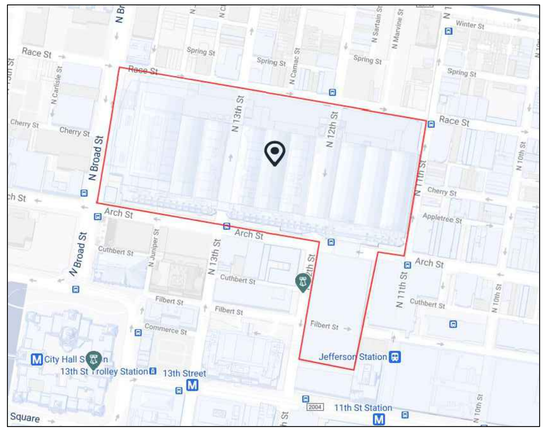
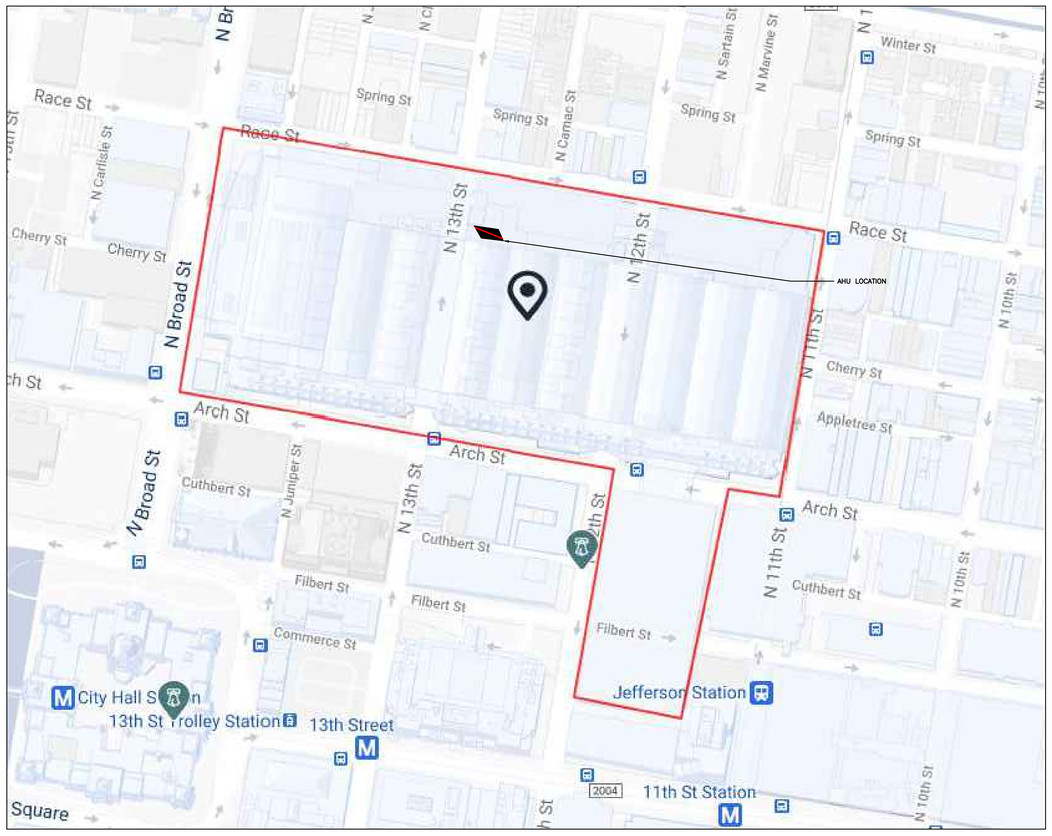


SITE PLAN
SCALE:N.T.S.



KEY PLAN
SCALE:N.T.S.

DRAWING LIST	
PROJECT: 1634C EXHIBIT HALL A AHU REPLACEMENT	
SHEET NO.	SHEET DESCRIPTION
MCS	MECHANICAL COVER SHEET
M1.3	AHU 14A & 14B PLANS & ELEVATIONS
M4.1	AIR HANDLING UNIT DETAILS, SCHEDULES & SPECIFICATIONS
M5.1	DETAILS, CONTROL DIAGRAM & SEQUENCE OF OPERATIONS
M6.1	SCHEDULES & GENERAL SPECIFICATIONS
E1.3	AHU 14A & 14B ELECTRICAL PLANS, DETAILS & SPECIFICATIONS

PCCA AHU REPLACEMENT

1101 Arch Street
Philadelphia, PA 19107
Phone: 215-418-4742

Pennsylvania Convention Center
PHILADELPHIA
AN SMG MANAGED FACILITY

DIMITRI J. VERVERELLI INC.
CONSULTING ENGINEERS
PHILADELPHIA, PENNSYLVANIA
211 N. 13TH STREET, 9TH FLOOR
PHILADELPHIA, PA 19107
Phone: 215-496-0000

AHU-14A&B CONSTRUCTION SET
JULY 26, 2022

MECHANICAL LEGEND

DUCTWORK

- NEW DUCTWORK
- EXISTING DUCTWORK
- EXISTING DUCTWORK TO BE DEMOLISHED
- CAP DUCT
- DIRECTION OF FLOW
- BREAK LINE
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- FLEXIBLE CONNECTION
- CHAMFER CONNECTION WITH VOLUME DAMPER
- BELLMOUTH CONNECTION WITH VOLUME DAMPER
- VOLUME DAMPER
- SUPPLY AIR
- RETURN OR MAKE-UP AIR
- EXHAUST OR RELIEF AIR
- SUPPLY OR OUTSIDE AIR DUCT/DIFFUSER
- RETURN OR EXHAUST AIR DUCT/GRILLE
- FD/AD — FIRE DAMPER W/ ACCESS DOOR
- RISE IN DUCT
- RECTANGLE TO ROUND TRANSITION
- DUCTWORK ROOF SUPPORT
- D — DAMPER NUMBER
- MOTORIZED CONTROL DAMPER

PIPING

- NEW PIPING
- EXISTING PIPING
- EXISTING PIPING TO BE DEMOLISHED
- HWS/R — HEATING HOT WATER SUPPLY/RETURN PIPING
- CHS/R — CHILLED WATER SUPPLY/RETURN PIPING
- AC CONDENSATE PIPING
- CRS/R — CONDENSER WATER SUPPLY/RETURN PIPING
- DROP IN PIPE
- RISE IN PIPE
- THRU PIPE
- CAP PIPE
- DIRECTION OF FLOW
- BREAK LINE
- UNION
- FLANGED CONNECTION
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- FLEXIBLE CONNECTION
- PUMP
- INSERTION PLUG FOR TEMPERATURE/PRESSURE GAUGES
- STRAINER W/DRAIN VALVE AND HOSE END CONNECTION
- SUCTION DIFFUSER W/ DRAIN VALVE AND HOSE END CONNECTION
- PG — PRESSURE GAUGE WITH ISOLATION VALVE
- T — THERMOMETER W/THERMOWELL
- AIR VENT
- RELIEF VALVE
- GAS COCK
- UNION
- GLOBE VALVE
- GATE VALVE
- CHECK VALVE
- BALANCING VALVE
- TRIPLE DUTY VALVE
- BALL VALVE
- 2-WAY AUTOMATIC CONTROL VALVE
- AUTOMATIC CONTROL BUTTERFLY VALVE
- 3-WAY AUTOMATIC CONTROL VALVE
- BUTTERFLY VALVE

EQUIPMENT

- VARIABLE AIR VOLUME BOX
- VARIABLE AIR VOLUME BOX W/ REHEAT COIL
- FAN

MISC. DRAWING SYMBOLS

- CONSTRUCTION NOTE
- DEMOLITION NOTE
- REVISION NOTE
- XX — EQUIPMENT TYPE / EQUIPMENT NUMBER
- XX / XX — SECTION NUMBER / REFERENCED DRAWING
- XX / XX — DETAIL NUMBER / REFERENCED DRAWING
- POINT OF CONNECTION NEW TO EXISTING
- EXTENT OF DEMOLITION
- EX. — EXISTING TO REMAIN
- (R) — EXISTING TO BE REMOVED
- (ER) — EXISTING TO BE RELOCATED
- (F) — FUTURE
- (N) — NEW
- SQUARE FOOT
- ø — DIAMETER

ABBREVIATIONS

AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AFS	AIR FLOW MONITOR STATION
AHU	AIR HANDLING UNIT
AS	AIR SEPARATOR
ATU	AIR TERMINAL UNIT
BAS	BUILDING AUTOMATION SYSTEM
BDD	BACKDRAFT DAMPER
BEL	BELOW
BHP	BRAKE HORSEPOWER
BOD	BOTTOM OF DUCT
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNITS PER HOUR
C	CONDENSATE DRAIN
CC	COOLING COIL
CLG	CEILING
CD	CEILING DIFFUSER
CFM	CUBIC FEET PER MINUTE
CH	CHILLER
CHR	CHILLED WATER RETURN
CHS	CHILLED WATER SUPPLY
CO	CLEAN OUT
CONN	CONNECTION
CSF	CHEMICAL SHOT FEEDER
CU	CONDENSER UNIT
CUH	CABINET UNIT HEATER
CV	CONSTANT VOLUME BOX
D	DAMPER
DEG	DEGREES (FAHRENHEIT)
DIA	DIAMETER
DN	DOWN
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
EG	EXHAUST GRILLE
ELEV	ELEVATION
ER	EXHAUST REGISTER
ERU	ENERGY RECOVERY UNIT
EWT	ENTERING WATER TEMPERATURE
EX	EXISTING
EXH	EXHAUST
EXT	EXPANSION TANK
FC	FLEXIBLE CONNECTION
FD	FIRE DAMPER
FL	FLOOR
FLEX	FLEXIBLE
FM	FLOW METER
FOB	FLAT ON BOTTOM
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOT	FLAT ON TOP
FPI	FINS PER INCH
FPM	FEET PER MINUTE
FPU	FAN POWERED UNIT
FSD	FIRE SMOKE DAMPER
FT	FIN TUBE RADIATION
FT.WG.	FEET WATER GAUGE
GA	GAUGE
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GPM	GALLONS PER MINUTE
HP	HORSEPOWER
HVAC	HEATING, VENTILATING, AND AIR CONDITIONING
HWP	HOT WATER PUMP
HZ	HERTZ
IN.WG.	INCHES WATER GAUGE
LAT	LEAVING AIR TEMPERATURE
LD	LINEAR DIFFUSER
LVR	LOUVER
LWT	LEAVING WATER TEMPERATURE
MBH	THOUSAND BTU PER HOUR
MC	MECHANICAL CONTRACTOR
MOD	MOTORIZED OPERATED DAMPER
MUA	MAKE UP AIR
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NK	NECK
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAI	OUTSIDE AIR INTAKE
PH	PHASE
PSI	POUNDS PER SQUARE INCH
RCVD	REMOTE CONTROLLED VOLUME DAMPER
RF	RETURN FAN
RG	RETURN GRILLE
RHC	REHEAT COIL
RR	RETURN REGISTER
SA	SUPPLY AIR
SCD	SMOKE CONTROL DAMPER
SD	SMOKE DETECTOR
SF	SUPPLY FAN
SP	STATIC PRESSURE
SR	SUPPLY REGISTER
TEMP	TEMPORARY
TG	TRANSFER GRILLE
UH	UNIT HEATER
UV	UNIT VENTILATOR
V	VALVE
VAV	VARIABLE AIR VOLUME BOX
VD	VOLUME DAMPER
VFD	VARIABLE FREQUENCY DRIVE
VIF	VERIFY IN FIELD
WMS	WIRE MESH SCREEN
W/	WITH

SENSORS

- T — THERMOSTAT
- H — HUMIDISTAT
- CO2 — CO2 SENSOR
- SD — SMOKE DETECTOR
- SD — DUCT MOUNTED SMOKE DETECTOR
- FZ — FREEZESTAT
- PG — PRESSURE GAUGE
- DPS — DIFFERENTIAL PRESSURE SENSOR
- FS — FLOW SENSOR
- TS — TEMPERATURE SENSOR

NOTE: THIS IS A GENERAL MECHANICAL LEGEND, ALL SYMBOLS, ABBREVIATIONS AND LINE DESIGNATIONS MAY NOT APPEAR ON THE DRAWINGS. SEE EQUIPMENT SCHEDULES FOR EQUIPMENT DESIGNATIONS.

GENERAL NOTES

1. THE SUBMISSION OF A PROPOSAL BY THE CONTRACTOR IS NOTIFICATION THAT THE CONTRACTOR HAS TOTALLY FAMILIARIZED HIMSELF WITH THE CONTRACT DOCUMENTS AND EXISTING SITE CONDITIONS AND HAS AGREED TO PROVIDE THE NECESSARY LABOR AND MATERIAL FOR THE COMPLETE INSTALLATION OF EACH SYSTEM IN A NEAT AND WORKMANLIKE MANNER IN ACCORDANCE WITH ALL AUTHORITIES HAVING JURISDICTION.
2. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, SIZES, CLEARANCES AND LOCATIONS PRIOR TO THE START OF CONSTRUCTION AND ADVISE THE ENGINEER AND THE OWNER OF ANY DISCREPANCIES BEFORE PERFORMING THE WORK.
3. THE DRAWINGS INDICATE ARRANGEMENTS AND APPROXIMATE SIZES AND RELATIVE LOCATIONS OF PRINCIPLE APPARATUS, EQUIPMENT, DEVICES AND SERVICES TO BE PROVIDED. DRAWINGS ARE DIAGRAMMATIC AND ARE A GRAPHIC REPRESENTATION OF THE CONTRACT REQUIREMENTS TO BEST AVAILABLE STANDARDS AT THE SCALE INDICATED.
4. LAYOUT OF EQUIPMENT INDICATED ON THE DRAWINGS SHALL BE CHECKED AND COMPARED AGAINST ALL DRAWINGS AND SPECIFICATIONS OF ALL TRADES AND EXACT LOCATIONS DETERMINED USING APPROVED SHOP DRAWINGS OF EACH EQUIPMENT. WHERE PHYSICAL INTERFERENCE OCCURS, CONSULT WITH ENGINEER AND PREPARE DATED, DIMENSIONED DRAWINGS COORDINATED WITH ALL OTHER TRADES. OBTAIN WRITTEN APPROVAL OF THE ENGINEER FOR SUCH DRAWINGS AND DISTRIBUTE SAME AS REQUIRED.
5. CONTRACTOR SHALL COORDINATE ALL WORK WITH THE OWNER AND ALL OTHER CONTRACTORS. CONTRACTOR SHALL ALSO SCHEDULE HIS WORK IN ACCORDANCE WITH THE CONSTRUCTION SCHEDULE SO THAT ALL OF HIS WORK CAN BE INSTALLED WITHOUT DELAYING THE PROJECT.
6. CONTRACTOR SHALL SECURE AND PAY ALL FEES AND PERMITS PERTAINING TO THE CONTRACT.
7. ALL EQUIPMENT SHALL BE INSTALLED IN STRICT COMPLIANCE WITH THE MANUFACTURERS' WRITTEN INSTRUCTIONS.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR WORKMEN'S IDENTIFICATION AND BADGING, SAFETY AND FIRE PROTECTION, BARRICADES, WARNING SIGNS, TRASH REMOVAL, CUTTING AND PATCHING.
9. CONTRACTOR SHALL SCHEDULE ALL SHUTDOWNS THAT AFFECT UTILITIES AND PORTIONS OF THE BUILDING THAT MUST REMAIN IN OPERATION WITH THE OWNER.
10. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL RIGGING, HANDLING AND PROTECTION OF MATERIALS. ALL EQUIPMENT AND MATERIALS SHALL BE NEW AND WITHOUT BLEMISH OR DEFECT.
11. CONTRACTOR SHALL PROVIDE LABOR TO RECEIVE, UNLOAD, STORE, PROTECT AND TRANSFER TO POINT OF INSTALLATION OF OWNER FURNISHED ITEMS.
12. WHERE PIPING AND DUCTWORK PASS THROUGH FIRE RATED FLOORS OR WALLS, THE PENETRATION SHALL BE COMPLETELY SEALED WITH A FIRE STOP MATERIAL THAT IS UL LISTED AND APPROVED BY THE LOCAL AUTHORITIES.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL SLAB OPENINGS, WALL OPENINGS, ROOF PENETRATIONS, BEAM PENETRATIONS AND CORING AS IT RELATES TO HIS WORK. CONTRACTOR SHALL SUBMIT SIZE AND LOCATION TO THE STRUCTURAL ENGINEER FOR REVIEW AND APPROVAL.
14. CONTRACTOR SHALL SUBMIT SCHEDULE OF SUBMITTALS PRIOR TO SUBMITTING ANY SHOP DRAWINGS. THIS SCHEDULE SHALL IDENTIFY ALL PRODUCT DATA, DRAWINGS, ETC TO BE SUBMITTED FOR THIS PROJECT, INCLUDING THE ANTICIPATED DATE OF EACH SUBMISSION. CONTRACTOR SHALL SUBMIT (6) SETS OF SHOP DRAWINGS AND EQUIPMENT CUTS TO THE ENGINEER FOR APPROVAL PRIOR TO PURCHASING EQUIPMENT OR STARTING ANY WORK. CONTRACTOR SHALL SUBMIT (3) PRINTS AND (1) REPRODUCIBLE OF ALL PIPING, DUCTWORK, FIRE PROTECTION, CONDUIT, AND CABLE TRAY FIELD INSTALLATION DRAWINGS FOR EACH SYSTEM TO BE INSTALLED. ANY WORK INSTALLED OR EQUIPMENT PURCHASED PRIOR TO RECEIPT OF ENGINEER-APPROVED SHOP DRAWINGS THAT REQUIRES CHANGES SHALL BE REPLACED AT THE EXPENSE OF THE CONTRACTOR.
15. SUBMIT CATALOG INFORMATION, FACTORY ASSEMBLY DRAWINGS AND FIELD INSTALLATION DRAWINGS AS REQUIRED FOR A COMPLETE EXPLANATION AND DESCRIPTION OF ALL ITEMS TO BE PROVIDED. THE CONTRACTOR SHALL REVIEW AND APPROVE ALL SHOP DRAWINGS. NO SUBMISSION WILL BE ACCEPTED WITHOUT THE SIGNED APPROVAL OF THE CONTRACTOR. THE CONTRACTOR SHALL CHECK AND VERIFY ALL FIELD MEASUREMENTS.
16. INSTALLED SYSTEMS SHALL OPERATE UNDER ALL CONDITIONS OF LOAD WITHOUT SOUND OR VIBRATION THAT IS OBJECTIONABLE TO THE ENGINEER OR OWNER. OBJECTIONABLE SOUND OR VIBRATION CONDITIONS SHALL BE CORRECTED IN AN APPROVED MANNER BY THE CONTRACTOR AT HIS EXPENSE.
17. FURNISH ACCESS DOORS AS REQUIRED FOR OPERATION AND MAINTENANCE OF CONCEALED EQUIPMENT, VALVES, CONTROLS, DAMPERS, ETC. ALL ACCESS DOORS SHALL BE COORDINATED WITH THE OWNER AND SHALL MATCH THE FIRE RATING OF THE PENETRATION AS REQUIRED.
18. ALL WORK FURNISHED UNDER THE CONTRACT SHALL BE GUARANTEED AGAINST ANY AND ALL DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF NOT LESS THAN ONE (1) YEAR FROM THE DATE OF FINAL ACCEPTANCE. ANY DEFECTS OF WORKMANSHIP DEVELOPING DURING THIS PERIOD SHALL BE REMEDIED AND ANY DEFECTIVE MATERIAL SHALL BE REPLACED WITHOUT ADDITIONAL COST TO THE OWNER.
19. UPON COMPLETION OF ALL UNFINISHED OR FAULTY WORK NOTED IN ENGINEER'S FINAL PUNCHLIST, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER IN WRITING A LETTER OF COMPLETION CERTIFYING THAT ALL PUNCHLIST ITEMS HAVE BEEN COMPLETED AND ALL AS-BUILT PLANS, MANUALS, ETC. HAVE BEEN SUBMITTED.
20. ALL CHANGES MADE BY THE CONTRACTOR WHICH ARE NOT APPROVED BY THE DESIGN ENGINEER SHALL BE DONE AT THE LIABILITY OF THE CONTRACTOR.
21. CONTRACTOR SHALL RESTORE EXISTING SYSTEMS, DEVICES, FINISHES, ETC. DAMAGED OR ALTERED BY WORK TO ACCEPTABLE CONDITION AS DETERMINED BY THE OWNER OR ENGINEER.
22. EXISTING WORK THAT IS TO BE REMOVED SHALL BE TURNED OVER TO THE OWNER OR DISPOSED OF AT THE OWNER'S DIRECTION. ALL WORK TO BE DISPOSED OF SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE PROMPTLY REMOVED FROM THE SITE. ALL EQUIPMENT TO BE TURNED OVER TO THE OWNER SHALL BE DELIVERED TO ON SITE CENTRAL RECEIVING LOCATION DESIGNATED BY THE OWNER.
23. ALL WORK AND SCHEDULING TO BE COORDINATED WITH OWNER.
24. GENERAL MECHANICAL NOTES PERTAIN TO ALL MECHANICAL DRAWINGS.
25. ALL WORK SHALL BE INSTALLED IN A NEAT AND WORKMAN-LIKE MANNER.
26. REFERENCE ELECTRICAL, PLUMBING AND STRUCTURAL DRAWINGS FOR COORDINATION.
27. THE CONTRACTOR SHALL REMOVE ALL WORK AS NOTED ON THE DRAWINGS. WHERE IT IS NOTED TO REMOVE EXISTING EQUIPMENT, DUCTWORK AND PIPING, ALL ASSOCIATED VALVES, FITTINGS, HANGERS, SUPPORTS, INSULATION, CONTROLS, ELECTRICAL WORK, AND APPURTENANCES SHALL ALSO BE REMOVED. ADEQUATELY SUPPORT EXISTING DUCTWORK AND PIPING TO REMAIN. THE CONTRACTOR SHALL RELOCATE EXISTING WORK AS REQUIRED TO INSTALL NEW WORK.
28. PERFORM ALL RIGGING REQUIRED TO COMPLETE ALL WORK UNDER THIS CONTRACT. IF REQUIRED, THE CONTRACTOR SHALL DISASSEMBLE EQUIPMENT OR ITEMS FOR RIGGING AND/OR ACCESS INTO THE BUILDING. AFTER RIGGING IS COMPLETE, THE CONTRACTOR SHALL REASSEMBLE THE EQUIPMENT OR ITEMS.
29. THE CONTRACTOR SHALL REVIEW THE SITE AND ALL CLEARANCES TO VERIFY THE NEW EQUIPMENT CAN BE INSTALLED IN THE LOCATION SHOWN ON DRAWINGS. PROVIDE ANY NECESSARY SHIPPING SPLITS ON UNITS TO ALLOW THEM TO BE INSTALLED IN THE LOCATION SHOWN. REMOVE ANY NECESSARY OBSTRUCTIONS TO ALLOW FOR INSTALLATION OF EQUIPMENT AND REPAIR/REPLACE ONCE INSTALLATION IS COMPLETE.
30. PROVIDE MANUFACTURER DESIGNATED CLEARANCES FOR EQUIPMENT MAINTENANCE AND REPAIR.
31. CONTRACTOR SHALL RELOCATE EXISTING SPRINKLERS AND PIPING AS REQUIRED FOR INSTALLATION OF NEW HVAC EQUIPMENT AND DUCTWORK.

GENERAL DEMOLITION NOTES

1. DEMOLITION/RELOCATIONS: EACH TRADE CONTRACTOR SHALL BE RESPONSIBLE FOR DEMOLITION AND RELOCATIONS OF SERVICES, EQUIPMENT AND MATERIAL RELATING TO THEIR RESPECTIVE TRADE.
2. WHERE EXISTING WALLS, FLOORS OR CEILINGS ARE REMOVED, ALL HVAC SHALL BE PROTECTED FROM DAMAGE AND SUPPORTED AS REQUIRED. REPAIR ANY DAMAGE TO EXISTING TO REMAIN EQUIPMENT.
3. PRIOR TO DEMOLITION, THE CONTRACTOR SHALL REVIEW WITH THE OWNER ALL MATERIALS TO BE REMOVED. SHOULD THE OWNER OPT TO KEEP ANY MATERIALS, THE CONTRACTOR SHALL REMOVE AND DELIVER THE PARTS TO THE OWNER ON THE SITE WHERE DIRECTED. OTHERWISE, ALL DEMOLISHED OR REMOVED MATERIALS SHALL BECOME THE PROPERTY OF THE CONTRACTOR, SHALL BE REMOVED FROM THE SITE, AND BE DISPOSED OF IN A LEGAL MANNER.
4. DEMOLITION SHALL INCLUDE REMOVAL OF ALL PARTS AND PIECES IN THEIR ENTIRETY BACK TO THE POINTS INDICATED OR IF NOT INDICATED BACK TO THEIR POINT OF SOURCE. WHERE CONDITIONS PROHIBIT TOTAL REMOVAL OF THE WORK, THE REMAINING PORTION SHALL BE CUT FLUSH WITH THE SURROUNDING SURFACE (CAPPED OR TERMINATED AS NOTED) BE REFINISHED IN AN APPROVED MANNER.
5. MAINTAIN EXISTING UTILITIES INDICATED OR WHERE REQUIRED TO REMAIN, KEEP IN SERVICE, AND PROTECT AGAINST DAMAGE DURING DEMOLITION OPERATIONS. DO NOT INTERRUPT EXISTING UTILITIES SERVING OCCUPIED OR USED FACILITIES, EXCEPT WHEN SCHEDULED WITH THE OWNER.
6. DO NOT REMOVE EXISTING STRUCTURAL WORK. DO NOT REMOVE OPERATIONAL ELEMENTS AND SAFETY-RELATED COMPONENTS IN A MANNER RESULTING IN A REDUCTION OF CAPACITIES TO PERFORM IN THE MANNER INTENDED OR RESULTING IN DECREASED OPERATIONAL LIFE, INCREASED MAINTENANCE, OR DECREASED SAFETY.
7. REMOVALS, DISCONNECTIONS, AND RELOCATIONS SHALL BE PERFORMED BY WORKMEN SKILLED IN THE TRADE INVOLVED AND SHALL BE EMPLOYED BY A CONTRACTOR LICENSED IN THE TRADE INVOLVED. ALL WORK SHALL BE DONE IN ACCORDANCE WITH ACCEPTED TRADE PRACTICES.
8. PROVIDE ADEQUATE TEMPORARY SUPPORT FOR WORK TO REMAIN TO PREVENT FAILURE. DO NOT ENDANGER OTHER WORK.
9. PROTECTION: PROVIDE ADEQUATE PROTECTION WHERE REQUIRED FOR THE PRESENT BUILDING AND ITS CONTENTS. TEMPORARY DUSTPROOF BARRIERS AND BARRICADES SHALL BE ERECTED WHERE REQUIRED FOR PROTECTION OF PERSONNEL, PROTECTION FROM DUST AND DIRT, FOR SECURITY, FIRE AND WEATHER PROTECTIVE REASONS. CONTRACTOR SHALL TAKE EVERY PRECAUTION AGAINST FIRE BY EMPLOYING FIRE DEPARTMENT TYPE HOSES AND PORTABLE FIRE EXTINGUISHERS AS REQUIRED BY OSHA AND/OR THE OWNER'S INSURANCE UNDERWRITER. COMPLY WITH GOVERNING REGULATIONS PERTAINING TO ENVIRONMENTAL PROTECTION.
10. ALL EXISTING EQUIPMENT REQUIRED TO BE REUSED SHALL BE CLEANED. IN ALL INSTANCES WHERE CONTRACTOR FINDS THAT EXISTING EQUIPMENT IS DEFECTIVE TO THE POINT WHERE IT CANNOT BE PROPERLY RESTORED AND WILL NOT OPERATE PROPERLY, THEY SHALL REPORT THE SPECIFIC INSTRUMENTS OR EQUIPMENT TO THE DESIGN PROFESSIONAL FOR DIRECTIONS.
11. EXTREME CARE SHALL BE EXERCISED FOR ALL EXISTING ITEMS THAT ARE TO REMAIN IN SERVICE UNTIL NEW ITEMS ARE INSTALLED FOR THE SAME SERVICE. ALL SHUTDOWNS OF ANY SYSTEM SHALL BE COORDINATED WITH THE OWNER.
12. ALL WORK TO BE DEMOLISHED REQUIRING DISRUPTION TO EXISTING AREAS ON FLOORS ABOVE, BELOW, OR ADJACENT TO THE CONTRACT AREA; EACH CONTRACTOR SHALL SCHEDULE EACH DISRUPTION WITH THE OWNER. WHERE DEMOLITION WORK WILL REQUIRE TEMPORARY REMOVAL OF EXISTING PIPING WHICH ARE TO REMAIN, THE OWNER SHALL DIRECT AND DEFINE PROCEDURES. NO WORK SHALL PROCEED WITHOUT OWNER'S AUTHORIZATION.
13. REMOVE AND REROUTE BY OFFSETTING AS REQUIRED ANY EXISTING PIPING RISERS, STACKS OR LATERAL PIPING TO REMAIN IN SERVICE AND BECOME EXPOSED DUE TO NEW FLOOR PLAN AND OR NEW CEILING LAYOUT.
14. WHERE DRAWINGS INDICATE THE DEMOLITION OF PIPING OR DUCTWORK, THE CONTRACTOR SHALL REMOVE ALL ABANDONED HANGERS AND SUPPORTS. PIPING AND/OR DUCTWORK SHALL BE CAPPED AND INSULATED WITH MATERIALS TO MATCH EXISTING.
15. THE CONTRACTOR SHALL REPAIR ALL PENETRATIONS OF ROOFS, WALLS AND FLOORS TO MATCH EXISTING OF WHICH ITEMS HAVE BEEN DEMOLISHED.
16. UNLESS NOTED OTHERWISE, THE CONTRACTOR SHALL REMOVE EQUIPMENT PADS/CURBS/ SUPPORTS FOR ALL FLOOR OR ROOF MOUNTED EQUIPMENT INDICATED TO BE REMOVED. REPAIR FLOORS AND ROOFS AS REQUIRED TO MATCH EXISTING. REMOVE HANGERS AND SUPPORTS FOR ALL SUSPENDED EQUIPMENT INDICATED TO BE REMOVED.
17. WHERE EQUIPMENT IS INDICATED TO BE REMOVED, THE CONTRACTOR SHALL REMOVE ALL DISCONNECTS, DRIVES, STARTERS, CONTACTORS, SWITCHES, CONTROLLERS, SENSORS, ACTUATORS, ETC. REMOVE EQUIPMENT POWER FEED WIRING AND CONDUIT COMPLETE BACK TO DISTRIBUTION PANEL. ALL CONTROLS CONDUIT, WIRING AND/OR PNEUMATIC TUBING SHALL BE REMOVED BACK TO A REASONABLE EXTENT.
18. WHERE EQUIPMENT, DUCTWORK, OR PIPING IS TO BE REMOVED AND NEW WORK IS TO BE CONNECTED AT A LATER TIME, CAP AND SEAL OPENINGS TO PROTECT THE INSIDE OF THE DUCTWORK OR PIPE. WHERE PIPING SYSTEMS ARE TO BE RETURNED TO OPERATION, INSTALL VALVES AND CAP TO PERMIT REFILLING AND OPERATION OF THE SYSTEM AND TO PERMIT CONNECTION AT A LATER TIME WITHOUT DRAINING THE SYSTEM AGAIN.

