DEPARTMENT OF HOMELAND SECURITY
UNITED STATES COAST GUARD
ENGINEERING SERVICES DIVISION

SPECIFICATIONS
FOR
REPAIR HVAC IN STATION BUILDING
U.S. COAST GUARD STATION
LITTLE CREEK
VIRGINIA BEACH, VA

SEPTEMBER 2016

COMMANDING OFFICER
UNITED STATES COAST GUARD
CIVIL ENGINEERING UNIT, RM 2179
1240 EAST NINTH STREET
CLEVELAND, OHIO 44199-2060

AUTHOR: E. F. WISNESKI FINAL

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(April 2014 Version)

SECTION 01 11 00
SCOPE OF WORK

1. WORK INCLUDED: Major items of work shall include the following:

1.1 Demolition of existing systems:
1.1.1 Remove the air handling unit (AHU-1), drain pan, and damaged flooring from second floor mechanical room.
1.1.2 Remove suspended ceiling as needed to access fan coil units.
1.1.3 Remove 31 fan coil units.
1.2 Clear floor drain in boiler room.
1.3 Clear condensate drain lines from each fan coil unit.
1.4 Provide and install new systems:
1.4.1 Install air handling unit (AHU-1), drain pan, and flooring in second floor mechanical room.
1.4.2 Install 31 fan coil units in Station Building.
1.4.3 Install new suspended ceiling to conceal fan coil units.
1.4.4 Install batt insulation in the ceiling of the boiler room.
1.4.5 Install drywall to close ceiling of the boiler room.
1.5 Combine temperature and fan speed as digital controls throughout Station Building.
1.6 Test, adjust, and balance hot and cold water supply and return from the boiler (B-1) and chiller (CH-1).
1.7 Test, adjust, and balance hot and cold air supply and return from the air handling unit (AHU-1).
1.8 Test, adjust, and balance exhaust fans (EF-1, EF-2, EF-3, EF-5).
1.9 Test, adjust, and balance supply and return air duct branches to match air volumes show on drawings.
1.10 Provide temporary heating and cooling during construction period. Temporary HVAC shall be capable of maintaining the normally conditioned space between 68°F and 78°F at all times.
1.11 Work associated with these items is described in the following specification sections and/or are shown on the contract drawings. Incidental work items not listed above and necessary for completing the project shall be included.

2. DRAWINGS: Drawings and the accompanying specifications are the property of the Government and comprise legal documentation that pertains exclusively to this project. Drawings will be made available in a format determined by the solicitation method. CEU Cleveland will not provide hard copies of drawings.

2.1 Construction Drawings: CG DWG. 8407-D, Sheets 1 through 6 of 6

SECTION 01 12 16
PROJECT PHASING

1. To minimize interference with Coast Guard operations, utilize the following phasing sequence to accomplish contract work. Coordinate timing between successive phases with Coast Guard personnel to allow for necessary relocations. Finish removal and installation of each fan coil unit and its controls before moving to the next.

PHASE I – Install and confirm proper operability of temporary HVAC units prior to demolition of existing systems.

PHASE II – Demolish air handling unit (AHU-1), repair floor of mechanical room and ceiling of boiler room, cast-in-place and set concrete housekeeping pad.

PHASE III – Demolish existing and provide/install fan coil units (FC-1 through FC-16), demolish/provide/install combined, digital fan/temperature controls. Demolish and install one unit at a time to cause minimal disruption to tenants; install air handling unit.

PHASE IV – Test, adjust, and balance HVAC system throughout Station building.

SECTION 01 14 00
CONTRACTOR WORK HOURS

1. WORK HOURS: Accomplish work during normal unit operational hours of 7:30 a.m. to 4:30 p.m., Monday through Friday unless otherwise approved by the Coast Guard. Note any departures from these work hours on the Daily Reports.

2. SATURDAY, SUNDAY AND HOLIDAYS: The contractor shall provide the Contracting Officer's Representative at least forty-eight hours advance notice prior to working on weekends or Federal holidays. The Government may reject any such request without impacting the completion time of the contract.

3. CONTRACT COMPLETION: The contractor shall complete work within the time frame indicated upon issuance of the Notice to Proceed. Limitations imposed by these work hours will not entitle the Contractor additional time to complete the project. Refer to FAR Clause 52.211-10 "Commencement, Prosecution and Completion of Work".

