University of South Carolina

Belle W. Baruch Marine Field Laboratory

Georgetown, SC

USC BARUCH MARINE LAB

HVAC UNIT REPLACEMENT & REPAIRS

PROJECT NUMBER: CP00428734

50000-A000

JUNE 30, 2016

PROJECT NAME: USC BARUCH MARINE LAB HVAC REPLACEMENT & REPAIRS

Project Number: CP00428734 June 30, 2016

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SE-311
INVITATION FOR MINOR CONSTRUCTION QUOTES

PROJECT NAME: USC Baruch Marine Lab HVAC Replacement & Repairs

PROJECT NUMBER: CP00428734

PROJECT LOCATION: Baruch Marine Lab, 2306 Crabhall Rd, Hobcaw Barony, Georgetown 29440

BID SECURITY REQUIRED? Yes ☐ No ☒

PERFORMANCE BOND REQUIRED? Yes ☐ No ☒

PAYMENT BOND REQUIRED? Yes ☐ No ☒ **CONSTRUCTION COST RANGE:** $ 40,000 to $50,000

DESCRIPTION OF PROJECT: Furnish and install one (1) nominal 12 ton 100% make-up air rooftop package HVAC unit at the Baruch Marine Lab in Georgetown, SC. Work incldues the removal and disposal of one (1) existing 15 ton unit. Include all labor materials and equipment necessary for complete start up, turn key operation. Alternate #1: Ceiling repairs and replacement; Alternate #2: AC-2 Damper Upgrades. Substantial completion is 45 days for base bid and 60 days total with alternate. Site contact Paul Kenny (843)520-6660. Small and minority business participation is highly encouraged. All bidders are responsible for obtaining all bidding documents from purchasing.sc.edu.

BIDDING DOCUMENTS/PLANS MAY BE OBTAINED FROM: purchasing.sc.edu. See Facilities/Construction Solicitations/Award

PLAN DEPOSIT AMOUNT: $ $0.00 **IS DEPOSIT REFUNDABLE** Yes ☐ No ☐ N/A ☒

Bidders must obtain Bidding Documents/Plans from the above listed source(s) to be listed as an official plan holder. Only those Bidding Documents/Plans obtained from the above listed source(s) are official. Bidders rely on copies of Bidding Documents/Plans obtained from any other source at their own risk.

IN ADDITION TO THE ABOVE OFFICIAL SOURCE(S), BIDDING DOCUMENTS/PLANS ARE ALSO AVAILABLE AT:
N/A

All questions & correspondence concerning this Invitation shall be addressed to the A/E.

A/E NAME: Essex Consulting Group
A/E CONTACT: Lance Barron
A/E ADDRESS: **Street/PO Box**: 3125 Medlock Bridge Road
City: Norcross **State:** GA **ZIP**: 30071-
EMAIL: llarron@essex.com
TELEPHONE: 404-365-9482 **FAX:** 404-365-8163

AGENCY: University of South Carolina
AGENCY PROJECT COORDINATOR: Aimee Rish
ADDRESS: **Street/PO Box**: 743 Greene Street
City: Columbia **State:** SC **ZIP:** 29208-
EMAIL: arish@fmc.sc.edu
TELEPHONE: 803-777-2261 **FAX:** 803-777-7334

PRE-QUOTE CONFERENCE: Yes ☒ No ☐ **MANDATORY ATTENDANCE:** Yes ☐ No ☒
PRE-QUOTE DATE: 10/3/2016 **TIME:** 10:00AM **PLACE:** 2306 Crabhall Rd, Hobcaw Barony, Georgetown
QUOTE CLOSING DATE: 10/12/2016 **TIME:** 2:00PM **PLACE:** 743 Greene St Conf Rm 053; Cola SC 29208

QUOTE DELIVERY ADDRESSES:

HAND-DELIVERY:
Attn: Aimee Rish "Bid Enclosed"
743 Greene Street
Columbia, SC 29208

MAIL SERVICE:
Attn: Aimee Rish "Bid Enclosed"
743 Greene Street
Columbia, SC 29208

APPROVED BY: _____ **DATE:** _____
(Agency Project Coordinator)

SE-331
QUOTE FORM

Quotes shall be submitted only on SE-331.

QUOTE SUBMITTED BY: _____

(Offeror's Name)

QUOTE SUBMITTED TO: University of South Carolina

(Owner's Name)

FOR: PROJECT NAME: USC-BARUCH MARINE LAB HVAC REPLACEMENT & ADDITIONAL REPAIRS

PROJECT NUMBER: CP00428734

OFFER

1. In response to the Invitation for Minor Construction Quotes, and in compliance with the Instructions to Bidders for the above-named Project, the undersigned **OFFEROR** proposes and agrees, if this Quote is accepted, to enter into a Contract with the Owner in the form included in the Solicitation Documents, and to perform all Work as specified or indicated in the Solicitation Documents, for the prices and within the time frames indicated in the Solicitation and in accordance with the other terms and conditions stated.
2. Pursuant to Section 11-32-3030(1) of the SC Code of Laws, as amended, **OFFEROR** has submitted Bid Security as follows in the amount and form required by the Solicitation Documents:

   ☐ **Bid Bond with Power of Attorney** ☐ **Electronic Bid Bond** ☐ **Cashier's Check**

   (Bidder check one)

3. **OFFEROR** acknowledges the receipt of the following Addenda to the Solicitation documents and has incorporated the effects of said Addenda into its Quote *(Bidder, check only boxes that apply.)*:

   ADDENDA: ☐ **#1** ☐ **#2** ☐ **#3** ☐ **#4** ☐ **#5**

4. **OFFEROR** agrees that this Quote, including all bid alternates, if any, may not be revoked or withdrawn after the opening of quotes, and shall remain open for acceptance for a period of **60** Days following the Quote Date, or for such longer period of time that **OFFEROR** may agree to in writing upon request of the Owner.
5. **OFFEROR** agrees that from the compensation to be paid, the Owner shall retain as Liquidated Damages the amount of $ **250.00** for each calendar day the actual construction time required to achieve Substantial Completion exceeds the specified or adjusted Contract Time for Substantial Completion, as provided in the Contract Documents.
6. **OFFEROR** herewith submits its offer to provide all labor, materials, equipment, tools of trades and labor, accessories, appliances, warranties and guarantees, and to pay all royalties, fee, permits, licenses and applicable taxes necessary to complete the following items of construction work:

   6.1 BASE QUOTE $_____

   (enter BASE QUOTE in figures only)

   6.1.1 ALTERNATE NO. 1 $_____ **to be ADDED / DEDUCTED from BASE QUOTE.**
   (circle one)

   6.1.2 ALTERNATE NO. 2 $_____ **to be ADDED / DEDUCTED from BASE QUOTE.**
   (circle one)

SC Contractor's License Number: _____

Classification(s) & Limits: _____

Address: _____

_____

Telephone/Fax _____

E-mail _____

This Quote is hereby submitted on behalf of the Offeror named above.

BY: _____

(Signature of Offeror's Representative)

_____

(Print or Type Name of Offeror's Representative)

TITLE: _____

USC SUPPLEMENTAL
CONDITIONS FOR WORK AT THE HOBCAW BARONY, GEORGETOWN S.C.

5-25-2016

1. Contractor's employees shall take all reasonable means not to interrupt the flow of student traffic in building corridors, lobbies and stairs. All necessary and reasonable safety precautions shall be taken to prevent injury to building occupants while transporting materials and equipment through the building to the work area. Providing safe, accessible, plywood pedestrian ways around construction may be required if a suitable alternative route is not available.

2. Fraternization between Contractor's employees and USC students, faculty or staff is strictly prohibited - zero tolerance!

3. USC will not tolerate rude, abusive or degrading behavior on the job site. Heckling and cat-calling directed toward students, faculty or staff or any other person on USC property is strictly prohibited. Any contractor whose employees violate this requirement will be assessed a fine of up to $500 per violation.

4. Contractor's employees must adhere to the University's policy of maintaining a drug-free and smoke-free/tobacco free workplace.

5. Contractor must sign a Contractor Key Receipt/Return form before any keys are issued. Keys must be returned immediately upon the completion of the work. The Contractor will bear the cost of any re-keying necessary due to the loss of or failure to return keys.

6. A welding permit must be issued by the Resident Safety Officer before any welding can begin inside a building. Project Manager will coordinate.

7. Contractor must notify the University immediately upon the discovery of suspect material such as those potentially containing asbestos or other such hazardous materials. These materials **must not** be disturbed until approved by the USC Project Manager.

8. At the beginning of the project, the USC Project Manager will establish the Contractor's lay-down area. This area will also be used for the Contractors work vehicles. No personal vehicles will be allowed in this area, or in any areas surrounding the construction site that are not regular or authorized parking lots. Personal vehicles must be parked in the perimeter parking lots. The lay down area will be clearly identified to the contractor by the PM, with a sketch or drawing provided to Parking. In turn, the contractor will mark off this area with a sign containing the project name, PM name, Contractor name and contact number, and end date. Where this area is subject to foot traffic, protective barriers will be provided as specified by the PM. The area will be maintained in a neat and orderly fashion. Note that access to the freight lift, wheelchair lift, handicap parking spaces, and the driveway to the well house and fire hydrant at the south end of the building must be kept free at all times.

9. Contractor will be responsible for providing its own temporary toilet facilities.

10. Use of USC communications facilities (telephones, computers, etc.) by the Contractor is prohibited, unless prior arrangements are made with the USC Project Manager.

11. For all projects over $100,000, including IDC's, an SE-395, Contractor Performance Evaluation, will be completed by the USC Project Manager and reviewed with the GC at the beginning of the project and a copy given to the GC. At the end of the project the form will be completed and a Construction Performance rating will be established.

12. Contractor is responsible for removal of all debris from the site, and is required to provide the necessary dumpsters which will be emptied at least one (1) times per week. Construction waste must not be placed in University dumpsters. The construction site must be thoroughly cleaned with all trash picked up and properly disposed of on a daily basis and the site must be left in a safe and sanitary condition each day. The University will inspect job sites regularly and will fine any contractor found to be in violation of this requirement an amount up to $1,000.00 daily per violation.

13. Contractor must provide all O&M manuals, as-built drawings, and training of USC personnel on new equipment, controls, etc. prior to Substantial Completion. Final payment will not be made until this is completed.

14. Tree protection fencing is required to protect existing trees and other landscape features to be preserved within a construction area. The limits of this fence will be evaluated for each situation with the consultant, USC Arborist and USC Project Manager. The tree protection fence shall be 6' high chain link fence unless otherwise approved by USC Project Manager. No entry or materials storage will be allowed inside the tree protection zone. A 3" layer of mulch shall be placed over the tree protection area to maintain moisture in the root zone if USC Arborist determines that construction may decrease amount of moisture needed to sustain health of tree(s).

15. All large vehicle traffic to include cranes and material deliveries need to be coordinated with the USC Project Manager or designated official on site. Preferred access of such vehicles will be identified to the contractor as required before access will be granted. A path of minimum size must always be used and marked to reduce the damage to the lawn and landscaping. Items on the property damaged due to unnecessary vehicle traffic will be repaired or replaced at the contractor's expense.

16. Contractor shall water trees and other landscape material as directed by USC Arborist until site is returned to Owner.

17. Where it is necessary to cross walks, tree root zones (i.e., under canopy) or lawns the following measures shall be taken: For single loads up to 9,000 lbs., a 3/4" minimum plywood base shall be placed over areas impacted. For single loads over 9,000 lbs., two layers of 3/4" plywood is required.

18. For projects requiring heavy loads to cross walks, tree root zones or lawns on a regular basis (as determined by USC Project Manager), a construction entry road consisting of 10' X 16' oak logging mats placed on 12" coarse, chipped, hardwood base. Mulch and logging mats shall be supplemented throughout the project to keep matting structurally functional.

19. Any damage to existing landscaping (including lawn areas) will be remediated at Contractor's expense before final payment is made.

20. Any damage to existing conditions, including but not limited to, of the attic space framing and ductwork, will be remediated at the Contractor's expense at the time of such occurrence and before final payment.

21. All power outages or shut-downs for the transferring of electrical feeds to associated equipment from the existing panels to the new panels are to be coordinated with the USC Project Manager and USC's on site staff. The Contractor is to provide a minimum of 72 hours notice and such work may be required to be done outside of regular working hours (after 4pm) or during the weekend in accordance with USC's requirements with ongoing research and functions occurring within the building during the duration of the project scope. The Contractor is to prepare and provide a phasing plan associated with the anticipated electrical shut downs.

22. The interior spaces of the building are to be protected against storm water intrusion during the project duration. The Contractor is to prepare and provide a phasing plan associated with the sequencing of exposed areas of the roof or provide means of an effective secondary roofing system during the replacement of the existing roof assembly.