GENERAL CONSTRUCTION NOTES

1. THE CONTRACTOR SHALL SUBMIT DRAWINGS SHOWING COORDINATION OF ALL TRADES, INCLUDING, BUT NOT LIMITED TO: DUCTS, PIPING, CONDUIT, EQUIPMENT, FIXTURES, STRUCTURE, FRAMING AND ANY ITEMS PENETRATING THE CEILING. THE CONTRACTOR SHALL INCUR ALL EXPENSES RELATED TO A LACK OF COORDINATION BETWEEN TRADES.
2. ALL MECHANICAL DRAWINGS ARE DIAGRAMMATIC AND SHOW DESIGN INTENT ONLY. THE EXACT LOCATION AND SIZES OF ALL EQUIPMENT SHALL BE VERIFIED BY THE CONTRACTOR AND COORDINATED WITH THE DESIGN PROFESSIONAL AND ALL OTHER TRADES.
3. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE INTERNATIONAL MECHANICAL CODE, THE INTERNATIONAL BUILDING CODE, AS WELL AS WITH ALL APPLICABLE STATE AND LOCAL CODES AND REGULATIONS, CURRENT EDITIONS.
4. THE CONTRACTOR TO PROVIDE A FUNCTIONAL INSTALLATION AS INTENDED BY THE DESIGN PROFESSIONAL.
5. MECHANICAL CONTRACTOR SHALL ENSURE MINIMUM NEC CLEARANCES IN FRONT OF ALL ELECTRICAL PANELS AND GEAR.
6. ALL FLOOR MOUNTED HVAC EQUIPMENT SHALL BE INSTALLED ON 4" HIGH REINFORCED CONCRETE HOUSEKEEPING PADS PROVIDED BY THE G.C. UNLESS NOTED OTHERWISE. HOUSEKEEPING PAD SHALL BE MINIMUM 4" LARGER THAN EQUIPMENT ON ALL SIDES. UNLESS OTHERWISE REQUIRED BY EQUIPMENT MANUFACTURER.
7. MECHANICAL SCHEDULES DO NOT NECESSARILY INDICATE EQUIPMENT QUANTITIES.
8. MECHANICAL CONTRACTOR SHALL PROVIDE FLEXIBLE CONNECTIONS AT ALL DUCTWORK-TO-EQUIPMENT CONNECTIONS.
9. FLEXIBLE DUCTWORK SHALL NOT EXCEED 6'-0" FROM POINT OF RIGID DUCT CONNECTION TO AIR TERMINAL. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DEVIATIONS FROM THE CONTRACT DRAWINGS THAT ARE NOT APPROVED BY THE DESIGN PROFESSIONAL.
10. MECHANICAL CONTRACTOR SHALL COORDINATE THE LOCATION OF ALL WALL MOUNTED THERMOSTATS AND HUMIDISTATS WITH THE DESIGN PROFESSIONAL AND/OR OWNER.
11. MECHANICAL CONTRACTOR SHALL COORDINATE THE EXACT LOCATION, MOUNTING STYLE AND FINISH OF ALL GRILLES, REGISTERS, DIFFUSERS, ETC. WITH THE DESIGN PROFESSIONAL.
12. ALL SUSPENDED AND FLOOR MOUNTED EQUIPMENT SHALL BE FURNISHED WITH VIBRATION ISOLATION AS PER MECHANICAL SPECIFICATIONS.
13. DUCT MOUNTED SMOKE DETECTORS ARE FURNISHED BY THE ELECTRICAL CONTRACTOR AND INSTALLED BY THE MECHANICAL CONTRACTOR. THE MECHANICAL CONTRACTOR SHALL PROVIDE ALL CONTROL WIRING FROM THE SMOKE DETECTOR'S ON-BOARD RELAY(S) TO THE EQUIPMENT CONTROLLERS/STARTERS/VFD'S FOR SHUTTING DOWN THE ASSOCIATED MECHANICAL EQUIPMENT AND ACTIVATION OF REQUIRED FIRE/SMOKE DAMPERS. THE SMOKE DETECTOR SHALL BE TIED INTO THE FIRE ALARM SYSTEM AND REMOTE TEST STATIONS BY THE ELECTRICAL CONTRACTOR. THE DUCT DETECTOR SHALL BE SUPPLIED WITH THE APPROPRIATE SAMPLING TUBES TO FIT THE INSTALLATION. COORDINATE INSTALL OF SMOKE DETECTORS WITH ELECTRICAL CONTRACTOR.
14. DUCT SIZES SHOWN ON PLANS REFER TO CLEAR INSIDE DIMENSIONS (CID) UNLESS NOTED OTHERWISE.
15. PROVIDE INSULATED BLANK-OFF/CAPS PANELS FOR ALL UNUSED PORTIONS OF LOUVERS, EQUIPMENT RETURNS/SUPPLIES, DUCTWORK, AIR TERMINALS, ETC.
16. PROVIDE ALL DUCTWORK AND PIPING TRANSITIONS/REDUCERS TO EQUIPMENT, COILS, ETC. AS REQUIRED THAT MAY NOT NECESSARILY APPEAR ON PLANS.
17. MECHANICAL CONTRACTOR SHALL INSULATE ALL DUCTWORK AND PIPING PER MECHANICAL SPECIFICATIONS, UNLESS OTHERWISE NOTED ON PLANS.
18. ALL DUCTWORK AND PIPING PENETRATIONS OF FIRE RATED PARTITIONS, BARRIERS OR WALLS SHALL BE PROTECTED PER THE LATEST INTERNATIONAL MECHANICAL CODE (IMC). PROVIDE FIRE RATED SLEEVES AND SEALANT AS REQUIRED FOR ALL FIRE RATED PIPING PENETRATIONS. PROVIDE 'UL' LISTED FIRE DAMPERS FOR ALL DUCTWORK PENETRATIONS OF FIRE RATED SURFACES AS SHOWN ON DRAWINGS. PROVIDE DUCTWORK SLEEVING AND CAULKING PER THE LATEST IMC AT FIRE RATED PENETRATIONS NOT PROTECTED BY A FIRE DAMPER.
19. PROVIDE 'UL'-LISTED RADIATION DAMPERS FOR ALL AIR TERMINALS MOUNTED IN A FIRE RATED ASSEMBLY.
20. PROVIDE P-TRAP OF SUFFICIENT SEAL DEPTH TO OVERCOME UNIT STATIC PRESSURE ON ALL AC CONDENSATE CONNECTIONS.

DRAWING SCHEDULE

DRAWING NUMBER	DRAWING TITLE	ISSUE: DATE 03/06/20	ISSUED FOR BID					
MCS	MECHANICAL COVER SHEET		*					
M1.1-3	AHU 14A & B PLANS & ELEVATIONS		*					
M4.1	AIR HANDLING UNIT DETAILS SCHEDULES & SPECIFICATIONS		*					
M5.1	DETAILS, CONTROL DIAGRAM & SEQUENCE OF OPERATIONS		*					
M6.1	SCHEDULES & GENERAL SPECIFICATIONS		*					
E1.3	AHU 14A & B ELECTRICAL PLANS DETAILS & SPECIFICATIONS		*					

REV	DESCRIPTION	DATE
4	ISSUED FOR AHU-14A&B BID	07/26/22
3	ISSUED FOR AHU-13A&B CONSTRUCTION	07/11/22
2	ISSUED FOR CONSTRUCTION	02/11/21
1	ADDENDUM 1	10/24/20
0	ISSUED FOR BID	03/06/20

N

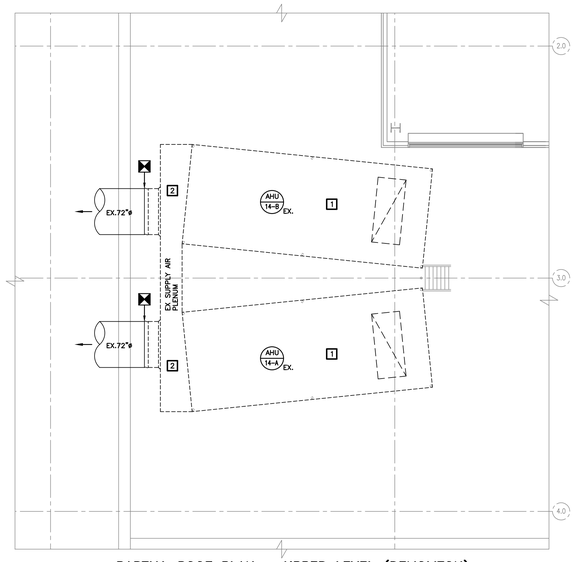
PENNSYLVANIA CONVENTION CENTER AUTHORITY
ONE CONVENTION CENTER PLACE
1101 ARCH STREET
PHILADELPHIA, PENNSYLVANIA 19107

PCCA EXHIBIT HALL A
AHU-14A&B

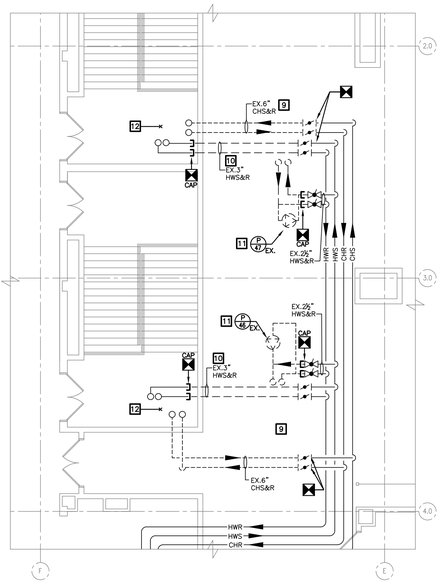
GENERAL NOTES & LEGEND

DIMITRI J. VERVERELLI INC.
CONSULTING ENGINEERS
PHILADELPHIA, PENNSYLVANIA

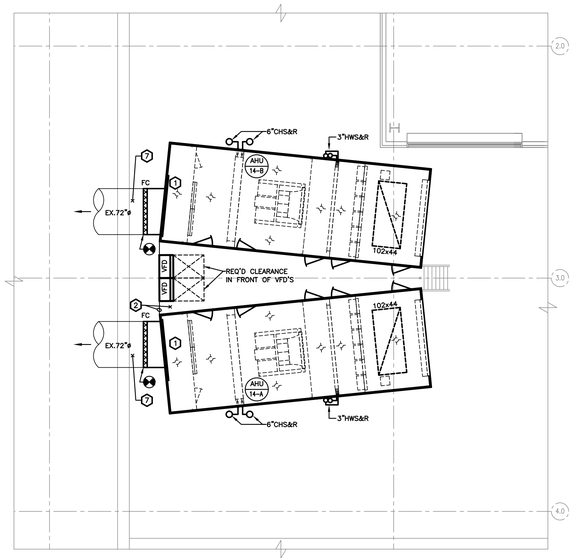
DRAWN BY:	SCALE:	DWG. NO.
DPC	AS NOTED	MCS
CHECKED BY: LOM	PROJ. NO: 1634C	



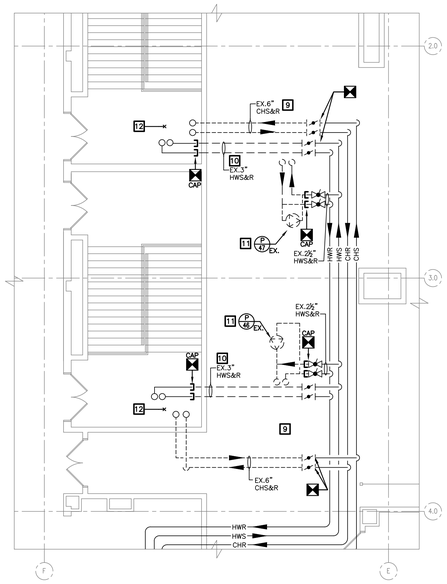
PARTIAL ROOF PLAN – UPPER LEVEL (DEMOLITON)
SCALE: 1/8"=1'-0"



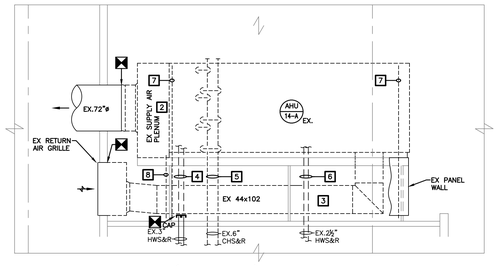
200 LEVEL PARTIAL PLAN (DEMOLITION)
SCALE: 1/8" = 1'-0"



PARTIAL ROOF PLAN – UPPER LEVEL (NEW WORK)
SCALE: 1/8"=1'-0"



200 LEVEL PARTIAL PLAN (NEW WORK)
SCALE: 1/8" = 1'-0"

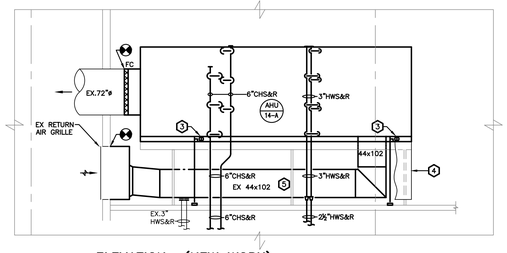


ELEVATION (DEMOLITON)
SCALE: 1/8"=1'-0"

NOTE: "A" UNIT SHOWN. "B" UNIT OPP. HAND.

DEMOLITION NOTES

1. REMOVE THE EXISTING AIR HANDLING UNIT IN ITS ENTIRETY INCLUDING ALL COMPONENTS, CONTROLS, AND APPURTENANCES.
2. REMOVE THE EXISTING SUPPLY AIR DUCT FROM THE AIR HANDLING UNITS TO THE LOCATION INDICATED INCLUDING ALL INSULATION, FLEX CONNECTIONS, SUPPORTS, AND APPURTENANCES.
3. REMOVE THE EXISTING RETURN AIR DUCT FROM THE AIR HANDLING UNITS BACK TO THE BUILDING INCLUDING ALL INSULATION, FLEX CONNECTIONS, SUPPORTS, AND APPURTENANCES.
4. REMOVE THE EXISTING HEATING HOT WATER PIPING FROM THE AIR HANDLING UNIT TO THE LOCATION INDICATED AND CAP. REMOVE ALL EXISTING INSULATION, HEAT TRACING, SUPPORTS, VALVES, PNEUMATIC CONTROL TUBING AND APPURTENANCES.
5. REMOVE THE EXISTING CHILLED WATER PIPING FROM THE AIR HANDLING UNIT TO THE LOCATION INDICATED. REMOVE ALL EXISTING INSULATION, HEAT TRACING, SUPPORTS, VALVES, PNEUMATIC CONTROL TUBING AND APPURTENANCES.
6. REMOVE THE EXISTING HEATING HOT WATER PIPING FROM THE AIR HANDLING UNIT TO THE LOCATION INDICATED. REMOVE ALL EXISTING INSULATION, HEAT TRACING, SUPPORTS, VALVES, PNEUMATIC CONTROL TUBING AND APPURTENANCES.
7. REMOVE THE EXISTING RAIN WATER CONDUCTORS.
8. REMOVE THE EXISTING AC CONDENSATE PIPING.
9. REMOVE THE EXISTING CHILLED WATER PIPING BETWEEN THE LOCATIONS INDICATED INCLUDING INSULATION, HANGERS, VALVES, AND APPURTENANCES.
10. REMOVE THE EXISTING HEATING HOT WATER PIPING BETWEEN THE LOCATIONS INDICATED INCLUDING INSULATION, HANGERS, VALVES, AND APPURTENANCES. CAP WHERE INDICATED. PATCH AND PAINT REMAINING WALL OPENINGS TO MATCH EXISTING.
11. REMOVE THE EXISTING HEATING HOT WATER PIPING BETWEEN THE LOCATIONS INDICATED INCLUDING INSULATION, HANGERS, PUMPS, VALVES AND APPURTENANCES. CAP WHERE INDICATED.
12. REMOVE PORTIONS OF EXISTING FIRE RATED SOFFIT TO MODIFY PIPING.



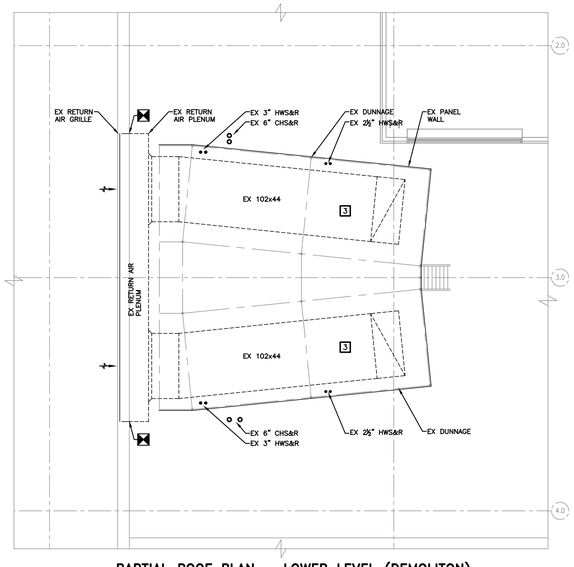
ELEVATION (NEW WORK)
SCALE: 1/8"=1'-0"

NOTE:

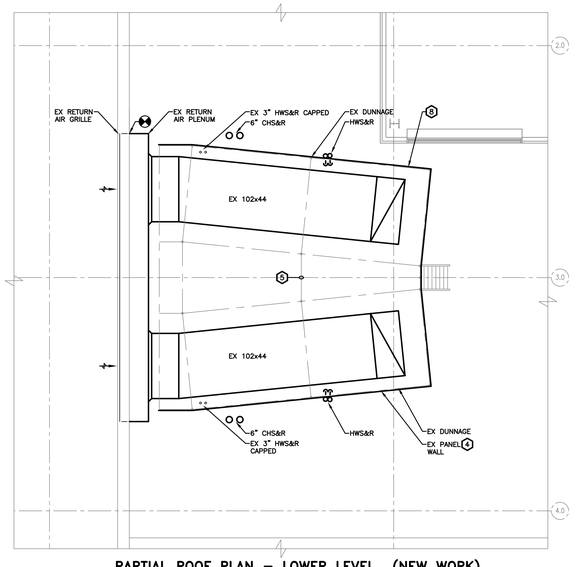
1. "A" UNIT SHOWN. "B" UNIT OPP. HAND.
2. PROVIDE FLANGES AND CONFIGURE PIPING TO PERMIT REMOVAL OF COILS AND FANS WITHOUT WELDING/CUTTING.

CONSTRUCTION NOTES

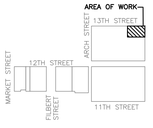
1. PROVIDE AN ALUMINUM, DOUBLE WALL INSULATED PANEL WITH THERMAL BREAKS TO SEAL AHU OPENING AROUND DUCT.
2. PROVIDE RAILING ALONG BACK EDGE OF PLATFORM BETWEEN VFD'S AND AHU. PROVIDE GRATING TO MATCH EXISTING TO FILL VOID CREATED BY PLENUM REMOVAL. SEE RAILING DETAIL.
3. PROVIDE CONDENSATE DRAIN AND EXTEND TO ROOF. SEE "CONDENSATE DRAIN DETAIL".
4. REMOVE, CLEAN, PREP, PAINT, AND REINSTALL EXISTING PANEL WALL AROUND PERIMETER OF DUNNAGE. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS. PROVIDE ALL NEW HARDWARE. MODIFY PANEL WALL AS REQUIRED FOR INSTALLATION OF NEW WORK.
5. REMOVE RUST AND CLEAN ALL DUNNAGE AND SUPPORTS TO SSPC-SP3 (POWER TOOL CLEANING) STANDARDS. COAT EXPOSED AREAS WITH 2 COATS ZINC RICH PAINT.
6. PATCH PORTIONS OF EXISTING FIRE RATED SOFFIT AFTER PIPING MODIFICATIONS ARE PERFORMED.
7. REMOVE EXISTING VEGETATION. REMOVE RUST AND CLEAN EXISTING DUCTWORK TO SSPC-SP3 (POWER TOOL CLEANING) STANDARDS. COAT EXPOSED AREAS WITH 2 COATS ZINC RICH PAINT.
8. PROVIDE NEW PANELS TO REPLACE MISSING SIDE PANELS AROUND PERIMETER FOR DUNNAGE.



PARTIAL ROOF PLAN – LOWER LEVEL (DEMOLITON)
SCALE: 1/8"=1'-0"



PARTIAL ROOF PLAN – LOWER LEVEL (NEW WORK)
SCALE: 1/8"=1'-0"



N

REV	DESCRIPTION	DATE
4	ISSUED FOR AHU-14A&B BID	07/26/22
3	ISSUED FOR AHU-13A&B CONSTRUCTION	07/11/22
2	ISSUED FOR CONSTRUCTION	02/11/21
1	ADDENDUM 1	10/24/20
0	ISSUED FOR BID	03/06/20

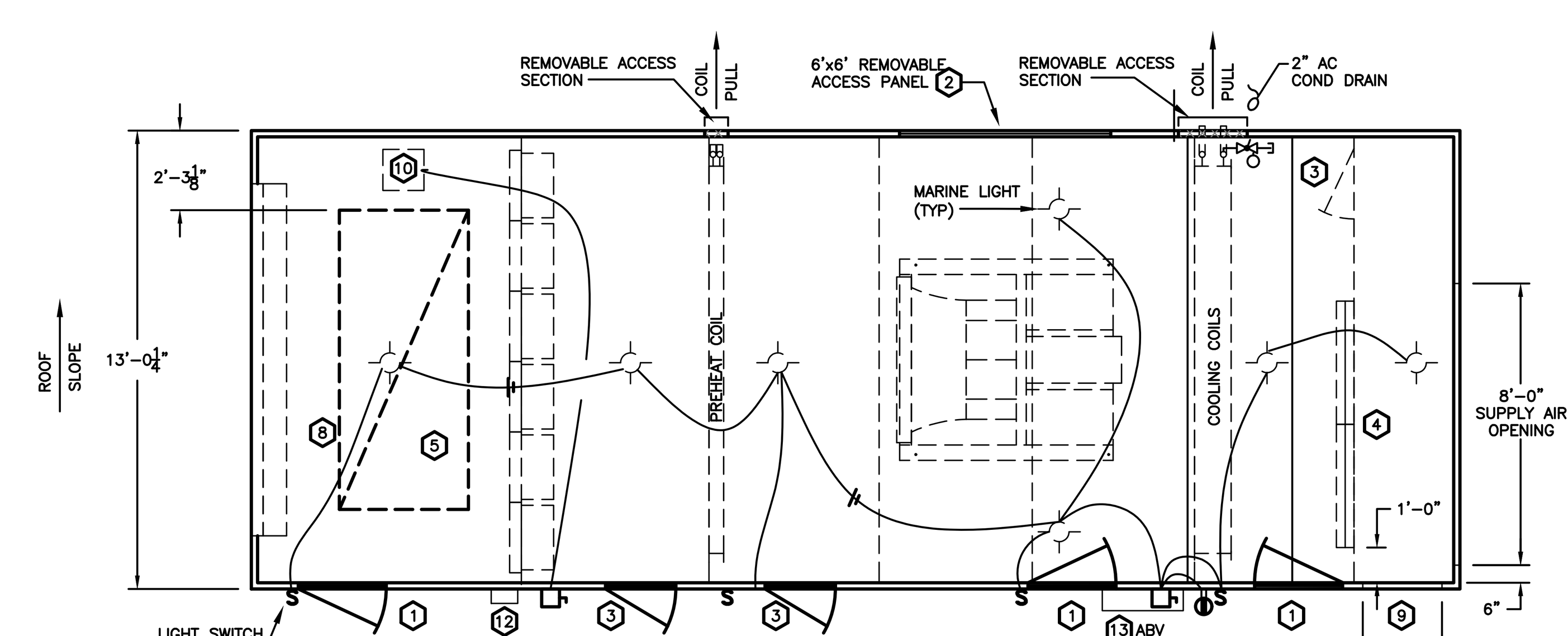
PENNSYLVANIA CONVENTION CENTER AUTHORITY
ONE CONVENTION CENTER PLACE
1101 ARCH STREET
PHILADELPHIA, PENNSYLVANIA 19107

PCCA EXHIBIT HALL A
AHU-14A&B

AHU 14A & 14B PLANS & ELEVATIONS

DIMITRI J. VERVERELLI INC.
CONSULTING ENGINEERS
PHILADELPHIA, PENNSYLVANIA

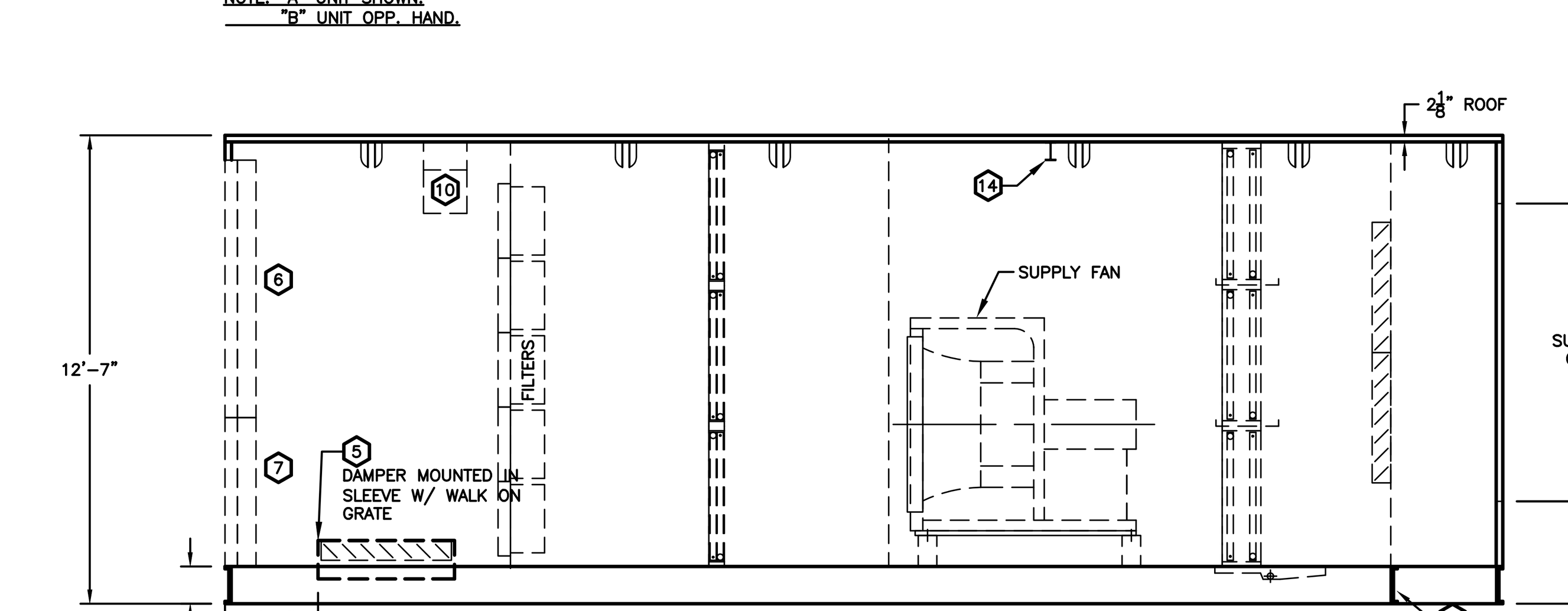
DRAWN BY:	SCALE:	DWG. NO.
DPC	AS NOTED	M1-3
CHECKED BY: LOM	PROJ. NO: 1634C	



AHU PLAN

SCALE: 1/4" = 1'-0"

NOTE: "A" UNIT SHOWN. "B" UNIT OPP. HAND.