SECTION 01 14 13
PRE-BID SITE VISITS

1. GENERAL: Bidders are responsible for visiting the site to field verify existing conditions and determine actual dimensions and the nature of the work required. Failure to visit the site does not relinquish the bidder from determining the extent and scope of the work required and estimating the difficulty and cost to complete the project. Requests for equitable adjustments, in either time or money, arising from failing to field verify site conditions may be denied. Provisions regarding the site visit requirements are outlined in FAR Clause 52.236-3

"Site Investigation and Conditions Affecting the Work".

2. SITE VISIT: Arrange pre-bid site visits to verify existing conditions with the Officer in Charge, U.S. Coast Guard Station Little Creek at (757) 856-2315. The Officer in Charge may limit hours of access or levy certain restrictions regarding visits to the site.

SECTION 01 14 14
PRE-CONSTRUCTION SITE CONDITIONS

1. SITE CONDITION VERIFICATION: The Contractor shall verify the conditions of the existing site, equipment and facilities potentially affected by the work under this contract and photograph and/or videotape the conditions in order to document their pre-construction condition. Copies of the photos and videos shall be submitted to the Contracting Officer prior to starting work.

SECTION 01 14 16
COORDINATION

1. INTERFERENCE WITH COAST GUARD OPERATIONS: Accomplish work in a manner that causes minimal impact on normal operations. The Contractor shall notify the Contracting Officer's Representative at least five working days in advance of any planned outages of water, electrical, telephone, or sanitary facilities. Notify the Contracting Officer's Representative at least one week prior to beginning construction.

2. MILITARY STATION REGULATIONS:

2.1 The Contractor, his employees, and subcontractors shall become familiar with and obey all station regulations. All personnel employed on the project shall keep within the limits of the work and avenues of ingress and egress, and shall not enter any other areas outside of the site of the work unless required to do so in the performance of their duties. The Contractor's equipment shall be conspicuously marked for identification.

2.2 There shall be NO SMOKING in any Coast Guard building.

2.3 Storage Areas: The Contracting Officer's Representative will determine exact location and boundaries of staging areas. Under no circumstances shall materials be stored in areas that will interfere with aircraft operations.

2.4 Storm Protection: If a gale force wind warning or higher is issued, take precautions to minimize any danger to persons and protect the work and nearby Government property. Precautions shall include, but not be limited to, closings, removing loose materials, tools and equipment, from exposed locations. Remove and secure scaffolding and temporary work. Close openings in the work area if storms of lessor intensity are imminent.

SECTION 01 14 19
FIELD ADJUSTMENTS

1. The Contracting Officer's Representative may authorize field adjustments. Field adjustments are those alterations that do not affect time, price, or intent of the contract documents. All field adjustments shall be documented in the Daily Reports and on the As-Built Drawings.

SECTION 01 18 14
BUILDING PERMITS

1. NO BUILDING PERMITS from state or local governments are required for work performed on federal property. Courtesy permits may be obtained at the Contractor's option. No payment will be made to the Contractor for any permit cost. Design changes to obtain courtesy permits, even at no cost, will not be allowed without written approval of the Contracting Officer.

SECTION 01 18 17
ENVIRONMENTAL PERMITS

1. Unless directed by other sections of this specification, the Contractor will not be responsible for obtaining environmental permits.

SECTION 01 26 13
REQUESTS FOR INFORMATION

1. SUMMARY:

A. Section Includes: Administrative requirements for requests for information.

2. DEFINITIONS:

A. Request for Information: A document submitted by the Contractor requesting clarification of a portion of the contract documents, hereinafter referred to as RFI (Request for Information).

B. Proper RFIs: A properly prepared request for information shall include a detailed written statement that indicates the specific Drawings or Specification in need of clarification and the nature of the clarification requested.

1. RFIs shall be sequentially numbered.
2. Drawings shall be identified by drawing number and location on the drawing sheet.
3. Specifications shall be identified by Section number, page and paragraph.