Contractor Vehicle Requirements on Campus

1. This project is located on the private property of the Belle W. Baruch Foundation (BWBF). All who access the site are subject to the rules and regulations of the BWBF. Access to the site is through an electronic gate off the main entrance. All contractors and subcontractors will need to sign for cards allowing access to the site. All motorized vehicles on the University campus are expected to travel and park on roadways and/or in parking stalls.

2. All motorized vehicles that leak or drip liquids are prohibited from entering the area. This is an environmentally protected and sensitive research site. No fuel or other potentially hazardous material will be stored on site. All precautions and effort must be taken to ensure that such substances are not spilled when in use. All materials and containers must be removed from the site immediately and all areas must be cleaned at the end of each working day.

3. Contractors, vendors, and delivery personnel are required to obtain prior parking authorization before parking in a designated space. Parking and storage space will be designated by USC Project Manager and or on site officials.

4. Drivers of equipment or motor vehicles that damage university hardscape or landscape will be held personally responsible for damages and restoration expense. Special previsions will be communicated to the contractor when traversing the single lane access road.

5. Vehicle drivers who park on landscape or drives must be able to produce written evidence of need or emergency requiring parking on same.

6. All vehicles parked on landscape, hardscape, or in the process of service delivery, must display adequate safety devices, i.e. flashing lights, cones, signage, etc.

7. All drivers of equipment and vehicles will be respectful of University landscape, equipment, structures, fixtures and signage.

8. All incidents of property damage will be reported to Parking Services or the Work Management Center.

Project Name: USC Baruch Marine Lab HVAC AC-1 Replacement & Ceiling Repair (6/30/2016)

Project Number: CP00428734

University of South Carolina

CONTRACTOR'S ONE YEAR GUARANTEE

STATE OF _____

COUNTY OF _____

WE_____
as General Contractor on the above-named project, do hereby guarantee that all work executed under the requirements of the Contract Documents shall be free from defects due to faulty materials and /or workmanship for a period of one (1) year from date of acceptance of the work by the Owner and/or Architect/Engineer; and hereby agree to remedy defects due to faulty materials and/or workmanship, and pay for any damage resulting wherefrom, at no cost to the Owner, provided; however, that the following are excluded from this guarantee;

Defects or failures resulting from abuse by Owner.

Damage caused by fire, tornado, hail, hurricane, acts of God, wars, riots, or civil commotion.

_____
[Name of Contracting Firm]

*By_____

Title_____

*Must be executed by an office of the Contracting Firm.

SWORN TO before me this
_____ day of _____, 2____ (seal)

_____State

My commission expires _____

DIVISION 1 – GENERAL REQUIREMENTS

University of South Carolina

Belle W. Baruch Marine Field Laboratory, Georgetown, SC

USC Baruch Marine Lab HVAC Unit Replacement & Repairs

CP00428734

Furnish and Install One (1) Nominal 12 ton 100% Make-up Air Rooftop Packaged HVAC Unit.

General Description – The University of South Carolina is accepting bids for the removal of an existing 15-ton rooftop Air Conditioning Systems; and the installation of one (1) new 12-ton 100% outside air self-contained package rooftop HVAC unit. This project is located at the Belle W. Baruch Marine Research Laboratory in Georgetown, South Carolina. This facility was constructed in 1991 and is a wooden structure on timber piles directly off the east coast (See following photographs). The new 12-ton unit is to be located on the roof in the mechanical well on the same curb where the existing 15-ton was located (See attached Roof Location Plan R-1). This project requires a complete turnkey installation of the new unit in the same location as the old. Also included are all the necessary electrical and mechanical items required to bring the new 12 ton unit online and in full operation.

The Contractor will be responsible for the following:

Removal & Disconnection:

- One (1) existing 15 ton HVAC unit from rooftop. Work will require electrical disconnect and disconnect from existing duct system.

- The roof system was recently redone so any and all penetrations must be sealed to include abandoned penetrations following the removal of the old unit.
- Contractor is responsible for any damage to the roof.
- Contractor responsible for any new curbing, or curbing adapters needed to accept the unit to be provided.

Furnish and Install the following:

- One (1) new nominal 12 ton 100% make-up air commercial rooftop package HVAC unit.
- Include with the unit a compatible programmable thermostat, humidistat and static pressure sensor with locking covers.
- Any modifications to the existing curb required for new HVAC must first be approved by owner.
- Provide an electronic smoke detection system in the air return ductworks for fire code compliance. Smoke detection systems **must shut entire HVAC system down** in the event smoke is detected.
- Include new condensate drain network to positively drain on existing roof system into roof scuppers.
- The system must **meet or exceed** the manufacturer's cooling, heating, and ARI Sound Rating performance data as provided below.
- Units shall be equipped with corrosion resistant outside coil material or coils coated with factory applied anti-corrosive coating. Corrosion resistance must meet or exceed ASTM B117.85 standards. This is required by Santee Cooper for units located within ½ mile of ocean front.
- Include all labor, materials, and equipment necessary to remove the existing unit, and install the new unit for complete start-up operation.
- This contractor will need to provide a crane and a crane operator to remove the existing unit from the roof and to lift and place the new unit into place on the existing curb with a new curb adapter if required. Contractor shall coordinate the schedule for crane operation with the Owners Representative. Contractor shall provide all labor and

material necessary to rig and attach unit to the crane lift cable and to guide and place the new unit into place.

- Extend and connect new supply air duct from the unit and connect to the existing 32 X 18 supply air duct located in the ceiling below the unit (See attached drawings M-1 and M-2).
- Remove the existing return air and outside air duct. Close up the existing roof opening with roof over to match existing.
- Extract existing electric duct heater out of the existing duct heater housing and close up and seal up duct heater housing with pressure sensitive tape and insulate with nominal 2" fiberglass insulation with aluminum jacket and pressure sensitive tape.
- Provide operating and management controls to provide Sequence of Operation as specified in the Scope of Requirements.
- Requests for substitutions shall be addressed during the period for questions following the pre-bid meeting. Responses will be addressed in addenda.
- Submittal of the bid form is required by the bid closing time and date at the designated location. Within 24 hours of the bid closing time, submit the following to the same persons/locations:
    - Issuing to the owner all service manuals along with the time required to cross train one facility staff member on digital controls and basic service requirements for the new unit.
    - One-year labor and parts warranty.
    - 5-year Manufacturer's warranty on unit submitted with bid.
    - Three references on projects completed of similar complexity and magnitude.
    - Proposed schedule of installation to include completion date.
    - Evidence of all required certifications, licenses, and insurance to perform this work.
- The entire membrane roof system was replaced in July of 2013 and must not be damaged in any way. Any damages due to this work will be the responsibility of the contractor to repair and to maintain the warranty.

- Contractor is responsible for any and all damages to sidewalks, buildings, roof, landscaping, etc. as a result of negligence.

Bid Alternate # 1

Ceiling Repairs and Replacement

This work includes the removal and replacement of damaged ceiling and the painting of all interior walls and ceilings

Bid Alternate # 2

Bid alternate # 2 includes the removal of two backdraft dampers and replacing them with motor operated dampers and providing additional controls to operate in accordance with the new sequence of controls for existing Roof Top HVAC Unit AC-2.

Minimum System Specification Requirements:

NOTE: THE PROPOSED HVAC UNIT MUST MEET OR EXCEED THE MINIMUM SPECIFICATIONS OUTLINED IN THE ATTACHED DOCUMENT PREPAIRED BY ESSEX CONSULTING GROUP. SHOULD ANY INFORMATION CONTAINED IN THIS DOCUMENT CONFLICT WITH STANDARD SPECIFICATIONS THE CONTRACTOR HAS THE RESPONSIBILITY TO MEET OR EXCEED THE PERFORMANCE SPECIFICATIONS PROVIDED.

SUBSTITUTIONS ARE ALLOWED BUT MUST BE APPROVED AND ACCEPTED BEFORE ANY AWARD CAN BE ISSUED.

All bidders are strongly encouraged to visit the site to review existing work conditions. Failure to visit the site will not be an excuse to fulfill the scope outlined in this document.

FRONT VIEW OF MARINE RESEARCH FACILITY. RED ARROW SHOWS HVAC LOCATION

VIEW OF MECHANICAL WELL ON ROOF. RED ARROWS SHOW AC-1 AND AC-2 HVAC LOCATION

Existing 15 ton to be removed and replaced with new 12 ton HVAC unit

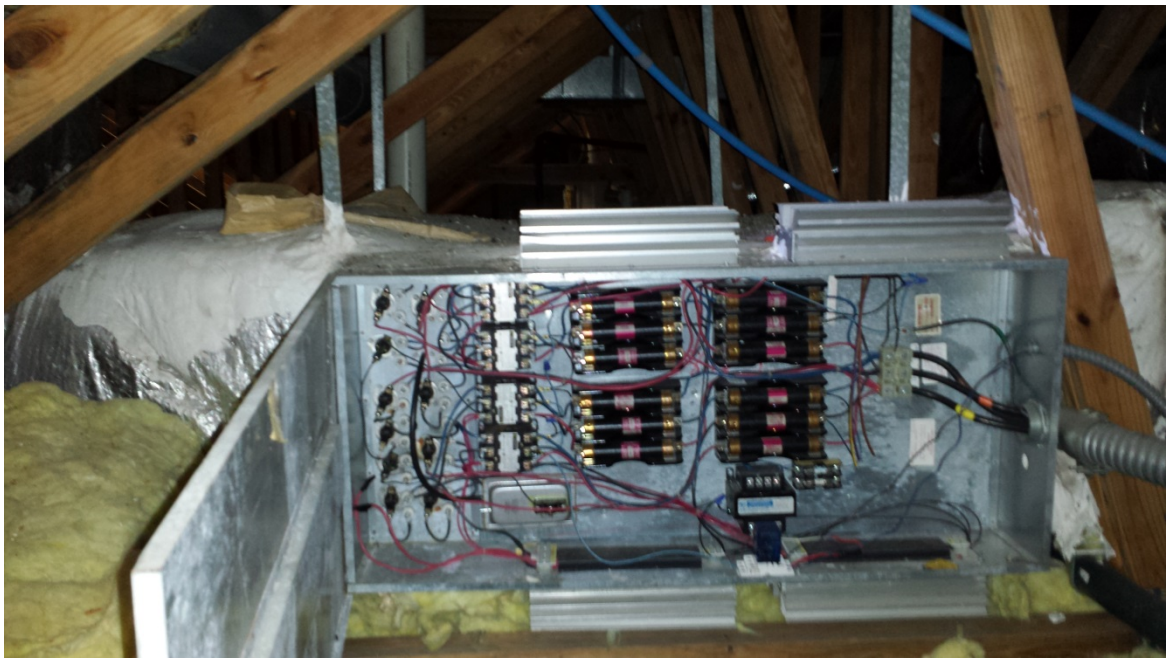
Recent photo showing previous crane removing and replacing adjacent HVAC Unit

Recent photo showing previous crane removing and replacing HVAC Unit

Existing return air and outside air duct to be removed

Roof penetration to be closed and roofed over to match existing

Location of existing electrical power riser thru roof and HVAC unit disconnect switch



Existing 100 KW electric duct heater and controls to be removed

Location of exiting power panel board NH-1

Existing AC-2 replaced previously
(Scope of work included as Alternate # 2)

University of South Carolina **June 30, 2016**
College of Arts and Sciences
Baruch Marine Field Laboratory
Georgetown, South Carolina

SCOPE OF WORK

Make-up Air Handling Unit AC-1 Replacement

This work shall include the removal and replacement of a packaged roof top make-up air handling unit located on the roof of the USC Baruch Marine Field Laboratory (BMFL) in Georgetown, South Carolina. Heating and cooling capacities shall be as scheduled on the drawings. The air handling unit is located on the flat part of the mansard roof and will need to be lifted onto the roof. Personnel access to the roof is by stairs up to thru Observation Tower. Specific scope of work shall include but not necessarily limited to the following:

1. Coordinate shutdown and replacement of the roof top air handling unit with USC BMFL facilities department. Unit replacement must be planned to accommodate USC BMFL schedule.

2. Provide ½" plywood sheeting around the unit to be replaced for roof protection.

3. Cut off power to the affected unit and electric duct heater at the electrical panel board NH-1 and disconnect power supply to air handling unit and electric duct heater.