SECTION

SCALE: 1/4" = 1'-0"

NOTE: "A" UNIT SHOWN. "B" UNIT OPP. HAND.

AHU CONSTRUCTION NOTES:

1A ACCESS DOOR 30"WIDE MIN.x6'-6"HIGH – SET BOTTOM OF DOOR 4" ABOVE SERVICE CORRIDOR FLOOR.

2 REMOVABLE ACCESS PANEL. SIZE TO PERMIT REMOVAL OF FAN MOTOR AND COMPONENTS.

3 ACCESS DOOR 24"WIDE MIN.x6'-6"HIGH – SET BOTTOM OF DOOR 4" ABOVE FLOOR.

4 SUPPLY AIR DAMPER. SEE CONTROL DAMPER SCHEDULE FOR DAMPER REQUIREMENTS.

5 RETURN AIR DAMPER. SEE CONTROL DAMPER SCHEDULE FOR DAMPER/LOUVER REQUIREMENTS.

6 ECONOMIZER OUTSIDE AIR DAMPER/LOUVER. SEE CONTROL DAMPER SCHEDULE FOR DAMPER/LOUVER REQUIREMENTS.

7 MINIMUM OUTSIDE AIR DAMPER/LOUVER. SEE CONTROL DAMPER SCHEDULE FOR DAMPER/LOUVER REQUIREMENTS.

8 MAINTAIN MIN 24" WIDE ACCESS PATH FROM ACCESS DOOR TO DAMPER. (TYP).

9 28"X80" OPENING WITH BOLT ON ACCESS PANEL.

10 1.9KW 208V/1/60 UNIT HEATER–SEE SPECIFICATIONS.

11 PROVIDE INTERMEDIATE BASE CHANNEL WHERE INDICATED. PLENUM EXTENSION WILL ONLY BE PARTIALLY SUPPORTED BY EXISTING DUNNAGE. SEE MECHANICAL PLANS FOR LOCATION OF DUNNAGE.

12 FILTER GAGE

13 BAS JUNCTION BOX

14 MOTOR REMOVAL RAIL

AIR HANDLING UNIT SCHEDULE

		AHU–14A	AHU–14B
SYSTEM NO.		AHU–14A	AHU–14B
LOCATION		ROOF (OUTDOOR)	ROOF (OUTDOOR)
SUPPLY FAN	TOTAL SYSTEM CFM	54500	54500
	EXTERNAL/TOTAL STATIC PRESSURE IN. W.G.	3.0/5.71	3.0/5.71
	RPM	861	861
	BHP/MOTOR HP/TYPE	64.5/75/TEFC PREM EFF VFD DUTY	64.5/75/TEFC PREM EFF VFD DUTY
	MOTOR V/PH/HZ	480/3/60	480/3/60
	FAN TYPE	DIRECT DRIVE PLENUM FAN	DIRECT DRIVE PLENUM FAN
	MANUFACTURER/MODEL	TWIN CITY EPFN, CLASS II, SIZE 542/100	TWIN CITY EPFN, CLASS II, SIZE 542/100
COOLING COIL	TOTAL BANK CFM	54500	54500
	NO. OF COILS	3	3
	FACE AREA (TOTAL) SQ. FT.	125.9	125.9
	CASING HEIGHT X FINNED LENGTH	42.25x143	42.25x143
	FACE VELOCITY (FPM)	433	433
	ROWS/FINS PER IN./TUBE PER CIRC.	6 / 8 / 4	6 / 8 / 4
	ENTERING AIR DB/WB (DEG. F.)	86.0/70.0	86.0/70.0
	LEAVING AIR DB/WB (DEG. F.)	56.5/55.7	56.5/55.7
	GPM (45 DEG EWT)	317	317
	HEAD LOSS FT	7.2	7.2
	AIR FRICTION (IN. W.G.)	0.47	0.47
PREHEAT COIL	TOTAL BANK CFM	54500	54500
	NO. OF COILS	3	3
	FACE AREA (TOTAL) SQ. FT.	125.9	125.9
	CASING HEIGHT X FINNED LENGTH	42.25x143	42.25x143
	FACE VELOCITY (FPM)	433	433
	ROWS/FINS PER IN./TUBE PER CIRC.	2 / 8 / 4	2 / 8 / 4
	ENTERING AIR (DEG. F.)	42.0	42.0
	LEAVING AIR (DEG. F.)	82.5	82.5
	GPM (150 DEG EWT)	110	110
	HEAD LOSS FT	5.4	5.4
	AIR FRICTION (IN. W.G.)	0.16	0.16
AIR FILTERS – PRE	QTY/SIZE INCHES	(30) 24x24x2" DEEP	(30) 24x24x2" DEEP
AIR FILTERS – PRE	MANUFACTURER, MODEL MERV 8	FARR	FARR
AIR FILTERS – FINAL	QTY/SIZE INCHES	(30) 24x24x12" DEEP	(30) 24x24x12" DEEP FARR
AIR FILTERS – FINAL	MANUFACTURER, MERV 13	FARR	
MAXIMUM UNIT WEIGHT (LBS)			
MANUFACTURER		YORK CUSTOM YCO–144x156	YORK CUSTOM YCO–144x156

AHU SPECIFICATIONS

1. DESCRIPTION:
   - A. THIS SECTION OF THE WORK INCLUDES THE DESIGN, FABRICATION, TESTING, CLEANING AND PACKAGING, SHIPMENT, FINAL ASSEMBLY AND INSTALLATION OF CUSTOM BUILT–UP AIR HANDLING UNITS BY THE UNIT MANUFACTURER IN COMPLETE ACCORDANCE WITH THE FOLLOWING SPECIFICATION.
   - B. THE DETAILS OUTLINED AND COMPONENT MANUFACTURERS NAMED IN THIS SPECIFICATION MAY NOT BE DEVIATED FROM IN THE AIR HANDLING UNIT MANUFACTURER'S PREPARATION OF THE BID, EVEN WHERE TECHNIQUES ARE REQUIRED WHICH ARE NOT CONSIDERED STANDARD BY THE MANUFACTURER. THE CONSTRUCTION AS DESCRIBED IN THIS SPECIFICATION IS CONSIDERED ESSENTIAL, AND ANY DEVIATION FROM THIS SPECIFICATION MUST BE SPECIFICALLY IDENTIFIED AND BID AS A VOLUNTARY ALTERNATE (ADD OR DEDUCT), BUT ONLY AFTER COMPLYING WITH THE SPECIFICATION DEFINED AS THE BASE BID.
2. QUALITY ASSURANCE:
   - A. ALL EQUIPMENT OR COMPONENTS OF THIS SPECIFICATION SECTION SHALL MEET OR EXCEED THE REQUIREMENTS AND QUALITY OF THE ITEMS HEREIN SPECIFIED OR AS DENOTED ON THE DRAWINGS AND SCHEDULE.
   - B. FANS SHALL BE RATED IN ACCORDANCE WITH AMCA STANDARD 210 FOR PERFORMANCE AND AMCA STANDARD 301 FOR SOUND AND SHALL BEAR THE AMCA SEAL.
   - C. MOTOR SHALL MEET REQUIREMENTS OF NEMA, IEEE, ANSI, AND NEC STANDARD.
   - D. COILS SHALL BE RATED IN ACCORDANCE WITH ARI STANDARD 410.
   - E. EQUIPMENT WITHIN UNIT SHALL BE UL LISTED WHERE APPLICABLE.
   - F. COMPLETE AIR HANDLING UNIT SHALL BEAR AN ETL LABEL UNDER UL STANDARD 1995.
   - G. UNIT CONSTRUCTION SHALL MEET NFPA 90 REQUIREMENTS AND ASHRAE 62–1.
3. SUBMITTALS:
   - A. SUBMIT SHOP DRAWINGS AND PRODUCT DATA IN ACCORDANCE WITH THE FOLLOWING:
   - B. SUBMITTALS SHALL INCLUDE:
     - 1). DIMENSIONED PLANS, ELEVATIONS, AND DETAILS INCLUDING REQUIRED CLEARANCES AND LOCATION OF ALL FIELD CONNECTIONS.
     - 2). SUMMARY OF ALL UTILITY REQUIREMENTS SUCH AS: ELECTRICITY, CHILLED WATER, HEATING HOT WATER, AIR, ETC., INCLUDING QUANTITY OF EACH REQUIRED UTILITY.
     - 3). MANUFACTURER'S PERFORMANCE OF EACH UNIT. SELECTION SHALL INDICATE, AS A MINIMUM, THE FOLLOWING:
       - a. INPUT DATA USED FOR SELECTION.
       - b. MODEL NUMBER OF THE UNIT.
       - c. NET CAPACITY FOR ALL HEAT TRANSFER COILS STATING CONDITIONS USED.
       - d. FURNISH FAN PERFORMANCE RATINGS AND FAN CURVES WITH SPECIFIED OPERATING POINT CLEARLY PLOTTED.
       - e. RATED LOAD HORSEPOWER
       - f. NOISE LEVELS PRODUCED BY EQUIPMENT.
       - g. FAN CURVES, SHOWN ON A FAMILY OF CURVES DIAGRAM
       - h. INTERNAL STATIC PRESSURE CALCULATIONS, INCLUDING FAN SYSTEM EFFECT.
       - i. APPROXIMATE UNIT SHIPPING WEIGHT FOR EACH SECTION
       - j. FINISH AND COLOR CHART.
       - k. FILTER AREAS AND VELOCITIES.
       - l. FACTORY TEST PROCEDURES
4. OPERATION AND MAINTENANCE DATA
   - A. PROVIDE MANUALS WITH DETAILED DESCRIPTION OF INSTALLATION, OPERATION, AND MAINTENANCE, INCLUDING THE FOLLOWING:
     - 1) ALL APPROVED "CERTIFIED FOR CONSTRUCTION" DRAWINGS.
     - 2) WRITTEN RECOMMENDATIONS FOR FIELD STORAGE, BOTH INDOORS AND OUTDOORS.
     - 3) INSTALLATION REQUIREMENTS INCLUDING ASSEMBLY INSTRUCTIONS, LIFTING REQUIREMENTS AND ADJUSTMENTS.
     - 4) MANUFACTURER'S LITERATURE DESCRIBING EACH PIECE OF EQUIPMENT INCLUDING OPERATION AND MAINTENANCE INSTRUCTIONS.
     - 5) FACTORY TEST REPORTS.
     - 6) MANUALS SHALL BE PROVIDED WITHIN THREE WEEKS AFTER SHIPMENT OF THE AIR HANDLING UNITS.
   - B. PROVIDE O&M ON COMPACT DISK (CD).
   - C. PROVIDE A GENERAL SERVICE MANUAL WITH EACH SHIPMENT
5. DELIVERY, STORAGE AND HANDLING
   - A. COMPLY WITH ASHRAE 62, SECTION 5 (MOLD AND CORROSION RESISTANT CASINGS, FILTERS UPSTREAM OF WETTED SURFACES, AND DRAIN PAN DESIGN).
   - B. COMPLY WITH ASHRAE 62, SECTION 7 (PRACTICES TO BE FOLLOWED DURING CONSTRUCTION AND STARTUP). PROTECT EQUIPMENT FROM MOISTURE BY APPROPRIATE IN–TRANSIT AND ON–SITE PROCEDURES.
   - C. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR HANDLING, UNLOADING AND STORAGE.
   - D. PROTECT, PACK, AND SECURE LOOSE–SHIPPED ITEMS WITHIN THE AIR–HANDLING UNITS. INCLUDE DETAILED PACKING LIST OF LOOSE–SHIPPED ITEMS, INCLUDING ILLUSTRATIONS AND INSTRUCTIONS FOR APPLICATION.
   - E. PROTECT, PACK AND SECURE CONTROLS DEVICES, MOTOR CONTROL DEVICES AND OTHER ELECTRONIC EQUIPMENT. DO NOT STORE ELECTRONIC EQUIPMENT IN WET OR DAMP AREAS EVEN WHEN THEY ARE SEALED AND SECURED.
   - F. ENCLOSE AND PROTECT CONTROL PANELS, ELECTRONIC OR PNEUMATIC DEVICES, AND VARIABLE FREQUENCY DRIVES. DO NOT STORE EQUIPMENT IN WET OR DAMP AREAS EVEN WHEN THEY ARE SEALED AND SECURED.
   - G. SEAL OPENINGS TO PROTECT AGAINST DAMAGE DURING SHIPPING, HANDLING AND STORAGE.
   - H. WRAP EQUIPMENT, INCLUDING ELECTRICAL COMPONENTS, FOR PROTECTION AGAINST RAIN, SNOW, WIND, DIRT, SUN FADING, ROAD SALT/CHEMICALS, RUST AND CORROSION. KEEP EQUIPMENT CLEAN AND DRY.
   - I. TARP OUTDOOR UNITS TO PROTECT AGAINST RAIN AND ROAD DEBRIS DURING SHIPPING.
   - J. CLEARLY MARK AHU SECTIONS WITH UNIT TAG NUMBER, SEGMENT SEQUENCE NUMBER, AND DIRECTION OF AIRFLOW. SECURELY AFFIX SAFETY–WARNING LABELS.
6. EXTRA MATERIALS
   - A. PROVIDE ONE SET OF FILTERS FOR BALANCING, AND ONE ADDITIONAL SET FOR FINAL TURNOVER TO OWNER.
7. WARRANTY
   - A. PROVIDE WARRANTY FOR 18 MONTHS FROM DATE OF SHIPMENT. WARRANTY SHALL COVER MANUFACTURER DEFECTS. WARRANTY WORK SHALL BE PERFORMED BY MANUFACTURER'S FACTORY–TRAINED AND FACTORY–EMPLOYED TECHNICIAN.
   - B. INCLUDE FACTORY–PROVIDED CONTROLS IN THE PARTS WARRANTIES.
   - C. PARTS ASSOCIATED WITH ROUTINE MAINTENANCE, SUCH AS BELTS AND AIR FILTERS SHALL BE EXCLUDED.
8. SYSTEM STARTUP
   - A. DO NOT OPERATE UNITS FOR ANY PURPOSE, TEMPORARY OR PERMANENT, UNTIL DUCTWORK IS CLEAN, FILTERS ARE IN PLACE, BEARINGS LUBRICATED, AND FAN HAS BEEN TEST RUN UNDER OBSERVATION.
   - B. COMPLY WITH MANUFACTURER'S START–UP REQUIREMENTS TO ENSURE SAFE AND CORRECT OPERATION AND INTEGRITY OF WARRANTY.
9. PRODUCT CLEANING, DELIVERY, STORAGE, AND HANDLING:
   - A. THOROUGHLY CLEAN EQUIPMENT, COMPONENTS AND SUBASSEMBLIES OF WATER, DIRT, DEBRIS, WELD SPLATTER, GREASE, OIL AND OTHER FOREIGN MATTER PRIOR TO SHIPMENT.
   - B. UNIT TO BE PREPPED AND SEALED WITH SHRINK WRAP PROTECTION FOR SHIPMENT.
   - C. IF EQUIPMENT IS TO BE STORED BEFORE USE, SHIPPING PROTECTION PROVIDED BY THE UNIT MANUFACTURER SHALL REMAIN ON THE UNIT UNTIL THE UNIT IS INSTALLED. MANUFACTURER SHALL SUBMIT WRITTEN RECOMMENDATIONS FOR FIELD STORAGE.
   - D. PROVIDE NON–CORROSIVE NAMEPLATE PERMANENTLY ATTACHED TO THE EQUIPMENT CONTAINING THE FOLLOWING INFORMATION:
     - 1) MANUFACTURER'S SHOP ORDER NUMBER.
     - 2) CUSTOMER NAME.
     - 3) CUSTOMER EQUIPMENT MARK/TAG NUMBER.
10. MANUFACTURERS:
    - A. PROVIDE AIR HANDLING UNITS AS MANUFACTURED BY YORK CUSTOM DIVISION OF JOHNSON CONTROLS INC.
    - B. ACCEPTABLE ALTERNATE MANUFACTURERS ARE BUFFALO AND AIR ENTERPRISES.
    - C. ALTERNATE PRICING BASED ON PRE–APPROVED MANUFACTURERS WILL BE CONSIDERED IF THE FOLLOWING PERFORMANCE REQUIREMENTS AND CONSTRUCTION TECHNIQUES ARE ADHERED TO IN ALL RESPECTS. ANY SUBSTITUTIONS SHALL BE APPROVED BY THE ARCHITECT/ENGINEER/OWNER IN WRITING TEN (10) DAYS PRIOR TO BID.
    - D. THE UNIT MANUFACTURER SHALL HAVE BEEN MANUFACTURING CUSTOM BUILT AIR HANDLING UNITS FOR A MINIMUM OF FIFTEEN (15) YEARS.
11. UNIT CASINGS
    - A. UNIT CASING
      - 1). LEAKAGE SHALL BE NO MORE THAN 1/2% OF RATED UNIT CFM AT +/– 10" STATIC PRESSURE. MANUFACTURER SHALL PERFORM A FACTORY LEAKAGE TEST ON AT LEAST ONE UNIT. CUSTOMER SHALL SELECT WHICH UNIT TO TEST. PERFORM TEST AT 10" STATIC PRESSURE. IF UNIT FAILS AT THE FACTORY, MANUFACTURER SHALL SEAL AND RETEST UNIT UNTIL IT MEETS SPECIFIED PERFORMANCE.
      - 2). DEFLECTION SHALL BE NO MORE THAN L/240 OF PANEL LENGTH AT +/– 10" STATIC PRESSURE. MANUFACTURER SHALL PERFORM A FACTORY DEFLECTION TEST ON AT LEAST ONE UNIT. CUSTOMER SHALL SELECT WHICH UNIT TO TEST. MEASURE DEFLECTION ON THE LARGEST WALL PANEL. PERFORM TEST AT 10" STATIC PRESSURE. IF UNIT FAILS, MANUFACTURER SHALL ADD STRUCTURAL SUPPORT REQUIRED TO ACHIEVE SPECIFIED PERFORMANCE.
      - 3). THERMAL PERFORMANCE: UNIT WALL SHALL NOT SWEAT WITH INTERIOR AIR TEMPERATURE OF 54°F AND EXTERIOR AIR AT 95/78 DB/WB.
      - 4). 2" FOAM INJECTED, THERMAL BREAK WALLS WITH INTERIOR AND EXTERIOR SHEET METAL SURFACES, WELDED INTERNAL POST STRUCTURE, AND 2" OF INJECTED FOAM INSULATION. FOAM BOARD OR FIBERGLASS INSULATION IS NOT ACCEPTABLE.
      - 5). INTERIOR LINER: ALUMINUM, 3003 SHALL BE 0.05" THICK.
      - 6). EXTERIOR SURFACE: ALUMINUM, 3003 SHALL BE 0.04" THICK, TEXTURED.
      - 7). EXTERIOR FASTENERS: FOR OUTDOOR UNITS, UNITS WITH STAINLESS STEEL OR ALUMINUM EXTERIOR WALLS USE SELF TAPPING SERIES 400 STAINLESS STEEL SHEET METAL SCREWS TO FASTEN EXTERIOR SHEET METAL WALLS TO POST FRAME STRUCTURE ON 18" CENTERS
      - 8). INTERIOR FASTENERS: FOR STAINLESS STEEL OR ALUMINUM INTERIOR LINER: USE SELF TAPPING SERIES 400 STAINLESS STEEL SHEET METAL SCREWS TO FASTEN EXTERIOR SHEET METAL WALLS TO POST FRAME STRUCTURE ON 27" CENTERS
      - 9). CASING JOINTS: JOINTS SHALL BE MECHANICALLY FASTENED. FASTENERS SHALL NOT EXTEND FROM THE OUTSIDE TO THE INSIDE OF THE UNIT. USE ANGLE TO FASTEN AND SEAL WALLS AT CORNERS, FLOORS, AND ROOFS.
      - 10).SEALING: SEAL JOINTS WITH POLYURETHANE WATER RESISTANT SEALANT.
      - 11).EXTERIOR COATING: FACTORY APPLIED HIGH BUILD (3 TO 5 MILS) ALKYD ENAMEL. COATING SHALL PASS ASTM B–117 500 HOUR SALT SPRAY TEST. COLOR SHALL BE MANUFACTURER'S STANDARD CHAMPAGNE, OR AS SPECIFIED BY OWNER.
      - 12).AIRSTREAM SURFACES: SURFACES IN CONTACT WITH THE AIRSTREAM SHALL COMPLY WITH REQUIREMENTS IN ASHRAE 62.1–2013.
      - 13).UNIT ROOF FOR OUTDOOR UNITS ARE TO BE SLOPED A MINIMUM PITCH OF 1/4" PER FOOT.
      - 14).THE ROOF SHALL OVERHANG ALL SIDE AND END PANELS TO PREVENT PRECIPITATION DRAINAGE FROM STREAMING DOWN THE UNIT WALL PANELS.
      - 15).ROOFS SHALL BE SLOPED TO THE NON–DOOR SIDE OF THE UNIT;
      - 16).ROOF CONSTRUCTION SHALL ACCOMMODATE A MINIMUM SNOW–LOAD OF 30 LB/FT2/.
      - 17).ROOF SHALL BE DESIGNED TO HOLD A 300LB LOAD FOR SERVICE AND MAINTENANCE.
      - 18) ACCESS DOORS:
        - m. FRAMES: TYPE 6063–T6 ALUMINUM EXTRUSION, WITH THERMAL BREAK FOR "NO THROUGH METAL" CONSTRUCTION, WELDED AT THE CORNERS AND ATTACHED TO THE UNIT CASING WITH STAINLESS STEEL HARDWARE.
        - n. HINGES: A FULL HEIGHT STAINLESS–STEEL PIANO HINGE WITH MINIMUM TWO ROLLER CAM LATCHES PER DOOR, OPERABLE FROM INSIDE AND OUTSIDE.
        - o. HANDLES: GLASS FIBER REINFORCED, UV RATED, PADLOCKABLE, NYLON POLYAMIDE AS MANUFACTURED BY ALLEGIS CORPORATION.
        - p. GASKET: EPDM–SPONGE, APPLIED AROUND ENTIRE PERIMETERS OF PANEL FRAMES.
        - q. VIEWPORTS: PROVIDE 12"X12", THERMAL PANE VIEWING WINDOW CENTERED IN EACH ACCESS DOOR WITH WIRE–REINFORCED SAFETY GLASS.
        - r. TEST PORTS: VENTLOK NO. 699 INSTRUMENT TEST HOLES INSTALLED IN DOOR LOCATIONS AS REQUIRED TO MEASURE PRESSURE DROPS ACROSS UNIT.
        - s. RAIN LIP: PROVIDE RAIN LIP OF SAME MATERIAL TYPE AS UNIT CASING ATTACHED WITH TEK SCREWS ABOVE ALL ACCESS DOORS.
    - B. FLOORS:
      - 1). FLOOR SHALL BE 0.125–IN, ALUMINUM DIAMOND PLATE STITCH WELDED, CAULKED AND SEALED TO THE BASE.
      - 2) FLOOR SHALL BE INSULATED WITH 2–INCH, POLYURETHANE SPRAY FOAM INSULATION. UNDERSIDES OF FLOOR INSULATION SHALL BE SEALED WITH 0.05" THICK ALUMINUM.
      - 3) FLOOR SHALL BE THERMALLY ISOLATED FROM WELDED BASE FRAME MEMBERS (PERIMETER AND INTERNAL SUPPORTS). CONSTRUCTION WITHOUT THERMALLY ISOLATED FLOOR AND WALLS SHALL NOT BE ACCEPTABLE.
        - a. FLOOR SHALL HAVE UPTURNED LIP WITH FULLY WELDED SEAMS, AND BE CAPABLE OF HOLDING 2–INCH OF WATER. PENETRATIONS THROUGH THE FLOOR SHALL NOT EXIST. CONSTRUCTION ALLOWING SCREWS OR BOLTS TO PENETRATE FLOOR SHALL NOT BE ALLOWED. ALL FLOOR OPENINGS SHALL HAVE A FULLY WELDED 2" UPTURNED LIP.
        - b. EACH SECTION SHALL BE EQUIPPED WITH DRAIN CONNECTION TO FACILITATE WASHDOWN AND MAINTENANCE. DRAIN CONNECTION SHALL BE EXTENDED THROUGH THE BASE AND HAVE A REMOVABLE CAP INSTALLED.
        - c. ALL INTERNAL EQUIPMENT SHALL BE PROVIDED WITH A MINIMUM 2–INCH HIGH BASE TO RAISE EQUIPMENT AND COMPONENTS OFF THE UNIT FLOOR FOR HOUSEKEEPING.
      - 4) FLOOR DRAINS:
        - a. FACTORY SHALL PROVIDE 1–1/4" FLOOR DRAIN IN SEGMENTS WHERE NOTED ON THE UNIT DRAWING.
        - b. FLOOR DRAIN PIPING SHALL BE 304 STAINLESS STEEL EXTENDED FROM THE FLOOR DRAIN AND TERMINATED WITH A 1–1/4" MPT THREADED CONNECTION TO THE EXTERIOR THROUGH THE UNIT BASE.
      - 5) FLOOR OPENINGS:
        - a. FACTORY SHALL PROVIDE C–CHANNEL SUPPORT AROUND PERIMETER OF ALL FLOOR OPENINGS.
        - b. FACTORY SHALL PROVIDE 304 STAINLESS STEEL FLATTENED EXPANDED METAL SAFETY SCREEN ATTACHED WITH SCREWS OVER ALL FLOOR OPENINGS.
    - C. BASERAILS:
      - 1) TYPE 6061 T6 WELDED STRUCTURAL ALUMINUM, 8–INCH, HEIGHT, WITH CROSS SUPPORTS SPACED AT REGULAR INTERVALS AND REMOVABLE LIFTING LUGS.
      - 2) EXTERIOR COATING: FACTORY APPLIED HIGH BUILD (3 TO 5 MILS) ALKYD ENAMEL. COATING SHALL PASS ASTM B–117 500 HOUR SALT SPRAY TEST. COLOR SHALL BE MANUFACTURER'S STANDARD CHAMPAGNE, OR OWNER SHALL SPECIFY COLOR.
12. DIRECT–DRIVE FANS SECTION
    - A. FAN AND DRIVE ASSEMBLIES: STATICALLY AND DYNAMICALLY BALANCED AND DESIGNED FOR CONTINUOUS OPERATION AT MAXIMUM–RATED FAN SPEED AND MOTOR HORSEPOWER.
      - 1) SHAFTS: DESIGNED FOR CONTINUOUS OPERATION AT MAXIMUM–RATED FAN SPEED AND MOTOR HORSEPOWER, AND WITH FIELD–ADJUSTABLE ALIGNMENT, DESIGNED TO OPERATE AT NO MORE THAN 70 PERCENT OF FIRST CRITICAL SPEED AT TOP OF FAN'S SPEED
      - 2) FLEXIBLE CONNECTOR: FACTORY FABRICATED WITH A 3 INCH WIDE FABRIC STRIP ATTACHED TO TWO STRIPS OF 3 INCH WIDE, 0.032–INCH THICK ALUMINUM SHEETS.
    - B. PLENUM FAN HOUSINGS: STEEL FRAME AND PANEL; FABRICATED WITHOUT FAN SCROLL AND VOLUTE HOUSING. ALL SINGLE WIDTH SINGLE INLET (SWSI) PLENUM FANS SHALL HAVE AIRFOIL BLADES. FLAT PLATE BLADES SHALL NOT BE ACCEPTABLE. SWSI FANS SHALL BE PROVIDED WITH INLET SCREENS
      - 1) ARRANGEMENT 4 DIRECT DRIVE PLENUM FANS SHALL INCLUDE WHEELS CONSTRUCTED ENTIRELY OF ALUMINUM TO REDUCE WEIGHT AND VIBRATION. AIRFOIL BLADES SHALL BE EXTRUDED ALUMINUM, AND CONTINUOUSLY WELDED AROUND ALL EDGES.
      - 2) DIRECT DRIVE PLENUM FAN WHEELS ARE ATTACHED TO THE MOTOR SHAFT USING TAPER LOCK BUSHINGS. THE WHEEL AND FAN INLET ARE MATCHED AND HAVE PRECISE RUNNING TOLERANCES FOR MAXIMUM PERFORMANCE AND OPERATING EFFICIENCY.
    - C. AIRFOIL, CENTRIFUGAL FAN WHEELS: SMOOTH–CURVED INLET FLANGE, BACKPLATE, AND HOLLOW DIE–FORMED AIRFOIL–SHAPED BLADES CONTINUOUSLY WELDED AT TIP FLANGE AND BACKPLATE; CAST–IRON OR CAST–STEEL HUB RIVETED TO BACKPLATE AND FASTENED TO SHAFT WITH SET SCREWS. ALL AIRFOIL FANS SHALL BEAR THE AMCA SEAL. AIRFOIL FAN PERFORMANCE SHALL BE BASED ON TESTS MADE IN ACCORDANCE WITH AMCA STANDARD 210 AND COMPLY WITH THE REQUIREMENTS OF AMCA STANDARD 300 FOR INLET SOUND AND OUTLET SOUND. FANS SHALL BE RUN TESTED AT THE SPECIFIED OPERATING SPEED PRIOR TO SHIPMENT. EACH FAN SHALL BE DYNAMICALLY BALANCED AS A COMPLETE ASSEMBLY IN ACCORDANCE WITH ISO–1940, TO ACHIEVE BALANCE QUALITY GRADE G6.3 FOR THE ROTATING ASSEMBLY. MAXIMUM VIBRATION SHALL BE WITHIN THE LIMITS OF ANSI/AMCA 204 FAN APPLICATION CATEGORY BV–3. BALANCE READINGS SHALL BE TAKEN ELECTRONICALLY IN THE AXIAL, VERTICAL, AND HORIZONTAL DIRECTIONS. RECORDS OF EACH FAN BALANCE SHALL BE MADE AVAILABLE UPON REQUEST.
    - D. INTERNAL VIBRATION ISOLATION AND SEISMIC CONTROL: FANS SHALL BE FACTORY MOUNTED WITH 2 INCH DEFLECTION SPRING ISOLATORS WITH SEISMIC RESTRAINTS. SWSI PLENUM FANS SHALL INCLUDE THRUST RESTRAINTS TO RESIST HORIZONTAL MOTION DUE TO THRUST DURING START–UP, AND TO MITIGATE FAN ASSEMBLY VIBRATION IN THE HORIZONTAL PLANE DURING OPERATION.
    - E. EACH FAN SHALL BE PROVIDED WITH AN AIRFLOW MEASURING SYSTEM (AFMS) CONSISTING OF A PIEZOMETER RING MOUNTED IN THE THROAT AND A STATIC PRESSURE TAP MOUNTED ON THE FACE OF THE INLET CONE. [A DIFFERENTIAL PRESSURE TRANSDUCER [AND AN ANALOG DISPLAY] SHALL BE PROVIDED. TRANSDUCER SHALL HAVE A FIELD CONFIGURABLE 0–5 VDC OR 0–10 VDC OUTPUT, AS WELL AS A 4–20 MA OUTPUT. TRANSDUCER SHALL HAVE A STANDARD ACCURACY OF ±1% FS.] AFMS SHALL NOT OBSTRUCT THE AIRFLOW IN ANY WAY AND SHALL HAVE NO EFFECT ON FAN AIRFLOW PERFORMANCE, STATIC PRESSURE, OR SOUND POWER LEVELS.
13. MOTORS
    - A. ALL FAN MOTORS SHALL COMPLY WITH NEMA AND IEEE FOR TEMPERATURE RATING, SERVICE FACTOR, ENCLOSURE TYPE, AND EFFICIENCY REQUIREMENTS FOR MOTORS SPECIFIED IN DIVISION 23 SECTION "COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT."
      - 1) ENCLOSURE TYPE SHALL BE TOTALLY ENCLOSED, FAN COOLED.
      - 2) ALL FAN MOTORS SHALL BE NEMA PREMIUM™ EFFICIENT MOTORS AS DEFINED IN NEMA MG 1.
      - 3) MOTORS SHALL BE RATED FOR CONTINUOUS DUTY AT FULL LOAD AT 40°C AMBIENT TEMPERATURE RISE.
      - 4) MOTORS SHALL BE "INVERTER READY", COMPLYING WITH NEMA STD MG1 PART 31.4.4.2
      - 5) MOTORS SHALL HAVE AN INSULATION CLASS F.
      - 6) MOTORS SHALL INCLUDE A SHAFT GROUNDING RING.
14. COILS
    - A. GENERAL REQUIREMENTS FOR COIL SECTION:
      - 1) PROVIDE COILS MANUFACTURED BY AHU MANUFACTURER, EXCEPT WHERE NOTED IN CONTRACT DOCUMENTS.
      - 2) COILS SHALL MEET OR EXCEED PERFORMANCE SCHEDULED ON DRAWINGS.
      - 3) PROVIDE HEATING AND COOLING COILS WITH A MAXIMUM FACE VELOCITY AS SCHEDULED. FACE VELOCITY CALCULATIONS SHALL BE BASED ON THE FINNED AREA OF THE COIL.
      - 4) PROVIDE COOLING COIL DRAIN PAN THAT IS SUFFICIENT TO CONTAIN COIL CONDENSATE. DRAIN PAN SHALL BE 16 GA. 304 STAINLESS STEEL [16 GA. G–90 STEEL][316L STAINLESS STEEL] CONSTRUCTION AND EXTEND A MINIMUM OF 6 [12] [18] INCHES DOWNSTREAM OF LEAVING FACE OF THE COIL TO ALLOW FOR CONDENSATE PAN ACCESS AND MAINTENANCE AND MEET REQUIREMENTS FOR ASHRAE 62–2007. IAQ DRAIN PAN MUST SLOPE IN 3 DIRECTIONS AND HAVE SINGLE 304 STAINLESS STEEL 1.5 [2] INCH CONNECTION FOR TRAPPING AT JOBSITE.
      - 5) PROVIDE COIL SEGMENT CASING THAT MEETS OR EXCEEDS CASING THERMAL PERFORMANCE OF THE UNIT. PROVIDE COIL PULL PANEL THAT ARE EASILY REMOVABLE WITH NO SPECIAL TOOLS. COILS SHALL BE REMOVABLE FROM THE SIDE OF THE AHU. [FOR UNITS WITH MULTIPLE STACKED COILS, PROVIDE A 304 STAINLESS STEEL STACKING RACK TO ALLOW INDIVIDUAL COILS TO BE REMOVED FROM SIDE OF AHU WITHOUT DISTURBING ANY OTHER COILS].
      - 6) PROVIDE HEATING COILS BUILT IN THEIR OWN FULL PERIMETER FRAME 304 STAINLESS STEEL. TUBE SHEETS ON EACH END SHALL HAVE FULLY DRAWN COLLARS TO SUPPORT AND PROTECT TUBES. HORIZONTAL COIL CASING AND SUPPORT MEMBERS SHALL ALLOW MOISTURE TO DRAIN. WHEN REQUIRED, INTERMEDIATE VERTICAL COILS SUPPORT WILL BE SAME MATERIAL AS CASING. BULKHEAD SUPPORT SHALL BE 304 STAINLESS STEEL AND SHALL NOT BLOCK FINNED AREA.
      - 7) PROVIDE COOLING COILS BUILT IN THEIR OWN FULL PERIMETER FRAME 304 STAINLESS STEEL. TUBE SHEETS ON EACH END SHALL HAVE FULLY DRAWN COLLARS TO SUPPORT AND PROTECT TUBES. HORIZONTAL COIL CASING AND SUPPORT MEMBERS SHALL ALLOW MOISTURE TO DRAIN. WHEN REQUIRED, INTERMEDIATE VERTICAL COILS SUPPORT WILL BE SAME MATERIAL AS CASING. BULKHEAD SUPPORT SHALL BE 304 STAINLESS STEEL AND SHALL NOT BLOCK FINNED AREA.
      - 8) PROVIDE AN INTERMEDIATE DRAIN PAN 304 STAINLESS STEEL ON STACKED COOLING COILS OR ANY COOLING COIL TALLER THAN 48 INCHES FINNED HEIGHT. INTERMEDIATE DRAIN PAN SHALL SLOPE IN A MINIMUM OF TWO PLANES AND PROVIDE COPPER DOWNSPOUTS TO LOWER DRAIN PAN.
      - 9) WATER AND GLYCOL COILS SHAVE HAVE A 1/4" FPT PLUGGED VENT/DRAIN TAP ON EACH CONNECTION. CIRCUITING SHALL ALLOW DRAINING AND VENTING WHEN INSTALLED. EXTEND VENT, DRAIN, AND COIL CONNECTIONS THROUGH AHU CASING, WHEN POSSIBLE.
      - 10) WATER AND GLYCOL COILS SHALL BE OPERABLE AT 250 PSIG WORKING PRESSURE AND UP TO 300 F. FACTORY TEST WATER AND GLYCOL COILS WITH 325 PSIG COMPRESSED AIR UNDER WATER.
      - 11) PROVIDE WATER, GLYCOL AND DX COILS WITH A TUBE OD OF 5/8 INCH. MECHANICALLY EXPAND TUBES TO FORM FIN BOND AND PROVIDE BURNISHED, WORK–HARDENED INTERIOR SURFACE. 5/8 INCH TUBE WALL THICKNESS OF 0.035"
      - 12) PROVIDE WATER AND GLYCOL COIL HEADERS MADE OF SEAMLESS COPPER TUBING. PIPE CONNECTIONS SHALL BE STEEL THREADED MPT RED BRASS THREADED MPT. HEADER CONNECTIONS (TUBES AND PIPING CONNECTIONS) SHALL BE SILVER–BRAZED OR TIG WELDED.
      - 13) PROVIDE COILS WITH DIE–FORMED, CONTINUOUS ALUMINUM FINS. FINS SHALL HAVE FULLY DRAWN COLLARS TO ACCURATELY SPACE FINS AND PROTECT TUBES. SINE WAVE, FIN THICKNESS SHALL BE 0.008 INCHES
15. AIR FILTRATION
    - A. GENERAL REQUIREMENTS FOR AIR FILTRATION SECTION:
      - 1) FILTERS SHALL BE MANUFACTURED BY KOCH, CAMFIL/FARR, OR FLANDERS.
      - 2) PROVIDE A MINIMUM EFFICIENCY REPORTING VALUE (MERV) ACCORDING TO ASHRAE 52.2.
      - 3) PROVIDE FILTER SEGMENTS WITH FILTERS AND FRAMES AS SCHEDULED.
      - 4) PROVIDE FILTER HOLDING FRAMES ARRANGED FOR FLAT OR ANGULAR ORIENTATION, WITH ACCESS DOORS AS INDICATED ON DRAWINGS. FILTERS SHALL BE LIFTED OUT FROM ACCESS PLENUM.
      - 5) FILTER MEDIA SHALL BE IN COMPLIANCE WITH UL900.
    - B. FILTER GAGE:
      - 1) 3–1/2–INCH– DIAMETER, DIAPHRAGM–ACTUATED DIAL IN METAL CASE.
      - 2) VENT VALVES.
      - 3) BLACK FIGURES ON WHITE BACKGROUND.
      - 4) FRONT RECALIBRATION ADJUSTMENT.
      - 5) 3 PERCENT OF FULL–SCALE ACCURACY.
      - 6) RANGE: 0– TO 2.0–INCH WG
      - 7) ACCESSORIES: STATIC–PRESSURE TIPS WITH INTEGRAL COMPRESSION FITTINGS, 1/4–INCH ALUMINUM TUBING, AND 2– OR 3–WAY VENT VALVES.
16. DAMPERS
    - A. CONTROL DAMPERS: DAMPERS SHALL BE OPPOSED/PARALLEL–BLADE AS SCHEDULED, LEAKAGE CLASS 1A DESIGN WITH A LEAKAGE RATE THAT SHALL NOT EXCEED 3 CFM/SQ. FT. AT 1 IN. W.G. PRESSURE DIFFERENTIAL WHEN TESTED ACCORDING TO AMCA 500, DAMPERS SHALL BE PROVIDED WITH EXTRUDED–ALUMINUM AIRFOIL–SHAPED, SINGLE–PIECE BLADES WITH FLEXIBLE METAL COMPRESSIBLE TYPE JAMB SEALS, EXTRUDED RUSKIPRENE BLADE EDGE SEALS, AND STAINLESS–STEEL SLEEVE BEARINGS MOUNTED IN A SINGLE EXTRUDED–ALUMINUM FRAME. AXLES SHALL BE HEXAGONAL POSITIVELY LOCKED INTO THE DAMPER BLADE. DAMPERS SHALL BE PROVIDED WITH A JACKSHAFT.
    - B. SMOKE DAMPERS: DAMPERS SHALL BE OPPOSED BLADE, LEAKAGE CLASS 1, EXTRUDED ALUMINUM WITH A LEAKAGE RATE THAT SHALL NOT EXCEED 4 CFM/SQ. FT. AT 1 IN. W.G. PRESSURE DIFFERENTIAL. SMOKE DAMPERS SHALL BE PROVIDED WITH AN ELECTRIC ACTUATOR, TWO POSITION FAIL CLOSED, VOLTAGE AS SCHEDULED DAMPER OPERATOR. ALL SMOKE DAMPERS SHALL COMPLY WITH UL 555S, NFPA 90A, NFPA 92A, NFPA 92B, AND NFPA 101.
17. TESTING
    - A. PERFORM FACTORY TEST ON A FULLY ASSEMBLED UNIT WITH SECTIONS JOINED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS. USE OF ADDITIONAL MATERIAL (TAPE, SEALANT, CAULK) SHALL BE MINIMIZED TO ONLY THAT REQUIRED TO SIMULATE PERMANENT JOBSITE CONDITIONS NOT OTHERWISE DUPLICABLE IN THE FACTORY.
    - B. FACTORY LEAK TESTING: THE UNIT MANUFACTURER SHALL PROVIDE A FACTORY LEAK TEST ON ONE UNIT ACROSS THE CABINET EXTERIOR WALLS. CASING LEAKAGE SHALL NOT EXCEED 0.5% OF DESIGN CFM AT +/–10" W.G. (OR AS REQUIRED BY AHRI 1350.)
18. LIGHTS AND OUTLETS
    - A. LIGHTS
      - 1) VAPOR RESISTANT PENDANT: FACTORY SHALL PROVIDE VAPOR RESISTANT PENDANT, MARINE TYPE LIGHT FIXTURE WITH CLEAR GLOBE, METAL GUARD, AND 23W COMPACT FLUORESCENT BULB IN SEGMENTS AND QUANTITY AS NOTED ON DRAWINGS.
      - 2) FACTORY SHALL WIRE EACH LIGHT FIXTURE TO A SEPARATE 120V SWITCH LOCATED NEAR THE ACCESS DOOR OF THE SEGMENT WITH THE LIGHT FIXTURE.
    - B. OUTLETS
      - 1) FACTORY SHALL PROVIDE A 15A GFI DUPLEX OUTLET MOUNTED IN A WEATHERPROOF ENCLOSURE IN SEGMENTS AND QUANTITY AS INDICATED ON THE DRAWINGS.
19. INSTALLATION
    - A. INSTALL EQUIPMENT PER INDUSTRY STANDARDS, APPLICABLE CODES, AND MANUFACTURER'S INSTRUCTIONS.
    - B. DO NOT USE AHU'S FOR TEMPORARY HEATING, COOLING OR VENTILATION PRIOR TO COMPLETE INSPECTION AND STARTUP PERFORMED PER THIS SPECIFICATION.
    - C. INSTALL AHU'S ON A CONCRETE PAD, ROOF CURB, OR STRUCTURAL STEEL BASE, AS SHOWN ON DRAWINGS.
    - D. INSTALL AHU'S WITH MANUFACTURER'S RECOMMENDED CLEARANCES FOR ACCESS, COIL PULL, AND FAN REMOVAL.
    - E. PROVIDE ONE COMPLETE SET OF FILTERS FOR TESTING, BALANCING, AND COMMISSIONING. PROVIDE SECOND COMPLETE SET OF FILTERS AT TIME OF TRANSFER TO OWNER.
    - F. INSTALL AHU PLUMB AND LEVEL. CONNECT PIPING AND DUCTWORK ACCORDING TO MANUFACTURER'S INSTRUCTIONS.
    - G. INSTALL SEISMIC RESTRAINTS AND ANCHORS PER APPLICABLE LOCAL BUILDING CODES. REFER TO SPECIFICATION SECTION 230548 (15240 / 15070) FOR PRODUCT AND INSTALLATION REQUIREMENTS.
    - H. INSULATE PLUMBING ASSOCIATED WITH DRAIN PAN DRAINS AND CONNECTIONS.
    - I. INSTALL INSULATION ON ALL STAGGERED COIL PIPING CONNECTIONS, BOTH INTERNAL AND EXTERNAL TO THE UNIT.
20. FIELD QUALITY CONTROL
    - A. STORE PER AHU MANUFACTURER'S WRITTEN RECOMMENDATIONS. STORE AHUS INDOORS IN A WARM, CLEAN, DRY PLACE WHERE UNITS WILL BE PROTECTED FROM WEATHER, CONSTRUCTION TRAFFIC, DIRT, DUST, WATER AND MOISTURE. IF UNITS WILL BE STORED FOR MORE THAN 6 MONTHS, FOLLOW MANUFACTURER'S INSTRUCTION FOR LONG–TERM STORAGE.
    - B. RIG AND LIFT UNITS ACCORDING MANUFACTURER'S INSTRUCTIONS.
21. AHU INSPECTION
    - A. PROVIDE MANUFACTURER'S FACTORY–TRAINED SERVICE TECHNICIAN TO PERFORM AN INSPECTION OF UNIT AND INSTALLATION PRIOR TO STARTUP. TECHNICIAN SHALL INSPECT AND VERIFY THE FOLLOWING AS A MINIMUM:
      - 1) DAMAGE OF ANY KIND
      - 2) LEVEL INSTALLATION OF UNIT
      - 3) PROPER REASSEMBLY AND SEALING OF UNIT SEGMENTS AT SHIPPING SPLITS.
      - 4) TIGHT SEAL AROUND PERIMETER OF UNIT AT THE ROOF CURB
      - 5) INSTALLATION OF SHIPPED–LOOSE PARTS, INCLUDING FILTERS, AIR HOODS, BIRD SCREENS AND MIST ELIMINATORS.
      - 6) COMPLETION AND TIGHTNESS OF ELECTRICAL, DUCTWORK AND PIPING
      - 7) TIGHT SEALS AROUND WIRING, CONDUIT AND PIPING PENETRATIONS THROUGH AHU CASING.
      - 8) SUPPLY OF ELECTRICITY FROM THE BUILDING'S PERMANENT SOURCE
      - 9) INTEGRITY OF CONDENSATE TRAP FOR POSITIVE OR NEGATIVE PRESSURE OPERATION
      - 10) CONDENSATE TRAPS CHARGED WITH WATER
      - 11) REMOVAL OF SHIPPING BOLTS AND SHIPPING RESTRAINTS
      - 12) SEALING OF PIPE CHASE FLOOR(S) AT PENETRATION LOCATIONS.
      - 13) TIGHTNESS AND FULL MOTION RANGE OF DAMPER LINKAGES (OPERATE MANUALLY)
      - 14) COMPLETE INSTALLATION OF CONTROL SYSTEM INCLUDING END DEVICES AND WIRING
      - 15) CLEANLINESS OF AHU INTERIOR AND CONNECTING DUCTWORK
      - 16) PROPER SERVICE AND ACCESS CLEARANCES
      - 17) PROPER INSTALLATION OF FILTERS
      - 18) FILTER GAUGE SET TO ZERO
    - B. PROVIDE THE MANUFACTURER'S FACTORY–TRAINED SERVICE TECHNICIAN PERFORM AN INSPECTION OF THE AHU FAN ASSEMBLY SUBSEQUENT TO GENERAL AHU INSPECTION AND PRIOR TO STARTUP. TECHNICIAN SHALL INSPECT AND VERIFY THE FOLLOWING AS A MINIMUM:
      - 1) FAN ISOLATION BASE AND THRUST RESTRAINT ALIGNMENT
      - 2) TIGHT SET SCREWS ON PULLEYS, BEARINGS AND FAN
      - 3) TIGHT FAN BEARING BOLTS
      - 4) TIGHT FAN AND MOTOR SHEAVES
      - 5) TIGHT MOTOR BASE AND MOUNTING BOLTS
      - 6) BLOWER WHEEL TIGHT AND ALIGNED TO FAN SHAFT
      - 7) SHEAVE ALIGNMENT AND BELT TENSION
      - 8) FAN DISCHARGE ALIGNMENT WITH DISCHARGE OPENING
      - 9) FAN BEARING LUBRICATION
      - 10) FREE ROTATION OF MOVING COMPONENTS (ROTATE MANUALLY)
22. STARTUP SERVICE AND OWNER TRAINING
    - A. MANUFACTURER'S FACTORY–TRAINED SERVICE TECHNICIAN SHALL STARTUP AHUS. TECHNICIAN SHALL PERFORM THE FOLLOWING STEPS AS A MINIMUM:
      - 1) ENERGIZE THE UNIT DISCONNECT SWITCH
      - 2) VERIFY CORRECT VOLTAGE, PHASES AND CYCLES
      - 3) ENERGIZE FAN MOTOR BRIEFLY ("BUMP") AND VERIFY CORRECT DIRECTION OF ROTATION.
      - 4) RE–CHECK DAMPER OPERATION; VERIFY THAT UNIT CANNOT AND WILL NOT OPERATE WITH ALL DAMPERS IN THE CLOSED POSITION.
      - 5) ENERGIZE FAN MOTORS AND VERIFY THAT MOTOR FLA IS WITHIN MANUFACTURER'S TOLERANCE OF NAMEPLATE FLA FOR EACH PHASE.
    - B. PROVIDE A MINIMUM OF 4 HOURS OF TRAINING FOR OWNER'S PERSONNEL BY MANUFACTURER'S FACTORY–TRAINED AND FACTORY–EMPLOYED SERVICE TECHNICIAN. TRAINING SHALL INCLUDE AHU CONTROLS, MOTOR STARTER, VFD, AND AHU.
    - C. TRAINING SHALL INCLUDE STARTUP AND SHUTDOWN PROCEDURES AS WELL AS REGULAR OPERATION AND MAINTENANCE REQUIREMENTS.
    - D. SUBMIT A STARTUP REPORT SUMMARIZING ANY PROBLEMS FOUND AND REMEDIES PERFORMED.
23. CLEANING
    - A. CLEAN UNIT INTERIOR PRIOR TO OPERATING. REMOVE TOOLS, DEBRIS, DUST AND DIRT.
    - B. CLEAN EXTERIOR PRIOR TO TRANSFER TO OWNER.
24. DOCUMENTATION
    - A. PROVIDE INSTALLATION INSTRUCTION MANUAL, & STARTUP CHECKLIST IN THE SUPPLY FAN SECTION OF EACH UNIT.
    - B. PROVIDE SIX COPIES OF SPARE PARTS MANUAL FOR OWNER'S PROJECT SYSTEM MANUAL.

