

ADDENDUM NO. 1

August 18, 2022

PART 1 - GENERAL

1.1 PROJECT –H59-6212-ML

- A. HGTC – UPGRADE AND REPLACE HVAC UNITS ON GEORGETOWN BUILDING 100

1.2 ENGINEER

- A. DWG Consulting Engineers, Inc.  
1009 Anna Knapp Blvd, Mt. Pleasant, SC 29464  
(843) 849-1141

1.3 RELATED DOCUMENTS

- A. This Addendum consists of 34 pages.
- B. To Prime Bidders of Record:
1. This addendum forms a part of the Contract Documents and modifies the original Project Manual and Drawings. Acknowledge receipt of this addendum on the Bid Form. Failure to do so may cause a bid to be rejected as unresponsive as outlined in the Instructions to Bidders.

PART 2 - ADDENDUM ITEMS

2.1 GENERAL

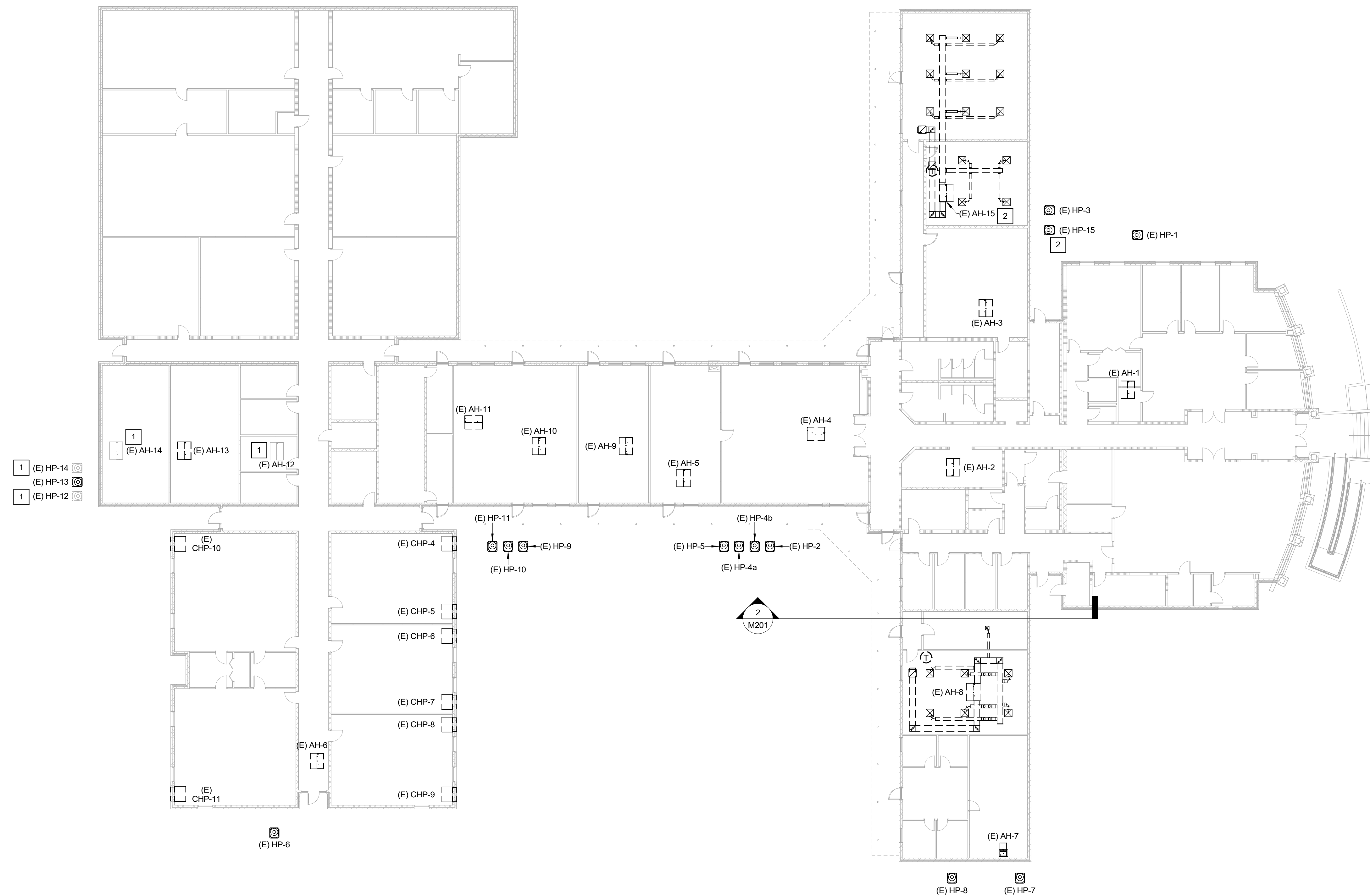
- A. The following changes/clarifications shall be made to the Georgetown Bldg. 100 drawings:
1. MD101, MD201, M101, M201 – General note added to protect existing interior finishes during demolition and renovation work.
  2. M101, M201 – Keynote added to patch and repair walls at packaged wall mounted unit installations.
  3. M101, M201 – Keynote added to insulate and seal soffit vents.
  4. M101 – Keynote added to call out encased and buried refrigerant lines under sidewalk concrete.
  5. E001 – Systems Symbols Legend has been added. General Fire Alarm Systems Notes have been revised.
  6. E002 – Sheet has been added to reflect the Partial Fire Alarm Riser Diagram detail.
  7. ED101 – Additional existing panelboards, existing fire alarm control equipment, and existing communications backboards have been added. General Note 2 has been added to address the demolition of existing duct mounted smoke detectors.
  8. ED301 – General Note 2 has been added to address the demolition of existing duct mounted smoke detectors.

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9. E101 – Additional existing panelboards, existing fire alarm control equipment, and existing communications backboards have been added. Existing circuits have been corrected and/or added for various HVAC equipment. Duct mounted smoke detectors and associated keynotes have been added to HVAC units “AH-4” and “AH-1”. General Notes 3 and 4 have been revised.
  10. E201 – General Note 3 and 4 have been revised.
  11. E301 – Existing circuits have been corrected and/or added for various HVAC equipment. Duct mounted smoke detectors and associated keynotes have been added to HVAC units “RTU-8”, ”ERV-9” and “RTU-11”.
- B. The following changes/clarifications shall be made to the Project Manual:
1. In Section 230900 INSTRUMENTATION AND CONTROL FOR HVAC, Manufacturer’s contact information shall be updated.
  2. In Section 260510 ELECTRICAL SUBMITTALS, fire alarm references have been added.
  3. In Section 260511 ELECTRICAL WORK CLOSEOUT, fire alarm references have been added.
  4. Section 280500 COMMON WORK RESULTS FOR SAFETY AND SECURITY has been added.
  5. Section 283111 DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM has been added.
- C. The following product substitutions shall be acceptable:
1. Subject to compliance with the contract documents, AIRSYS Focus IQ is an acceptable manufacturer to submit on wall mounted packaged heat pump units.

END OF ADDENDUM NO. 1



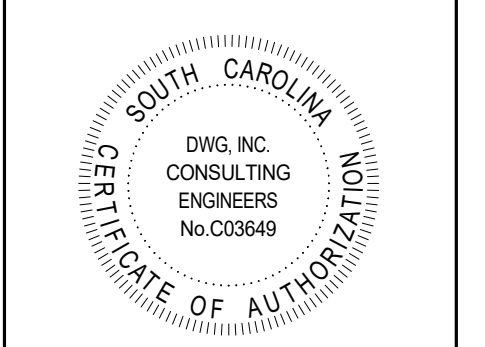
1 FIRST FLOOR HVAC DUCTWORK DEMO PLAN  
 MD101 SCALE: 1/16" = 1'-0"

KEYNOTES

- 1 EXISTING HVAC UNIT TO REMAIN IN SERVICE.
- 2 (E)AH-15 & (E)HP-15 SHALL BE TURNED OVER TO BUILDING OWNER.

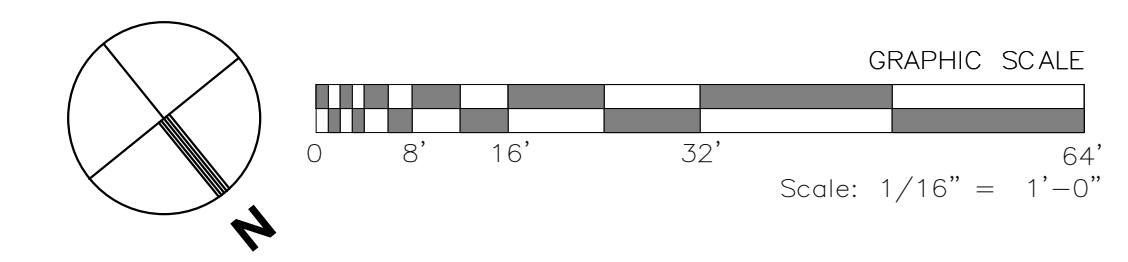
GENERAL NOTES

1. ALL REFRIGERANT SHALL BE CAPTURED FROM DEMOLISHED HVAC EQUIPMENT AND TURNED OVER TO BUILDING OWNER.
2. DEMOLISH EXISTING THERMOSTATS FOR HVAC EQUIPMENT BEING DEMOLISHED. CONTROL WIRING SHALL REMAIN TO BE REUSED FOR NEW THERMOSTAT IN RENOVATION.
3. DUCT ROUTING AND DIFFUSER LAYOUT ARE APPROXIMATE AND SHOWN FOR REFERENCE. FIELD VERIFY ROUTING AND DIFFUSER LOCATIONS. CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY CEILING TILES DAMAGED DURING DEMOLITION.
4. PERFORM AIRFLOW TEST OF OUTSIDE AIR PRIOR TO DEMOLITION OF HVAC EQUIPMENT.
5. PROTECT EXISTING INTERIOR FINISHES, INCLUDING FLOOR COVERING PROTECTION WHILE DEMOLITION / RENOVATION WORK IS ONGOING.

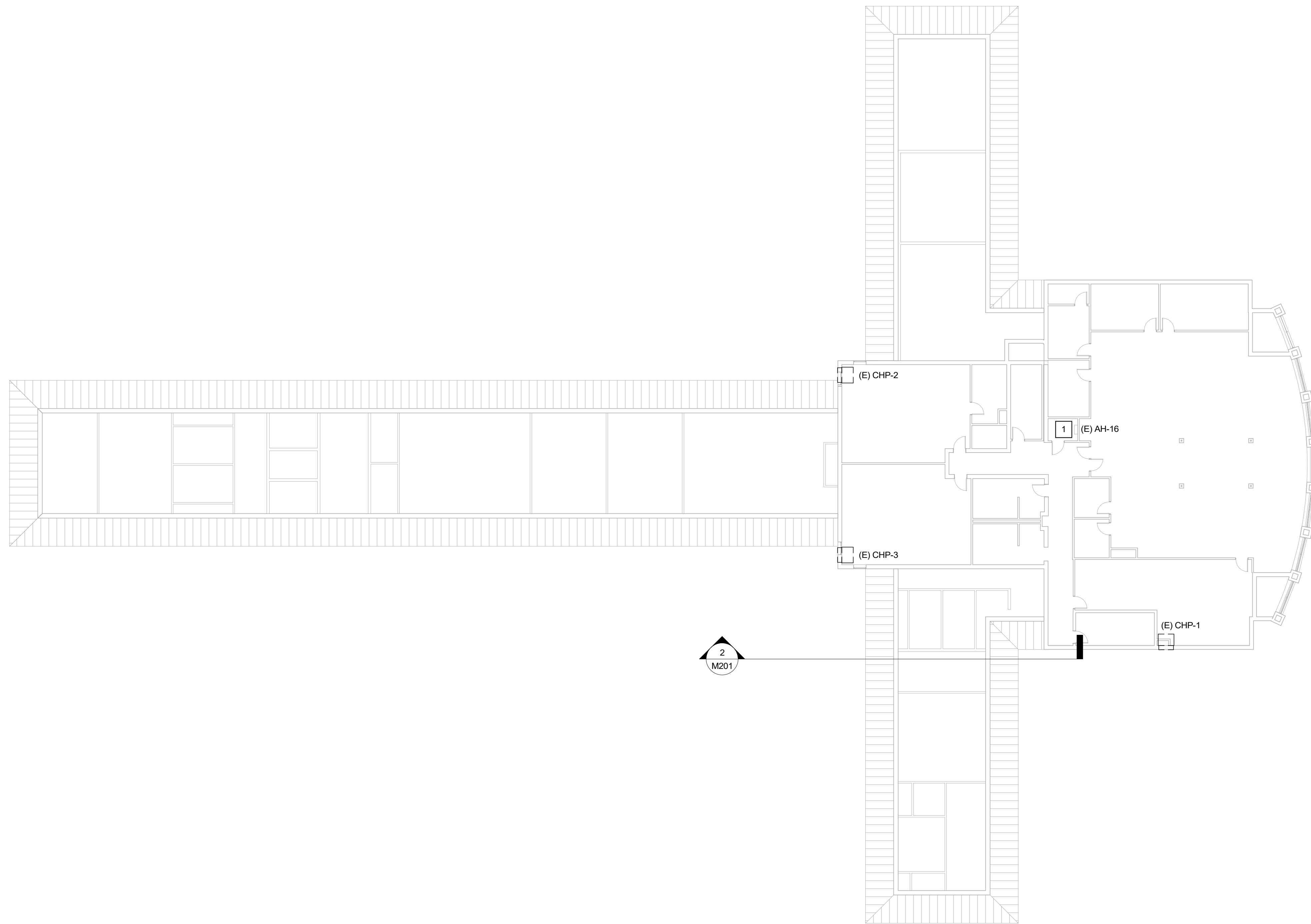


UPGRADE AND REPLACE HVAC UNITS ON GEORGETOWN  
 BUILDING 100  
 4003 SOUTH FRASER ST., GEORGETOWN, SC 29440  
 FIRST FLOOR MECHANICAL DEMOLITION PLAN

REV	
1	ADDENDUM #1 08/17/2022
JOB No.	H59-6212-ML
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DRAWN BY:	SJR
CHECKED BY:	WDB
SHEET	NUMBER



MD101



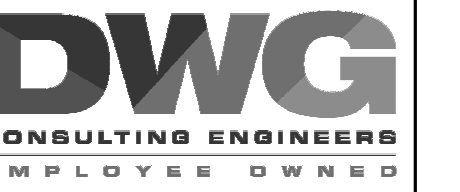
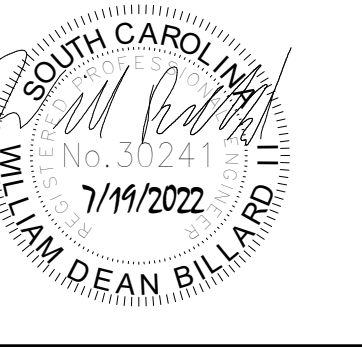
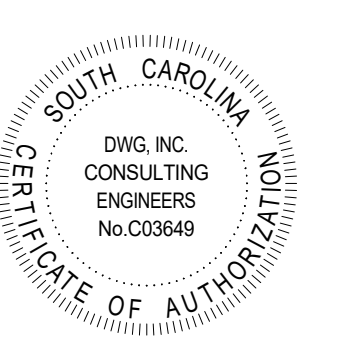
1 SECOND FLOOR MECHANICAL DEMOLITION PLAN  
MD201 SCALE: 1/16" = 1'-0"

KEYNOTES

- 1 EXISTING HVAC UNIT TO REMAIN IN SERVICE.

GENERAL NOTES

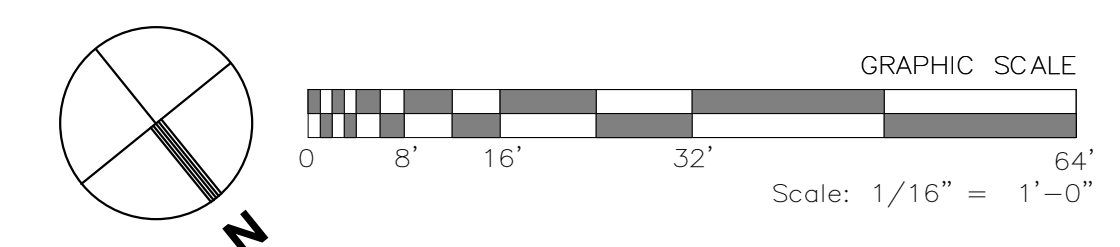
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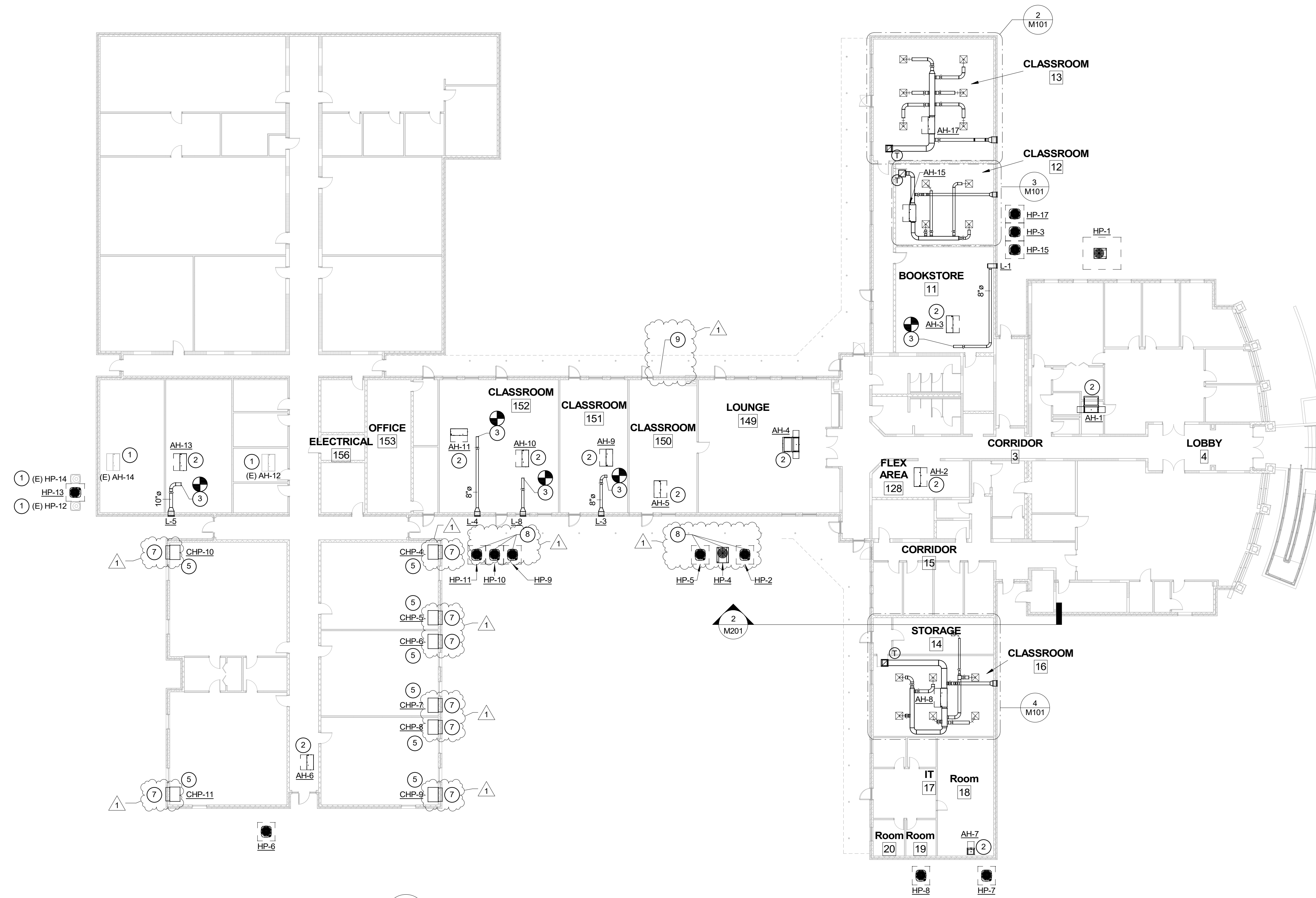