C. Improper RFIs: RFIs that are not properly prepared.

1. Improperly prepared RFIs will not be processed by the Contracting Officer, but will be returned unprocessed.

D. Frivolous RFIs: RFIs that request information that is clearly shown on the Contract Documents.

1. Frivolous RFIs may be returned unprocessed.

3. CONTRACTOR'S REQUESTS FOR INFORMATION:

A. When the Contractor is unable to determine from the Contract Documents, the material, process or system to be installed, the Contracting Officer shall be requested to make a clarification of the indeterminate item.

1. Wherever possible after contract award, such clarification shall be requested at the next site visit by the Contracting Officer's Representative (COR), with the response entered on the daily reports. When clarification at the COR's site visit is not possible either because of the urgency of the need, or the complexity of the item, Contractor shall prepare and submit an RFI to the Contracting Officer.

B. Contractor shall endeavor to minimize the number of RFIs. In the event that the process becomes unwieldy, in the opinion of the Contracting Officer because of the number and frequency of the RFIs submitted, the Contracting Officer may require the Contractor to abandon the process and submit future requests as either submittals, substitutions or requests for change.

C. RFIs shall be submitted on the form provided by the Contracting Officer. Forms completely filled in, and if prepared by hand, shall be fully legible after photocopying or fax transmission. Each page of the attachments to RFIs shall bear the RFI number in the upper right corner.

D. RFIs shall be originated by the Prime Contractor.

1. RFIs from subcontractors or material suppliers shall be submitted through, reviewed by, and signed by the Prime Contractor prior to submitting to the Contracting Officer.

2. The Contracting Officer will neither act on nor respond to RFIs received directly from subcontractors or suppliers.

E. Contractor shall carefully study the Contract Documents to assure that the requested information is not available therein. RFIs which request information available in the Contract Documents will be deemed either Improper or Frivolous as defined above.

F. In cases where RFIs are issued to request clarification of coordination issues, for example, pipe and duct routing, clearances, specific locations of work shown diagrammatically, and similar items when feasible, Contractor shall fully lay out a suggested solution using drawings or sketches drawn to scale, and submit with the RFI.

G. RFIs shall not be used for the following purposes:

1. To request approval of submittals.
2. To request approval of substitutions.
3. To request changes which entail additional cost or credit.
4. To request different methods of performing work than those drawn and specified.

H. In the event the Contractor believes that a clarification by the Contracting Officer results in additional cost or time, the Contractor shall not proceed with the work indicated by the

RFI until a modification is prepared and approved. RFIs do not automatically justify a cost increase in the work or a change in the project schedule.

1. Answered RFIs shall not be construed as approval to perform extra work.

I. Contractor shall prepare and maintain a log of RFIs, and at any time requested by the Contracting Officer, Contractor shall furnish copies of the log showing outstanding RFIs. Contractor shall note unanswered RFIs in the log.

J. Contractor shall allow up to 14 days review and response time for RFIs, however, the Contracting Officer will endeavor to respond in a timely fashion to RFIs.

K. The Government reserves the right to issue a change order to expedite the work per FAR Clause 52.243-4, Changes.

4. CONTRACTING OFFICER'S RESPONSE TO RFIs:

A. Contracting Officer will respond to RFIs on one of the following forms:

1. Proper RFIs:
   a. Change Order
   b. Request for Proposal
2. Improper or Frivolous RFIs:
   a. Unprocessed RFIs will be returned with a stamp or notation: Not Reviewed.
3. Answers to properly prepared RFIs may be made directly upon the RFI form with supplementary instructions as necessary.

SECTION 01 31 19
PROJECT MEETINGS

1. LOCATION: Project meetings will be conducted either on-site or with a conference call. The following meetings may be held:

1.1 Pre-Construction Conference: After award of a contract, the Coast Guard will arrange a conference with the contractor, and necessary Coast Guard personnel. The purpose of this conference is to orient the Contractor to Government procedures for wage rates, contractual and administrative matters, and to discuss specific issues regarding actual construction.

1.2 Progress and Technical Review Meetings: These meetings generally take place at the project site. Either party may request a meeting to review the progress of the project and/or review or clarify the technical requirements of the specifications.

