

**GUAM MEMORIAL HOSPITAL AUTHORITY
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TAMUNING, GUAM 96913
PHONE: 671-647-2165
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TRANSMITTAL SHEET

TO: Prospective Bidder
FROM: Hospital Materials Management Administrator
DATE: August 1, 2024
SUBJECT: **GMHA IFB 007-2024 Removal and Replacement of Emergency
Department AHU and Installation of DOAS
Amendment No.9**

PAGES: 14 including cover sheet

NOTES:

An acknowledgement via a return email would be appreciated as soon as possible.

DATE / VENDOR ACKNOWLEDGEMENT

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GUAM MEMORIAL HOSPITAL AUTHORITY

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AMENDMENT #9

FOR

IFB 007-2024

Removal and Replacement of Emergency Department AHU and Installation of DOAS

This amendment is issued in response to clarifications received from Dylan Mechanical that required responses from GMHA Facilities Maintenance for RFI# 1-5:

1. **Question:** The new AHU and DOAS are larger than the existing. Are modifications to housekeeping pads required? If so, please provide drawings and specs.

Response: Provide pad for floor mounted unit with height of 4" and off-set of 6" around the actual size of the AHU.

2. **Question:** Does the OSA duct from the intake to DOAS2 need to be insulated? Yes. What are the insulation specifications?

Response: Section 15500 Air Conditioning and Ventilation Systems (see attached).

3. **Question:** Technical Assessment: The air velocity through the OSA intake is almost 1500FPM. The high velocity, high pressure drop will probably be noisy. Can the OSA intake duct be changes to 22" round SS ductwork, 1269FPM? The intake hood should also be increased to lower intake velocity and noise.

Response: Due to limited ceiling height, the duct size of DOAS #2 will be changed from 24" x 14" to 34" x 14".

4. **Question:** Technical Assessment: DOAS2 air temperature 68F Db and 67.3F WB, and 67F DP Dewpoint less than 62F is required to be inside ASHRAE 55 comfort zone. Suggest lowering DOAS2 supply temperature between 55F and 60F max to be within recommended comfort zone and to reduce RH, mold, bacteria, etc.

Response: Design drawing shows outside air from DOAS#2 was supplies to AHU and it meets the ASHRAAE requirements.

5. **Question:** What is the specification for chilled water and condensate pipe insulation?

Response: Section 15500 Air Conditioning and Ventilation Systems (see attached).

6. BID SUBMISSION DATE & TIME READS AS: Thursday, August 08, 2024 @ 10:00am.
BID SUBMISSION TIME CHANGED TO READ AS: Thursday, August 22, 2024 @ 10:00am.

BID OPENING DATE & TIME READS AS: Thursday, August 08, 2024 @ 10:30am.,
Facilities Maintenance Conference Room

BID OPENING DATE & TIME CHANGED TO READ AS: Thursday, August 22, 2024 @ 10:30 am, Facilities Maintenance Conference Room

Note: There are still some pending Response to Inquiries that will be forthcoming.

If you have any questions, please feel free to address your letter to Lillian Perez-Posadas MN, RN, and email it to Materials Management at materials.mgmt@gmha.org.

Sincerely;



DOLORES PANGELINAN

Hospital Materials Management Administrator

ACKNOWLEDGMENT:

PRINT NAME

SIGNATURE

DATE

SECTION 15500
AIR CONDITIONING AND VENTILATION SYSTEMS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Work included: Air conditioning and ventilation required for this Work is indicated on the Drawings and includes, but is not necessarily limited to:
1. Air conditioning and ventilation equipment.
 2. Ductwork and accessories.
 3. Diffusers, Grilles, and Registers.
 5. Chilled Water Piping and Accessories.
 6. Condensate Drain Piping.
 7. Insulation.
 8. Controls.
 9. All other items required for a complete and operating air conditioning and ventilation systems.
- B. Related work described elsewhere: Power wiring, Section 16400.

1.02 QUALITY ASSURANCE

- A. Qualifications of installers
1. For the actual fabrication, installation, and testing of work under this Section, use only thoroughly trained and experienced workmen completely familiar with the items required and shall be under full supervision of Manufacturer's Technical Representative.
 2. In acceptance or rejection of installed work, the Architect will make no allowance for lack of skill on the part of workmen.
- B. Codes and standards: In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations contained in the Standards listed below, latest edition, as published by the Sheet Metal and Air Conditioning Contractor's National Association.
1. HVAC Metal Duct Standards.
 2. HVAC Systems Testing, Adjusting, and Balancing.