4. Electrical Power Change Over Sequence (See attached drawing E-1)
    a. Turn off and lockout the breaker in the main electrical panel NH-1 for the existing duct heater for AC-1.
    b. Turn off and lockout the existing AC-1 duct heater disconnect switch.
    c. Pull the AC-1 duct heater and controls and leave the duct in place.
    d. Remove conduit, power wiring and control wiring between the AC-1 duct heater and the duct-heater disconnect switch.
    e. Remove AC-1 duct heater disconnect switch.
    f. Remove old breakers for the AC-1 duct heater and for the old AC-1 rooftop unit from the main electrical panel board NH-1.
    g. Pull the existing electrical cables out of the conduit between the old AC-1 disconnect switch and the main electrical panel board NH-1.
    h. For the new AC-1 rooftop unit, electrical power cables must be installed from the main electrical panel board NH-1 to a new disconnect switch mounted on the unit

conduit that meets electrical code requirements. New conduit must be run concealed in the attic space. If the existing conduit meets the code requirements, the contractor may elect to use it.

i. If the contractor does not elect to use the existing conduit, remove electrical cables and conduit back to the main electrical panel. Repair any remaining penetrations left by removal of the old conduit that ensures the penetration will not be a source of roof leaks.
j. Install new breaker for the new AC-1 rooftop unit in the main electrical panel NH-1.
k. Install new electrical disconnect switch for the new rooftop unit.
l. Install electrical power cables from the new disconnect switch to the point of connection for the rooftop unit in flexible conduit that meets electrical code requirements.

5. Disconnect condensate drain from the air handling unit.

6. Disconnect supply air ductwork.

7. Disconnect and remove existing return air and outside air duct.

8. Close up exiting return air duct roof penetration and roof over to match exiting roof.

9. Remove existing air handling unit. Inspect and clean inside of curb. Confirm that there are no leaks or punctures in the curb flashing.

10. Reinstall new air handling unit on the existing curb. If curb adaptor is required install insulated waterproof curb adaptor before installing the air handling unit. Curb adapter cannot raise the height of the unit more than 12”.

11. This contractor will need to provide a crane and a crane operator to remove the existing unit from the roof and to lift and place the new unit into place on the existing curb with new curb adapter if required. Contractor shall coordinate the schedule for crane operation with the Owners Representative. Contractor shall provide all labor and material necessary to rig and attach unit to the crane lift cable and to guide and place the new unit into place.

12. Extend and connect new supply air duct from the unit and connect to the existing 32 X 18 supply air duct located in the ceiling below the unit (See attached drawings M-1 and M-2).

13. Extract existing electric duct heater out of the existing duct heater housing and close up and seal up duct heater housing with pressure sensitive tape and insulate with nominal 2" fiberglass insulation with aluminum jacket and pressure sensitive tape.

14. Provide new breaker in panel board NH1 located on the roof, extend power wiring in conduit to new air handling unit, and provide a NEMA 3R disconnect switch at the unit.

15. Remove the existing thermostat located in Preserved Sample Lab Room # 138 and provide the controls as specified in the Air Handling Unit Specification.
16. Energize the new AC-1 with electric heater.

17. Provide system start-up and check-out in accordance with manufacturer's recommendations.

18. Rebalance supply air distribution system and exhaust air system to match capacities as shown on drawing M-1.

19. Provide operator and maintenance training for USC BMFL facilities personnel.

20. Provide two copies of shop drawings and operating and maintenance manuals in a bound folder.

Bid Alternate # 2

This work includes the removal and replacement of two backdraft dampers and the replacement with two motor operated dampers in the attic of the USC Baruch Marine Laboratory (BMFL) in Georgetown, South Carolina. New sequence of control shall be as specified in the Technical Specifications. Specific scope of work shall include but not necessarily limited to the following:

1. Coordinate shutdown and replacement of the backdraft dampers with USC BMFL facilities department. Damper replacement must be planned to accommodate USC BMFL schedule.

2. Cut off power to the affected unit and electric duct heater at the electrical panel board NH-1.

3. Disconnect and remove exiting backdraft dampers located in the supply air bypass duct and the return air duct. See drawings M-3, AC-2 Rework Part Floor Plan and drawing M-4, AC-2 Rework Schematic Diagram.
4. Replace the backdraft dampers with opposed blade motor operated dampers.

5. Remove the existing thermostat located in the Corridor and provide the controls as specified in the Air Handling Unit Specification including the interface and control of the existing electric duct heater.
6. Re-energize the AC-2 and the existing electric duct heater.
7. Provide system start-up and check-out in accordance with manufacturer's recommendations.
8. Provide operator and maintenance training for USC BMFL facilities personnel.
9. Provide two copies of shop drawings and operating and maintenance manuals in a bound folder.

University of South Carolina
College of Arts and Sciences
Baruch Marine Field Laboratory
Georgetown, South Carolina

June 30, 2016

BID ALTERNATE # 1 CEILING REPAIRS SCOPE OF WORK

GENERAL

This work includes the repair and replacement of ceilings that were damaged from roof leaks and from excessive humidity due to failure of some of the HVAC systems and controls. Work also includes painting of all interior walls and ceilings in the building.

A new roof has been installed and the roof leaks have been eliminated. HVAC work included in this contract will resolve the excessive humidity problems.

This is a functioning and working research laboratory and classroom facility. Work in the research labs that contain sensitive equipment and valuable preserved samples will be accomplished with as little disruption as possible and with no damage to the lab equipment or samples.

Prior to starting this work in any room or protected area the contractor must coordinate with the Owner's Representative and the Lab User Group the relocation of any mobile lab equipment and the protection of any non-mobile lab equipment. Contractor shall provide a temporary dust proof housing or shroud to protect the non-mobile lab equipment. Lab equipment and supplies will be relocated by the Lab User Group personnel.

CEILING REPAIR AND REPLACEMENT

This work includes the repair, removal and replacement of ceilings that have been damaged by moisture from roof leaks and excessive humidity.

Damaged ceilings are located throughout the building in various sizes and locations. Recording of the damaged ceiling was taken during a site visit and documented on the attached Alternate-1 Ceiling Plan drawing ALT-1.

Bid Pricing

Contractor's base bid price shall be based on the quantities included in the following table. Contractor shall also submit unit prices for each type of repair and a square foot cost for ceiling repair. Painting should not be included in the unit prices. Also Contractor

should account for the double layer of fire rated gyp board in the exit corridors in their unit pricing.

TYPE	SIZE	QUANTITY/COUNT	Total SF
Type 1	2' x 2'	15	**60**
Type 2	4' x 4'	23	**368**
Type 3	4' x 8'	15	**480**
Type 4	All Ceiling	2	**400**
Type 5	As Shown	8	**1250**

Specific scope of work shall include but not limited to the following activities:

1. Schedule and coordinate ceiling repairs with Owner's Representative and the Lab User Group.

2. Work shall be scheduled so that the contractor can remove, repair and or replace all damaged ceiling in one room or protected area.

3. After areas have been approved and scheduled for repairs contractor shall:

   a. Cover and protect all equipment and surfaces.

   b. Remove any lighting fixtures, grills, diffusers, and any other ceiling mounted appurtenances that are in the area to be removed, repaired or replaced.

   c. Demo the damaged ceiling and remove the trash from the room/space and place in an approved trash receptor. Salvage the existing lay-in batt insulation and reinsert when replacement gyp board is installed.

   d. Cut and re-attach new gyp board and finish joints with tape and joint compound. Reinsert existing batt insulation before attaching the new gyp board ceiling.

   e. Sand and touch-up joint compound to produce a surface free of visual defects and ready for painting. Use sanders with vacuum attachments to collect and control dust.

   f. Provide primer coat on new surface.

   g. Clean and reinstall lighting fixtures, grills, diffusers and other ceiling mounted appurtenances that were removed.

PAINTING

These works includes the preparation and painting of gyp board ceilings, walls, and trim in all interior rooms and the window and door frames that are in the wall areas to be painted.

Specific scope of work shall include but not limited to the following activities:

1. Schedule and coordinate the painting with the Owner's Representative and Lab User Group. Painting may be done after each ceiling replacement activity or may be deferred to provide painting after all ceiling repairs is completed or a portion of

   the ceiling repairs are completed (i.e. the Administrative Offices, the Small Labs and Offices and/or the Corridors).

2. After areas have been approved and scheduled for painting Contractor shall:

   a. Remove or mask all surface appurtenances, including electrical plates, hardware, grills, diffusers, light fixture trim, escutcheons and fittings, prior to preparing surfaces for finishing.

   b. Clean all surfaces and correct defects.

   c. Apply paint in finishes and number of coats as specified.

   d. Reinstall and remove masking from all surface appurtenances, including electrical plates, hardware, grills, diffusers, light fixture trim, escutcheons and fittings previously removed and masked.

SECTION 01 04 50

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract Conditions, including General Conditions and other Technical Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF REQUIREMENTS

Definition: Cutting and Patching is hereby defined to mean alteration and repair of nominally completed and existing work for the following reasons, but not necessarily limited to only these:

Removal and re-installation of lights, grills, diffusers, and other ceiling mounted fixtures and equipment.

Cutting and patching of existing gyp board walls and ceilings

Removal and replacement of existing sealants

Install/repair/remove control joints

1.3 QUALITY ASSURANCE:

Visual Requirements: Do not cut and patch work in a manner that reduces the visual qualities or which will result in substantial evidence of cutting and patching, both as judged solely by Owner. Remove and replace work judged by Owner to be cut and patched in a visually unsatisfactory manner.

PART 2 – PRODUCTS

2.1 MATERIALS:

General: Provide material for repairs, which will result in equal or better work than work being cut and patched.

PART 3 – EXECUTION

3.1 PREPARATION:

Protection: Provide adequate protection of other work and surrounding area during cutting and patching. As necessary, provide barriers to prevent airborne material from leaving the immediate area,

3.2 CUTTING AND PATCHING:

Employ only skilled tradesmen to perform cutting and patching. Cut work by methods least likely to damage work to be attained and work adjoining. Where physical cutting is required cut work with sawing and grinding tools. While cutting in and around existing laboratory equipment and other sensitive equipment use vacuum tools to contain all dust and debris.

Restore finishes of patched areas and, where necessary, extend finished restoration into retained work adjoining in such a manner which will eliminate evidence of patching. Patch in such a manner to match adjacent surface texture.

END OF SECTION 01 04 50

SECTION 01 71 00

CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General Conditions and other Technical Specification Sections, apply to Work of this section.

1.2 DESCRIPTION OF REQUIREMENTS:

General: Maintain facility and the site in state of cleanliness throughout construction period.

Laboratories and other sensitive areas shall be protected from construction materials at all times. Coordinate activities in these areas with on-site USC facilities personnel.

Related work described elsewhere: Special cleaning for specific units of work is specified in individual technical sections.

1.3 QUALITY ASSURANCE:

Conduct daily inspection and more often as necessary, to verify that requirements for cleanliness are being met.

In addition to standards for cleaning described herein, comply with pertinent requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS AND EQUIPMENT:

General: Use only cleaning materials and equipment which are compatible with surfaces being cleaned, as recommended by manufacturer of product or as approved by Owner.

PART 3 - EXECUTION

3.1 PROGRESS CLEANING

General: Maintain project in neat and orderly state throughout construction process.

Storage: Retain stored items in orderly arrangement, adequately protected, and allowing convenient access without impeding operations or traffic.

Waste Removal: Do not allow the accumulation of scraps, debris or other waste material. Provide adequate temporary storage for waste material on site, observing requirements for safety and fire protection. As often as required, but not less than once weekly, remove and legally dispose of all stored waste material from site.

Graffiti: Promptly remove all evidence of graffiti.

Site Cleaning: Inspect site not less than daily; remove all waste material to designated temporary storage. Inspect all stored materials not less than weekly; adjust as necessary to maintain orderly and accessible conditions.

Room Cleaning: After installation of Work in a room or space, broom sweep and vacuum the floor, wipe down all surfaces clean and have unit inspected by the USC Facility Manager.

Construction Cleaning: Inspect building areas not less than daily. Remove all waste material to designated temporary storage. As often as required, but not less than weekly, sweep, vacuum and wipe down interior spaces clean so that they are reasonably free of dust and other waste material. Before installing products on existing Work, clean substrates to a degree of cleanliness and by means recommended by manufacturer of product being installed. Do not allow the accumulation of waste material which would be harmful to finished surfaces; institute whatever protective or precautionary measures may be necessary to ensure that the Work will be without damage or deterioration at completion.

3.2 FINAL CLEANING

General: Provide final cleaning for each area of the Work which will result in a level of cleanliness generally provided by commercial building maintenance subcontractors using commercial quality equipment and materials.

Glass: Clean exterior and interior door and window glass of any material deposited as a result of the Work.

Ceiling and Wall Surfaces: Clean ceiling and wall surfaces to dirt-free condition, free of dust, stains, films, and other foreign matter.

Remove all traces of splashed material from adjacent surfaces.

Remove paint droppings, spots, stains, and dirt from finished surfaces.

END OF SECTION 01 71 00

SECTION 09 20 00

GYPSUM BOARD REPLACEMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General Conditions and other Technical Specification Sections, apply to Work of this section.

1.2 SUMMARY

A. This Section includes gypsum board replacement for locations where interior gypsum board is damaged requiring replacement and where fire rated ceilings require replacement.

