

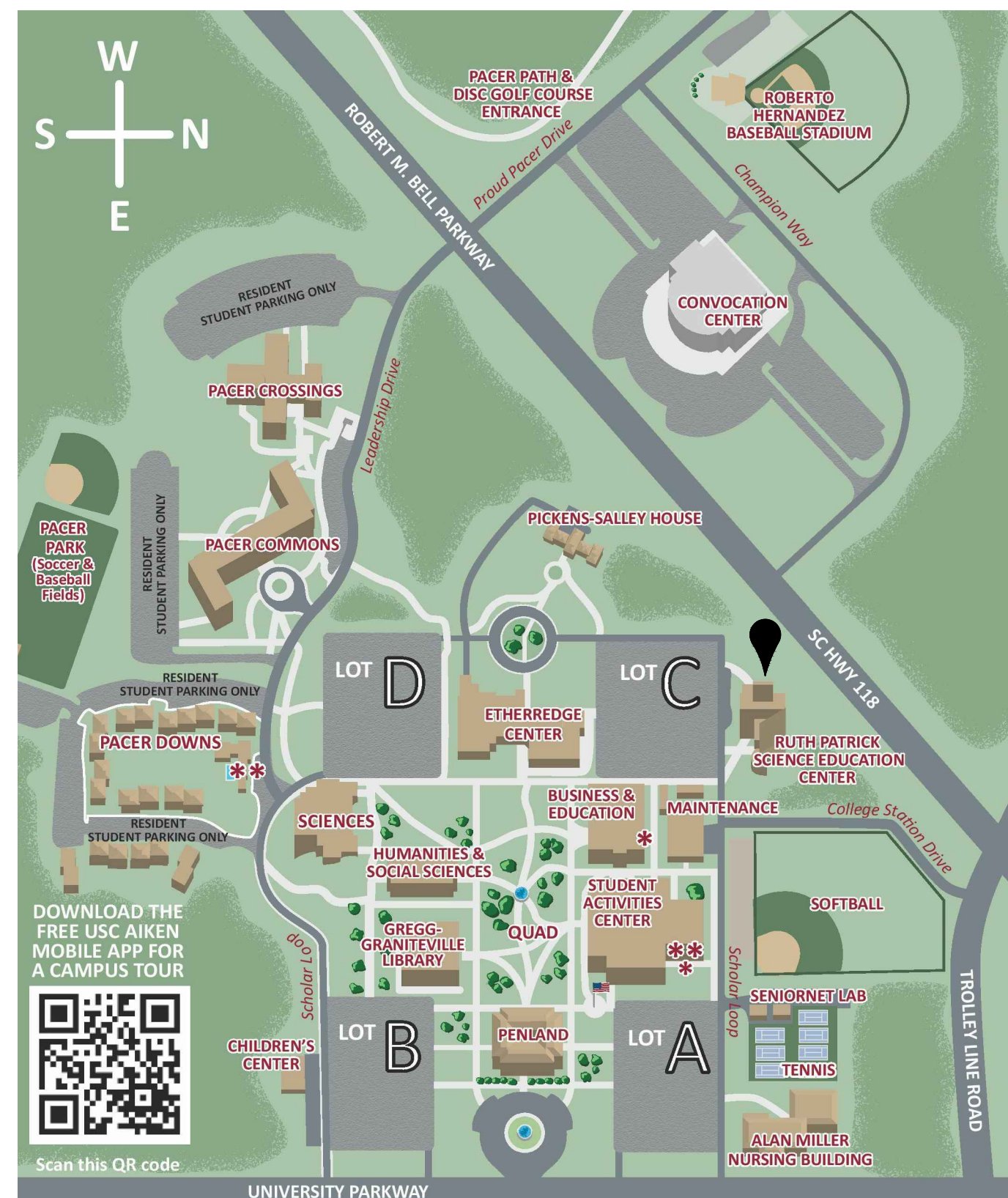


UNIVERSITY OF
SOUTH CAROLINA
 AIKEN

471 UNIVERSITY PKWY., AIKEN, SC 29801

RUTH PATRICK SCIENCE CENTER HVAC AND ELECTRICAL REPLACEMENT

FEBRUARY 24, 2016



USC AIKEN CAMPUS MAP
 NOT TO SCALE



PROJECT LOCATION MAP
 NOT TO SCALE

LEGEND

= PROJECT LOCATION

SCHEDULE OF DRAWINGS

| SHEET: | TITLE: |
|--------|----------------------------------|
| CS-1.0 | COVER SHEET |
| M-1.0 | MECHANICAL DETAILS AND SCHEDULES |
| M-1.1 | MECHANICAL DEMOLITION PLAN |
| M-2.0 | MECHANICAL NEW WORK PLAN |
| E-1.0 | ELECTRICAL PLANS |



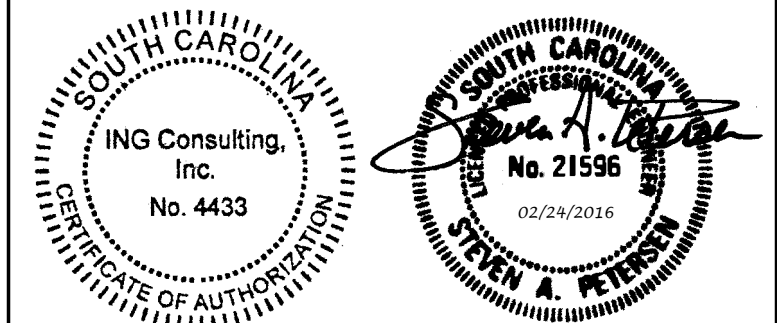
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PROJECT H29-9549

RUTH PATRICK
 SCIENCE CENTER
 HVAC AND ELECTRICAL
 REPLACEMENT

| MARK | DATE | DESCRIPTION |
|------|---------|-------------------------|
| 0 | 2/24/16 | ISSUED FOR CONSTRUCTION |

PROJECT NO: 612-1402

CAD DWG FILE: MECH.DWG

DRAWN BY: LMA

CHK'D BY: SAP

SHEET TITLE:

COVER SHEET

SHEET NUMBER: REVISION:

CS-1.0

0

| AIR HANDLER SCHEDULE | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------|--------------|--------|-------------|---------------|---------------|----------------|-----|----------------------|----------------------|---------------------|---------------------|--------------------------|-----------------------------|-----------------|--------------------------|---------|-----|-----|-------|-------|-------------------------|--------------------------|----------------------|------------------------------|---------------------|
| TAG | MANUFACTURER | MODEL | WEIGHT (lb) | HYDRONIC COIL | AIRFLOW (CFM) | E.S.P. (in wg) | RPM | COOLING | | | | | HEATING COIL | | | | | MCA | MOCP | V/P/H | COIL & REFRIGERANT TYPE | COOLING NOMINAL CAPACITY | | | |
| | | | | | | | | ENTERING AIR DB (°F) | ENTERING AIR WB (°F) | LEAVING AIR DB (°F) | LEAVING AIR WB (°F) | NET TOTAL CAPACITY (MBH) | NET SENSIBLE CAPACITY (MBH) | EVAPORATOR ROWS | ENTERING WATER TEMP (°F) | DELTA T | GPM | | | | | | ENTERING AIR DB (°F) | TOTAL HEATING CAPACITY (MBH) | LEAVING AIR DB (°F) |
| AH-1 | TRANE | TWE090 | 360 | HOT WATER | 3000 | 0.5 | 968 | 80 | 67 | 59.75 | 57.71 | 88.3 | 66.92 | 4 | 140 | 20 | 11 | 60 | 110.3 | 94 | 7.8 | 15 | 208-230/3/60 | SINGLE CIRCUIT - R410A | 7 1/2 Tons R-410A |
| AH-2 | TRANE | TWE090 | 360 | HOT WATER | 3000 | 0.5 | 968 | 80 | 67 | 59.75 | 57.71 | 88.3 | 66.92 | 4 | 140 | 20 | 11 | 60 | 110.3 | 94 | 7.8 | 15 | 208-230/3/60 | SINGLE CIRCUIT - R410A | 7 1/2 Tons R-410A |
| AH-3 | TRANE | TWE120 | 429 | HOT WATER | 4000 | 0.5 | 745 | 80 | 67 | 59.35 | 58 | 114.09 | 90.7 | 4 | 140 | 20 | 15 | 60 | 150.3 | 95 | 7.8 | 15 | 208-230/3/60 | SINGLE CIRCUIT - R410A | 10 Tons R-410A |
| AH-4 | TRANE | TWE150 | 730 | HOT WATER | 5000 | 0.5 | 721 | 80 | 67 | 59.45 | 57.71 | 148.19 | 114.28 | 4 | 140 | 20 | 21 | 60 | 208.2 | 99 | 7.4 | 15 | 208-230/3/60 | DUAL CIRCUIT - R410A | 12.5 Tons R-410A |

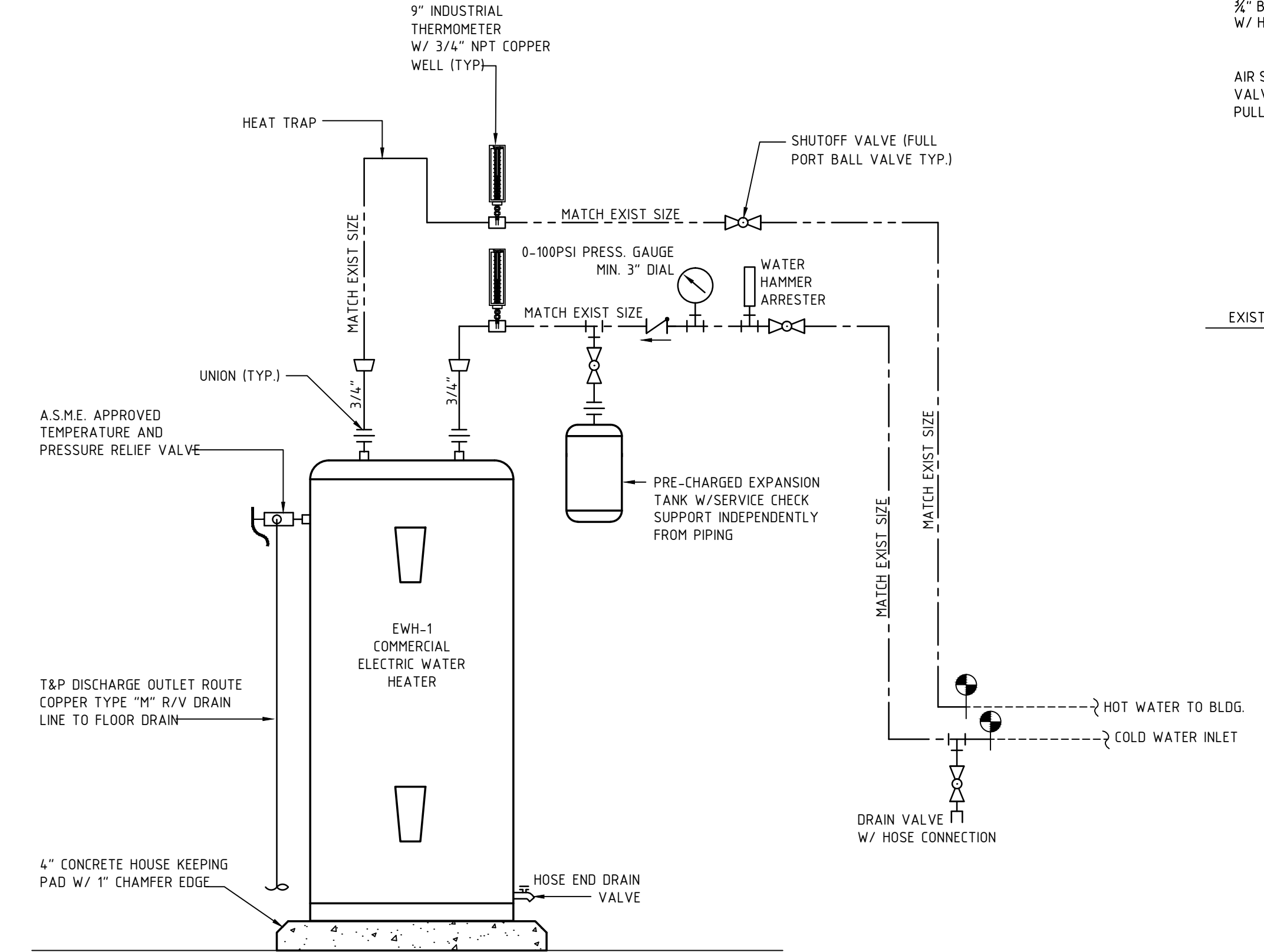
| A/C CONDENSER UNIT SCHEDULE | | | | | | | | | | | |
|-----------------------------|--------------|--------|------------------|-------------|----------------------------|------|------|------------|--------------|-------------------------|-------------------------------|
| TAG | MANUFACTURER | MODEL | AMBIENT TEMP. °F | WEIGHT (lb) | TOTAL COOLING CAPACITY MBH | MCA | MOCP | EER @ AHRI | V/P/H | COOLING NOMIAL CAPACITY | COMPRESSOR & REFRIGERANT TYPE |
| | | | | | | | | | | | |
| CU-2 | TRANE | TTA090 | 97 | 363 | 93.75 | 34.4 | 45 | 11.2 | 208-230/3/60 | 7 1/2 Tons R-410A | SINGLE COMPRESSOR - R410A |
| CU-3 | TRANE | TTA120 | 97 | 467 | 119.54 | 42.6 | 60 | 11.2 | 208-230/3/60 | 10 Tons R-410A | SINGLE COMPRESSOR - R410A |
| CU-4 | TRANE | TTA150 | 97 | 543 | 152.82 | 55.4 | 70 | 11 | 208-230/3/60 | 12 1/2 Tons R-410A | DUAL COMPRESSORS - R410A |

| WATER HEATER AND ACCESSORIES | | | | | | | | | | | |
|------------------------------|--------|--------|---------------|-----|------------------------|----------|----------------------|------------|--------------------------------------------------------------------------------|--|--|
| MARK | MANUF. | MODEL# | CAPACITY GAL. | KW | # STAGES / THERMOSTATS | ELEMENTS | CW / HW TAP SIZE IN. | ELECTRICAL | OPTIONS TO BE PROVIDED: | | |
| EWH-1 | RHEEM | ELDS2 | 50 | 4.5 | NON-SIMULTANEOUS | 2 | 3/4" | 208/1/60 | T&PRV VALVE FACTORY MOUNTED WATTS EXPANSION TANK # DET-5 WITH SERVICE CHECK | | |