N

REV	DESCRIPTION	DATE
4	ISSUED FOR AHU–14A&B BID	07/26/22
3	ISSUED FOR AHU–13A&B CONSTRUCTION	07/11/22
2	ISSUED FOR CONSTRUCTION	02/11/21
1	ADDENDUM 1	10/24/20
0	ISSUED FOR BID	03/06/20

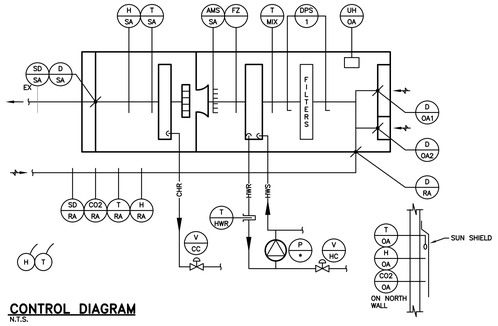
PENNSYLVANIA CONVENTION CENTER AUTHORITY
ONE CONVENTION CENTER PLACE
1101 ARCH STREET
PHILADELPHIA, PENNSYLVANIA 19107

PCCA EXHIBIT HALL A
AHU–14A&B

AIR HANDLING UNIT DETAILS, SCHEDULE, & SPECIFICATIONS

DIMITRI J. VERVERELLI INC.
CONSULTING ENGINEERS
PHILADELPHIA, PENNSYLVANIA

DRAWN BY: DPC	SCALE: AS NOTED	DWG. NO.
CHECKED BY: LOM	PROJ. NO: 1634C	M4.1



CONTROL DIAGRAM

N.T.S.

SEQUENCE OF OPERATIONS

A. GENERAL

1. THE DIRECT DIGITAL AUTOMATIC CONTROLS SHALL BE THROUGH NEW NETWORK CONTROL UNITS (NCU) AND THE EXISTING SIEMENS BUILDING AUTOMATION SYSTEM (BAS).
2. THE SPACE IS SERVED BY 14 SIMILAR AHU'S. THE BAS SHALL PROVIDE CONTROLS FOR THE OWNER TO SELECT WHICH UNITS SHALL BE OPERABLE FOR EVENTS AND FOR MAINTAINING SPACE TEMPERATURES WHEN THE SPACE IS UNOCCUPIED.

B. SYSTEM INOPERATIVE

1. WHEN THE SYSTEM IS INDEXED TO INOPERATIVE THE SUPPLY FAN STOPS; OUTSIDE AIR DAMPERS, D-OA1 AND DOA2 CLOSE; SUPPLY AIR DAMPER, D-SA AND RETURN AIR DAMPER, D-RA CLOSE; COOLING COIL CONTROL VALVE, V-CC CLOSES AND HEATING COIL CONTROL VALVE, V-HC MODULATES TO MAINTAIN A PLENUM TEMPERATURE OF 50 DEGREES AS SENSED BY TEMPERATURE SENSOR, T-MIX. PUMP, P-* SHALL STOP UPON A SPACE TEMPERATURE OF 50° OR GREATER.
2. UNIT HEATER SHALL BE SET TO OPERATE THROUGH AN INTERNAL ADJUSTABLE THERMOSTAT SET AT 45°F TO MAINTAIN TEMPERATURE.

C. SYSTEM OPERATIVE – COOLING

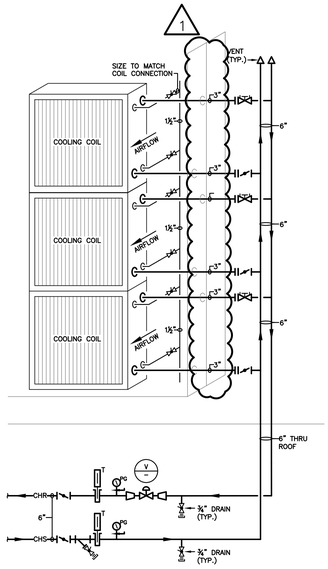
1. WHEN THE SYSTEM IS INDEXED TO OPERATIVE, SUPPLY AIR DAMPER, D-SA AND RETURN AIR DAMPER, D-RA OPEN, MINIMUM OUTSIDE AIR DAMPER, D-OA2 OPENS. UPON CONFIRMATION THAT SUPPLY AIR DAMPER, D-SA IS FULLY OPEN, THE SUPPLY FAN SOFT STARTS THROUGH ITS VARIABLE FREQUENCY DRIVE. MINIMUM OPERATING SPEED OF SUPPLY FAN SHALL BE 50% (ADJUSTABLE).
2. ON A RISE IN SPACE TEMPERATURE ABOVE 72 DEGREES F, AS SENSED BY SPACE TEMPERATURE SENSOR, T, COOLING COIL CONTROL VALVE V-HC SHALL MODULATE TO A SUPPLY AIR TEMPERATURE OF 50°F.
3. ON A CONTINUED RISE IN SUPPLY AIR TEMPERATURE, SUPPLY FAN VFD SHALL INCREASE SUPPLY FAN FLOW RATE WHILE MAINTAINING A SUPPLY AIR TEMPERATURE OF 50°F.
4. ON A CONTINUED RISE IN SUPPLY TEMPERATURE AND WHEN CONDITIONS PERMIT ECONOMIZER COOLING, ENTHALPY CONTROLLER SHALL COMPARE RETURN AIR AND OUTSIDE AIR CONDITIONS AND MODULATE OUTSIDE AIR DAMPER, D-OA1 OPEN AS RETURN AIR DAMPER, D-RA PROPORTIONALLY CLOSES. WHEN OUTSIDE AIR ENTHALPY IS GREATER THAN RETURN AIR ENTHALPY, THE OUTSIDE AIR DAMPER, D-OA1 MODULATES CLOSED AND RETURN AIR DAMPER, D-RA PROPORTIONALLY OPENS.
5. ON A CONTINUED RISE IN SUPPLY AIR TEMPERATURE ABOVE 55°F, CHILLED WATER CONTROL VALVE, V-CC SHALL MODULATE OPEN.
6. WHEN ALL SPACE TEMPERATURES ARE SATISFIED SUPPLY FAN SPEED SHALL BE REDUCED.
7. ON A RISE IN RETURN AIR CO2 LEVELS 500 PPM ABOVE OUTSIDE AIR CO2 LEVELS (ADJUSTABLE), OUTSIDE AIR DAMPER, D-OA1 SHALL MODULATE OPEN AND RETURN AIR DAMPER, D-RA SHALL MODULATE CLOSED.