1.2 SUBMITTALS

A. Product Data: For each type of product specified.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, and other causes. Neatly stack gypsum boards flat and properly supported to prevent sagging.

1.4 PROJECT CONDITIONS

A. Environmental Conditions, General: Establish and maintain environmental conditions for application and finishing gypsum board to comply with ASTM C 840 requirements or gypsum board manufacturer's recommendations, whichever are more stringent.

PART 2 – PRODUCTS

Similar size and thickness gypsum board shall be used for replacement where replacement occurs. Fire-rated ceilings will require Type-X gypsum board. Fire rated ceilings, for example, are present in the main exit corridor. Fire-rated wall and ceiling assemblies require a double layer of Type-X gypsum board.

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. G-P Gypsum Company.
2. National Gypsum Company.
3. United States Gypsum Co.

No gypsum products shall be used that contain asbestos.

2.2 GYPSUM BOARD PRODUCTS

A. General: Provide gypsum board of types indicated in maximum lengths available that will minimize end-to-end butt joints in each area indicated to receive gypsum board application.

1. Widths: Provide gypsum board in widths of 48 inches.

B. Gypsum Wallboard: ASTM C 36, and as follows:

1. Type: Regular for vertical surfaces.
2. Edges: Tapered.
3. Thickness: 5/8 inch where indicated or as required to match existing.

2.3 TRIM ACCESSORIES

A. Accessories for Interior Installation: Cornerbead and edge trim complying with ASTM C 1047 and requirements indicated below:

1. Material: Hot-dip zinc-coated sheet steel.
2. Provide cornerbead on outside corners.
3. For L-beads, provide type with face flange only; face flange formed to receive joint compound.

2.4 JOINT TREATMENT MATERIALS

A. General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.

B. Joint Tape for Gypsum Board: Paper-reinforcing tape.

1. Use pressure-sensitive or staple-attached, open-weave glass fiber reinforcing tape with compatible joint compound where

recommended by manufacturer of gypsum board and joint treatment materials for application indicated.

C. Setting-Type Joint Compound for Gypsum Board: Factory-prepackaged, job-mixed, chemical-hardening powder products formulated for uses indicated.

1. Where setting-type joint compounds are indicated as a taping compound only or for taping and filling only, use formulation that is compatible with other joint compounds applied over it.

2. For prefilling gypsum board joints, use formulation recommended by gypsum board manufacturer for this purpose.

3. For topping compound, use sandable formulation.

D. Drying-Type Joint Compounds for Gypsum Board: Factory-prepackaged vinyl-based products complying with the following requirements for formulation and intended use.

1. Ready-Mix Formulation: Factory-mixed product.
   a. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.
   b. Topping compound formulated for fill (second) and finish (third) coats.
   c. All-purpose compound formulated for both taping and topping compounds.

2. Job-Mixed Formulation: Powder product for mixing with water at Project site.
   a. Taping compound formulated for embedding tape and for first coat over fasteners and flanges and flange faces of trim accessories.
   b. Topping compound formulated for fill (second) and finish (third) coats.
   c. All-purpose compound formulated for use as both taping and topping compounds.

2.5 MISCELLANEOUS MATERIALS

A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.

B. Use plastic accessories to match existing shape and contour of existing accessories.

C. Steel Drill Screws: Comply with ASTM C 1002.

D. Primer: Provide gypsum board manufacturer's standard latex-based wall primer suitable as the primer coat for paint finish.

PART 3 – EXECUTION

3.1 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.

B. Install gypsum panels with face side out. Do not install imperfect, damaged or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between boards. Do not force into place.

C. Locate both edge or end joints over supports. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions. Avoid joints at corners of framed openings where possible.

D. Attach gypsum panels to steel studs so that the leading edge or end of each panel is attached to open (unsupported) edge of stud flanges first.

E. Attach gypsum panels to framing provided at openings and cutouts.

F. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.

3.2 GYPSUM BOARD APPLICATION METHODS

A. Single-Layer Application: Install gypsum wallboard panels vertically (parallel to framing), unless otherwise indicated, and provide sheet lengths that will minimize end joints.

B. Double-Layer Application: Install gypsum wallboard panels of second layer with joints staggered from first layer.

C. Fastening Methods: Apply gypsum panels to supports with screws with spacing of fasteners in accordance with ASTM C 840 and GA-216 Standards.

3.3 INSTALLING TRIM ACCESSORIES

A. General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.

B. Install corner beads at external corners.

C. Install edge trim where edge of gypsum panels would otherwise be exposed. Provide edge trim type with face flange to receive joint compound, except where other types are indicated.

3.4 FINISHING GYPSUM BOARD ACCESSORIES

A. General: Treat gypsum board joints, interior angles, flanges of corner beads, edge trim, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for painting.

B. Prefill open joints, rounded or beveled edges, and damaged areas using setting type joint compound.

C. Apply joint tape over gypsum board joints and to flanges of trim accessories as recommended by trim accessory manufacturer.

D. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish per GA-214.

1. Level 4 for gypsum board surfaces, unless otherwise indicated.

E. Use the following joint compound combination:

1. Embedding and First Coat: Setting-type joint compound. Fill (Second) Coat: Setting-type joint compound. Finish (Third) Coat: Setting-type joint compound.

F. For Level 4 gypsum board finishes, embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration.

G. Provide specified primer coat at application rate and dry film thickness recommended by gypsum board manufacturer.

3.5 CLEANING

A. Promptly remove any residual joint compound from adjacent surfaces.

END OF SECTION 09 20 00

SECTION 09 90 00

PAINTING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

1.01 RELATED DOCUMENTS

General provisions of Contract, including General Conditions and Technical Specification Sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

Extent of painting is to include all gyp board ceilings and walls and trim in all interior rooms and window and door frames included in the wall area to be painted.

The existing ceiling mounted grills and diffusers, lights, and other ceiling mounted equipment with factory finish do not require painting but are to be removed and cleaned and reinstalled after ceiling or wall repair paint application.

Supply air grills and transfer grills located in the main exit corridor have fired dampers and must be reinstalled to maintain the fire rating.

The work includes painting and finishing of surfaces as described above including surface preparation, priming, and coats of paint specified.

Definitions: Painting is defined as and includes the following:

Providing all painting materials, including cleaners, primers, paint materials, fillers, and other miscellaneous material such as protection equipment, such as tapes and tarps.

Paint exposed surfaces where items or surfaces are not specifically mentioned, paint same as adjacent similar materials or areas.

Do not paint over any code-required labels, such as Underwriters Laboratories and Factory Mutual, or any equipment or equipment identification names, or nomenclature plate.

1.3 SUBMITTALS

A. Product Data: Provide complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").

2. Master Painters Institute product number (e.g. MPI #47).

3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

4. Manufacturer's installation instructions.

C. Samples: Submit two painted samples, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on aluminum sheet, 8 x 10 inch in size.

D. Certification: By manufacturer that paints and finishes comply with VOC limits required by authorities having jurisdiction.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.

2. Label each container with color in addition to the manufacturer's label.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum ten years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years’ experience and approved by manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.6 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturers recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

D. Minimum Application Temperatures for Paints: 50 degrees F for interiors unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft. candles measured mid-height at substrate surface.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

B. Paints:
1. Base Manufacturer: PPG Porter Paints: www.ppgporterpaints.com.
2. Benjamin Moore & Co: www.benjaminmoore.com.
3. Sherwin-Williams Company: www.sherwin-williams.com.

2.2 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.

1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.

2. Supply each paint material in quantity required to complete entire project's work from a single production run.

3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Flammability: Comply with applicable code for surface burning characteristics.

C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Owner from the manufacturer's full line.

D. Colors: To be selected from manufacturer's full range of available colors.

1. Selection to be made by Owner after award of contract.

2. Extend colors to surface edges; colors may change at any edge as directed by Owner.

3. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.

4. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the Owner's direction.

2.3 PAINT SCHEDULE

A. Gypsum Wallboard:

1. Primer:
   a. PPG: 6-2 Speedhide Interior Latex Primer Sealer
   b. Sherwin Williams: Pro-Mar 200 Zero VOC Int. Latex Primer B28W02600
   c. Benjamin Moore: Super Spec Latex Enamel Undercoater & Primer 253
2. First and Second Coats:
   a. PPG: 6-70 Series Speedhide Interior Latex Flat Wall Paint
   b. Sherwin Williams: Pro-Mar 200 Interior Flat Latex Wall Paint B30W251
   c. Benjamin Moore: Super Spec Interior Flat Latex Wall Paint 275

B. Miscellaneous Steel Fabrications:
1. Primer:
a. PPG: PPG Amerlock 2 VOC Polyamide Epoxy Coating
b. Sherwin Williams: Pro Industrial High Performance Epoxy B67 Series
c. Benjamin Moore: Super Spec Epoxy Mastic P45 Series
2. First and Second Coats:
a. PPG: PPG Amerlock 2 VOC Polyamide Epoxy Coating
b. Sherwin Williams: Pro Industrial High Performance Epoxy B67 Series
c. Benjamin Moore: Super Spec Epoxy Mastic P45 Series

C. Steel Door & Window Frames:
1. Primer:
a. PPG: 90-712 Pitt Tech Interior Exterior DTM Acrylic Primer Finish
b. Sherwin Williams: Pro-Cryl Universal Acrylic Primer B66 Series
c. Benjamin Moore: Super Spec HP Acrylic Metal Primer P04
2. First and Second Coats:
a. PPG: 90-374 Pitt Tech DTM Acrylic Industrial Gloss Enamel
b. Sherwin Williams: Pro Industrial Gloss Acrylic Coating B66-600 Series
c. Benjamin Moore: Super Spec DTM Acrylic Gloss Enamel P28

D. Wood Door and Window Frames and Trim:
1. Primer:
a. PPG: 17-951 Seal Grip Interior Acrylic Primer/Finish
b. Sherwin Williams: PrepRite Pro Block LatexPrimer/Sealer: B51-600
c. Benjamin Moore: Fresh Start All Purpose Acrylic Primer 023
2. First and Second Coats:
a. PPG: 6-500 Speedhide Interior Latex Semi Gloss Enamel
b. Sherwin Williams: Pro-Mar 200 Latex Semi Gloss Enamel B31W2200
c. Benjamin Moore: Super Spec Interior Latex Semi-Gloss Enamel 276

E. Painted Wood Trim (Base, Casing, Crown, etc.):
1. Primer:
a. PPG: 17-951 Seal Grip Interior Acrylic Primer/Finish

b. Sherwin Williams: PrepRite Pro Block LatexPrimer/Sealer: B51-600
c. Benjamin Moore: Fresh Start All Purpose Acrylic Primer 023

2. First and Second Coats:
a. PPG: 6-500 Speedhide Interior Latex Semi Gloss Enamel
b. Sherwin Williams: Pro-Mar 200 Latex Semi Gloss Enamel B31W2200
c. Benjamin Moore: Super Spec Interior Latex Semi-Gloss Enamel 276

2.4 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:

1. Gypsum Wallboard: 12 percent.

2. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Surfaces with mildew shall be removed and replaced.

F. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

G. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

H. Galvanized Surfaces:

1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

2. Prepare surface according to SSPC-SP 2.

I. Ferrous Metal:

1. Solvent clean according to SSPC-SP1.

2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.

3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

J. Wood Surfaces to Receive Opaque Finish:

Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

K. Wood Surfaces to Receive Transparent Finish:

Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

3.3 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

E. Sand wood and metal surfaces lightly between coats to achieve required finish.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 FIELD QUALITY CONTROL

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from the Owner before proceeding.

D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.5 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of Owner, it is not practical to remove and replace the Work, Owner will direct an appropriate remedy or adjust payment.

3.6 WARRANTY

Special Product Warranty: Provide written warranty from the manufacturer and one from the Contractor, as attached to the contract, agreeing to replace and/or repair defective material and workmanship, including damage from the leakage of water, abnormal aging or deterioration of material, any change to the appearance of the material to change its perceived “aesthetic” qualities, and other failures of materials to perform as required during the warranty period.

Warranty includes responsibility for removing and replacing the Work and other work as may be necessary to accomplish repairs or replacement of the Work.

Warranty Period: Five years after date of Substantial Completion.

3.5 CLEAN-UP AND PROTECTION:

Cleanup: During progress of work, remove from site discarded paint materials, rubbish, cans and rags at end of workday. Do not discharge paint or paint-related products into storm sewers. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping; using care not to scratch or otherwise damaged finished surfaces.

Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing, or replacing, and repainting, as acceptable to Consultant.
Provide “Wet Paint” signs as required to protect newly applied finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

END OF SECTION 09 90 00

SECTION 23 00 00

HVAC SYSTEM SPECIFICATIONS

Packaged Unitary Make-up and Ventilation Air Unit

PART 1 GENERAL

1. SECTION INCLUDES
   A. Packaged Heating/Cooling Makeup Air Systems.
   B. Electric Heat
   C. Hot Gas Reheat
   D. Unit Operating and Safety Controls
   E. Roof Curb Adaptor
   F. Electrical Power Supply
   G. Operation and Maintenance Service

2. RELATED SECTIONS
   A. USC Supplemental Conditions for Construction Projects
   B. Division 1-General Requirements
   C. Scope Requirements

3. SUBMITTALS
   A. Submit Product Data: Manufacturer's data sheets on each product to be used, including:
      1. Preparation instructions and recommendations.
      2. Storage and handling requirements and recommendations.
      3. Installation methods.
   B. Submit Shop Drawings: Submit manufacturer/installer's shop drawings, including plans, elevations, sections, and details, indicating location of equipment, operating characteristics, loads, dimensions, tolerances, materials, components, fabrication, fasteners, hardware, finish, options, and accessories.

4. QUALITY ASSURANCE
   A. Manufacturer Qualifications: Single source for design, engineering, production and warranty.
   B. Installer Qualifications: Licensed and experienced with mechanical equipment installation, testing and start-up. Familiar with local and national code requirements and restrictions.

5. DELIVERY, STORAGE, AND HANDLING
   A. Store products in manufacturer's unopened packaging until ready for installation.

6. PROJECT CONDITIONS
   A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

7. WARRANTY
   A. Provide 5 year parts and labor warranty from date of shipment.

8. EXTRA MATERIALS
   A. Provide one set of additional filters to be installed by the contractor after acceptance by the Owner.

PART 2 PRODUCTS

1. MANUFACTURERS
   A. Basis of design: YORK Model JDMA.

   B. Equal units furnished by the following manufacturers are acceptable:
      1. AAON Heating and Cooling Products
      2. Trane Corporation
      3. Addison

   C. DX Cooling
      1. Unit: High Capacity DX Cooling Makeup Air Units utilizing R410-A Refrigerant:
      2. Furnish and install roof top package heating and cooling unit for treatment of up to 100% constant outside air per plans and specifications. Unit shall be completely factory assembled, tested, internally wired, fully charged with Refrigerant R410A, and shipped as one piece. Unit shall consist of foam insulated weather-tight casing with optional field installed outdoor intake hood, compressors, air-cooled condenser coils, condenser fans, evaporator coils, supply fan, motors and drives, and unit controls. Packaged Cooling and Heating Units shall carry an ETL listing. Refrigerant System:
      3. DX systems shall be designed to provide 10% to 100% incremental capacity control for treatment of up to 100% outside air with up to 80 degree F (27 degree C) dewpoint entering the unit. Unit shall have hermetic compressors with a scroll design with internal pressure relief and motor temperature winding protection. Compressor shall be equipped with reversal rotation protection.

Refrigeration protection shall include low and high pressure switches, refrigerant circuit frost protection, liquid line filters/dryers and service gage ports. The unit shall have a factory installed refrigerant charges to provide unit performance as shown in the schedule. Low pressure switch shall operate at 35 psi or lower pressure. The auto reset low pressure switch shall not reset until the pressure rises about 50 psi. The manual reset high pressure switch shall operate above 600 psi with ± 15 psi. The unit will not reset without a user manually pushing the reset button and the refrigerant line pressure is below 400 psi. Refrigeration control shall include thermal expansion valves, external equalizers and distributors for each compressor circuit.

a. The refrigerant system shall have a non-user adjustable 5 minute minimum ON and minimum OFF timer circuit protection. The refrigerant circuit shall have an anti-cycle timer in addition to the minimum ON/OFF timer that prevents the compressor(s) from cycle on the minimum timer circuit.
b. The refrigerant system shall include evaporator coil. The copper tube-aluminum plate fin evaporator coil shall be 4 rows with 14 fins per inch to meet leaving air performance as shown on the unit schedule. The multi-circuit evaporator coils shall be interlaced configuration. The entire coil face area shall be active with a single circuit or multiple circuit activation such that the entire coil face shall provide air cooling and dehumidification in part load operation. Split coil face design not acceptable because it does not allow full active face area for dehumidification in the part load operation. The evaporator coils shall be protected from frosting by a low temperature cutout. The factory installed froststat on each circuit shall interrupt power to the associated compressor when the temperature drops below 35°F. The frost stat shall not deactivate until the circuit temperature rises to 50°F. The coils shall be leak tested at the factory to ensure pressure integrity. The unit shall include air cooled condenser coils sized to provide the unit performance as shown in the mechanical schedule. The condenser coil shall be light weight 5/16 copper tubing with aluminum fins. The condenser shall be compact 2 row coil design with low refrigerant volume. The condenser coils shall NOT be aluminum micro-channel type design.
c. The condensate drain pan shall be rust proof or high corrosion resistant 316 stainless steel. The drain outlet shall be attached to a double sloped drain pan with a minimum 1/8 inch per foot (10 mm per meter) slope. The drain pain shall collect potential condensate from all evaporator/condenser coils and distributor area in the air stream to prevent blow-off condensate reaching unprotected bottom unit surfaces.

The unit shall have field supplied and installed P trap, in accordance with all local and area codes and Best Practices.

d. The unit shall be supplied with standard efficiency condenser fan motor(s) rated for the necessary condenser coil airflows. The condenser fans shall be accessible for servicing. The condenser fan system shall be dynamically balanced at the factory and installed with vibration dampening to reduce ambient noise.
e. Factory installed hot gas bypass options shall be available on all fixed capacity refrigerant stages in addition to multiple steps of capacity modulation to supplement discharge air control. The hot gas bypass valve shall have a range of 95 -115 psi with a factory setting of 105. (SST 33.7F) The valve shall be rated to handle 30% of the associated compressor capacity. The HGBP circuit shall be equipped to prevent reverse flow through the valve.
f. The condenser coils shall be copper tube and aluminum fin design. The coils shall be light weight and low refrigerant volume with the use of 5/16 copper tubing. The condenser coils shall NOT be aluminum micro-channel type design.
g. The evaporator coil(s) shall be copper tube and aluminum fin design. The evaporator coils shall be interlaced, 4 row design maximizing latent performance as shown on the unit's mechanical schedule.
h. Coils shall have coating to prevent premature deterioration caused by salt or other environmental chemicals. The coat shall provide an ASTM B117-97 salt spray of 6048 hours. The coat shall provide dip & baked onto the coil insure even coating with no reducing of thermal performance. Spray on coat is not acceptable. The coat shall pass ASTM G21 mold growth standard. The following coils shall be coated:
    a. All DX Evaporator Coil(s)
    b. All DX Condenser Coil(s)
    c. Reheat Coil(s)

4. Unit shall include DX based reheat. The method of reheat shall comply with ASHRAE 90.1 requirements. Unit shall include a dedicated compressor and refrigeration circuit using full condenser reheat or total heat of rejection to the supply airstream. The reheat coil position shall include a minimum separation of 10 inches (102 mm) from the cooling coil to eliminate re-evaporation of cooling coil condensate. The circuit shall be capable of delivering a nominal 13°F to 17°F temperature rise from the main evaporator temperature without the need for modulating the capacity for all entering outside air conditions. The reheat system shall modulate to maintain the user adjustable unit leaving air

temperature setpoint while also maintaining a constant evaporator temperature setpoint. The reheat coil shall operate down to 50°F ambient temperature without the need of low ambient kit. The reheat coil shall provide greater than 7 COP efficiency at 65°F_{db}/64°F_{wb} entering air temperature. Manufacturer shall show unit performance at above condition. The refrigerant circuits shall include thermal expansion valves with external equalizers. Service gage ports and refrigerant line filter dryers are factory installed as standard. Pre-cooling coils shall be two rows deep with 6 fins per inch to minimize air pressure drop.

D. Electric Heat

1. Manufacturer to provide factory installed electric resistance heat for unit. Unit shall include field-replaceable heat sections. All heat sections are to be sub-fused. Electric heat shall include SCR control for 0-100% capacity control. The packaged unit shall be certified to UL-1995 – UL Standards for Safety Heating & Cooling Equipment Second Edition: CAN/CSA C22.2 NO. 236-95.

E. Cabinet

1. Unit shall have Foam panel construction for all exterior surfaces and base. The foam insulation shall meet ASTM E-84 with a flame spread of 20 and smoke density of 300. No foam panel acceptable if unit construction exceeds R12 value, no exposed installation air stream and exceed flame safety characteristic of foam paneling. Outer casing shall be fabricated from G90 galvanized steel substrate with 60 gloss painted finish coat. Finish shall be rated for > 1000 salt spray hours. The cabinet design shall prevent condensation forming on the outside of the unit casing in operation via a dedicated thermal break from all internal components to the external surface. Fully gasketed, hinged doors of foam construction shall provide access to filters, dampers, evaporator coils section, supply fan section. Provide hinged single wall construction doors for the heater section and control section. On hinged doors frequently used for service (i.e. filter and coil access) the unit control panel section shall be laid out to provide separation of high and low voltage components per UL standards. High voltage contactors & distribution shall be touch safe. The control panels shall be hinged for easy access to the unit controls. For ease of service, all electrical components will be clearly identified with 1/2 inch (13 mm) diameter self-adhesive labels to match the unit specific wiring diagram. The low voltage and unit controller access electrical panel shall be physically isolated from the high voltage section. The open door to the control section reveals the wiring diagrams, DDC programming instructions and all manuals and literature protected and permanently attached to the cover. Control transformers will incorporate integral, resettable circuit breaker protection.

F. Supply Fan

1. The unit's supply fan shall be direct drive with a variable frequency drive allowing peak fan efficiency and system RPM. The fan system shall be made of galvanized steel. The impeller shall have RAL 5002 coating, directional arrows marketing. The fan sled shall allow up to 176°F (80°C) for the impeller and the motor shall allow ambient temperatures -4°F to 104°F (-20°C to 40°C). The impeller and motor shall be designed for continuous operation. The impeller shall be dynamically balanced at the factory with hub; admissible vibration level less than 2.8 mm/s (0.11 in/s) in conformity with ANSI/AMCA 204.
    a. The supply fan sled shall have slide out design for easy inspection and replacement.
    b. The fan sled shall also allow inspection of the electric heat exchangers.
    c. The fan sled shall have rubber dampers to isolate and minimize vibration.
    d. The fan sled shall include Inlet cone with measuring device for airflow measurement. The packaged unit shall allow fan inlet differential pressure readings inside the control panel to measure supply fan CFM with an accuracy of +/-5%. The unit controller shall allow fan speed settings for occupied and unoccupied modes. The unit controller shall also allow fan speed settings for heating and cooling modes. The unit shall meet the schedule performance. The unit control system shall have test and balance function to allow permanent setting of the airflow(s) as shown in the mechanical schedule.
    e. The frequency drive shall be factory installed with line reactor, ECM Filter and all necessary wiring per UL standard. The drive shall have built in menu drive display with test, start-up, maintenance and diagnostic assistant. The drive shall be factory programmed for 30 second soft start. The drive shall have the following protection and alarms: single phase, overvoltage trip limit, under voltage trip limit, over temperature, microprocessor fault, motor stall protection, motor over temperature.

        Supply fan shall be controlled by duct static pressure. Duct static pressure sensor shall be unit mounted; sensing range 0 -2.5" w.c.; 24 Vac, 0-10V signal; ± 1% FS accuracy; 1/4" barb connections. Sensor shall have field installed 1/4" pneumatic tubing to the ductwork located 2/3 down the duct. **Sequence**: Whenever the supply fan is running in any mode, the fan speed shall vary to maintain the user selected duct static pressure setpoint. (Default 1", adjustable range 0-2.5") When the supply fan is OFF, the

VFD supply fan signal will be 0%. (OFF) The control system shall limit the actual VFD range between a user adjusted minimum and maximum output setting with default values of 25% and 100% output - other mechanical limits may apply.

