

# CAROLINA FOREST ELEMENTARY HVAC RENEWAL HORRY COUNTY SCHOOLS CAROLINA FOREST, SOUTH CAROLINA

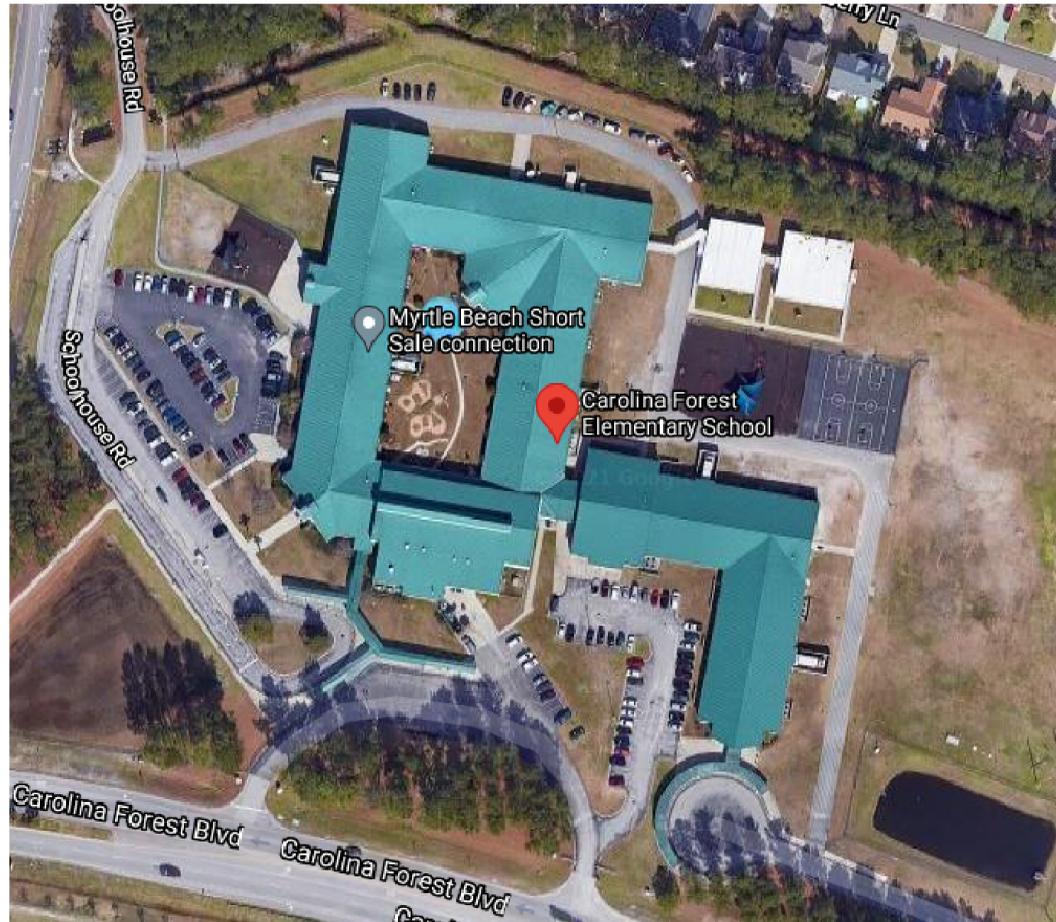


| JOB NUMBER  | 21-097     |
|-------------|------------|
| DESIGNED BY | US         |
| CHECKED BY  | JJC        |
| DATE        | 11/17/2021 |

**JOB TITLE**  
CAROLINA FOREST ELEM.  
285 CAROLINA FOREST BLVD.  
MYRTLE BEACH, SC, 29579  
HVAC RENEWAL

**SHEET TITLE**  
COVER SHEET

**SHEET**  
CS1.0  
1 OF 1

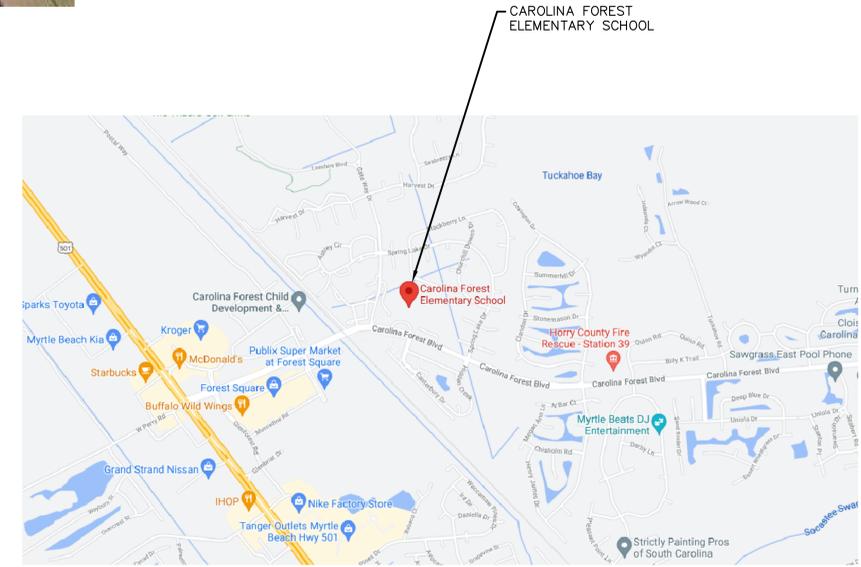


**SITE PLAN**  
N.T.S.



**SHEET LIST**

- CS1.0 COVER SHEET
- MECHANICAL PLANS**
  - M1.0 MECHANICAL FLOOR PLAN SECTION 1
  - M1.1 MECHANICAL FLOOR PLAN SECTION 2
  - M1.2 MECHANICAL FLOOR PLAN SECTION 3
  - M1.3 MECHANICAL FLOOR PLAN SECTION 5
  - M1.4 MECHANICAL FLOOR PLAN SECTION 6
  - M1.5 MECHANICAL FLOOR PLAN ALT #1 - NAT. GAS PLAN
  - M2.0 MECHANICAL DETAILS AND SCHEDULES
  - M2.1 MECHANICAL SEISMIC DETAILS
  - M3.0 MECHANICAL COMCHECK
- ELECTRICAL PLANS**
  - E1.0 ELECTRICAL FLOOR PLAN - SECTION 1
  - E1.1 ELECTRICAL FLOOR PLAN - SECTION 2
  - E1.2 ELECTRICAL FLOOR PLAN - SECTION 3
  - E1.3 ELECTRICAL FLOOR PLAN - SECTION 5
  - E1.4 ELECTRICAL FLOOR PLAN - SECTION 6
  - E2.0 SYMBOLS AND SCHEDULES
  - E2.1 SPECIFICATIONS



**VICINITY MAP**  
N.T.S.







NOTE: CEILING REMOVAL IS LIMITED TO THAT REQUIRED FOR INSTALLATION OF SMOKE DETECTOR, CARBON MONOXIDE DETECTOR, AND AHU.

NOTE: THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS. SUBMISSION OF BIDS IS CONSIDERED VERIFICATION THAT THE CONTRACTOR HAS VISITED THE SITE. NO EXTRAS WILL BE ALLOWED DUE TO LACK OF KNOWLEDGE OF THE EXISTING CONDITIONS.

**FIRE RATED WALLS**

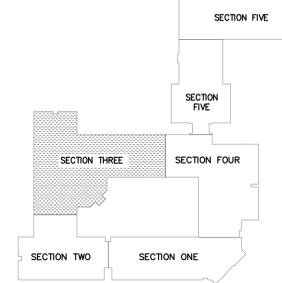
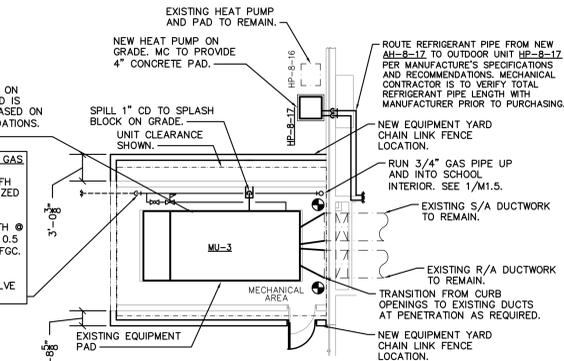
|       |             |
|-------|-------------|
| ..... | 1 HOUR WALL |
| ----- | 2 HOUR WALL |
| ----- | 4 HOUR WALL |

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO APPLY THE PROPER FIRE-RATING DETAIL FOR ALL DUCT AND PIPE PENETRATIONS THRU FIRE-RATED WALLS AND SMOKE PARTITIONS.

NEW OUTSIDE AIR UNIT TO BE LOCATED ON EXISTING PAD AS SHOWN. IF A NEW PAD IS REQUIRED, THE FOOTPRINT SHALL BE BASED ON THE UNIT MANUFACTURER'S RECOMMENDATIONS. SEE 1/M2.0

ALT #1 - PACKAGED DX UNIT WITH NATURAL GAS HEAT - PIPING:  
FROM GAS MAIN TO REGULATOR: 1" - 350 CFH @ 1850 FT TEL, 2.0 PSI INLET, 1.0 PSI PD, SIZED PER 402.4(22) OF 2018 SFGC.

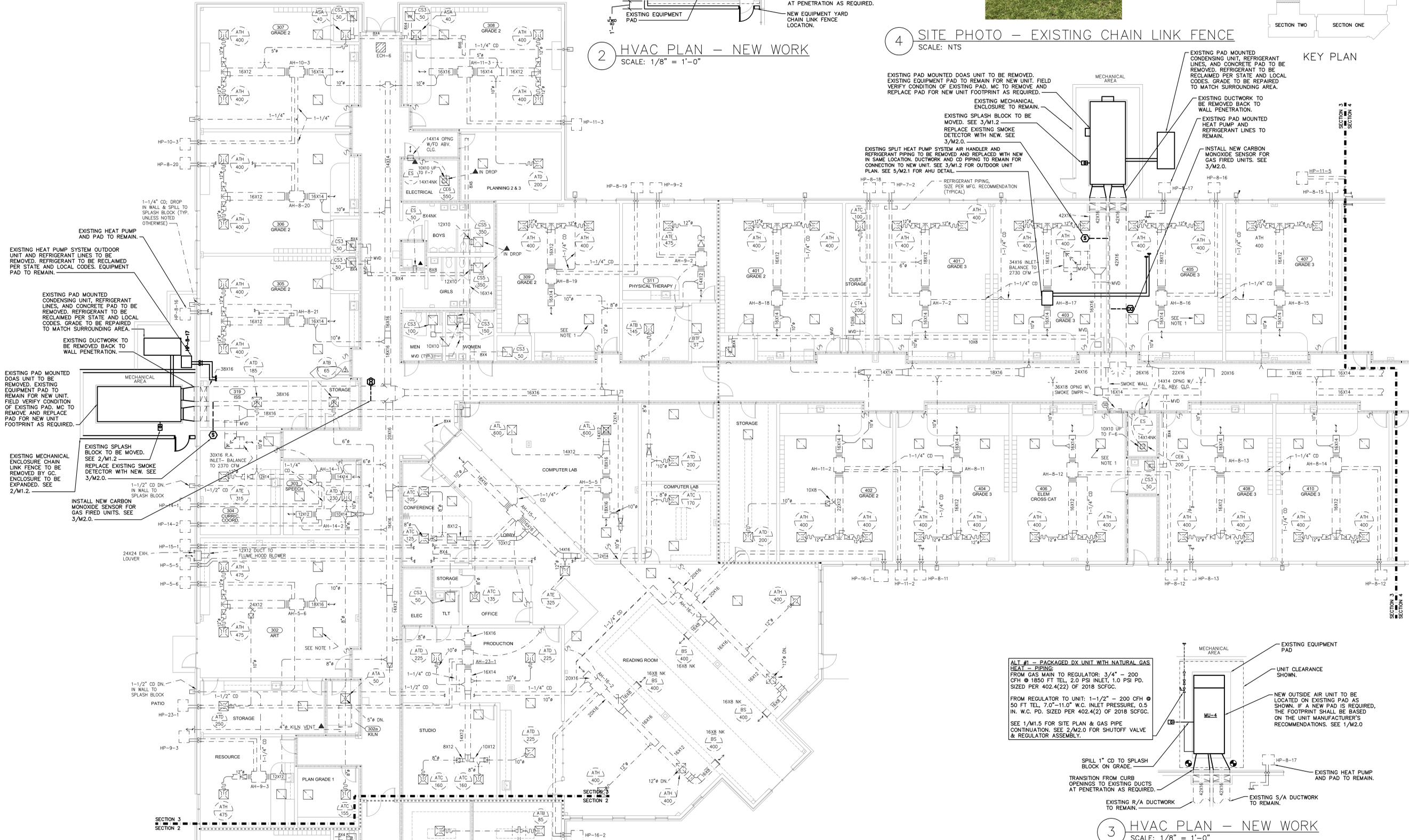
FROM REGULATOR TO UNIT: 1-1/2" - 150 CFH @ 50 FT TEL, 7.0"-11.0" W.C. INLET PRESSURE, 0.5 IN. W.C. PD, SIZED PER 402.4(2) OF 2018 SFGC.  
SEE 1/M1.5 FOR SITE PLAN & GAS PIPE CONTINUATION. SEE 2/M2.0 FOR SHUTOFF VALVE & REGULATOR ASSEMBLY.



2 HVAC PLAN - NEW WORK  
SCALE: 1/8" = 1'-0"

4 SITE PHOTO - EXISTING CHAIN LINK FENCE  
SCALE: NTS

KEY PLAN



1 HVAC PLAN - SECTION THREE  
SCALE: 1/8" = 1'-0"

3 HVAC PLAN - NEW WORK  
SCALE: 1/8" = 1'-0"

**MCKNIGHT • SMITH**  
**WARD • GRIFFIN**  
**ENGINEERS, INCORPORATED**  
4223 South Boulevard  
Charlotte, NC 28209  
704/527-2112

21-097

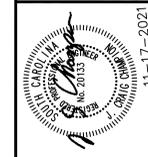
11-17-2021

| JOB NUMBER | REVISION DATES | REVISION DESCRIPTION |
|------------|----------------|----------------------|
| 21-097     | 1/17/2021      | ISS                  |
|            |                | JOC                  |
|            |                | DATE                 |

JOB TITLE: CAROLINA FOREST ELEM. 285 CAROLINA FOREST BLVD. MYRTLE BEACH, SC, 29579 HVAC RENEWAL

SHEET TITLE: MECHANICAL FLOOR PLAN SECTION 3

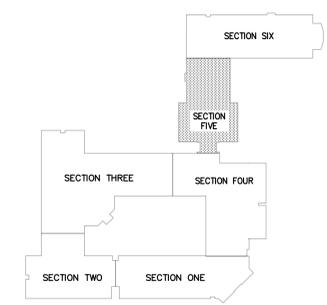
SHEET: M1.2  
3 OF 9



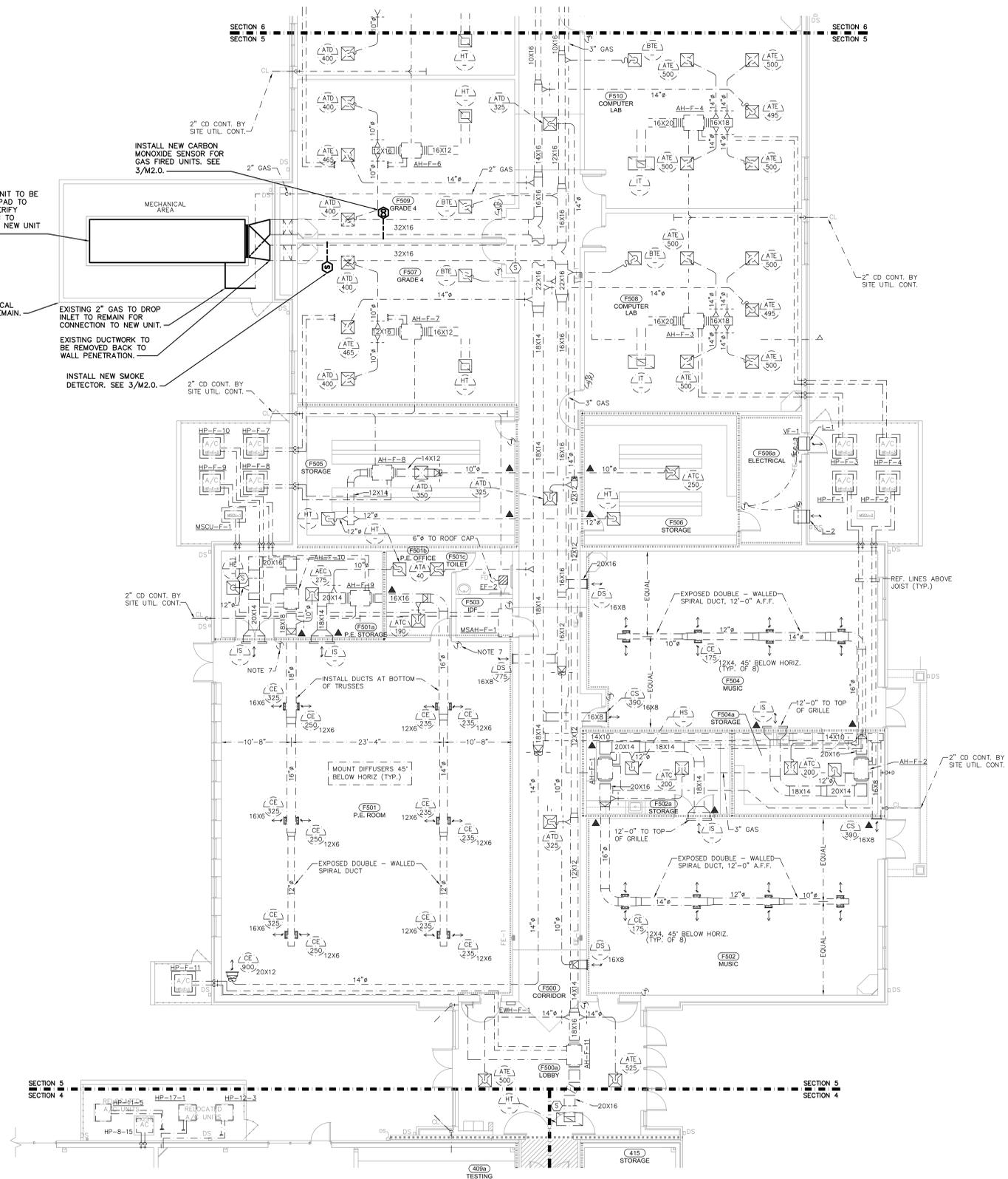
| REVISION | DATE       | DESCRIPTION      |
|----------|------------|------------------|
| 1        | 11-17-2021 | ISSUE FOR PERMIT |
| 2        | 11/17/2021 | ISSUE FOR PERMIT |

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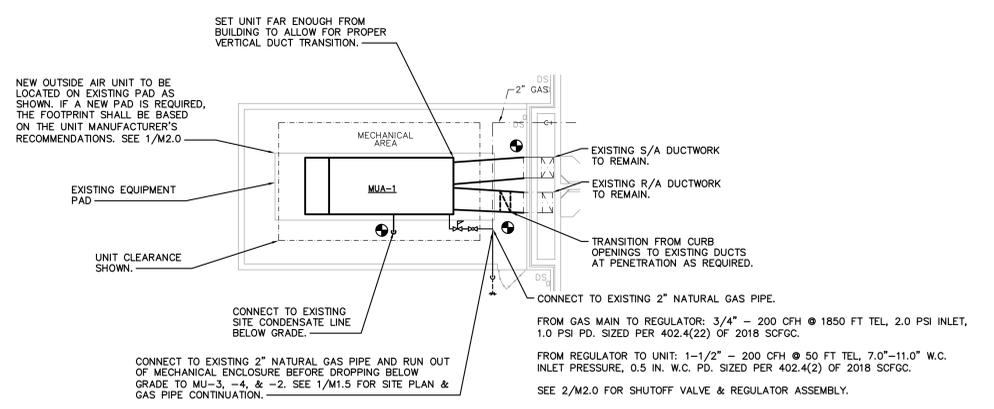
**SHEET TITLE**  
MECHANICAL FLOOR PLAN  
SECTION 5



**KEY PLAN**



**1 HVAC PLAN - SECTION FIVE**  
SCALE: 1/8" = 1'-0"



**2 HVAC PLAN - NEW WORK**  
SCALE: 1/8" = 1'-0"

EXISTING PAD MOUNTED DOAS UNIT TO BE REMOVED. EXISTING EQUIPMENT PAD TO REMAIN FOR NEW UNIT. FIELD VERIFY CONDITION OF EXISTING PAD. MC TO REMOVE AND REPLACE PAD FOR NEW UNIT FOOTPRINT AS REQUIRED.