UPGRADE AND REPLACE HVAC UNITS ON GEORGETOWN  
BUILDING 100  
4003 SOUTH FRASER ST., GEORGETOWN, SC 29440  
SECOND FLOOR MECHANICAL DEMOLITION PLAN

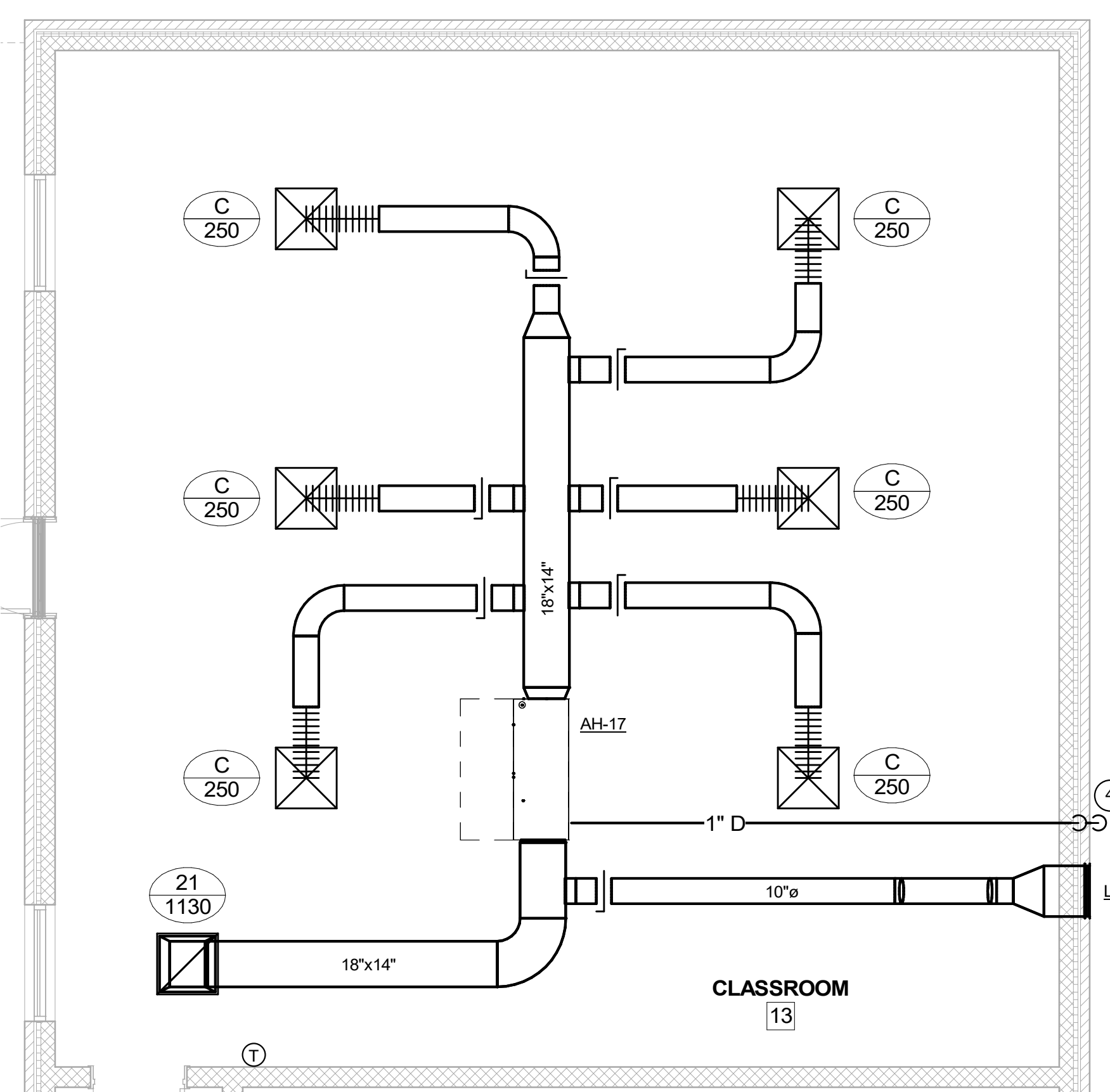
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MD201

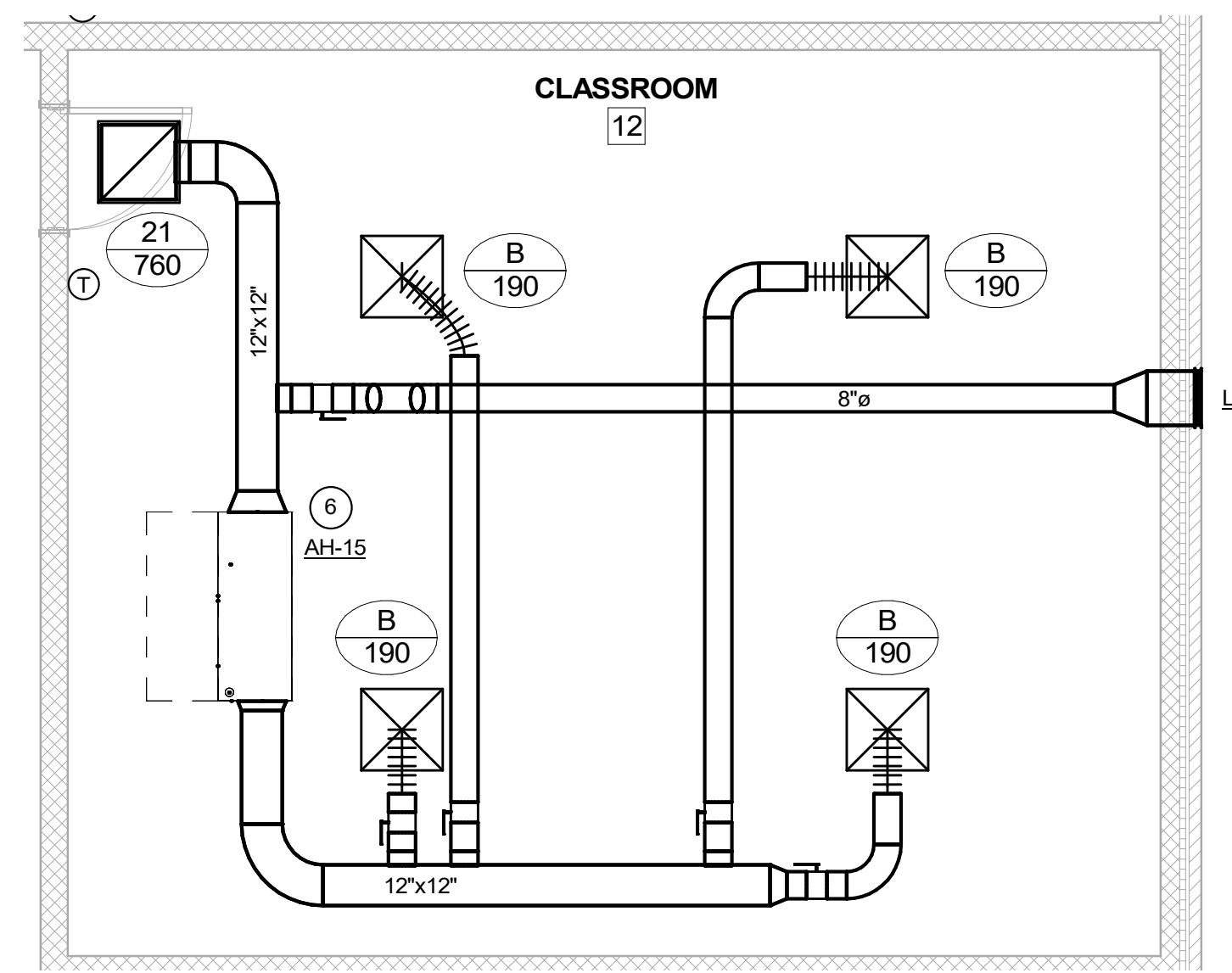




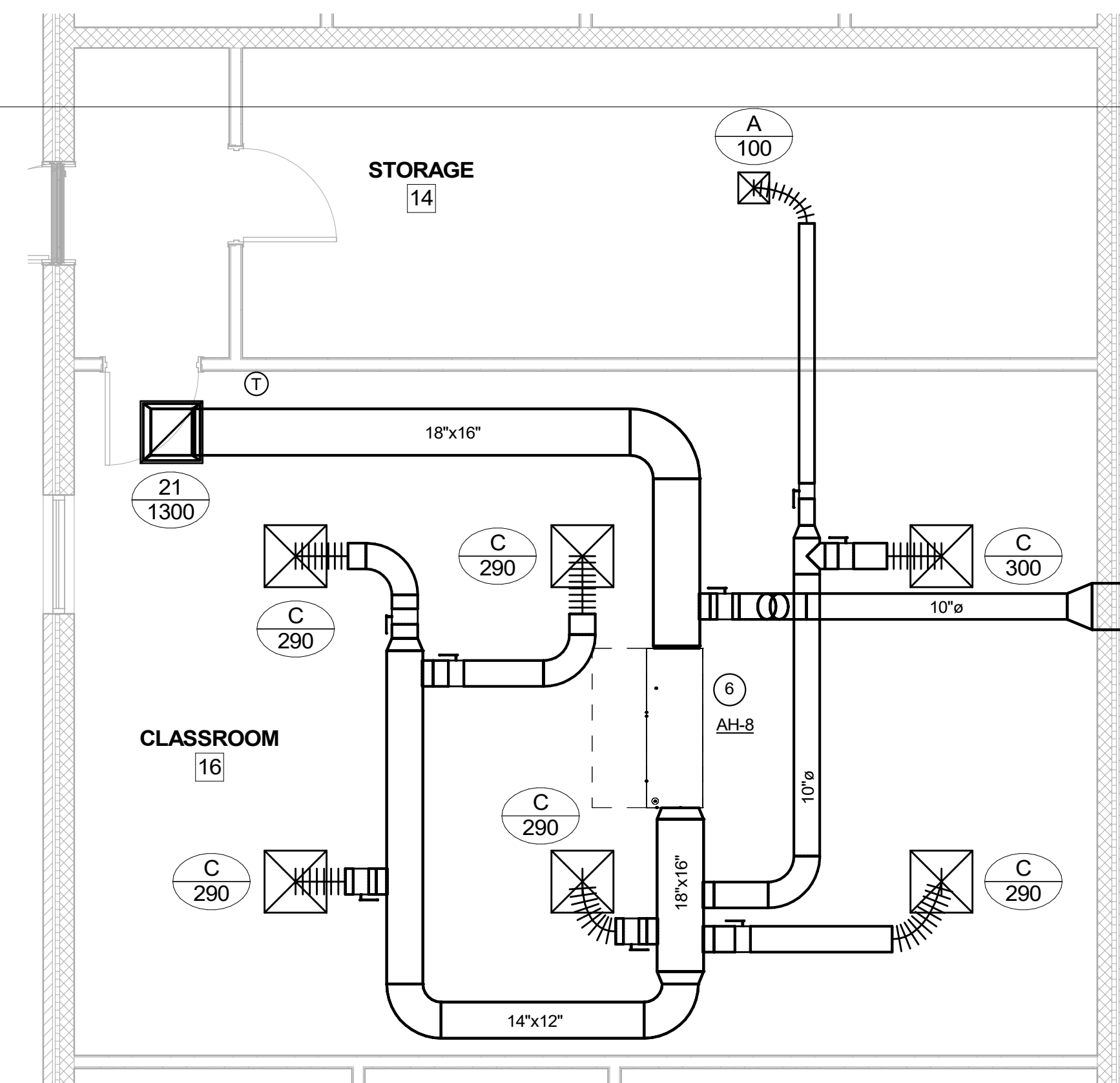
1 FIRST FLOOR HVAC DUCTWORK PLAN  
M101 SCALE: 1/16" = 1'-0"



2 FIRST FLOOR MECHANICAL RENOVATION PLAN - CALLOUT 2  
M101 SCALE: 1/4" = 1'-0"



3 FIRST FLOOR MECHANICAL RENOVATION PLAN - CALLOUT 3  
M101 SCALE: 1/4" = 1'-0"



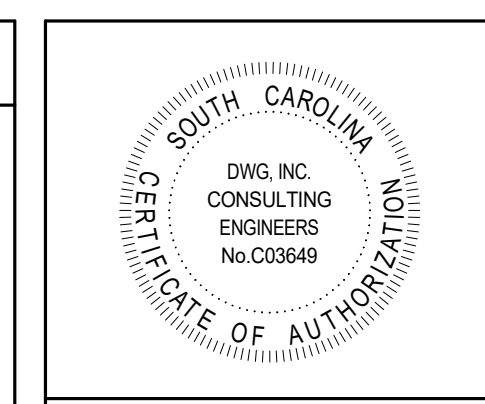
4 FIRST FLOOR MECHANICAL RENOVATION PLAN - CALLOUT 4  
M101 SCALE: 1/4" = 1'-0"

KEYNOTES

- 1 EXISTING HVAC UNIT TO REMAIN IN SERVICE.
- 2 RECONNECT TO EXISTING SUPPLY DUCT, RETURN DUCT, OUTSIDE AIR DUCT (IF APPLICABLE), AND CONDENSATE LINE.
- 3 CONNECT NEW OUTSIDE AIR DUCT TO EXISTING RETURN DUCT.
- 4 DROP TO CONDENSATE DRAIN PIT. REFER TO DETAIL.
- 5 ROUTE 1" CONDENSATE PIPE TO EXTERIOR.
- 6 RECONNECT TO EXISTING CONDENSATE LINE.
- 7 PATCH AND REPAIR INTERIOR AND EXTERIOR WALLS AT WALL MOUNTED PACKAGED UNIT. PAINT WALLS TO MATCH ADJACENT SURFACES.
- 8 REFRIGERANT LINES SHALL BE ROUTED UNDER SIDEWALK ENCASED IN 6" SCHEDULE 40 PVC CONDUIT WITH A MAXIMUM OF 45° ELBOWS. CONTRACTOR IS RESPONSIBLE FOR CUTTING AND PATCHING CONCRETE SIDEWALK, AND PATCHING AND REPAIRING INTERIOR WALL. PAINT WALL TO MATCH ADJACENT SURFACES.
- 9 INSULATE AND SEAL OFF THE BACK SIDE OF THE SOFFIT VENTS AROUND THE PERIMETER OF THE FIRST AND SECOND FLOOR BUILDING ROOF (APPROX. 75 TOTAL, FIELD VERIFY). REFERENCE 2/M201.

GENERAL NOTES

1. DUCT ROUTING AND DIFFUSER LAYOUT ARE APPROXIMATE. FIELD VERIFY ROUTING AND ALIGN DIFFUSERS TO CEILING GRID.
2. CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY CEILING TILES DAMAGED DURING RENOVATION.
3. NEW THERMOSTATS SHALL BE REPLACED IN THE SAME LOCATION AS EXISTING WITH NEW HVAC EQUIPMENT.
4. PROTECT EXISTING INTERIOR FINISHES, INCLUDING FLOOR COVERING PROTECTION, WHILE DEMOLITION / RENOVATION WORK IS ONGOING.

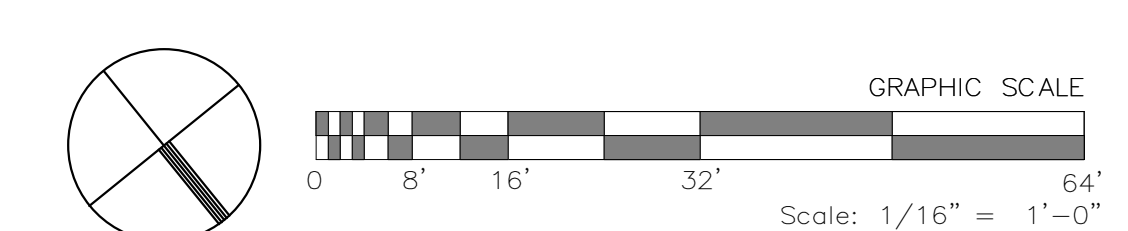


**DWG**  
CONSULTING ENGINEERS  
EMPLOYEE OWNED

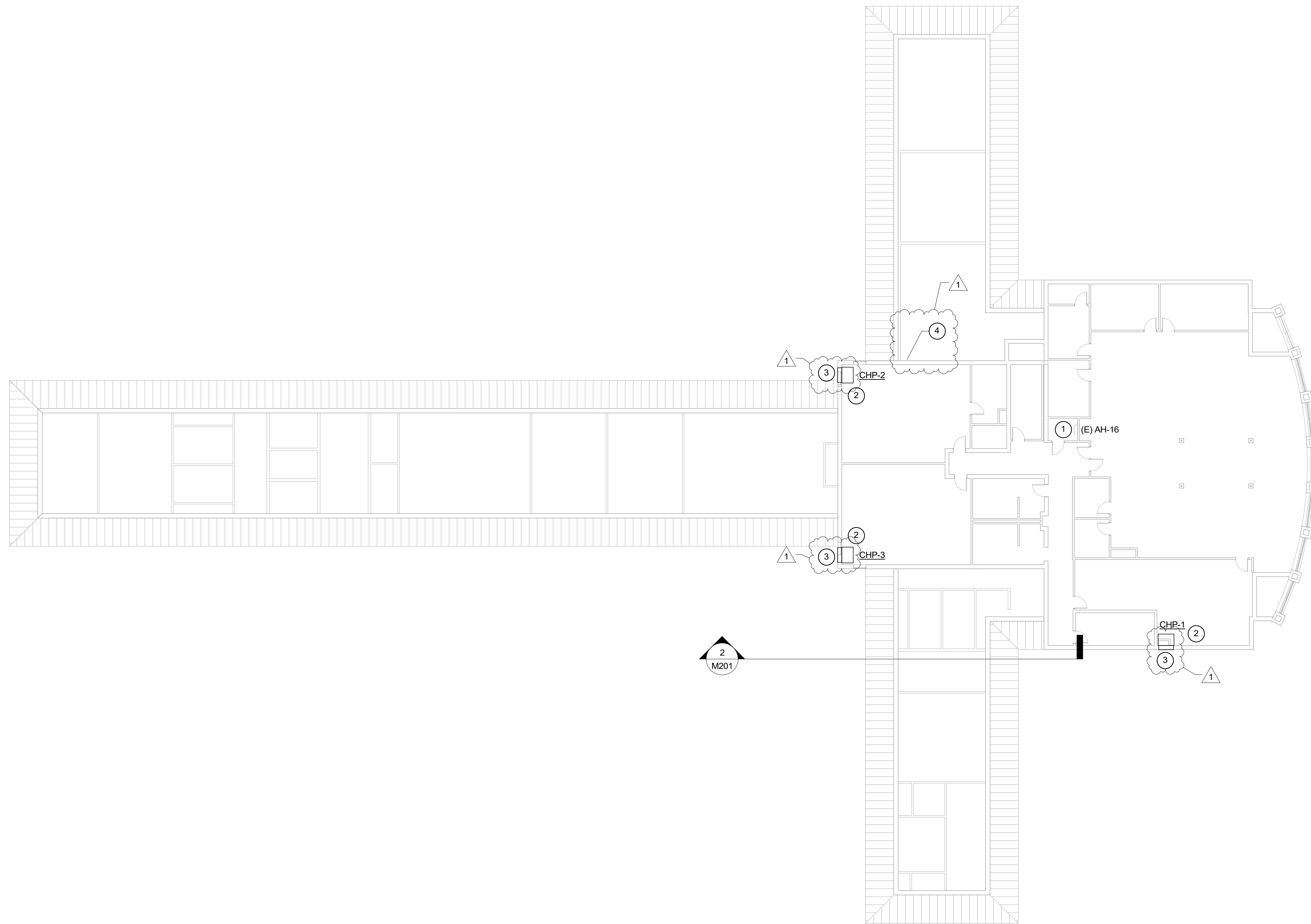
UPGRADE AND REPLACE HVAC UNITS ON GEORGETOWN  
 BUILDING 100  
 4003 SOUTH FRASER ST., GEORGETOWN, SC 29440  
 FIRST FLOOR MECHANICAL RENOVATION PLAN