SECTION 01 32 16
CONSTRUCTION SCHEDULE, SCHEDULE OF VALUES, AND PROGRESS SCHEDULE

1. In accordance with the Notice to Proceed letter, the Contractor shall submit the following:

a. Construction Schedule-This schedule shall be prepared using a horizontal bar graph with time scale. It shall be in an industry accepted Project Management format and shall accurately display:

1. All major categories of work to be performed within the required contract completion date broken out in sufficient detail to track progress throughout the life of the contract. Major work categories should include but are not limited to mobilization, carpentry, plumbing, mechanical, electrical, roofing, concrete, site work, and demobilization. In addition to construction activities, procurement times for critical items, submittal turnaround time, mobilization, final inspection, punchlist work, and demobilization shall be shown on the schedule.
2. The duration of each work category.
3. Any concurrent work categories.

b. Schedule of Values-This schedule shall be prepared as a **detailed** cost breakdown of the contract price and be submitted with the Construction Schedule. This schedule shall include but not be limited to costs of materials, equipment, and labor for all major work categories shown on the Construction Schedule. The Contractor shall adhere to the following guidelines when developing the Schedule of Values.

1. Format - The line items in the Schedule of Values **shall** be the same as that of the Construction Schedule.
2. Bonds - Bonding costs will only be paid in a lump sum if they are broken out separately and included with the schedule of values. The Contractor shall provide evidence that he has furnished full payment to the surety.
3. Materials - To request progress payments for materials delivered to the construction or fabrication site, the particular category of work associated with the materials must be broken down into separate material and labor costs.

2. UPDATES: **Each month and /or with each progress payment request,** the Contractor **shall** submit the following:

a. **Progress Schedule**-This schedule shall be an update of the Construction Schedule. It shall show the current schedule of all work.

1. Modifications - If modifications are made to the contract, the work added shall be tracked separately from the original Construction Schedule and shall maintain its individuality on the Progress Schedule throughout the life of the contract. Progress Payment requests shall not lump modification costs into the original contract price.

SECTION 01 32 26
CONSTRUCTION DAILY REPORTS

1. GENERAL: **The Contractor shall complete a Daily Report for each and every day after mobilization.** The importance of an accurate, fully detailed Daily Report, promptly delivered to the designated On-Site Representative cannot be overemphasized. The report shall provide an accurate cumulative summary of the history and performance of the work. The Daily Report shall document weather; work hours; work in-place; inspections and tests conducted, and

their results; dimensional checks; equipment and material checks; data on workers by classification; the mobilization and demobilization of construction equipment; materials delivered to the site; and any other pertinent noteworthy event; e.g., personnel injury, site visit by Coast Guard personnel, etc.

2. RESPONSIBILITY: The Daily Reports play an important role in settling disputes and claims for both parties. For this reason the On-Site Representative and the Contractor's Superintendent, together, should review the report to ensure its completeness and accuracy. Each day's report shall be submitted to the On-Site Representative no later than 10:00 a.m. the following morning. The maximum allowable retainage will be enforced for late, sporadic or non-submission of Daily Reports. In the absence of an On-Site Representative the Contractor shall mail the Daily Reports directly to the Contracting Officer every Friday. Should the Daily Report indicate an accident, environmental issue, OSHA violation or any crisis the On-Site Representative deems important, the Report should be faxed immediately to the Contracting Officer at (216) 902-6278.

3. DESIGNATED ON-SITE REPRESENTATIVE RESPONSIBILITY: After a Notice to Proceed for site work has been issued the On-Site Representative shall complete a Daily Report for each day until the Contractor mobilizes. After the Contractor is at the site, the On-Site Representative shall ensure that the Contractor completes the Daily Report in accordance with Paragraphs 1 and 2 above. Any items of dispute or other notes the On-Site Representative feels appropriate shall be added to the Daily Report. The On-Site Representative is also responsible for informing the COR when the contractor fails to submit daily reports.

SECTION 01 33 00
SUBMITTAL PROCEDURES

1. GENERAL: The Contractor shall submit to the Contracting Officer (4) copies of submittals required by this specification and/or itemized on the **"List of Submittals"** found at the end of this division.

2. REQUEST: A **"CONTRACT ITEM ACCEPTANCE REQUEST"** shall accompany all submittals. All items shall be individually listed and clearly identified, referencing the applicable Section and Paragraph. A copy of this form is located at the end of this division and may be reproduced as needed.

