**1664**		3	20			EX SPARE	34
35								**1664**						36
37														38
39	EX AHU-8D		EXISTING	20	3				3	20	EXISTING		EX AHU-9D	40
41														42
					Total Load:	**0**	**1664**	**1664**						
					Amps:		**9.2**							

NOTES:
1. UNLESS OTHERWISE NOTED, ALL BRANCH CIRCUIT BREAKERS ARE EXISTING TO REMAIN.
2. (WHERE NOTED) PROVIDE NEW CIRCUIT BREAKER; SIZED AS SHOWN. MATCH MANUFACTURER, MODEL, AND AIC RATING OF EXISTING CIRCUIT BREAKERS.

Existing Branch Panel: LD2

Location: REFER TO PLAN
Supply From: EXISTING
Mounting: RECESSED
Enclosure: TYPE 1

Volts: 480/277V
Phases: 3
Wires: 4

A.I.C. Rating: EX KAIC
Mains Type: MLO
Mains Rating: 200
MCB Rating: -

CKT	Circuit Description	Notes	Wire Size	Trip	Pole	LOAD (VA) A	LOAD (VA) B	LOAD (VA) C	Pole	Trip	Wire Size	Notes	Circuit Description	CKT
1	EX NURSE LTS		EXISTING	20	1				1	20	EXISTING		EX COMP RM LTS	2
3	EX SEM/ELEC LTS		EXISTING	20	1				1	20	EXISTING		EX CHOIR LTS	4
5	EX CORR LTS		EXISTING	20	1				1	20	EXISTING		EX MUSIC OFF LTS	6
7	EX CONT #17		EXISTING	20	1				1	20			EX SPARE	8
9	EX CONT#18		EXISTING	20	1				1	20			EX SPARE	10
11								**9422** **3880**						12
13	**CU-D205, CU-D206, CU-D207**	**2**	**4#6, 1#10G - 1"C**	**50**	**3**	**9422** **3880**			**3**	**20**	**4#12, 1#12G - 3/4"C**	**2**	**RTU-D-01**	14
15							**9422** **3880**							16
17														18
19	EX CU8-D		EXISTING	20	3				3	20	EXISTING		EX CU9-D	20
21														22
23								**5820** **3880**						24
25	**CU-D-3**	**2**	**4#10, 1#10G - 3/4"C**	**30**	**3**	**5820** **3880**			3	20	**4#12, 1#12G - 3/4"C**		**RTU-D-02**	26
27							**5820** **3880**							28
29														30
31	EX ZONE CONT PNL #1		EXISTING	15	3				3	20	EXISTING		EX RT2-D	32
33														34
					Total Load:	**23002**	**23002**	**23002**						
					Amps:		**83.0**							

NOTES:
1. UNLESS OTHERWISE NOTED, ALL BRANCH CIRCUIT BREAKERS ARE EXISTING TO REMAIN.
2. (WHERE NOTED) PROVIDE NEW CIRCUIT BREAKER; SIZED AS SHOWN. MATCH MANUFACTURER, MODEL, AND AIC RATING OF EXISTING CIRCUIT BREAKERS.

Existing Branch Panel: LD3

Location: REFER TO PLAN
Supply From: EXISTING
Mounting: RECESSED
Enclosure: TYPE 1

Volts: 480/277V
Phases: 3
Wires: 4

A.I.C. Rating: EX KAIC
Mains Type: MLO
Mains Rating: 200
MCB Rating: -

CKT	Circuit Description	Notes	Wire Size	Trip	Pole	LOAD (VA) A	LOAD (VA) B	LOAD (VA) C	Pole	Trip	Wire Size	Notes	Circuit Description	CKT
	EX PROVISION				1				1	20			EX SPARE	
1	EX INSTR MUSIC		EXISTING	20	1				1	20	EXISTING		EX RSTRM LTS	2
3	EX STAGE LIGHT		EXISTING	20	1				1	20			EX SPARE	4
5	EX SPARE			20	1				1	20	EXISTING		EX LTS	6
7	EX SPARE			20	1				1	20			EX SPARE	8
9								**5820**						10
11	EX CU14-D		EXISTING	40	3	**5820**			**3**	**30**	**4#10, 1#10G - 3/4"C**	**2**	**CU-D-8**	12
13							**5820**							14
15								**4212**						16
17	EX CU12-D		EXISTING	20	3	**4212**			**3**	**25**	**4#10, 1#10G - 3/4"C**	**2**	**CU-D213A, CU-213B**	18
19							**4212**							20
21								**3880**						22
23	EX CU5-D		EXISTING	40	3	**3880**			3	20	**4#12, 1#12G - 3/4"C**		**RTU-D-03**	24
25							**3880**							26
27														28
29	EX ZONE CONT PNL #1		EXISTING	15	3				3	40	EXISTING		EX CU4-D	30
31														32
					Total Load:	**13912**	**13912**	**13912**						
					Amps:		**50.2**							

NOTES:
1. UNLESS OTHERWISE NOTED, ALL BRANCH CIRCUIT BREAKERS ARE EXISTING TO REMAIN.
2. (WHERE NOTED) PROVIDE NEW CIRCUIT BREAKER; SIZED AS SHOWN. MATCH MANUFACTURER, MODEL, AND AIC RATING OF EXISTING CIRCUIT BREAKERS.

REVISION RECORD

NO	DATE	DRAWN	CHECK	DESCRIPTION
	19 SEP 2023	MAB	DCP	ISSUED FOR PERMIT/BID

Civil & Environmental Consultants, Inc.
700 Cherrington Parkway • Moon Township, Pa 15108
Ph: 412.429.2324 • Fax: 800.365.2324
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GREENSBURG SALEM SCHOOL DISTRICT
HIGHSCHOOL
65 MENNEL DRIVE
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Allen + Shariff
MEP Engineering
Project Management
2 Allegheny Center
Nova Tower 2, Suite 1001
Pittsburgh, Pennsylvania 15212
412.322.9280
A+S Project: 2341083

COMMONWEALTH OF PENNSYLVANIA — REGISTERED PROFESSIONAL — DAVID C. PRICE — No. PE081572

HIGH SCHOOL ELECTRICAL SCHEDULES

DATE:	xx-xx-xx
DRAWN BY:	ETC
DWG SCALE:	AS SHOWN
CHECKED BY:	ETC
PROJECT NO:	2341083
APPROVED BY:	DEB

DRAWING NO.:
E-3501