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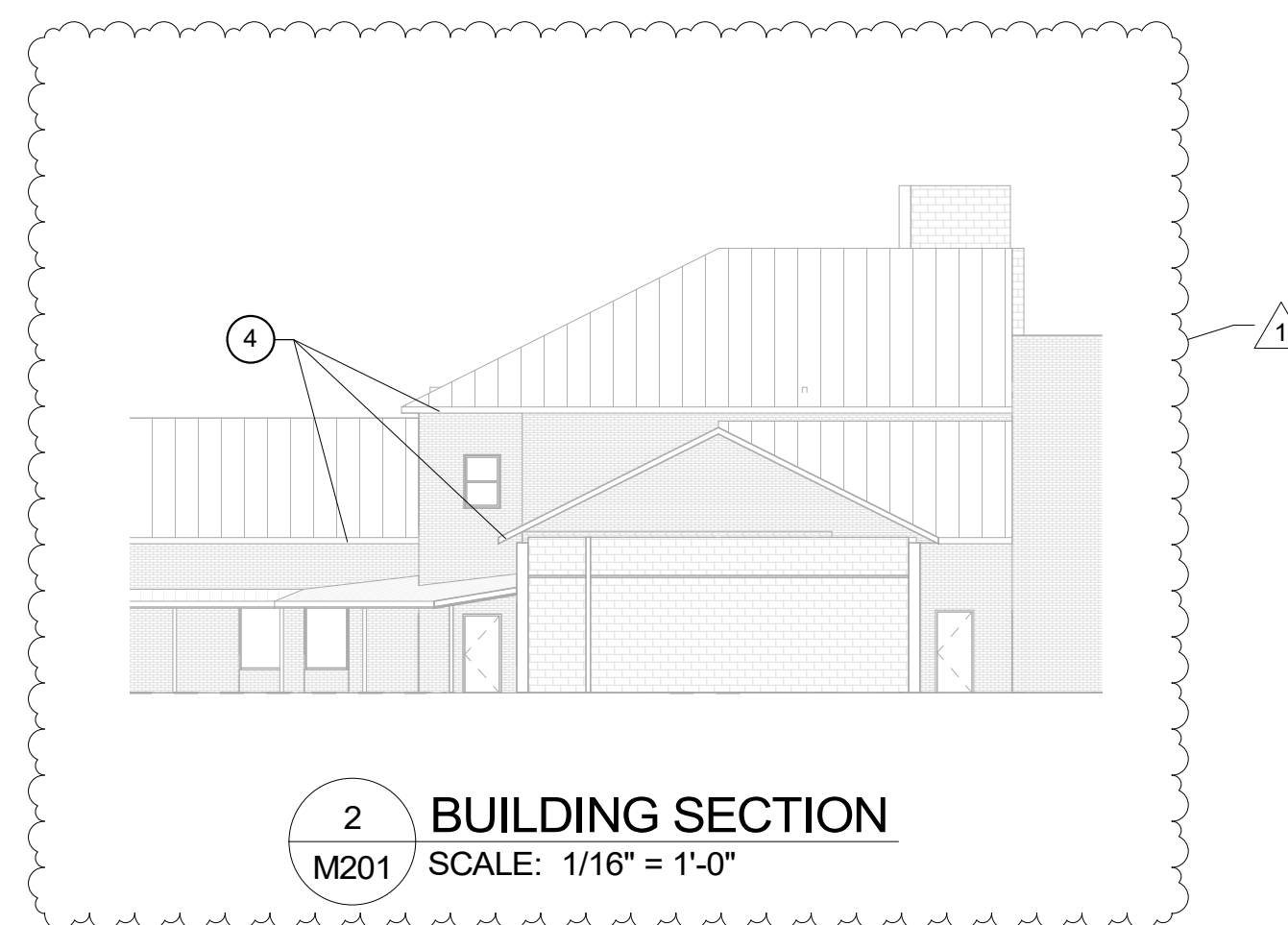
**M101**



PLOT DATE: 7/19/2022



1 SECOND FLOOR MECHANICAL RENOVATION PLAN  
M201 SCALE: 1/16" = 1'-0"



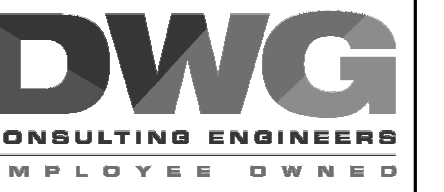
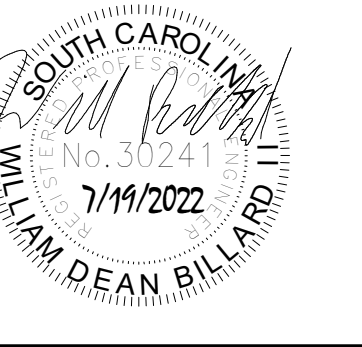
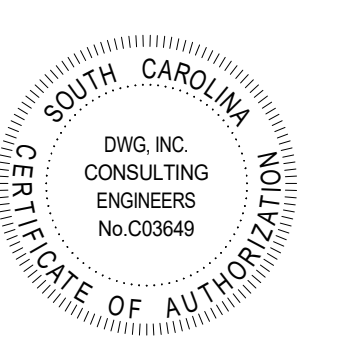
2 BUILDING SECTION  
M201 SCALE: 1/16" = 1'-0"

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- 4 INSULATE AND SEAL OFF THE BACK SIDE OF THE SOFFIT VENTS AROUND THE PERIMETER OF THE FIRST AND SECOND FLOOR BUILDING ROOF (APPROX. 75 TOTAL, FIELD VERIFY), REFERENCE 2/M201.

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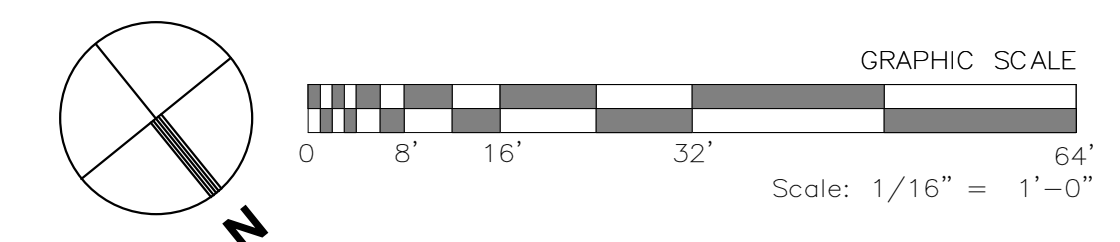
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SECOND FLOOR MECHANICAL RENOVATION PLAN

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M201



## ELECTRICAL SYSTEMS SEISMIC REQUIREMENTS PER IBC-2018/ASCE 7-16

- A. PER THE 2018 INTERNATIONAL BUILDING CODE, MECHANICAL, PLUMBING AND ELECTRICAL EQUIPMENT AND COMPONENTS, INCLUDING THEIR SUPPORTS AND ATTACHMENTS, SHALL BE DESIGNED FOR SEISMIC FORCES IN ACCORDANCE WITH CHAPTER 13 OF ASCE 7-16.
- B. EXTERIOR EQUIPMENT (INCLUDING ROOF CURBS, RAILS, SUPPORTS) EXPOSED TO WIND SHALL BE DESIGNED AND INSTALLED TO RESIST THE WIND PRESSURES DETERMINED IN ACCORDANCE WITH CHAPTER 26 TO 29 OF ASCE 7-16.
- C. WHERE DESIGN FOR SEISMIC AND WIND LOADS IS REQUIRED, THE MORE DEMANDING FORCE MUST BE USED.
- D. REFERENCE THE STRUCTURAL DRAWINGS FOR SITE SPECIFIC INFORMATION ON SEISMIC DESIGN CATEGORY, WIND SPEEDS, ETC.
- E. USE THE TABLE BELOW TO DETERMINE SEISMIC RESTRAINT REQUIREMENTS FOR EACH COMPONENT.
- F. FOR ALL COMPONENTS REQUIRING SEISMIC RESTRAINT, THE COMPONENT SUPPORTS AND ATTACHMENTS SHALL BE DESIGNED BY A REGISTERED DESIGN PROFESSIONAL REGISTERED IN THE STATE THE JOB IS LOCATED. SUBMITTALS MUST INCLUDE STAMPED AND SIGNED DRAWINGS AND CALCULATIONS.
- G. WHERE SEISMIC RESTRAINT IS REQUIRED, HOUSEKEEPING PADS NEEDED FOR THE INSTALLATION OF EQUIPMENT UNDER THIS CONTRACT MUST BE DESIGNED BY THE SEISMIC ENGINEER. DO NOT POUR ANY HOUSEKEEPING PADS PRIOR TO THE RECEIPT OF THE APPROVED SEISMIC SUBMITTAL.
- H. SEISMIC RESTRAINTS FOR DUCTWORK, PIPING, CONDUIT, CABLE TRAYS AND BUS DUCT MUST BE SHOWN ON LAYOUT DRAWINGS SHOWING SPECIFIC RESTRAINT LOCATIONS ALONG WITH ACCOMPANYING DETAILS AND CALCULATIONS.

### ELECTRICAL COMPONENT IMPORTANCE FACTOR (Ip) DESIGNATION

Ip = 1.0

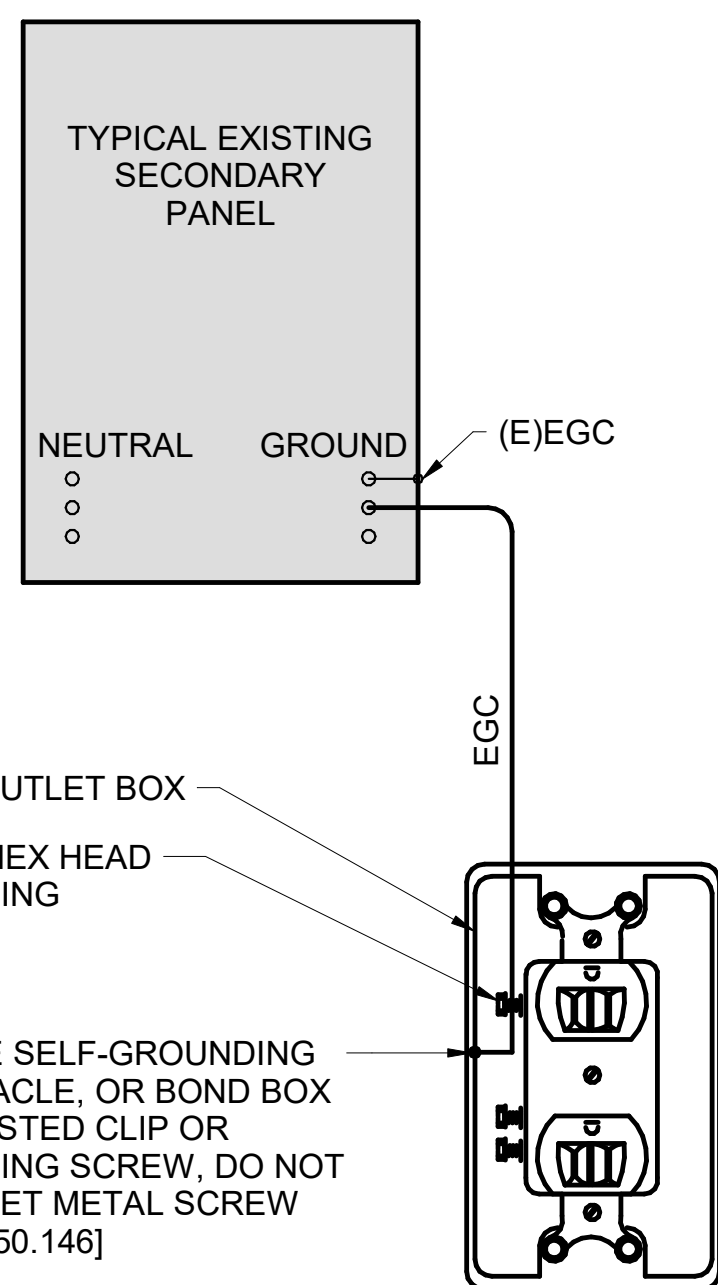
Ip = 1.5

- ALL ASSOCIATED ELECTRICAL WORK UNLESS NOTED OTHERWISE
- EMERGENCY LIGHTS
- EXIT LIGHTS
- FIRE ALARM

### SEISMIC DESIGN CATEGORIES D, E, F

COMPONENT IDENTIFICATION	SEISMIC RESTRAINT REQUIREMENT	COMPARTMENT IMPORTANCE FACTOR (Ip)		NOTES
		1.0	1.5	
ROOF MOUNTED	RESTRAIN ALL	1	RESTRAIN ALL	-
FLOOR MOUNTED	RESTRAIN ALL	1,2	RESTRAIN ALL	-
WALL MOUNTED	RESTRAIN ALL	1,2	RESTRAIN ALL	-
COMPONENT SUPPORTS	RESTRAIN ALL	1	RESTRAIN ALL	-
SUSPENDED EQUIPMENT	RESTRAIN ALL	1	RESTRAIN ALL	-
SINGLE CONDUIT	RESTRAIN IF > 2.5"	3	RESTRAIN IF > 2.5"	3
CABLE TRAY/BUS DUCT TRAPEZE CONDUIT	DO NOT DELETE ON TRAPEZE > 2.5". RESTRAIN IF TOTAL WEIGHT OF SUSPENDED COMPONENT > 10 LBS/FT	3	RESTRAIN IF ANY CONDUIT ON TRAPEZE > 2.5". RESTRAIN IF TOTAL WEIGHT OF SUSPENDED COMPONENT > 10 LBS/FT	3
COMPONENT CERTIFICATION	NOT REQUIRED	-	REQUIRED	5
PENDANT, LAY-IN AND CAN LIGHTS	REQUIRED	4	REQUIRED	4

- NOTES:**
- EQUIPMENT 20 LBS. OR LESS IS EXEMPT IF THE COMPONENT IS POSITIVELY ATTACHED TO THE STRUCTURE AND FLEXIBLE CONNECTIONS ARE PROVIDED BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING AND CONDUIT.
  - RESTRAINTS ARE NOT REQUIRED IF THE COMPONENT WEIGHS 400 LBS. OR LESS, IS MOUNTED WITH THE CENTER MASS AT 4' OR LESS ABOVE A FLOOR, IS POSITIVELY ATTACHED TO THE STRUCTURE, AND HAS FLEXIBLE CONNECTIONS BETWEEN THE COMPONENT AND ASSOCIATED DUCTWORK, PIPING AND CONDUIT.
  - RESTRAINT IS NOT REQUIRED IF THE CONDUIT IS SUPPORTED BY HANGERS AND EACH HANGER IN THE RUN IS 12" IN. OR LESS IN LENGTH FROM THE TOP OF THE PIPE TO THE SUPPORTING STRUCTURE. WHERE PIPES ARE SUPPORTED ON A TRAPEZE, THE TRAPEZE SHALL BE SUPPORTED BY HANGERS HAVING A LENGTH OF 12" IN. OR LESS. WHERE ROD HANGERS ARE USED, THEY SHALL BE EQUIPPED WITH SWIVELS, EYE NUTS OR OTHER DEVICES TO PREVENT BENDING IN THE ROD.
  - THE RESTRAINT OF PENDANT, LAY-IN AND CAN LIGHTS IS ADDRESSED IN ASTM C636 AND E580.
  - COMPONENT CERTIFICATION MUST BE SUPPLIED BY THE EQUIPMENT MANUFACTURER AT TIME OF SUBMITTAL FOR REVIEW BY ENGINEER OF RECORD.



GROUNDING LEGEND		
ABBR.	DESCRIPTION	SIZE
EGC	EQUIPMENT GROUNDING CONDUCTOR	*
*	SIZE PER TABLE 250.122.	

#### GROUNDING NOTES:

- NUMBERS IN BRACKETS REFER TO SPECIFIC SECTIONS OF THE NATIONAL ELECTRICAL CODE.
- ALL UNDERGROUND OR OTHERWISE INACCESSIBLE GROUND CONNECTIONS AND SPLICES SHALL BE EXOTHERMICALLY WELDED [250.68].
- GROUND ELECTRODE FOR SEPARATELY DERIVED SYSTEMS SHALL BE THE NEAREST METAL WATER PIPE OR STRUCTURAL METAL. IF EITHER IS NOT AVAILABLE, PROVIDE GROUNDING CONDUCTOR BACK TO MAIN GROUND BUS AT SERVICE ENTRANCE.
- PROVIDE A GROUND WIRE IN ALL CONDUITS.
- EARTH SHALL NOT BE USED AS THE SOLE GROUND RETURN PATH FOR ANY EQUIPMENT POWERED UNDER THIS PROJECT. OTHERWISE OVERCURRENT PROTECTION MIGHT NOT WORK, OR IT MIGHT CAUSE POWER QUALITY PROBLEMS.
- NO ALUMINUM SHALL BE USED FOR GROUNDING WORK WITHOUT THE SPECIFIC WRITTEN PERMISSION OF THE ENGINEER. EXCEPTION: ALUMINUM BUILDING STRUCTURAL MATERIALS SHALL BE BONDED WITH LISTED ALUMINUM EQUIPMENT WITH ALUMINUM TO COPPER CONNECTORS FOR ROUTING COPPER EGC'S.
- ALL METAL ENCLOSURES AND RACEWAYS SHALL BE BONDED TO GROUND [250.86]. FOR CIRCUITS OVER 250V PROVIDE BOND PER [250.97]. STANDARD LOCKNUTS ARE NOT ACCEPTABLE.
- PROVIDE EGC CONNECTED TO ANY JUNCTION BOX WHERE SPLICE IS MADE [250.148].
- PROVIDE BOND TO EXPOSED METAL ON ALL MOTORS, PUMPS, AND LIGHTING FIXTURES PER [250.112].

4  
E001

GROUNDING DETAIL  
NOT TO SCALE

### GENERAL ELECTRICAL NOTES

- BRANCH CIRCUIT WIRING FOR 20A CIRCUITS SHALL BE SIZED PER WIRE SIZING CHART. WHERE CONDUCTOR AND RACEWAY SIZE ARE SHOWN AT HOMERUN, SUCH SIZE SHALL BE USED FOR THE ENTIRE CIRCUIT. EXCEPTION: FINAL CONNECTION TO DEVICES IN OUTLET BOXES IS NOT REQUIRED TO BE LARGER THAN #12.
- RACEWAYS SHALL BE INSTALLED CONCEALED IN NEW WALL CONSTRUCTION. ABOVE CEILING, BELOW FLOOR AND IN OTHER CAVITIES TO THE GREATEST EXTENT POSSIBLE. EXPOSED RACEWAYS MAY BE USED IN UNFINISHED SPACES, WHERE EXPLICITLY NOTED ON PLANS AND WHERE APPROVED BY THE ARCHITECT AND ENGINEER. LAY OUT EXPOSED RACEWAYS TO MINIMIZE THE NUMBER OF VERTICAL RUNS.
- FEEDER CONDUITS AND BRANCH CIRCUITS ROUTING SHALL COMPLY WITH DETAILS ON DRAWINGS AND SHALL BE COORDINATED WITH THE WORK OF OTHER TRADES BEFORE ANY ELECTRICAL CONSTRUCTION. A FIRESTOP SYSTEM SHALL BE USED TO SEAL ALL PENETRATIONS OF ELECTRICAL CONDUITS AND CABLES THROUGH FIRE-RATED PARTITIONS. THE FIRESTOP SYSTEM SHALL CONSIST OF A FIRE-RATED CAULK TYPE SUBSTANCE AND HIGH TEMPERATURE FIBER INSULATION BY STI OR APPROVED EQUAL. ONLY METAL CONDUIT SHALL BE USED TO PENETRATE FIRE-RATED PARTITIONS. SEE ARCHITECTURAL DRAWINGS FOR ALL LOCATIONS OF FIRE-RATED WALLS.
- THE USE OF MC CABLE IS NOT ALLOWED, UNLESS NOTED OTHERWISE.
- PROVIDE A LISTED EXPANSION/DEFLECTION FITTING FOR ALL CONDUIT CROSSING EXPANSION JOINTS PER NEC 300.4.H. SEE ARCHITECTURAL DRAWINGS FOR LOCATIONS OF EXPANSION JOINTS.
- WHEREVER THE WORD "PROVIDE" IS USED ON THE ELECTRICAL DRAWINGS, IT SHALL BE INFERRED TO MEAN "FURNISH AND INSTALL", UNLESS NOTED OTHERWISE.
- REFER TO THE ARCHITECTURAL DRAWINGS FOR PROJECT PHASING.