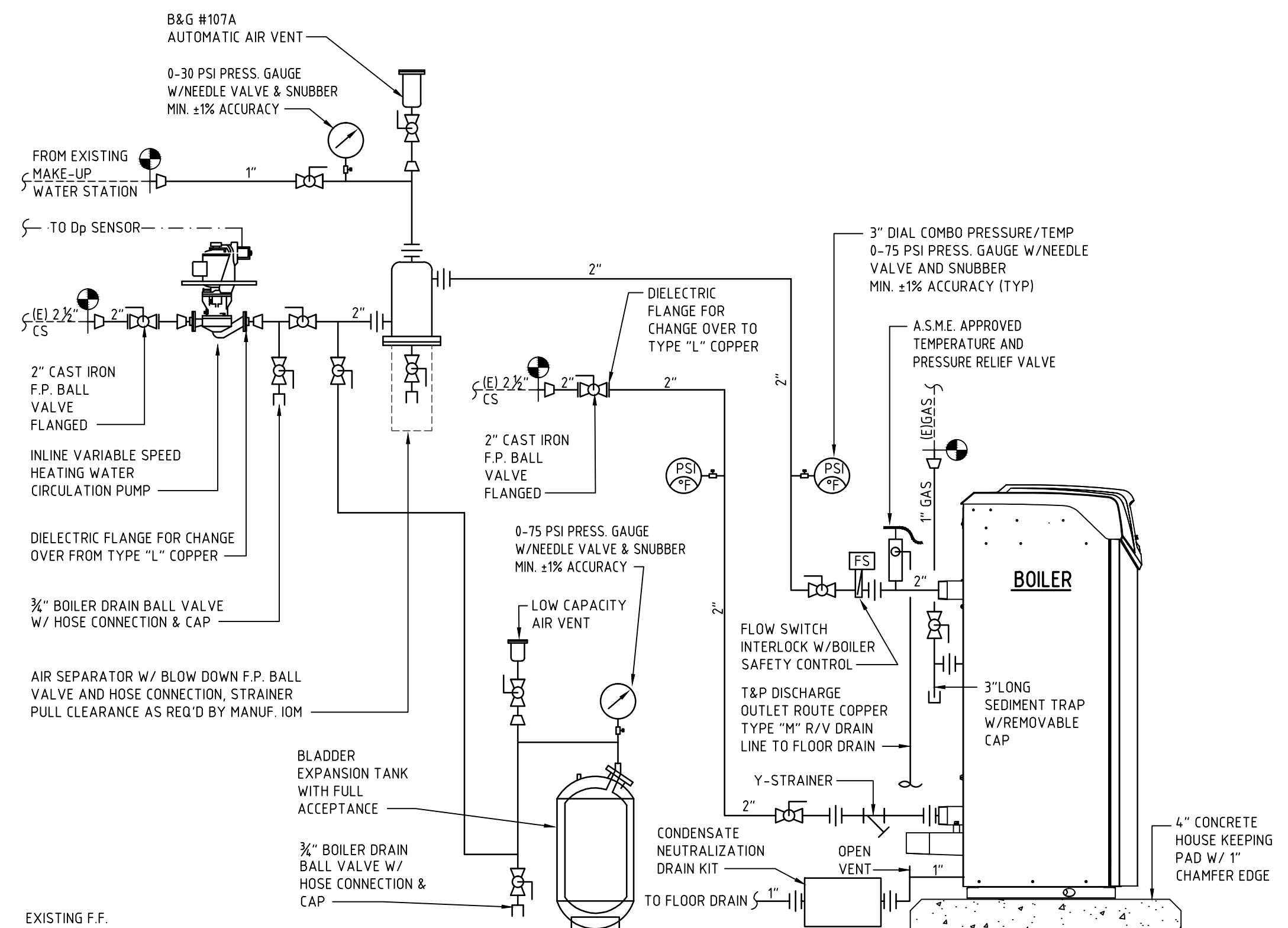
| CONDENSING GAS BOILER SCHEDULE | | | | | | | | | | | | | | | | | |
|--------------------------------|--------------|---------|-------------------|------------|------------|-----------------------|----------|-------------|--------------|-------------------------|---------------------|----------------|-----------|---------|-------------|----------|-------------|
| TAG | MANUFACTURER | MODEL | HEATING HOT WATER | | | HEATING FUEL | | | COMBUSTION | | | | ELECTRIC | | WEIGHT (LB) | OPTIONS: | |
| | | | ENTER (°F) | LEAVE (°F) | FLOW (GPM) | PRES. DROP (FT. W.G.) | TYPE | INPUT (MBH) | OUTPUT (MBH) | EFFICIENCY AT 100% FIRE | COMBUSTION AIR PIPE | VENT AIR PIPE | TURN-DOWN | V / PH | | | MOCP (AMPS) |
| B-1 | LOCHINVAR | FTX725N | 120 | 140 | 60 | 5.2 | NAT. GAS | 600 | 585 | 97.5% | 4" SCH.40 PVC | 4" SCH.40 CPVC | 7:1 | 120 / 1 | 15 | 650 | ①②③ |

OPTIONS:
 ① ONBOARD CONTROLLER WITH:
 -BACNET INTERFACE TO BUILDING CONTROL SYSTEM
 -SYSTEM PUMP CONTROL
 -REMOTE ENABLE / DISABLE
 -FLOW SWITCH
 -OUTDOOR AIR RESET USING 0-10 VDC SIGNAL FROM BUILDING CONTROL SYSTEM
 ② CONDENSATE NEUTRALIZATION KIT
 ③ SIDEWALL VENT TERMINATION KIT, KIT # KIT30046