EXISTING MECHANICAL ENCLOSURE TO REMAIN.

EXISTING 2" GAS TO DROP INLET TO REMAIN FOR CONNECTION TO NEW UNIT.

EXISTING DUCTWORK TO BE REMOVED BACK TO WALL PENETRATION.

INSTALL NEW SMOKE DETECTOR. SEE 3/M2.0.

2" CD CONT. BY SITE UTIL. CONT.

NEW OUTSIDE AIR UNIT TO BE LOCATED ON EXISTING PAD AS SHOWN. IF A NEW PAD IS REQUIRED, THE FOOTPRINT SHALL BE BASED ON THE UNIT MANUFACTURER'S RECOMMENDATIONS. SEE 1/M2.0

SET UNIT FAR ENOUGH FROM BUILDING TO ALLOW FOR PROPER VERTICAL DUCT TRANSITION.

EXISTING S/A DUCTWORK TO REMAIN.

EXISTING R/A DUCTWORK TO REMAIN.

TRANSITION FROM CURB OPENINGS TO EXISTING DUCTS AT PENETRATION AS REQUIRED.

CONNECT TO EXISTING 2" NATURAL GAS PIPE.

FROM GAS MAIN TO REGULATOR: 3/4" - 200 CFH @ 1850 FT TEL, 2.0 PSI INLET, 1.0 PSI PD, SIZED PER 402.4(2) OF 2018 SCFGC.

FROM REGULATOR TO UNIT: 1-1/2" - 200 CFH @ 50 FT TEL, 7.0"-11.0" W.C. INLET PRESSURE, 0.5 IN. W.C. PD. SIZED PER 402.4(2) OF 2018 SCFGC.

SEE 2/M2.0 FOR SHUTOFF VALVE & REGULATOR ASSEMBLY.

CONNECT TO EXISTING SITE CONDENSATE LINE BELOW GRADE.

CONNECT TO EXISTING 2" NATURAL GAS PIPE AND RUN OUT OF MECHANICAL ENCLOSURE BEFORE DROPPING BELOW GRADE TO MU-3, -4, & -2. SEE 1/M1.5 FOR SITE PLAN & GAS PIPE CONTINUATION.

UNIT CLEARANCE SHOWN.

NOTE: CEILING REMOVAL IS LIMITED TO THAT REQUIRED FOR INSTALLATION OF SMOKE AND CARBON MONOXIDE DETECTORS.

| FIRE RATED WALLS |             |
|------------------|-------------|
| .....            | 1 HOUR WALL |
| -----            | 2 HOUR WALL |
| -----            | 4 HOUR WALL |

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO APPLY THE PROPER FIRE-SAFING DETAIL FOR ALL DUCT AND PIPE PENETRATIONS THRU FIRE-RATED WALLS AND SMOKE PARTITIONS.

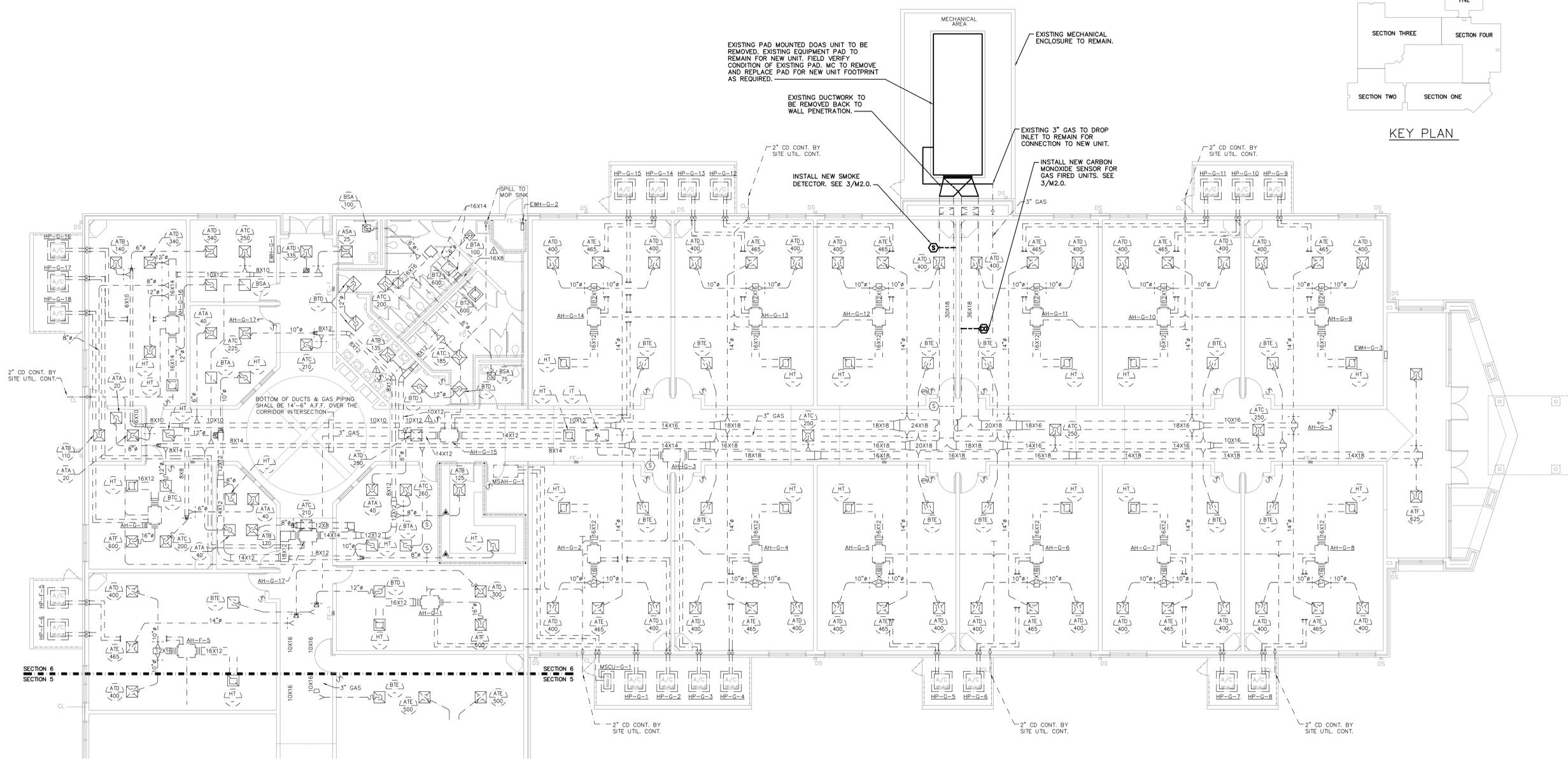
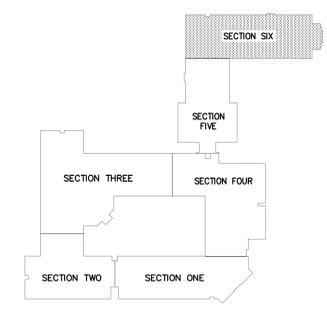
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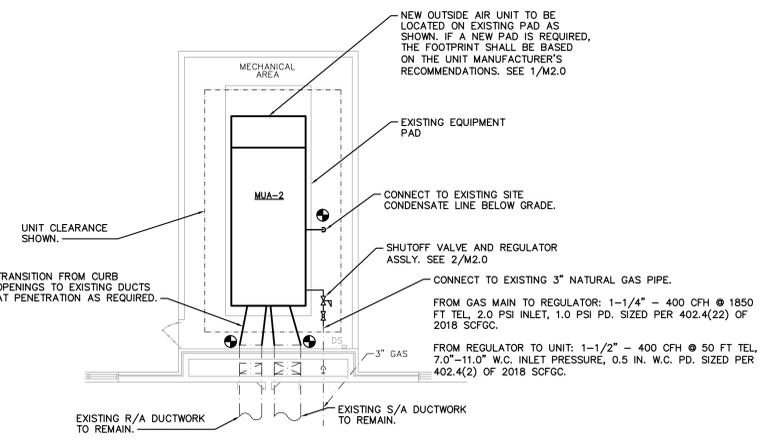
| REVISION DESCRIPTION | REVISION DATES |
|----------------------|----------------|
| 1                    | 11-17-2021     |

**CAROLINA FOREST ELEM.**  
**285 CAROLINA FOREST BLVD.**  
**MYRTLE BEACH, SC, 29579**  
**HVAC RENEWAL**

**MECHANICAL FLOOR PLAN**  
**SECTION 6**



**1 HVAC PLAN - SECTION SIX**  
SCALE: 1/8" = 1'-0"



**2 HVAC PLAN - NEW WORK**  
SCALE: 1/8" = 1'-0"

NOTE: CEILING REMOVAL IS LIMITED TO THAT REQUIRED FOR INSTALLATION OF SMOKE AND CARBON MONOXIDE DETECTORS.

| FIRE RATED WALLS |             |
|------------------|-------------|
| .....            | 1 HOUR WALL |
| -----            | 2 HOUR WALL |
| -----            | 4 HOUR WALL |

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO APPLY THE PROPER FIRE-SAFING DETAIL FOR ALL DUCT AND PIPE PENETRATIONS THRU FIRE-RATED WALLS AND SMOKE PARTITIONS.

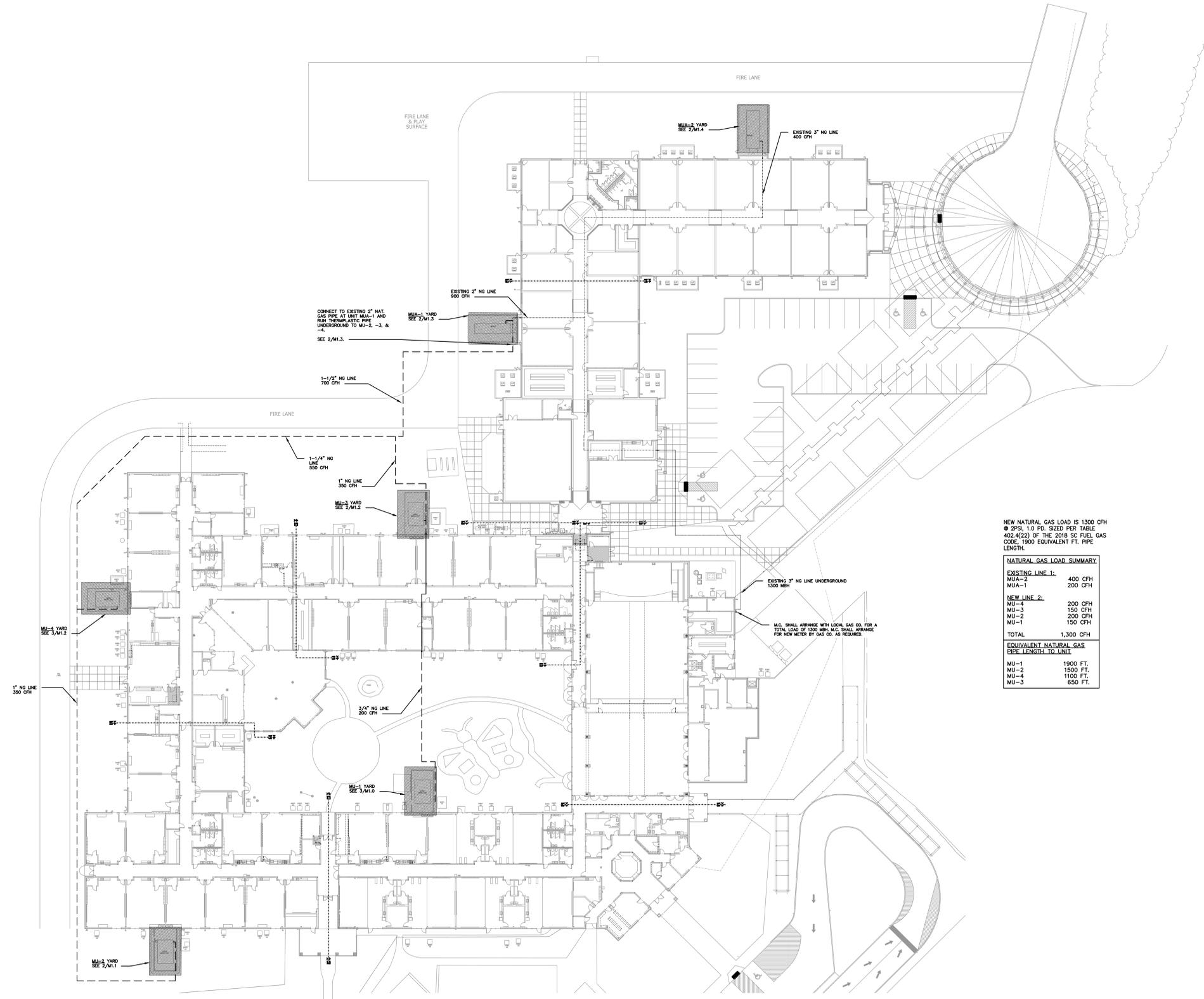
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|-------------|------------|----------------------|
| DESIGNED BY | LMS        |                      |
| CHECKED BY  | JJC        |                      |
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**CAROLINA FOREST ELEM.**  
**285 CAROLINA FOREST BLVD.**  
**MYRTLE BEACH, SC, 29579**  
**HVAC RENEWAL**

**MECHANICAL FLOOR PLAN**  
**ALT #1 - NAT. GAS PLAN**



NEW NATURAL GAS LOAD IS 1300 CFH @ 2PSI, 1.0 PD, SIZED PER TABLE 402.4(22) OF THE 2018 SC FUEL GAS CODE, 1900 EQUIVALENT FT. PIPE LENGTH.

| NATURAL GAS LOAD SUMMARY |           |
|--------------------------|-----------|
| EXISTING LINE 1:         |           |
| MUA-2                    | 400 CFH   |
| MUA-1                    | 200 CFH   |
| NEW LINE 2:              |           |
| MU-4                     | 200 CFH   |
| MU-3                     | 150 CFH   |
| MU-2                     | 200 CFH   |
| MU-1                     | 150 CFH   |
| TOTAL                    | 1,300 CFH |

| EQUIVALENT NATURAL GAS PIPE LENGTH TO UNIT |          |
|--|----------|
| MU-1                                       | 1900 FT. |
| MU-2                                       | 1500 FT. |
| MU-4                                       | 1100 FT. |
| MU-3                                       | 650 FT.  |

**1 SITE PLAN - NATURAL GAS LAYOUT**  
SCALE: 1" = 30'-0"

**MECHANICAL SYSTEMS, SERVICE SYSTEMS AND EQUIPMENT METHOD OF COMPLIANCE**

Prescriptive Energy Cost Budget

Thermal Zone: Horry County (3A)

Exterior Design Conditions

Winter Dry Bulb: 25  
Summer Dry Bulb: 96

Interior Design Conditions

Winter Dry Bulb: 70  
Summer Dry Bulb: 75  
Relative Humidity: 50%

Building Heating Load: 4967.7 MBH

Building Cooling Load: 4128.1 MBH

Mechanical Space Conditioning System

Unitary: Description of Unit: Packaged DOAS Unit w/Energy Recovery

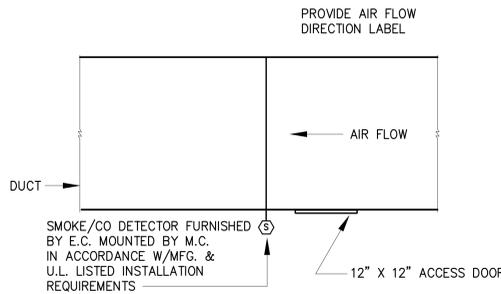
Heating Efficiency: Refer to HVAC Equipment Schedules  
Cooling Efficiency: Refer to HVAC Equipment Schedules  
Heat Output of Unit: Refer to HVAC Equipment Schedules  
Cooling Output of Unit: Refer to HVAC Equipment Schedules

List Equipment Efficiencies:

Equipment Schedules with Motors (Mechanical Systems)

Motor Horsepower: Comply w/ 2009 International Energy Code  
Number of Phases: Comply w/ 2009 International Energy Code  
Minimum Efficiency: Comply w/ 2009 International Energy Code  
Motor Type: Comply w/ 2009 International Energy Code  
Number of Poles: Comply w/ 2009 International Energy Code

Designer Statement: To the best of my knowledge and belief, the design of this building complies with the 2009 International Energy Conservation code.



**3 SMOKE/CO DETECTOR MOUNTING DETAIL**  
SCALE: NTS  
NOTE: M.C. TO WIRE FOR UNIT SHUTDOWN, E.C. TO WIRE TO FIRE ALARM SYSTEM.

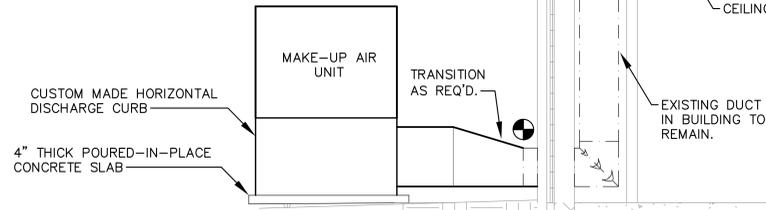
**APPROVED MANUFACTURER LISTING**

THE FOLLOWING MANUFACTURER'S LISTING (ALPHABETICALLY ORDERED) IS PROVIDED FOR BIDDING PURPOSES AND DOES NOT IMPLY OR PROVIDE A GUARANTEE OF SUBMITTAL APPROVAL. ALL ITEMS SUBMITTED SHALL MEET OR EXCEED THE MINIMUM SPECIFIED DESIGN AND QUALITY CRITERIA IN THIS SET OF CONSTRUCTION DOCUMENTS. ANY BIDDER THAT INTENDS TO SUBMIT USING A MANUFACTURER NOT LISTED BELOW MAY REQUEST A PRIOR APPROVAL IN ACCORDANCE WITH THE ENTIRETY OF THE PROJECT BID DOCUMENTS, REFER TO THE ARCHITECT'S GENERAL CONDITIONS AND BIDDING REQUIREMENTS.