### GENERAL DEMOLITION NOTES

- ALL ELECTRICAL EQUIPMENT TO BE REMOVED SHALL REMAIN THE PROPERTY OF THE OWNER. THE CONTRACTOR SHALL NOT DISPOSE OF ANY MATERIALS UNTIL RELEASED BY THE OWNER'S PROJECT MANAGER. MATERIALS THAT THE OWNER'S PROJECT MANAGER CHOOSES TO RETAIN SHALL BE DELIVERED BY THE CONTRACTOR TO A LOCATION DESIGNATED BY THE PROJECT MANAGER. ALL OTHER MATERIALS SHALL BE PROPERLY DISPOSED OF BY THE CONTRACTOR.

### GENERAL EXISTING CONDITION NOTES

- AREAS OF WORK EXIST FOR THIS PROJECT WHICH WERE NOT ACCESSIBLE OR HAD LIMITED ACCESS DURING DESIGN. AS SUCH, CONTRACTOR SHALL VERIFY ALL UTILITIES IN AREA OF WORK BEFORE DEMOLITION OF ANY SERVICE. ANY ELECTRICAL COMPONENTS NOT SHOWN SHALL BE IDENTIFIED AND THE ARCHITECT AND ENGINEER SHALL BE NOTIFIED AS SOON AS POSSIBLE. NO ELECTRICAL REWORK SHALL BE COMMENCED WITHOUT COORDINATION OF BOTH ARCHITECT AND ENGINEER. WHERE INFORMATION SHOWN ON THESE DRAWINGS CONFLICTS WITH VERIFIED FIELD CONDITIONS, IT SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT AND ENGINEER.
- IN AREAS WHERE THE EXISTING CEILINGS ARE NOT SLATED TO BE REPLACED, THE CONTRACTOR SHALL WORK THROUGH THE EXISTING CEILINGS (SEE ARCHITECTURAL REFLECTED CEILING PLAN FOR AREA OF WORK). THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING ANY DAMAGED TILE OR GRID THAT IS A RESULT OF THEIR WORK. ALL WORK PERFORMED ABOVE EXISTING CEILINGS SHALL BE PERFORMED AFTER HOURS AND SCHEDULED WITH THE OWNER IN ADVANCE.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLING A FIRESTOP SYSTEM IN ALL PENETRATIONS OF FIRE-RATED FLOORS AND WALLS CREATED BY THE REMOVAL OF EXISTING ELECTRICAL CONDUIT OR CABLES, AS WELL AS THOSE CREATED BY NEWLY INSTALLED CONDUITS AND SLEEVES.
- WHERE INSTALLATION REQUIRES CUTTING OR DRILLING OF THE EXISTING FLOOR SLAB, THE CONTRACTOR SHALL X-RAY THE EXISTING SLAB PRIOR TO WORK TO ENSURE THAT NO EXISTING UTILITIES OR STRUCTURAL ELEMENTS IN THE SLAB WILL BE COMPROMISED BY THE WORK. NOTIFY THE A/E OF ANY CONFLICTS THAT WILL REQUIRE RELOCATING THE PROPOSED SLAB WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REPAIR OF ANY DAMAGED UTILITIES OR STRUCTURAL ELEMENTS CAUSED BY THE SLAB DEMOLITION.
- SUPPORT ALL EXISTING CONDUITS AND JUNCTION BOXES ABOVE THE CEILING IN THE CONSTRUCTION AREA PER NEC.
- REMOVE ALL ABANDONED CONDUIT, WIRE AND CABLES ABOVE THE CEILING IN THE CONSTRUCTION AREA.
- PROVIDE JUNCTION BOX COVERS ON ALL EXISTING JUNCTION BOXES ABOVE THE CEILING IN THE CONSTRUCTION AREA.
- SUPPORT ALL EXISTING CABLES ABOVE THE CEILING IN THE CONSTRUCTION AREA.

### GENERAL HVAC CONTROLS CONDUIT NOTES

- PROVIDE CONDUIT FOR HVAC CONTROL CIRCUITS AS REQUIRED TO INTERCONNECT HVAC UNIT TO CONTROL CIRCUITS. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH MECHANICAL CONTRACTOR AND CONTROLS PROVIDER TO DETERMINE SCOPE OF CONDUITS REQUIRED FOR HVAC CONTROLS. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL REQUIRED CONDUIT. COORDINATE POINTS OF CONNECTION WITH DIVISION 23. PROVIDE PULL CORD IN ALL EMPTY CONDUITS. SEE MECHANICAL PLANS FOR EXACT LOCATIONS OF ALL HVAC EQUIPMENT (AHU, HP, CU, RTU, DUCT SMOKE DETECTORS, VAV, FCU, THERMOSTATS, ETC).
- THESE DOCUMENTS MAY NOT INCLUDE ENTIRE ELECTRICAL INFRASTRUCTURE REQUIRED TO SUPPORT THE BUILDING AUTOMATION SYSTEM. COORDINATE WITH BAS PROVIDER ON ALL NECESSARY INFRASTRUCTURE FOR A COMPLETE AND WORKING SYSTEM.

### GENERAL FIRE ALARM SYSTEM NOTES

- ALL HVAC UNITS ARE BEING REPLACED IN KIND AND IT IS ASSUMED EXISTING DUCT MOUNTED SMOKE DETECTORS ARE CURRENTLY INSTALLED IN ALL DUCTWORK WHERE REQUIRED BY UNIT CFM. ALL DUCT MOUNTED SMOKE DETECTORS ASSOCIATED WITH HVAC UNITS BEING REPLACED SHALL BE DEMOLISHED AND REPLACED.
- EXISTING FIRE ALARM SYSTEM SHALL BE RECERTIFIED UPON COMPLETION OF WORK.

### ELECTRICAL ABBREVIATIONS

ABBR.	DESCRIPTION
(E)	EXISTING
AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
BAS	BUILDING AUTOMATION SYSTEM
BFC	BELOW FINISHED CEILING
BFG	BELOW FINISHED GRADE
BOD	BOTTOM OF DEVICE
CBB	COMMUNICATIONS BACKBOARD
cd	CANDELA
CGB	COMMUNICATIONS GROUNDING BUSBAR
CLG	CEILING
ECB	ENCLOSED CIRCUIT BREAKER
EF	EXHAUST FAN
FACP	FIRE ALARM CONTROL PANEL
FCU	FAN COIL UNIT
FDS	FUSED DISCONNECT SWITCH
GBB	GROUND BUSBAR
GFCI	GROUND-FAULT CIRCUIT-INTERRUPTING
GFI	GROUND-FAULT INTERRUPTING
GP	GENERAL PURPOSE
HP	HEAT PUMP
ICP	IRRIGATION CONTROL PANEL
IG	ISOLATED GROUND
J-BOX	JUNCTION BOX
KW	KILOWATTS
MCGB	MAIN COMMUNICATIONS GROUNDING BUSBAR
NACP	NOTIFICATION APPLIANCE CIRCUIT PANEL
NEC	NATIONAL ELECTRICAL CODE
NFDS	NON-FUSED DISCONNECT SWITCH
OC	ON CENTER
RTU	ROOF TOP UNIT
UNO	UNLESS NOTED OTHERWISE
W	WITH
WP	WEATHERPROOF
XFMR	TRANSFORMER
CONTROL PANELS	DESCRIPTION
BMS	BUILDING MANAGEMENT (AUTOMATION) SYSTEM

POWER AND TELECOMMUNICATIONS SYMBOL LEGEND			
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
⊗ ×	JUNCTION BOX (WALL MOUNTED) *X* INDICATES JUNCTION BOX TYPE	■	PANELBOARD - BRANCH, SURFACE MOUNTED
⊙ ×	JUNCTION BOX (CEILING MOUNTED) *X* INDICATES JUNCTION BOX TYPE	■	PANELBOARD - BRANCH, FLUSH MOUNTED
□	DISCONNECT SWITCH (FUSIBLE OR NON-FUSIBLE)	⊠	TRANSFORMER
■	SWITCHBOARD		

SYSTEMS SYMBOL LEGEND			
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
⊠	CONTROL PANEL, *X* INDICATES TYPE	sd	SMOKE DETECTOR - DUCT MOUNTED

### ELECTRICAL CODES AND STANDARDS (WITH ALL SOUTH CAROLINA MODIFICATIONS)

CODE	DESCRIPTION
IBC (2018)	INTERNATIONAL BUILDING CODE
IECC (2009)	INTERNATIONAL ENERGY CONSERVATION CODE
IFC (2018)	INTERNATIONAL FIRE CODE
NFPA 70 (2017)	NATIONAL ELECTRICAL CODE
NFPA 72 (2016)	NATIONAL FIRE ALARM AND SIGNALING CODE

WIRE SIZING CHART 20 AMP BRANCH CIRCUITS		
DISTANCE, 120V	MINIMUM WIRE SIZE	
0 - 90 FEET	#12 AWG	
90 - 230 FEET	#10 AWG	
230 - 446 FEET	#8 AWG	
DISTANCE, 277V	MINIMUM WIRE SIZE	
0 - 209 FEET	#12 AWG	
209 - 533 FEET	#10 AWG	
533 - 1033 FEET	#8 AWG	

LINE LEGEND	
SYMBOL	DESCRIPTION
—	EXISTING TO REMAIN
—	NEW CONSTRUCTION
---	DEMOLISH

### EQUIPMENT CONNECTION SCHEDULE

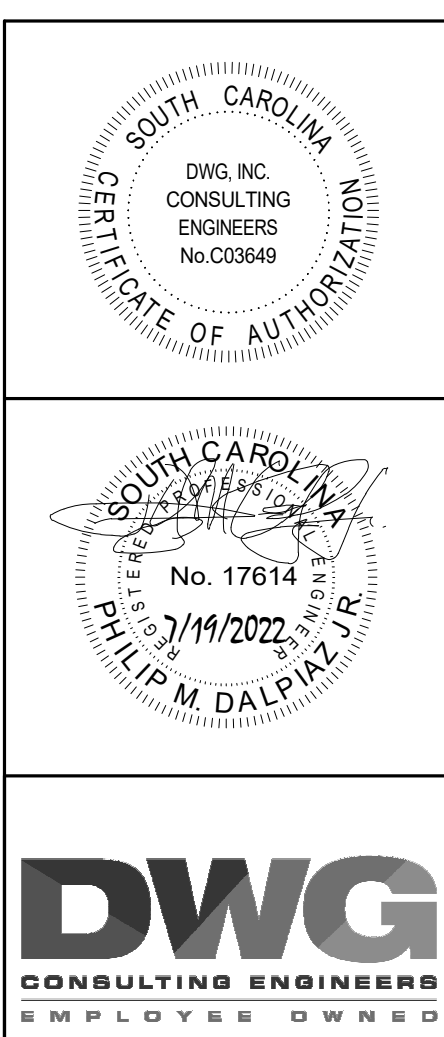
UNIT I.D.	VOLTS	# OF POLES	LOAD (VA)	BRANCH CIRCUIT WIRING	DISCONNECT / STARTER	CIRCUIT BREAKER
ERV						
ERV-9	208 V	3	7997	3#8, 1#10G, 3/4"C	NFDS 60/3/4X	35A
ERV-11	208 V	2	3744	2#10, 1#10G, 3/4"C	NFDS 30/2/4X	25A
RTU-8	208 V	3	28100	3#3, 1#8G, 1-1/4"C	NFDS 100/3/4X	100A
PHP						
CHP-1	208 V	3	17148	3#8, 1#10G, 3/4"C	NFDS 60/3/1	50A
CHP-2	208 V	3	17220	3#8, 1#10G, 3/4"C	NFDS 60/3/1	50A
CHP-3	208 V	3	17220	3#8, 1#10G, 3/4"C	NFDS 60/3/1	50A
CHP-4	208 V	3	12861	3#8, 1#10G, 3/4"C	NFDS 60/3/1	40A
CHP-5	208 V	3	12861	3#8, 1#10G, 3/4"C	NFDS 60/3/1	40A
CHP-6	208 V	3	12861	3#8, 1#10G, 3/4"C	NFDS 60/3/1	40A
CHP-7	208 V	3	12861	3#8, 1#10G, 3/4"C	NFDS 60/3/1	40A
CHP-8	208 V	3	12861	3#8, 1#10G, 3/4"C	NFDS 60/3/1	40A
CHP-9	208 V	3	12861	3#8, 1#10G, 3/4"C	NFDS 60/3/1	40A
CHP-10	208 V	3	17148	3#8, 1#10G, 3/4"C	NFDS 60/3/1	50A
CHP-11	208 V	3	17148	3#8, 1#10G, 3/4"C	NFDS 60/3/1	50A
ROOFTOP UNITS						
RTU-1	208 V	3	15491	3#8, 1#10G, 3/4"C	NFDS 60/3/4X	50A
RTU-2	208 V	3	15491	3#8, 1#10G, 3/4"C	NFDS 60/3/4X	50A
RTU-3	208 V	2	5408	3#10, 1#10G, 3/4"C	NFDS 30/2/4X	30A
RTU-4	208 V	2	5408	3#10, 1#10G, 3/4"C	NFDS 30/2/4X	30A
RTU-5	208 V	3	15491	3#8, 1#10G, 3/4"C	NFDS 60/3/4X	50A
RTU-6	208 V	3	15131	3#8, 1#10G, 3/4"C	NFDS 60/3/4X	50A
RTU-7	208 V	3	15131	3#8, 1#10G, 3/4"C	NFDS 60/3/4X	50A
RTU-11	208 V	3	30622	3#3, 1#8G, 1-1/4"C	NFDS 100/3/4X	100A
SPLIT SYSTEMS						
AH-1	208 V	3	13171	3#8, 1#10G, 3/4"C	NFDS 60/3/1	50A
AH-2	208 V	2	11024	2#6, 1#10G, 3/4"C	NFDS 60/2/1	60A
AH-3	208 V	2	5980	2#10, 1#10G, 3/4"C	NFDS 30/2/1	25A
AH-4	208 V	3	13171	3#8, 1#10G, 3/4"C	NFDS 60/3/1	50A
AH-5	208 V	2	6614	2#8, 1#10G, 3/4"C	NFDS 60/2/1	40A
AH-6	208 V	2	4180	2#10, 1#10G, 3/4"C	NFDS 30/2/1	25A
AH-7	208 V	2	7009	2#8, 1#10G, 3/4"C	NFDS 60/2/1	45A
AH-8	208 V	2	11024	2#6, 1#10G, 1"C	NFDS 60/2/1	60A
AH-9	208 V	2	3452	2#10, 1#10G, 3/4"C	NFDS 30/2/1	25A
AH-10	208 V	2	4180	2#10, 1#10G, 3/4"C	NFDS 30/2/1	25A
AH-11	208 V	2	4180	2#10, 1#10G, 3/4"C	NFDS 30/2/1	25A
AH-13	208 V	2	6614	2#8, 1#10G, 3/4"C	NFDS 60/2/1	40A
AH-15	208 V	2	3452	2#10, 1#10G, 3/4"C	NFDS 30/2/1	25A
AH-17	208 V	2	7508	2#8, 1#10G, 3/4"C	NFDS 60/2/1	45A
HP-1	208 V	3	18088	3#8, 1#10G, 3/4"C	NFDS 60/3/4X	50A
HP-2	208 V	3	7565	3#8, 1#10G, 3/4"C	NFDS 60/3/4X	35A
HP-3	208 V	2	2496	2#12, 1#12G, 3/4"C	NFDS 30/2/4X	20A
HP-4	208 V	3	11528	3#8, 1#10G, 3/4"C	NFDS 60/3/4X	40A
HP-5	208 V	2	3744	2#10, 1#10G, 3/4"C	NFDS 30/2/4X	30A
HP-6	208 V	2	2912	2#10, 1#10G, 3/4"C	NFDS 30/2/4X	25A
HP-7	208 V	2	4992	2#8, 1#10G, 3/4"C	NFDS 60/2/4X	40A
HP-8	208 V	3	7565	3#8, 1#10G, 3/4"C	NFDS 60/3/4X	35A
HP-9	208 V	2	2912	2#10, 1#10G, 3/4"C	NFDS 30/2/4X	25A
HP-10	208 V	2	3536	2#10, 1#10G, 3/4"C	NFDS 30/2/4X	25A
HP-11	208 V	2	3536	2#10, 1#10G, 3/4"C	NFDS 30/2/4X	25A
HP-13	208 V	2	3744	2#10, 1#10G, 3/4"C	NFDS 30/2/4X	30A
HP-15	208 V	2	2912	2#10, 1#10G, 3/4"C	NFDS 30/2/4X	25A
HP-17	208 V	2	4576	2#8, 1#10G, 3/4"C	NFDS 60/2/4X	35A

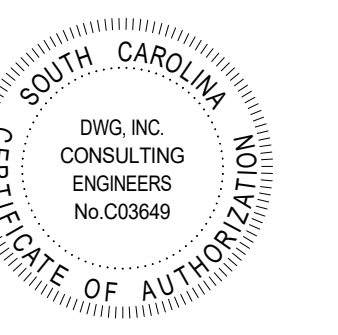
#### EQUIPMENT CONNECTION SCHEDULE GENERAL NOTES:

- ALL HVAC UNITS IN THIS SCHEDULE ARE INTENDED TO REPLACE THE EXISTING HVAC UNIT IN THE SAME LOCATION. EXISTING CONDUIT AND CONDUCTORS SHALL REMAIN AND BE EXTENDED IN KIND TO NEW DISCONNECT LOCATION. IF EXISTING CONDUCTOR/CONDUIT OR CIRCUIT BREAKER SIZES SHOWN ON THIS SCHEDULE DIFFER IN THE FIELD, NOTIFY ENGINEER FOR DIRECTION. REFER TO ADDITIONAL NOTES ON RENOVATION DRAWINGS.

#### EQUIPMENT CONNECTION SCHEDULE KEY NOTES:

- THIS AIR HANDLER REPLACES AN EXISTING 3 PHASE AIR HANDLER AND WILL REQUIRE A NEW CIRCUIT. DEMOLISH EXISTING CIRCUIT BACK TO SOURCE PANELBOARD AND PROVIDE NEW CIRCUIT.