1.03 SUBMITTALS

- A. General: Comply with the provisions of Section 15000.

- B. **Product Data:** Within 35 calendar days after award of the Contract, submit:
1. Following items proposed to be furnished and installed under this section.
 - a. All air conditioning and ventilating equipment
 - b. Diffusers, Grilles and Registers
 - c. Insulation
 2. Shop Drawing showing all details of the proposed installation, and the interface of ducts, piping and equipment with all other items.
 3. Manufacturer's recommended installation procedures which, when approved by the Architect, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.
- C. **Record Documents:** During progress of the Work, maintain an accurate record of all changes made in the air conditioning and ventilating systems from the layout and materials shown on the approved submittals.
- D. **Manual:** Upon completion of this portion of the Work, and as a condition of its acceptance, deliver to the Owner and the Architect each three copies of the operations and maintenance Manual. Include in each copy of the Manual a copy of the Record Documents.
- E. **Control Wiring Diagrams:** Submit for approval along with shop drawings.

1.04 PRODUCTS HANDLING

- A. **Protection:** Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.
- B. **Replacements:** In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. **General:** All equipment shall be the capacity and types shown on the Equipment Schedule in the Drawings, and shall be the listed manufacturer and model number or shall be an equal approved in advance by the Architect.
- B. **Single Source:** For ease of maintenance and parts replacement, to the maximum extent possible use equipment of a single manufacturer.
- C. The Architect reserves the right to reject any materials list which contains equipment from various manufacturers if suitable materials can be secured from fewer manufacturers, and to require source of materials to be unified to the maximum extent possible.
- D. **Air Handling Units**
1. Unit shall be factory-assembled, horizontal, draw-thru type air-handling unit. Unit

shall be complete with water coils, fan, U. L. approved motor, belt drive, drain pan, and filter.

2. Casing shall be double-walled heavy-gage galvanized steel, with 1-inch thick glass fiber thermal/acoustical insulation in between. Insulation and adhesive shall meet NFPA 90A requirement for flame spread and smoke generation. Supply and return duct connection shall be provided for access to the fan/motor assembly. Removable side panels shall be provided for access to the fan/motor assembly. Drain pan shall be constructed of galvanized steel, extending under the full length and width of the coil and pitched for positive drainage. The inside surface of the drain pan shall be coated with closed cell fire-retardant, foam insulation.
3. Fans shall be belt-driven, double-width fan wheels shall have forward-curved blades and be statically and dynamically balanced. Fan drive shall consist of variable-pitch motor pulley, fixed-pitch fan pulley belt and V-belt. Fans and scrolls shall be of galvanized steel.
4. Unit shall be equipped with a cooling coil suitable for installation a 2-pipe system. Coils shall have copper tubes with aluminum fins bonded to the tubes by mechanical expansion and have a working pressure of 250 psig. Each coil shall have a manual air vent.
5. Fans motors shall be open, drip proof, single-speed, 60 Hz, 1750 rpm, suitable for continuous duty at 104 F (40 C).
6. Air handling unit shall be "Carrier" 39 M Series or approved equal as manufactured by "Trane" or "York".

E. HEPA Filte/UV and Blower

1. HEPA Filter/UV unit shall consist of pre-filters, high efficiency particulate filters, 4-2 watt germicidal UV lamps with on/off UV indicator light, 2 speed fan switch, minihelic gauge and electronic hour meter, all in a 16 gauge galvanized steel housing design for ceiling mounting.
2. Steel housing shall have side mounted 10" duct connections, suspension hangers at four corners, and 20 gauge stainless perforated swing-down grille which will also be serve as access to the inside components. Housing shall be 29.75" wide, 23.75" long, and 12" high.
3. Blower shall be forward curved, centrifugal fan with 1/5 Hp shaded pole motor, with sleeve bearings that allow installation in any position. Motor shall have automatic reset thermal protection and electrical junction box. Blower capacity shall be 545-760 CFM at 0" static pressure. Fan speed shall be 1,100 to 1,450 rpm. Housing shall be 13.5" wide, 13.5" long, and 13.5" high.
4. HEPA filters shall be certified at 99.97% efficiency on 0.3 micron particles. Filter media shall be glass micro fiber, 100% water proof, with fire retardant/adhesive sealant.
5. Pre-filter shall be 1", two ply, synthetic.
6. HEPA filter/UV Unit and Blower shall be Microcon BUV as manufactured by Biological Controls or approved equal.