D. UNOCCUPIED MODE

1. WHEN THE SYSTEM IS INDEXED TO UNOCCUPIED, THE SYSTEM SHALL BE INDEXED TO INOPERATIVE UNLESS THE UNIT IS SELECTED FOR MAINTAINING UNOCCUPIED TEMPERATURE SET POINTS.
2. WHEN THE SYSTEM IS SELECTED FOR MAINTAINING UNOCCUPIED SET POINTS, THE SYSTEM SHALL REMAIN INOPERATIVE WHEN THE SPACE TEMPERATURES ARE BETWEEN A HEATING SET POINT OF 50°F AND A COOLING SET POINT OF 80° (ADJUSTABLE). WHEN THE FAN IS OPERATIVE, THE SYSTEM SHALL OPERATE AS DESCRIBED ABOVE EXCEPT OUTSIDE AIR DAMPERS SHALL REMAIN CLOSED AND RETURN AIR DAMPER SHALL REMAIN OPEN, EXCEPT FOR ECONOMIZER COOLING.

E. SAFETY CONTROLS

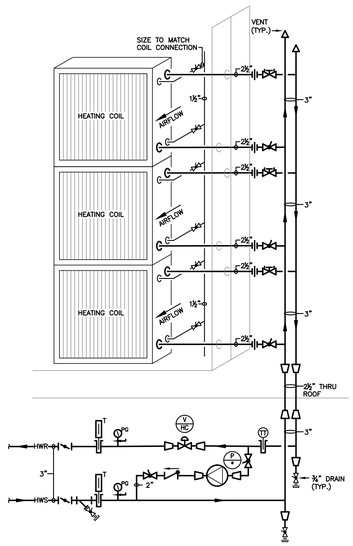
1. HEATING COIL PUMP, P-* SHALL OPERATE WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 50°F IN OCCUPIED OR UNOCCUPIED MODE. THE BAS SHALL MONITOR THE STATUS OF THE PUMP AND SIGNAL AN ALARM TO THE BAS IN THE EVENT OF PUMP FAULT.
2. FREEZESTAT, FZ SHALL RENDER THE SYSTEM INOPERATIVE AT 40 DEGREES F AND SIGNAL AN ALARM THROUGH THE BAS. OUTSIDE AIR DAMPER, D-OA SHALL CLOSE AND HEATING COIL CONTROL VALVE, V-HC MODULATES TO MAINTAIN A PLENUM TEMPERATURE OF 50 DEGREES AS SENSED BY TEMPERATURE SENSOR, T-1.
3. ON A DROP IN HEATING HOT WATER RETURN TEMPERATURE BELOW 50°F AS SENSED BY TEMPERATURE SENSOR, TT, HOT WATER CONTROL VALVE SHALL OPEN FULL. RENDER THE SYSTEM INOPERATIVE AND SIGNAL AN ALARM TO THE BAS.
4. TEMPERATURE SENSOR, T-MIX SHALL MONITOR THE MIXED AIR TEMPERATURE. ON A DROP IN MIXED AIR TEMPERATURE BELOW 45°, AS SENSED BY TEMPERATURE SENSOR, T-MIX, OUTDOOR AIR DAMPER, D-OA2 SHALL MODULATE CLOSED, WHILE RETURN AIR DAMPER, D-RA MODULATES OPEN.
5. ON A CONTINUED DROP IN TEMPERATURE BELOW 45° (IN ANY MODE), SIGNAL AN ALARM THROUGH THE BAS.
6. ACTIVATION OF DUCT MOUNTED SMOKE DETECTORS, SD SHALL RENDER THE SYSTEM INOPERATIVE, AND SIGNAL THE BUILDING FIRE ALARM SYSTEM AND BAS.
7. SIGNAL AN ALARM TO THE BAS UPON ACTIVATION OF THERMAL OVERLOAD RELAY IN THE UNIT HEATER.
8. ALL SAFETY CONTROLS SHALL BE HARDWIRED TO THE STARTERS OF THE SYSTEM'S COMPONENT EQUIPMENT.
9. THE STATUS OF THE SUPPLY FAN SHALL BE MONITORED THROUGH ITS VARIABLE FREQUENCY DRIVE.
10. MONITOR SUPPLY FAN AIRFLOW RATE THROUGH FAN INLET AIRFLOW STATION, AFS-SF.
11. DIFFERENTIAL PRESSURE SWITCH, DPS-1 SHALL SIGNAL THE BAS ON HIGH DIFFERENTIAL PRESSURE ACROSS THE FILTERS.
12. ALL SAFETY CONTROLS SHALL BE MONITORED AND ALARMED AT THE BAS.



COOLING COIL PIPING DIAGRAM

N.T.S.

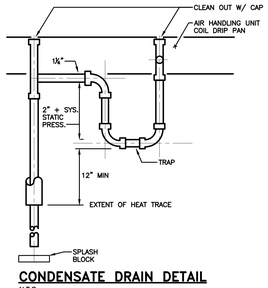
NOTE:
1. GENERAL COIL CONNECTIONS SHOWN.
2. SEE MANUFACTURER FOR EXACT CONNECTION ARRANGEMENT.
3. SEE SPECIFICATIONS FOR RECOMMENDED VALVES & FITTINGS.
4. CONTROL VALVES SHALL BE INSTALLED WITH ACTUATORS VERTICAL UP OR HORIZONTAL. IF INSTALLED HORIZONTAL, PROVIDE SEPARATE SUPPORTS FOR ACTUATORS.



HEATING COIL PIPING DIAGRAM

N.T.S.

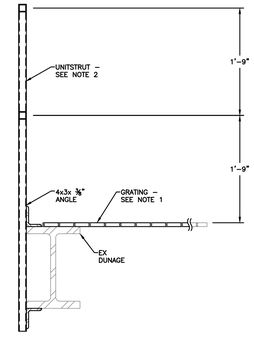
NOTE:
1. GENERAL COIL CONNECTIONS SHOWN.
2. SEE MANUFACTURER FOR EXACT CONNECTION ARRANGEMENT.
3. SEE SPECIFICATIONS FOR RECOMMENDED VALVES & FITTINGS.
4. CONTROL VALVES SHALL BE INSTALLED WITH ACTUATORS VERTICAL UP OR HORIZONTAL. IF INSTALLED HORIZONTAL, PROVIDE SEPARATE SUPPORTS FOR ACTUATORS.



CONDENSATE DRAIN DETAIL

N.T.S.

NOTE: HEAT TRACE CONDENSATE PIPING FROM AHU TO BELOW TRAP AS INDICATED. HEAT TRACE SHALL BE INCLUDED ONLY ON CONDENSATE DRAINS LOCATED AT COOLING COILS. REFER TO SPECIFICATIONS AND SCHEDULES FOR ADDITIONAL REQUIREMENTS.



RAILING DETAIL

SCALE: 1" = 1'-0"

NOTE:
1. PROVIDE GRATING TO MATCH EXISTING TO FILL AREA WHERE PLENUM WAS REMOVED AND VFD'S TO BE INSTALLED.
2. PROVIDE 1½" SQUARE UNISTRUT RAILING BETWEEN VFD'S AND AHU'S. PROVIDE ADDITIONAL UNISTRUT AS REQUIRED TO SUPPORT VFD'S. PROVIDE KICK PLATE (ANGLE) ALONG ENTIRE WIDTH.

REV	DESCRIPTION	DATE
4	ISSUED FOR AHU-14A&B BID	07/26/22
3	ISSUED FOR AHU-13A&B CONSTRUCTION	07/11/22
2	ISSUED FOR CONSTRUCTION	02/11/21
1	ADDENDUM 1	10/24/20
0	ISSUED FOR BID	03/06/20

N

PENNSYLVANIA CONVENTION CENTER AUTHORITY
ONE CONVENTION CENTER PLACE
1101 ARCH STREET
PHILADELPHIA, PENNSYLVANIA 19107

PCCA EXHIBIT HALL A
AHU-14A&B

DETAILS, CONTROL DIAGRAM & SEQUENCE OF OPERATIONS

DIMITRI J. VERVERELLI INC.
CONSULTING ENGINEERS
PHILADELPHIA, PENNSYLVANIA

DRAWN BY:	SCALE:	DWG. NO.
DPC	AS NOTED	M5.1
CHECKED BY: LOM	PROJ. NO: 1634C	

GENERAL SPECIFICATIONS

1. GENERAL
   A. PROVIDE COMPLETE SYSTEMS AS INDICATED ON DRAWINGS AND SPECIFIED HEREIN.
   B. ANY EXISTING POTENTIALLY HAZARDOUS MATERIALS ENCOUNTERED IN THE COURSE OF THE WORK SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER FOR REMOVAL AND DISPOSAL.
   C. FLAMMABLE MATERIALS MAY NOT BE STORED OR ALLOWED TO REMAIN OVERNIGHT WITHIN THE BUILDING. THIS INCLUDES, BUT IS NOT LIMITED TO, PAINTS, THINNERS, CLEANING AND RESTORATION PRODUCTS, RAGS OR BRUSHES, AND ANY TOOL THAT IS CAPABLE OF PRODUCING FLAME. SAWDUST, SCRAP LUMBER, SOAKED RAGS, AND OTHER FLAMMABLE CONSTRUCTION DEBRIS MUST BE COLLECTED AT THE END OF EACH DAY AND DISPOSED OF PROPERLY OUTSIDE OF THE BUILDING.
   D. MAINTAIN SUITABLE FIRE PROTECTION EQUIPMENT AT BUILDING SITE. AT MINIMUM, TYPE ABC FIRE EXTINGUISHERS SHALL BE PROVIDED WHERE WORK IS BEING PERFORMED WITH OPEN FLAME OR USING FLAMMABLE MATERIALS AND AN ADDITIONAL FIRE EXTINGUISHER SHALL BE PROVIDED TO THE WORKER PERFORMING THE WORK. TRAIN ALL WORKERS IN THE USE OF FIRE PROTECTION EQUIPMENT. ALL FIRE SAFETY REQUIREMENTS LISTED ABOVE ARE TO BE CONSIDERED MINIMUMS. CONTRACTOR IS RESPONSIBLE FOR TAKING OTHER MEASURES DEEMED NECESSARY BY THE CONTRACTOR TO PROTECT THE BUILDING.

2. SCOPE OF WORK
   A. PROVIDE ALL MATERIALS AND LABOR FOR THE COMPLETE WORK AS SHOWN ON THE DRAWINGS AND AS SPECIFIED. ANY APPLIANCE, DEVICE OR WORK INCIDENTAL OR NECESSARY TO MAKE THE WORK COMPLETE SHALL BE PROVIDED WITHOUT ADDITIONAL EXPENSE TO THE OWNER.
   B. WITHOUT LIMITING THE WORK IT SHALL CONSIST MAINLY OF THE FOLLOWING:
      - DEMOLITION/TEMPORARY PROTECTION
      - REPLACEMENT OF AIR HANDLING UNITS
      - ASSOCIATED DUCTWORK AND PIPING
      - BUILDING AUTOMATION CONTROLS
      - TESTING AND BALANCING

3. CONCURRENT WORK BY THE OWNER – THE OWNER RESERVES THE RIGHT TO HAVE OTHER CONTRACTORS PERFORM WORK IN OTHER AREAS OF THE COMPLEX SIMULTANEOUSLY WHILE THIS CONTRACTOR IS ENGAGED TO DO WORK. THIS CONTRACTOR AND HIS PERSONNEL SHALL COOPERATE AND COORDINATE THE WORK TO BE PERFORMED WITH ALL OTHER CONTRACTORS WITH WHO HE COMES IN CONTACT. IN NO WAY SHALL THIS CONTRACTOR INTERFERE WITH THE PROGRESS OF THE WORK.

4. DEFINITIONS
   A. "PROVIDE", WHEN USED IN THIS SPECIFICATION AND DRAWINGS, SHALL MEAN "FURNISH AND INSTALL".
   B. "OWNER", WHEN USED IN THE SPECIFICATIONS AND DRAWINGS SHALL MEAN "PENNSYLVANIA CONVENTION CENTER AUTHORITY".

5. REGULATIONS & CODES
   A. GIVE ALL NOTICES, OBTAIN ALL PERMITS AND PAY ALL GOVERNMENTAL TAXES, FEES AND COSTS; FILE NECESSARY PLANS AND OBTAIN APPROVALS OF ALL GOVERNMENTAL DEPARTMENTS AND PUBLIC UTILITIES HAVING JURISDICTION; OBTAIN CERTIFICATES OF INSPECTION FROM AN NFPA APPROVED AGENCY FOR THE WORK AND DELIVER SAME TO THE OWNER WITH REQUEST FOR FINAL PAYMENT.
   B. ALL WORK SHALL BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE CITY OF PHILADELPHIA CODES AND REGULATIONS.
   C. ELECTRICAL WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE.
   D. ALL WORK SHALL BE IN ACCORDANCE WITH OWNER'S BUILDING SYSTEM STANDARDS AND PROCEDURES.

6. VISIT THE SITE – VISIT THE SITE, VERIFY ALL MEASUREMENTS AND FIELD CONDITIONS AFFECTING THE WORK, PRIOR TO SUBMITTING BID. THE CONTRACTOR SHALL SUBMIT IN WRITING TO THE OWNER THAT HE HAS VISITED THE SITE. NO ADDITIONAL COST TO THE OWNER WILL BE INCURRED DUE TO THE CONTRACTOR'S FAILURE TO VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING HIS BID. ANY DISCREPANCIES BETWEEN THE DRAWINGS AND FIELD CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE OWNER AND ENGINEER.

7. COORDINATION – COORDINATE ALL SHUTDOWNS AND THE SEQUENCE AND INSTALLATION OF ALL WORK WITH THE OWNER OR AUTHORIZED REPRESENTATIVE. FABRICATE AND PREFAB AS MUCH OF THE NEW WORK AS POSSIBLE IN ORDER THAT ANY REQUIRED SHUTDOWNS WILL BE KEPT AT A MINIMUM.

8. MATERIALS AND WORKMANSHIP – MATERIALS AND EQUIPMENT SHALL BE NEW AND OF THE QUALITY SPECIFIED, LISTED WITH UL AND OTHER RECOGNIZED AUTHORITIES. WORK SHALL BE DONE IN A NEAT AND WORKMANLIKE MANNER BY SKILLED MECHANICS USING THE BEST TRADE METHODS.

9. SHOP DRAWINGS – SUBMIT TO OWNER, FOR APPROVAL, SHOP DRAWINGS OF ALL EQUIPMENT, MATERIALS, AND ACCESSORIES. SHOP DRAWINGS SUBMITTED FOR REVIEW SHALL INCLUDE A MINIMUM OF THE FOLLOWING ITEMS:
   - AIR HANDLING UNIT
   - VALVES AND PIPING SPECIALTIES
   - DUCTWORK
   - INSULATION
   - PUMP
   - HEAT TRACING
   - PAINTING W/ COLOR SAMPLES.
   - BUILDING AUTOMATION CONTROLS
   - BALANCING REPORT

10. AS-BUILT DRAWINGS – THE CONTRACTOR SHALL MAINTAIN AS-BUILT DRAWINGS OF THE WORK PERFORMED. AT THE COMPLETION OF THE INSTALLATION, EACH TRADE WILL INCORPORATE ALL FIELD CHANGES ON THE AUTOCAD DATA BASE AND SUBMIT THREE (3) SETS OF PLOTTED PRINTS & A DATA DISK FOR RECORD PURPOSES.

11. GUARANTEE – PRIOR TO FINAL ACCEPTANCE OF THE WORK SUBMIT A WRITTEN STATEMENT TO THE OWNER GUARANTEEING ALL EQUIPMENT AND WORK FOR ONE (1) YEAR FROM DATE OF ACCEPTANCE.

12. PROTECTION
   A. CONTRACTOR SHALL PROPERLY PROTECT ALL WORK AND EQUIPMENT TO PREVENT OBSTRUCTION, DAMAGE, OR LOSS. ALL CONDUIT OPENINGS SHALL BE CLOSED WITH CAPS OR PLUGS DURING INSTALLATION. ALL EQUIPMENT SHALL BE TIGHTLY COVERED WITH APPROVED MATERIAL AND PROTECTED AGAINST DIRT, WATER, OR MECHANICAL INJURY. AT FINAL COMPLETION, ALL WORK SHALL BE THOROUGHLY CLEANED AND DELIVERED IN PERFECT, UNBLEMISHED CONDITION.
   B. ALL DAMAGE TO THE BUILDING, MECHANICAL AND ELECTRICAL SYSTEMS OR SURROUNDINGS, RESULTING FROM CONTRACTOR'S FAILURE TO ADEQUATELY PROTECT THE WORK SHALL BE REPAIRED OR REPLACED AS DIRECTED, AT NO ADDITIONAL COST TO THE OWNER, INCLUDING ANY WORK DAMAGED IN ORDER TO MAKE GOOD SUCH DEFECTS.

13. DEMOLITION – REFER TO GENERAL DEMOLITION NOTES

14. RIGGING
   A. THE CONTRACTOR SHALL PERFORM ALL RIGGING REQUIRED TO COMPLETE ALL WORK UNDER THIS CONTRACT.
   B. THE CONTRACTOR SHALL PERFORM ALL DIS-ASSEMBLY AND RE-ASSEMBLY OF EQUIPMENT AS REQUIRED TO COMPLETE ALL WORK UNDER THIS CONTRACT.
   C. THE CONTRACTOR SHALL PROVIDE REQUIRED TEMPORARY SUPPORTS, EQUIPMENT, ETC. REQUIRED FOR THE RIGGING OPERATIONS AND REMOVE SAME AFTER THE RIGGING IS COMPLETED.
   D. PROTECT ALL ROOFS AND FINISHED FLOOR SURFACES DURING THE RIGGING OPERATIONS.

15. CUTTING AND PATCHING
   A. THE CONTRACTOR SHALL PERFORM ANY CUTTING AND PATCHING REQUIRED FOR THE INSTALLATION OF THE WORK.
   B. ALL HOLES FOR THE NEW PIPING AND CONDUIT SHALL BE CORE BORED.
   C. ALL PATCHING SHALL BE DONE TO MATCH THE ADJOINING SURFACES IN MATERIALS, TEXTURE AND FINISH.
   D. THE CONTRACTOR SHALL PATCH AND SEAL ALL WALLS, FLOORS, AND CEILINGS (DRYWALL, LAY-IN, ETC.) WHERE EXISTING ITEMS SUCH AS PIPING, HANGERS, SUPPORTS, ETC. ARE REMOVED UNDER THIS CONTRACT.
   E. THE CONTRACTOR SHALL REPAIR AND PATCH ALL FIRE PROOFING ON EXPOSED STRUCTURAL STEEL AND SUPPORTS WHICH IS DAMAGED OR REMOVED DURING THE COURSE OF THE WORK.
   F. PIPE AND DUCTS PENETRATING WALL AND FLOORS SHALL BE INSTALLED WITH SLEEVES. FIRE STOP ALL PENETRATIONS IN RATED WALLS, FLOORS AND PARTITIONS.

16. FIRE RATED CAULK
   A. UNLESS OTHERWISE INDICATED, THE CONTRACTOR SHALL IN ALL LOCATIONS CAULK THE SPACE BETWEEN THE SLEEVES AND THE PIPING (INSULATED OR NON-INSULATED) WITH UL APPROVED FIRESTOP SEALANTS AS MANUFACTURED BY HILTI CORPORATION.
   B. ALL PRODUCTS SHALL BE INSTALLED IN STRICT COMPLIANCE WITH THE MANUFACTURERS' INSTRUCTIONS. SUBMIT CAULK MANUFACTURERS' PRODUCT DATA FOR APPROVAL.

17. WELDING – ALL WELDING, SHOP OR FIELD, SHALL BE DONE BY A CERTIFIED LICENSED WELDER FOLLOWING STANDARD PRACTICES ESTABLISHED BY THE AMERICAN WELDING SOCIETY. DURING ALL FIELD WELDING A FIRE WATCH SHALL BE MAINTAINED DURING THE ENTIRE WELDING PROCEDURE.

18. MISCELLANEOUS STEEL WORK
   A. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY MISCELLANEOUS STEEL REQUIRED FOR THE INSTALLATION OF THE WORK UNDER THIS CONTRACT. WORK SHALL INCLUDE BUT NOT BE LIMITED TO, EQUIPMENT AND PIPING SUPPORTS, ETC.
   B. UNLESS OTHERWISE INDICATED, ALL STRUCTURAL STEEL SHALL BE ASTM-A36 WITH HOT DIPPED GALVANIZED FINISH. WELDS SHALL BE FINISHED WITH TWO (2) COATS OF ZINC RICH PAINT.

19. HARDWARE
   A. ALL HARDWARE ASSOCIATED WITH THE INSTALLATION OF MIST ELIMINATORS, COILS, AND SAFING AND SUPPORTS ASSOCIATED WITH THE MIST ELIMINATORS AND COILS SHALL BE STAINLESS STEEL.
   B. ALL REMAINING HARDWARE SHALL BE CADMIUM PLATED GRADE 5 HARDWARE UNLESS NOTED OTHERWISE.

20. CLEANING AND FINAL CLEAN UP (GENERAL)
   A. CONTRACTOR SHALL, AT ALL TIMES, KEEP THE PREMISES FREE OF ALL WASTE OR SURPLUS MATERIALS, RUBBISH AND DEBRIS WHICH IS CAUSED BY HIS EMPLOYEES OR RESULTING FROM HIS WORK. ALL AREAS SHALL BE BROOM SWEPT CLEAN AT THE END OF EACH WORK DAY.
   B. AFTER ALL EQUIPMENT HAS BEEN INSTALLED, CONTRACTOR SHALL REMOVE ALL STICKERS, RUST STAINS, LABELS, TEMPORARY COVERS, ETC.
   C. ALL FOREIGN MATTER SHALL BE BLOWN OUT OR FLUSHED OUT OF ALL DEVICES, CONDUITS, ETC.
   D. IDENTIFICATION PLATES ON ALL EQUIPMENT SHALL BE FREE OF PAINT AND SHALL BE POLISHED.
   E. CONTRACTOR SHALL LEAVE HIS WORK AT ALL TIMES IN A SAFE AND CLEAN CONDITION READY FOR OPERATION.
   F. CONTRACTOR SHALL CLEAN ALL CONDUIT, TUBING, EQUIPMENT, ETC. AT THE COMPLETION OF HIS CONTRACT, AND ALL WORK SHALL BE TURNED OVER TO THE OWNER CLEAN AND IN PERFECT CONDITION, READY FOR SATISFACTORY SERVICE.
   G. DURING THE PROGRESS OF THE WORK, CONTRACTOR SHALL REMOVE ALL OF HIS RUBBISH, CRATING AND PACKING MATERIALS, METAL SCRAP AND ANY AND ALL DEBRIS FROM THE BUILDING, NOT ALLOWING IT TO ACCUMULATE AND CAUSE FIRE AND ACCIDENT HAZARDS.

21. PAINTING
   REMOVE AND MARK STEEL PANELS FOR REINSTALLATION AFTER NEW FINISH PROCESS. PREPARE EXTERIOR PANEL SURFACE FOR AUTOMOBILE-TYPE 3- STEP ELECTROSTATIC PAINTING PROCESS. ABRADE SURFACES WHERE EXISTING PAINT SUBSTRATE HAS FAILED. CLEAN ENTIRE EXTERIOR SURFACE. APPLY 3-STEP (PRIMER, COLOR BASE-COAT AND CLEAR-COAT) THERMOSET DRY PIGMENT COATING PROCESSES. HEAT CURE PANELS AS RECOMMENDED BY COATING MANUFACTURER. REINSTALL PANELS USING FASTENERS THAT PROTECT PANELS FROM ELECTROLYSIS FROM DISSIMILAR METALS WITH NEOPRENE OR DELRIN TYPE NYLON FASTENER WASHERS. FINISH COLOR TO MATCH AIR HANDLING UNITS. SUBMIT CHIP SAMPLE AND MANUFACTURE OF COATING TOGETHER WITH SHORT FORM MATERIAL LIST OF COATING FOR SHOP DRAWING REVIEW.

22. HANGERS AND SUPPORTS, INSERTS, AND GUIDES
   A. SUPPORT COMPONENTS SHALL CONFORM TO MANUFACTURER'S STANDARDIZATION SOCIETY SPECIFICATIONS SP-58.
   B. PIPE HANGERS SHALL BE LOCATED NEAR OR AT CHANGES IN PIPING DIRECTION AND CONCENTRATED LOADS. HANGERS SHALL BE CLEVIS TYPE AND ARE TO HAVE VERTICAL ADJUSTMENTS FOR MAINTAINING THE PITCH OF PIPING.
   C. HANGER ROD SIZES SHALL BE AS FOLLOWS:

MIN. HANGER PIPE SIZE	ROD DIAMETER
1-1/2 INCHES AND SMALLER	3/8 INCH
2 THROUGH 3 INCHES	1/2 INCH
4 THROUGH 5 INCHES	5/8 INCH
6 THROUGH 8 INCHES	3/4 INCH
10 THROUGH 12 INCHES	7/8 INCH

   D. HANGER SPACING SHALL BE AS FOLLOWS:

PIPE SIZE	HANGER SPACING
1-1/2 INCHES AND SMALLER	NOT OVER 6 FEET
2 THROUGH 4 INCHES	NOT OVER 10 FEET
6 THROUGH 8 INCHES	NOT OVER 17 FEET
10 THROUGH 12 INCHES	NOT OVER 22 FEET

   E. HANGERS SHALL BE THE FOLLOWING GRINNELL NUMBERS AND ON INSULATED PIPING SHALL BE SIZED TO FIT OUTSIDE INSULATION COVERING:
      1) FIG. CT-69 COPPER FINISH FOR UNINSULATED COPPER PIPING.
      2) FIG. 260 FOR INSULATED COPPER AND STEEL PIPING AND UNINSULATED STEEL PIPING.

23. VALVES AND PIPING SPECIALTIES – VALVES AND PIPING SPECIALTIES SHALL BE AS SCHEDULED.

24. PIPING
   A. THE CONTRACTOR SHALL TAKE NOTE THAT DUE TO THE LIMITED SPACE AVAILABLE SURROUNDING THE AREA OF MAJOR WORK; EXTREMELY CLOSE COORDINATION OF THE WORK IS AN ABSOLUTE NECESSITY.
   B. CHILLED WATER, AND HEATING HOT WATER PIPING EXTERNAL TO THE AIR HANDLING UNIT SHALL BE SCHEDULE 40 STEEL PIPE. STEEL PIPE SHALL CONFORM TO ASTM SPECIFICATIONS A-53 GRADE B, BUTT WELDED CARBON STEEL AND DIMENSIONAL STANDARDS OF ANSI B36.1. FITTINGS FOR STEEL PIPING 2-1/2" AND SMALLER SHALL BE THREADED MALLEABLE IRON BONDED FITTINGS CONFORMING TO ANSI 16.3 SPECIFICATIONS AND TAPPED TO ANSI 82.1 HAVING 150# RATING FOR STEAM. FITTINGS FOR STEEL PIPING 3" AND LARGER SHALL BE CARBON STEEL, STANDARD WEIGHT, BUTT WELDED FITTINGS CONFORMING TO ASTM A-243 GRAD WPB. PROVIDE WELD NECK FLANGES AT CONNECTION POINTS. FLANGES SHALL BE 150 LB. CLASS CARBON STEEL CONFORMING TO ASTM A-105.
   C. PIPING FOR CHILLED WATER AND HEATING HOT WATER INTERNAL TO THE AIR HANDLING UNIT AND ALL AC CONDENSATE PIPING SHALL BE HARD DRAWN SEAMLESS COPPER TUBING, ASTMB88 – TYPE L.
   D. ALL SCREWED CONNECTIONS SHALL BE ASSEMBLED WITH LUBRICANT APPLIED TO THE MALE THREADS ONLY.
   E. CONNECTIONS BETWEEN TUBING AND/OR PIPING OF DISSIMILAR METALS SHALL BE MECHANICALLY SEPARATED AND ELECTRICALLY ISOLATED FROM EACH OTHER TO PREVENT GALVANIC CORROSION AND OBTAIN ELECTRICAL ISOLATION BY DIELECTRIC (INSULATED) UNIONS EQUAL TO THOSE MANUFACTURED BY EPCO SALES, INC. DIELECTRIC FLANGE UNIONS SHALL BE USED IN PIPING LARGER THAN 1½".
   F. DRAWINGS DO NOT INDICATE ALL PIPING OFFSETS THAT MAY BE REQUIRED. NO PIPING, VALVES, JOINTS, OR FITTINGS SHALL BE ERECTED OVER ANY MOTORS, PANELBOARDS, OR OTHER ELECTRICAL EQUIPMENT.
   G. UNLESS OTHERWISE INDICATED, PROVIDE MANUAL AIR VENTS IN ALL HIGH POINTS OF THE NEW PIPING. VENTS SHALL CONSIST OF A BALL VALVE AND A 3/4" HOSE ADAPTOR.
   H. MISCELLANEOUS EXISTING PIPING, WHICH IS REVISED SHALL BE DONE WITH MATERIALS THAT MATCH THE EXISTING.