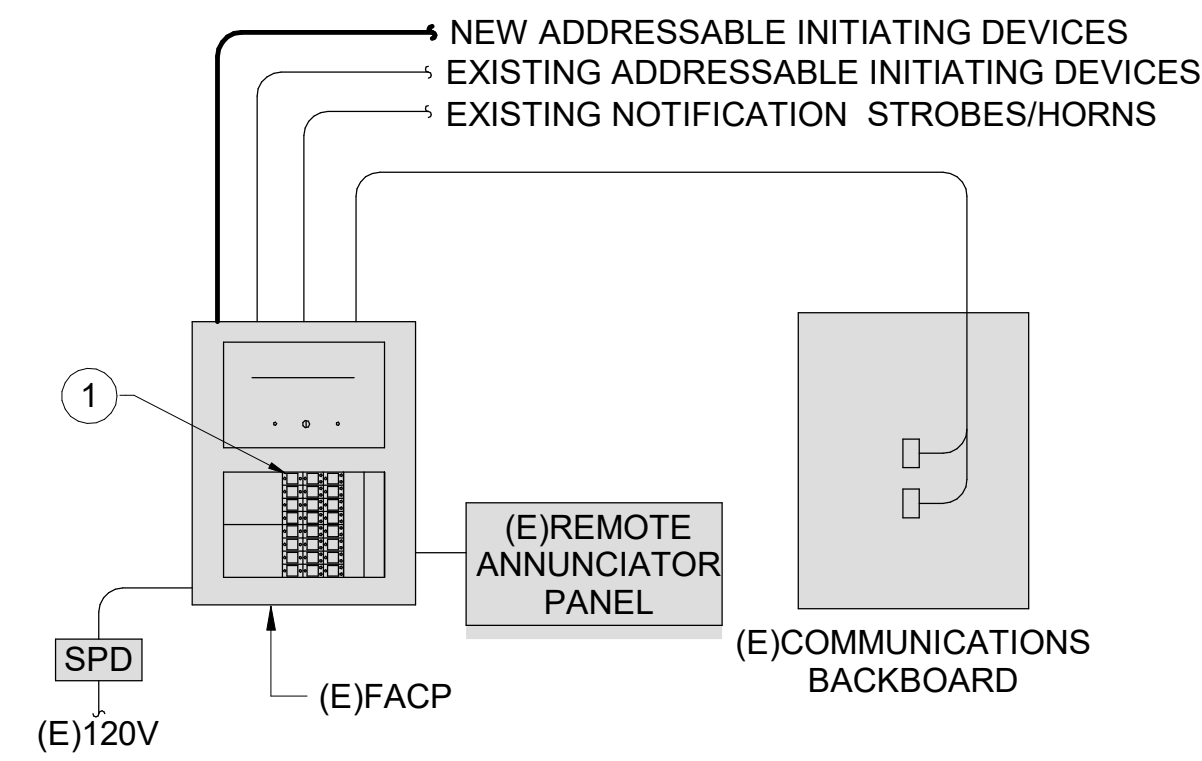
UPGRADE AND REPLACE HVAC UNITS ON GEORGETOWN  
 BUILDING 100  
 4003 SOUTH FRASER ST., GEORGETOWN, SC 29440  
 ELECTRICAL DETAILS

REV
1   ADDENDUM #1   08/17/2022
JOB No. H59-6212-ML
DATE: 7/19/2022
DRAWN BY: SPW
CHECKED BY: PMD
SHEET NUMBER

E002

**FIRE ALARM SINGLE-LINE NOTES**

- 1 PROVIDE ALL REQUIRED PROGRAMMING, MODIFICATIONS, SOFTWARE, AND HARDWARE AS REQUIRED AT THE EXISTING FIRE ALARM SYSTEM.

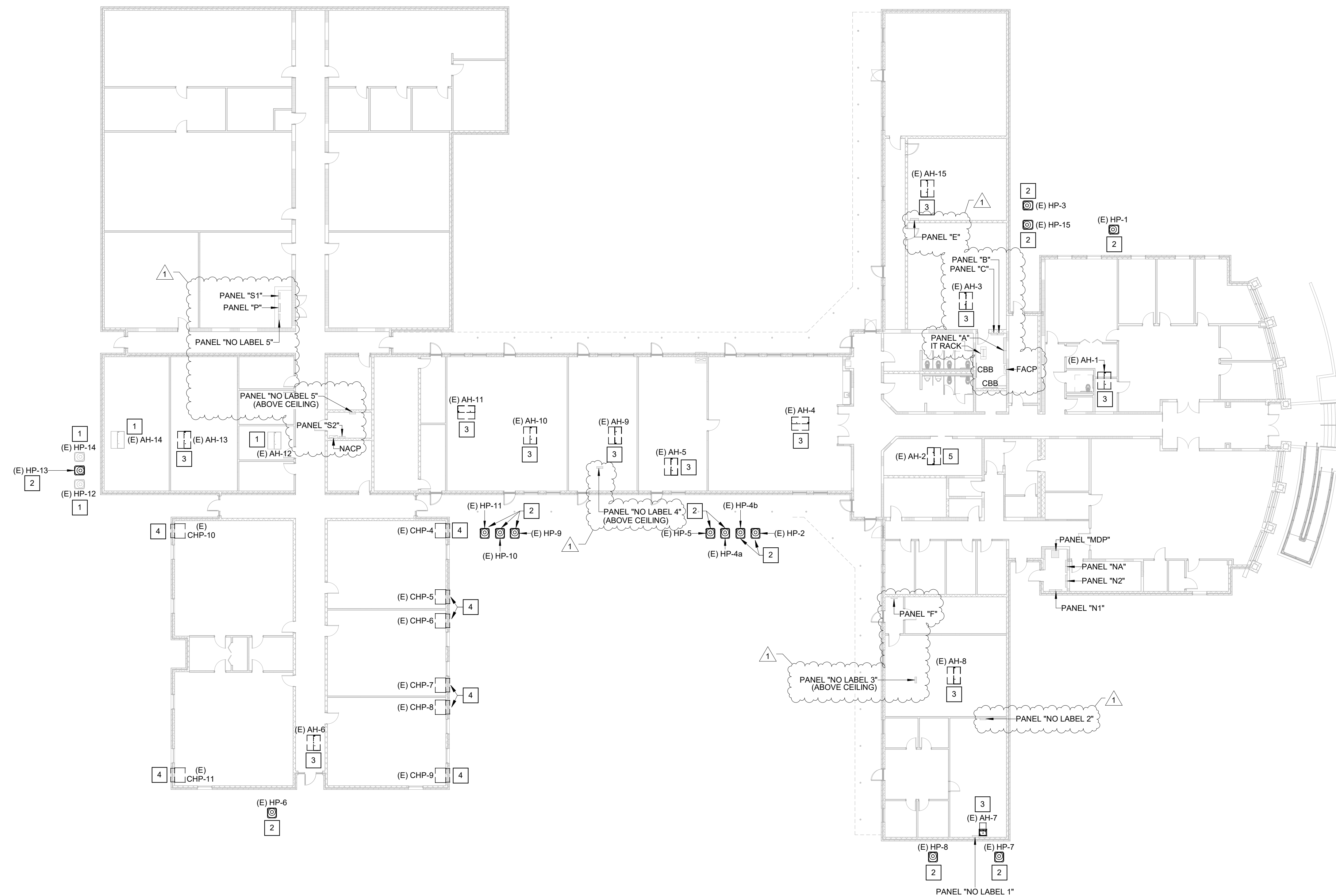


1 PARTIAL FIRE ALARM RISER DIAGRAM  
 E002 NOT TO SCALE

**FIRE ALARM SYSTEM GENERAL NOTES**

1. SEE FLOOR PLANS FOR INTENDED COVERAGE OF FIRE ALARM SYSTEM.
2. THE FOLLOWING SHALL OCCUR UPON ACTIVATION OF ANY INITIATING DEVICE:
  - A) SOUND ALL AUDIBLE DEVICES (CHIMES, HORNS, BELLS, ETC.) AND FLASH ALL VISUAL DEVICES (LIGHTS OR STROBES) THROUGHOUT THE ENTIRE FACILITY.
  - B) ALERT A CENTRAL STATION ALARM REPORTING SERVICE VIA DIGITAL COMMUNICATOR AND LEASED TELEPHONE LINES.
  - C) CLOSE ALL SMOKE DOORS THROUGHOUT THE FACILITY.
  - D) STOP OR START AHU'S OR FANS.
  - E) INDICATE BY ZONE WITH AUDIO/VISUAL SIGNAL AT FACP AND ALL REMOTE ANNUNCIATORS.
3. INITIATING DEVICES SHALL BE SMOKE DETECTORS, DUCT-MOUNTED SMOKE DETECTORS, HEAT DETECTORS, MANUAL PULL STATIONS, AND SPRINKLER FLOW SWITCHES.
4. UPON ACTIVATION OF ANY VALVE SUPERVISORY (TAMPER) SWITCH, A DISTINCT SIGNAL ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION SHALL BE SENT TO THE FACP. VISUAL PORTION OF SIGNAL SHALL BE CONTINUOUS. TONE DURATION SHALL BE 3 SECONDS.
5. SYSTEM TROUBLE (OPEN WIRING, SHORTED WIRING, OR GROUND FAULTS) SHALL BE ANNUNCIATED BOTH AUDIBLY AND VISUALLY AT THE FACP AND AT ALL ANNUNCIATORS.
6. ALL SYSTEM WIRING SHALL BE CLASS B, NO T-TAPPING IS PERMITTED.
7. PROVIDE BATTERY AND VOLTAGE DROP CALCULATIONS THAT INCLUDE ALL EXISTING AND NEW DEVICES AND APPLIANCES INSTALLED IN SYSTEM AND SUBMIT TO CONTRACTING OFFICER.
8. FIRE ALARM SYSTEM CONTROL EQUIPMENT, ALARM INITIATING DEVICES, POWER SOURCES, MUNICIPAL OR REMOTE STATION SIGNALING APPARATUS, SMOKE DOOR HOLD/RELEASE DEVICES, AND REMOTE ANNUNCIATION/CONTROL PANELS SHALL BE UNDERWRITER'S LABORATORIES LISTED FOR THE INSTALLED APPLICATION.
9. ALL FIRE ALARM CABLING SHALL BE IN RED EMT CONDUIT.

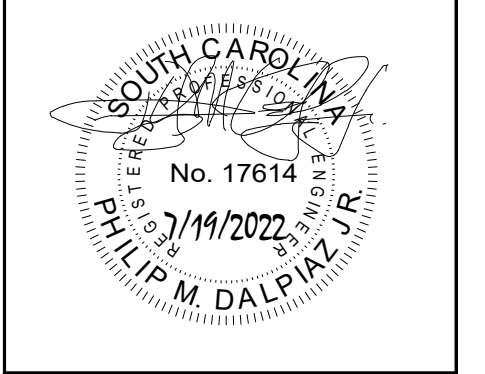
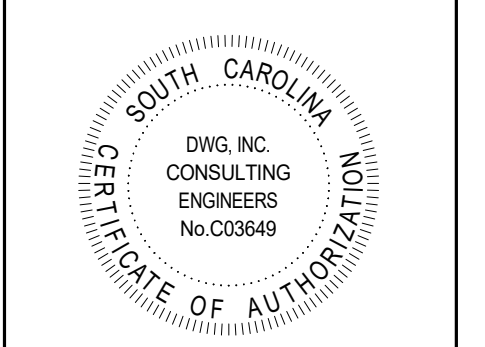




1 FIRST FLOOR ELECTRICAL DEMOLITION PLAN  
ED101 SCALE: 1/16" = 1'-0"

**KEYNOTES**

- 1 EXISTING HVAC UNIT SHALL REMAIN AND BE REUSED.
- 2 EXISTING HEAT PUMP AND ASSOCIATED DISCONNECT SWITCH SHALL BE DISCONNECTED AND REMOVED. EXISTING WIRING AND CONDUIT SHALL REMAIN FOR REUSE AND SUBSEQUENT RECONNECTION TO NEW HVAC EQUIPMENT.
- 3 EXISTING AIR HANDLER AND ASSOCIATED DISCONNECT SWITCH SHALL BE DISCONNECTED AND REMOVED. EXISTING WIRING AND CONDUIT SHALL REMAIN FOR REUSE AND SUBSEQUENT RECONNECTION TO NEW HVAC EQUIPMENT.
- 4 EXISTING PACKAGED WALL MOUNTED HEAT PUMP AND ASSOCIATED DISCONNECT SWITCH SHALL BE DISCONNECTED AND REMOVED. EXISTING WIRING AND CONDUIT SHALL REMAIN FOR REUSE AND SUBSEQUENT RECONNECTION TO NEW HVAC EQUIPMENT.
- 5 EXISTING AIR HANDLER AND ASSOCIATED DISCONNECT SWITCH SHALL BE DISCONNECTED AND REMOVED. PULL WIRING BACK TO SOURCE. EXISTING UNUSED CONDUIT MAY BE ABANDONED IN PLACE.



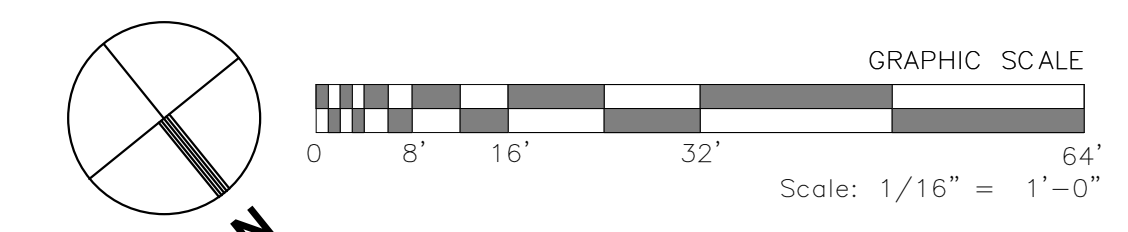
**DWG**  
CONSULTING ENGINEERS  
EMPLOYEE OWNED

**GENERAL NOTES**

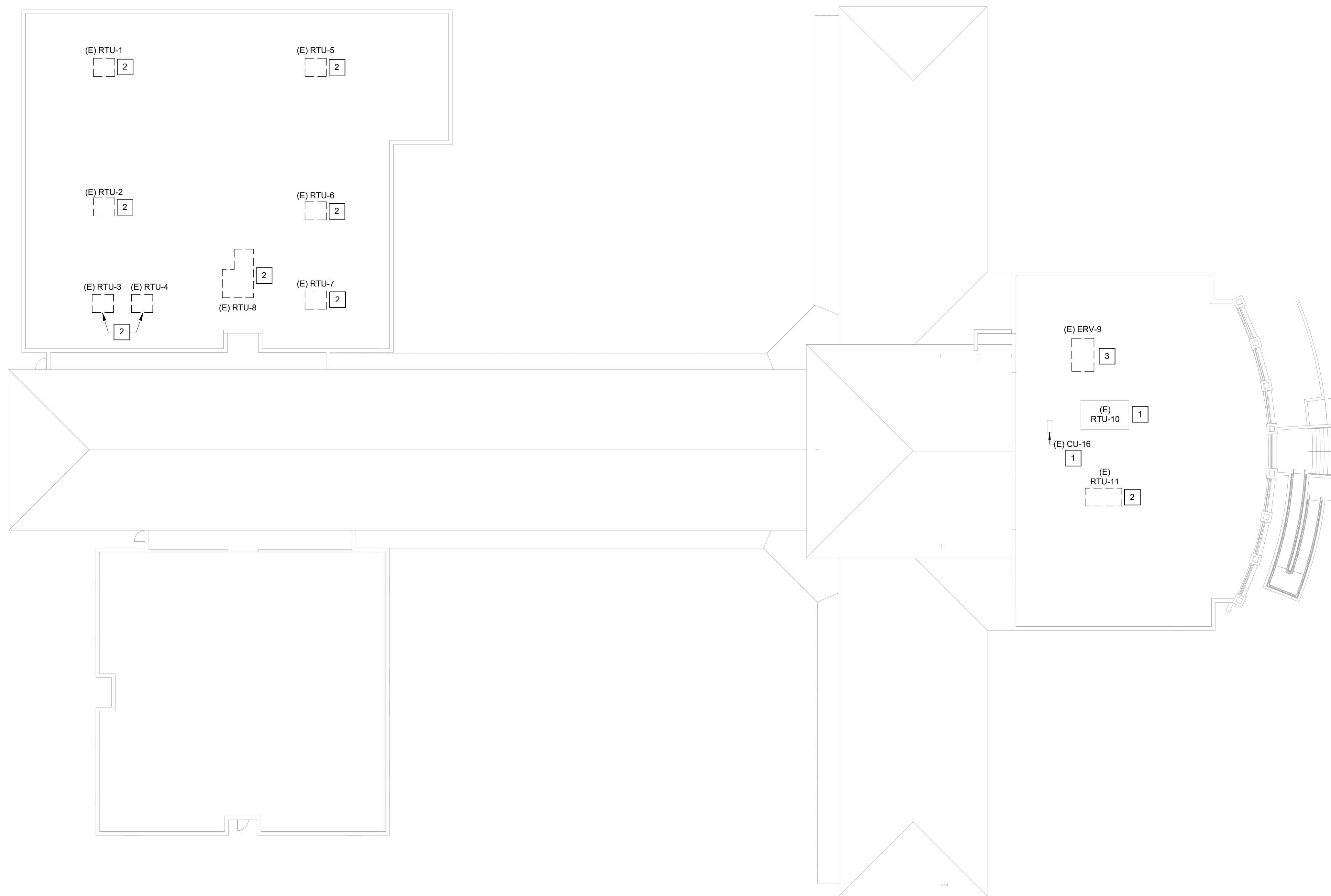
- 1. ALL EXISTING CONDITIONS SHOWN ARE BASED ON A COMBINATION OF AS-BUILT DRAWINGS AND SITE OBSERVATIONS AND SHALL BE VERIFIED WITH ACTUAL FIELD CONDITIONS.
- 2. DEMOLISH EXISTING DUCT MOUNTED SMOKE DETECTORS LOCATED IN DUCTWORK ASSOCIATED WITH HVAC UNITS BEING DEMOLISHED.

**UPGRADE AND REPLACE HVAC UNITS ON GEORGETOWN  
BUILDING 100  
4003 SOUTH FRASER ST., GEORGETOWN, SC 29440  
FIRST FLOOR ELECTRICAL DEMOLITION PLAN**

REV	
1	ADDENDUM #1 08/17/2022
JOB No.	HS9-6212-ML
DATE:	7/19/2022
DRAWN BY:	SPW
CHECKED BY:	PMD
SHEET	NUMBER



**ED101**



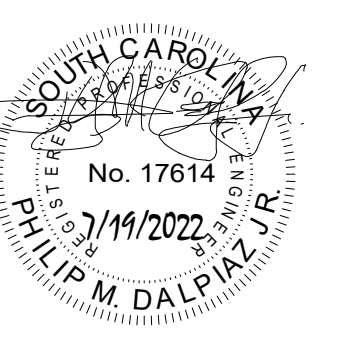
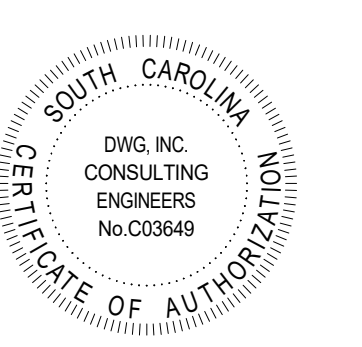
1 ROOF ELECTRICAL DEMOLITION PLAN  
ED301 SCALE: 1/16" = 1'-0"

KEYNOTES

- 1 EXISTING HVAC UNIT SHALL REMAIN AND BE REUSED.
- 2 EXISTING ROOFTOP UNIT AND ASSOCIATED DISCONNECT SWITCH SHALL BE DISCONNECTED AND REMOVED. EXISTING WIRING AND CONDUIT SHALL REMAIN FOR REUSE AND SUBSEQUENT RECONNECTION TO NEW HVAC EQUIPMENT.
- 3 EXISTING ERV AND ASSOCIATED DISCONNECT SWITCH SHALL BE DISCONNECTED AND REMOVED. EXISTING WIRING AND CONDUIT SHALL REMAIN FOR REUSE AND SUBSEQUENT RECONNECTION TO NEW HVAC EQUIPMENT.

GENERAL NOTES

- 1. ALL EXISTING CONDITIONS SHOWN ARE BASED ON A COMBINATION OF AS-BUILT DRAWINGS AND SITE OBSERVATIONS AND SHALL BE VERIFIED WITH ACTUAL FIELD CONDITIONS.
- 2. DEMOLISH EXISTING DUCT MOUNTED SMOKE DETECTORS LOCATED IN DUCTWORK ASSOCIATED WITH HVAC UNITS BEING DEMOLISHED.