2.1 Up to eight (8) items may be listed on an individual acceptance request. Number each Contract Item Acceptance Request consecutively *(Submittals # 1, 2, etc.)* and re-submittals with letters *(Submittal #1A is the first re-submittal of Submittal #1).*

2.2 Submittals shall be forwarded to the Contracting Officer. The contractor **shall allow 14 calendar days**, excluding mailing time, for the review process in the Construction Schedule and all project planning. In instances where submittal review must be expedited, the Contractor may annotate the Contract Item Acceptance Request as "Urgent" and provide a FAX number for prompt return. The Coast Guard will make every effort to accelerate the review of each urgent

submittal; however, the Contractor should not anticipate a reduced time schedule and shall plan project progress accordingly.

3. ACCEPTANCE: Submittals will be stamped "Accepted," "Accepted with Comments," or "Resubmit". Acceptance, Acceptance with comments or Resubmit for each item will be indicated on the Contract Item Acceptance Request form and one copy returned to the Contractor.

3.1 **Prompt re-submittal of items is required.** The Contractor shall furnish a new Contract Item Acceptance Request numbered in accordance with the requirements of paragraph 2.1.

4. DEFECTIVE WORK: Acceptance of Submittals **does not** restrict the Government's right to reject departures from contract requirements, use of damaged or improperly installed items/materials, or latent defects, nor does it prejudice the Government's rights of rejecting any work found defective at Final Inspection and Acceptance.

4.1 Work started or completed prior to submittal acceptance is **solely** at Contractor's risk and may jeopardize contract performance.

SECTION 01 35 29
SAFETY PROGRAM

1. GENERAL: The Contractor is wholly responsible for work site safety. The Contractor shall implement a safety program that protects the lives and health of personnel in the construction area, prevents damage to property, and avoids work interruptions. The Contractor shall provide appropriate safety barricades, signs, signal lights, etc. (see Section 01 56 00, "Lights, Signs & Barricades") as well as complying with the requirements of all applicable Federal, State and Local safety laws, rules and regulations.

2. COMPLIANCE: The Contractor is specifically required to comply with the requirements of the U. S. Army Corps of Engineers "Safety and Health Requirements Manual" (EM 385-1-1, *latest version available*) and the "Accident Prevention" clause (FAR 52.236-13). Once accepted, this safety plan shall become part of the contract requirements. ***Note: This review/acceptance does not in any way relinquish the Contractor from responsibility for work site safety nor the obligation to comply with the OSHA regulations found in 29 CFR 1910 & 1926 or any other State or Local safety law, rule or regulation applicable to the contract work.*** *The Coast Guard will cooperate fully with the Department of Labor (Occupational Safety and Health Administration) in their enforcement of OSHA regulations.*

3. SAFETY PLAN: The Contractor **shall submit a written safety plan.** At a minimum, this plan shall describe the Contractor's general safety program and identify specific safety provisions for hazards incidental to the contract work; e.g., elevated working surfaces, working over water, working from floating work platforms, overhead crane operations, etc.

SECTION 01 51 00
TEMPORARY UTILITIES

1. GENERAL: All temporary utility connections shall be compatible with existing materials and equipment to provide safe and efficient installation, operation and removal.

2. ELECTRICITY AND WATER: Electrical power and water are available on the site. The Contractor will be permitted to utilize these utilities in performing the work, provided that the existing systems are not overloaded. The Contractor is responsible for installing and removing all connections to existing systems and shall ensure work and materials are in accordance with local codes. The use of the electricity shall be limited to tools that can be operated on 60 Hertz, single phase, 20 ampere, 120 volt circuits.

3. TELEPHONE: Telephone services will not be available for use by the Contractor.

4. WATER HOOKUP: All connections to the water system shall be equipped with back flow protection. Temporary potable water pipes and hoses shall be sterilized before being placed in operation and every time the system is opened to the atmosphere for repair or relocation.

5. SANITARY FACILITIES: It shall be the Contractor's responsibility to furnish and maintain approved portable toilet facilities for all Contractor personnel. The On-Site Representative will designate the physical location for the facility and the Contractor shall maintain the toilet facility to the satisfaction of the Government. Contractor personnel are forbidden to use toilet facilities within existing buildings.