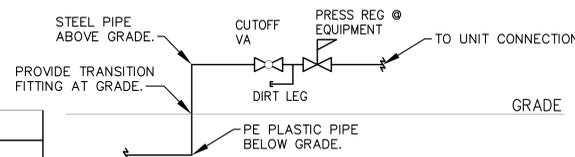
THE BIDDER IS RESPONSIBLE FOR INCLUDING ALL COSTS ASSOCIATED WITH SUBSTITUTED EQUIPMENT, INCLUDING BUT NOT LIMITED TO, CODE AND MANUFACTURER'S REQUIRED MAINTENANCE AND ACCESS CLEARANCE, COORDINATION WITH ALL OTHER BUILDING TRADES, AND INSTALLATION OF DUCTWORK, PIPING, ETC. BIDDER SHALL BEAR RESPONSIBILITY FOR ALL ASSOCIATED COSTS AND ADDITIONAL COSTS RESULTING FROM SUBSTITUTED ITEMS SHALL NOT BE CONSIDERED FOR APPROVAL AFTER BIDS ARE AWARDED.

| ITEM                           | MANUFACTURER'S CARRIER, TRANE |
|--------------------------------|-------------------------------|
| SPLIT HEAT PUMP SYSTEMS        | TRANE, GREENHECK              |
| 100% OUTSIDE AIR MAKE-UP UNITS |                               |

DUCTWORK EXPOSED TO WEATHER SHALL BE INSULATED BY SEALING ALL JOINTS WITH HARD CAST SEALER, APPLYING POLYSTYRENE INSULATION (THICKNESS AS REQUIRED FOR INSTALLED R-VALUE OF 8), AND COVERING WITH TWO (2) INDIVIDUAL LAYERS OF GLASSFAB AND WHITE MASTIC. PAINT TO MATCH BACKGROUND COLOR. AT CONTRACTOR'S OPTION, ALUMINUM ALL-WEATHER DUCT COVER MAY BE USED.



**1 GRADE LEVEL MAKE-UP AIR UNIT DETAIL**  
SCALE: NTS



**2 TYPICAL GAS EQPMT. CONNECTION**  
NTS

| MECHANICAL EQUIPMENT LEGEND  |   |
|------------------------------|---|
| SYMBOL                       | DESCRIPTION                                   |
| <b>LOW PRESSURE DUCTWORK</b> |   |
| 10 X 12                      | DUCT SECTION - 1ST FIGURE WIDTH, 2ND DEPTH    |
| [Symbol]                     | SQUARE TO ROUND TRANS.                        |
| [Symbol]                     | FLEX DUCTWORK                                 |
| [Symbol]                     | ELBOW W/TURNING VANES                         |
| [Symbol]                     | LONG RADIUS ELBOW                             |
| [Symbol]                     | EXHAUST DUCT SECTION                          |
| [Symbol]                     | SUPPLY DUCT SECTION                           |
| [Symbol]                     | OUTSIDE AIR DUCT SECTION                      |
| [Symbol]                     | RETURN/RELIEF AIR DUCT SECTION                |
| [Symbol]                     | TRANSFER AIR DUCT SECTION                     |
| [Symbol]                     | EXPOSED DUCT                                  |
| [Symbol]                     | SHORT RADIUS VANED ELBOW                      |
| [Symbol]                     | CONICAL DUCT TAKE-OFF                         |
| [Symbol]                     | RECTANGULAR-TO-ROUND TAKE-OFF WITH DAMPER     |
| [Symbol]                     | RECTANGULAR-TO-ROUND TAKE-OFF WITHOUT DAMPER  |
| [Symbol]                     | RECTANGULAR TAKE-OFF                          |
| [Symbol]                     | LONG RADIUS TEE                               |
| [Symbol]                     | TEE W/TURNING VANES                           |
| [Symbol]                     | "Y" TAKE-OFF WITH SPLUTTER DAMPER             |
| [Symbol]                     | FIRE DAMPER "A" OR "B"                        |
| [Symbol]                     | COMBINATION FIRE/ SMOKE DAMPER                |
| [Symbol]                     | VOLUME EXTRACTOR                              |
| <b>MISCELLANEOUS</b>         |   |
| [Symbol]                     | THERMOSTAT                                    |
| [Symbol]                     | THERMOSTAT W/ABUSE PROOF COVER, CAST ALUMINUM |
| [Symbol]                     | HUMIDISTAT                                    |
| [Symbol]                     | CARBON DIOXIDE SENSOR                         |
| [Symbol]                     | SMOKE DAMPER                                  |
| [Symbol]                     | SMOKE DETECTOR                                |
| [Symbol]                     | CONDENSATE DRAIN                              |
| [Symbol]                     | BACKDRAFT DAMPER                              |
| [Symbol]                     | MOTOR OPERATED DAMPER                         |
| [Symbol]                     | DAMPER  |
| [Symbol]                     | MANUAL SWITCH                                 |
| [Symbol]                     | SUMMER/WINTER SWITCH                          |
| [Symbol]                     | ABOVE FINISHED FLOOR                          |
| [Symbol]                     | INTO EXISTING AT THIS POINT                   |
| [Symbol]                     | CAST IRON                                     |
| [Symbol]                     | UNLESS NOTED OTHERWISE                        |

**SPLIT SYSTEM HEAT PUMP SCHEDULE W/ELECTRIC HEAT**

| Unit Tag        | Unit Location | Nom. Tons | SEER (min.) | COP @ 47 Deg F. | CFM | O.A. | ESP | Air Handling Unit |       |                       |     | DX Coil Performance |      |                       |       | HP Heating Performance |           |           |      | Electrical Data (Outdoor Unit) |      |      |       | Remarks |       |     |      |                       |       |       |       |    |     |          |     |
|-----------------|---------------|-----------|-------------|-----------------|-----|------|-----|-------------------|-------|-----------------------|-----|---------------------|------|-----------------------|-------|------------------------|-----------|-----------|------|--------------------------------|------|------|-------|---------|-------|-----|------|-----------------------|-------|-------|-------|----|-----|----------|-----|
|                 |               |           |             |                 |     |      |     | Fan Motor         |       | Electric Heating Coil |     | MCA                 | MOCP | Approx. Weight (lbs.) | Model | EAT                    | MBH Total | MBH Sens. | EAT  | LAT                            | LRA  | RLA  | Volts |         | Phase | MCA | MOCP | Approx. Weight (lbs.) | Model |       |       |    |     |          |     |
|                 |               |           |             |                 |     |      |     | HP                | Volts | Phase                 | kW  |                     |      |                       |       |                        |           |           |      |                                |      |      |       |         |       |     |      |                       |       | Volts | Phase | EA | EA  | EA       | EA  |
| AH-8-17/HP-8-17 | SECTION 3     | 2         | 15.00       | 3.6             | 800 | 375  | 5   | 1/4               | 208   | 1                     | 4.8 | 480                 | 3    | 8.9                   | 15    | 150                    | TEMAA0B24 | 80/67     | 23.8 | 17.9                           | 70.0 | 87.4 | 23.0  | 1       | 0.64  | 1   | 62.9 | 10.9                  | 208   | 1     | 14.0  | 25 | 250 | 4TWR5024 | 1-9 |

- REFER TO APPROVED MANUFACTURER LIST FOR ACCEPTABLE EQUAL MANUFACTURERS. COORDINATE POWER REQUIREMENTS FOR ALL SUBSTITUTIONS.
- PROVIDE WITH THERMOSTAT CONTROL.
- CONTRACTOR SHALL VERIFY SERVICE CLEARANCES FOR ALL SUBSTITUTIONS.
- SINGLE POINT ELECTRICAL CONNECTION AT AIR HANDLING UNITS.
- PROVIDE TRANSFORMER TO STEP DOWN VOLTAGE FOR FAN MOTOR.
- REFRIGERANT LINES AND ACCESSORIES PER UNIT MFG. RECOMMENDATIONS.
- AIR HANDLER CONVERTIBLE FOR VERTICAL / HORIZONTAL INSTALLATION.
- PROVIDE OVERFLOW DRAIN PAN BELOW UNIT WITH MICROSWITCH TO SHUT OFF UNIT PRIOR TO PAN OVERFLOW.
- VIBRATION ISOLATORS TO BE SEISMIC RATED.

**BASE BID - PACKAGED ENERGY RECOVERY UNIT - ELECTRIC HEAT**

| Unit Tag | Area Served | EER | Supply Fan |           |     |    | Exhaust Fan |     |     |     | Condenser Fan |      |     |     | Cooling Performance |    |     |     | Electric Heating Performance |                         |                        |               | Compressor               |                 |                  |               | Energy Recovery Wheel |                  |     |       | Winter Performance |           |           |                   | Electrical Data  |                  |                   |                | Controls | Approx. Weight w/out Curb (lb.) | Model | Remarks |                   |                   |                  |                  |                   |                |                   |                |      |      |       |       |      |         |             |     |
|----------|-------------|-----|------------|-----------|-----|----|-------------|-----|-----|-----|---------------|------|-----|-----|---------------------|----|-----|-----|------------------------------|-------------------------|------------------------|---------------|--------------------------|-----------------|------------------|---------------|-----------------------|------------------|-----|-------|--------------------|-----------|-----------|-------------------|------------------|------------------|-------------------|----------------|----------|---------------------------------|-------|---------|-------------------|-------------------|------------------|------------------|-------------------|----------------|-------------------|----------------|------|------|-------|-------|------|---------|-------------|-----|
|          |             |     | Qty        | CFM       | ESP | HP | FLA         | EA  | Qty | CFM | ESP           | HP   | FLA | EA  | Qty                 | HP | FLA | EA  | Gross Total MBH              | Entering Coil (F) DB/WB | Leaving Coil (F) DB/WB | Reheat (F) DB | Leaving Unit (F) DB (T3) | Input Total MBH | Output Total MBH | Min. Turndown | Entering Coil (F)     | Leaving Coil (F) | Qty | RLA   | LRA                | EA        | EA        | Outside (F) DB/WB | Supply (F) DB/WB | Return (F) DB/WB | Exhaust (F) DB/WB | Total Cap. MBH |          |                                 |       |         | Sensible Cap. MBH | Outside (F) DB/WB | Supply (F) DB/WB | Return (F) DB/WB | Exhaust (F) DB/WB | Total Cap. MBH | Sensible Cap. MBH | ERV Wheel Size | HP   | FLA  | Volts | Phase | FLA  | MCA     | MOCP        | FLA |
|          |             |     | MU-1       | SECTION 1 | 19  | 1  | 3570        | 1.5 | 3   | 4   | 1             | 3378 | 0.5 | 1.5 | 2.4                 | 2  | 1   | 2.1 | 235.5                        | 82.4/70.2               | 49.0/48.6              | 83.6/62.44    | 85.4/63.1                | 28              | 50.1             | 74.9          | 2                     | 14.7             | 130 | 95/80 | 82.4/70.2          | 75.0/62.5 | 87.7/73.9 | 141.25            | 50.91            | 20/15            | 50.1/44.0         | 70.0/58.5      |          |                                 |       |         | 37.8/34.5         | 189.3             | 121.56           | ERC-4136C        | 0.17              | 0.44           | 460               | 3              | 42.9 | 53.7 | 60    | 1     | 4360 | OADG020 | 1-30, 32-33 |     |

- MODEL BASED ON TRANE. REFER TO APPROVED MFG. LISTING FOR EQUALS.
- PROVIDE WITH RETURN AIR RECIRC/BYPASS CAPABILITY.
- SINGLE POINT ELECTRICAL CONNECTION AND FACTORY NON-FUSED DISCONNECT.
- PROVIDE WITH MERV-8 AND MERV-13 FILTERS.
- ENTIRE UNIT TO BE STARTED BY FACTORY AUTHORIZED TECHNICIAN. PAPERWORK MUST BE SENT TO CONTRACTOR.
- PROVIDE WITH CONDENSER HAILGUARD.
- SCR MODULATING ELECTRIC HEAT.
- POLYMER ERV WITH BYPASS DAMPERS.
- MODULATING OA/RA DAMPER FOR ECONOMIZER CONTROL.
- COND. COIL SHALL BE FURNISHED AS AN INTEGRAL PART OF THE MAKE-UP AIR UNIT, FACTORY PIPED & WIRED.
- COMPRESSORS SHALL HAVE INTERNAL VIBRATION ISOLATORS.
- PROVIDE MINIMUM 2 COMPRESSOR CIRCUITS.
- PROVIDE MINIMUM 1 DIGITAL SCROLL TYPE COMPRESSOR.
- MAIN UNIT CONTROLLER PROVIDED BY CMI.
- PROVIDE SUPPLY AND EXHAUST FANS WITH PIEZO RINGS AND TAPS.
- PROVIDE WITH SEISMICALLY RATED HORIZONTAL DISCHARGE CURB.
- PROVIDE WITH 2" DOUBLE WALL CONSTRUCTION.
- PROVIDE WITH SUPPLY DISCHARGE AIR SENSOR.
- PROVIDE EVAPORATOR COIL WITH MINIMUM 6 ROWS.
- PROVIDE WITH MODULATING HOT GAS REHEAT.
- PROVIDE STAINLESS STEEL DRIP PAN.
- PROVIDE WITH 1 YEAR MANUFACTURER WARRANTY ON PARTS.
- PROVIDE WITH 5 YEAR WARRANTY ON DIGITAL SCROLL COMPRESSORS.
- PROVIDE WITH 5 YEAR WARRANTY ON PARTS AND LABOR PLUS.
- PROVIDE WITH 25 YEAR WARRANTY ON GAS-FIRED HEAT EXCHANGER.
- PROVIDE WITH AIR COOLED VARIABLE SPEED HEAD PRESSURE CONTROL CONDENSER.
- INSTALL DUCT MOUNTED CARBON DIOXIDE DETECTOR IN SUPPLY DUCT AND CONNECT TO NEAREST ADDRESSABLE FIRE ALARM CIRCUIT. EC TO FURNISH DETECTOR AND MC TO INSTALL. DETECTOR SHALL BE ACCESSIBLE FOR INSPECTION AND SERVICE.
- PROVIDE UNIT MANUFACTURER'S SEA COAST PROTECTIVE COATING ON ALL EXTERIOR COMPONENTS AND COOLING COIL. SEA COAST PROTECTION SHALL BE IN COMPLIANCE WITH ASTM B45 SALT SPRAY TESTING AT A MINIMUM OF 672 HOUR DURATION.
- UNDER BASE BID, PROVIDE UNIT MANUFACTURER'S STAINLESS STEEL INTERIOR PANELS IN CONTACT WITH AIRFLOW. UNDER ALTERNATE #2, PROVIDE A FACTORY APPLIED SEA COAST PROTECTIVE COATING FOR INTERIOR PANELS IN CONTACT WITH AIRFLOW. FACTORY APPLIED COATING SHALL BE HUSKY COAT GOLD BY BRONZ-GLOW (OR EQUAL) AND UNIT SHALL BE PROVIDED WITH A NAMEPLATE THAT CERTIFIES COATING HAS BEEN APPLIED BY COATING MANUFACTURER IN THEIR FACTORY.
- FIELD APPLIED SEA COAST PROTECTIVE COATINGS SHALL NOT BE ACCEPTED FOR BASE BID OR ALTERNATE 2.
- PROVIDE SUPPLY AND EXHAUST FANS WITH ECM.
- PROVIDE SUPPLY AND EXHAUST FANS WITH DIRECT DRIVE MOTORS W/ VFD.
- PROVIDE ISOLATION DAMPERS FOR EXHAUST FAN(S).

**PACKAGED ENERGY RECOVERY UNIT - GAS HEAT**

| Unit Tag | Area Served | EER | Supply Fan |           |      |    | Exhaust Fan |     |     |     | Condenser Fan |      |     |    | Cooling Performance |    |     |     | Natural Gas Heating Performance |                         |                        |               | Compressor               |                 |                  |               | Energy Recovery Wheel |                  |     |     | Winter Performance |       |           |                   | Electrical Data  |                  |                   |                | Controls | Approx. Weight w/out Curb (lb.) | Model | Remarks |                   |                   |                  |                  |                   |                |                   |                |     |     |       |       |     |     |      |        |
|----------|-------------|-----|------------|-----------|------|----|-------------|-----|-----|-----|---------------|------|-----|----|---------------------|----|-----|-----|---------------------------------|-------------------------|------------------------|---------------|--------------------------|-----------------|------------------|---------------|-----------------------|------------------|-----|-----|--------------------|-------|-----------|-------------------|------------------|------------------|-------------------|----------------|----------|---------------------------------|-------|---------|-------------------|-------------------|------------------|------------------|-------------------|----------------|-------------------|----------------|-----|-----|-------|-------|-----|-----|------|--------|
|          |             |     | Qty        | CFM       | ESP  | HP | FLA         | EA  | Qty | CFM | ESP           | HP   | FLA | EA | Qty                 | HP | FLA | EA  | Gross Total MBH                 | Entering Coil (F) DB/WB | Leaving Coil (F) DB/WB | Reheat (F) DB | Leaving Unit (F) DB (T3) | Input Total MBH | Output Total MBH | Min. Turndown | Entering Coil (F)     | Leaving Coil (F) | Qty | RLA | LRA                | EA    | EA        | Outside (F) DB/WB | Supply (F) DB/WB | Return (F) DB/WB | Exhaust (F) DB/WB | Total Cap. MBH |          |                                 |       |         | Sensible Cap. MBH | Outside (F) DB/WB | Supply (F) DB/WB | Return (F) DB/WB | Exhaust (F) DB/WB | Total Cap. MBH | Sensible Cap. MBH | ERV Wheel Size | HP  | FLA | Volts | Phase | FLA | MCA | MOCP | FLA    |
|          |             |     | MUA-1      | SECTION 5 | 16.4 | 1  | 4100        | 0.5 | 6   | 7   | 1             | 3973 | 0.5 | 6  | 7                   | 3  | 1   | 2.1 | 235.5                           | 82.9/70.7               | 49.9/49.6              | 81.1/62.02    | 83.3/62.8                | 200             | 160              | 10:1          | 48.9                  | 84.9             | 2   | 16  | 140                | 95/80 | 82.9/70.7 | 75.0/62.5         | 87.2/73.5        | 155.15           | 55.84             | 20/15          |          |                                 |       |         | 48.9/42.9         | 70.0/58.5         | 39.0/35.8        | 208.64           | 133.37            | ERC-4136C      | 0.17              | 0.44           | 460 | 3   | 53.7  | 57.7  | 70  | 1   | 4570 | OAG264 |