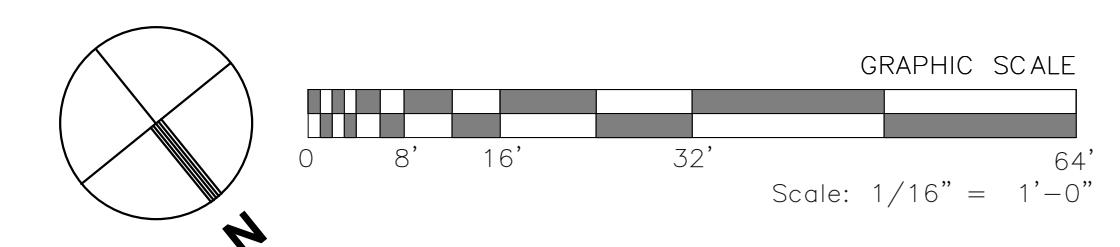


**DWG**  
CONSULTING ENGINEERS  
EMPLOYEE OWNED

UPGRADE AND REPLACE HVAC UNITS ON GEORGETOWN  
BUILDING 100  
4003 SOUTH FRASER ST., GEORGETOWN, SC 29440  
ROOF ELECTRICAL DEMOLITION PLAN

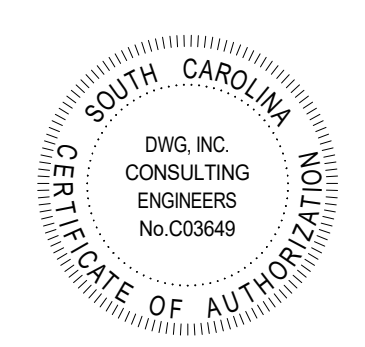
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JOB No.	H59-6212-ML
DATE:	7/19/2022
DRAWN BY:	SPW
CHECKED BY:	PMD
SHEET	NUMBER

ED301

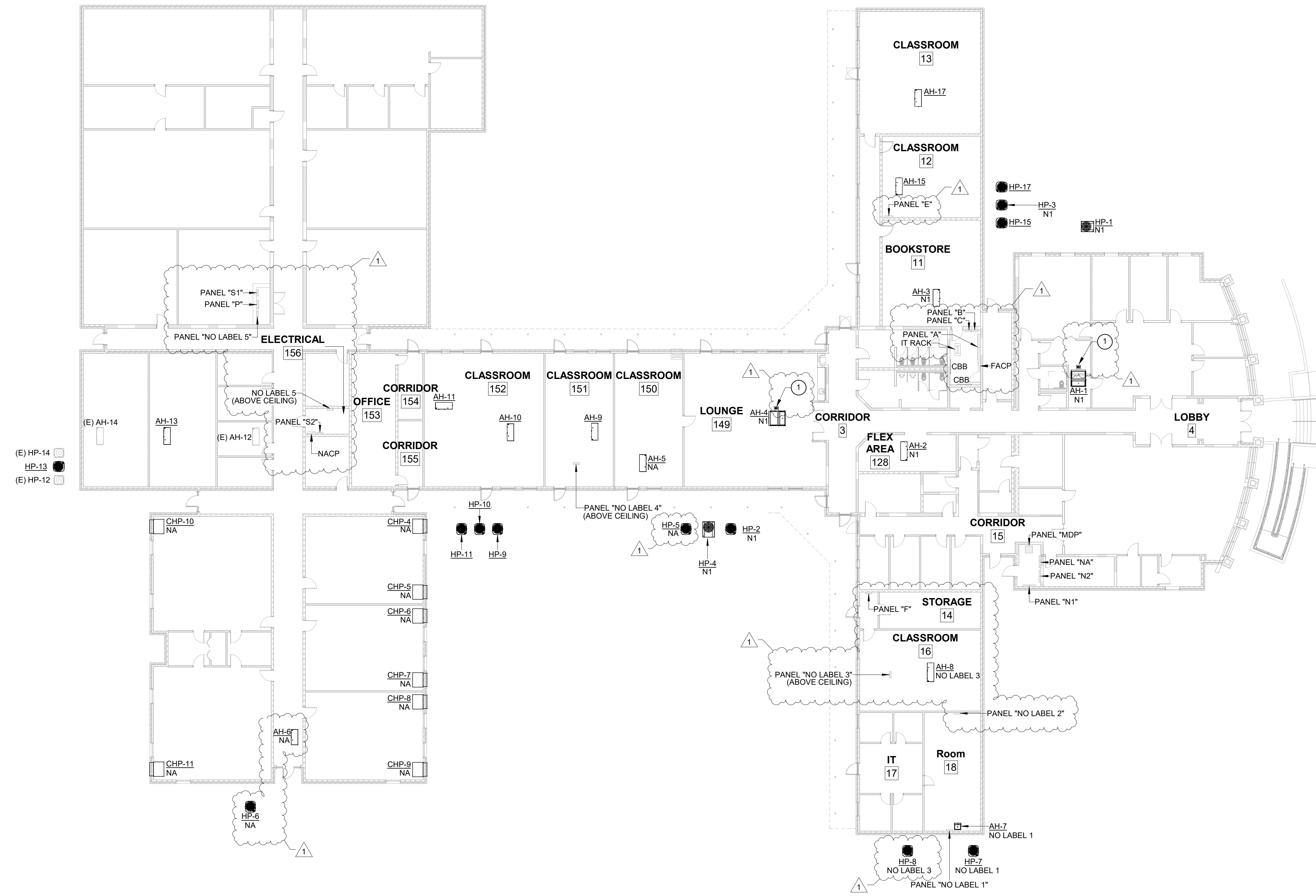


**KEYNOTES**

- ① DUCT MOUNTED SMOKE DETECTORS SHALL BE INSTALLED IN RETURN AIR DUCTS OF ASSOCIATED OF HVAC UNITS, COORDINATE EXACT LOCATION WITH MECHANICAL.



**DWG**  
CONSULTING ENGINEERS  
EMPLOYEE OWNED



- (E) HP-14
- HP-13
- (E) HP-12

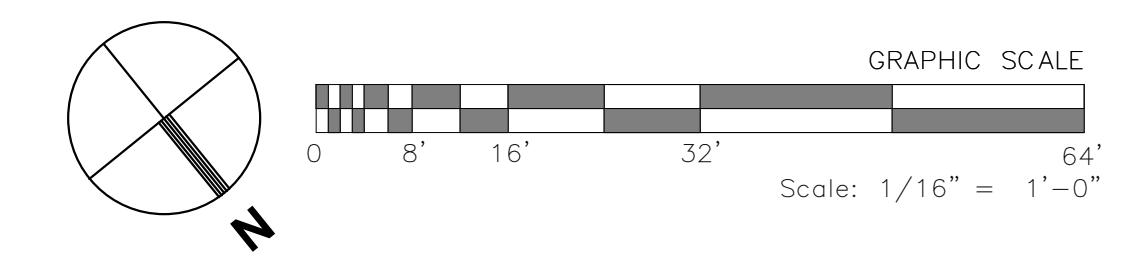
**1 FIRST FLOOR ELECTRICAL RENOVATION PLAN**  
E101 SCALE: 1/16" = 1'-0"

**GENERAL NOTES**

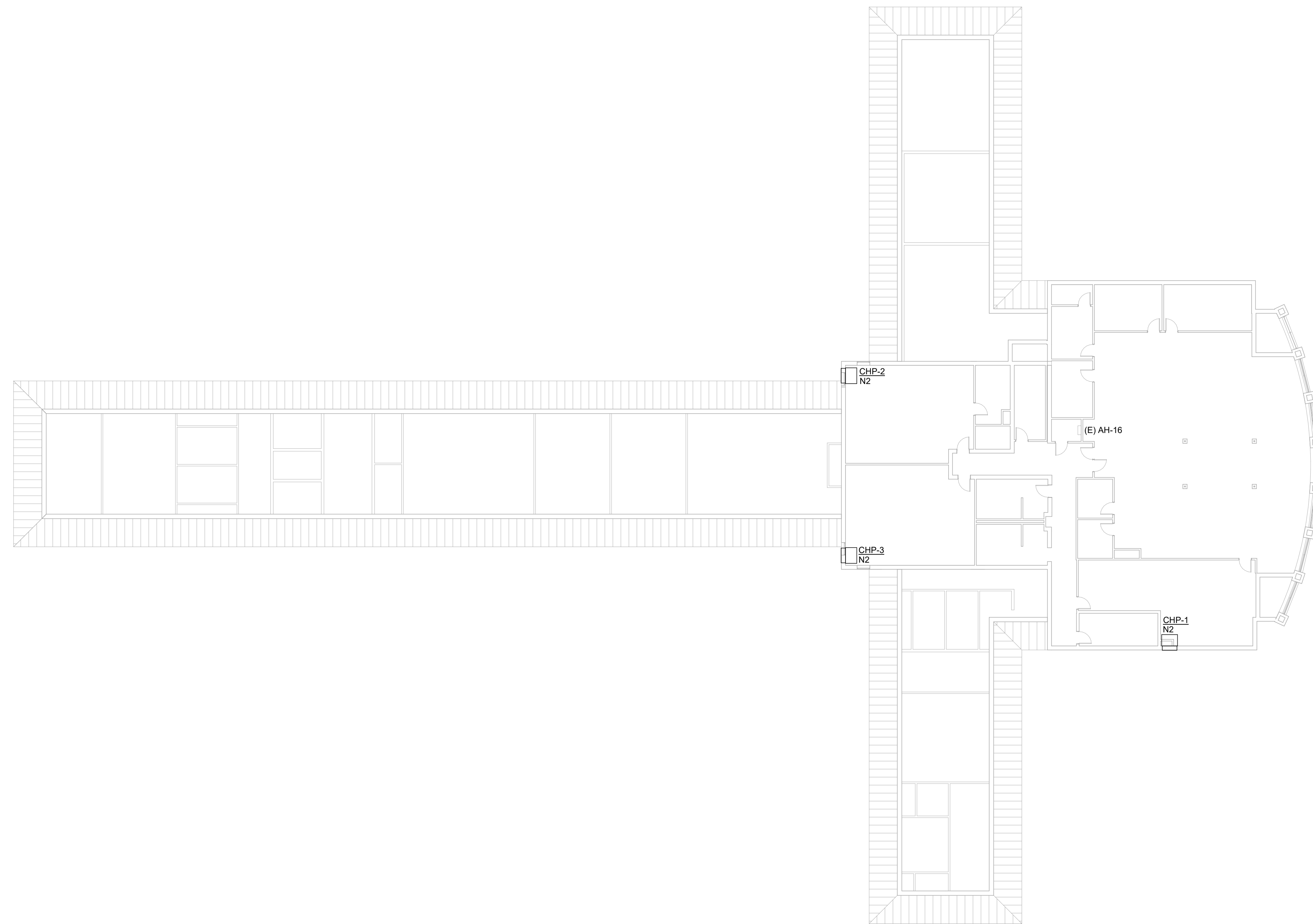
- ALL EXISTING CONDITIONS SHOWN ARE BASED ON A COMBINATION OF AS-BUILT DRAWINGS AND SITE OBSERVATIONS AND SHALL BE VERIFIED WITH ACTUAL FIELD CONDITIONS. CONTRACTOR SHALL MAKE MINOR MODIFICATIONS SUCH AS LOCATION AS REQUIRED BY ACTUAL FIELD CONDITIONS. ANY MAJOR DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO PROCEEDING WITH WORK.
- CONTRACTOR SHALL LOCATE SOURCE OF EXISTING CIRCUITS FEEDING ALL HVAC UNITS SHOWN. VERIFY EXISTING CONDUIT AND CONDUCTORS ARE OF ADEQUATE SIZE TO FEED NEW HVAC UNITS. IN THE EVENT THAT LARGER CONDUIT/CONDUCTOR SIZES ARE REQUIRED, ROUTE NEW CIRCUIT TO HVAC UNIT LOCATION FROM SOURCE PANELBOARD AND REPLACE EXISTING CIRCUIT BREAKER IN EXISTING PANELBOARDS FEEDING THESE UNITS PER THE EQUIPMENT CONNECTION SCHEDULE.
- WHERE KNOWN, PANELBOARD DESIGNATIONS THAT SERVED DEMOLISHED HVAC UNITS ARE PROVIDED ADJACENT TO NEW EQUIPMENT ANNOTATIONS. VERIFY ACTUAL PANELBOARD ORIGIN AND CIRCUIT BREAKER LOCATION WITHIN PANELBOARD WITH ACTUAL FIELD CONDITIONS. WHERE NO PANELBOARD DESIGNATIONS ARE SHOWN, CONTRACTOR SHALL LOCATE SOURCE PER NOTE 2.
- ALL PANELBOARDS AND FIRE ALARM CONTROLS SHOWN ARE EXISTING.
- FIELD MODIFICATIONS TO EXISTING PANEL SCHEDULES HAVE MADE IT DIFFICULT TO VERIFY WITH CERTAINTY WHICH HVAC UNIT IS SERVED FROM WHICH CIRCUIT BREAKER IN ALL PANELBOARDS. CONTRACTOR SHALL TEST EACH CIRCUIT SERVING HVAC UNITS BEING REPLACED AND VERIFY CONDUIT, CONDUCTOR, AND BREAKER SIZING IS APPROPRIATE FOR NEW HVAC UNITS REPLACING THOSE BEING DEMOLISHED. NOTIFY ENGINEER OF DEVIATIONS FROM DRAWINGS.

**UPGRADE AND REPLACE HVAC UNITS ON GEORGETOWN BUILDING 100**  
4003 SOUTH FRASER ST., GEORGETOWN, SC 29440  
**FIRST FLOOR ELECTRICAL RENOVATION PLAN**

REV	
1	ADDENDUM #1 08/17/2022
JOB No.	H59-6212-ML
DATE:	7/19/2022
DRAWN BY:	SPW
CHECKED BY:	PMD
SHEET	NUMBER



**E101**

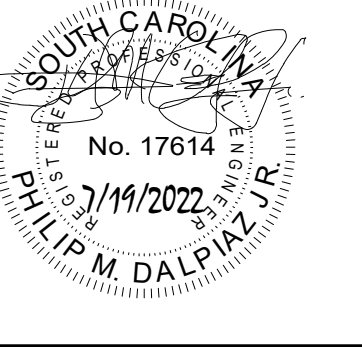
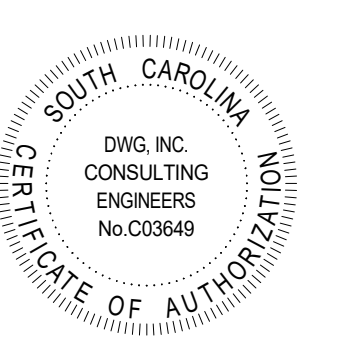
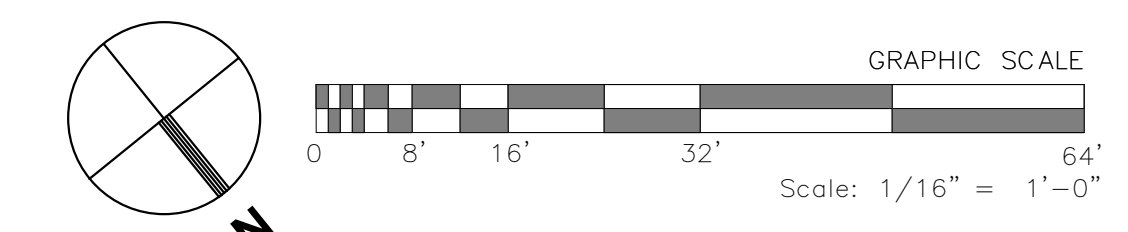


1 SECOND FLOOR ELECTRICAL RENOVATION PLAN  
E201 SCALE: 1/16" = 1'-0"

KEYNOTES

GENERAL NOTES

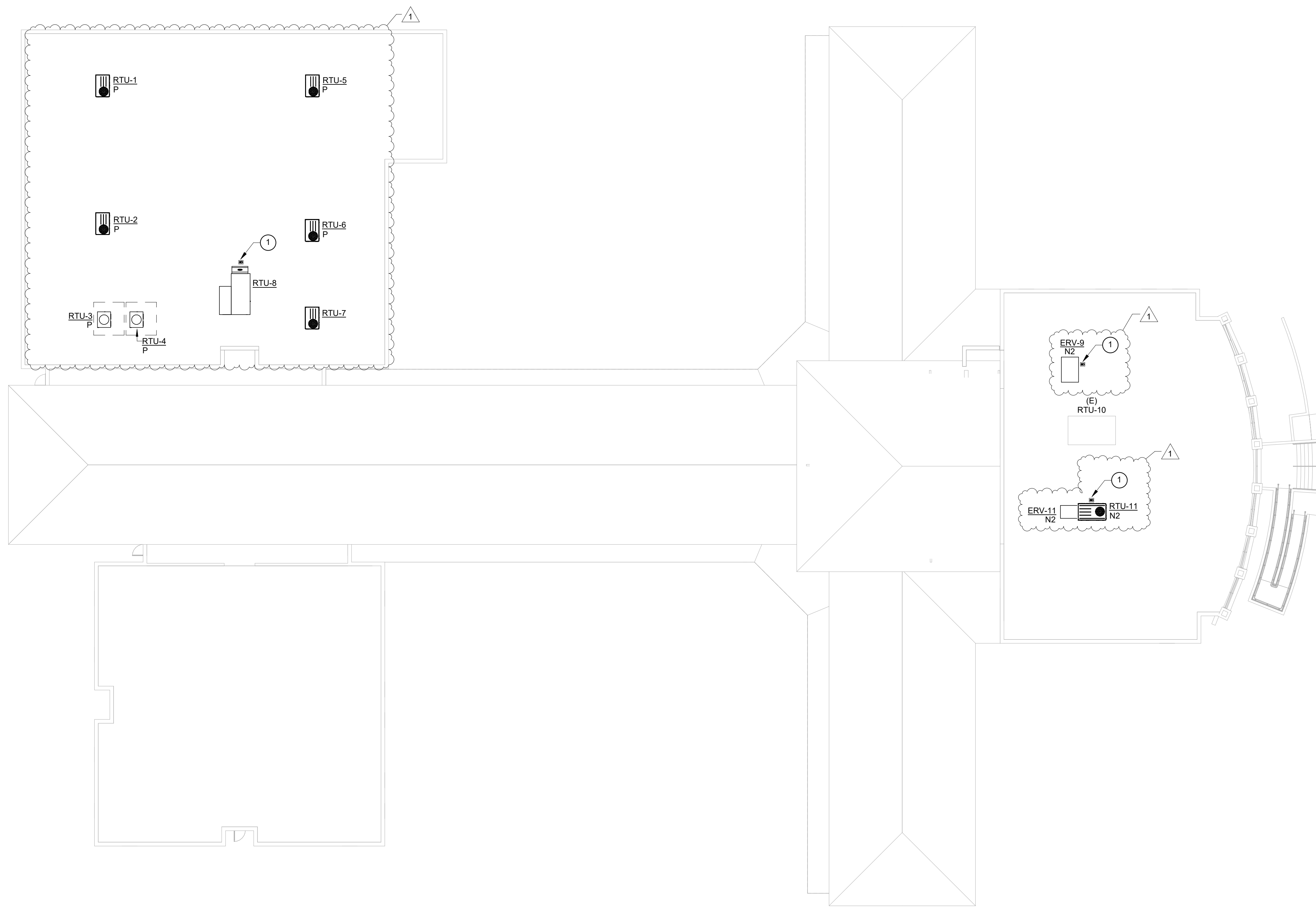
1. ALL EXISTING CONDITIONS SHOWN ARE BASED ON A COMBINATION OF AS-BUILT DRAWINGS AND SITE OBSERVATIONS AND SHALL BE VERIFIED WITH ACTUAL FIELD CONDITIONS. CONTRACTOR SHALL MAKE MINOR MODIFICATIONS SUCH AS LOCATION AS REQUIRED BY ACTUAL FIELD CONDITIONS. ANY MAJOR DISCREPENCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO PROCEEDING WITH WORK.
2. CONTRACTOR SHALL LOCATE SOURCE OF EXISTING CIRCUITS THAT FEED ALL NEW HVAC UNITS SHOWN. VERIFY EXISTING CONDUIT AND CONDUCTORS ARE OF ADEQUATE SIZE TO FEED NEW HVAC UNITS. IN THE EVENT THAT LARGER CONDUIT/CONDUCTOR SIZES ARE REQUIRED, ROUTE NEW CIRCUIT TO HVAC UNIT LOCATION FROM SOURCE PANELBOARD AND REPLACE EXISTING CIRCUIT BREAKER IN EXISTING PANELBOARDS FEEDING THESE UNITS PER THE EQUIPMENT CONNECTION SCHEDULE.
3. WHERE KNOWN, PANELBOARD DESIGNATIONS THAT SERVED DEMOLISHED HVAC UNITS ARE PROVIDED ADJACENT TO NEW EQUIPMENT ANNOTATIONS. VERIFY ACTUAL PANELBOARD ORIGIN AND CIRCUIT BREAKER LOCATION WITHIN PANELBOARD WITH ACTUAL FIELD CONDITIONS. WHERE NO PANELBOARD DESIGNATIONS ARE SHOWN, CONTRACTOR SHALL LOCATE SOURCE PER NOTE 2.
4. ALL PANELBOARDS AND FIRE ALARM CONTROLS SHOWN ARE EXISTING.
5. FIELD MODIFICATIONS TO EXISTING PANEL SCHEDULES HAVE MADE IT DIFFICULT TO VERIFY WITH CERTAINTY WHICH HVAC UNIT IS SERVED FROM WHICH CIRCUIT BREAKER IN ALL PANELBOARDS. CONTRACTOR SHALL TEST EACH CIRCUIT SERVING HVAC UNITS BEING REPLACED AND VERIFY CONDUIT, CONDUCTOR, AND BREAKER SIZING IS APPROPRIATE FOR NEW HVAC UNITS REPLACING THOSE BEING DEMOLISHED. NOTIFY ENGINEER OF DEVIATIONS FROM DRAWINGS.