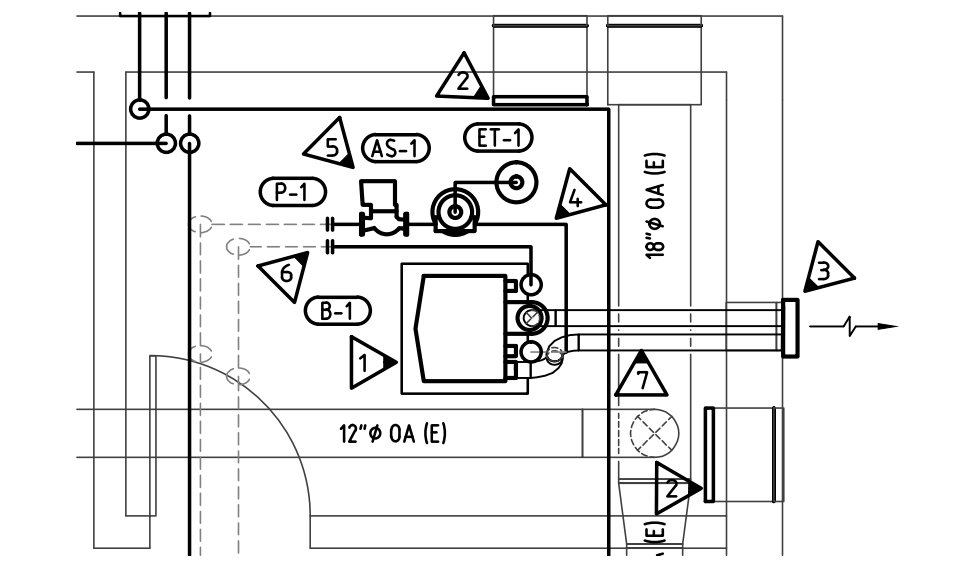
| PUMP SCHEDULE | |
|------------------|------------------------------------------------------------------------------------------------------------|
| TAGS | |
| DUTY | PRIMARY |
| MANUFACTURER | BELL & GOSSETT |
| MODEL | ECOCIRC XL 65-130 |
| PARAMETERS | |
| FLOW | 60 GPM |
| HEAD | 20 FT. |
| SPEED | 2200 RPM |
| EFFICIENCY | 85.67 |
| MOTOR SIZE | 1 HP |
| SUCTION SIZE | 1-1/2 in. |
| DISCHARGE | 1-1/2 in. |
| ELECTRICAL | |
| VOLTS / PHASE | 208/1/60 |
| REQUIRED OPTIONS | ①②③④⑤ |
| KEY TO OPTIONS: | |
| ① | ECM MOTOR CONTROL PANEL |
| ② | PROPORTIONAL CONTROL. PROVIDE AND INSTALL NEW DIFFERENTIAL PRESSURE SENSOR INTO EXISTING PIPING NEAR AH-2. |
| ③ | AIR WATER SEPARATOR BELL & GOSSETT MODEL R-2N. |
| ④ | VERTICAL PRESSURIZED EXPANSION TANK BELL & GOSSETT MODEL B-35LA. |
| ⑤ | CERTIFIED TECHNICIAN STARTUP AND PROGRAMMING. |



DETAIL - LIGHT COMMERCIAL ELECTRIC WATER HEATER
NOT TO SCALE



DETAIL - BOILER SYSTEM PIPING
NOT TO SCALE



A1 ENLARGED BOILER ROOM PLAN
SCALE: 1/4" = 1'-0"

NEW WORK KEYNOTES: (this sheet only)

- ▲ PROVIDE NEW 4" HIGH CONCRETE HOUSEKEEPING PAD FOR NEW BOILER. COORDINATE WITH EXISTING FLOOR DRAIN LOCATION.
- ▲ CAP EXISTING COMBUSTION AIR VENTS WITH SHEET METAL.
- ▲ PROVIDE NEW SIDEWALL TERMINATION OF AIR AND VENT KIT. SEAL AROUND EXISTING OPENING.
- ▲ INSTALL NEW PIPING TO CONNECT NEW BOILER PER DETAIL THIS SHEET.
- ▲ INSTALL NEW PUMP, AIR WATER SEPARATOR, AND EXPANSION TANK.
- ▲ CONNECT TO EXISTING PIPING IN THIS LOCATION.
- ▲ INSTALL PVC/CPVC AIR AND VENT PIPING PER MANUFACTURER'S INSTRUCTIONS. 4" VENT AND 4" INTAKE AIR.