F. Accustat

1. Accustat shall be a room pressure differential monitor, sensitive to monitor either positive or negative pressure to within 0.001" water gage static pressure.
2. The accustat shall have audio and visual alarms that will alert personnel if room condition deviates from pre-set conditions. The alarms should have built-in false alarm delay.
3. The accustat shall be wired to the HEPA filter/UV Unit which controls fan speed to obtain designed room pressure.
4. Accustat shall be product of Biological Controls or approved equal.

G. Motor Control

1. Air conditioning equipment shall be provided with combination starters-circuit breakers.
2. Control wiring and relays not provided by air conditioning equipment manufacturers shall be provided by Electrical Contractor.
3. Provide engraved plastic nameplate for each unit and for each switch on the motor controller.
4. The Mechanical Contractor shall verify from electrical drawings the extent of electrical work to be provided by Electrical Contractor and shall provide all other work necessary to complete the installation.
5. All control and power wiring shall be in accordance with electrical section of these specifications.

H. Roof Ventilators

1. Centrifugal type with internal parts protected by a heavy gage spun aluminum housing. Drive shall be isolated from the air stream. Wheel shall be statically and dynamically balanced, all aluminum. Provide unit complete with backdraft damper, bird screen, and disconnect switch. Capacity shall be as indicated.
2. Roof ventilator shall be products of Greenheck or approved equal.
3. Roof ventilator for hood exhaust shall be of the upblast discharge type.

I. In-line Centrifugal Fans

1. Units shall be factory-assembled in-line fan, AMCA rated, with capacities as indicated. Each unit shall consist of a housing, fan and motor. Unit shall be selected to operate at the lower half of its capacity range.
2. Housing shall be square, of steel construction, with baked enamel finish internally lined with acoustical insulation, with diagonal bracings and hanging brackets with spring isolators. Fan shall be centrifugal, backward-curved, with spun venturi throat overlapped by the fan. Motor shall be isolated from the air stream by a motor enclosure and shall draw cooling air from outside the fan housing. Motor and fan

assembly shall be mounted on a hinged side of the housing allowing the assembly to swing out for inspection, cleaning or service.

2.02 CHILLED AND CONDENSER WATER PIPING AND ACCESSORIES

- A. Chilled Water Piping aboveground shall be Schedule 40 black steel pipes, conforming to ASTM A-120 or A-53 with mechanical joint fittings for pipes 2-1/2" and bigger and 125-lb. cast iron screwed fittings for pipes 2" and smaller. Unions for pipes 2" and smaller shall be black malleable iron, ground joint, brass seat, 150-lb., ANSI B2.1.
- B. All shut-off valves on chilled water lines shall be full-port ball valves.
- C. Plug Valves shall have semi-steel bodies with bronze eccentric plugs, bronze bearings, and compressible resilient molded seals. Valves 3" and smaller shall have screwed ends and lever operators with memory stops. Valves bigger than 3" shall have flanged ends and worm gear actuated, handwheels. All valves shall be rated for 200 lbs. W.O.G.
- D. All gage cocks and manual air vents shall be 1/4" gate valves.
- E. Piping Accessories
 - 1. Thermometers: Thermometers shall be of the liquid filled, universal angle type dial thermometer with brass thermometer wells, 4-1/2" diameter, white faced dial, aluminum case, and brass stems. Thermometer range shall be 0 to 100 degrees F. Thermometers shall be "Terice" No. L80742 or approved equal as manufactured by "Marsh", "Marshalltown" or "U.S. Gage".
 - 2. Pressure Gage: Gages shall be of the bourdon spring type with 4-1/2" diameter, white dial face, aluminum case, gage cocks and snubbers, 30" Hg. vacuum to 60 psig scale range at pump suction, 0 to 100 psig scale range elsewhere. "Terice" No. 500X, or approved equal as manufactured by "Marsh", "Marshalltown" or "U.S. Gage".
 - 3. Strainers: Strainers shall be rated for 200 psig W.O.G., of the wye pattern type, with cast iron body, heavy gage perforated brass strainer with 1/8" perforations, blow-off connections provided with 1" blow off valves, bolted cover flange, and flanged connections. Strainer connections shall be of the same size as the line where the strainer is located.
 - 4. Flexible Pipe Connections on chilled water lines shall be of the two arch bellows type, complete with molded teflon bellows, reinforcing rings, ductile flanges, limit bolts, and gaskets, as manufactured by "Resistoflex" or approved equivalent as manufactured by "Vibration Mounting & Controls" or "Belmont Packing & Rubber Co.".
 - 5. Two-way Control Valves:
 - a. Valves for Chilled Water Service: Bodies for valves 1 1/2 inches and smaller shall be brass or bronze, with threaded or union ends. Bodies for valves from 2 inches to 3 inches inclusive shall be of brass, bronze or iron. Bodies for 2 inch valves shall have threaded ends. Bodies for valves from 2 1/2 to 3 inches shall have flanged-end connections. Internal valve trim shall be brass or bronze except that valve stems may be Type 316 stainless steel. Water valves shall be sized for a 3 psi differential through