UPGRADE AND REPLACE HVAC UNITS ON GEORGETOWN BUILDING 100 4003 SOUTH FRASER ST., GEORGETOWN, SC 29440 SECOND FLOOR ELECTRICAL RENOVATION PLAN

REV	
1	ADDENDUM #1 08/17/2022
JOB No.	HS9-6212-ML
DATE:	7/19/2022
DRAWN BY:	SPW
CHECKED BY:	PMD
SHEET	NUMBER

E201



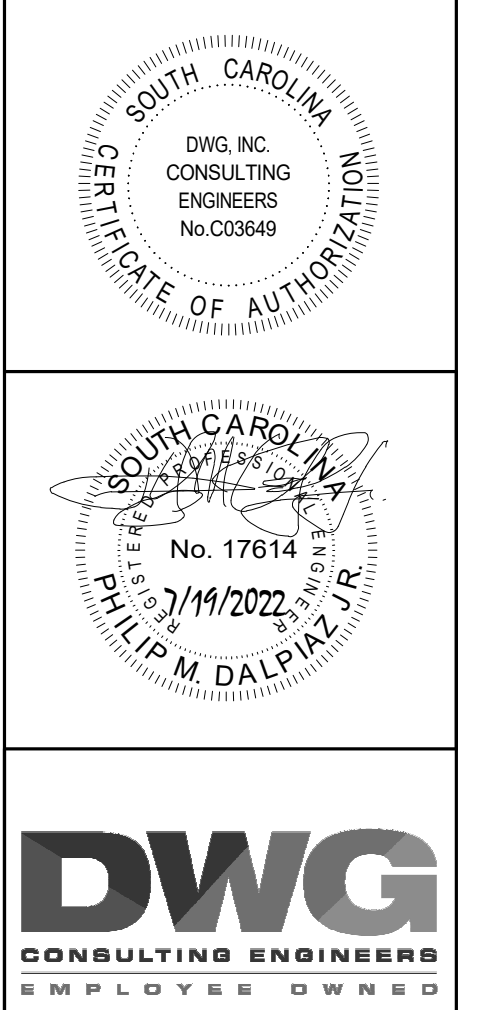
1 ROOF ELECTRICAL RENOVATION PLAN  
E301 SCALE: 1/16" = 1'-0"

KEYNOTES

- 1 DUCT MOUNTED SMOKE DETECTORS SHALL BE INSTALLED IN RETURN AIR DUCTS OF ASSOCIATED OF HVAC UNITS, COORDINATE EXACT LOCATION WITH MECHANICAL.

GENERAL NOTES

- ALL EXISTING CONDITIONS SHOWN ARE BASED ON A COMBINATION OF AS-BUILT DRAWINGS AND SITE OBSERVATIONS AND SHALL BE VERIFIED WITH ACTUAL FIELD CONDITIONS. CONTRACTOR SHALL MAKE MINOR MODIFICATIONS SUCH AS LOCATION AS REQUIRED BY ACTUAL FIELD CONDITIONS. ANY MAJOR DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO PROCEEDING WITH WORK.
- ALL RTU-# UNITS BEING REPLACED SHALL BE WIRED THROUGH ROOF CURB. SEAL UNUSED ROOF PENETRATIONS FROM PREVIOUS CONDUIT AND CONTROLS FEEDS WHERE APPLICABLE.
- CONTRACTOR SHALL LOCATE SOURCE OF EXISTING CIRCUITS THAT FEED ALL NEW HVAC UNITS SHOWN. VERIFY EXISTING CONDUIT AND CONDUCTORS ARE OF ADEQUATE SIZE TO FEED NEW HVAC UNITS. IN THE EVENT THAT LARGER CONDUIT/CONDUCTOR SIZES ARE REQUIRED, ROUTE NEW CIRCUIT TO HVAC UNIT LOCATION FROM SOURCE PANELBOARD AND REPLACE EXISTING CIRCUIT BREAKER IN EXISTING PANELBOARDS FEEDING THESE UNITS PER THE EQUIPMENT CONNECTION SCHEDULE.
- WHERE KNOWN, PANELBOARD DESIGNATIONS SERVING DEMOLISHED HVAC UNITS ARE PROVIDED ADJACENT TO NEW EQUIPMENT ANNOTATIONS. VERIFY ACTUAL PANELBOARD ORIGIN AND CIRCUIT BREAKER LOCATION WITHIN PANELBOARD WITH ACTUAL FIELD CONDITIONS. WHERE NO PANELBOARD DESIGNATIONS ARE SHOWN, CONTRACTOR SHALL LOCATE SOURCE PER NOTE 3.
- LIQUID TIGHT FLEXIBLE METAL CONDUIT ASSOCIATED WITH EXISTING CIRCUITS SERVING NEW HVAC UNITS SHALL BE REPLACED.
- FIELD MODIFICATIONS TO EXISTING PANEL SCHEDULES HAVE MADE IT DIFFICULT TO VERIFY WITH CERTAINTY WHICH HVAC UNIT IS SERVED FROM WHICH CIRCUIT BREAKER IN ALL PANELBOARDS. CONTRACTOR SHALL TEST EACH CIRCUIT SERVING HVAC UNITS BEING REPLACED AND VERIFY CONDUIT, CONDUCTOR, AND BREAKER SIZING IS APPROPRIATE FOR NEW HVAC UNITS REPLACING THOSE BEING DEMOLISHED. NOTIFY ENGINEER OF DEVIATIONS FROM DRAWINGS.



UPGRADE AND REPLACE HVAC UNITS ON GEORGETOWN  
BUILDING 100  
4003 SOUTH FRASER ST., GEORGETOWN, SC 29440  
ROOF ELECTRICAL RENOVATION PLAN

REV	
1	ADDENDUM #1 08/17/2022
JOB No.	HS9-6212-ML
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E301

## SECTION 230900 - INSTRUMENTATION AND CONTROL FOR HVAC

### PART 1 - GENERAL

#### 1.1 SYSTEM DESCRIPTION

- A. A fully integrated building automation system, incorporating direct digital control (DDC) for energy management, equipment monitoring and control. Use of multiple manufacturers' products is not allowed.
- B. A peer-to-peer network of DDC controllers and a web-based operator interface. Depict each mechanical system and building floor plan by a point-and-click graphic. A web server with a network interface card shall gather data from the system and generate web pages accessible through a conventional web browser on each PC connected to the network. Operators shall be able to perform all normal operator functions through the web browser interface.
- C. Provide DDC controls for new air handlers, rooftop units, split systems, etc.
- D. Provide control system consisting of interface equipment and other apparatus and accessories to operate mechanical systems and to perform functions specified.
- E. Provide installation and calibration, supervision, adjustments and fine tuning necessary for complete and fully operational system.
- F. Controls Contractor shall provide new DDC control panel(s) and system to integrate the new equipment into the existing campuswide infrastructure.

#### 1.2 SUBMITTALS

- A. Shop Drawings – Indicate the following:
  - 1. Network riser diagrams showing programmable control unit locations and network data conductors.
  - 2. Connected data points, including connected control unit and input-output device.
  - 3. System graphics showing monitored systems, data (connected and calculated).
  - 4. System configuration with peripheral devices, batteries, power supplies, diagrams, modems and interconnections.
  - 5. Description and sequence of operation for operating user.
- C. Product data: Submit data for each system component and software module.
- D. Manufacturers installation instructions: Submit installation instruction for each control system component.
- E. Manufacturer's certificate: Certify products meet or exceed specified requirements.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Execution Requirements: Requirements for submittals.
- B. Project Record Documents:
  - 1. Record actual locations of control panels and components, including control units, thermostats and sensors.
  - 2. Revise shop drawings to reflect actual installation and operating sequences.

3. Submit data specified in "Submittals" in final "Record Documents" form.

C. Operation and Maintenance data:

1. Submit interconnection wiring diagrams, complete field installed systems with identified and numbered, system components and devices.
2. Submit inspection period, cleaning methods, cleaning materials recommended and calibration tolerances.

1.4 WARRANTY

A. Execution Requirements: Requirements for warranties.

1. Contractor shall provide a standard 1-year warranty on all control products and labor associated with this project.

1.5 SERVICE

A. Execution Requirements: Requirements for service.

B. Furnish service and maintenance of control systems for one year from date of substantial completion. Include complete service of control systems including callbacks. Make a minimum of two complete normal inspections of four hours duration in addition to normal service calls to inspect, calibrate and adjust controls.

C. Perform work without removing units from service during normal building occupied hours.

D. Provide emergency call back service at all hours for this maintenance period.

E. Maintain at local branch office, adequate levels of replacement parts in stock for emergency purposes. Have personnel available to ensure fulfillment of this maintenance service, without reasonable loss of time.

F. Perform maintenance work using competent and qualified personnel under supervision and in direct employ of manufacturer or original installer.

PART 2 - PRODUCTS

2.1 DIRECT DIGITAL CONTROLS

A. Acceptable manufacturers:

1. Siemens by Control Management, Inc.  
Eric Scales – (803) 351-0881  
erics@controlmanagement.com

2.2 MATERIALS

A. Use new products the manufacturer is currently manufacturing and selling for use in new installations. Do not use this installation as a product test site unless explicitly approved in writing by Owner. Spare parts shall be available for at least five years after completion of this contract.

## 2.3 COMMUNICATION

- A. Control products, communication media, hubs, and routers shall comprise a unified control network. Acceptable network mediums are Cat 5 Ethernet or twisted pair networks. Controller products and hardware or software gateways shall be from a single manufacturer.
- B. Use Owner Provided TCP/IP Ethernet backbone for network segments to all DDC Building Controller panels marked on project drawings. Project drawings indicate remote buildings or sites to be connected via intranet or internet connections. In each remote location an intranet or internet connection shall be provided for connection to the building automation system (BAS).
- C. Connection to BAS shall be by connecting to any Ethernet port in the facility for temporary connection to a laptop computer or other operator interface such as a Pocket PC or system display panel. In addition, any workstation in the facilities may be used for web browser communication to BAS system. Connection shall support commissioning and troubleshooting operations.
- D. System shall automatically synchronize controller time clocks daily from an operator-designated controller via the network. If applicable, system shall automatically adjust for daylight saving and standard time.
- E. System shall communicate in a peer-to-peer way and discretely check for system errors and verify controller communications.

## 2.4 BUILDING CONTROLLERS

- A. General: Provide Building Controller (BC) as required to achieve sequence of operation. Provide one BC for Chilled Water System application. Controller shall be capable of adequately covering all IO points listed in points list plus 25% expansion capability. Using more than one BC controller to carry out an equipment application is not acceptable.
- B. Stand-Alone Operation. Each building controller on the BAS system shall be of true stand-alone operation. All schedules, data logs, time-clock, alarms graphics and program application shall reside in the controller. Controllers that require global or master controllers or devices are not acceptable. Each BC controller shall be able to broadcast data from one to another or globally throughout the system in a true peer-to-peer way, any data value within the controller to any other controller, specified group of controllers, or globally around the system. Controllers shall build LAN and internetwork communications across data networks and routers and report communications loss to Operator Interface.
- C. Hardware Design. BC's must be modular in design and be mounted on standard DIN Rail for ease of replacement and expansion. Every input or output shall have 2-part connectors provided to facilitate commissioning and replacement. BC's shall have a minimum of 16 IO points and be capable of expanding to a total of 128 input-output points through a series of plug in input-output modules. Input-output modules shall be connected to the BC by a CAN network bus and have the capability of being mounted up to 33 feet from controller. Each BC shall provide a serial service communication port for connection to a Portable Operator's Terminal or connection to a local controller display panel.
- D. Hardware. Controllers shall be powered by 24VAC or DC and shall be protected by a self-resetting solid state circuit breaker and bus communications shall be protected by a multifuse. Controllers shall be rated to operate at plus or minus 15%. Each BC shall have LED status indication of network, bus, power and controller failure.



- E. Environment. Controller hardware shall be suitable for anticipated ambient conditions and mounted in plenum or inside specified equipment. Controllers shall have the following specifications as a minimum:
1. UL916 Listed – Enclosed Energy Management Equipment
  2. Temperature – rated at 32°F to 120°F
  3. Humidity – 0 to 90%RH non-condensing
- F. Memory. BC's must have flash memory that is non-volatile to power cycles. Application program and controller parameters must be stored in flash in case of a power outage. Controllers using batteries to store program or parameters are not acceptable. A minimum of 16MB of SDRAM and 8MB of Flash memory shall be employed at each controller.
- G. Network communication. Each BC shall have a minimum of one 10BaseT Ethernet port as its primary network communications connection and communicate directly on the buildings TCP/IP data network without the need for master control panels. Each BC shall have an on-board web server that will allow local or remote system control, monitoring and configuration via a standard web browser.
- H. Real Time Clock. Each BC must have a Real Time Clock. In case of a power outage the time-clock must be maintained for 6 days by a capacitor. Any BC shall have the ability to act as the system time-master. System timemaster will automatically adjust to Daylight Savings Times.
- I. Sequencing. BC's shall execute all program sequences independent of program size once per second. Controller shall execute all program and mathematical functions and PID Loops as described in Section 2.4.E
- J. Scheduling. BC controllers shall provide the following schedule options as a minimum. All schedule, exception or holiday changes shall be configurable from the web browser interface or the Operator Interfaces.
1. Weekly. Provide separate schedules for each day of the week. Each schedule shall be able to include up to 50 occupied periods (50 start-stop pairs). Days shall have the ability of being copied and pasted from the web browser.
  2. Exception. Operator shall be able to designate an exception schedule for each of the next 365 days in advance. After an exception schedule has executed, system shall discard and replace exception schedule with standard schedule for that day of the week. Exceptions shall have up to 16 priority levels. Should exceptions overlap, exception with highest priority level shall take precedence over others with lower priorities. Exceptions shall be added, edited or adjusted from the web browser.
  3. Holiday. Web operator shall be able to define holiday exception schedules of varying length on a scheduling calendar that repeats each year.
  4. Controller shall support multiple shifted scheduling, enabling start-stop of equipment up to 6 hours before-after normal schedule start-stop. Shifted scheduling shall also support Optimized start-stop.
  5. Optimized start-stop. One optstart-stop function shall be assigned to any schedule within the controller. Optstart functions shall be self-learning and shall have operator adjustable start-stop limits.
- K. Data Logs. Each BC controller shall be able to log any data within a controller at one second, 1 minute, 5 minute, 10 minute, 15 minute, 20 minute, 30 minute, 1 hour, 6 hour or 24 hour intervals. 1000 points of data must be held in data log until last value is overwritten. Multiple data logs with differing intervals shall have the capability of being attached to any data point. Any data log shall be viewed from the browser or Operator Interfaces. Data logs shall be viewed in graphical or text format by the operator.

- L. Alarms. BC controllers shall generate alarms configured by the programming tool. Alarms shall be sent to the operator interface workstation. In event that operator workstation is off-line for any reason, alarms shall be sent to the system Display Panel, via email or cell phone text message directly from the controller across the data network to any internal or external email or cell phone email address. Alarms shall have the capability of being sent to different locations depending on schedule status or operator defined alarm group. An internal alarm log shall record the last 50 alarms generated by controller. Alarm log shall be viewed from the browser or Operator Interfaces.
- M. Graphics. Each building controller shall be capable of containing graphics pages of the connected mechanical equipment as well as the application program. Dynamic data points shall be shown on graphical backdrops representing all hardware and software points within the controller. Graphics pages shall contain links to other graphics pages within the controller, other building controllers on the BAS system, any intranet or internet website and any valid email address. Controller shall have the ability to add any user defined text to any graphics page. Graphics pages shall be accessible from any standard web browser on the intranet or internet.
- N. Security. Each BC shall have username and password security with the ability to have a unique username and password for up to 500 users. In addition, each user shall have a level of access from 0 to 100 to the controller ranging from read only access through to full configuration rights to the controller. Access to the controller shall be read only until a valid username and password is entered via any standard web browser. All users and levels of access shall be configurable by the operator. Each user shall have a default graphics page assigned and loaded when valid username and password is entered.
- O. Controller Input-Outputs. All controller inputs and outputs may be overridden on-off or by any analog value of the operator's choice via a standard web browser. In addition an override timer may be initiated to switch all inputs-outputs to automatic operation after user has logged out.
  - 1. Controller inputs shall all be Universal Inputs and be selectable by moving a jumper for the required input type. Controller shall support thermistor, 0-10vdc voltage and 0-20 or 4-20mA current inputs with 12-bit resolution. All digital inputs shall be volt free contacts capable of pulse counting up to 30 pulses per second. When input is selected for digital, LED shall indicate when contact is closed. All sensor scaling and curves shall be software configurable.
  - 2. Controller shall have analog or Form C relay outputs. Analog outputs shall be modulating 0-10Vdc and current limited to 20mA as required to properly control output devices. All analog outputs shall have modulating LED's to indicate output voltage. Analog outputs shall have 11-bit resolution as a minimum. Form-C relay outputs shall have common, normally-open and normally-closed contacts. All relay outputs shall have LED's to indicate relay status.
  - 3. Protection. All input and outputs shall have over-voltage protection built-in to protect main board from failure.
- P. PID Loops. Loops shall have the capability to be sequenced once per second and switched between occupied and unoccupied setpoints. In addition, a manual override and level may be initiated and implemented in logic. PID Loops shall support drift-limit alarm and controlled input alarms. Should controlled input fail or alarm, one of the following actions shall be initiated:
  - 1. Maintain output at level when sensor failed and return to normal operation on alarm clear.
  - 2. Automatically go to pre-defined controlled input value and return to normal operation on alarm clear.
  - 3. Automatically go to pre-defined loop output level and return to normal operation on alarm clear.