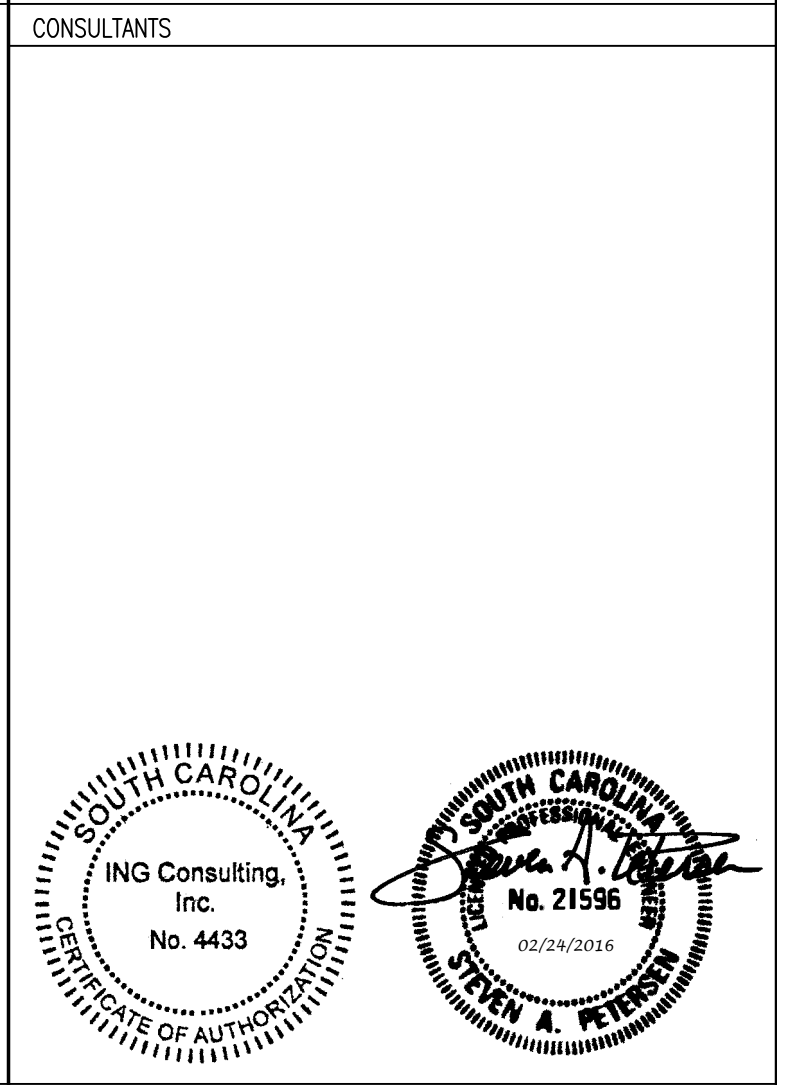


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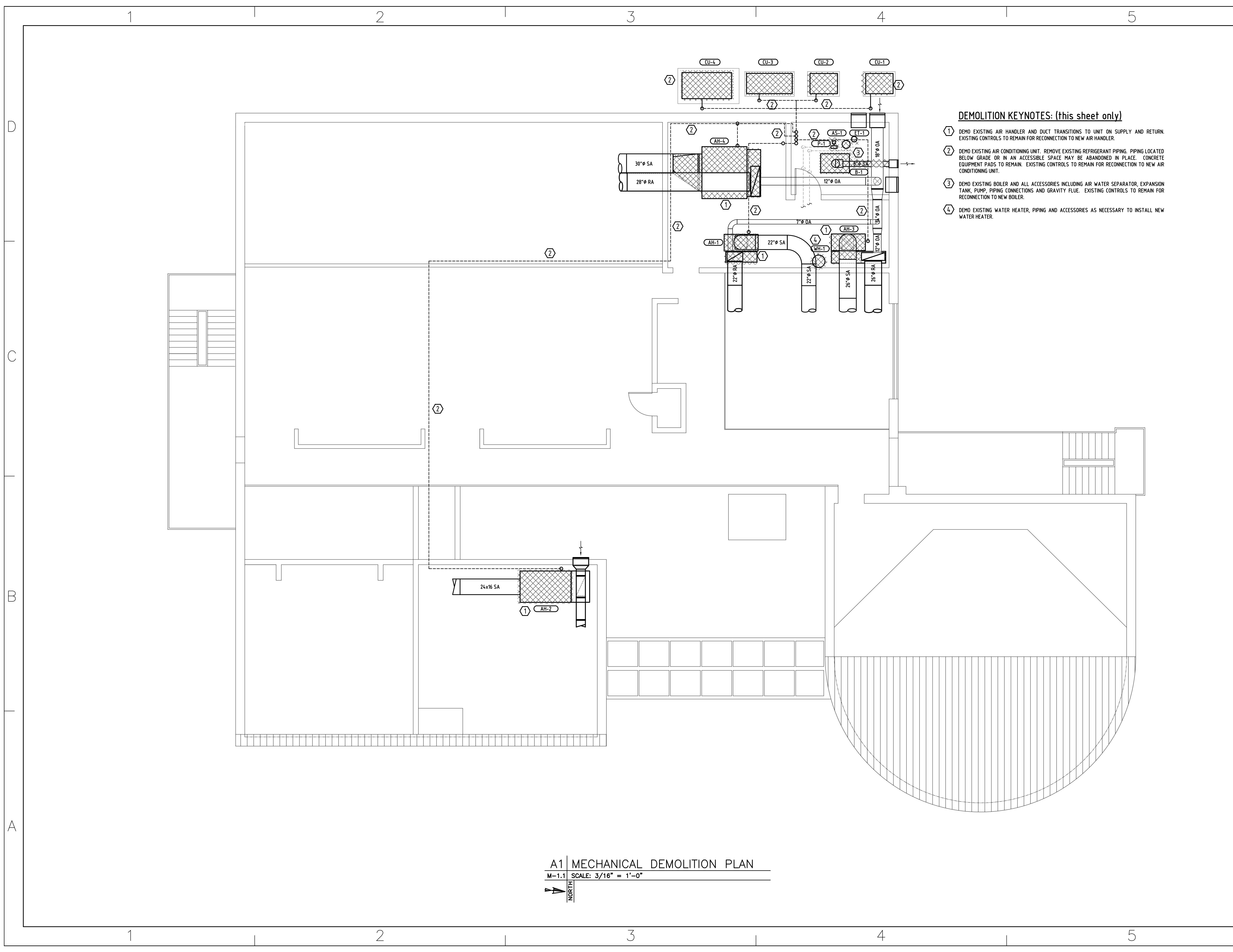
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PROJECT NO: 612-1402
CAD DWG FILE: MECH.DWG
DRAWN BY: LMA
CHK'D BY: SAP

SHEET TITLE:
MECHANICAL DETAILS AND SCHEDULES

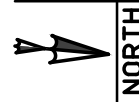
| SHEET NUMBER: | REVISION: |
|---------------|-----------|
| M-1.0 | 0 |



DEMOLITION KEYNOTES: (this sheet only)

- ① DEMO EXISTING AIR HANDLER AND DUCT TRANSITIONS TO UNIT ON SUPPLY AND RETURN. EXISTING CONTROLS TO REMAIN FOR RECONNECTION TO NEW AIR HANDLER.
- ② DEMO EXISTING AIR CONDITIONING UNIT. REMOVE EXISTING REFRIGERANT PIPING. PIPING LOCATED BELOW GRADE OR IN AN ACCESSIBLE SPACE MAY BE ABANDONED IN PLACE. CONCRETE EQUIPMENT PADS TO REMAIN. EXISTING CONTROLS TO REMAIN FOR RECONNECTION TO NEW AIR CONDITIONING UNIT.
- ③ DEMO EXISTING BOILER AND ALL ACCESSORIES INCLUDING AIR WATER SEPARATOR, EXPANSION TANK, PUMP, PIPING CONNECTIONS AND GRAVITY FLUE. EXISTING CONTROLS TO REMAIN FOR RECONNECTION TO NEW BOILER.
- ④ DEMO EXISTING WATER HEATER, PIPING AND ACCESSORIES AS NECESSARY TO INSTALL NEW WATER HEATER.

A1 MECHANICAL DEMOLITION PLAN
 M-1.1 SCALE: 3/16" = 1'-0"



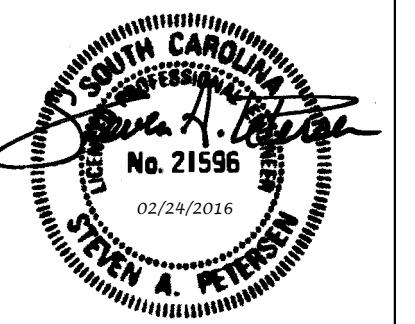
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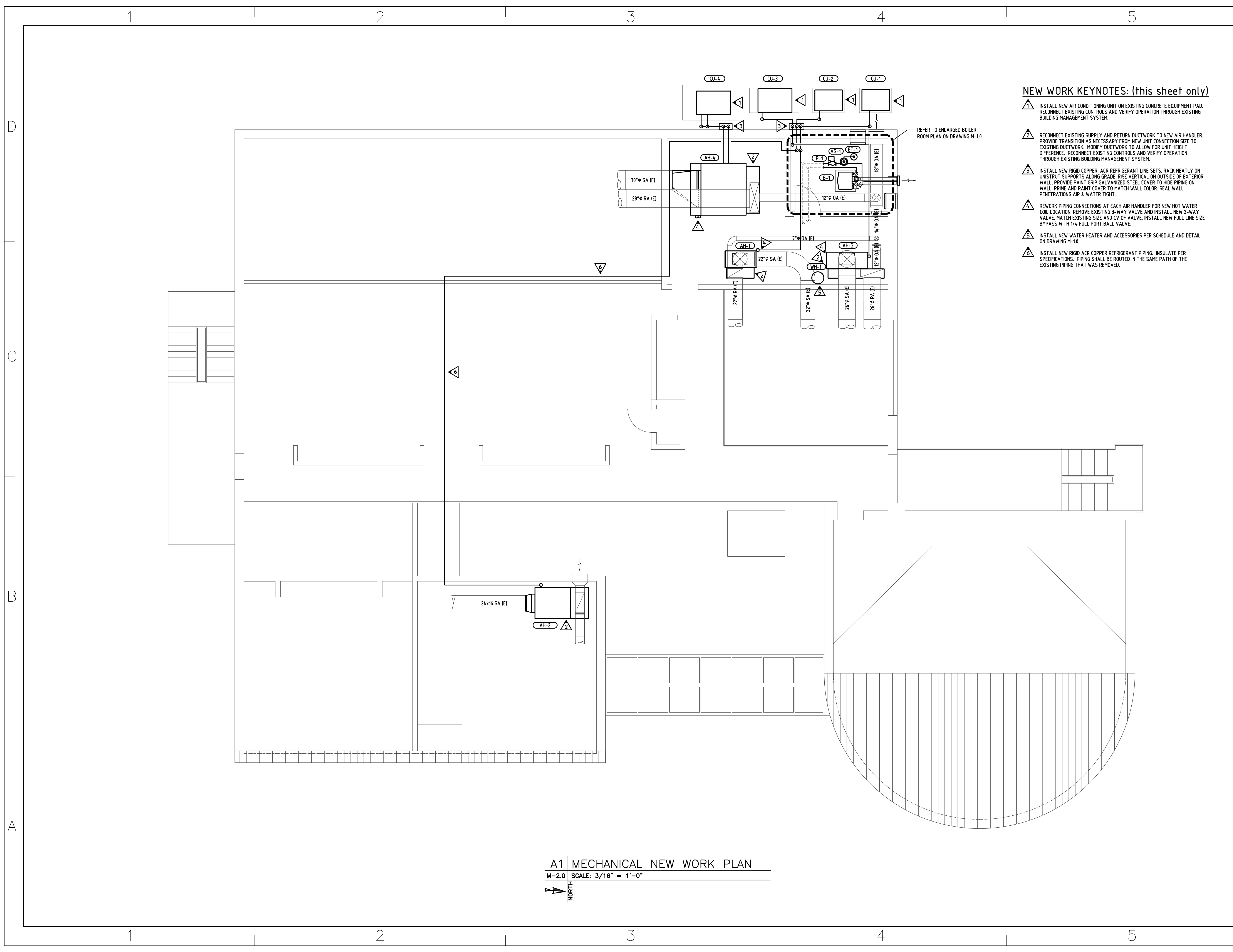
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 DRAWN BY: LMA
 CHK'D BY: SAP