- MODEL BASED ON TRANE. REFER TO APPROVED MFG. LISTING FOR EQUALS.
- PROVIDE WITH RETURN AIR RECIRC/BYPASS CAPABILITY.
- SINGLE POINT ELECTRICAL CONNECTION AND FACTORY NON-FUSED DISCONNECT.
- PROVIDE WITH MERV-8 AND MERV-13 FILTERS.
- ENTIRE UNIT TO BE STARTED BY FACTORY AUTHORIZED TECHNICIAN. PAPERWORK MUST BE SENT TO CONTRACTOR.
- PROVIDE WITH CONDENSER HAILGUARD.
- MIN. 10:1 TURNDOWN NATURAL GAS HEAT.
- POLYMER ERV WITH BYPASS DAMPERS.
- MODULATING OA/RA DAMPER FOR ECONOMIZER CONTROL.
- COND. COIL SHALL BE FURNISHED AS AN INTEGRAL PART OF THE MAKE-UP AIR UNIT, FACTORY PIPED & WIRED.
- COMPRESSORS SHALL HAVE INTERNAL VIBRATION ISOLATORS.
- PROVIDE MINIMUM 2 COMPRESSOR CIRCUITS.
- PROVIDE MINIMUM 1 DIGITAL SCROLL TYPE COMPRESSOR.
- PROVIDE 439 STAINLESS STEEL FURNACE.
- MAIN UNIT CONTROLLER PROVIDED BY CMI.
- PROVIDE SUPPLY AND EXHAUST FANS WITH PIEZO RINGS AND TAPS.
- PROVIDE WITH SEISMICALLY RATED HORIZONTAL DISCHARGE CURB.
- PROVIDE WITH 2" DOUBLE WALL CONSTRUCTION.
- PROVIDE WITH SUPPLY DISCHARGE AIR SENSOR.
- PROVIDE EVAPORATOR COIL WITH MINIMUM 6 ROWS.
- PROVIDE WITH MODULATING HOT GAS REHEAT.
- PROVIDE STAINLESS STEEL DRIP PAN.
- PROVIDE WITH 1 YEAR MANUFACTURER WARRANTY ON PARTS.
- PROVIDE WITH 5 YEAR WARRANTY ON DIGITAL SCROLL COMPRESSORS.
- PROVIDE WITH 5 YEAR WARRANTY ON PARTS AND LABOR PLUS.
- PROVIDE WITH 25 YEAR WARRANTY ON GAS-FIRED HEAT EXCHANGER.
- PROVIDE WITH AIR COOLED VARIABLE SPEED HEAD PRESSURE CONTROL CONDENSER.
- INSTALL DUCT MOUNTED CARBON DIOXIDE DETECTOR IN SUPPLY DUCT AND CONNECT TO NEAREST ADDRESSABLE FIRE ALARM CIRCUIT. EC TO FURNISH DETECTOR AND MC TO INSTALL. DETECTOR SHALL BE ACCESSIBLE FOR INSPECTION AND SERVICE.
- PROVIDE UNIT MANUFACTURER'S SEA COAST PROTECTIVE COATING ON ALL EXTERIOR COMPONENTS AND COOLING COIL. SEA COAST PROTECTION SHALL BE IN COMPLIANCE WITH ASTM B45 SALT SPRAY TESTING AT A MINIMUM OF 672 HOUR DURATION.
- UNDER BASE BID, PROVIDE UNIT MANUFACTURER'S STAINLESS STEEL INTERIOR PANELS IN CONTACT WITH AIRFLOW. UNDER ALTERNATE #2, PROVIDE A FACTORY APPLIED SEA COAST PROTECTIVE COATING FOR INTERIOR PANELS IN CONTACT WITH AIRFLOW. FACTORY APPLIED COATING SHALL BE HUSKY COAT GOLD BY BRONZ-GLOW (OR EQUAL) AND UNIT SHALL BE PROVIDED WITH A NAMEPLATE THAT CERTIFIES COATING HAS BEEN APPLIED BY COATING MANUFACTURER IN THEIR FACTORY.
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- PROVIDE SUPPLY AND EXHAUST FANS WITH ECM.
- PROVIDE SUPPLY AND EXHAUST FANS WITH DIRECT DRIVE MOTORS W/ VFD.
- PROVIDE ISOLATION DAMPERS FOR EXHAUST FAN(S).

**ALTERNATE # 1 - PACKAGED ENERGY RECOVERY UNIT - GAS HEAT**

| Unit Tag | Area Served | EER | Supply Fan |           |      |    | Exhaust Fan |     |     |     | Condenser Fan |      |     |     | Cooling Performance |    |     |     | Natural Gas Heating Performance |                         |                        |               | Compressor               |                 |                  |               | Energy Recovery Wheel |                  |     |      | Winter Performance |       |           |                   | Electrical Data  |                  |                   |                | Controls | Approx. Weight w/out Curb (lb.) | Model | Remarks |                   |                   |                  |                  |                   |                |                   |                |     |     |       |       |     |     |      |         |
|----------|-------------|-----|------------|-----------|------|----|-------------|-----|-----|-----|---------------|------|-----|-----|---------------------|----|-----|-----|---------------------------------|-------------------------|------------------------|---------------|--------------------------|-----------------|------------------|---------------|-----------------------|------------------|-----|------|--------------------|-------|-----------|-------------------|------------------|------------------|-------------------|----------------|----------|---------------------------------|-------|---------|-------------------|-------------------|------------------|------------------|-------------------|----------------|-------------------|----------------|-----|-----|-------|-------|-----|-----|------|---------|
|          |             |     | Qty        | CFM       | ESP  | HP | FLA         | EA  | Qty | CFM | ESP           | HP   | FLA | EA  | Qty                 | HP | FLA | EA  | Gross Total MBH                 | Entering Coil (F) DB/WB | Leaving Coil (F) DB/WB | Reheat (F) DB | Leaving Unit (F) DB (T3) | Input Total MBH | Output Total MBH | Min. Turndown | Entering Coil (F)     | Leaving Coil (F) | Qty | RLA  | LRA                | EA    | EA        | Outside (F) DB/WB | Supply (F) DB/WB | Return (F) DB/WB | Exhaust (F) DB/WB | Total Cap. MBH |          |                                 |       |         | Sensible Cap. MBH | Outside (F) DB/WB | Supply (F) DB/WB | Return (F) DB/WB | Exhaust (F) DB/WB | Total Cap. MBH | Sensible Cap. MBH | ERV Wheel Size | HP  | FLA | Volts | Phase | FLA | MCA | MOCP | FLA     |
|          |             |     | MU-1       | SECTION 1 | 18.6 | 1  | 3570        | 1.5 | 3   | 4   | 1             | 3378 | 0.5 | 1.5 | 2.4                 | 2  | 1   | 2.1 | 235.5                           | 82.4/70.2               | 49.0/48.6              | 83.6/62.44    | 85.7/63.2                | 150             | 120              | 10:1          | 50.1                  | 81.1             | 2   | 14.7 | 130                | 95/80 | 82.4/70.2 | 75.0/62.5         | 87.7/73.9        | 141.25           | 50.91             | 20/15          |          |                                 |       |         | 50.1/44.0         | 70.0/58.5         | 37.8/34.5        | 189.3            | 212.56            | ERC-4136C      | 0.17              | 0.44           | 460 | 3   | 41    | 45.1  | 50  | 1   | 4300 | OADG020 |

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- PROVIDE ISOLATION DAMPERS FOR EXHAUST FAN(S).

**MCKNIGHT • SMITH ENGINEERS, INCORPORATED**  
4223 South Boulevard  
Charlotte, NC 28209  
704/527-2112

**MECHANICAL SCHEDULES AND DETAILS**

**M2.0**

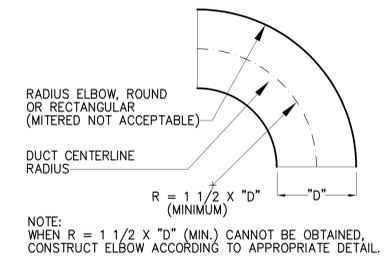
21-097  
11-17-2021  
JOB NUMBER: 21-097  
JOB TITLE: CAROLINA FOREST ELEM. 285 CAROLINA FOREST BLVD. MYRTLE BEACH, SC, 29579 HVAC RENEWAL  
CREATED BY: JOC  
CHECKED BY: JOC  
DATE: 11/17/2021  
REVISION DATES: 21-097



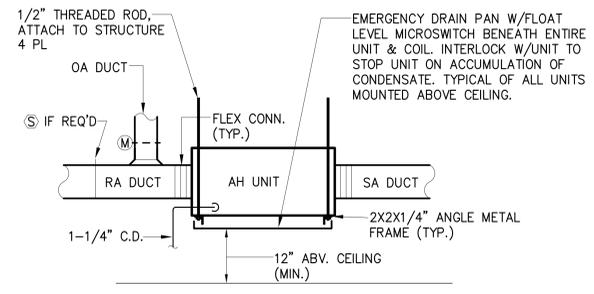
| JOB NUMBER  | 21-097     |
|-------------|------------|
| DESIGNED BY | US         |
| CHECKED BY  | JOC        |
| DATE        | 11/07/2021 |

**CAROLINA FOREST ELEM.**  
**285 CAROLINA FOREST BLVD.**  
**MYRTLE BEACH, SC, 29579**  
**HVAC RENEWAL**

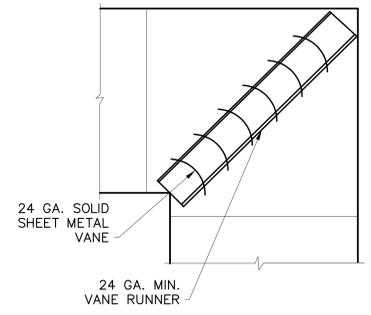
**MECHANICAL SEISMIC  
DETAILS**



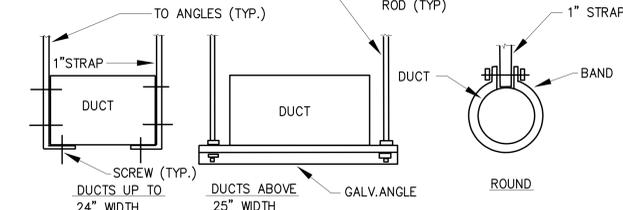
**4 RADIUS ELBOW DETAIL**  
SCALE: NTS



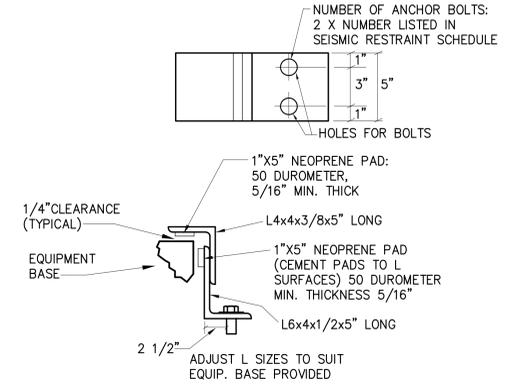
**5 SECTION AT AHU DETAIL**  
SCALE: NTS



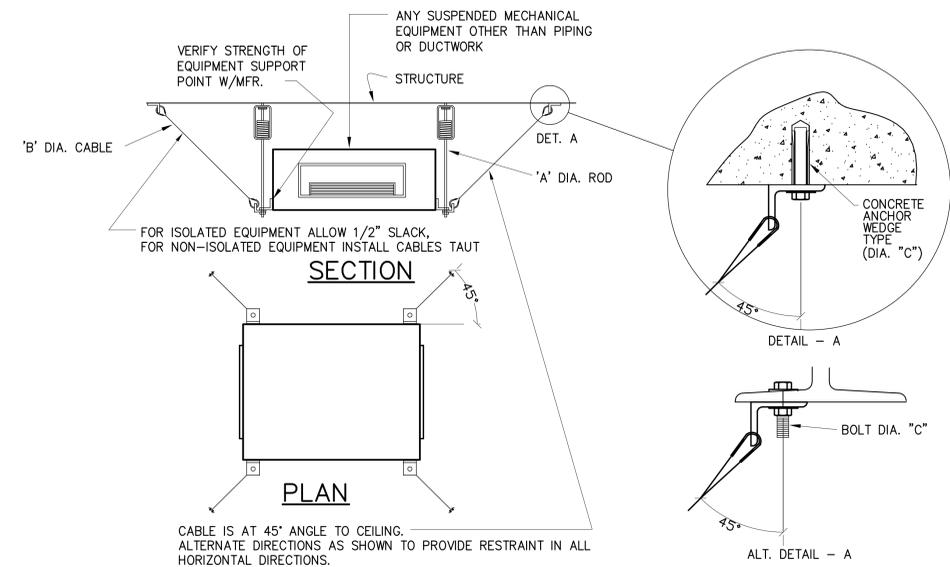
**6 TURNING VANE DETAIL**  
SCALE: NTS  
PERMITTED ONLY WHERE RADIUS ELL WILL NOT FIT.



**7 DUCTWORK HANGER DETAILS**  
SCALE: NTS



**3 SEISMIC SNUBBER DETAIL**  
SCALE: NTS  
NOTE: IN LIEU OF THIS DETAIL, PROVIDE MASON INDUSTRIES TYPE "Z" SNUBBER.

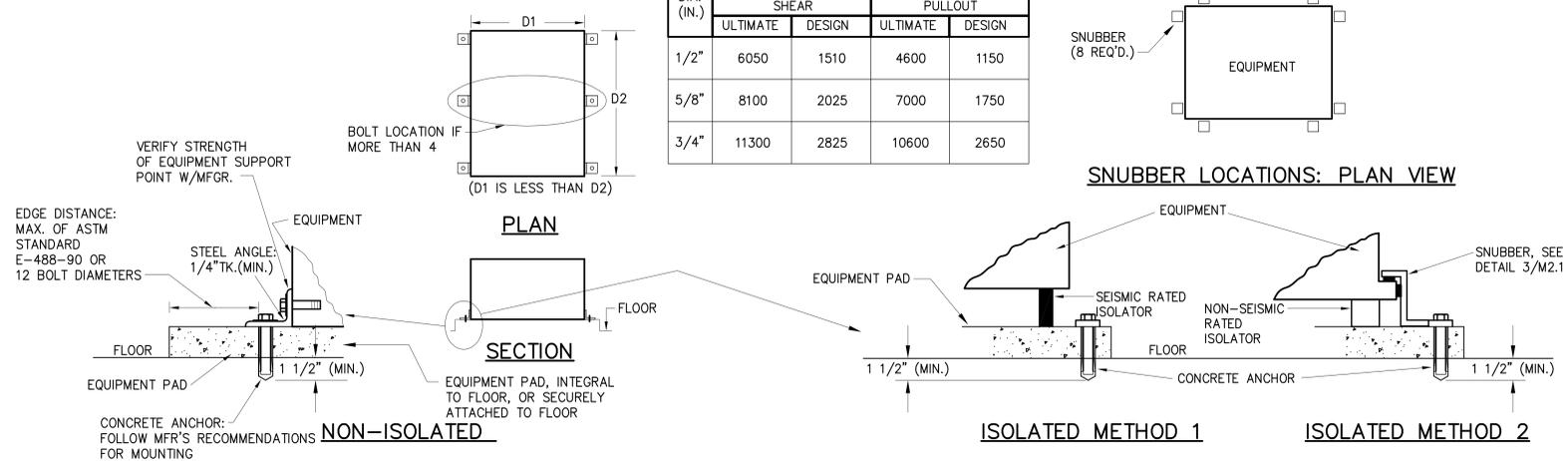


**2 TYP. SEISMIC CABLE RESTRAINTS FOR EQUIPMENT SUSPENDED FROM STRUCTURE**  
SCALE: NTS  
NOTE: REFERENCE SEISMIC RESTRAINT SCHEDULE FOR MORE INFORMATION. THIS DETAIL APPLIES TO ALL SUSPENDED EQUIPMENT UNLESS NOTED OTHERWISE.

| CABLE, BOLT SIZES |          |      |          |      |               |      |   |       |
|-------------------|----------|------|----------|------|---------------|------|---|-------|
| UNIT WGT. (LB)    | ROD      |      | CABLE    |      | BOLTS/ANCHORS |      | ANCHORS: ULTIMATE STRENGTH MIN. PULLOUT |       |
|                   | DIA. "A" | QNTY | DIA. "B" | QNTY | DIA. "C"      | QNTY | MIN. LBS.(EA)                           | SHEAR |
| 1 - 1000          | 1/2"     | 4    | 1/8"     | 4    | 1/2"          | 4    | 4600                                    | 6050  |
| 1001 - 4000       | 1/2"     | 4    | 3/16"    | 4    | 1/2"          | 4    | 4600                                    | 6050  |
| 4001 - 8000       | 3/4"     | 4    | 1/4"     | 4    | 3/4"          | 8    | 10600                                   | 11300 |

| SEISMIC RESTRAINT SCHEDULE<br>(BASED ON INTERNATIONAL BUILDING CODE) |   |                              |                         |         |
|--|---|------------------------------|-------------------------|---------|
| EQUIPMENT  | SEE DETAIL  | MOUNTING VIB. ISOL. OR FIXED | BOLTS/ANCHORS DIA. QNTY | REMARKS |
| SUSPENDED EQUIPMENT  |   |                              |                         |         |
| PIPING   | SEE 2008 SMACNA SEISMIC RESTRAINT MANUAL GUIDELINES FOR MECHANICAL SYSTEMS: SEISMIC HAZARD LEVEL (SHL) "B" RESTRAINTS |                              |                         | 1, 2    |
| DUCT   |   |                              |                         | 1, 3    |
| ALL OTHER SUSPENDED EQUIPMENT  |   |                              |                         | 1       |

| DIA. (IN.) | MINIMUM STRENGTH (LBS) |        |          |        |
|------------|------------------------|--------|----------|--------|
|            | SHEAR                  |        | PULLOUT  |        |
|            | ULTIMATE               | DESIGN | ULTIMATE | DESIGN |
| 1/2"       | 6050                   | 1510   | 4600     | 1150   |
| 5/8"       | 8100                   | 2025   | 7000     | 1750   |
| 3/4"       | 11300                  | 2825   | 10600    | 2650   |



**1 SEISMIC RESTRAINTS FOR FLOOR/SLAB MOUNTED EQUIPMENT**  
SCALE: NTS

- SEISMIC HAZARD EXPOSURE GROUP II, A = J, GROUP D, SEISMIC PERF. CATEGORY D. ALL MECHANICAL & PLUMBING EQUIPMENT SHALL BE DESIGNED TO RESIST SEISMIC FORCES. SEISMIC RESTRAINTS ARE REQUIRED FOR THIS PROJECT WITH EXCEPTIONS LISTED IN 2 AND 3. SEISMIC FORCE TO BE RESISTED EQUALS .3 TIMES THE EQUIPMENT WEIGHT IN ANY HORIZONTAL DIRECTION, AND .1 TIMES THE EQUIPMENT WEIGHT IN THE VERTICAL DIRECTION.
- SEISMIC RESTRAINTS SHALL NOT BE REQUIRED FOR THE FOLLOWING PIPING INSTALLATIONS (EXCLUDING GAS, HIGH HAZARD, AND FIRE PROTECTION):
  - PIPING IN BOILER & MECHANICAL ROOMS LESS THAN 1 1/4" INSIDE DIAMETER.
  - PIPING IN OTHER AREAS WHICH HAS LESS THAN 2 1/2" INSIDE DIAMETER.
  - PIPING SUSPENDED BY INDIVIDUAL HANGERS 12" OR LESS IN LENGTH FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE SUPPORT FOR THE HANGER.
- SEISMIC RESTRAINTS SHALL NOT BE REQUIRED FOR THE FOLLOWING DUCT INSTALLATIONS:
  - ALL RECTANGULAR AIR HANDLING DUCTS LESS THAN 6 sq. ft. IN CROSS-SECTIONAL AREA.
  - ALL ROUND AIR HANDLING DUCTS LESS THAN 28" IN DIAMETER.
  - ALL DUCTS SUSPENDED BY HANGERS 12" OR LESS IN LENGTH FROM THE TOP OF THE DUCT TO THE BOTTOM OF THE SUPPORT FOR THE HANGER.