25. TESTING – TEST ALL NEW PIPING AT 1½ TIMES THE SYSTEMS OPERATING PRESSURE WITH A MINIMUM 150# HYDROSTATIC TEST WHICH SHALL HOLD TIGHT FOR A PERIOD OF TWO (2) HOURS. ALL LEAKS SHALL BE REPAIRED WITH NEW MATERIALS AND THEN RETESTED. SUBMIT TEST RECORDS FOR REVIEW. CONDUCT TESTING PRIOR TO INSTALLING INSULATION.

26. SHEET METAL
   A. EXCEPT AS OTHERWISE SPECIFIED, DUCTWORK CONSTRUCTION FOR SUPPLY, RETURN, MIXED, AND EXHAUST AIR SHALL CONFORM TO SMACNA "HVAC DUCT CONSTRUCTION STANDARDS", LATEST EDITION.
   B. EACH DUCT SYSTEM SHALL BE CONSTRUCTED FOR THE SPECIFIC DUTY OF THE SYSTEM AND THE SPECIFIC DUCT PRESSURE CLASSIFICATION AS INDICATED OR REQUIRED FOR THE PROJECT. SUPPLY DUCTWORK SHALL BE 2" STATIC PRESSURE CLASS. RETURN AIR AND OUTSIDE AIR DUCTWORK SHALL BE NEGATIVE 2" STATIC PRESSURE CLASS. WHERE NO SPECIFIC DUCT PRESSURE CLASS DESIGNATIONS ARE PROVIDED BY THE DESIGNER THE 2 INCH WATER GAUGE PRESSURE CLASS IS THE BASIS OF COMPLIANCE WITH THESE STANDARDS REGARDLESS OF THE VELOCITY WITHIN THE DUCT.
   C. ALL DUCTWORK SHALL BE SEALED PER SMACNA DUCT CONSTRUCTION STANDARDS METAL AND FLEXIBLE MANUAL WITH A SEAL CLASS A.
   D. ALL DUCTWORK SHALL MEET SMACNA STANDARDS PER HVAC AIR DUCT LEAKAGE TEST MANUAL. DUCTWORK SHALL HAVE DUCT LEAKAGE CLASSIFICATION OF 6.
   E. EXCEPT WHERE SQUARE ELBOWS ARE INDICATED ON THE DRAWINGS, BENDS IN LOW PRESSURE DUCTS SHALL BE MADE WITH A CENTER LINE RADIUS NOT LESS THAN 1-1/2 TIMES THE WIDTH OF THE DUCT. IF, BECAUSE OF STRUCTURAL OR OTHER LIMITATIONS, THE CENTER LINE RADIUS MUST BE LESS THAN 1-1/2 THE DUCT WIDTH, INTERIOR GUIDE VANES SHALL BE PROVIDED. ALL SQUARE ELBOWS SHALL BE CONSTRUCTED WITH LOW LOSS, DOUBLE THICKNESS EXTENDED TRAILING EDGE INTERIOR GUIDE VANES EQUAL TO H-E-P, HIGH EFFICIENCY PROFILE ON SIDE RAILS BY AERO/DYNE COMPANY, DUCTMATE, L.C. WARD, OR APPROVED EQUAL.
   F. WHERE DUCTS OR FLUES ARE REDUCED OR INCREASED IN SIZE, THE SLOPE OF THE TAPERED SIDE SHALL NOT EXCEED 1 IN 5 AND MINIMUM LENGTH SHALL BE NOT LESS THAN 2 FEET. ATTENTION IS CALLED TO THIS REQUIREMENT PARTICULARLY WITH REGARD TO DUCTS CONNECTING TO SUPPLY AIR GRILLES.
   G. PROVISION SHALL BE MADE FOR THE INSTALLATION OF TEMPERATURE CONTROL SYSTEM DAMPERS SPECIFIED ELSEWHERE IN THE SPECIFICATION. DUCTS AND CASINGS SHALL BE REINFORCED WHERE NECESSARY FOR THE INSTALLATION OF CONTROL DEVICES, THERMOMETERS, AND SIMILAR EQUIPMENT, WHETHER FURNISHED UNDER THIS OR OTHER CONTRACTS.
   H. GALVANIZED DUCTWORK (RETURN)
      1) DUCTWORK SHALL BE CONSTRUCTED OF GALVANIZED STEEL SHEETS WITH AIRTIGHT LOCKED JOINTS. GALVANIZING SHALL BE IN ACCORDANCE WITH G-90 PER ASTM A90/A90M, ASTM A-653/A653M AND ASTM A-924/A924M.
   I. ALUMINUM DOUBLE WALL DUCTWORK
      1) ALL SUPPLY DUCTWORK SHALL BE DOUBLE WALL CONSTRUCTION WITH AN OUTER PRESSURE SHELL AND SOLID INNER LINING. DUCTWORK SHALL BE CONSTRUCTED OF ALUMINUM. INTERNAL LINING SHALL BE A MINIMUM OF 2" THICK WITH AN R-8 THERMAL RESISTANCE. DUCT CONSTRUCTIONS SHALL INLCUDE THERMAL BREAKS.
   J. ACCESS DOORS
      1) ACCESS DOORS SHALL BE HINGED WITH A MINIMUM SIZE OF 16"X16".
      2) ACCESS DOORS SHALL BE OF A CONSTRUCTION AND THICKNESS THAT MATCH THE DUCTWORK WITH A GASKET SEAL, BUT NOT LESS THAN 22GA.
      3) SHALL HAVE A CONTINUOUS PIANO TYPE HINGE AND SHALL HAVE TWO LOCKS.
      4) DOUBLE SKIN ACCESS DOORS SHALL HAVE BEEN TESTED TO 8 INCHES W.G. AND SHALL HAVE 1 INCH THICK FIBERGLASS. DOORS SHALL BE RATED FOR DUCT SYSTEM THEY ARE INSTALLED IN BUT NOT LESS THAN THE SYSTEM FAN STATIC PRESSURE.
   J. DUCTWORK SEALANT SHALL BE SILICONE BASED SEALANT BY UNITED MCGILL. WATER BASED SEALANTS ARE PROHIBITED.
   K. PROVIDE A FLEXIBLE DUCT CONNECTION BETWEEN THE AIR HANDLING UNIT AND DUCTWORK. FLEX DUCT CONNECTION SHALL B VINYL FABRIC RATED FOR 10" STATIC PRESSURE, DUCTMATE PROFLEX WITH HYPALON COATING FOR UV PROTECTION OR EQUAL.

27. HEAT TRACING FOR HVAC
   A. INSTALL HEAT TRACE ON ALL CHILLED WATER AND HEATING HOT WATER SUPPLY AND RETURN PIPING LOCATED OUTDOORS.
   B. INSTALL PRIOR TO INSULATING PIPING SYSTEMS.
   C. HEAT TRACING SHALL BE SELF REGULATING.
   D. SELECT CABLE LENGTHS TO MAINTAIN 40°F FLUID IN PIPE FOR FREEZE PROTECTION, WITH AN OUTDOOR AMBIENT AT -20°F.
   E. PROVIDE SYSTEM WITH NECESSARY STAND-OFF AND CABLE TIE KITS.
   F. PROVIDE MONITORING AND ALARMING VIA BAS SYSTEM TO PROVE SYSTEM IS DRAWING CURRENT AS OPPOSED TO MONITORING CONTRACT IN A HEAT TRACE CONTROLLER.
   G. APPROVED MANUFACTURER IS RAYCHEM OR APPROVED EQUAL.

28. INSULATION
   A. INSULATION SHALL BE AS SCHEDULED ON THE DRAWINGS.
   B. GLASS FIBER PIPE INSULATION SHALL BE JOHNS MANVILLE MICRO-LOK MOLDED TYPE WITH FACTORY APPLIED WHITE (AP) ALL-PURPOSE FIRE RETARDANT VAPOR BARRIER JACKET. LAP SEAMS SHALL BE MINIMUM OF 1_1/2" WIDE. INSTALL A 4_INCH SEALING STRIP AT EACH JOINT. ALL LAP SEAMS AND SEALING STRIPS SHALL BE SEALED WITH FOSTER 85_20 SPARK_FAS OFF_WHITE FIRE_RESISTIVE VAPOR BARRIER ADHESIVE. NO STAPLES SHALL BE USED. INSULATION SHALL HAVE A MINIMUM DENSITY OF 3.5 LBS. PER CUBIC FOOT.
   C. EXCEPT AS NOTED ELSEWHERE HEREIN, INSULATE ALL FITTINGS, VALVES, AND UNIONS WITH JOHNS MANVILLE ZESTON 2000 PVC INSULATION FITTING COVERS AND (1) LAYER OF FIBERGLASS INSULATION INSERTS. VAPOR SEAL ALL EXPOSED ENDS OF PIPE INSULATION, JOINTS, SEAMS, AND CONNECTIONS BETWEEN FITTING COVERS AND INSULATION JACKET WITH VAPOR RETARDANT MASTIC (COMPATIBLE WITH THE PVC) AND PRESSURE SENSITIVE PVC Z-TAPE. STAPLES SHALL NOT BE USED.
   D. AT EACH HANGER LOCATION, PROVIDE A PREFABRICATED 18 GAUGE 12" LONG GALVANIZED STEEL SHIELD WITH RIGID URETHANE INSULATION TO SUPPORT THE WEIGHT OF THE PIPE WITHOUT DEFORMATION. INSULATION SHALL BE APPLIED IN A MANNER TO PRESERVE THE VAPOR BARRIER.
   E. COVER ALL INSULATED PIPING EXPOSED ON THE ROOF WITH CHILDERS .016" CORRUGATED ALUMINUM JACKET WITH FACTORY-ATTACHED INTEGRAL POLYFILM MOISTURE BARRIER OR APPROVED EQUAL. JACKETING SHALL BE ATTACHED WITH BANDS AND SEALS ON 9" CENTERS. FURNISH AND INSTALL ALUMINUM UNIVERS-ELL JACS ON FITTINGS. SEAL ALL JOINTS AND SEAMS IN THE JACKET WITH CHILDERS CP-76 VAPOR BARRIER SEALANT. ENTIRE INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
   F. DUCTWORK SHALL BE EXTERNALLY INSULATED WITH RIGID, 4.25 LB. DENSITY BOARD FIBERGLASS WITH REINFORCED WHITE KRAFT FACING (JOHNS MANVILLE SPIN-GLAS TYPE 815). INSULATION SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS:
   G. EXPOSED DUCTWORK LOCATED ON THE ROOF SHALL BE JACKETED WITH VENTURECLAD 1577CW OR APPROVED EQUAL. OVERLAP SEAMS AND LOCATE SEAMS WITH EDGING FACING DOWN. INSTALL JACKETING IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
   H. PATCH ALL EXISTING INSULATION DAMAGED DURING THE CONSTRUCTION WORK.

29. PUMP
   A. PUMP SHALL BE CLOSE COUPLED IN-LINE, SINGLE STAGE DESIGN AS MANUFACTURED BY BELL & GOSSETT OR EQUAL BY TACO, PATTERSON OR AURORA. N THE DRAWING.
   B. PUMP CASING SHALL BE CLASS 30 CAST IRON. IMPELLER SHALL BE OF STAINLESS STEEL CLOSED TYPE WITH A STAINLESS STEEL SHAFT SLEEVE.
   C. LIQUID CAVITY SHALL BE SEALED OFF AT THE MOTOR BY AN INTERNALLY FLUSHED MECHANICAL SEAL WITH CERAMIC SEAL SEAT AND CARBON SEAL RING, SUITABLE FOR CONTINUOUS OPERATION AT 225°F.

30. BALANCING AND ADJUSTING OF THE WATER AND AIR SYSTEMS
   A. PERFORM ALL BALANCING AND ADJUSTING OF THE CHILLED WATER COILS, HEATING HOT WATER COILS, AND TOTAL SYSTEM AIRFLOW. ADJUST FLOWS TO THE CAPACITIES INDICATED ON THE DRAWINGS.
   B. ALL WORK SHALL BE PERFORMED BY SKILLED MECHANICS UNDER THE DIRECTION AND SUPERVISION OF THE CONTRACTOR FOR BALANCING AND ADJUSTING WHICH SHALL BE AN INDEPENDENT NEBB CERTIFIED COMPANY NOT AFFILIATED WITH THE MECHANICAL CONTRACTOR.
   C. SUBMIT A REPORT INDICATING ALL FINAL CONDITIONS.

31. IDENTIFICATION
   A. PROVIDE IDENTIFICATION AND FLOW ARROWS ON ALL NEW PIPING. PIPE IDENTIFICATION SHALL BE BY SETON NAME PLATE CORPORATION OR BRADY USA, INC. AND MANUFACTURED OF PRESSURE SENSITIVE VINYL SHEETS WITH SCREEN PRINTED LETTERS. COLORING SHALL BE PER ASME COLOR CODE.
   B. PROVIDE DESCRIPTIVE ENGRAVED 1/16" THICK PLASTIC-LAMINATED LABEL WITH BLACK FACE AND WHITE LETTERS ON ALL EQUIPMENT BEING ADDED OR MODIFIED AND ON ALL NEW CIRCUIT BREAKERS.
   C. LABELS SHALL BE PUNCHED AND ATTACHED TO EQUIPMENT WITH MECHANICAL FASTENERS.

32. VALVE TAGS – PROVIDE FOR EACH VALVE A 2" DIAMETER BRASS VALVE TAG ATTACHED TO THE VALVE WITH A BRASS HOOK AND JACK CHAIN. IDENTIFY EACH VALVE AND ADD SAME TO THE EXISTING VALVE CHARTS OR PROVIDE A VALVE CHART WITH ALL VALVE DATA (VALVE NUMBER, SERVICE, SIZE, AND LOCATION).

33. AUTOMATIC TEMPERATURE CONTROLS
   A. AUTOMATIC TEMPERATURE CONTROLS (ATC) SHALL BE AN EXTENSION OF THE EXISTING SIEMENS DDC AND PNEUMATIC SYSTEMS.
   B. ATC SHALL BE UNDER SEPARATE CONTRACT DIRECT TO THE OWNER. INFORMATION HEREIN IS PROVIDED FOR COORDINATION.
   C. THE SCOPE OF WORK SHALL INCLUDE CONTROLLERS, TEMPERATURE TRANSMITTERS, PRESSURE SWITCHES, CONTROL VALVES (UNLESS NOTED OTHERWISE) AND ALL WORK NECESSARY TO CONNECT THE ABOVE TO THE EXISTING LAN TRUNK. THE WORK SHALL ALSO INCLUDE PROGRAMMING THE CENTRAL SYSTEM AS REQUIRED TO RECOGNIZE AND COMMUNICATE WITH THE NEW DEVICES.
   D. PERFORM ALL ELECTRICAL WORK IN ACCORDANCE WITH THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE. ALL CONTROL WIRING SHALL BE INSTALLED IN EMT. PROVIDE ALL LOW VOLTAGE CONTROL TRANSFORMERS. REFER TO ELECTRICAL DRAWINGS FOR ADDITIONAL REQUIREMENTS.
   E. EXISTING CONTROLS SERVING OTHER EQUIPMENT NOT SPECIFICALLY LISTED FOR DEMOLITION SHALL REMAIN.
   F. SUBMIT COMPLETE AUTOMATIC TEMPERATURE CONTROL INSTALLATION SHOP DRAWINGS FOR REVIEW.

34. VARIABLE FREQUENCY DRIVES – (BASE BID)
   A. VARIABLE FREQUENCY DRIVES SHALL BE FURNISHED BY THE ATC CONTRACTOR AND INSTALLED UNDER THIS CONTRACT.
   B. VARIABLE FREQUENCY DRIVES SHALL BE SIEMENS BT300 VFD'S IN NEMA 3R ENCLOSURES RATED FOR THE VOLTAGES AND HORSEPOWERS INDICATED. REFER TO THE ELECTRICAL PLANS FOR POWER WIRING REQUIREMENTS.
   C. VFD'S SHALL BE SUPPLIED BY THE BAS CONTRACTOR, MOUNTING AND POWER WIRING SHALL BE BY THE ELECTRICAL CONTRACTOR, CONTROL WIRING BY THE BAS CONTRACTOR.
   D. VFD'S SHALL INCLUDE THE FOLLOWING OPTIONS/FEATURES:
      - NEMA 3R ENCLOSURE W/ LOCKABLE DISCONNECT
      - NO BYPASS
      - CONTROL LOGIC FOR HVAC SAFTIES.
      - ENCLOSURE HEATER WITH ALL CONTROLS, SAFETIES AND (IF REQUIRED) TRANSFORMERS. HEATER TO BE POWERED DIRECTLY FROM LINE VOLTAGE WITHOUT THE NEED FOR A SEPARATE POWER FEED.

VALVES, SPECIALTIES AND APPUTENANCES SCHEDULE

TYPE	SERVICE	CONNECTION TYPE	ANSI PRESSURE CLASS	SIZES	DESCRIPTION AND COMMENTS	MANUFACTURER	MODEL OR FIGURE NO.
BALL	CHS&R, HWS&R	SOLDERED	600	1/2"-> 2"	TWO PC BRONZE W/ STAINLESS STEEL BALL & THREAD	APOLLO	77C-24-SIZE-27SERIES
BUTTERFLY	CHS&R, HWS&R	HIGH PERFORMANCE BUTTERFLY FLANGED	150	2-1/2"-> 8"	ASTM A216 CARBON STEEL, LUG PATTERN W/SS DISC & STEM VIRGIN TFE SEAT & PACKING SEALS PROVIDE HANDWHEEL & WORMGEAR ON 4" VALVES & LARGER	CAMERON WKM MB-1 DYNACENTRIC OR EQUAL BY BRAY, DEZURIK OR JAMESBURY	(SIZE)-B5-113-02-S02-11-WG
CHECK	CHS&R, HWS&R	THREADED	300	1/2"-> 2"	STAINLESS STEEL/BOLTED COVER	CRANE	FIG. NO. 2370
BALANCING	CHS&R, HWS&R	THREADED	300	1/2"-> 3"	BRONZE BODY W/ BRASS BALL	B&G	CIRCUIT SETTER PLUS
STRAINERS	CHS&R, HWS&R	FLANGED & THREADED	150 & 300	1/2"-> 8"	CAST STEEL OR SS STEEL – 0.045" PERFORATED SS SCREEN INSTALL WITH STRAINER TO SIDE (3 OR 9 O'CLOCK) AND PROVIDED BALL VALVE W/HOSE ADAPTOR FOR BLOWDOWN	SPIRAX SARCO OR SPENCE ENGINEERING CO.	FIG. NO. 34 (FLANGED)/CT (THREADED NPT)/SSY (THREADED NPT) OR 150Y & 300Y (FLANGED) & 600Y (THREADED NPT)
GASKETS	CHS&R, HWS&R	NA	150 & 300	1/2"-> 8"	ASME B16.20	GARLOCK	STYLE RW
UNIONS	STM & LPC	THREADED	150 & 300	1/2"-> 2"		SPENCE ENGINEERING CO.	UNIFLEX
UNIONS	CHS&R, HWS&R	THREADED	150 & 300	1/2"-> 2"	BRASS	STOCKHAM, GRINELL, OR DART	
PRESSURE GAUGES	CHS&R, HWS&R	1/2" NPT		N/A	4½" DIAL, ½% FULL SCALE ACCURACY W/ ½" BALL ISOLATION VALVE	ASHCROFT OR TRERICE	ASHCROFT 45-1279-SS-1/2"-XLL-RANGE OR TRERICE 450SS-45-1/2"-LOCATION-A-RANGE-SSCODE
MAGNEHELIC PRESSURE GAUGES	CHS&R, HWS&R	COMPRESSION FITTINGS			PROVIDE ADJUSTABLE SIGNAL FLAG, STATIC PRESSURE TIPS, ALUMINUM TUBING, COMPRESSION FITTINGS	DWYER	SERIES 2000
THERMOMETER	CHS&R, HWS&R	STEM TYPE				ASHCROFT OR TRERICE	ASHCROFT 50-EL-42-E-STEM L-RANGE OR TRERICE B856-STEM L-RANGE-SWV
NUTS, BOLTS, & STUDS	ALL FLANGED	FLANGED	150 & 300	ALL FLANGED	ASTM "HIGHER STRENGTH" STUDS -B7 PRECUT	N/A	A94 2H (NUTS) A193 B7 (BOLTS)

HVAC/PLUMBING THERMAL INSULATION SCHEDULE

DESCRIPTION	INSULATION TYPE	THICKNESS	COVERING/JACKET	HEAT TRACE	PIPE SIZE	WATTS/FT
HEATING HOT WATER PIPING 1½" AND SMALLER	RIGID FIBERGLASS JOHNS MANVILLE MICROLOK	1½"	ASJ w/VAPOR BARRIER (INDOOR) – CHILDERS ALUMINUM (OUTDOOR)	OUTDOOR ONLY	UP TO 3"	3W/FT
HEATING HOT WATER PIPING 2" AND LARGER	RIGID FIBERGLASS JOHNS MANVILLE MICROLOK	2"	ASJ w/VAPOR BARRIER (INDOOR) – CHILDERS ALUMINUM (OUTDOOR)	OUTDOOR ONLY	UP TO 3"	3W/FT
CHILLED WATER PIPING	RIGID FIBERGLASS JOHNS MANVILLE MICROLOK	1½"	ASJ w/VAPOR BARRIER (INDOOR) – CHILDERS ALUMINUM (OUTDOOR)	OUTDOOR ONLY	3" 6"	3W/FT 5W/FT
AC CONDENSATE	RIGID FIBERGLASS JOHNS MANVILLE MICROLOK	1"	CHILDERS ALUMINUM (OUTDOOR)	WHERE INDICATED ON DETAIL		3W/FT
SUPPLY AIR DUCTWORK	DOUBLE WALL CONSTRUCTION (SEE SPECIFICATIONS)			N/A		
RETURN DUCTWORK	FIBERGLASS BOARD JOHNS MANVILLE 800 SERIES SPIN-GLAS	2"	VENTURECLAD 1577CW	N/A		

INSULATION NOTES:
1. DO NOT INSULATE PIPING INTERNAL TO AHU.
2. PRESSURE TEST ALL PIPING PRIOR TO INSULATION.
3. INSTALL HEAT TRACING WHERE INDICATED PRIOR TO INSULATION.
4. SLOPE OR CROWN DUCTWORK INSULATION TO PREVENT PONDING ON HORIZONTAL SURFACES.

HEAT TRACING NOTES:
1. HEAT TRACING TO BE SELF REGULATING TAPE AS MANUFACTURED BY RAYCHEM.
2. INPUT VOLTAGE ON ALL HEAT TRACING SHALL BE 120V/1/60 AND FED FROM A SINGLE 20A CIRCUIT.
3. INPUT POWER SHALL BE FROM THE EXISTING HEAT TRACE POWER PANEL, WHICH IS CONTROLLED TO DE-ENERGIZE WHEN SITE TEMPERATURE EXCEEDS 40°F.
4. PROVIDE AN LED END SEAL AT THE TERMINATION OF EACH RUN TO PROVIDE VISIBLE INDICATION OF ACTIVE HEAT TRACE.

PUMP SCHEDULE

NO.	SERVICE	LOCATION	GPM	HD. IN. FT.	RPM	MOTOR HP	MOTOR V/PH/HZ	MANUFACTURER & MODEL NO.
P-46	AHU-14A PRE-HEAT	ENE LEVEL 63	40	18	1750	½	480/3/60 VERIFY	B&G 1½X1½X5¼ SERIES 60
P-47	AHU-14B PRE-HEAT	ENE LEVEL 63	40	18	1750	½	480/3/60 VERIFY	B&G 1½X1½X5¼ SERIES 60

CONTROL DAMPER/ACTUATOR SCHEDULE

DAMPER No.	CONTROL DAMPER								ACTUATOR						
	SIZE, WxH (IN.)	AIRFLOW (CFM)	FACE VELOCITY (FPM)	MAX PRESS DROP (IN. W.G.)	LINKAGE	MANUFACTURER/MODEL	SEALS	PROVIDED BY	ACTUATOR TYPE	FAIL POSITION	SIGNAL RANGE	END SWITCHES	WEATHER COVER	PROVIDED BY
D-14A-SA	84x84	54,500	1,112	0.1	PARALLEL BLADE	RUSKIN SD-50 SMOKE DAMPER	SEE SPECIFICATIONS	AHU MFR.	24V ELECTRIC – 2 POSITION	FAIL CLOSED	NA	FULL OPEN	NONE	AHU MFR.
D-14A-RA	102x44	32,500	1,042	0.1	OPPOSED BLADE	RUSKIN SD-50 SMOKE DAMPER	SEE SPECIFICATIONS	AHU MFR.	24V ELECTRIC – MODULATING	FAIL CLOSED	2-10V	FULL CLOSED	NONE	AHU MFR.
D-14A-OA1	120x84	34,000	464	0.2	OPPOSED BLADE	RUSKIN ELF375DXH LOUVER BIRDSCREEN W/ RUSKIN CD50 DAMPER	SEE SPECIFCATIONS	AHU MFR.	24V ELECTRIC – MODULATING	FAIL CLOSED	2-10V	N/A	NONE	AHU MFR.
D-14A-OA2	120x48	20,500	550	0.2	PARALLEL BLADE	RUSKIN ELF6375DXH LOUVER BIRDSCREEN W/ RUSKIN CD50 DAMPER	SEE SPECIFICATIONS	AHU MFR.	24V ELECTRIC – 2 POSITION	FAIL CLOSED	NA	FULL OPEN	NONE	AHU MFR.
D-14B-SA	84x84	54,500	1,112	0.1	PARALLEL BLADE	RUSKIN SD-50 SMOKE DAMPER	SEE SPECIFICATIONS	AHU MFR.	24V ELECTRIC – 2 POSITION	FAIL CLOSED	NA	FULL OPEN	NONE	AHU MFR.
D-14B-RA	102x44	32,500	1,042	0.1	OPPOSED BLADE	RUSKIN SD-50 SMOKE DAMPER	SEE SPECIFICATIONS	AHU MFR.	24V ELECTRIC – MODULATING	FAIL CLOSED	2-10V	FULL CLOSED	NONE	AHU MFR.
D-14B-OA1	120x84	34,000	464	0.2	OPPOSED BLADE	RUSKIN ELF6375DXH LOUVER BIRDSCREEN W/ RUSKIN CD50 DAMPER	SEE SPECIFICATIONS	AHU MFR.	24V ELECTRIC – MODULATING	FAIL CLOSED	2-10V	N/A	NONE	AHU MFR.
D-14B-OA2	120x48	20,500	550	0.2	PARALLEL BLADE	RUSKIN ELF375DXH LOUVER BIRDSCREEN W/ RUSKIN CD50 DAMPER	SEE SPECIFICATIONS	AHU MFR.	24V ELECTRIC – 2 POSITION	FAIL CLOSED	NA	FULL OPEN	NONE	AHU MFR.