SHEET TITLE:
MECHANICAL DEMOLITION PLAN

| SHEET NUMBER: | REVISION: |
|---------------|-----------|
| M-1.1 | 0 |



NEW WORK KEYNOTES: (this sheet only)

- 1. INSTALL NEW AIR CONDITIONING UNIT ON EXISTING CONCRETE EQUIPMENT PAD. RECONNECT EXISTING CONTROLS AND VERIFY OPERATION THROUGH EXISTING BUILDING MANAGEMENT SYSTEM.
- 2. RECONNECT EXISTING SUPPLY AND RETURN DUCTWORK TO NEW AIR HANDLER. PROVIDE TRANSITION AS NECESSARY FROM NEW UNIT CONNECTION SIZE TO EXISTING DUCTWORK. MODIFY DUCTWORK TO ALLOW FOR UNIT HEIGHT DIFFERENCE. RECONNECT EXISTING CONTROLS AND VERIFY OPERATION THROUGH EXISTING BUILDING MANAGEMENT SYSTEM.
- 3. INSTALL NEW RIGID COPPER, ACR REFRIGERANT LINE SETS. RACK NEATLY ON UNISTRUT SUPPORTS ALONG GRADE. RISE VERTICAL ON OUTSIDE OF EXTERIOR WALL. PROVIDE PAINT GRIP GALVANIZED STEEL COVER TO HIDE PIPING ON WALL. PRIME AND PAINT COVER TO MATCH WALL COLOR. SEAL WALL PENETRATIONS AIR & WATER TIGHT.
- 4. REWORK PIPING CONNECTIONS AT EACH AIR HANDLER FOR NEW HOT WATER COIL LOCATION. REMOVE EXISTING 3-WAY VALVE AND INSTALL NEW 2-WAY VALVE. MATCH EXISTING SIZE AND CV OF VALVE. INSTALL NEW FULL LINE SIZE BYPASS WITH 1/4 FULL PORT BALL VALVE.
- 5. INSTALL NEW WATER HEATER AND ACCESSORIES PER SCHEDULE AND DETAIL ON DRAWING M-1.0.
- 6. INSTALL NEW RIGID ACR COPPER REFRIGERANT PIPING. INSULATE PER SPECIFICATIONS. PIPING SHALL BE ROUTED IN THE SAME PATH OF THE EXISTING PIPING THAT WAS REMOVED.

A1 | MECHANICAL NEW WORK PLAN
 M-2.0 SCALE: 3/16" = 1'-0"
 NORTH



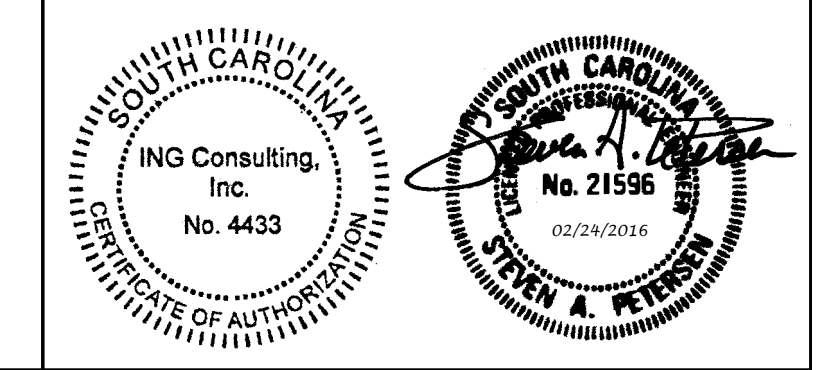
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MECHANICAL NEW WORK PLAN

| SHEET NUMBER: | REVISION: |
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| M-2.0 | 0 |