G. Intake & Section

1. Unit shall have outdoor air hood design for 100% airflow to allow uniform coil velocity and filter loading. The motorized damper shall be spring return for closure during unit shutdown or power interruption. Outdoor air inlet hood shall include 1 inch (25 mm) permanent filters and screen. Hood filter and screen shall meet MERV 4 rating. (Dust mites, pollen, and water spray) Hood airflow shall not exceed 300 fpm intake velocity to prevent snow and rain entrainment. Units designed for 100% outside air intake only shall include an integrated transition section (without return air opening) designed specifically for 100% outside air introduction
2. Units shall have fully integrated factory installed 100% motorized outdoor air damper.
3. Damper Construction: The control damper shall be low leak with blade and jamb seals. The damper leakage shall not exceed 10 cfm per square foot at 4" sp. The damper shall be constructed of 16 gage galvanized steel with reinforcement to insure structural integrity. Blade edge seals shall be PVC coated polyester fabric suitable for -25°F to +180°F (-32°C to +83°C) mechanically locked into the blade edge. Jamb seals shall be flexible stainless steel metal, compression type to prevent leakage between end of the blade and the damper frame. Bearings shall be corrosion resistant, molded synthetic sleeve type turning in an extruded hole in the damper frame. Linkage shall be concealed out of airstream, within the damper frame to reduce pressure drop and noise and lessen the need for maintenance.
4. The damper(s) shall be control from an external 0-10V input signal. Sensors/Signal: User supplied 0-10 volt, 2 wire signal. Independent power source provided by the contractor. Sequence: The control system accepts a 0-10 volt signal that will position the damper from 0-100% open between the user set maximum and minimum settings.
5. The unit shall have factory installed 4" MERV 13 filters before the evaporator coils. The filters shall be accessible through a hinged door. None hinge door access is not acceptable. The filters shall be pleated V configuration with an average arrestance of 95%; MERV Rating 13 per ASHRAE 52.2-99. The filters shall be manufactured from recycled synthetic material with moisture & microbial growth resistant properties. The filter shall have less than 0.36" w.c. pressure drop at 500 fpm air velocity. The filter area shall be sized to handle the rated airflow as shown on the mechanical schedule.

H. Full Perimeter Curbs:

New unit shall be placed on the existing curb. Contractor will provide insulated curb adaptor to match the unit to the existing curb.

1. Curbs shall be designed to meet the National Roofing Contractors Association August 1985 guidelines for roof mounted installations. The roof curbs shall be 12 gauge (2.8 mm) zinc coated steel with a 2 inches by 6 inches (51 mm by 152 mm) nailer.

I. Make-up Air Control System. The unit shall operate to maintain one of the following discharge air temperature setpoints during all weather conditions.

- Space Cooling Required: 55F DAT (Range 50 – 100F)
- Space Heating Required: 90F DAT (Range 50 – 100F)
- Space cooling required during winter operation. 55F DAT (Range 50 – 100F)
- Neutral Air - Dehumidified: 70F DAT @ 52-55 Dewpoint (Range 50 – 100F)
- Neutral Air - Heating: 70F DAT (Range 50 – 100F)

1. The unit shall operate based upon a 7-day programmable time schedule, contact closure to operate in either occupied or unoccupied mode. In the occupied mode the unit supply fan shall run continuous based upon duct static pressure. In the unoccupied mode the fan shall run intermittently to maintain a space temperature setpoint. (74F cooling/ 68F heating).
2. The intake dampers shall operate based upon one of the following: 100% outside, external input from user supplied 0-10v. In the unoccupied period the outside air damper shall be 100% closed.
3. The mechanical heating and cooling shall operate to maintain the discharge air temperature setpoint.
4. The control system shall incorporate all the necessary safeties.
5. The alarm functionality shall include low temperature, compressor failure, sensor failure, smoke alarm, power failure, heating failure and supply fan failure. The failures mounted display. The unit will have test and diagnostics routines for services and start-up.
6. The control system shall be able to provide neutral air and space temperature control per the sequence of operation shown.
7. The unit shall be supplied with a wall mounted DDC temperature/humidity monitor and setpoint adjustment interface device. The wall mounted unit communicating thermostat shall provide space temperature and space humidity values back to the unit controller. The room module shall allow the user to set

the space temperature setpoint and read current values. The room module shall allow the user to read alarm codes from the control system. The room interface module shall allow occupancy time schedules and direct unit mode commands.

8. The unit shall be supplied with factory installed disconnect. The line voltage connections to the unit shall be made through a flush-mounted, NEMA 4X switch with lock-out feature. The disconnect shall be rated for the unit MCA/MOP as shown on the schedule. The unit shall carry a rating plate showing necessary data and all approval.

A. Options

1. A weatherproof convenience outlet shall be provided. The outlet shall be field powered utilizing an independent circuit form the main unit power. The circuit shall be a 20 amp circuit with breaker and installed per local and state building codes.
2. The unit shall have a factory installed dirty filter switch installed for the unit DX filters. The switch shall have an adjustable differential pressure range between 0.25 - 1.5 inch w.c. The switch shall be connected to the unit's controller and display and alarm when the switch makes indicating an alarm.
3. Photoelectric Smoke Detector: The unit shall have a 24V ac/dc photoelectric smoke detector with 2 auxiliary contacts for control.

2. BID ALTERNATE # 2

A. Bid alternate # 2 includes the removal of two backdraft dampers and the installation of two motor operated opposed blade dampers and the reprogramming of the unit operating controls in existing roof mounted AC-2.

1. New motor operated dampers shall meet the same construction and performance requirements as the intake air dampers specified in Section G. paragraphs 3 and 4 above.
2. Remove exiting thermostat/humidistat controller located in the Corridor and provide a wall mounted DDC temperature/humidity monitor the same as specified in Section I. paragraph 7 above.
3. Occupied Space Temperature/Humidity Control-When in occupied mode the DDC temperature/humidity monitor/control shall operate stages of heating and cooling to maintain space temperature and space dewpoint set point.
4. Unoccupied Space Temperature/Humidity Control-When in the unoccupied the DDC temperature/humidity monitor/control shall operate stages of heating and cooling to maintain space temperature and space dewpoint setpoint.
5. Sequence of Control-Unit shall have the following sequence of control:

OCCUPIED MODE

a. AC-2 runs continuously
b. Thermostat set point
   Summer 74° F.
   Winter 72° F.
   Humidistat set point 45% RH
c. On a call for cooling the thermostat energizes AC-2 staged refrigeration cycle to maintain set point.
d. On a call for heat the refrigeration cycle is locked off and the existing SCR controlled 30 KW electric duct mounted heating coil is used to maintain heating set point.
e. When humidity exceeds humidistat set point hot gas bypass reheat cycle shall be activated to maintain thermostat set point and humidistat set point.
f. Static pressure sensor located in the supply air duct in the Corridor shall modulate the fan speed control to maintain .15" (adjustable) static pressure in the supply air duct.
g. Bypass Air Outside Temperature Reset:
   During the cooling cycle the return air damper shall be closed and a temperature sensor in the mixed air shall modulate the bypass air damper to reduce bypass air in accordance with the following outside air reset schedule:

OA Temp	OA CFM	Bypass CFM	Fan CFM	Ent. Air Temp	Lvg. Air Temp
95° F.	1700	1700	3400	75.50° F.	56° F.
90° F.	1700	1350	3050	74.93° F.	56° F.
85° F.	1700	1000	2700	74.27° F.	56° F.
80° F.	1700	650	2350	73.35° F.	56° F.
75° F.	1700	300	2000	72.15° F.	56° F.
Below 70° F.	1700	Closed	1700	Less Than 70° F.	56° F.

During heating cycle the return air damper and the bypass air damper shall be closed.

UNOCCUPIED MODE

a. AC-2 runs on a call for cooling, heating or dehumidification
b. Thermostat set point
   Summer 72° F.
   Winter 68° F.
   Humidistat set point 45% RH
c. On a call for cooling the thermostat activates AC-2 fan and the refrigeration cycle is staged to maintain thermostat set point.
d. On a call for heat AC-2 fan is activated, the refrigeration cycle is locked off and the existing SCR controlled 30 KW electric duct mounted heating coil is used to maintain heating set point.

e. When humidity exceeds humidistat set point Ac-2 is activated and hot gas bypass reheat cycle shall be activated to maintain thermostat set point and humidistat set point.
f. Static pressure located in the supply air duct in the Corridor shall modulate the fan speed control to maintain .15" (adjustable) static pressure in the supply air duct.

PART 3 EXECUTION

1. EXAMINATION
   A. Contractor shall verify that the existing roof curb is ready to receive work and opening dimensions are adequate for the unit.
   B. Contractor shall verify that proper power supply is adequate to supply the unit.

2. INSTALLATION
   A. Contractor shall install in accordance with manufacturer's instructions.
   B. Mount unit on factory built roof mounting frame providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

3. MANUFACTURER'S FIELD SERVICES

   A. Factory authorized start up commissioning.

   B. The contractor shall furnish manufacturer complete submittal wiring diagrams of the package unit as applicable for field maintenance and service.

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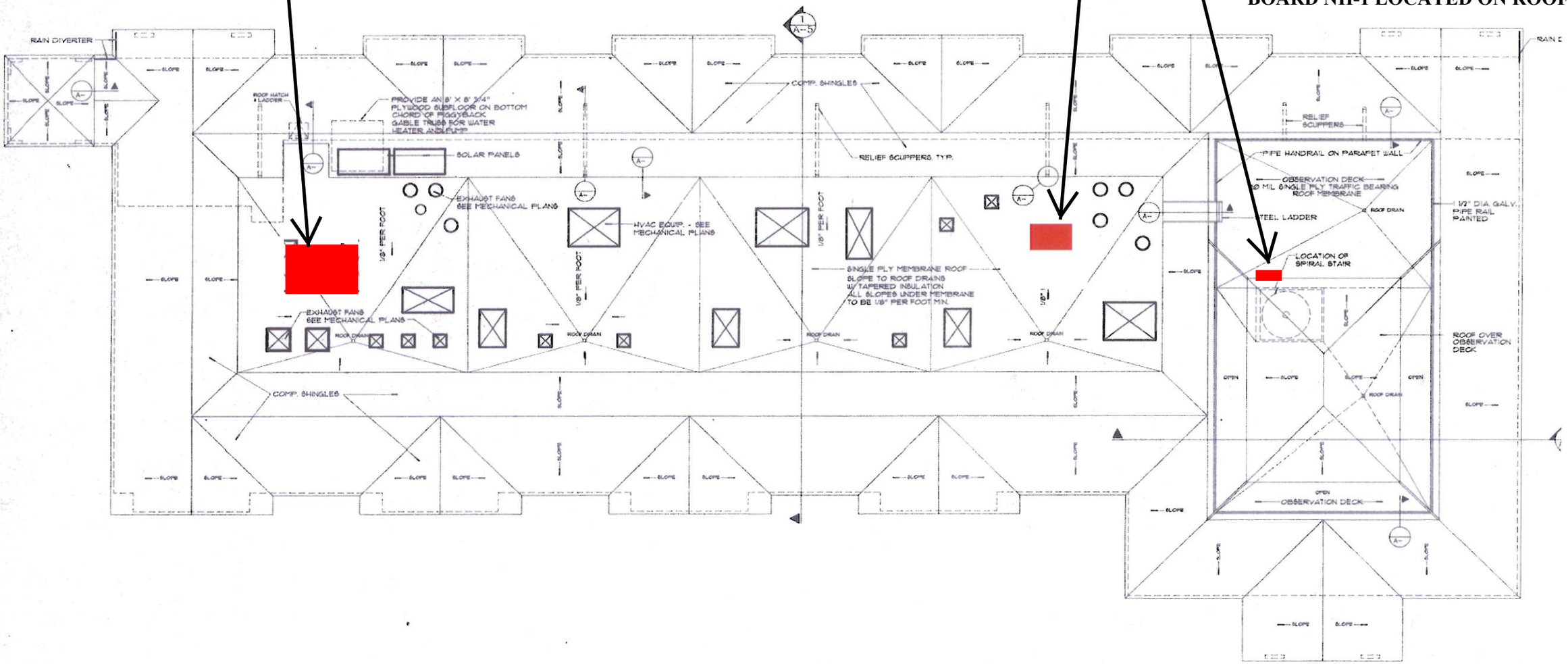
NEW AC-1 LOCATED ON EXISTING CURB ON ROOF

EXISTING AC-2 LOCATED ON ROOF

EXISTING ELECTRIC PANEL BOARD NH-1 LOCATED ON ROOF



ROOF LOCATION PLAN DRAWING R-1

1 **Roof Plan**

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REMOVE EXISTING 100 KW ELECTRIC DUCT HEATER AND SEAL UP AND INSULATE THE HEATER HOUSING