the valve at rated flow, except as indicated otherwise. Select valve flow coefficient (Cv) for an actual pressure drop not less than 50 percent or greater than 125 percent of the design pressure drop at design flow.

- b. Electric Actuators: Connect to existing Direct Digital Control (DDC) system. Provide direct drive electric actuators for all control applications, except where indicated otherwise. When operated at rated voltage, each actuator shall be capable of delivering torque required for continuous uniform motion and shall have end switch to limit travel, or shall withstand continuous stalling without damage. Actuators shall function properly with range of 85 to 110 percent of line voltage.

Provide gears manufactured from steel, copper alloy, fiber, or reinforced nylon. Provide hardened steel running shafts in sleeve bearing of copper alloy, hardened steel, nylon, or ball bearing. Provide two-position actuators of the single direction, spring return, or reversing type. Provide proportioning actuators capable of stopping at all points in the cycle and starting in either direction, from any point.

Provide reversing and proportioning actuators with limit switches to limit travel in either direction unless operator is stall type. Actuators shall have a simple switch for reversing direction, and a button to disengage clutch for manual adjustments. Provide reversible shaded pole, split capacitor, synchronous, or stepper type electric motors.

2.03 CONDENSATE DRAIN PIPING

- A. Condensate drain piping shall be polyvinyl chloride DWV pipes and fittings conforming to ASTM D2665 with solvent weld joints inside the building, schedule 40 galvanized steel pipes conforming to ASTM A53 or A120 with screwed cast iron drainage fittings when exposed outdoors.

2.04 DUCTWORK

- A. Air conditioning ducts shall be fabricated from prime grade galvanized steel sheets.

2.05 DUCTWORK ACCESSORIES

- A. Volume dampers shall be factory fabricated of galvanized steel, at least 2 gauges heavier than duct where dampers are installed, single-bladed for duct depths up to 10", opposed blade type for ducts with depths more than 10" complete with indicating locking quadrants. Volume dampers for installation above plaster ceilings shall have remote damper operators mounted on plaster ceilings.
- B. Turning vanes shall be factory fabricated of galvanized steel, with double-walled blades rolled from a single sheet of metal, assembled over precision-formed tenons on the side pieces. Turning vanes shall be screwed or riveted into the duct elbow.

2.06 AIR INLETS AND OUTLETS

- A. The following items are products of "Tuttle and Bailey" (Hart & Cooley), similar and equal units as manufactured by "Carnes", "J and J", or "Waterloo" are acceptable. All air outlets shall be factory-finish painted to match adjacent surface color. Contractor shall submit manufacturers color chart for color selection by the Architect.
 - 1. Supply air registers shall be Series A-647 extruded aluminum registers with

removable core, double deflection, vertical outer bars, A45 frame, opposed-blade dampers, and type VLR vectrol air extractors.

2. Return, outside air and exhaust registers shall be Series A110 aluminum registers with A45 frame, 1-1/4" margin, horizontal bars set at 40 degrees, and opposed blade volume dampers.
3. Return and transfer grilles shall be as specified for return registers except without volume dampers.
4. Square ceiling diffusers with square necks shall be Type AME aluminum construction ceiling diffusers with pattern control as shown, M-7 opposed blade damper, M-6 grid.
5. Square ceiling diffusers with round necks shall be Type AMASR, aluminum construction, baked white enamel finish, with opposed blade volume damper.