- NOTES:
- THIS DETAIL APPLIES TO ALL FLOOR/SLAB MOUNTED EQUIPMENT UNLESS NOTED OTHERWISE.
  - REFER TO SEISMIC RESTRAINT SCHEDULE FOR ANCHOR SIZES FOR SPECIFIC PIECES OF EQUIPMENT



| REVISION NUMBER | REVISION DESCRIPTION |
|-----------------|----------------------|
| 21-097          | US                   |
| JOC             | 11/17/2021           |

**CAROLINA FOREST ELEM.  
285 CAROLINA FOREST BLVD.  
MYRTLE BEACH, SC, 29579  
HVAC RENEWAL**

**MECHANICAL  
COMCHECK**



**Section 1: Project Information**

Energy Code: 2009 IECC  
Project Title: 21-097 Carolina Forest Elementary  
Project Type: Alteration

Construction Site: 285 Carolina Forest Blvd, Myrtle Beach, South Carolina 29579

Owner/Agent: Craig Champion  
MSWG Engineers, Inc.  
4223 South Blvd  
Charlotte, North Carolina 28209  
704-527-2112  
champion@mswg.com

**Section 2: General Information**

Building Location (for weather data): Myrtle Beach, South Carolina  
Climate Zone: 3a

**Section 3: Mechanical Systems List**

| Quantity | System Type & Description  |
|----------|--|
| 1        | AH-8-17HP-8-17 (Single Zone) : Split System Heat Pump<br>Heating Mode Capacity = 23 kBtu/h<br>Proposed Efficiency = 8.50 HSPF, Required Efficiency = 7.70 HSPF<br>Cooling Mode Capacity = 24 kBtu/h<br>Proposed Efficiency = 10.00 SEER, Required Efficiency: 13.00 SEER<br>Fan System: FAN SYSTEM AH-8-17 – Compliance (Motor nameplate HP and fan efficiency method) : Passes  |
| 1        | MU-1 (Single Zone)<br>Heating: 1 each - Central Furnace, Electric, Capacity = 98 kBtu/h<br>No minimum efficiency requirement applies<br>Cooling: 1 each - Single Package DX Unit, Capacity = 235 kBtu/h, Air-Cooled Condenser, Air Economizer<br>Proposed Efficiency = 18.00 EER, Required Efficiency: 11.00 EER<br>Fan System: FAN SYSTEM MU-1 – Compliance (Brake HP and fan efficiency method) : Passes             |
| 1        | MU-2 (Single Zone)<br>Heating: 1 each - Central Furnace, Electric, Capacity = 109 kBtu/h<br>No minimum efficiency requirement applies<br>Cooling: 1 each - Single Package DX Unit, Capacity = 291 kBtu/h, Air-Cooled Condenser, Air Economizer<br>Proposed Efficiency = 18.80 EER, Required Efficiency: 10.00 EER + 9.3 IPLV<br>Fan System: FAN SYSTEM MU-2 – Compliance (Brake HP and fan efficiency method) : Passes |
| 1        | MU-3 (Single Zone)<br>Heating: 1 each - Central Furnace, Electric, Capacity = 109 kBtu/h<br>No minimum efficiency requirement applies<br>Cooling: 1 each - Single Package DX Unit, Capacity = 245 kBtu/h, Air-Cooled Condenser, Air Economizer<br>Proposed Efficiency = 19.30 EER, Required Efficiency: 10.00 EER + 9.7 IPLV<br>Fan System: FAN SYSTEM MU-3 – Compliance (Brake HP and fan efficiency method) : Passes |
| 1        | MU-4 (Single Zone)<br>Heating: 1 each - Central Furnace, Electric, Capacity = 137 kBtu/h<br>No minimum efficiency requirement applies<br>Cooling: 1 each - Single Package DX Unit, Capacity = 356 kBtu/h, Air-Cooled Condenser, Air Economizer<br>Proposed Efficiency = 19.30 EER, Required Efficiency: 10.00 EER + 9.7 IPLV<br>Fan System: FAN SYSTEM MU-4 – Compliance (Brake HP and fan efficiency method) : Passes |

Project Title: 21-097 Carolina Forest Elementary  
Data Filename: Report date: 11/10/21  
Page 1 of 8

- 3. Integrated economizer is required for this location and system.
  - 4. Cooling system provides a means to relieve excess outdoor air during economizer operation.
  - 5. Hot gas bypass prohibited unless system has multiple steps of unloading or continuous capacity modulation
  - 6. Hot gas bypass limited to 25% of total cooling capacity
- Requirements Specific To: MU-4 :**
- 1. Equipment minimum efficiency: Single Package Unit: 10.00 EER + 9.7 IPLV
  - 2. Newly purchased equipment meets the efficiency requirements
  - 3. Integrated economizer is required for this location and system.
  - 4. Cooling system provides a means to relieve excess outdoor air during economizer operation.
  - 5. Hot gas bypass prohibited unless system has multiple steps of unloading or continuous capacity modulation
  - 6. Hot gas bypass limited to 25% of total cooling capacity
- Requirements Specific To: MUA-1 :**
- 1. Equipment minimum efficiency: Central Furnace (Gas): 80.00 % Et (or 78% AFUE)
  - 2. Equipment minimum efficiency: Single Package Unit: 9.80 EER + 9.5 IPLV
  - 3. Integrated economizer is required for this location and system.
  - 4. Cooling system provides a means to relieve excess outdoor air during economizer operation.
  - 5. Hot gas bypass prohibited unless system has multiple steps of unloading or continuous capacity modulation
  - 6. Hot gas bypass limited to 25% of total cooling capacity
- Requirements Specific To: MUA-2 :**
- 1. Equipment minimum efficiency: Central Furnace (Gas): 80.00 % Et
  - 2. Equipment minimum efficiency: Single Package Unit: 9.80 EER + 9.5 IPLV
  - 3. Integrated economizer is required for this location and system.
  - 4. Cooling system provides a means to relieve excess outdoor air during economizer operation.
  - 5. Hot gas bypass prohibited unless system has multiple steps of unloading or continuous capacity modulation
  - 6. Hot gas bypass limited to 25% of total cooling capacity
- Requirements Specific To: MU-1 ALT :**
- 1. Equipment minimum efficiency: Central Furnace (Gas): 80.00 % Et (or 78% AFUE)
  - 2. Equipment minimum efficiency: Single Package Unit: 10.00 EER
  - 3. Integrated economizer is required for this location and system.
  - 4. Cooling system provides a means to relieve excess outdoor air during economizer operation.
  - 5. Hot gas bypass prohibited unless system has multiple steps of unloading or continuous capacity modulation
  - 6. Hot gas bypass limited to 25% of total cooling capacity
- Requirements Specific To: MU-3 ALT :**
- 1. Equipment minimum efficiency: Central Furnace (Gas): 80.00 % Et (or 78% AFUE)
  - 2. Equipment minimum efficiency: Single Package Unit: 9.80 EER + 9.5 IPLV
  - 3. Integrated economizer is required for this location and system.
  - 4. Cooling system provides a means to relieve excess outdoor air during economizer operation.
  - 5. Hot gas bypass prohibited unless system has multiple steps of unloading or continuous capacity modulation
  - 6. Hot gas bypass limited to 25% of total cooling capacity
- Requirements Specific To: MU-4 ALT :**
- 1. Equipment minimum efficiency: Central Furnace (Gas): 80.00 % Et (or 78% AFUE)
  - 2. Equipment minimum efficiency: Single Package Unit: 9.80 EER + 9.5 IPLV
  - 3. Integrated economizer is required for this location and system.
  - 4. Cooling system provides a means to relieve excess outdoor air during economizer operation.
  - 5. Hot gas bypass prohibited unless system has multiple steps of unloading or continuous capacity modulation
  - 6. Hot gas bypass limited to 25% of total cooling capacity
- Generic Requirements: Must be met by all systems to which the requirement is applicable:**
- 1. Plant equipment and system capacity no greater than needed to meet loads

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Fully ducted return and/or exhaust air systems, 0.6009 credit

|   |   |
|---|---|
| 1 | MU-3 (Single Zone)<br>Heating: 1 each - Central Furnace, Electric, Capacity = 109 kBtu/h<br>No minimum efficiency requirement applies<br>Cooling: 1 each - Single Package DX Unit, Capacity = 245 kBtu/h, Air-Cooled Condenser, Air Economizer<br>Proposed Efficiency = 19.30 EER, Required Efficiency: 10.00 EER + 9.7 IPLV<br>Fan System: FAN SYSTEM MU-3 – Compliance (Brake HP and fan efficiency method) : Passes  |
| 1 | MU-4 (Single Zone)<br>Heating: 1 each - Central Furnace, Electric, Capacity = 137 kBtu/h<br>No minimum efficiency requirement applies<br>Cooling: 1 each - Single Package DX Unit, Capacity = 356 kBtu/h, Air-Cooled Condenser, Air Economizer<br>Proposed Efficiency = 19.30 EER, Required Efficiency: 10.00 EER + 9.7 IPLV<br>Fan System: FAN SYSTEM MU-4 – Compliance (Brake HP and fan efficiency method) : Passes  |
| 1 | MUA-1 (Single Zone)<br>Heating: 1 each - Central Furnace, Gas, Capacity = 160 kBtu/h<br>Proposed Efficiency = 80.00% Et, Required Efficiency: 80.00 % Et (or 78% AFUE)<br>Cooling: 1 each - Single Package DX Unit, Capacity = 288 kBtu/h, Air-Cooled Condenser, Air Economizer<br>Proposed Efficiency = 18.40 EER, Required Efficiency: 9.80 EER + 9.5 IPLV<br>Fan System: FAN SYSTEM MUA-1 – Compliance (Brake HP and fan efficiency method) : Passes       |
| 1 | MUA-2 (Single Zone)<br>Heating: 1 each - Central Furnace, Gas, Capacity = 320 kBtu/h<br>Proposed Efficiency = 80.00% Et, Required Efficiency: 80.00 % Et<br>Cooling: 1 each - Single Package DX Unit, Capacity = 557 kBtu/h, Air-Cooled Condenser, Air Economizer<br>Proposed Efficiency = 18.20 EER, Required Efficiency: 9.80 EER + 9.5 IPLV<br>Fan System: FAN SYSTEM MUA-2 – Compliance (Brake HP and fan efficiency method) : Passes                     |
| 1 | MU-1 ALT (Single Zone)<br>Heating: 1 each - Central Furnace, Gas, Capacity = 120 kBtu/h<br>Proposed Efficiency = 80.00% Et, Required Efficiency: 80.00 % Et (or 78% AFUE)<br>Cooling: 1 each - Single Package DX Unit, Capacity = 225 kBtu/h, Air-Cooled Condenser, Air Economizer<br>Proposed Efficiency = 18.80 EER, Required Efficiency: 10.80 EER<br>Fan System: FAN SYSTEM MU-1 ALT – Compliance (Brake HP and fan efficiency method) : Passes           |
| 1 | MU-2 ALT (Single Zone)<br>Heating: 1 each - Central Furnace, Gas, Capacity = 160 kBtu/h<br>Proposed Efficiency = 80.00% Et, Required Efficiency: 80.00 % Et (or 78% AFUE)<br>Cooling: 1 each - Single Package DX Unit, Capacity = 291 kBtu/h, Air-Cooled Condenser, Air Economizer<br>Proposed Efficiency = 18.80 EER, Required Efficiency: 9.80 EER + 9.5 IPLV<br>Fan System: FAN SYSTEM MU-2 ALT – Compliance (Brake HP and fan efficiency method) : Passes |

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- Exception(s):
- Standby equipment automatically off when primary system is operating
  - Multiple units controlled to sequence operation as a function of load
  - 2. Minimum one temperature control device per system
  - 3. Minimum one humidity control device per installed humidification/dehumidification system
  - 4. Load calculations per ASHRAE/ACCA Standard 183.
  - 5. Automatic Controls: Setback to 55°F (heat) and 85°F (cool); 7-day clock, 2-hour occupant override, 10-hour backup
- Exception(s):
- Continuously operating zones
  - Outside-air source for ventilation; system capable of reducing OSA to required minimum
  - R-8 supply and return air duct insulation in unconditioned spaces
  - R-4 insulation between ducts and the building exterior when ducts are part of a building assembly
- Exception(s):
- Ducts located within equipment
  - Ducts with interior and exterior temperature difference not exceeding 15°F.
  - 8. Mechanical fasteners and sealants used to connect ducts and air distribution equipment
  - 9. Ducts sealed - longitudinal seams on rigid ducts; transverse seams on all ducts, UL 181A or 181B tapes and mastics
  - 10. Hot water pipe insulation: 1.5 in. for pipes <= 1.5 in. and 2 in. for pipes > 1.5 in.  
Chilled water/refrigerant/brine pipe insulation: 1.5 in. for pipes >= 1.5 in. and 1.5 in. for pipes > 1.5 in.  
Steam pipe insulation: 1.5 in. for pipes <= 1.5 in. and 3 in. for pipes > 1.5 in.
  - Piping within HVAC equipment.
  - Fluid temperatures between 55 and 105°F.
  - Fluid not heated or cooled with renewable energy.
  - Piping within room fan-coil (with AHR440 rating) and unit ventilators (with AHR840 rating).
  - Runouts < 4 ft in length.
  - 11. Operation and maintenance manual provided to building owner
  - 12. Thermostatic controls have 5°F deadband
- Exception(s):
- Thermostat requiring manual charge/operation between heating and cooling
  - Special occupancy or special applications where wide temperature ranges are not acceptable and are approved by the authority having jurisdiction.
  - 13. Balancing devices provided in accordance with IMC 603.17
  - 14. Demand control ventilation (DCV) present for high design occupancy areas (>40 persons/1000 ft<sup>2</sup> in spaces >500 ft<sup>2</sup>) and served by systems with any one of (1) an air-side economizer, (2) automatic modulating control of the outdoor air damper, or (3) a design outdoor airflow greater than 3000 cfm.
- Exception(s):
- Systems with heat recovery.
  - Multiple-zone systems without DDC of individual zones communicating with a central control panel.
  - Systems with a design outdoor airflow less than 1200 cfm.
  - Spaces where the supply airflow rate minus any makeup or outgoing transfer air requirement is less than 1200 cfm.
- Exception(s):
- 15. Motorized, automatic shutoff dampers required on exhaust and outdoor air supply openings
- Exception(s):
- Gravity dampers acceptable in buildings < 3 stories
  - 16. Automatic controls for freeze protection systems present
  - 17. Exhaust air heat recovery included for systems 5,000 cfm or greater with more than 70% outside air fraction or specifically exempted
- Exception(s):
- Hazardous exhaust systems, commercial kitchen and clothes dryer exhaust systems that the International Mechanical Code prohibits the use of energy recovery systems.
  - Systems serving spaces that are heated and not cooled to less than 60°F.
  - Where more than 80 percent of the outdoor heating energy is provided from site-recovered or site solar energy.
  - Heating systems in climates with less than 3600 HDD.
  - Cooling systems in climates with a 1 percent cooling design wet-bulb temperature less than 64°F.
  - Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
  - Laboratory fume hood exhaust systems that have either a variable air volume system capable of reducing exhaust and makeup air volume to 50 percent or less of design values or, a separate make up air supply meeting the following makeup air requirements:

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Fans:  
SF-2 ALT Supply, Constant Volume, 4965 CFM, 6.0 motor nameplate hp, 4.7 design brake hp (4.7 max. BHP)  
SF-2 ALT Exhaust, Constant Volume, 4609 CFM, 5.0 motor nameplate hp, 3.1 design brake hp (3.1 max. BHP)  
Pressure Drop Credits:  
Exhaust filters, scrubbers, or other exhaust treatment, 0.2328 credit  
Particulate filtration credit: MERV 13 through 15, 1.0817 credit  
Return and/or exhaust airflow control devices, 0.5821 credit  
Fully ducted return and/or exhaust air systems, 0.6009 credit  
Heat recovery device, 1.0338 credit

|   |   |
|---|---|
| 1 | MU-3 ALT (Single Zone)<br>Heating: 1 each - Central Furnace, Gas, Capacity = 120 kBtu/h<br>Proposed Efficiency = 80.00% Et, Required Efficiency: 80.00 % Et (or 78% AFUE)<br>Cooling: 1 each - Single Package DX Unit, Capacity = 245 kBtu/h, Air-Cooled Condenser, Air Economizer<br>Proposed Efficiency = 19.30 EER, Required Efficiency: 9.80 EER + 9.5 IPLV<br>Fan System: FAN SYSTEM MU-3 ALT – Compliance (Brake HP and fan efficiency method) : Passes |
| 1 | MU-4 ALT (Single Zone)<br>Heating: 1 each - Central Furnace, Gas, Capacity = 160 kBtu/h<br>Proposed Efficiency = 80.00% Et, Required Efficiency: 80.00 % Et (or 78% AFUE)<br>Cooling: 1 each - Single Package DX Unit, Capacity = 356 kBtu/h, Air-Cooled Condenser, Air Economizer<br>Proposed Efficiency = 12.90 EER, Required Efficiency: 9.80 EER + 9.5 IPLV<br>Fan System: FAN SYSTEM MU-4 ALT – Compliance (Brake HP and fan efficiency method) : Passes |
| 1 | MUA-1 ALT (Single Zone)<br>Heating: 1 each - Central Furnace, Gas, Capacity = 320 kBtu/h<br>Proposed Efficiency = 80.00% Et, Required Efficiency: 80.00 % Et<br>Cooling: 1 each - Single Package DX Unit, Capacity = 557 kBtu/h, Air-Cooled Condenser, Air Economizer<br>Proposed Efficiency = 18.20 EER, Required Efficiency: 9.80 EER + 9.5 IPLV<br>Fan System: FAN SYSTEM MUA-1 ALT – Compliance (Brake HP and fan efficiency method) : Passes             |
| 1 | MUA-2 ALT (Single Zone)<br>Heating: 1 each - Central Furnace, Gas, Capacity = 640 kBtu/h<br>Proposed Efficiency = 80.00% Et, Required Efficiency: 80.00 % Et<br>Cooling: 1 each - Single Package DX Unit, Capacity = 1114 kBtu/h, Air-Cooled Condenser, Air Economizer<br>Proposed Efficiency = 18.20 EER, Required Efficiency: 9.80 EER + 9.5 IPLV<br>Fan System: FAN SYSTEM MUA-2 ALT – Compliance (Brake HP and fan efficiency method) : Passes            |

**Section 4: Requirements Checklist**

- Requirements Specific To: AH-8-17HP-8-17 :**
- 1. Equipment minimum efficiency: Heat Pump: 7.70 HSPF 13.00 SEER
- Requirements Specific To: MU-1 :**
- 1. Equipment minimum efficiency: Single Package Unit: 11.00 EER
  - 2. Newly purchased equipment meets the efficiency requirements
  - 3. Integrated economizer is required for this location and system.
  - 4. Cooling system provides a means to relieve excess outdoor air during economizer operation.
  - 5. Hot gas bypass prohibited unless system has multiple steps of unloading or continuous capacity modulation
  - 6. Hot gas bypass limited to 50% of total cooling capacity
- Requirements Specific To: MU-2 :**
- 1. Equipment minimum efficiency: Single Package Unit: 10.00 EER + 9.7 IPLV
  - 2. Newly purchased equipment meets the efficiency requirements
  - 3. Integrated economizer is required for this location and system.
  - 4. Cooling system provides a means to relieve excess outdoor air during economizer operation.
  - 5. Hot gas bypass prohibited unless system has multiple steps of unloading or continuous capacity modulation
  - 6. Hot gas bypass limited to 25% of total cooling capacity
- Requirements Specific To: MU-3 :**
- 1. Equipment minimum efficiency: Single Package Unit: 10.00 EER + 9.7 IPLV
  - 2. Newly purchased equipment meets the efficiency requirements

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**Section 5: Compliance Statement**

Compliance Statement: The proposed mechanical alteration project represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed mechanical alteration project has been designed to meet the 2009 IECC, Chapter 8, requirements in COMcheck-Web and to comply with the mandatory requirements in the Requirements Checklist.