SECTION 01 51 13
EQUIPMENT/UTILITY LOCKOUT AND TAGOUT REQUIREMENTS

1. GENERAL: The Contractor shall comply with OSHA 29 CFR 1910.147, “The Control of Hazardous Energy” (Lockout/Tagout). The Contractor shall provide a Lockout/Tagout Plan to the Contracting Officer prior to starting any work affected by the energy in the equipment/utility system.

2. APPLICATION: The Contractor shall be responsible for locking out and tagging out of service, all equipment/utility systems involved in the work under this contract. After the Contracting Officer’s Representative has approved an outage, Government personnel and the Contractor shall independently secure the equipment/utility system and tag the respective system out of service. The Contractor shall provide their own locks and chains that are required to secure the equipment/utility systems; e.g., steam, water, air, and/or electricity.

SECTION 01 54 30
CONFINED ENTRY

1. COMPLIANCE: The Contractor shall comply with OSHA 29 CFR 1910.146, Permit-Required Confined Space. The Contractor shall provide a Confined Space Entry Plan to the Contracting Officer prior to entering, or starting any work, in a confined space. The Contractor shall provide all equipment and materials as required to comply with OSHA and complete the work under this contract.

SECTION 01 55 00
ACCESS ROADS AND PARKING

1. ACCESS: The site is remote and the contractor shall comply with all rules imposed by the owner of the site.

2. PARKING: Vehicular operations and parking shall comply with all applicable government orders and regulations. All driveways and entrances serving the Government shall be kept clear and available to emergency vehicles at all times.

3. VEHICLE AND VEHICLE OPERATION: All vehicles, owned by the Contractor or employees of the Contractor, and operators of these vehicles, shall meet all state regulations for safety, noise, loading and minimum liability insurance. All vehicle operators demonstrating reckless or careless operation in the opinion of the Government shall not be allowed to operate vehicles on government property for the duration of the contract.

4. VISITORS: No visiting vehicles will be permitted on government property unless the operator is employed by a subcontractor or supplier.

SECTION 01 55 29
STAGING AREAS AND ACCESS

1. LOCATION: The Contractor shall store materials and operate equipment within the confines of the staging area identified by the Government. Storage of materials outside of the staging area will not be permitted.

2. COORDINATION: Two weeks prior to construction, the Contractor shall contact the Officer in Charge, U.S. Coast Guard Station Little Creek, at (757) 856-2315, to verify the condition of the staging area.

3. ADJACENT AREAS: The Contractor shall ensure that all land and vegetation adjacent to the staging area and access drive remain undisturbed and undamaged; all damages shall be repaired at no cost to the Government.

SECTION 01 56 00
LIGHTS, SIGNS & BARRICADES

1. GENERAL: The contractor shall provide and maintain all warning lights, sign, and barriers to insure the safety of pedestrians or vehicles traveling near or through any hazardous area caused by the execution of the Contract work.

2. LIGHTING: All lighting requirements shall meet table 7-1 in the US Army Corps of Engineers Safety and Health Requirements Manual (EM 385-1-1).

3. BARRICADES: Hard barricades or flexible barriers shall completely encompass all exterior work areas. Flexible barriers shall consist of 1/2 inch steel bars or 2" X 2" wood stakes driven 12 inches minimum into hard packed soil. Space stakes on a maximum 10 feet interval and with two rows of yellow or orange 1/4 inch diameter rope (wire and plastic tape are not acceptable) at 24 inches and 36 inches each above ground.

4. HAZARD FENCING: Special fencing 4 foot high shall be installed to prevent small children or pets from entering the work area when within 300 feet of family housing or for special hazards as shown on the drawings.

SECTION 01 57 23
POLLUTION CONTROL

1. VOLATILE ORGANIC COMPOUND (VOC) REGULATIONS: Contractors are required to comply with local, state and federal VOC compliance laws and regulations in the foregoing order of precedence. In order to comply with the provisions of the Clean Air Act, each state must have a State Implementation Plan. Some contractors may be required to abide by the provisions of a Title V Permit. Some contractors may be required by state or local law to operate under the terms of a Compliance Plan to reduce VOC Emissions.

1.1 In accordance with the Notice to Proceed Letter, the contractor will submit copies of any local, state or federal implementation plans, permits or compliance plans required/applicable to the use/application of VOCs at contractor's facility or offsite work places.