AHU CONTROL VALVE/ACTUATOR SCHEDULE

VALVE No.	FUNCTION	CONTROL VALVE							ACTUATOR							
		FLUID	CAPACITY	PRESS DROP	SIZE	CV	PIPE CONFIG.	MANUFACTURER/MODEL	ACTUATOR TYPE	NO OR NC	FAIL POSITION	SIGNAL	MANUFACTURER/ MODEL	FURNISHED BY	INSTALLED BY	CONTROLS BY
CV-CH14A	CHILLED WATER	WATER	317GPM	4.0 PSI	4"	160	2-WAY	SIEMENS 599	ELECTRIC MODULATING	NC	CLOSED	0-10VDC	SIEMENS SKB82	BAS CONTRACTOR	MECHANICAL CONTRACTOR	BAS CONTRACTOR
CV-HW14A	HEATING HOT WATER	WATER	70GPM	3.1 PSI	2"	40	2-WAY	SIEMENS 599	ELECTRIC MODULATING	NO	OPEN	MFT	SIEMENS SKD82	BAS CONTRACTOR	MECHANICAL CONTRACTOR	BAS CONTRACTOR
CV-CH14B	CHILLED WATER	WATER	317GPM	4.0 PSI	4"	160	2-WAY	SIEMENS 599	ELECTRIC MODULATING	NC	CLOSED	0-10VDC	SIEMENS SKB82	BAS CONTRACTOR	MECHANICAL CONTRACTOR	BAS CONTRACTOR
CV-HW14B	HEATING HOT WATER	WATER	70GPM	3.1 PSI	2"	40	2-WAY	SIEMENS 599	ELECTRIC MODULATING	NO	OPEN	MFT	SIEMENS SKD82	BAS CONTRACTOR	MECHANICAL CONTRACTOR	BAS CONTRACTOR

CONTROL DEVICE COORDINATION SCHEDULE

COMPONENTS	DESCRIPTION	FURNISHED BY	INSTALLED BY	WIRING BY
DAMPER ACTUATORS	SEE SCHEDULE	AHU MANUFACTURER	AHU MANUFACTURER	WIRED TO EXTERNAL JUNCTION BOX BY AHU MANUFACTURER, FINAL WIRING BY BAS CONTRACTOR
DAMPER END SWITCHES	BLADE MOUNTED END SWITCHES – SEE SCHEDULE FOR LOCATIONS AND CONFIGURATION	AHU MANUFACTURER	AHU MANUFACTURER	WIRED TO EXTERNAL JUNCTION BOX BY AHU MANUFACTURER, FINAL WIRING BY BAS CONTRACTOR
CONTROL VALVES	SEE SCHEDULE	BAS CONTRACTOR	MECH CONTRACTOR	BAS CONTRACTOR
DIFFERENTIAL PRESSURE SWITCH		BAS CONTRACTOR	AHU MANUFACTURER	WIRED TO EXTERNAL JUNCTION BOX BY AHU MANUFACTURER, FINAL WIRING BY BAS CONTRACTOR
MIXED AIR TEMPERATURE SENSOR	TEMPERATURE PROBE	BAS CONTRACTOR	AHU MANUFACTURER	WIRED TO EXTERNAL JUNCTION BOX BY AHU MANUFACTURER, FINAL WIRING BY BAS CONTRACTOR
FREEZESTAT	PROVIDE 3 FREEZESTATS W/ 20' SENSING TUBES AND MANUAL RESET	BAS CONTRACTOR	AHU MANUFACTURER	WIRED TO EXTERNAL JUNCTION BOX BY AHU MANUFACTURER, FINAL WIRING BY BAS CONTRACTOR
AIRFLOW MEASURING STATION AND TRANSMITTER	SEE SPECIFICATIONS	AHU MANUFACTURER	AHU MANUFACTURER	WIRED TO EXTERNAL JUNCTION BOX BY AHU MANUFACTURER, FINAL WIRING BY BAS CONTRACTOR
SUPPLY AIR TEMPERATURE AND HUMIDITY SENSORS	PROBE STYLE	BAS CONTRACTOR	AHU MANUFACTURER	WIRED TO EXTERNAL JUNCTION BOX BY AHU MANUFACTURER, FINAL WIRING BY BAS CONTRACTOR
OUTSIDE AIR TEMPERATURE AND HUMIDITY SENSOR		BAS CONTRACTOR (1)	BAS CONTRACTOR (1)	BAS CONTRACTOR (1)
OUTSIDE AIR CO2 SENSOR		BAS CONTRACTOR (1)	BAS CONTRACTOR (1)	BAS CONTRACTOR (1)
HOT WATER RETURN TEMPERATURE SENSOR		SENSOR BY BAS CONTRACTOR, THERMOWELL BY MECH CONTRACTOR	SENSOR BY BAS CONTRACTOR, THERMOWELL BY MECH CONTRACTOR	BAS CONTRACTOR
RETURN AIR TEMPERATURE AND HUMIDITY SENSORS	PROBE STYLE	BAS CONTRACTOR	AHU MANUFACTURER	WIRED TO EXTERNAL JUNCTION BOX BY AHU MANUFACTURER, FINAL WIRING BY BAS CONTRACTOR
RETURN AIR CO2 SENSOR		BAS CONTRACTOR (1)	BAS CONTRACTOR (1)	BAS CONTRACTOR (1)
DUCT SMOKE DETECTORS (SUPPLY & RETURN)	ELEC CONTRACTOR	ELEC CONTRACTOR	ELEC CONTRACTOR	ELEC CONTRACTOR TO FIRE ALARM SYSTEM, RELAYS AND WIRING TO BAS SYSTEM BY BAS CONTRACTOR
UNIT HEATER THERMAL OVERLOAD	INTERNAL TO UNIT HEATER – SEE SPECIFICATIONS	AHU MANUFACTURER	AHU MANUFACTURER	WIRED TO EXTERNAL JUNCTION BOX BY AHU MANUFACTURER, FINAL WIRING BY BAS CONTRACTOR
SPACE TEMPERATURE, HUMIDITY AND CO2 SENSORS		BAS CONTRACTOR (1)	BAS CONTRACTOR (1)	BAS CONTRACTOR (1)

NOTES:
1. BAS CONTRACTOR IS PERMITTED TO USE SITE/COMMON SENSORS AND PROVIDE PROGRAMMING TO CONTROLLER FOR COMMON INPUT DATA.
2. REFER TO ELECTRICAL DRAWINGS AND SPECIFICATIONS FOR WIRING REQUIREMENTS.
3. WHERE UNIT IS SHIPPED IN SECTIONS, BAS CONTRACTOR SHALL MAKE FINAL CONNECTIONS IN FIELD.

N

REV	DESCRIPTION	DATE
4	ISSUED FOR AHU-14A&B BID	07/26/22
3	ISSUED FOR AHU-13A&B CONSTRUCTION	07/11/22
2	ISSUED FOR CONSTRUCTION	02/11/21
1	ADDENDUM 1	10/24/20
0	ISSUED FOR BID	03/06/20

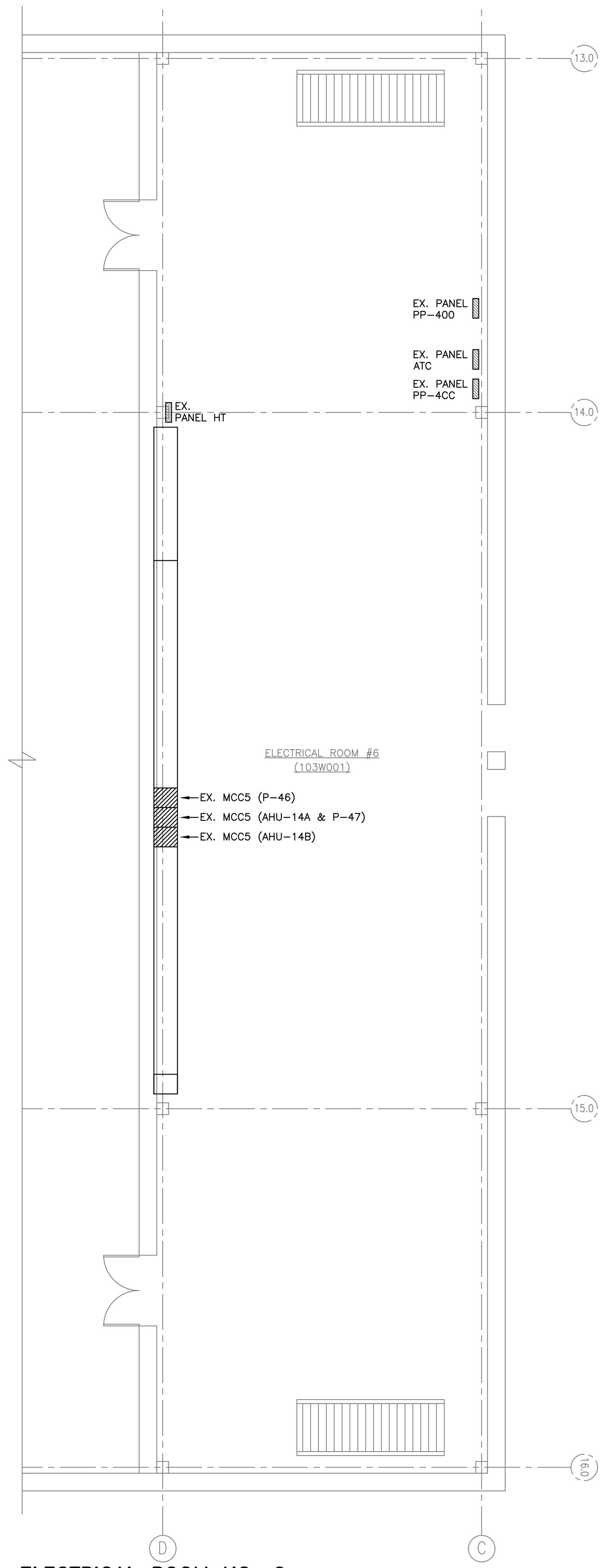
PENNSYLVANIA CONVENTION CENTER AUTHORITY
ONE CONVENTION CENTER PLACE
1101 ARCH STREET
PHILADELPHIA, PENNSYLVANIA 19107

PCCA EXHIBIT HALL A
AHU-14A&B

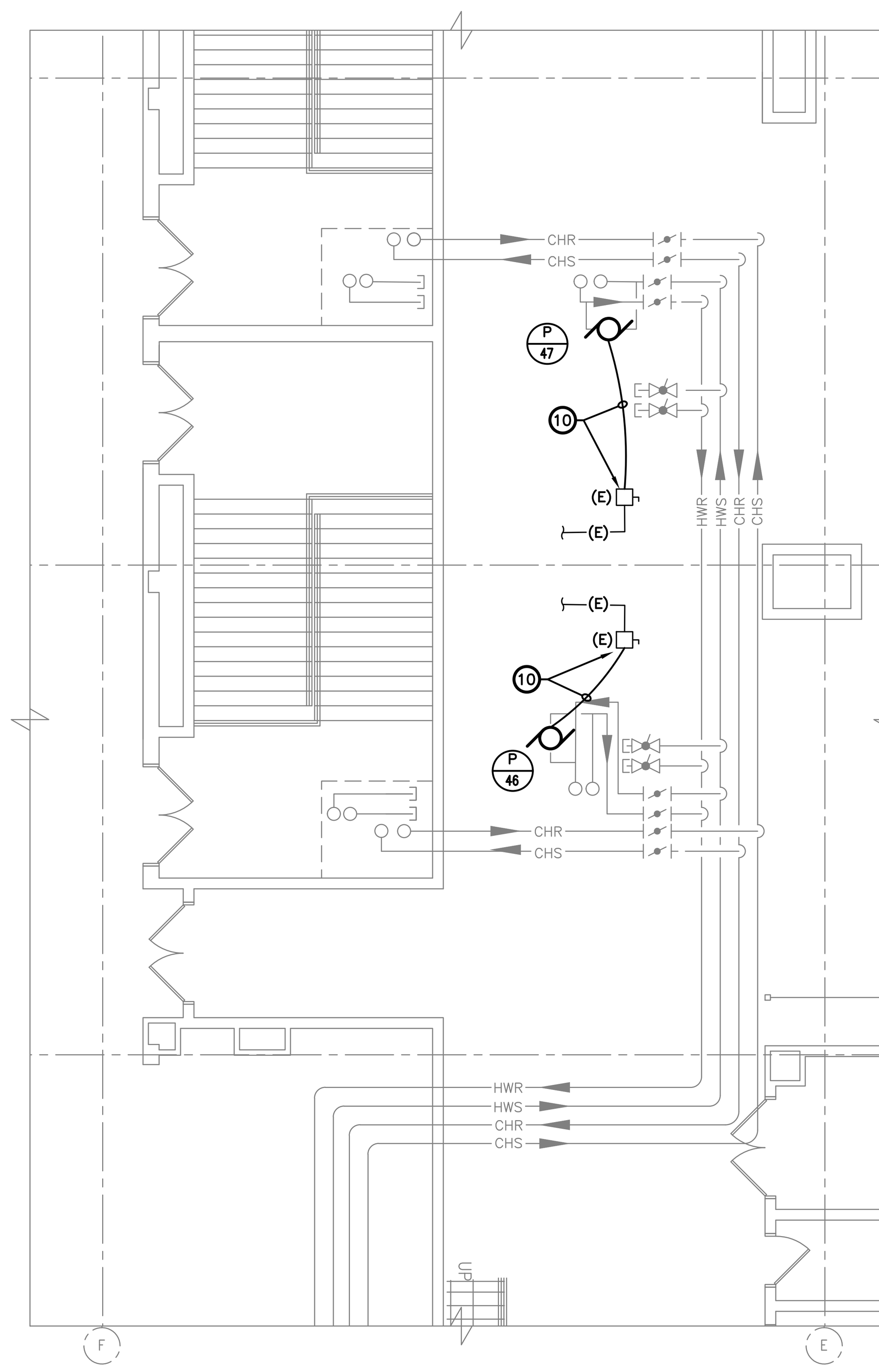
SCHEDULES & GENERAL SPECIFICATIONS

DIMITRI J. VERVERELLI INC.
CONSULTING ENGINEERS
PHILADELPHIA, PENNSYLVANIA

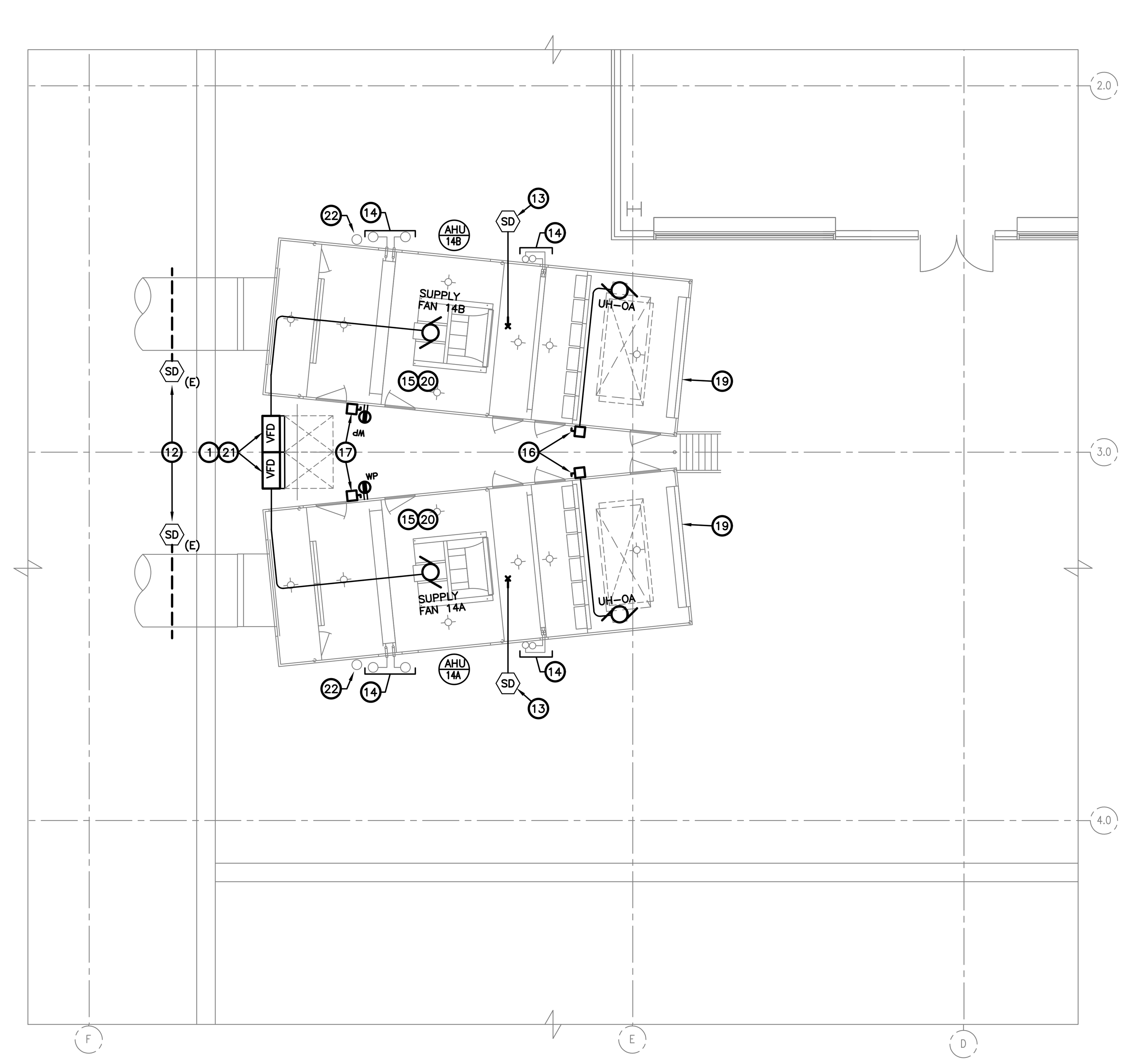
DRAWN BY: DPC	SCALE: AS NOTED	DWG. NO.
CHECKED BY: LOM	PROJ. NO: 1634C	M6.1



ELECTRICAL ROOM NO. 6
SCALE: ⅛" = 1'-0"



200 LEVEL PARTIAL PLAN
SCALE: ⅛" = 1'-0"



PARTIAL ROOF PLAN – UPPER LEVEL
SCALE: ⅛" = 1'-0"

ELECTRICAL CONSTRUCTION NOTES

(1) NEW VFD TO BE FURNISHED BY THE ATC CONTRACTOR (SIEMENS) AND INSTALLED BY THE ELECTRICAL CONTRACTOR. WIRING INTERNAL TO THE AHU IS BY THE AHU MANUFACTURER. WIRING BETWEEN MCC, VFD, AND AHU BY THE ELECTRICAL CONTRACTOR.

(2) REMOVE EXISTING AHU MOTOR MCC AUTOTRANSFORMER MOTOR STARTER ASSEMBLY, INCLUDING PILOT LIGHTS, CONTROL DEVICES, TRANSFORMERS, CIRCUIT BREAKER, CONTACTORS, THRU-DOOR OPERATING MECHANISM, AND WIRING. THE BUCKET ASSEMBLY AND DOOR SHALL REMAIN.

(3) PROVIDE NEW INVERSE-TIME/THERMAL-MAGNETIC MOLDED CASE FEEDER CIRCUIT BREAKER IN EXISTING BUCKET ASSEMBLY COMPLETE WITH NEW THRU-DOOR OPERATING MECHANISM AND MECHANICALLY ATTACHED LABEL. PROVIDE MOUNTING HARDWARE AND BUS CONNECTION FOR THE NEW BREAKER.

(4) REMOVE EXISTING PILOT DEVICES ON FACE OF EXISTING BUCKET ASSEMBLY DOOR AND BLANK-OFF.

(5) DISCONNECT AND REMOVE THE EXISTING POWER FACTOR CORRECTION CAPACITOR (PFCC) AND BRANCH CIRCUIT ASSOCIATED WITH THE DEMOLISHED AHU MOTOR AND STARTER ASSEMBLY.

(6) ALL MOTORS SHALL BE CONNECTED TO THEIR ASSOCIATED BRANCH CIRCUIT WITH U.L. LISTED 3M MOTOR LEAD SPLICING KITS 5300 SERIES AND 3M SCOTCHLOK COPPER COMPRESSION LUGS, 30000 SERIES. (SPLIT BOLT OR TWIST ON CONNECTORS ARE NOT ACCEPTABLE).

(7) PROVIDE CONDUCTOR EXTENSION FROM EXISTING AHU FEEDER TO NEW BREAKER. PROVIDE PRE-INSLUATED POWER DISTRIBUTION SPLICE BLOCKS MOUNTED IN EXISTING BUCKET ASSEMBLY.

(8) DISCONNECT AND REMOVE EXISTING MOTOR FEEDER BACK TO EXHIBIT HALL EXTERIOR WALL. EXTEND NEW FEEDER AND CONDUIT TO UNDERSIDE OF AHU (PROVIDE JUNCTION BOX AS REQUIRED) AND TURN UP TO NEW DISCONNECT SWITCH. (ALL EXTERIOR CONDUIT TO BE REMOVED AND REPLACED WITH RMC)

(9) EXISTING PUMP MCC MOTOR STARTER TO BE RE-USED. REPLACE OR ADJUST MOTOR OVERLOAD PROTECTION BASED ON NEW MOTOR FLA.

(10) EXISTING PUMP MOTOR DISCONNECT SWITCH TO BE RE-USED. REMOVE EXISTING BRANCH CIRCUIT AND EXTEND NEW BRANCH CIRCUIT FROM DISCONNECT SWITCH TO MOTOR.

(11) NEMA-3R DISCONNECT SWITCH FOR VFD TO BE INTEGRAL TO VFD.

(12) EXISTING SMOKE DETECTOR TO REMAIN.

(13) REMOVE EXISTING DUCT MOUNTED SMOKE DETECTOR FROM RETURN AIR DUCTWORK LOCATED BELOW THE AHU. RE-INSTALL IN SAME LOCATION AFTER THE NEW DUCTWORK IS COMPLETED. PROVIDE NEW SAMPLING TUBES AS REQUIRED. RECONNECT TO THE EXISTING FIRE ALARM SYSTEM. (ALL EXTERIOR CONDUIT TO BE REMOVED AND REPLACED WITH RMC)

(14) DISCONNECT AND REMOVE HEAT TRACING BRANCH CIRCUIT TO WHERE IT ENTERS THE BUILDING. EXTEND EXISTING #8 AWG CIRCUIT IN NEW CONDUIT AND RECONNECT TO NEW HEAT TRACING. PROVIDE JUNCTION BOX AS REQUIRED. (ALL EXTERIOR CONDUIT TO BE REMOVED AND REPLACED WITH RMC). CIRCUITS ARE FED FROM EXISTING CONTACTOR CONTROLLED PANEL HT.

(15) ALL CONDUIT PENETRATIONS THROUGH AHU CASING SHALL BE SEALED WATER AND AIR TIGHT WITH APPROPRIATE THROUGH WALL BUSHINGS.

(16) THE EXISTING UNIT HEATER, LIGHTS, AND RECEPTACLE ASSOCIATED WITH THE AHU ARE CURRENTLY FED FROM (1) 208/1, 20A CIRCUIT FROM EXISTING PANEL PP-4GG (VERIFY) SPLIT INTO (2) SEPARATE DISCONNECT SWITCHES AT AHU. REMOVE THE (2) DISCONNECT SWITCHES AND THE CIRCUIT BACK TO WHERE IT ENTERS THE BUILDING. EXTEND EXISTING #8 AWG CIRCUIT IN NEW CONDUIT AND RECONNECT TO A NEW 240V.,30A.,3P.,NEMA-3R FUSED DISCONNECT SWITCH (FUSE SIZE AS RECOMMENDED BY UH MANUFACTURER). EXTEND CIRCUIT FROM DISCONNECT SWITCH TO THE NEW UNIT HEATER INSIDE THE AHU. (ALL EXTERIOR CONDUIT TO BE REMOVED AND REPLACED WITH RMC)

(17) EXTEND NEW 120V.,20A., 3#8 AWG BRANCH CIRCUIT FROM SPARE IN EXISTING PANEL PP-4CC (OR AS DIRECTED BY OWNER) TO A NEW 240V.,30A.,2P.,NEMA-3R DISCONNECT SWITCH. EXTEND CIRCUIT FROM DISCONNECT SWITCH TO THE NEW AHU LIGHTING AND RECEPTACLE JUNCTION BOX. (LIGHTING, SWITCH CONTROL, AND RECEPTACLE ARE PRE-WIRED BY THE MANUFACTURER) THE NEW CIRCUIT SHALL BE ROUTED THROUGH THE BUILDING ALONG THE SAME PATH AS THE EXISTING UH CIRCUIT.

(18) NOT USED.

(19) REMOVE THE EXISTING LIGHTING PROTECTION SYSTEM ASSOCIATED WITH THE AHU'S AND PROVIDE NEW MASTER LABEL U.L. LISTED LIGHTNING PROTECTION SYSTEM CONNECTED TO EXISTING ROOF/DOWN CONDUCTORS.

(20) WITHIN THE AHU, THE ELECTRICAL CONTRACTOR SHALL INTERCONNECT MANUFACTURER'S INTERNAL WIRING AT EACH SHIPPING SPLIT. REFERENCE THE MECHANICAL DRAWINGS AND AND REVIEWED SUBMITTALS FOR EXACT LOCATIONS. (GENERALLY OCCURS IN THREE LOCATIONS)

(21) PROVIDE GALVANIZED STEEL UNISTRUT FRAMING TO SUPPORT THE NEW VFD'S FROM THE SIDE OF THE EXISTING STEEL DUNNAGE. NOTE: FRONT OF VFD SHALL BE ALIGNED WITH THE OUTSIDE EDGE OF GRATING/DUNNAGE (OR SLIGHT OVERHANG) TO ACCOMMODATE THE REQUIRED NEC CLEARANCES TO ADJACENT DISCONNECT SWITCHES AND PROVIDE CLEARANCE IN FRONT OF THE AHU ACCESS DOORS. PROVIDE OSHA APPROVED STEEL KNEE AND KICK PLATES UNDER VFD AS REQUIRED (DEPENDANT ON PHYSICAL HEIGHT OF VFD). OPEN SPACE BETWEEN VFD'S AND AHU'S SHALL BE CLOSED OFF WITH NEW OSHA APPROVED RAILINGS AND KNEE/KICK PLATES. REFERENCE MECHANICAL DRAWINGS.

(22) EXTEND EXISTING #8 AWG CIRCUIT IN NEW CONDUIT TO NEW AHU CONDENSATE DRAIN HEAT TRACING. PROVIDE JUNCTION BOX AS REQUIRED. (ALL EXTERIOR CONDUIT TO BE IN RMC.) CIRCUIT IS FED FROM EXISTING CONTRACTOR CONTROLLED PANEL HT.