Craig Champion P.E. Signature: 11/10/2021

**Section 6: Post Construction Compliance Statement**

- HVAC record drawings of the actual installation, system capacities, calibration information, and performance data for each equipment provided to the owner.
  - HVAC O&M documents for all mechanical equipment and system provided to the owner by the mechanical contractor.
  - Written HVAC balancing and operations report provided to the owner.
- The above post construction requirements have been completed.

Principal Mechanical Designer-Name Signature: Date

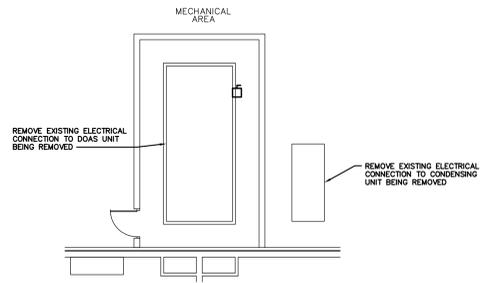
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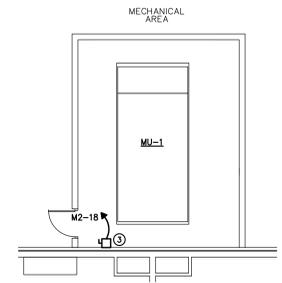
| JOB NUMBER  | 21-097     | REVISION DATES | REVISION DESCRIPTION |
|-------------|------------|----------------|----------------------|
| DESIGNED BY | SMB        |                |                      |
| CHECKED BY  | WFA        |                |                      |
| DATE        | 11/17/2021 |                |                      |

**JOB TITLE**  
CAROLINA FOREST ELEM.  
285 CAROLINA FOREST BLVD.  
MYRTLE BEACH, SC, 29579  
HVAC RENEWAL

**SHEET TITLE**  
ELECTRICAL FLOOR PLAN -  
SECTION 1

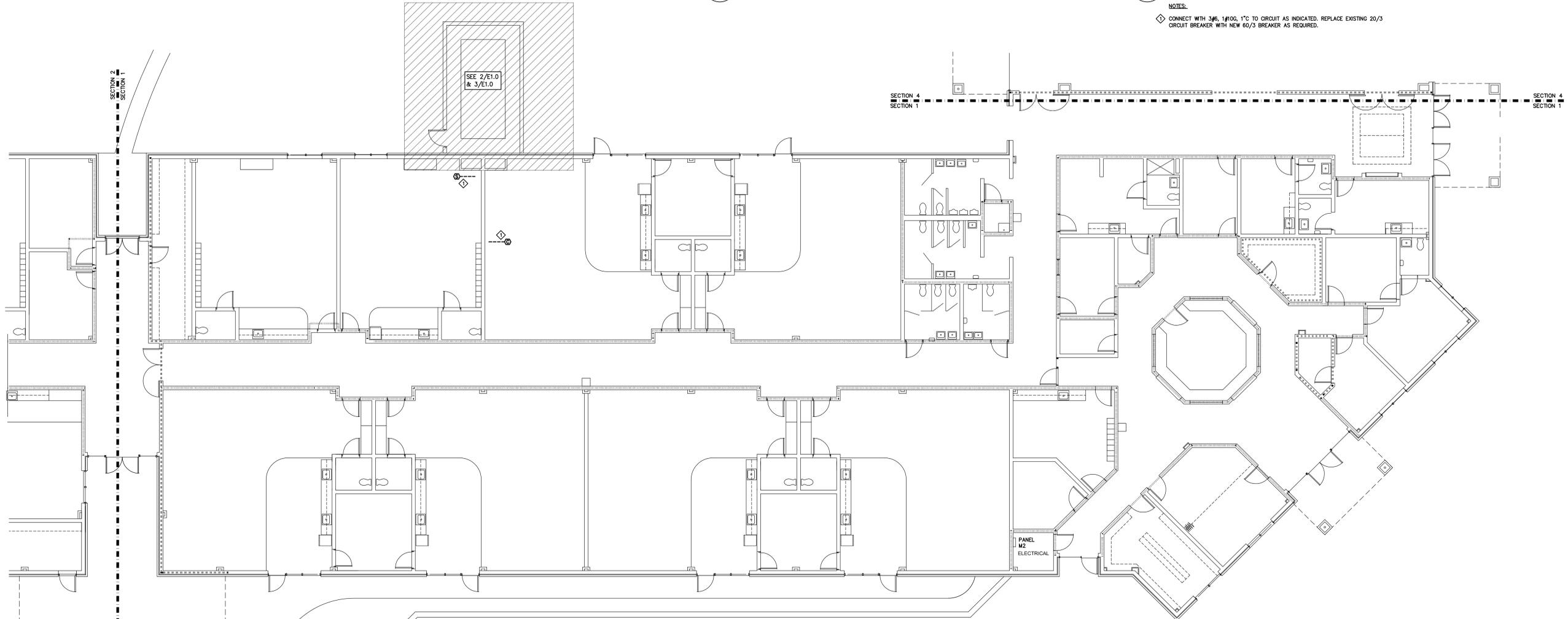


**2 ELECTRICAL PLAN - DEMO**  
SCALE: 1/8" = 1'-0"



**3 ELECTRICAL PLAN - RENO**  
SCALE: 1/8" = 1'-0"

NOTES:  
◇ CONNECT WITH 3/8", 1#10G, 1" C TO CIRCUIT AS INDICATED. REPLACE EXISTING 20/3 CIRCUIT BREAKER WITH NEW 60/3 BREAKER AS REQUIRED.



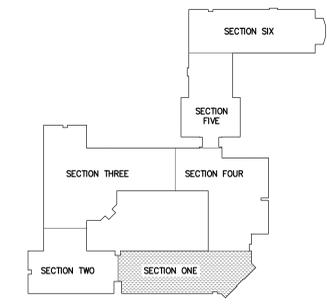
**1 ELECTRICAL FLOOR PLAN - SECTION 1**  
SCALE: 1/8" = 1'-0"

NOTES:  
◇ CONNECT TO EXISTING ADDRESSABLE FIRE ALARM CIRCUIT.

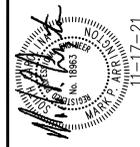
| FIRE RATED WALLS |             |
|------------------|-------------|
| .....            | 1 HOUR WALL |
| .....            | 2 HOUR WALL |
| .....            | 4 HOUR WALL |

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO APPLY THE PROPER FIRE-RATING DETAIL FOR ALL DUCT AND PIPE PENETRATIONS THRU FIRE-RATED WALLS AND SMOKE PARTITIONS.

NOTE: THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS. SUBMISSION OF BIDS IS CONSIDERED VERIFICATION THAT THE CONTRACTOR HAS VISITED THE SITE. NO EXTRAS WILL BE ALLOWED DUE TO LACK OF KNOWLEDGE OF THE EXISTING CONDITIONS.



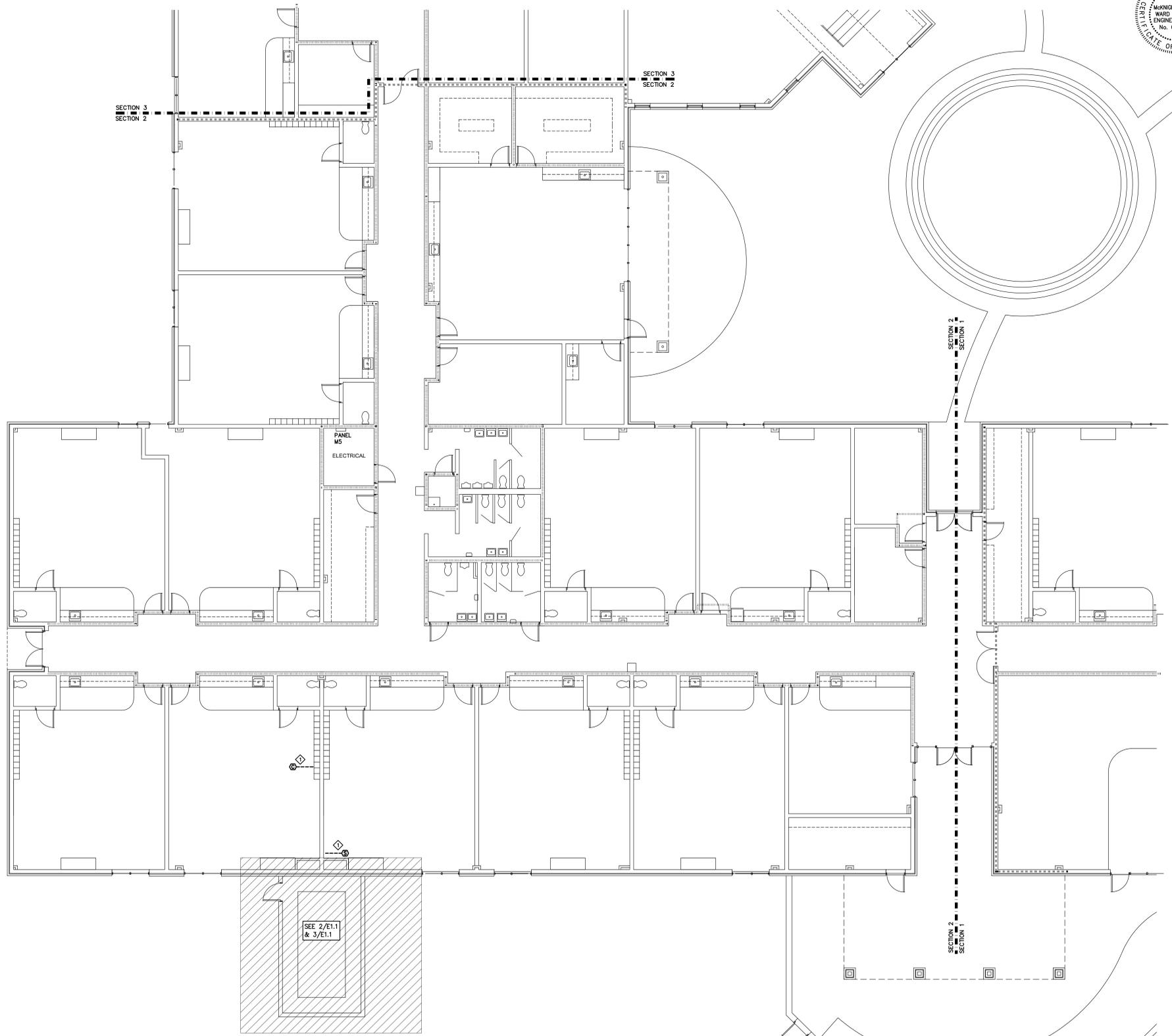
KEY PLAN



| JOB NUMBER  | 21-097     | REVISION DATES | REVISION DESCRIPTION |
|-------------|------------|----------------|----------------------|
| DESIGNED BY | SMB        |                |                      |
| CHECKED BY  | WPA        |                |                      |
| DATE        | 11/17/2021 |                |                      |

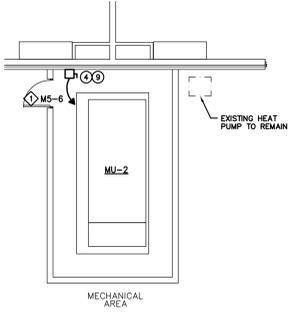
JOB TITLE  
**CAROLINA FOREST ELEM.  
285 CAROLINA FOREST BLVD.  
MYRTLE BEACH, SC, 29579  
HVAC RENEWAL**

SHEET TITLE  
**ELECTRICAL FLOOR PLAN -  
SECTION 2**



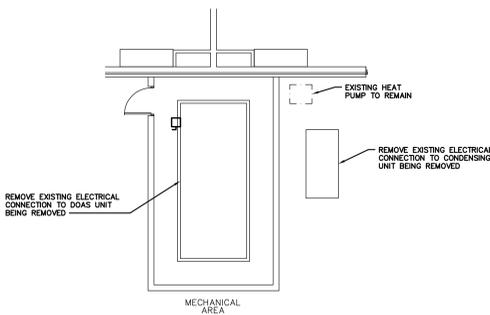
**3 ELECTRICAL PLAN - RENO**

SCALE: 1/8" = 1'-0"  
NOTES:  
◆ BASE BID: CONNECT WITH 3#3, 1#8G, 1-1/4" C TO CIRCUIT AS INDICATED. REPLACE EXISTING 40/3 CIRCUIT BREAKER WITH NEW 90/3 BREAKER AS REQUIRED.  
ALTERNATE BID: CONNECT WITH 3#3, 1#8G, 1-1/4" C TO CIRCUIT AS INDICATED. REPLACE EXISTING 40/3 CIRCUIT BREAKER WITH NEW 90/3 BREAKER AS REQUIRED.



**2 ELECTRICAL PLAN - DEMO**

SCALE: 1/8" = 1'-0"



**1 ELECTRICAL FLOOR PLAN - SECTION 2**

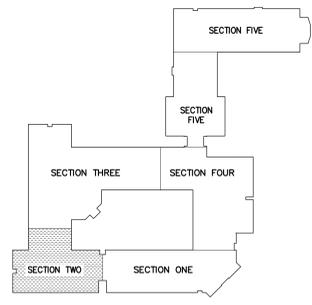
SCALE: 1/8" = 1'-0"  
NOTES:  
◆ CONNECT TO EXISTING ADDRESSABLE FIRE ALARM CIRCUIT.

**FIRE RATED WALLS**

|       |             |
|-------|-------------|
| ..... | 1 HOUR WALL |
| ..... | 2 HOUR WALL |
| ..... | 4 HOUR WALL |

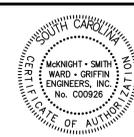
IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO APPLY THE PROPER FIRE-RATING DETAIL FOR ALL DUCT AND PIPE PENETRATIONS THRU FIRE-RATED WALLS AND SMOKE PARTITIONS.

NOTE: THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS. SUBMISSION OF BIDS IS CONSIDERED VERIFICATION THAT THE CONTRACTOR HAS VISITED THE SITE. NO EXTRAS WILL BE ALLOWED DUE TO LACK OF KNOWLEDGE OF THE EXISTING CONDITIONS.

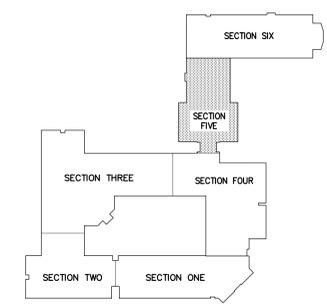
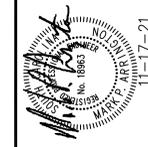


KEY PLAN

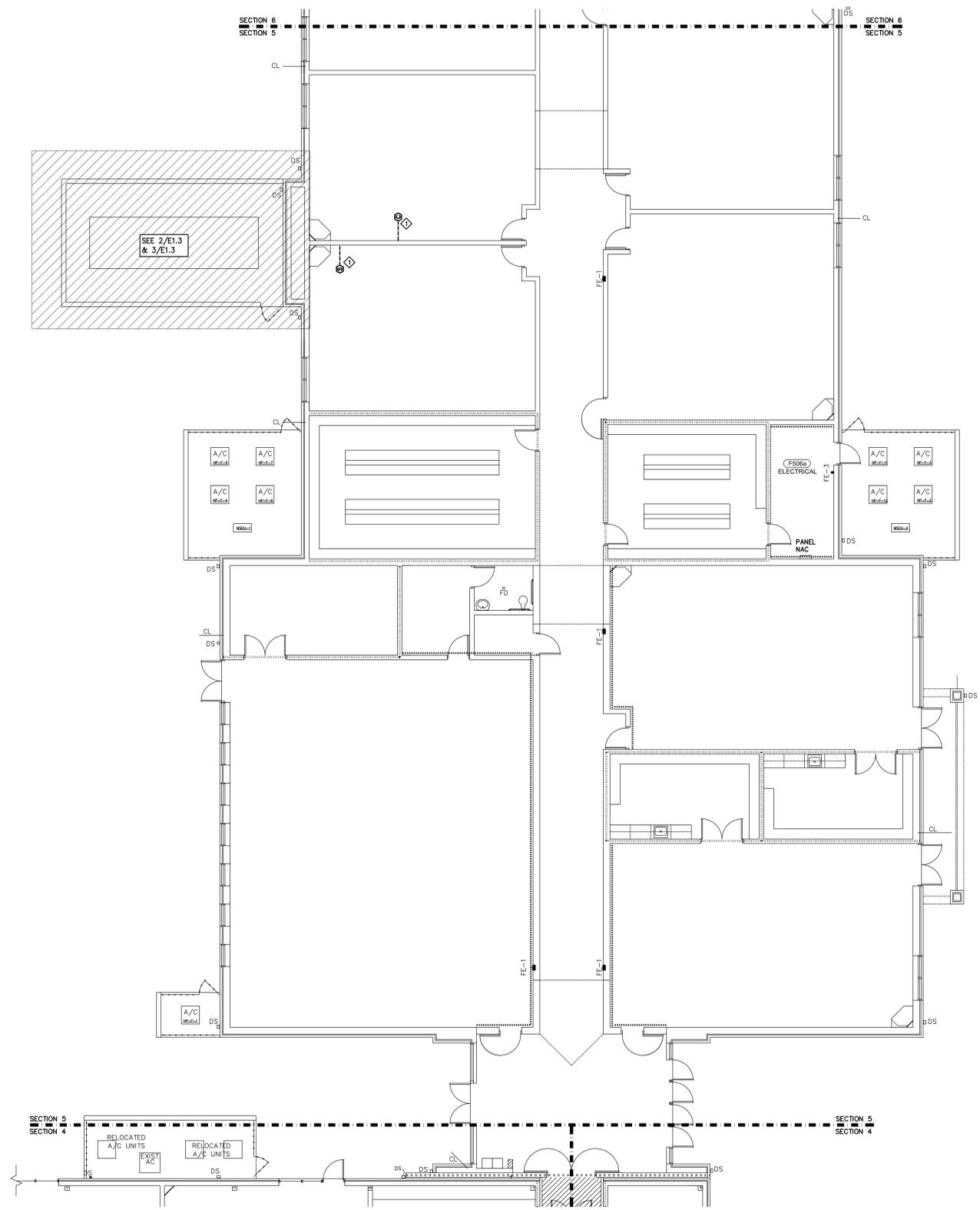




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ENGINEERS, INCORPORATED  
4223 South Boulevard  
Charlotte, NC 28209  
704/527-2112

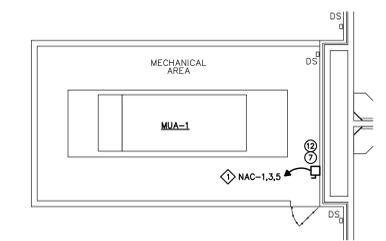


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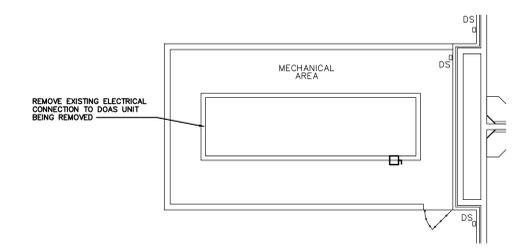
**1** ELECTRICAL FLOOR PLAN - SECTION 5  
SCALE: 1/8" = 1'-0"

NOTES:  
◆ CONNECT TO EXISTING ADDRESSABLE FIRE ALARM CIRCUIT.