1.2 If no local, state or federal implementation plans, permits or compliance plans are required/applicable to the use/application of VOCs, then the contractor shall submit to the designated Contracting Officer a letter, notarized under oath, that such documents are not required.

1.3 If the use of paint is required the contractor shall submit to the Contracting Officer and in accordance with the Notice to Proceed Letter, certificates, specifications or manufacturing data verifying the VOC rating.

2. SPILL RESPONSE PLAN: The Contractor shall submit a Spill Response Plan covering all regulated materials brought to the site for execution of work and all wastes generated as a

result of the work to the Contracting Officer. The plan shall include, at a minimum, the following: types and quantity of all substances covered under this plan; the reportable quantity (RQ) for each substance; the on site storage location of each substance; the Contractor's spill response equipment, if applicable; procedures to be followed for responding to a spill, including initial responses to be taken; procedures to be followed in reporting a spill, including the names and telephone numbers for all federal, state, and local agencies/authorities to be notified; and the name, address, and telephone number (work, home, cell and pager) of all Contractor response and media relations personnel.

2.1 In the event of a spill or release, the Contractor shall be responsible for immediate implementation of the spill response plan and restoration of the site to pre-spill condition at no cost to the Government. The Contractor shall also immediately notify the Contracting Officer to coordinate further notifications.

SECTION 01 65 00
RECOVERED MATERIALS NOTICE

1. GENERAL: It is the intent of CEU Cleveland to comply with the requirements of Section 6002 of the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act (RCRA or the Act) as amended, 42 U.S.C. 6962 and Executive Order 12873 as they apply to the procurement of the materials designated in paragraph 2.

2. DESIGNATED RECOVERED MATERIALS: It is the purpose of this section to designate items that are or can be made with recovered materials. These designated items can be found at http://www.epa.gov/epaoswer/non-hw/procure/products.htm .

3. CONTRACTOR RESPONSBILITY: The contractor should provide recycled materials to the extent practical, provided the materials meet all other requirements of the applicable specification section.

SECTION 01 66 13
HAZARDOUS WASTE

1. GENERAL: The Contractor shall comply with all federal, state, and local environmental regulations dealing with the generation, management, storage, and disposal of solid, toxic, and hazardous wastes. The Contractor shall ensure that all wastes are properly containerized, labeled and placarded, managed, tested, stored, documented/manifested, transported and disposed of in accordance with all applicable regulations.

2. USED ELECTRIC LAMPS: 40 CFR 273 requires that electric lamps, including incandescent, fluorescent, neon and high intensity discharge (mercury vapor, high/low pressure sodium, metal halide) lamps that are no longer of use be recycled or treated as hazardous waste. The Contractor shall not dispose of any used electric lamps as solid waste. The Contractor shall recycle all waste electric lamps generated as a result of this work only at a licensed recycling facility.

3. METALS: Unless noted otherwise, scrap metal shall not be landfilled or treated as hazardous waste. Recycle all scrap metal by smelting or any other acceptable recycling process. Scrap metal includes ductwork, light fixture housings, pipe, mechanical and electrical equipment, doors and frames, etc.

4. SUBMITTALS: The Contractor shall provide the Contracting Officer with signed and fully executed originals of all hazardous waste profiles, test results, hazardous waste manifests and/or other shipping papers, electric lamp disposal documents and all other required documentation. Maximum payment retention shall be withheld until this documentation is received.

SECTION 01 66 16
SAFETY DATA SHEETS AND MATERIAL HANDLING PROCEDURES

1. DATA SHEETS: Submit a Safety Data Sheet (SDS) for all materials containing hazardous substances required for contract execution. Information provided in SDS's shall meet the requirements of 29 CFR 1910.1200. SDS's require Contracting Officer review and acceptance prior to bringing these materials on site.

2. MATERIAL STORAGE: Limit the quantity of these materials stored on site to the amount needed for execution of work. Storage of excess materials will not be permitted. Assure that the storage of these materials comply with all applicable federal, state, and local laws and regulations and provide additional storage facilities (paint lockers, etc.) as required for the storage of such materials. Coordinate the physical location of storage areas with the On-site Representative prior to bringing these materials on site.