GENERAL ELECTRICAL SPECIFICATIONS

1. ALL WORK SHALL COMPLY AND BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE CODES, THE LATEST UNIFORM CONSTRUCTION CODE STATUTE, THE INTERNATIONAL CODES AS AMENDED AND ADOPTED BY THE LOCAL JURISDICTION (PHILADELPHIA, PA), REGULATIONS, LOCAL CODES, THE NATIONAL ELECTRIC CODE, PENNSYLVANIA CONVENTION CENTER AUTHORITY (PCCA) BUILDING STANDARDS, NFPA, AND ALL OTHER AGENCIES HAVING JURISDICTION. OBTAIN ALL REQUIRED PERMITS AND PAY ALL REQUIRED FEES.
2. ALL ELECTRICAL EQUIPMENT, MATERIALS, DEVICES, AND APPLIANCES SHALL BE LABELED AND LISTED BY A CERTIFIED TESTING LABORATORY.
3. PROVIDE COMPLETE ELECTRICAL SYSTEMS AS INDICATED ON DRAWINGS AND SPECIFIED HEREIN. "PROVIDE" SHALL MEAN "FURNISH AND INSTALL".
4. REFERENCE MECHANICAL DRAWINGS FOR COORDINATION.
5. PROVIDE ALL MATERIALS AND LABOR FOR THE COMPLETE ELECTRICAL WORK AS SHOWN ON THE DRAWINGS AND AS SPECIFIED. ANY APPLIANCE, DEVICE OR WORK INCIDENTAL OR NECESSARY TO MAKE THE WORK COMPLETE SHALL BE PROVIDED WITHOUT ADDITIONAL EXPENSE TO THE OWNER.
6. GIVE ALL NOTICES, OBTAIN ALL PERMITS AND PAY ALL GOVERNMENTAL TAXES, FEES AND COSTS; FILE NECESSARY PLANS AND OBTAIN APPROVALS OF ALL GOVERNMENTAL DEPARTMENTS AND PUBLIC UTILITIES HAVING JURISDICTION; OBTAIN CERTIFICATES OF INSPECTION FROM AN NFPA APPROVED AGENCY FOR THE WORK AND DELIVER SAME TO THE OWNER WITH REQUEST FOR FINAL PAYMENT.
7. VISIT THE SITE AND VERIFY ALL MEASUREMENTS AND FIELD CONDITIONS AFFECTING THE WORK, PRIOR TO SUBMITTING BID. IN SUBMITTING THE BID THE CONTRACTOR VERIFIES AND ASSERTS THAT HE HAS VISITED THE SITE AND NO ADDITIONAL COST TO THE OWNER WILL BE INCURRED DUE TO THE CONTRACTOR'S FAILURE TO VERIFY EXISTING CONDITIONS PRIOR TO SUBMITTING HIS BID. ANY DISCREPANCIES BETWEEN THE DRAWINGS AND FIELD CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER.
8. WORK SHALL BE DONE IN A NEAT AND WORKMANLIKE MANNER BY SKILLED MECHANICS USING THE BEST TRADE METHODS.
9. SUBMIT SHOP DRAWINGS AND/OR SUBMITTALS FOR ALL ELECTRICAL ITEMS AND OBTAIN APPROVAL BEFORE PURCHASE OR INSTALLATION OF WORK.
10. COORDINATE ALL RIGGING ACTIVITIES AND POWER SHUTDOWNS WITH THE OWNER'S REPRESENTATIVE AND OTHER TRADES. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL STAGING, RIGGING, HOISTING AND SERVICES NECESSARY FOR THE ERECTION AND DELIVERY OF THE ELECTRICAL EQUIPMENT INTO THE BUILDING.
11. PRIOR TO FINAL ACCEPTANCE OF THE WORK SUBMIT A WRITTEN STATEMENT TO THE ARCHITECT GUARANTEEING ALL EQUIPMENT AND WORK FOR ONE (1) YEAR FROM DATE OF ACCEPTANCE.
12. DEVICE AND EQUIPMENT LOCATIONS SHOWN ON DRAWINGS ARE DIAGRAMMATIC, COORDINATE EXACT LOCATION AND MOUNTING HEIGHT IN FIELD PRIOR TO ROUGH IN.
13. NOTE THAT CONSTRUCTION IS TO BE PERFORMED IN EXISTING FACILITIES AND THAT THE DRAWINGS GENERALLY SHOW ONLY NEW WORK THAT IS REQUIRED. THE DRAWINGS DO NOT SHOW IN DETAIL HOW THE NEW WORK IS TO BE INSTALLED BECAUSE UNKNOWN OBSTRUCTIONS TO ITS INSTALLATION MAY BE DISCLOSED AS THE WORK PROGRESSES. PERFORM THE WORK INDICATED, AND PERFORM SUCH ADDITIONAL WORK AS MAY BE REQUIRED BUT IS NOT SPECIFICALLY SHOWN. PERFORM THIS WORK IN SUCH A MANNER AS TO OVERCOME ALL OBSTRUCTIONS AND DIFFICULTIES THAT ARE ENCOUNTERED AT NO ADDITIONAL EXPENSE TO THE OWNER.
14. NEW AND EXISTING WIRING PASSING THROUGH FIRE RATED PARTITIONS, FLOORS, AND CEILINGS: CAULK THE SPACE BETWEEN THE OPENING AND SLEEVE OR WIRING/CONDUIT AND THE SPACE BETWEEN THE SLEEVE AND WIRING/CONDUIT WITH U.L. APPROVED FIRESTOP PRODUCT AS MANUFACTURED BY HILTI, 3M, OR STI TO OBTAIN A U.L. LISTED FIRE RATED ASSEMBLY. ALL PRODUCTS SHALL BE INSTALLED IN STRICT COMPLIANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
15. CONTRACTOR SHALL PROPERLY PROTECT ALL WORK AND EQUIPMENT TO PREVENT OBSTRUCTION, DAMAGE, OR LOSS. ALL CONDUIT OPENINGS SHALL BE CLOSED WITH CAPS OR PLUGS DURING INSTALLATION. ALL EQUIPMENT SHALL BE TIGHTLY COVERED WITH APPROVED MATERIAL AND PROTECTED AGAINST DIRT, WATER, OR MECHANICAL INJURY. AT FINAL COMPLETION, ALL WORK SHALL BE THOROUGHLY CLEANED AND DELIVERED IN PERFECT, UNBLEMISHED CONDITION.
16. PROVIDE BARRICADES AND LIGHTS (IF REQUIRED) AROUND ALL WORK AREAS TO PROTECT PEDESTRIAN TRAFFIC AND TO PREVENT UNAUTHORIZED PEDESTRIAN ACCESS. PROTECTION SHALL MEET THE REQUIREMENTS OF THE LOCAL AND STATE REGULATIONS AND GOVERNMENT BODIES.
17. ALL DAMAGE TO THE BUILDING, MECHANICAL, PLUMBING, AND ELECTRICAL SYSTEMS OR SURROUNDINGS, RESULTING FROM CONTRACTOR'S FAILURE TO ADEQUATELY PROTECT THE WORK SHALL BE REPAIRED OR REPLACED AS DIRECTED, AT NO ADDITIONAL COST TO THE OWNER, INCLUDING ANY WORK DAMAGED IN ORDER TO MAKE GOOD SUCH DEFECTS.
18. ALL EQUIPMENT AND MATERIALS REMOVED AND NOT WANTED BY OWNER SHALL BECOME PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED IMMEDIATELY FROM THE SITE.
19. SEAL AND PATCH ALL REMAINING HOLES, OPENINGS, ETC. TO MATCH THE ADJOINING SURFACES IN MATERIALS, TEXTURES, AND FINISHES.
20. ANY EXISTING POTENTIALLY HAZARDOUS MATERIALS ENCOUNTERED IN THE COURSE OF THE WORK SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER FOR REMOVAL AND DISPOSAL.
21. SMOKING AT THE JOB SITE IS NOT ALLOWED.
22. FLAMMABLE MATERIALS MAY NOT BE STORED OR ALLOWED TO REMAIN OVERNIGHT WITHIN THE BUILDING. THIS INCLUDES, BUT IS NOT LIMITED TO, PAINTS, THINNERS, CLEANING AND RESTORATION PRODUCTS, RAGS OR BRUSHES, AND ANY TOOL THAT IS CAPABLE OF PRODUCING FLAME. SAWDUST, SCRAP LUMBER, SOAKED RAGS, AND OTHER FLAMMABLE CONSTRUCTION DEBRIS MUST BE COLLECTED AT THE END OF EACH DAY AND DISPOSED OF PROPERLY OUTSIDE OF THE BUILDING.
23. MAINTAIN SUITABLE FIRE PROTECTION EQUIPMENT AT BUILDING SITE. AT MINIMUM, TYPE ABC FIRE EXTINGUISHERS SHALL BE PROVIDED WHERE WORK IS BEING PERFORMED WITH OPEN FLAME OR USING FLAMMABLE MATERIALS AND AN ADDITIONAL FIRE EXTINGUISHER SHALL BE PROVIDED TO THE WORKER PERFORMING THE WORK. TRAIN ALL WORKERS IN THE USE OF FIRE PROTECTION EQUIPMENT.
24. ALL FIRE SAFETY REQUIREMENTS LISTED ABOVE ARE TO BE CONSIDERED MINIMUM. CONTRACTOR IS RESPONSIBLE FOR TAKING OTHER MEASURES DEEMED NECESSARY BY THE CONTRACTOR TO PROTECT THE BUILDING.
25. THE CONTRACTOR SHALL MAINTAIN AS-BUILT DRAWINGS OF THE WORK PERFORMED. AT THE COMPLETION OF THE INSTALLATION, EACH TRADE WILL INCORPORATE ALL FIELD CHANGES ON THE AUTOCAD DATA BASE AND SUBMIT THREE (3) SETS OF PLOTTED PRINTS & A DATA DISK FOR RECORD PURPOSES.
26. ALL EXTERIOR CONDUIT BODIES AND DEVICE BACK BOXES SHALL BE CAST METAL WITH THREADED HUBS.
27. CONDUIT TERMINATIONS AT EXTERIOR EQUIPMENT, WIRE TROUGHS, JUNCTION BOXES, ETC. SHALL BE MADE WITH WATER-TIGHT THREADED GROUNDING MYERS HUBS OR EQUIVALENT. CONDUIT LOCK NUTS ON THE EXTERIOR OF EQUIPMENT, WIRE TROUGHS, JUNCTION BOXES, ETC. ARE NOT ACCEPTABLE.
28. DISCONNECT SWITCHES – SWITCHES SHALL BE NEMA 3R, HEAVY DUTY CONSTRUCTION, FUSED AND NON-FUSED AS SHOWN, WITH POSITIVE QUICK-MAKE AND QUICK-BREAK OPERATING MECHANISMS, SAFETY INTERLOCKING COVER AND EXTERNAL OPERATING HANDLE. THE SWITCH SHALL FUNCTION WITH THE QUICK-MAKE AND BREAK SPRING REMOVED. SWITCHES SHALL BE MANUFACTURED BY SQUARE-D CO., CUTLER-HAMMER, GENERAL ELECTRIC OR SIEMENS. FUSES SHALL BE DUAL-ELEMENT CURRENT LIMITING TYPE.

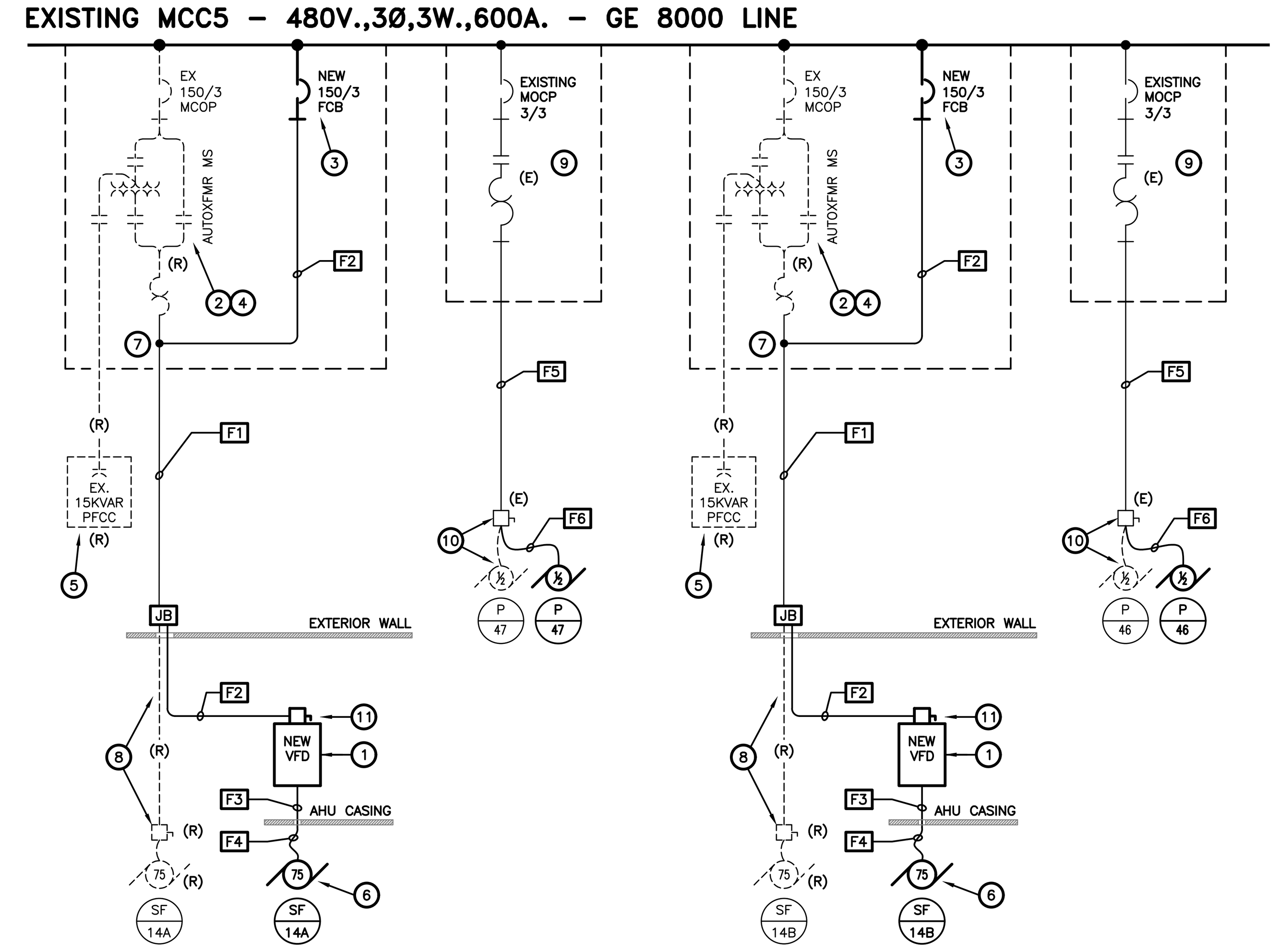
ELECTRICAL LEGEND

SF 1	EQUIPMENT TAG
	BRANCH CIRCUIT HOME-RUN
	MOTOR CONNECTION
	DISCONNECT SWITCH
#	CONSTRUCTION NOTE
SD	SPOT TYPE SMOKE DETECTOR
SD	DUCT MOUNTED SMOKE DETECTOR
RM	FIRE ALARM RELAY
WP	WEATHERPROOF GFCI DUPLEX RECEPTACLE
JB	JUNCTION BOX
J	JUNCTION BOX
	EXISTING BRANCH CIRCUIT PANELBOARD
FCB	FEEDER CIRCUIT BREAKER
C	CONDUIT
MCC	MOTOR CONTROL CENTER
VFD	VARIABLE FREQUENCY DRIVE
BAS	BUILDING AUTOMATION SYSTEM
MOCP	MOTOR CIRCUIT PROTECTOR
D.S.	DISCONNECT SWITCH
RMC	RIGID METAL CONDUIT
LFMC	LIQUID-TIGHT FLEXIBLE METAL CONDUIT
(E)	DENOTES "EXISTING"
(R)	DENOTES "REMOVE"

GENERAL WIRING METHODS

1. ALL CONDUCTOR INSULATION SHALL BE 90°C THHN/THWN. ALL FEEDERS AND BRANCH CIRCUITS SHALL BE COPPER.
2. ALL LUGS SHALL BE U.L. LISTED FOR USE WITH COPPER OR ALUMINUM CABLE WHOSE AMPACITY IS BASED ON 75°C CONDUCTOR TEMPERATURE RATING.
3. ALL CIRCUITS TO BE 2#12, 1#12GND., UNLESS OTHERWISE NOTED.
4. BRANCH CIRCUITS ARE DIAGRAMMATIC AND DO NOT REPRESENT ACTUAL PLACEMENT OF CONDUIT.
5. ALL JUNCTION BOX AND DEVICE COVER PLATES SHALL IDENTIFY CIRCUIT NUMBERS.
6. ALL DEVICES AND EQUIPMENT, INCLUDING VFD'S, SHALL HAVE ADHESIVE LABELS ATTACHED TO COVER PLATE / FRONT COVER IDENTIFYING CIRCUIT NUMBER(S).
7. GROUNDING SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE ARTICLE 250.
8. WIRE AND CABLE SHALL BE COPPER, 600 VOLT INSULATION TYPE THHN, UNLESS OTHERWISE NOTED. WIRE SIZES #10 AND SMALLER SHALL BE SOLID, #8 AND LARGER SHALL BE STRANDED. MINIMUM SIZE WIRE SHALL BE #12AWG.
9. ALL RACEWAYS SHALL BE U.L. APPROVED. MINIMUM SIZE CONDUIT AND EMT SHALL BE ¾", UNLESS OTHERWISE NOTED.
10. INTERIOR WIRING METHODS
    - FEEDERS – RIGID METAL CONDUIT.
    - BRANCH CIRCUITS – ELECTRICAL METALLIC TUBING.
    - CONTROLS – ELECTRICAL METALLIC TUBING.
    -
11. EXTERIOR WIRING METHODS
    - FEEDERS – GALVANIZED RIGID STEEL CONDUIT.
    - BRANCH CIRCUITS – GALVANIZED RIGID STEEL CONDUIT.
    - CONTROLS – GALVANIZED RIGID STEEL CONDUIT.
12. FINAL CONNECTION TO PUMP MOTOR SHALL BE MADE WITH A MAXIMUM 36" OF LIQUID-TIGHT FLEXIBLE METAL CONDUIT.
13. LIQUID-TIGHT FLEXIBLE METAL CONDUIT SHALL BE USED INSIDE AHU.
14. PROVIDE GALVANIZED UNISTRUT SUPPORT STEEL FOR NEW INTERIOR AND EXTERIOR CONDUITS AS REQUIRED.

EXISTING MCC5 – 480V.,3Ø,3W.,600A. – GE 8000 LINE



SINGLE LINE DIAGRAM
N.T.S.

FEEDER/BRANCH CIRCUIT SCHEDULE

F1	EXISTING 3#1/0, 1#6 GND.,1-1/2" RMC
F2	NEW 3#1/0, 1#6 GND.,1-1/2" RMC
F3	3#1, 1#6 GND.,1-1/4" RMC
F4	3#1, 1#6 GND.,1-1/4" LFMC
F5	EXISTING 3#12, 1#12 GND.,3/4" EMT
F6	NEW 3#12, 1#12 GND.,3/4" LFMC

GENERAL DEMOLITION NOTES

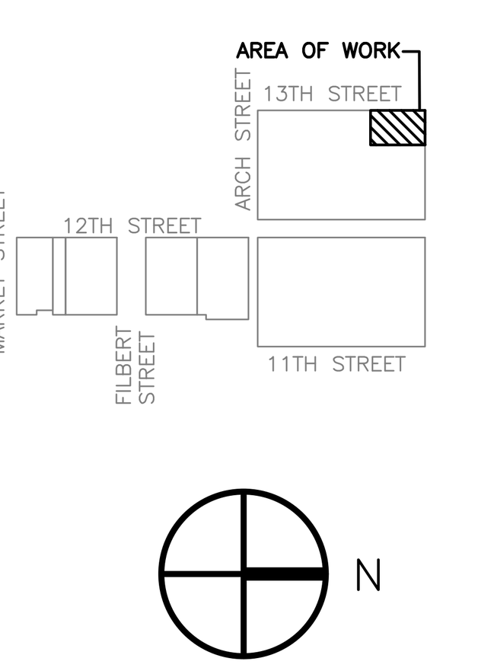
1. REMOVE CIRCUITS NOT REQUIRED IN THE RENOVATED AREA BACK TO SOURCE OF POWER INCLUDING ALL HANGERS, SUPPORTS, CONDUITS, JUNCTION BOXES, ETC. ALL FEEDERS, CONDUIT, CIRCUITS, WIRING, AND CABLING PASSING THROUGH THE WORK AREA WHICH SERVES OTHER AREAS OF THE BUILDING SHALL BE RETAINED. RELOCATE AND RECONNECT AS REQUIRED FOR THE NEW CONSTRUCTION.
2. EXISTING POWER, LIGHTING, AND LOW VOLTAGE CIRCUITS BEYOND CONTRACT LIMITS SHALL REMAIN IN SERVICE. RECIRCUIT AND SWITCH AS REQUIRED.
3. ALL REMOVED EQUIPMENT AND MATERIALS NOT WANTED BY THE OWNER SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED IMMEDIATELY FROM THE SITE.
4. ANY EXISTING APPARATUS OR DEVICE REQUIRED TO REMAIN IN OPERATION, ALTHOUGH, NOT SPECIFICALLY SHOWN OR MENTIONED, SHALL BE CONNECTED OR RECONNECTED AND SUPPLIED FROM AN AVAILABLE SOURCE OF POWER.
5. REMOVE ALL EQUIPMENT, BRANCH CIRCUIT WIRING AND CONTROL WIRING FOR DEVICES AND EQUIPMENT THAT ARE NOT REQUIRED IN THE NEW INSTALLATION. BLANK ALL UNUSED OUTLET BOXES.
6. ANY EXISTING APPARATUS OR DEVICE TO BE RETAINED SHALL BE DISCONNECTED AND RELOCATED AND REINSTALLED AS REQUIRED TO ALLOW FOR THE INSTALLATION OF THE NEW AHU'S, EQUIPMENT, PIPING, DUNNAGE, AND DUCTWORK.
7. ALL RELOCATED DEVICES AND EQUIPMENT SHALL HAVE THEIR CORRESPONDING CIRCUITS EXTENDED TO THE NEW LOCATION AND RECONNECTED.
8. PROVIDE NEW CIRCUIT BREAKERS IN EXISTING PANELS FOR NEW CIRCUITS AS REQUIRED. THE CONTRACTOR SHALL TRACE OUT ALL EXISTING BRANCH CIRCUITS AND INDICATE EQUIPMENT SERVED ON THE NEW TYPED PANEL SCHEDULES.

GENERAL FIRE ALARM NOTES

1. THIS SPECIFICATION DESCRIBES THE EXPANSION OF THE EXISTING SIEMENS FIRE ALARM SYSTEM.
2. THE SYSTEM SHALL BE IN FULL COMPLIANCE WITH NATIONAL AND LOCAL CODES.
3. THE SYSTEM SHALL INCLUDE ALL REQUIRED HARDWARE, RACEWAYS, INTERCONNECTING WIRING AND SOFTWARE TO ACCOMPLISH THE REQUIREMENTS OF THIS SPECIFICATION AND THE CONTRACT DRAWINGS, WHETHER OR NOT SPECIFICALLY ITEMIZED HEREIN.
4. ALL EQUIPMENT FURNISHED SHALL BE NEW AND THE LATEST STATE OF THE ART PRODUCTS OF A SINGLE MANUFACTURER, ENGAGED IN THE MANUFACTURING AND SALE OF FIRE DETECTION DEVICES FOR OVER TEN YEARS, UNLESS OTHERWISE NOTED TO REUSE EXISTING.
5. THE SYSTEM AS SPECIFIED SHALL BE SUPPLIED, INSTALLED, TESTED AND APPROVED BY THE LOCAL AUTHORITY HAVING JURISDICTION, AND TURNED OVER TO THE OWNER IN AN OPERATIONAL CONDITION.
6. THE CONTRACTOR SHALL INCLUDE IN HIS WORK, WITHOUT EXTRA COST TO THE OWNER, ANY LABOR, MATERIALS, SERVICES, APPARATUS, DRAWINGS, IN ADDITION TO CONTRACT DOCUMENTS, IN ORDER TO MEET THE FUNCTIONAL INTENT AND COMPLY WITH ALL APPLICABLE CODES, LAWS, ORDINANCES, RULES AND REGULATIONS, WHETHER OR NOT INDICATED IN THE CONSTRUCTION DOCUMENTS.
7. ALL FIRE ALARM CABLE SHALL BE SOLID COPPER CABLE INSTALLED IN EMT IN INTERIOR LOCATIONS AND RIGID METAL CONDUIT AT EXTERIOR LOCATIONS.
8. THE CONTRACTOR IS RESPONSIBLE FOR SIZING ALL WIRE AND CABLE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS, NFPA, AND VOLTAGE DROP.
9. PROVIDE ADDITIONAL POWER SUPPLIES AND CONTROL HARDWARE AS REQUIRED FOR A COMPLETE FUNCTIONAL SYSTEM INTEGRATED WITH THE EXISTING BUILDING SYSTEM.
10. SYSTEMS MUST BE PROTECTED AND MAINTAINED DURING DEMOLITION AND CONSTRUCTION.
11. THE ELECTRICAL CONTRACTOR SHALL INCLUDE IN HIS BID PROPOSAL ALL COSTS INCURRED BY THE FIRE ALARM VENDOR AND FOR ALL EQUIPMENT AND DEVICES.
12. FURNISH BATTERY CALCULATIONS AND DRAWINGS FOR THE REVISED SYSTEM.
13. ALL FIRE ALARM DEVICES SHALL BE NEW AND COMPATIBLE WITH THE EXISTING SYSTEM.
14. LABEL ALL FIELD DEVICES, I.E. DETECTORS AND MODULES, WITH A PRINTED DEVICE ADDRESS.
15. CONDUIT COMPRESSION CONNECTORS AND COUPLINGS ARE TO BE INSULATED STEEL.

LIGHTNING PROTECTION SYSTEM NOTES

1. THE SCOPE OF THE WORK IS THE REPLACEMENT OF THE EXISTING LIGHTNING PROTECTION SYSTEM FOR THE AHU'S AND DUCTWORK.
2. THE WORK SHALL CONSIST OF FURNISHING LABOR, MATERIALS AND SERVICES REQUIRED FOR THE COMPLETION OF A FUNCTIONAL AND UNOBTRUSIVE LIGHTNING PROTECTION SYSTEM APPROVED BY THE OWNER.
3. A FIRM ACTIVELY ENGAGED IN THE INSTALLATION OF CERTIFIED LIGHTNING PROTECTION SYSTEMS AND LISTED WITH UNDERWRITERS' LABORATORIES, INC. AND THE LIGHTNING PROTECTION INSTITUTE SHALL INSTALL THE SYSTEM.
4. THE NEW SYSTEM SHALL BE TIED INTO THE EXISTING BUILDING STEEL AND/OR ROOF/DOWN CONDUCTORS.
5. REMOVE THE EXISTING LIGHTNING PROTECTION SYSTEM ASSOCIATED WITH THE DEMOLITION OF EXISTING EQUIPMENT AND DUCTWORK.
6. THE NEW LIGHTNING PROTECTION SYSTEM SHALL PROVIDE PROTECTION FOR ALL NEW EQUIPMENT AND PROVIDE COVERAGE FOR SURROUNDING EXISTING EQUIPMENT AND BUILDING.
7. THE NEW SYSTEM SHALL MATCH THE MATERIAL CHARACTERISTICS OF THE EXISTING SYSTEM.
8. SYSTEM DESCRIPTION – THE ENTIRE LIGHTNING PROTECTION SYSTEM SHALL BE DESIGNED AND INSTALLED IN ACCORDANCE WITH: NATIONAL FIRE PROTECTION ASSOC. (NFPA) DOCUMENT # 780, UNDERWRITERS' LABORATORIES, INC. (UL) STANDARD # 96A, AND THE LIGHTNING PROTECTION INSTITUTE (LPI) STANDARD # 175
9. SUBMITTALS – A COMPLETE SHOP DRAWING SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO COMMENCEMENT OF THE INSTALLATION. THE SHOP DRAWING WILL SHOW THE EXTENT OF THE SYSTEM LAYOUT DESIGNED FOR THE STRUCTURE ALONG WITH DETAILS OF THE PRODUCTS TO BE USED IN THE INSTALLATION.
10. QUALITY ASSURANCE – THE CONTRACTOR SHALL FURNISH A UL MASTER LABEL OR LETTER OF FINDINGS UPON COMPLETION OF THE INSTALLATION. THE SYSTEM INSTALLATION SHALL BE MADE UNDER THE SUPERVISION OF AN LPI CERTIFIED MASTER INSTALLER, AND THE LPI SYSTEM CERTIFICATION SHALL BE DELIVERED UPON COMPLETION OF THE INSTALLATION.
11. ALL MATERIALS SHALL COMPLY IN WEIGHT, SIZE, AND COMPOSITION WITH THE REQUIREMENTS OF THE UL 96 MATERIALS STANDARDS.
12. ALL EQUIPMENT SHALL BE UL LISTED AND PROPERLY LABELED. THE SYSTEM SHALL BE THE STANDARD PRODUCT OF A MANUFACTURER REGULARLY ENGAGED IN THE PRODUCTION OF LIGHTNING PROTECTION EQUIPMENT AND A MEMBER OF LPI. EQUIPMENT SHALL BE THE MANUFACTURER'S LATEST APPROVED DESIGN OF CONSTRUCTION TO SUIT THE APPLICATION WHERE IT IS TO BE USED IN ACCORDANCE WITH ACCEPTED INDUSTRY STANDARDS AND WITH NFPA, LPI, & UL REQUIREMENTS.
13. LIGHTNING PROTECTION MATERIALS SHALL BE COORDINATED WITH BUILDING CONSTRUCTION MATERIALS TO ASSURE COMPATIBILITY.
14. ALUMINUM LIGHTNING PROTECTION MATERIALS SHALL NOT BE EMBEDDED IN CONCRETE OR MASONRY, INSTALLED ON OR BELOW COPPER SURFACES, OR USED FOR THE IN-GROUND SYSTEM. COPPER LIGHTNING PROTECTION MATERIALS SHALL NOT BE INSTALLED ON ALUMINUM SURFACES. COPPER SYSTEM COMPONENTS WITHIN 2 FEET OF CHIMNEY EXHAUSTS SHALL BE TIN COATED TO PROTECT AGAINST DETERIORATION.
15. STRIKE TERMINATION DEVICES SHALL BE PROVIDED TO PLACE THE ENTIRE STRUCTURE UNDER A ZONE OF PROTECTION AS DEFINED BY THE STANDARDS. AIR TERMINALS SHALL PROJECT A MINIMUM OF 12 INCHES ABOVE PROTECTED AREAS OR OBJECTS. AIR TERMINALS SHALL BE LOCATED WITHIN 2 FEET OF EXPOSED CORNERS AND ROOF EDGES.
16. METALLIC BODIES HAVING A THICKNESS 3/16" OR GREATER MAY SERVE AS STRIKE TERMINATION DEVICES WITHOUT THE ADDITION OF AIR TERMINALS. THESE BODIES SHALL BE MADE A PART OF THE LIGHTNING PROTECTION SYSTEM BY CONNECTION(S) ACCORDING TO THE STANDARDS USING MAIN SIZE CONDUCTORS AND BONDING FITTINGS WITH 3 SQUARE INCHES OF SURFACE CONTACT AREA.
17. CABLE CONDUCTORS SHALL PROVIDE A TWO-WAY PATH FROM STRIKE TERMINATION DEVICES HORIZONTALLY AND DOWNWARD TO CONNECTIONS WITH THE GROUND SYSTEM. CABLE CONDUCTORS SHALL BE FREE OF EXCESSIVE SPLICES AND SHARP BENDS. NO BEND OF A CONDUCTOR SHALL FORM A FINAL INCLUDED ANGLE OF LESS THAN 90 DEGREES NOR HAVE A RADIUS OF BEND LESS THAN 8 INCHES. STRUCTURAL ELEMENTS AND DESIGN FEATURES SHALL BE USED WHENEVER POSSIBLE TO MINIMIZE THE VISUAL IMPACT OF EXPOSED CONDUCTORS.
18. EXPOSED CABLE CONDUCTORS SHALL BE SECURED TO THE STRUCTURE AT INTERVALS NOT EXCEEDING 3 FEET – 0 INCHES. FASTENERS, NAILS, SCREWS, OR BOLTS SHALL BE OF SUITABLE CONFIGURATION FOR THE INTENDED APPLICATION AND OF THE SAME MATERIAL AS THE CONDUCTOR OR OF ELECTROLYTICALLY COMPATIBLE MATERIALS. GALVANIZED OR PLATED STEELS ARE NOT ACCEPTABLE.



REV	DESCRIPTION	DATE
4	ISSUED FOR AHU-14A&B BID	07/26/22
3	ISSUED FOR AHU-13A&B CONSTRUCTION	07/11/22
2	ISSUED FOR CONSTRUCTION	02/11/21
0	ISSUED FOR BID	03/06/20

PENNSYLVANIA CONVENTION CENTER AUTHORITY
ONE CONVENTION CENTER PLACE
1101 ARCH STREET
PHILADELPHIA, PENNSYLVANIA 19107

PCCA EXHIBIT HALL A
AHU-14A&B

AHU 14A & 14B
ELECTRICAL PLANS, DETAILS & SPECIFICATIONS

DIMITRI J. VERVERELLI INC.
CONSULTING ENGINEERS
PHILADELPHIA, PENNSYLVANIA

DRAWN BY: THS	SCALE: AS NOTED	DWG. NO. E1.3
CHECKED BY: LOM	PROJ. NO: 1634C	