**3** ELECTRICAL PLAN - RENO  
SCALE: 1/8" = 1'-0"

NOTES:  
◆ BASE BID: CONNECT WITH 3/4, 1#8G, 1-1/4" C TO CIRCUIT AS INDICATED. REPLACE EXISTING 125/3 CIRCUIT BREAKER WITH NEW 70/3 BREAKER AS REQUIRED.  
ALTERNATE BID: CONNECT WITH 3/4, 1#8G, 1-1/4" C TO CIRCUIT AS INDICATED. REPLACE EXISTING 125/3 CIRCUIT BREAKER WITH NEW 70/3 BREAKER AS REQUIRED.



**2** ELECTRICAL PLAN - DEMO  
SCALE: 1/8" = 1'-0"

| FIRE RATED WALLS |             |
|------------------|-------------|
| .....            | 1 HOUR WALL |
| - - - - -        | 2 HOUR WALL |
| .....            | 4 HOUR WALL |

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO APPLY THE PROPER FIRE-SAFING DETAIL FOR ALL DUCT AND PIPE PENETRATIONS THRU FIRE-RATED WALLS AND SMOKE PARTITIONS.

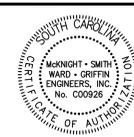
NOTE: THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS. SUBMISSION OF BIDS IS CONSIDERED VERIFICATION THAT THE CONTRACTOR HAS VISITED THE SITE. NO EXTRAS WILL BE ALLOWED DUE TO LACK OF KNOWLEDGE OF THE EXISTING CONDITIONS.

| JOB NUMBER  | 21-097     | REVISION DATES | REVISION DESCRIPTION |
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| DESIGNED BY | SMB        |                |                      |
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| DATE        | 11/17/2021 |                |                      |

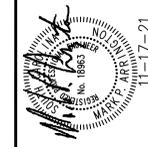
JOB TITLE  
**CAROLINA FOREST ELEM.  
285 CAROLINA FOREST BLVD.  
MYRTLE BEACH, SC, 29579  
HVAC RENEWAL**

SHEET TITLE  
**ELECTRICAL FLOOR PLAN -  
SECTION 5**

SHEET  
**E1.3**  
4 OF 7



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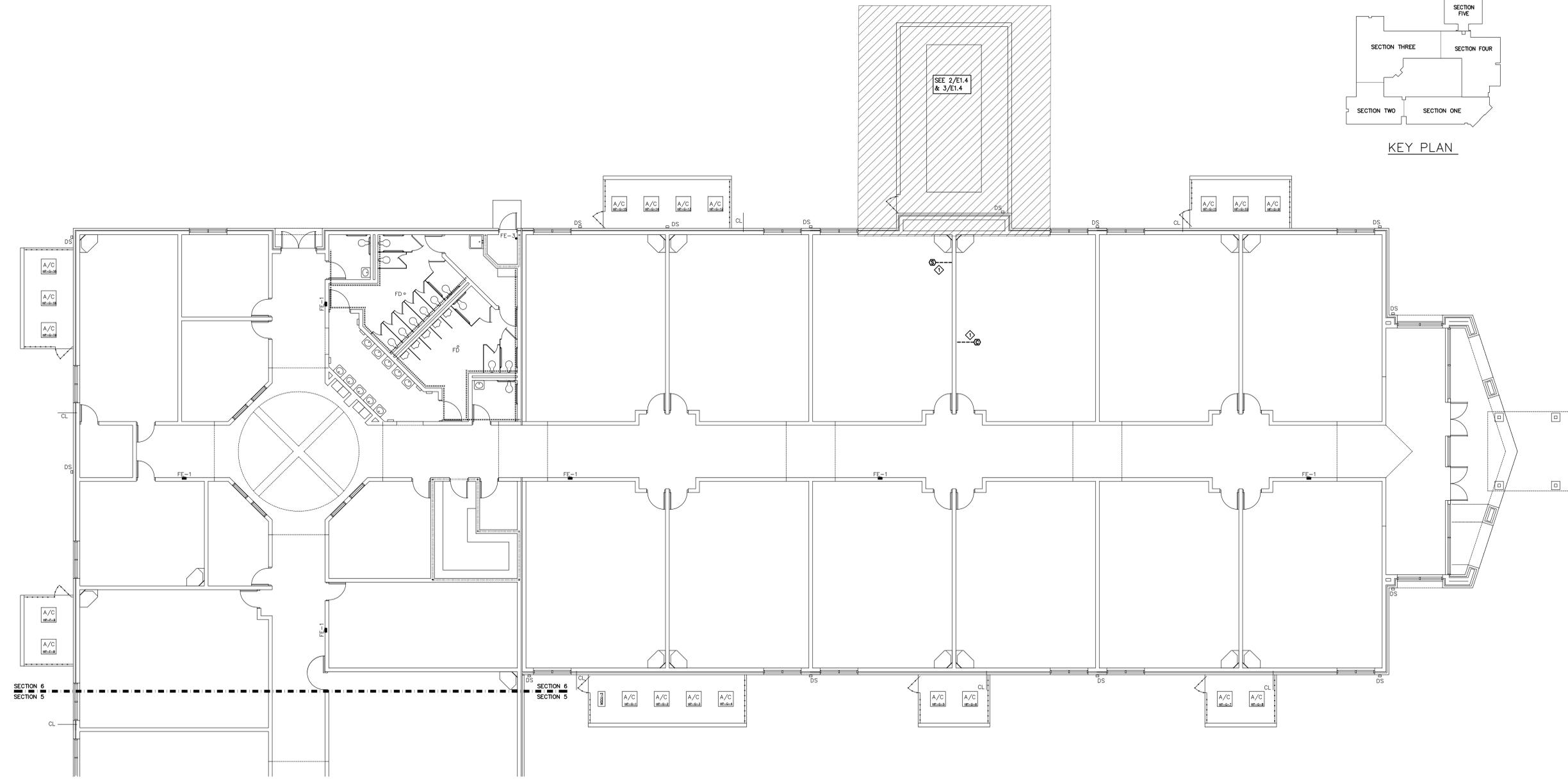
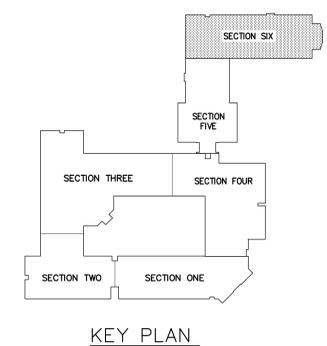


| JOB NUMBER  | 21-097     | REVISION DATES | REVISION DESCRIPTION |
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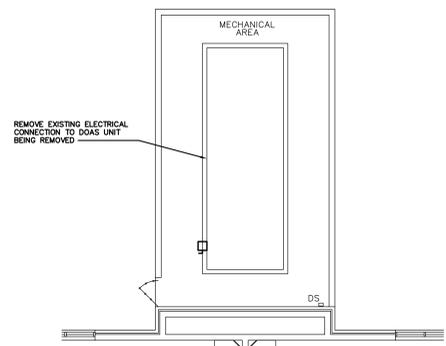
JOB TITLE  
**CAROLINA FOREST ELEM.  
285 CAROLINA FOREST BLVD.  
MYRTLE BEACH, SC, 29579  
HVAC RENEWAL**

SHEET TITLE  
**ELECTRICAL FLOOR PLAN -  
SECTION 6**

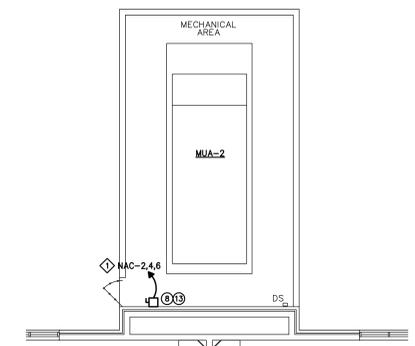
SHEET  
**E1.4**  
5 OF 7



**1 ELECTRICAL FLOOR PLAN - SECTION 6**  
SCALE: 1/8" = 1'-0"  
NOTES:  
◇ CONNECT TO EXISTING ADDRESSABLE FIRE ALARM CIRCUIT.



**2 ELECTRICAL PLAN - DEMO**  
SCALE: 1/8" = 1'-0"



**3 ELECTRICAL PLAN - RENO**  
SCALE: 1/8" = 1'-0"  
NOTES:  
◇ BASE BID: CONNECT WITH 3#1, 1#6G, 1-1/2" TO CIRCUIT AS INDICATED. REPLACE EXISTING 150/3 CIRCUIT BREAKER WITH NEW 125/3 BREAKER AS REQUIRED.  
ALTERNATE BID: CONNECT WITH 3#1, 1#6G, 1-1/2" TO CIRCUIT AS INDICATED. REPLACE EXISTING 150/3 CIRCUIT BREAKER WITH NEW 125/3 BREAKER AS REQUIRED.

| FIRE RATED WALLS |             |
|------------------|-------------|
| .....            | 1 HOUR WALL |
| -----            | 2 HOUR WALL |
| -----            | 4 HOUR WALL |

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO APPLY THE PROPER FIRE-SAFING DETAIL FOR ALL DUCT AND PIPE PENETRATIONS THRU FIRE-RATED WALLS AND SMOKE PARTITIONS.

NOTE: THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS. SUBMISSION OF BIDS IS CONSIDERED VERIFICATION THAT THE CONTRACTOR HAS VISITED THE SITE. NO EXTRAS WILL BE ALLOWED DUE TO LACK OF KNOWLEDGE OF THE EXISTING CONDITIONS.



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| JOB NUMBER  | 21-097     |
|-------------|------------|
| DESIGNED BY | SMB        |
| CHECKED BY  | MFA        |
| DATE        | 11/07/2021 |

JOB TITLE  
**CAROLINA FOREST ELEM.  
285 CAROLINA FOREST BLVD.  
MYRTLE BEACH, SC, 29579  
HVAC RENEWAL**

SHEET TITLE  
**SYMBOLS AND  
SCHEDULES**

| SYMBOL SCHEDULE   |   |
|-------------------|---|
| GENERAL SYMBOLS   |   |
| SYMBOL            | DESCRIPTION   |
| —                 | CONDUIT RUN CONCEALED ABOVE CEILINGS OR IN WALLS.                                   |
| →                 | HOMERUN TO PANEL AND CIRCUIT(S) DESIGNATED. ARROW(S) INDICATE QUANTITY OF CIRCUITS. |
| ◇                 | SPECIAL NOTE, NUMERALS IDENTIFY, SEE SCHEDULE.                                      |
| ⊙                 | SPECIAL CONNECTION TO A SPECIFIC ITEM OF EQUIPMENT. SEE CONNECTION SCHEDULE.        |
| DISTRIBUTION      |   |
| SYMBOL            | DESCRIPTION   |
| ■                 | ELECTRICAL PANELBOARD, SURFACE MOUNTED.   |
| □                 | DISCONNECT SWITCH, NON-FUSIBLE.   |
| ⊠                 | DISCONNECT SWITCH, FUSIBLE.   |
| ⊕                 | GROUND CONNECTION.  |
| Δ                 | DRY-TYPE TRANSFORMER, 480-120/208V 3-PHASE OR 208-120/208V 3-PHASE.                 |
| FIRE ALARM SYSTEM |   |
| SYMBOL            | DESCRIPTION   |
| ⊙                 | FIRE ALARM SYSTEM DUCT MOUNTED PHOTOELECTRIC TYPE SMOKE DETECTOR.                   |
| ⊙                 | FIRE ALARM SYSTEM DUCT MOUNTED CARBON MONOXIDE DETECTOR.                            |

| EQUIPMENT CONNECTION SCHEDULE |                       |                 |                |            |        |       |           |            |             |      |        |
|-------------------------------|-----------------------|-----------------|----------------|------------|--------|-------|-----------|------------|-------------|------|--------|
| SYM.                          | EQUIPMENT             | LOAD            | VOLT/<br>PHASE | DISCONNECT |        |       |           | CONDUCTORS | RACEWAY     |      | NOTES  |
|                               |                       |                 |                | TYPE       | RATING | POLES | TRIP/FUSE |            | ENCL.       | TYPE |        |
| ①                             | AH-8-17               | 1/4HP, 4.8KW    | 480/3          | FDS        | 30A    | 3     | 15A       | 1          | 3#12, 1#12G | FMC  | 1/2"   |
| ②                             | HP-8-17               | 0.6FLA, 10.9RLA | 208/1          | FDS        | 30A    | 2     | 25A       | 3R         | 2#10, 1#10G | LFMC | 1/2"   |
| ③                             | MU-1                  | 3, 1.5HP; 28KW  | 480/3          | NFS        | 60A    | 3     | ---       | 3R         | 3#6, 1#10G  | LFMC | 1"     |
| ④                             | MU-2 (BASE BID)       | 2#6, 6HP; 32KW  | 480/3          | NFS        | 100A   | 3     | ---       | 3R         | 3#3, 1#6G   | LFMC | 1-1/4" |
| ⑤                             | MU-3 (BASE BID)       | 3, 2HP; 32KW    | 480/3          | NFS        | 100A   | 3     | ---       | 3R         | 3#4, 1#6G   | LFMC | 1-1/4" |
| ⑥                             | MU-4 (BASE BID)       | 2#6, 6HP; 40KW  | 480/3          | NFS        | 200A   | 3     | ---       | 3R         | 3#2, 1#6G   | LFMC | 1-1/4" |
| ⑦                             | MUA-1 (BASE BID)      | 6, 6HP; 32KW    | 480/3          | NFS        | 100A   | 3     | ---       | 3R         | 3#4, 1#6G   | LFMC | 1-1/4" |
| ⑧                             | MUA-2 (BASE BID)      | 7.5, 3HP; 79KW  | 480/3          | NFS        | 200A   | 3     | ---       | 3R         | 3#1, 1#6G   | LFMC | 1-1/2" |
| ⑨                             | MU-2 (ALTERNATE BID)  | 2#6, 6HP        | 480/3          | NFS        | 100A   | 3     | ---       | 3R         | 3#3, 1#6G   | LFMC | 1-1/4" |
| ⑩                             | MU-3 (ALTERNATE BID)  | 5, 2HP          | 480/3          | NFS        | 60A    | 3     | ---       | 3R         | 3#6, 1#10G  | LFMC | 1"     |
| ⑪                             | MU-4 (ALTERNATE BID)  | 2#6, 6HP        | 480/3          | NFS        | 200A   | 3     | ---       | 3R         | 3#2, 1#6G   | LFMC | 1-1/4" |
| ⑫                             | MUA-1 (ALTERNATE BID) | 6, 6HP          | 480/3          | NFS        | 100A   | 3     | ---       | 3R         | 3#4, 1#6G   | LFMC | 1-1/4" |
| ⑬                             | MUA-2 (ALTERNATE BID) | 7.5, 3HP        | 480/3          | NFS        | 200A   | 3     | ---       | 3R         | 3#1, 1#6G   | LFMC | 1-1/2" |

**LEGEND**

|   |   |   |  |
|---|---|---|--|
| <b>DISCONNECT TYPES</b><br>ETCB = ELECTRONIC-TRIP CIRCUIT BREAKER<br>FDS = FUSIBLE DISCONNECT SWITCH<br>MCP = MOTOR CIRCUIT PROTECTOR<br>NFD5 = NON-FUSIBLE DISCONNECT SWITCH<br>ST/DS = COMBINATION STARTER/DISCONNECT SWITCH<br>TMCB = THERMAL-MAGNETIC CIRCUIT BREAKER<br>TOS = HP-RATED TOGGLE SWITCH | <b>DISCONNECT ENCLOSURE TYPES</b><br>1 = NEMA 1 ENCLOSURE<br>3R = NEMA 3R ENCLOSURE<br>4 = NEMA 4 ENCLOSURE<br>4X = NEMA 4X ENCLOSURE<br>FPN = FUSE PER NAMEPLATE | <b>RACEWAY TYPES</b><br>EMT = ELECTRIC METALLIC TUBING<br>FMC = FLEXIBLE METAL CONDUIT<br>IMC = INTERMEDIATE METAL CONDUIT<br>LFMC = LIQUID-TIGHT FLEXIBLE METAL CONDUIT<br>PVC = NON-METALLIC PVC CONDUIT<br>RMC = RIGID METAL CONDUIT | <b>STARTER TYPES</b><br>CFWR = COMBINATION FULL VOLTAGE, NONREVERSING<br><b>CONTROL DEVICES</b><br>HDA = HAND-OFF-AUTO<br>RPL = RED PILOT LIGHT<br>AUX = AUXILIARY CONTACTS (2 N.O., 1 N.C.)<br>CTS0 = 50 VA CONTROL TRANSFORMER |
|---|---|---|--|

**NOTES**

ALL ELECTRICAL CHARACTERISTICS SCHEDULED ABOVE ARE BASED ON INFORMATION AVAILABLE AT THE TIME OF DESIGN. ELECTRICAL CONTRACTOR SHALL VERIFY ELECTRICAL CHARACTERISTICS OF ALL EQUIPMENT WITH EQUIPMENT SUPPLIER(S) PRIOR TO ROUGHING, AND SHALL VERIFY EXACT LOCATION AND EXACT TYPE OF CONNECTION. ALL EQUIPMENT SHALL BE PROPERLY AND SECURELY GROUNDED. ANY SIGNIFICANT CHANGES IN LOCATION, ELECTRICAL REQUIREMENTS, OR TYPE OF CONNECTION REQUIRED FOR ANY EQUIPMENT SCHEDULED ABOVE SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IN WRITING PRIOR TO PROCEEDING.

CONDUCTORS AND RACEWAY SPECIFIED IN THE ABOVE SCHEDULE ARE FOR FINAL CONNECTION TO UNIT AND SHALL BE EXTENDED FROM THE DISCONNECT SHOWN ON THE FLOOR PLANS TO THE EQUIPMENT TERMINATION BOX.

CONDUIT AND BOXES REQUIRED FOR EQUIPMENT CONNECTIONS SHALL BE INSTALLED IN SUCH A WAY AS TO NOT COVER UP EQUIPMENT NAMEPLATES, SERVICE AREAS, AIR FLOW AREAS, ETC.

**ELECTRICAL GENERAL REQUIREMENTS**

**1.1 SCOPE:**

- a. Applicable requirements of the General Conditions of the Contract, Amendments, Supplementary General Conditions, and Special Conditions govern work under this Division.
- b. Work covered by this Division consists of providing all labor, equipment, supplies, and materials; and performing all operations, including trenching, backfilling, cutting, patching, and chasing necessary for the installation of complete electrical systems in strict accordance with these specifications and the applicable drawings.
- c. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.
- d. This Contractor is referred to the General and Special Conditions of the contract which shall form a part and be included in this section of the specification and shall be binding on this Contractor.
- e. Some items of equipment are specified in the singular; however, the Contractor shall provide and install the number of items or equipment as indicated on the drawings, and as required for complete systems.

**1.2 RECORD DRAWINGS:**

- a. During construction of this project, the Contractor shall maintain one complete set of electrical contract drawings, on which shall be recorded all significant changes. This set of drawings shall be used for no other purpose. In the event of a discrepancy, the Contractor shall submit these drawings to the Architect/Engineer for approval and presentation to the Owner.