NOTE:
REBALANCE SUPPLY AIR AND EXHAUST AIR QUANTITIES AS SHOWN

2 EXISTING EXH GRILLS AT 350 CFM EACH

2 EXISTING SUPPLY AIR DIFFUSERS AT 255 CFM EACH

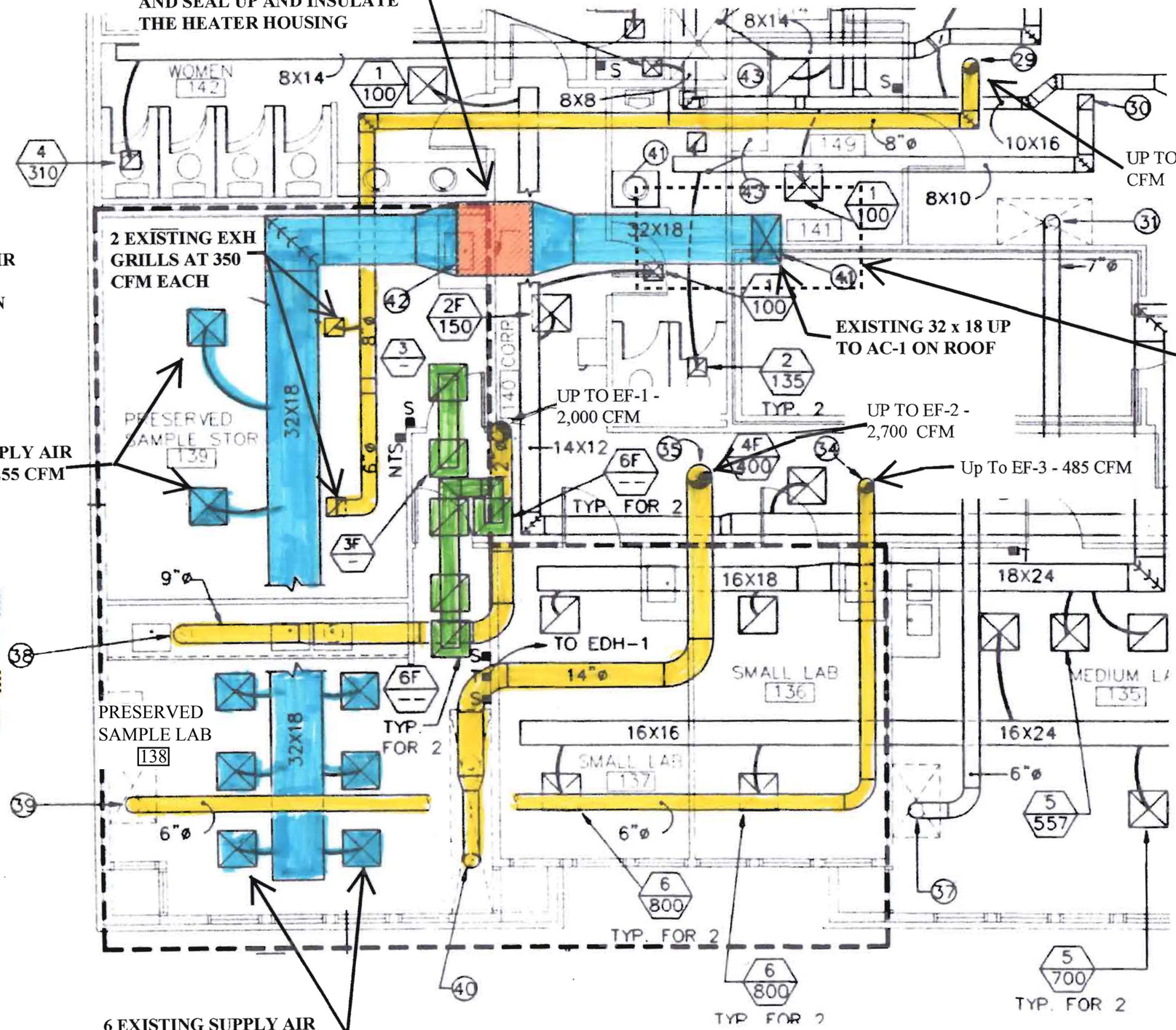
LEGEND:

SUPPLY AIR DUCT

RETURN AIR DUCT

EXHAUST DUCT

TRANSFER DUCT



EXISTING 32 x 18 UP TO AC-1 ON ROOF

NEW AC-1 LOCATED ON ROOF. SEE DWG R-1

UP TO EF-1 - 2,000 CFM

UP TO EF-2 - 2,700 CFM

Up To EF-3 - 485 CFM

6 EXISTING SUPPLY AIR DIFFUSERSAT 665 CFM EACH

AC-1 REPLACEMENT PART FLOOR PLAN M-1

AC UNIT SCHEDULE

Unit	CFM	Fan HP	Ext SP	MBH	Power
	SA - OA			EAT 95F/75F - LAT 55.9F/54.8F	
AC-1	4500 - 4500	5	.75”	170.6/119.6	480 Volt/3Phase

Basis of design is York Model JDMA 180 Packaged Roof Top Unit with variable speed supply air fan, hot gas reheat, and electric reheat. See Technical Specifications for additional approved unit suppliers.

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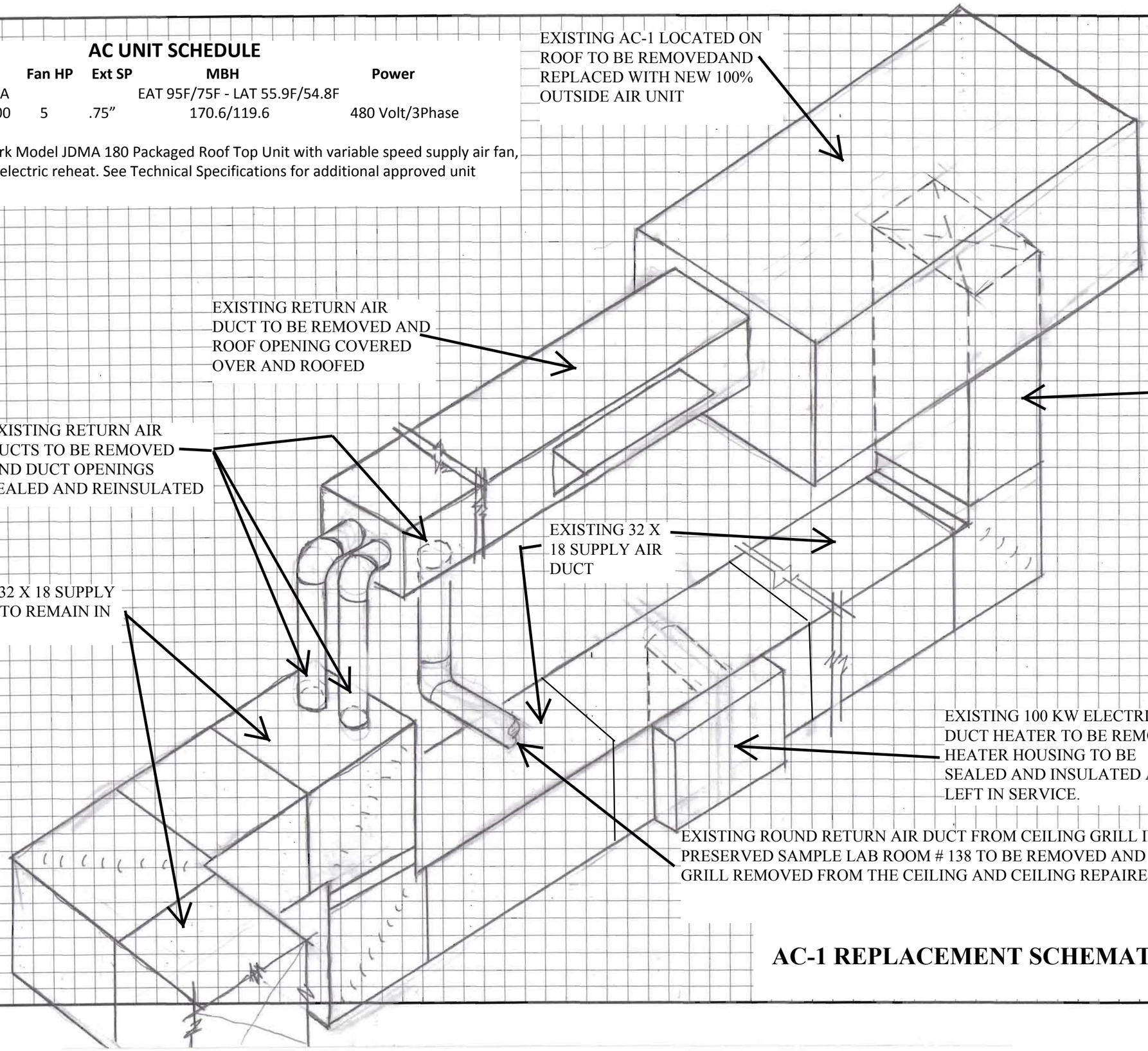
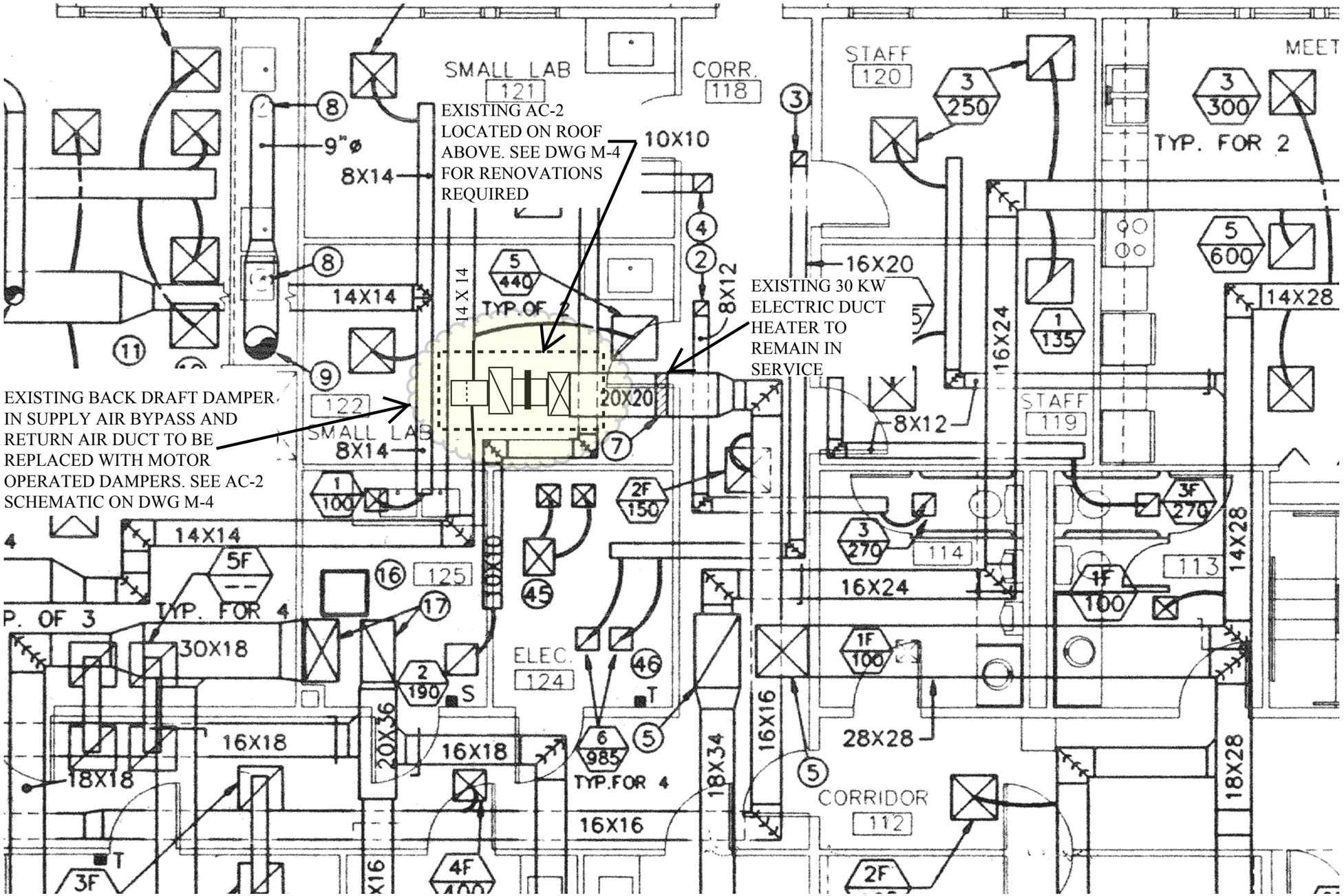