2.07 INSULATION, ADHESIVES, TAPES, SEALERS

- A. All insulation, adhesives, tapes and sealers shall have a flame spread rating of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with ASTM E84.
- B. External Air Conditioning Duct Insulation shall be 1-1/2" thick faced fiberglass duct wrap, Type FRK25, Series ED-100 as manufactured by "Owens-Corning" or approved equal as manufactured by "Johns-Manville" or "Certain Teed".
- C. Chilled Water Piping insulation shall be 1-1/2" thick foamglass insulation, product of "Pittsburgh-Corning" or approved equal, with Pittwrap jacketing. All insulation outdoors shall have additional stainless steel jacketing.
- D. Condensate drain insulation shall be 3/4" thick foam rubber insulation.
- E. Insulation for valves, fittings, and flanges shall be premolded precut foamglass insulation, of the same thickness as used on adjacent piping. Jacketing shall be as specified for piping above.
- F. Adhesives, sealers and tapers, for use in the application of insulation shall be as recommended by the insulation manufacturer, products of "Minnesota Mining and Manufacturing Co.", "Benjamin Foster", or "United Sheet Metal Company".

2.08 OPERATING AND TEMPERATURE CONTROLS

- A. Air conditioning systems shall be connected to the existing DDC system. Provide remote start/stop and monitoring of air handling unit and exhaust fans.
- B. 2-Way chilled water control valve at the pre-cooling unit shall be controlled by leaving air duct thermostat set at 70^o F (adjustable).
- C. 2-Way chilled water control valve at main air handling units shall be controlled by room temperature sensor to main room temperature at 75± 2^o F.

2.09 OTHER MATERIALS

- A. All other materials, not specifically described but required for a complete and proper installation, shall be as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Inspection
 - 1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
 - 2. Verify that the work of this Section may be completed in strict accordance with all pertinent codes and regulations, the approved Shop Drawings, and the manufacturers' recommendations.
- B. Discrepancies
 - 1. In the event of discrepancy, immediately notify the Architect.
 - 2. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 PIPING SYSTEMS

- A. Piping shall be installed straight and plumb, parallel to building walls and columns, with due allowance for expansion and contraction.
- B. Risers shall be provided with hangers at the horizontal line, within 6" of the riser.
- C. All connections to equipment, valves and accessories shall be provided with unions or flanged joints, unless such items have flanged connections for easy removal.
- D. Connections between piping of dissimilar metals shall be provided with dielectric unions.
- E. All high points in the chilled water piping systems where air may tend to accumulate shall be provided with 1/4" gate valves for venting.
- E. All equipment shall be provided with isolation valves except where piping and valve arrangement for equipment is such that the same can be isolated without additional isolation valves.
- G. Piping Accessories
 - 1. Thermometers (Temperature Sensors): Thermometers shall be provided at chilled water inlet and outlet of each air handling unit. Thermometers shall be installed complete with thermometers wells.
 - 2. Thermometer Wells: All inlets and outlets of each fan-coil unit.

3. Pressure Gage Cocks: Gage cocks shall be provided at inlet and outlet of each air-handling unit and each fan-coil unit.
- H. All drain piping shall be pitched, preferably at 1/4" per foot, 1/8" per foot minimum in the direction of flow, adequate cleanouts shall be provided in changes of direction to facilitate rodding.

3.03 DUCTWORK

- A. Low pressure galvanized steel air conditioning ducts shall be fabricated and erected in accordance with the SMACNA HVAC Metal Duct Standards. Beading and crossbreaking are both acceptable. Longitudinal seams shall either be the Pittsburgh lock or Acme locked grooved seam. Button punch snap lock may be used with 1/2" pocket depth for gauge 26 material, 1/2" or 5/8" for gauge 24 and 5/8" for heavier material. Round elbows with standard elbows may be used in lieu of rectangular vaned elbow.
- B. All square elbows in all ductwork shall be provided with double thickness turning vanes. All branch take-offs shall be provided with adjustable air extractors.
- C. Duct dimensions shown are net inside dimensions.