**1.3 REGULATIONS AND COMPLIANCE:**

- a. The requirements of the International Building Code which includes the National Electrical Code, and of all other State and Local codes, ordinances, regulations and interpretations by authorities having jurisdiction are binding upon this Contractor, and nothing contained in, or inferred by, these specifications or the applicable drawings may be construed as waiving those requirements. The latest edition of the National Electrical Code, referred to herein and on the drawings as "N.E.C.", forms a part of these specifications; and under no circumstances may the installation fail to meet the minimum requirements therein.
- b. This Contractor shall secure and pay for all permits, fees, inspections and licenses required. It is the responsibility of the Contractor to notify the Local Electrical Inspector to schedule the required inspections. Upon completion of the project and prior to his request for final payment he shall present to the Architect/Engineer a certificate of inspection and approval from the inspection authorities.
- c. All materials and equipment shall bear the approval label, and shall be listed by the Underwriters' Laboratories, Inc.

**2.1 GENERAL:**

- a. Except where reuse of existing items are specifically indicated or permitted, all materials and equipment shall be new and shall conform with the standards of the National Electrical Manufacturers' Association and Underwriter's Laboratories, Inc. in every instance where such a standard has been established for the item involved.
- b. Materials shall be inspected by the Contractor upon their arrival at the site to be sure they are correct. Material and equipment stored on the site shall be protected against physical damage, dirt and damage caused by precipitation, wind, condensation, excessive humidity, and extremes of temperature. Materials shall be stored in their original cartons within substantial, clean and dry storage facilities provided under this Contract. Conduit, large galvanized boxes, and lighting poles may be stored outdoors on suitable blocks or racks clear of the earth and undergrowth, and pitched to drain. Large electrical equipment intended for ultimate installation outdoors may be stored in the weather on suitable blocks or platforms clear of the earth and undergrowth, and with interior lamps or space heaters continuously energized to prevent condensation. Alternate storage provisions may be submitted to the Architect/Engineer for approval prior to the arrival of the material. Under no circumstances shall equipment be stored in the weather under a cover of polyethylene or tarpaulin. The Architect/Engineer will be the sole judge as to the acceptability of storage facilities, and when directed by the Architect/Engineer, improperly stored or damaged material shall be removed from the site and replaced with new material.
- c. The Contractor shall coordinate the work and equipment of this Division with the work and equipment specified elsewhere in order to assure a complete and satisfactory installation. Work such as excavation, backfill, concrete, flashing, wiring, etc., which is required by the work of this section shall be performed in accordance with the requirements of the applicable section of the specifications.
- d. It is the intention of these specifications and drawings to call for finished work, tested and ready for operation. Whenever the work "provide" is used, it shall mean "furnish and install complete and ready for use."

**3.1 COORDINATION:**

- a. This Contractor coordinate the work of all subs and shall furnish any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.
- b. Where the work will be installed in close proximity to, or may interfere with the work of other trades, the Contractor shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the Engineer, the Contractor shall prepare composite working drawings and sections at a suitable scale not less than 3/8" = 1" or 1/4" = 1", clearly showing how his work is to be installed in relation to the work of other trades. If the Contractor installs his work before coordination, or so as to cause any interference with work of any subs, he shall make the necessary changes in his work to correct the condition without extra charge.
- c. The Contractor shall furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

**3.2 SLEEVES, CUTTING, AND PATCHING:**

- a. Contractor shall place his own sleeves and advise other trades of required chases and openings so they can be properly built in. Where any raceway supports installed under this Contract pierce the roof, suitable pith pockets shall be provided and coordinated with the roofing contractor as necessary to be acceptable to the Architect. Provide suitable fittings where any raceways or equipment cross expansion joints.
- b. Permitted cutting or patching necessary shall be done by Contractor. Structural members shall not be cut except by written permission of Architect/Engineer.

**3.4 PROTECTION AND CLEAN-UP:**

- a. Protect all material and work from damage during construction. Equipment installed in the building prior to its being closed in and dried out shall be protected from the elements in the same manner as previously specified for stored materials. Protect finished surfaces from splattering of mortar, paint, dirt, plaster, etc. Do not install device plates, face plates, covers, flush cabinet trims, or fixtures on walls or ceilings until after painting or cleaning of the surface has been completed, and arrange for such items that are required to be field painted to be painted before being mounted. Repair, clean and touch-up or replace, all damaged material. At the completion of the project, remove all dust from finished surfaces, including lighting fixtures, lenses and lamps.
- b. The Contractor shall keep premises free of debris resulting from his work.

**3.5 PAINTING AND FINISHING:**

- a. Suitable finishes shall be provided on all items of electrical equipment and materials which are exposed. This shall consist of either an acceptable finish as manufactured and supplied to the job or application of suitable finishes after installation.
- b. Where installed in finished areas, exposed equipment and materials shall be supplied with prime coat, and shall be professionally painted or enameled as directed to match or blend with adjacent surfaces.
- c. In unfinished areas such as equipment rooms, exposed equipment shall be furnished with suitable factory applied finishes (e.g. standard gray enamel finish for panelboards, etc.).

**3.6 OBSERVATION:**

- a. The project will be observed periodically as construction progresses. The Contractor will be responsible for notifying the Architect at least 72 hours in advance when any work to be covered up is ready for inspection. No work will be covered up until after observation has been completed on such items as piping and insulation, etc.

**EQUIPMENT CONNECTIONS AND COORDINATION**

**1.1 GENERAL:**

- a. Heating, Ventilating, Air Conditioning, Refrigeration and Plumbing Equipment: Unless otherwise indicated, provide all power wiring, including feeders and branch circuits, to the terminals of the equipment, including mounting of motor starters, feeder and branch circuit over-current protection; disconnecting means within sight of each motor and each starter, whether or not specifically indicated on drawings; and Motor Control Centers indicated, complete as scheduled and specified.

**BASIC MATERIALS AND METHODS**

**1.1 WIRING METHOD:**

- a. Unless otherwise indicated or specified, the Wiring Method for this project shall consist of copper conductors with 600 volt insulation installed in metal raceways.
- b. The word "Raceway" and the word "Conduit" (or abbreviation "C") used herein or on the drawings indicate Rigid Metal Conduit, and where permitted, Intermediate Metal Conduit, Electrical Metallic Tubing, Rigid Nonmetallic Conduit, Flexible Metal Conduit, or Liquidtight Flexible Metal Conduit.
- c. Reference to "MC" indicates Intermediate Metal Conduit.
- d. Reference to "EMT" or "Tubing" indicates Electrical Metallic Tubing.
- e. Reference to "Flex" or "Flexible Conduit" indicates Flexible Metal Conduit, or, where required, Liquidtight Flexible Metal Conduit.

**1.2 FASTENINGS METHODS:**

- a. Acceptable fastening methods include wood screws and nails on wood construction, toggle bolts on hollow masonry, expansion bolts and lead anchors on brick and concrete, and machine screws on metal surfaces.
- b. Explosive fasteners may be used in steel and concrete in accordance with the manufacturer's recommendations.
- c. Wire, perforated metal strap, and wooden plugs are not acceptable as fastening material.
- d. Materials used shall be good quality, made of zinc or cadmium coated steel or other non-corroding material.
- e. Materials, whether exposed or concealed, shall be firmly and adequately held in place. Fastening and support shall afford safety factor of three or higher, and shall be in full compliance with the seismic protection requirements of the N.C. State Building Code.
- f. Fixtures, raceways, and equipment shall be supported from the structure. Nothing may be supported on suspended ceiling unless definitely noted so on the Drawings or specifically permitted by the Architect/Engineer.
- g. Equipment and raceways attached to outside walls, or interior walls subject to permanent moisture, shall be shimmed out with non-corrodible material so as to provide 1/4" air space between wall and equipment or raceway.

**RACEWAYS AND FITTINGS**

**1.1 MATERIALS AND APPLICATIONS:**

- a. Intermediate Metal Conduit (IMC) with threaded couplings and fittings may be used for exposed and concealed work in lieu of rigid metal conduit except underground outside the building foundation, or where supporting lighting fixtures, or in hazardous locations, or where exposed to severe impact or injury. Termination at sheet metal enclosures shall consist of double locknuts and insulating bushings.
- b. Electrical Metallic Tubing (EMT) of 2" maximum size may be used for concealed work in lieu of Rigid Metal Conduit except underground or in poured concrete. EMT of 2" maximum size may be used for exposed work in lieu of Rigid Metal Conduit except

outdoors, or above a roof, or where supporting lighting fixtures, or where exposed to severe impact or injury, or in hazardous locations, or less than 10 feet above a floor or platform in either in electrical, mechanical, or communications closets or equipment rooms.

- j. Flexible Metal Conduit shall be of zinc coated steel of minimum length, and shall be used in lieu of Rigid Metal Conduit for connections to moving or vibrating apparatus, recessed lighting fixtures, dry-type transformers, and motors. Flexible Metal Conduit may be used where rigid connections are impractical due to obstructions or space limitations. Flexible Metal Conduit used in wet, damp, or corrosive location shall be PVC jacketed liquid-tight complete with liquid-tight connectors.

k. Fittings for steel conduit and tubing shall be of zinc coated steel or malleable iron. Insulating bushings of plastic provided for Rigid and Intermediate Metal Conduits shall be rated for 150°C. Bonding bushings shall be steel or malleable iron with non-removable plastic throats rated 150°C. EMT fittings shall be of the compression type. Set-screw, indentor, pressure cast, and die cast fittings are not acceptable. Connectors for EMT, Flexible Metal Conduit and Liquid-tight Flexible Metal Conduit shall be the insulated thru type. Connectors for Flexible Metal Conduits shall be of the "Tite-Bite" design.

l. Conduit expansion fittings shall be of zinc coated cast or malleable iron and steel conduit, complete with flexible bonding straps. Expansion fittings shall allow longitudinal conduit movement of 4 inches.

m. Minimum raceway size shall be 1/2". Other raceway sizes, unless indicated on the drawings, shall be determined by the Contractor in accordance with NEC requirements for type THW insulated conductors, or the actual insulation used if it is thicker than type THW.

**2.1 INSTALLATION:**

- a. Rigid and Intermediate Metal Conduits shall be made up with full threads, to which a conductive pipe compound (T & B Kopr-Shield or equal) has been applied, and butted in coupling. Terminations at sheet metal enclosures in outdoor, damp, and wet locations shall be made with threaded conduit hubs of zinc coated malleable iron.
- b. Conduits shall be rigidly supported not more than 8 feet on center and shall be concealed within walls, ceilings, and floors, except as indicated or specifically approved by the Architect/Engineer; kept at least 6" from flues and steam or hot water pipes; and protected against the entry of dirt, plaster, or trash. Raceways shall be supported independently of suspended ceiling members and suspension wires.
- c. Suspended EMT shall be provided with additional hangers at elbows and bends, and where necessary to avoid strain at couplings and connectors.
- d. Exposed conduits, where permitted, shall be run parallel or perpendicular to walls, structural members and ceilings; with right-angle turns consisting of symmetrical bends or cast metal fittings with threaded hubs. Offsets may be used where necessary provided that they are of minimum length.
- e. Conduits crossing expansion and contraction joints shall cross perpendicular to the joint and shall be provided with expansion fittings. Conduits shall not be embedded in the concrete slabs at the expansion and contraction joints.

**CONDUCTORS**

**1.1 MATERIALS:**

- a. Unless otherwise indicated, all wire and cable conductors shall be copper.
- b. Conductors shall be not smaller than #12 AWG except that #10 AWG minimum is required for the entire length of 120 volt branch circuits whose distance to the center of the load exceeds 75 feet. #14 AWG may be used for signal and remote control circuits. #16 AWG may be used for taps to individual recessed lighting fixtures on circuits protected by over-current devices rated at 20 amperes or less and contained within flexible metal conduits that do not exceed 6 feet in length. Other conductors smaller than #14 AWG may be used only where specifically indicated on the drawings or specified herein.
- c. Conductors #10 AWG and smaller shall be solid, dual rated type THHN/THHN.
- d. Conductors #8 AWG and larger shall be stranded, dual rated type THHN/THHN.
- e. Each conductor shall bear easily readable markings along entire length, indicating size and insulation type.
- f. Insulation on conductors #10 AWG and smaller shall be suitably colored in manufacture.
- g. Conductors in any location subject to abnormal temperature shall be furnished with an insulation type suitable for temperature encountered.
- h. Where no indication is made of wire size, the conductor shall be of N.E.C. size to match its overcurrent protective device, but in no case smaller than #12 AWG.

**2.1 SPLICES, TAPS, AND CONNECTIONS:**

- a. Splices in conductors #10 AWG and smaller shall be made with twist-on spring steel devices UL listed as Pressure Cable Connectors, with integral insulating covers rated 75°C, at 600 volts.
- b. Splices in copper conductors #8 AWG and larger shall be made with mechanical devices UL listed as Pressure Cable Connectors and insulated with thermoplastic tape UL listed for use as sole insulation. Taps may be omitted from connectors supplied with securely fastened insulating covers which completely enclose the connector and the conductors. Insulating covers shall be rated 75°C at 600 volts.

**2.2 COLOR CODING:**

- a. All wiring shall be color coded.
- b. On 120/208V, 3 phase, 4 wire power systems, conductors shall be color coded Black (Phase A), Red (Phase B), Blue (Phase C), and White (Neutral). On 277/480V, 3 phase, 4 wire systems, conductors shall be color coded Brown (Phase A), Orange (Phase B), Yellow (Phase C), and Gray (Neutral).
- c. Insulation for grounding conductors on all systems shall be Green.
- d. Conductors #8 AWG and larger may be identified with two or more bands of proper color plastic tape applied near each splice and termination. Painting of wire will not be acceptable.
- e. Phase sequence shall be "A", "B" and "C" from left to right, top to bottom or front to back when facing equipment.

**2.3 BRANCH CIRCUIT RACEWAY WIRING:**

- a. Three-phase circuits shall be limited to one such circuit per raceway. They shall consist of three different phase wires, and a neutral where required.
- b. A neutral shall not serve more than one circuit. The neutral carrying all or any part of the current of any specific load shall be contained in the same raceway or enclosure with the phase wire or wires also carrying that current.
- c. Circuits shall be connected to panels as shown in the panel schedules.
- d. Under the above requirements and with required color coding system no raceway shall contain more than one wire of the same color, except for switch legs and control conduits.
- e. Conductors supplying lighting outlets may be combined in the same raceways with conductors supplying receptacles; but lighting outlets and receptacle outlets shall not be connected to the same circuits unless specifically indicated on the drawings.

**GROUNDING AND BONDING**

**1.1 SCOPE:**

- a. The electric system neutral, the neutral of each separately derived system, and all non-current-carrying metal parts, raceways, and enclosures shall be permanently and effectively grounded.
- b. Grounding and bonding shall be provided in strict accordance with the National Electrical Code, and as specified herein and on the drawings.
- c. The Contractor shall note that required grounding conductors and connections are not all shown on the drawings. NEC requirements apply.

**2.1 MATERIALS AND APPLICATIONS:**

- a. Grounding conductors shall be of THWN insulated copper, unless otherwise indicated.
- b. Equipment grounding conductors shall be THWN insulated copper, unless otherwise indicated.

**3.1 EQUIPMENT GROUNDING:**

- a. All non-current-carrying metal parts, raceways, and enclosures of the electrical system and of equipment supplied through the electrical system shall be permanently and effectively grounded.
- b. Equipment grounding conductors shall be provided for each feeder and for each branch circuit and shall be contained within the same raceways as the feeder and branch circuit conductors. The equipment grounding conductor shall be THWN insulated copper, not smaller than #12 AWG.
- c. Copper bonding strips normally included in small sizes of liquid-tight flexible metal conduit and dependent upon the terminal connectors for bonding continuity will not be accepted in lieu of the equipment grounding conductors specified herein.
- d. Where metal raceways enter sheet metal enclosures through knockouts provide bonding bushings and jumpers to the enclosure under any of the following conditions:
  1. Voltage exceeds 250 volts to ground.
  2. Branch circuit conduit exceeds 1" in size.
  3. Feeder conduit regardless of voltage and size.

**SECONDARY DISTRIBUTION EQUIPMENT**

**1.1 OVERCURRENT PROTECTION DEVICES:**

- a. Unless otherwise indicated, circuit breakers shall be provided as the overcurrent protection devices for services, separately derived systems, feeders, and branch circuits. Fuses may be used only where indicated on the drawings, or required by the manufacturer for equipment connected, or specified herein.
- b. Molded-case and insulated-case circuit breakers shall be the static or thermal-magnetic type, quick-make and quick-break for manual and automatic operation. Multiple breakers shall be common trip. Circuit breakers shall be bolted in place where possible. Thermal-magnetic breakers shall be calibrated at 40°C, or ambient compensated. Ampere ratings, frame sizes, and short circuit ratings shall be as indicated on the drawings. Series ratings may be applied only where specifically indicated on the drawings. Individual enclosures shall be NEMA 1 indoors, 3R outdoors, unless otherwise indicated. Other circuit breakers shall be suitable for installation in Switchboards, Panelboards, and Motor Control Centers as hereinafter specified.
- c. Single-pole 15 and 20 amp circuit breakers shall be SMD rated.
- d. Fuses shall be the non-renewable, time delay, cartridge type, UL Class RK5 unless otherwise indicated; for installation in Safety

Switches, Panelboards, Switchboards, and/or Motor Control Centers as hereinafter specified.

**1.2 SWITCHING EQUIPMENT:**

- a. Fusible switches shall be incorporated into Safety Switches, as hereinafter specified. Manual operation shall be quick-make and quick-break. Fuse holders shall be the Class R rejection type unless otherwise indicated.
- b. Safety Switches shall be the NEMA heavy duty type, horsepower rated, with interlocked covers, non-fusible except where fused switches are indicated or fuses are required. Switch mechanisms shall be quick-make and quick-break. Enclosures shall be NEMA 1 indoors, NEMA 3R outdoors unless otherwise indicated. Fuse holders, where required, shall be as specified above for fusible switches.
- c. Switches for disconnecting small single-phase motors and appliances shall comply with SECTION 16150. WIRING DEVICES.

**2.1 INSTALLATION:**

- a. Distribution Equipment shall be installed in strict accordance with the manufacturer's instructions for handling, support, connections, assembly, protection, energization, adjustment, and similar procedures.
- b. Fastening methods shall comply with SECTION 16100. BASIC MATERIALS AND METHODS.
- c. Floor mounted equipment such as Switchboards, Motor Control Centers, and Dry-Type Transformers shall be provided with 4" high concrete pads and shall be secured to the concrete pad. Pads shall have a 3/4 inch chamber on each accessible side.
- d. Equipment interiors shall be thoroughly cleaned of dust, dirt, trash, and other foreign material prior to energization of the equipment.
- e. Exterior Safety Switches that are readily accessible to unauthorized persons shall have their covers padlocked closed by the Contractor. Keys shall be identified and delivered to the Owner.
- f. Upon completion of the project, furnish to the Owner one complete set of replacement fuses, consisting of three fuses of each type and rating used.
- g. Directory cards for Panelboards and for group mounted Switchboard sections shall be neatly filed-in with a typewriter to indicate the type and location of the load on each circuit or feeder.



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| JOB NUMBER  | 21-097     | REVISION DATES | REVISION DESCRIPTION |
|-------------|------------|----------------|----------------------|
| DESIGNED BY | SMW        |                |                      |
| CHECKED BY  | MFA        |                |                      |
| DATE        | 11/07/2021 |                |                      |

**CAROLINA FOREST ELEM.  
285 CAROLINA FOREST BLVD.  
MYRTLE BEACH, SC, 29579  
HVAC RENEWAL**

**SPECIFICATIONS**