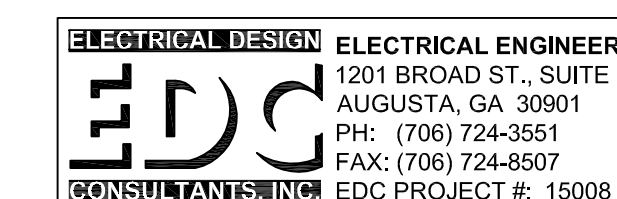
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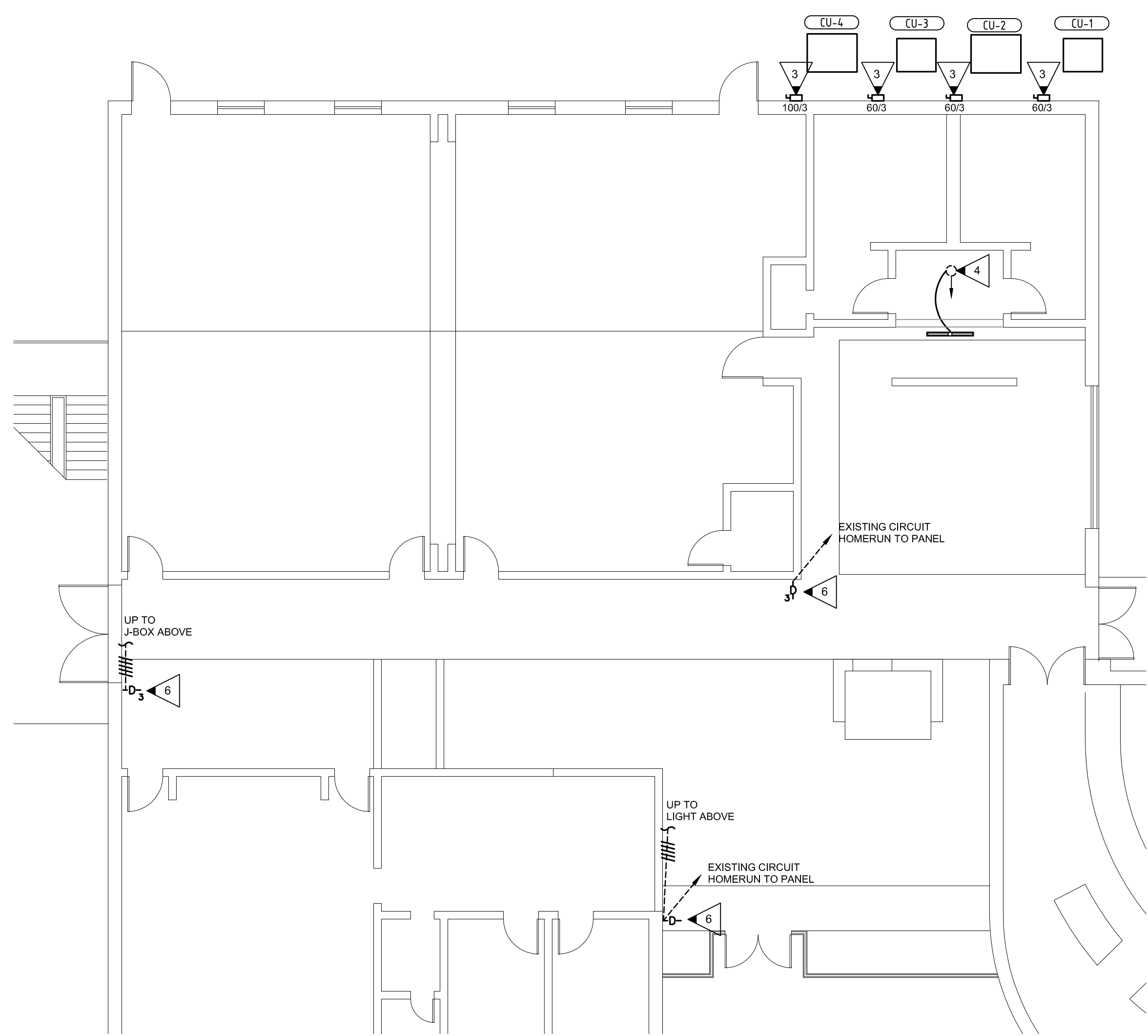
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| CAD DWG FILE: | |
| DRAWN BY: | K. HOLT |
| CHK'D BY: | |
| SHEET TITLE: | |

ELECTRICAL PLANS

| | | | |
|---------------|-------|-----------|---|
| SHEET NUMBER: | E-1.0 | REVISION: | 0 |
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1 ELECTRICAL PLANS - FIRST FLOOR (PARTIAL)
E-1.0 SCALE: 1/8"=1'-0"

KEYED NOTES:

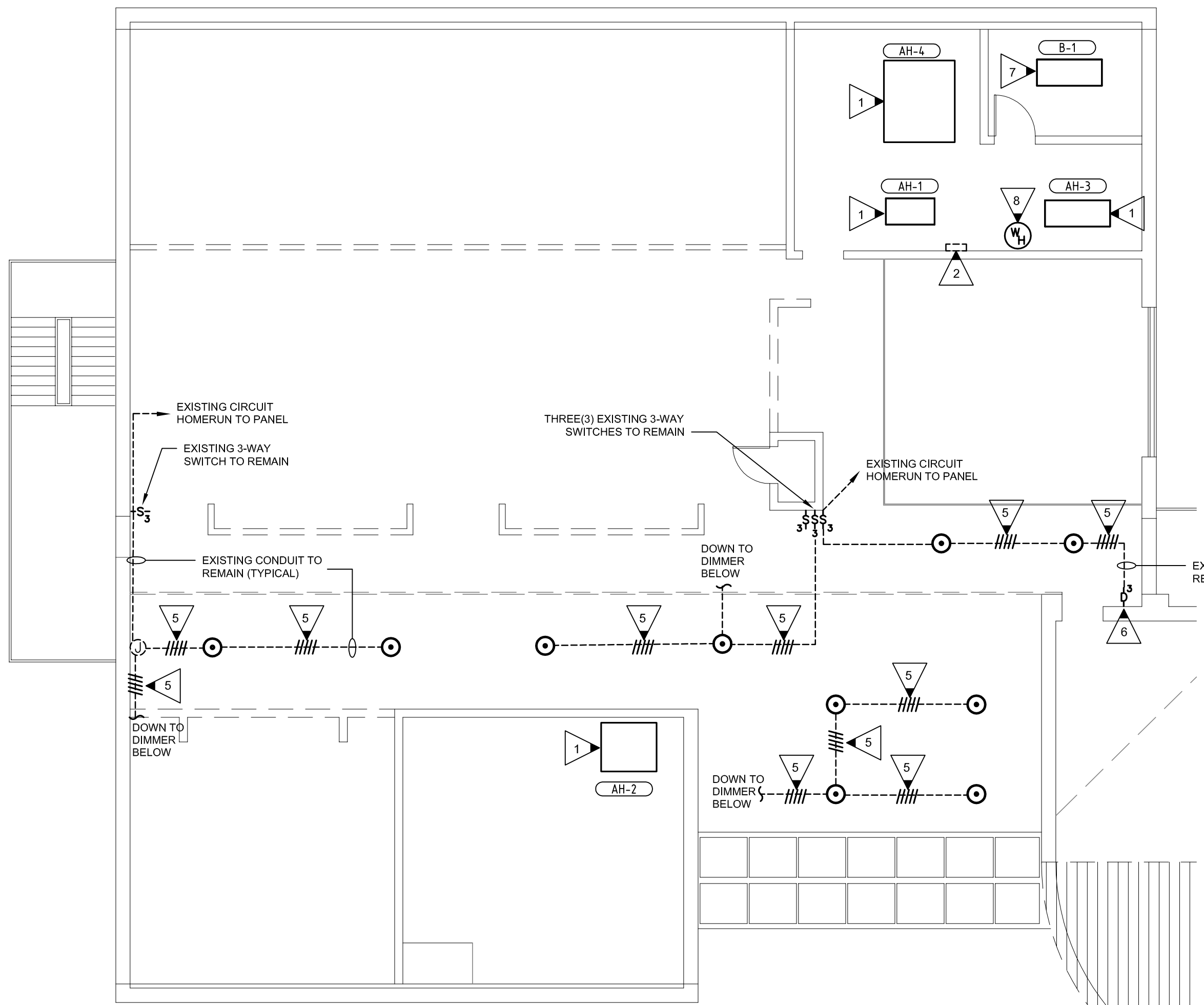
- 1 EXISTING AIR HANDLER UNIT AT THIS LOCATION TO BE REMOVED AND REPLACED WITH NEW UNIT. ALL EXISTING CONDUCTORS CURRENTLY SERVING UNIT TO REMAIN. DIVISION 16 TO DISCONNECT CONDUCTORS FROM EXISTING UNIT BEING REMOVED AND RECONNECT TO NEW UNIT. SPLICE/EXTEND CONDUCTORS AS REQUIRED TO REACH TERMINALS OF NEW UNIT.
- 2 EXISTING 120/208V/225A "SQUARE-D HOOD" PANEL "C" TO REMAIN. DIVISION 16 TO REMOVE FOUR(4) EXISTING 3-POLE BREAKERS CURRENTLY SERVING EXISTING AIR HANDLER UNITS BEING REMOVED. DIVISION 16 TO INSTALL FOUR(4) NEW 15A/3P BREAKERS TO SERVE NEW AIR HANDLER UNITS AND RECONNECT EXISTING FEEDER CONDUCTORS AT PANEL TO NEW BREAKERS. TURN OVER ALL EXISTING BREAKER TO OWNER.
- 3 EXISTING DISCONNECT AT THIS LOCATION SERVING EXISTING CONDENSING UNITS TO BE REMOVED. DIVISION 16 TO PROVIDE NEW NEMA-3R DISCONNECT WITH SIZE AS NOTED ON DRAWINGS AT SAME LOCATION. DIVISION 16 TO REUSE BOTH LINE AND LOAD SIDE CONDUCTORS TO BE RECONNECTED TO NEW DISCONNECT. DIVISION 16 TO PROVIDE NEW FUSES IN DISCONNECT MATCHING NEW CONDENSING UNIT NAMEPLATE DATA. PROVIDE NEW IDENTIFICATION LABELS ON DISCONNECTS DENOTING UNIT NAME AND PANEL/REAKER SERVING UNIT.
- 4 EXISTING DOWNLIGHT AT THIS LOCATION SHALL BE RELOCATED APPROXIMATELY 18" IN THE DIRECTION AS INDICATED AND HOUSING ADJUSTED TO VERTICAL POSITION. VERIFY RELOCATION WITH OWNER PRIOR TO PERFORMING WORK.
- 5 DIVISION 16 TO UTILIZE EXISTING CONDUIT TO INSTALL NEW CONDUCTORS AS SHOWN WITH 600V RATED 0-10V CONDUCTORS FOR DIMMING CAPABILITIES.
- 6 DIVISION 16 TO REMOVE EXISTING NORMAL OR 3-WAY TOGGLE SWITCH AT THIS LOCATION AND INSTALL NEW 0-10V DIMMER AS SHOWN.
- 7 EXISTING GAS FIRED BOILER AND BOILER PUMP TO BE REPLACED WITH NEW GAS FIRED BOILER AND BOILER PUMP. DIVISION 16 TO DISCONNECT EXISTING 120V CIRCUIT FOR BOILER CONTROLS AND RECONNECT TO UNIT. DIVISION 16 TO DISCONNECT EXISTING CIRCUIT SERVING BOILER PUMP AND RECONNECT TO NEW PUMP. EXTEND ALL EXISTING CONDUCTORS AS REQUIRED TO REACH UNIT TERMINAL LOCATIONS.
- 8 EXISTING WATER HEATER AT THIS LOCATION TO BE REPLACED WITH NEW UNIT OF SAME ELECTRICAL CHARACTERISTICS. DIVISION 16 TO DISCONNECT EXISTING BRANCH CIRCUIT CONDUCTORS AND RECONNECT TO NEW UNIT.