AC-1 REPLACEMENT SCHEMATIC DIAGRAM M-2



ALTERNATE # 2
AC-2 REWORK PART FLOOR PLAN M-3

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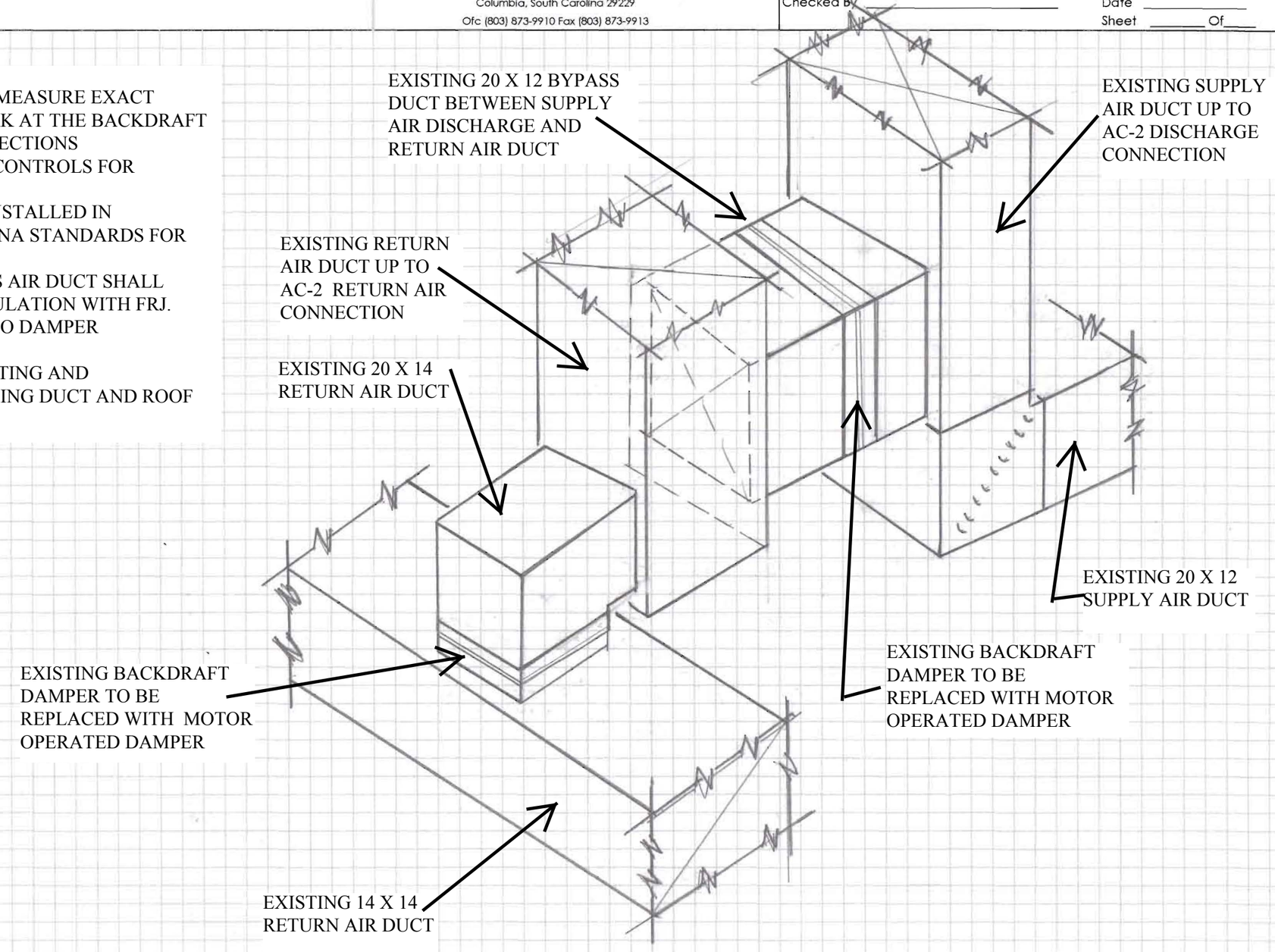
Job Name _____ Job No. _____
By _____ Date _____
Checked By _____ Date _____
Sheet _____ Of____

NOTES
1. CONTRACTOR TO FIELD MEASURE EXACT DIMENSIONS OF DUCTWORK AT THE BACKDRAFT DAMPERS AND UNIT CONNECTIONS
2. SEE NEW SEQUENCE OF CONTROLS FOR ALTERNATE # 2.
3. DUCTWORK SHALL BE INSTALLED IN ACCORDANCE WITH SMACNA STANDARDS FOR MEDIUM PRESSURE DUCT.
4. SUPPLY AIR AND BYPASS AIR DUCT SHALL HAVE 1 ½" FIBERGLAS INSULATION WITH FRJ.
5. PROVIDE TRANSITIONS TO DAMPER CONNECTIONS.
6. COORDINATE DUCT ROUTING AND CONNECTIONS WITH EXISTING DUCT AND ROOF FRAMING STRUCTURE



ALTERNATE # 2
AC-2 REWORK SCHEMATIC DIAGRAM M-4

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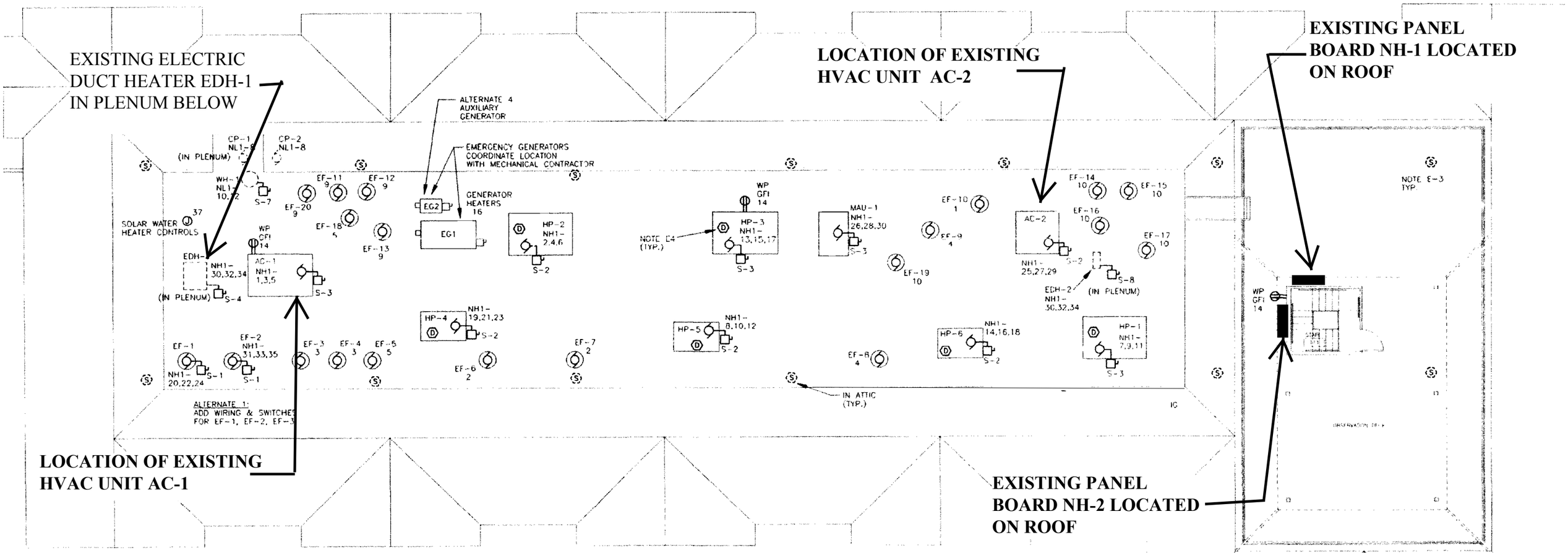


ROOF ELECTRICAL PLAN

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

3#8 - 1#10 GND - 1"C

277/480V, 3 PH., 3W, 60 HZ
600 AMP M.L.O.
SURFACE MOUNTED
22,000 A.I.C. SYM. (MINIMUM)

PANEL "NH1"

NEMA 3R ENCLOSURE

	LOADS SERVED	BKR. AMP	LOAD KVA	CKT. NO.	(S / N)	CKT. NO.	LOAD KVA	BKR. AMP	LOADS SERVED	
	–	–	7.9	1		2	12.7	–	–	
(5)	AC-1	45	7.9	3		4	12.7	60	HP-2	(7)
	–	–	7.9	5		6	12.7	–	–	
	–	–	14.7	7		8	7.6	–	–	
(8)	HP-1	70	14.7	9		10	7.6	40	HP-5	(5)
	–	–	14.7	11		12	7.6	–	–	
	–	–	14.7	13		14	12.7	–	–	
(8)	HP-3	70	14.7	15		16	12.7	60	HP-6	(7)
	–	–	14.7	17		18	12.7	–	–	
	–	–	7.6	19		20	0.5	–	–	
(5)	HP-4	40	7.6	21		22	0.5	*20	EF-1	(1)*
	–	–	7.6	23		24	0.5	–	–	
	–	–	4.5	25		26	13.9	–	–	
(3)	AC-2	30	4.5	27		28	13.9	70	MAU-1	(8)
	–	–	4.5	29		30	13.9	–	–	
	–	–	0.5	31		32	33.3	–	–	
* (1)	EF-2	*20	0.5	33		34	33.3	150	EDH-1	(13)
	–	–	0.5	35		36	33.3	–	–	
	SPACE	–	–	37		38	10.0	–	–	
	SPACE	–	–	39		40	10.0	50	EDH-2	(5)
	SPACE	–	–	41		42	10.0	–	–	

CONNECTED LOADS (KVA) ---- ØA 141.6 ØB 141.6 ØC 141.6

TOTAL LOADS (KVA) --- 424.8

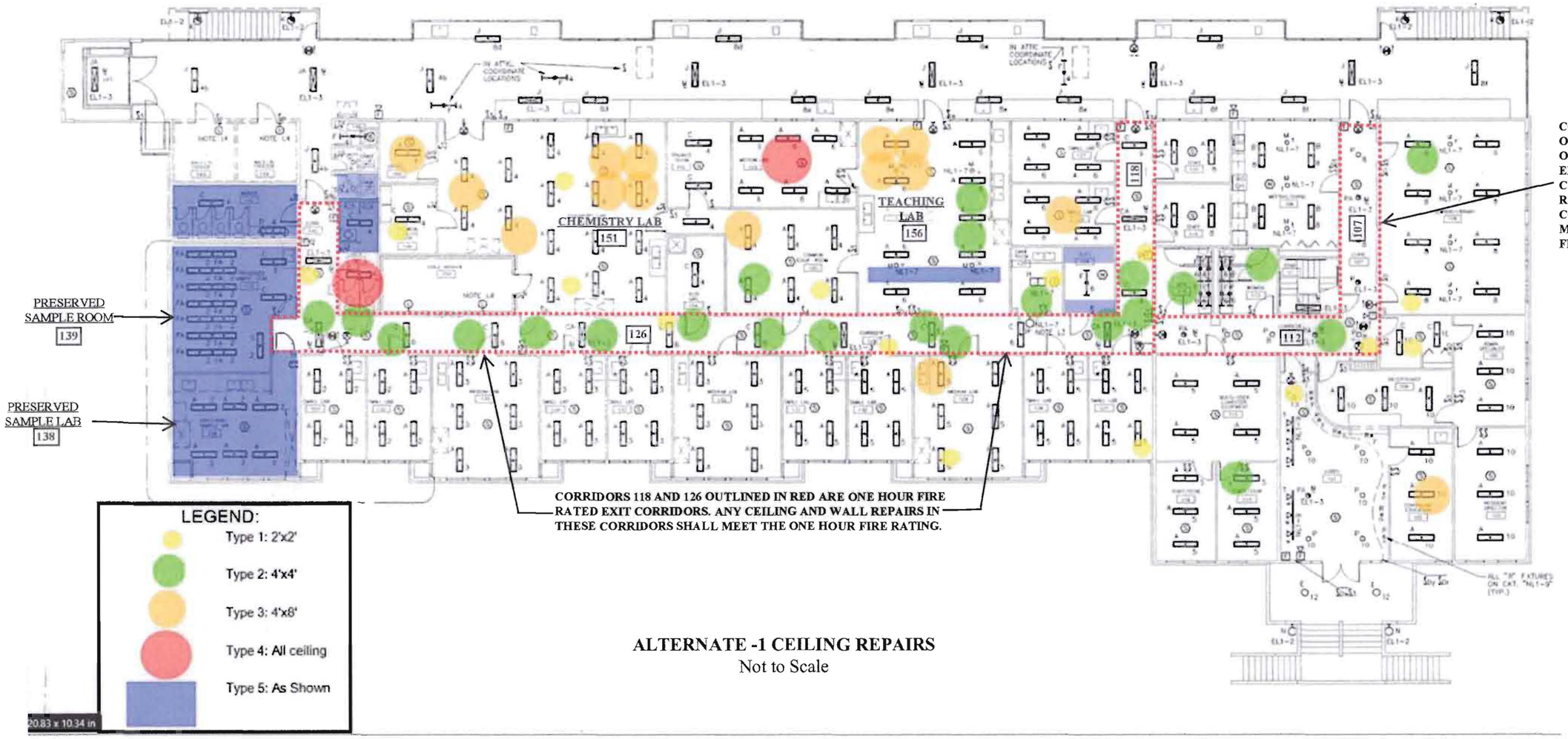
* DENOTES ALTERNATE 1

3 - 1/O - 1#6 GND - 2"C

EXISTING PANEL BOARD SCHEDULE NH-1

AC-1 REPLACEMENT ELECTRICAL PLAN E-1

ESSEX
THE HOLISTIC SOLUTION FOR BUILDING MANAGEMENT



ALTERNATE -1 CEILING REPAIRS
Not to Scale

ALT -1