3.04 INSULATION

- A. All air conditioning ducts shall be provided with 2" thick ductwrap insulation.
- B. Chilled Water Lines, Condensate Lines, and valves shall be insulated. Piping shall not be insulated at joints until tested, approved, and painted. Self-sealing adhesive strips shall be pressed in place only with nylon tools to be provided for that specific purpose.
- C. Chilled water lines and condensate water lines shall be insulated with foamglass insulation.

3.05 INSTALLATION OF REGISTERS AND DIFFUSERS

- A. Install and connect all registers and diffusers, in the locations shown, securely anchoring each item in place and sealing with rubber gaskets to prevent leakage.

3.06 WATER SIDE BALANCING AND TESTING REQUIREMENTS:

- A. Balancing of water side shall be done after balancing of air side is completed.
- B. Remove and clean all strainers or clean strainers. Examine water in the system and make sure water has been treated and cleaned. Check and vent all high points in the system. Check operation of control valves.

3.07 TEST REPORTS

- A. Completed test report forms and data sheets be submitted in triplicate after testing and balancing is completed. Report form and data sheets shall be as follows:
 1. Air Handling Unit Test Report - Similar to the following:

AIR HANDLER TEST REPORT

Project _____ Sheet _____ of _____
System _____ Floor # _____ Zone # _____
Job # _____ Date _____

Remarks _____

Item Specified Field Test 1 Field Test 2 Field Test 3

Outside air cfm _____

Total air cfm _____

% outside air _____

Discharge duct sq. ft. _____

Discharge duct fpm _____

Return duct sq. ft. _____

Return duct fpm _____

Return air cfm _____

Manufacturer _____

Fan size _____

Arrangement _____

Fan blade _____

Fan sheeve _____

Motor sheeve _____

No. rows coil _____

Filters _____

Rpm _____

Hp _____

Bhp _____

Volts _____

Phase _____

Cycle _____

Full-load amps _____

No-load amps _____

Heaters: rated amps _____

Suction sp _____

Discharge sp _____

Total sp _____

Ent. DB temperature _____

Ent. WB temperature _____

Lvg. DB temperature _____

Lvg. WB temperature _____

Outside air temperature _____

Gpm circulating H₂O _____

Pressure drop _____

Ent. water temperature _____

Lvg. water temperature _____

Remarks: _____

2. Exhaust Fan Data Sheets - indicating all data on fan nameplate, current characteristics to fan motor, suction and discharge static pressures, total fan cfm,

and cfm through each exhaust registers.

3. All other readings required to be recorded under balancing and test requirements.

3.08 CLOSING-IN OF UNINSPECTED WORK

- A. General: Do not allow or cause any of the work of this Section to be covered up or enclosed until it has been inspected, tested, and approved by the Architect and by all other authorities having jurisdiction.
- B. Uncovering: Should any of the work of this Section be covered up or enclosed before it has been completely inspected, tested, and approved, do all things necessary to uncover all such work. After the work has been completely inspected, tested, and approved, provide all materials and labor necessary and make all repairs necessary to restore the work to its original and proper condition at no additional cost to the Owner.

3.09 COOPERATION WITH OTHER TRADES

- A. Do all things necessary to cooperate with other trades in order that all systems in the Work may be installed in the best arrangement. Coordinate as required with all other trades to share space in common areas and to provide the maximum of access to each system.

3.10 TESTING AND AIR BALANCING

- A. General: Provide all necessary personnel, equipment, and services and perform all tests necessary to demonstrate the integrity of the completed installation to the approval of the Architect and all other authorities having jurisdiction. Make all adjustments necessary to balance the completed system in accordance with the data shown on the Drawings.
- B. Air Balancing: Perform in accordance with SMACNA HVAC Systems Testing, Adjusting, and Balancing Manual.

3.11 INSTRUCTING

- A. Upon completion of all required testing and balancing, and at a date set by the Architect to coincide with the Owner's acceptance of the completed Work, furnish all necessary personnel and thoroughly indoctrinate and instruct the Owner's maintenance and operation personnel in all aspects of operation and maintenance of the installed systems. Demonstrate the contents of the Operation and Maintenance Manual and ensure that the Owner's personnel are thoroughly familiar with all aspects of operation and maintenance of the installed systems.

END OF SECTION