LEGEND

- LIGHTING AND POWER**
- 4'-0" LINEAR FLUORESCENT FIXTURE TO BE SURFACE MOUNTED TO UNDERSIDE OF EXISTING METAL TRUSS. PROVIDE FIXTURE WITH HOUSING, CURVED CLEAR ACRYLIC LENS, WITH EXTRUDED WHITE MICRO BAFFLE. FIXTURE TO BE CORELITE "RB-W-B-2-N5" SERIES OR EQUAL BY LITHONIA, COLUMBIA, OR PHILIPS.
- LAMPS: TWO(2) - 28WATT, T5 AT @ 4100°K. BALLAST: MULTIVOLT ELECTRONIC
- L.E.D. FIXTURE, ROUND PENDANT MOUNTED HIGH BAY WITH DIE FORMED ALUMINUM HOUSING, ANODIZED ALUMINUM REFLECTOR, AND WHITE POWDER COAT FINISH. DIVISION 16 SHALL REMOVE EXISTING FIXTURE AT END OF EXISTING PENDANT STEM AND CONNECT NEW FIXTURE. FIXTURE SHALL BE NORABACHI "HBDM" SERIES OR PREAPPROVED EQUAL.
- LAMPS: L.E.D. WITH MINIMUM 12,000 DELIVERED LUMENS WITH MAXIMUM 150 WATT CONSUMPTION. 80" WIDE LAMP DISTRIBUTION AT 4000°K
- DRIVER: MULTIVOLT WITH 0-10V DIMMING OPTION.
- THREE OR FOUR WAY SWITCH AS INDICATED. +3'-6" MOUNTING HEIGHT.
- FLUSH WALL MOUNTED DIMMER AT +3'-6" AFF. LEVITON "ILLUMATECH - ILP710" 0-10VDC CAPABLE DIMMER. EQUALS BY LUTRON, WATTSSTOPPER, HUBBELL, OR COOPER. (DEVICE SHALL OPERATE FIXTURE LOAD WITHOUT ADDITIONAL POWER PACK). DIVISION 16 SHALL PROVIDE ALL ADDITIONAL 0-10V CONDUCTORS TO ALL FIXTURES AS SHOWN CONTROLLED VIA DIMMER. REFER TO DIMMER MANUFACTURER'S INSTALLATION GUIDELINES AND 3-WAY OPERATION WHERE SHOWN.

GENERAL NOTES:

1. DO NOT SCALE DRAWINGS TO LOCATE EQUIPMENT OR OUTLETS.
2. MOUNTING HEIGHTS AS INDICATED ON THE DRAWINGS SHALL BE FROM THE FINISHED FLOOR TO THE CENTER LINE OF THE OUTLET BOX.
3. THE ELECTRICAL DRAWINGS ARE ONLY A PART OF THE CONTRACT DOCUMENTS. ALL OF THE DRAWINGS AND SPECIFICATIONS MUST BE REVIEWED FOR THEIR INTERRELATIONSHIP AND REQUIRED COORDINATION BETWEEN DISCIPLINES.
4. ALL CONDUIT, OUTLET BOXES, AND LOW VOLTAGE CABLING SHALL BE APPROPRIATELY SUPPORTED THROUGHOUT THE PROJECT. SUPPORT OF THESE ITEMS BY CEILING GRID OR GRID SUPPORT WIRES IS NOT ACCEPTABLE.



2 ELECTRICAL PLANS - SECOND FLOOR (PARTIAL)
E-1.0 SCALE: 1/8"=1'-0"