4. Automatically go to pre-defined loop output level and stay there until a alarm clears and a manual override is initiated by operator.
- Q. Runtime Totalization. Controller shall provide an algorithm that can totalize runtime for each digital input or output and calculate the number of starts. Operator shall be able to enable runtime alarm based on exceeded adjustable runtime limit via the web browser interface.
- R. Staggered Start. Controller shall stagger controlled equipment restart after power outage. Operator shall be able to adjust equipment restart order and time delay between equipment restarts via the web browser interface.
- S. Web Browser. In addition, the web browser interface shall support the following functions on the building controller other than outlined above:
1. Configuration and editing of any function or programming module stored within the controller.
  2. Operator override of any function module or software point within the controller in addition to the physical input-outputs.
  3. Support of navigation through logic flow diagram to support commissioning via the browser.
  4. Display lists of each type of function or programming module within the controller in numerical order and highlight any current alarm points in flashing red format.
  5. Operation will be mouse driven point and click between views, graphics and modules. Values shall be changed by drop-down menus or by clicking and typing in open fields.

## 2.5 AUXILIARY CONTROL DEVICES

- A. Temperature Sensors. Temperature sensors shall be thermistor or 4-20mA dependent on application.
1. Immersion Sensors. Provide immersion sensors with a separable stainless steel or brass well. Well pressure rating shall be consistent with system pressure it will be immersed in. Well shall withstand pipe design flow velocities. Immersion sensors shall be thermistor of type 10KII.
- B. Relays.
1. Control Relays. Control relays shall be plug-in type, UL listed, and shall have dust cover and LED "energized" indicator. Contact rating, configuration, and coil voltage shall be suitable for application.
  2. Time Delay Relays. Time delay relays shall be solid-state plug-in type, UL listed, and shall have adjustable time delay. Delay shall be adjustable  $\pm 100\%$  from setpoint shown. Contact rating, configuration, and coil voltage shall be suitable for application. Provide NEMA 1 enclosure for relays not installed in local control panel.
  3. Relay-in-box. Shall be UL listed and have a compact NEMA 1 housing with  $\frac{1}{2}$  or  $\frac{3}{4}$  inch NPT nipples. Relays shall have LED "energized" indication. Wires shall be color-coded. Contact rating, configuration, and coil voltage shall be suitable for application.
- C. Current Switches.
1. Current-operated switches shall be self-powered, solid-state with adjustable trip current. Select switches to match application current and DDC system output requirements. Any current switches used on VSD's shall be specialized for VSD application. Current switches shall be Veris Hawkeye or equivalent.
- D. Local Control Panels.

1. Indoor control panels shall be fully enclosed NEMA 1 construction with hinged door key lock latch and removable sub-panels. A common key shall open each control panel and sub-panel.
2. Pre-wire internal and face-mounted device connections with color-coded stranded conductors tie-wrapped or neatly installed in plastic troughs. Field connection terminals shall be UL listed for 600 V service, individually identified per control and interlock drawings, with adequate clearance for field wiring.
3. Each Building Control panel shall have one 110Vac power outlet for connecting laptops.

## 2.6 WIRING RACEWAYS AND POWER SUPPLIES

- A. General. Provide copper wiring, plenum cable, and raceways as specified in applicable sections of Division 16.
- B. Insulated wire shall use copper conductors and shall be UL listed for 200°F minimum service and be plenum rated.
- C. Power Supplies. Control transformers shall be UL listed. Furnish Class 2 current-limiting type or furnish over-current protection in primary and secondary circuits for Class 2 service in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.
  1. DC power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100-microsecond response time for 50% load changes. Unit shall have built-in over-voltage and over-current protection and shall be able to withstand 150% current overload for at least three seconds without trip-out or failure.
- D. Wiring Standards and Identification. Control wiring shall conform to the following standards and color codes:
 

1. Ethernet Communication	Orange	CAT5E
2. Twisted Pair Communication	Blue Jacket	22-2
3. Two Wire Sensors	Purple strip	20-2/SH
4. Wall Sensors	Purple Jacket	22-6
5. Digital Output	Green Stripe	18/2
6. Interface Device	Orange Stripe	18/4
7. ASC Power	Red Stripe	16/2
8. Comb Digital Input/Output	Orange Stripe	18/4

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Thoroughly examine project plans for control device and equipment locations. Report discrepancies, conflicts, or omissions to Architect or Engineer for resolution before starting rough-in work.
- B. Inspect site to verify that equipment can be installed as shown. Report discrepancies, conflicts, or omissions to Engineer for resolution before starting rough-in work.

### 3.2 INSTALLATION

- A. Install control units and other hardware on permanent walls where not subject to excessive vibration.
- B. Install controller software and implement features of programs to specified requirements and appropriate to sequence of operation.
- C. A 120volt alternating current, dedicated power circuit to each programmable control panel shall be provided by Division 16.
- D. Mechanical Rooms and exposed locations to be in full conduit.
- E. Conduit sleeves in fire rated walls to be caulked with firestop and have bushings on both ends. All conduit stubs and knockouts to have bushings.

### 3.3 COORDINATION

- A. Site:
  - 1. Assist in coordinating space conditions to accommodate the work of each trade where work will be installed near or will interfere with work of other trades.
  - 2. Coordinate and schedule work with other work in the same area and with work dependent upon other work to facilitate mutual progress.
- B. Test and Balance:
  - 1. Provide Test and Balance Contractor a single set of necessary tools to interface to control system for testing and balancing.
  - 2. Train Test and Balance Contractor to use control system interface tools.
  - 3. Test and Balance Contractor shall return tools undamaged and in working condition at completion of testing and balancing.

### 3.4 SYSTEM CHECKOUT AND TESTING

- A. Startup testing. Complete startup testing to verify operational control system before notifying owner of system demonstration.
  - 1. Calibrate and prepare for service each instrument, control, and accessory equipment furnished under Section 15900.
  - 2. Verify that control wiring is properly connected and free of shorts and ground faults. Verify that terminations are tight.
  - 3. Enable control systems and verify each input device's calibration. Calibrate each device according to manufacturer's recommendations.
  - 4. Verify that binary output devices such as relays, solenoid valves, two-position actuators and control valves, and magnetic starters, operate properly and that normal positions are correct.
  - 5. Verify that analog output devices such as actuators are functional, that start and span are correct, and that direction and normal positions are correct. Check control valves and automatic dampers to ensure proper action and closure. Make necessary adjustments to valve stem and damper blade travel.
  - 6. Verify that system operates according to sequences of operation. Simulate and observe each operational mode by overriding and varying inputs and schedules. Tune PID loops and each control routine that requires tuning.
  - 7. Alarms and Interlocks.

- a) Check each alarm with an appropriate signal at a value that will trip the alarm.
- b) Trip interlocks using field contacts to check logic and to ensure that actuators fail in the proper direction.
- c) Test interlock actions by simulating alarm conditions to check initiating value of variable and interlock action.

### 3.5 TRAINING

- A. Provide training for a designated staff of Owner's representatives. Training shall be provided via on-site computer-based training.
- B. Training shall enable students to accomplish the following objectives.
  - 1. Proficiently operate system
  - 2. Understand control system architecture and configuration
  - 3. Understand job layout and location of control components
  - 4. Understand DDC system components
  - 5. Understand system operation, including DDC system control and optimizing routines.
  - 6. Log on and off system
  - 7. Access graphics, point reports, and logs
  - 8. Adjust and change system setpoints, time schedules, and holiday schedules
  - 9. Recognize common HVAC system malfunctions by observing system graphics, trend graphs, and other system tools
  - 10. Understand system drawings and Operation and Maintenance manual
  - 11. Access data from DDC controllers
  - 12. Create, delete, and modify alarms, including configuring alarm reactions
  - 13. Create, delete, and modify point trend logs (graphs) and multi-point trend graphs
  - 14. Add new users and understand password security procedures
- C. Provide a total of 8 hours training as part of this contract.

### 3.6 SEQUENCE OF OPERATIONS AND POINTS LIST

- A. Sequence of Operation and Points List: See Drawings

END OF SECTION 230900

## SECTION 260510 – ELECTRICAL SUBMITTALS

### PART 1 - GENERAL

#### 1.1 RELATED REQUIREMENTS

- A. Comply with the applicable requirements of the Division 1 specifications (013300) and the requirements of this Division of the specifications.

#### 1.2 SUBMITTALS

- A. Submit for review by the Engineer Architect a schedule with engineering data of materials and equipment to be incorporated in the work. Submittals shall be supported by descriptive materials, i.e., catalog sheets, product data sheets, diagrams, performance curves and charts published by the manufacturer, warranties, etc., to show conformance to Specifications and Plan requirements; model numbers alone shall not be acceptable. Data submitted for review shall contain all information to indicate compliance with Contract Documents. Complete electrical characteristics shall be provided for all equipment. Submittals for lighting fixtures shall include Photometric Data. The Engineer reserves the right to require samples of any equipment to be submitted for review.
- B. The purpose of shop drawing review is to demonstrate to the Architect that the Contractor understands the design concept. The Architect's review of such drawings, schedules, or cuts shall not relieve the Contractor from responsibility for deviations from the drawings or specifications unless he has, in writing, called the Architect's attention to such deviation at the time of submission, and received written permission from the Architect for such deviations.
- C. Where cut sheets include an entire product family, mark all specific items to be utilized for this project on equipment cut sheets. Generic cut sheets with no indication of which items on the cut sheet shall be used will be rejected.
- D. Response to Submittals: Shop drawings shall be returned by the Electrical Engineer with the following classifications:
  - 1. "No Exceptions Taken": No corrections, no marks. Contractor shall submit copies for distribution
  - 2. "Make Corrections Noted": A few minor corrections. Items may be ordered as marked up without further resubmission. Submit copies for distribution.
  - 3. "Amend and Resubmit": Minor corrections. Item may be ordered at the Contractor's risk. Contractor shall resubmit drawings with corrections noted.
  - 4. "Rejected - Resubmit": Major corrections or not in accordance with the contract documents. No items shall be ordered. Contractor shall correct and resubmit drawings.
- E. Prior Approvals and Shop Drawings must be hand delivered, received by mail, or email.
- F. Equipment and materials requiring submittals:
  - 1. Section 260500 – Common Work Results for Electrical

- a. Product Warranties
  - b. Firestopping Materials
  - c. Firestopping Installation Drawings for each conduit penetration, cable in metal sleeve penetration and blank metal sleeve penetration for each type of wall/floor construction encountered.
2. Section 260511 – Electrical Work Closeout
    - a. Record Drawings
    - b. Record Manuals
    - c. Close out submittals
    - d. Training verification
  3. Section 260512 – Electrical Coordination
    - a. Coordination Affidavit
  4. Section 260519 – Low-Voltage Electrical Conductors and Cables
    - a. Splice Kits
    - b. Waterproof Wire Connectors
    - c. Wire
  5. Section 260526 – Grounding and Bonding for Electrical Systems
    - a. Grounding Connections
    - b. Ground Wire
  6. Section 260529 – Hangers and Supports for Electrical Systems
    - a. Product Data
  7. Section 260533 – Raceway and Boxes for Electrical Systems
    - a. Raceway
    - b. Boxes
    - c. Enclosure ratings
    - d. Dimension data
    - e. Conduit Bodies, Fittings, Outlet Boxes, and Covers
  8. Section 260548 – Vibration and Seismic Controls for Electrical Systems
    - a. Submit seismic force level (Fp) calculations from applicable building code.
    - b. Submit pre-approved restraint selections and installation details
    - c. Restraint selection and installation details shall be sealed by a professionally licensed engineer experienced in seismic restraint design.
    - d. Submit manufacturer's product data on strut channels including, but not limited to, types, materials, finishes, gauge thickness, and hole patterns. For each different strut cross-section, submit cross sectional properties including Section Modulus (Sx) and Moment of Inertia (Ix).
  9. Section 260553 – Identification for Electrical Systems
    - a. Product data for all labeling products
  10. Section 262400 – Switchboards and Panelboards
    - a. Circuit Breaker Product data
  11. Section 262816 – Enclosed Switches and Circuit Breakers



- a. Product data
  - b. Enclosures
  - c. Dimensional Data
  - d. Control Wiring Diagrams
  - e. Accessories
  - f. Short Circuit Current Rating
  - g. Test reports
  - h. Indicate on the submittal the name of the load served by each device submitted.
12. Section 283111 – Digital, Addressable, Fire Alarm System
- a. Installer’s qualifications.
  - b. Manufacturer's detailed data sheet for each control unit, initiating device, and notification appliance.
  - c. Device layout drawings with proposed conduit routing. Drawings must be prepared using AutoCAD Release 2017 or newer.
  - d. List of all devices on each signaling line circuit, with spare capacity indicated.
  - e. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72
  - f. Warranty
  - g. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
  - h. Submission to Authority Having Jurisdiction: In addition to routine submission of the above material, make an identical submission to the authority having jurisdiction. Include copies of shop drawings as required to depict component locations to facilitate review. Upon receipt of comments from the Authority, make resubmissions if required to make clarifications or revisions to obtain approval.
  - i. Inspection and Test Reports:
    - 1) Submit inspection and test plan prior to closeout demonstration
    - 2) Submit documentation of satisfactory inspections and tests.
    - 3) Submit NFPA 72 "Inspection and Test Form," filled out.

## PART 2 - PRODUCTS

2.1 Not Used.

## PART 3 - EXECUTION

### 3.1 MANUFACTURER’S DATA

- A. Include the manufacturer's comprehensive product data sheet and installation instructions. Where operating ranges are shown, mark data to show portion of range required for project application. Where pre-printed data sheet covers more than one distinct product-size, type, material, trim, accessory group or other variations, delete or mark-out portions of the pre-printed data which are not applicable.

### 3.2 EQUIPMENT LIST

- A. Where more than one type of a product is being used (i.e. starters, disconnects, breakers, etc.) provide a list with each submittal correlating the type and size of product to the load served.

### 3.3 TEST REPORTS

- A. Submit test reports which have been signed and dated by the firm performing the tests, and prepare in the manner specified in the standard or regulation governing the tests procedure as indicated.

END OF SECTION 260510

## SECTION 260511 - ELECTRICAL WORK CLOSEOUT

### PART 1 - GENERAL

#### 1.1 SUBMITTALS

- A. Refer to section 260510.

#### 1.2 RELATED SECTIONS

- A. Refer to section 017839 for additional requirements.

### PART 2 - PRODUCTS

#### 2.1 RECORD DRAWINGS

- A. Except where otherwise indicated, electrical drawings prepared by Engineer are diagrammatic in nature and may not show locations accurately for various components of electrical system. Shop drawings, including coordination drawings, prepared by the Contractor show portions of work more accurately to scale and location, and in greater detail. It is recognized that actual layout of installed work may vary substantially from both Contractor drawings and shop drawings.
- B. The electrical superintendent shall maintain a white set of contract documents and shop drawings in clean, undamaged condition, for mark-up of actual installations which vary substantially from the work as shown. PDF or digital mark-ups is acceptable alternates Mark-up whatever drawings are most capable of showing installed conditions accurately. However, where shop drawings are marked, record a reference note on appropriate contract drawings. Mark with erasable pencil, and use multiple colors to aid in the distinction between work of separate electrical systems. These documents shall be used for no other purpose. In general, record every substantive installation of electrical work which previously is either not shown or shown inaccurately, but in any case, record the following:
  - 1. Post all addenda prior to beginning work.
  - 2. Underground feeder conduits, both interior and exterior, drawn to scale and fully dimensioned.
  - 3. Work concealed behind or within other work, in a non-accessible arrangement.
  - 4. Mains and branches of wiring systems, with panelboards and control devices located and numbered, with concealed splices located, and with devices requiring maintenance located.
  - 5. Scope of each change order (C.O.), noting C.O. number.
- C. Upon each visit by the Architect/Engineer, the Contractor shall demonstrate that the record documents are being kept current, as specified hereinbefore.

#### 2.2 RECORD MANUALS

- A. Record manuals shall include the following:
  - 1. Manufacturer's operation and maintenance manuals for:
    - a. Circuit Breakers
    - b. Enclosed Switches
    - c. Fire Alarm System

2. Shop drawings, revised to reflect all review comments, supplemented with the installation instructions shipped with equipment.
  3. One copy of all revised panelboard directories.
  4. All field test Reports
  5. Electrical Contractor's Warranty
- B. Submit record manuals in quantities and in the format prescribed in the Division 1 specifications.
- C. Submit copies of all Maintenance contracts including:
1. Fire Alarm Systems.
- D.

### PART 3 - EXECUTION

#### 3.1 SITE VISITS

- A. At all construction observations by the Engineer, the Contractor shall demonstrate to the Engineer that all work is complete in accordance with the contract documents and that all systems have been tested and are fully operational. The Contractor shall furnish the personnel, tools and equipment required to inspect and test all systems.

#### 3.2 TRAINING

- A. Train Owner's personnel on the operation and maintenance of the following systems:
1. Fire Alarm System – 0.5 hours

END OF SECTION 260511

SECTION 280500 – COMMON WORK RESULTS FOR SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. All division 28 work shall, in addition to all division 1 specification sections, comply with all of the requirements in the following specification sections:

260500 Common Work Results for Electrical  
260501 Electrical Demolition  
260510 Electrical Submittals  
260511 Electrical Work Closeout  
260512 Electrical Coordination  
260519 Low-Voltage Electrical Conductors and Cables  
260526 Grounding and Bonding for Electrical Systems  
260529 Hangers and Supports for Electrical Systems  
260533 Raceway and Boxes for Electrical Systems  
260548 Vibration and Seismic Controls for Electrical Systems  
260553 Identification for Electrical Systems

END OF SECTION 280500

## SECTION 283111 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. System smoke detectors(duct mounted).

#### 1.2 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. HLI: High Level Interface.
- D. NICET: National Institute for Certification in Engineering Technologies.
- E. PC: Personal computer.
- F. VESDA: Very Early Smoke-Detection Apparatus.

#### 1.3 ACTION SUBMITTALS

- A. Refer to Specification 260510 Electrical Submittals.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level III technician.
- C. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL (nationally recognized testing laboratory).

#### 1.5 PROJECT CONDITIONS

- A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.
- B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
  - 1. Notify Owner no fewer than seven days in advance of proposed interruption of fire-alarm service.
  - 2. Do not proceed with interruption of fire-alarm service without Owner's written permission.

- C. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

## 1.6 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.

## 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.

## PART 2 - PRODUCTS

### 2.1 SYSTEM DESCRIPTION

- A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.
- B. Automatic sensitivity control of certain smoke detectors.
- C. All components provided shall be listed for use with the selected system.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- E. Provide TVSS for any exterior mounted or remote from building annunciation or alarm devices.

### 2.2 FIRE-ALARM CONTROL UNIT

- A. Existing fire alarm control panel manufacturer is noted on drawings.

### 2.3 SYSTEM SMOKE DETECTORS

- A. Duct Smoke Detectors: Photoelectric type complying with UL 268A.
  - 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
  - 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
    - a. Primary status.
    - b. Device type.
    - c. Present average value.
    - d. Present sensitivity selected.
    - e. Sensor range (normal, dirty, etc.).

3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
  1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
  1. Devices placed in service before all other trades have completed cleanup shall be replaced.
  2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
  1. Connect new equipment to existing control panel in existing part of the building.
  2. Connect new equipment to existing monitoring equipment at the supervising station.
  3. Expand, modify, and supplement existing control equipment as necessary to extend existing control functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.
- C. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
- D. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches (9100 mm) long shall be supported at both ends.
  1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.



- E. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector that is not readily visible from normal viewing position.
- F. Device Location-Indicating Lights: Locate in public space near the device they monitor.

### 3.3 PATHWAYS

- A. Fire alarm cabling shall be run in J-hooks above accessible ceilings and in exposed to structure areas. Fire alarm cable shall not be supported by building structure or above other ceiling systems. The fire alarm cabling must be supported by a dedicated support system.
  - Exposed pathways located less than 96 inches (2440 mm) above the floor shall be installed in EMT.
- B. Pathways shall be installed in red EMT.
- C. Exposed EMT in public areas shall be painted to match the background color of the ceiling area.

### 3.4 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

### 3.5 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Visual Inspection: Conduct visual inspection prior to testing.
    - a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
    - b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
  - 2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
  - 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
  - 4. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- B. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- C. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

- E. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- F. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

### 3.6 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  - 1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
  - 2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
  - 3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

### 3.7 SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.
- B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
  - 1. Upgrade Notice: At least 30 days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

### 3.8 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION 283111