3. PROTECTIVE MEASURES: The contractor shall take all protective measures outlined on the SDS's and as required by federal, state, and local regulations to protect all personnel in the vicinity of the work area from exposure to these materials. The Contractor shall include any required protective measures in the Safety Plan (See Section 01 35 29, "Safety Program"). The Contracting Officer's Representative shall review protective measures prior to allowing use of these materials.

4. DISPOSAL OF EXCESS MATERIAL: The Contractor shall dispose of all excess hazardous materials as required by the SDS and all applicable federal, state, and local laws and regulations.

SECTION 01 71 33
PROTECTION FROM WEATHER AND CONSTRUCTION OPERATIONS

1. TEMPORARY ENCLOSURES: Protect existing facilities/equipment and new construction, whether in progress or newly completed, from the adverse effects of the weather and construction operations. Provide temporary enclosures, coverings and barriers as required to afford protection against exposure, weather and wind damage and from construction operations

which could degrade, stain, age, or reduce the finished quality of new work or damage existing facilities and equipment.

2. REAPPLICATION: All temporary closures or enclosures shall be made ready for immediate re-application in the event of sudden storms or man-made conditions requiring protection of existing facilities or completed construction.

3. CLIMATE CONTROL: Where temporary heat is required during construction to protect work completed or to heat facilities in operation by the Coast Guard, all openings shall be made weather tight to allow the maintenance of 68 degrees F heat minimum with the existing or temporary heating equipment or 78 degrees F. maximum with existing or temporary cooling. NOTE TO OFFEROR: CLIMATE CONTROL SPECIFICALLY REQUIRED BY THIS CONTRACT WILL BE SPECIFIED IN THE STATEMENT OF WORK AND/OR ASSOCIATED DRAWINGS.

4. PIPING: Prevent water-filled pipes or tanks from freezing for both interior and exterior systems installed or in storage.

SECTION 01 74 00
GENERAL CLEANUP & SITE RESTORATION OF WORK AREAS

1. GENERAL: The Contractor shall remove and properly dispose of all trash and debris incidental to the contract work from the limits of government property, as well as all adjacent affected areas. The Contracting Officer shall determine the extent and interval of these cleanups.

2. WORK AREA CLEANUP: At the end of each day the entire work area and all adjacent affected areas shall be thoroughly cleaned by removing all trash, debris, dust, etc. caused by the contract work. Any floor, wall or ceiling surfaces that may have been stained or soiled by the contract work shall be restored to pre-construction condition.

3. SITE RESTORATION: If at any time while performing the contract the Contractor causes damage or destruction to any portion of any Government facility or grounds; e.g., bulkheads, pavement, lawns, shrubbery, etc., it shall be the Contractor's responsibility to replace and/or restore the damage as approved by the Contracting Officer's Representative at no additional cost to the Government.

4. POST CONSTRUCTION CLEANUP: Upon completion of the job, the Contractor shall clean up the job site, returning it to a state of cleanliness equal to or exceeding that in which it was found. The Contractor shall properly dispose of any trash, extra materials, dirt, debris, or other litter that remains. If the job site appearance is not to the satisfaction of the Contracting Officer's Representative, final acceptance will not be approved.

SECTION 01 78 00
AS BUILT DRAWINGS

1. GENERAL: Maintain one full size set of contract drawings to record variations from the original design. **All deviations shall be neatly and clearly marked in RED** on these drawings to show work and/or materials actually provided. As Built drawings shall be **updated** as work progresses and kept at the work site for the duration of the contract. These drawings shall be available for Contracting Officer Representative review upon request.

2. DISCOVERED UTILITIES: Indicate the exact location of any **underground utility lines discovered in the course of the work** on the As-Built drawings.

3. PERMITTED VARIATIONS: As Built drawings shall reflect the actual construction and materials provided when alternative materials or work methods are allowed in the specifications and/or drawings or if the scope is altered by award of bid items, subsequent changes or modifications.

4. STANDARDS: Variations shown on As Built drawings shall be neat, clear and conform with standard drafting practices. Mark-ups shall include supplementary notes, legends, and details necessary to convey the exact representation of construction actually provided**. To comply with Computer Assisted Design (CAD) practices, only full size AS BUILT drawings are acceptable.**

5. SUBMITTAL: Submit As Built drawings for Contracting Officer acceptance upon completion of the contract. **Final payment will not be until all required As-Built drawings are accepted.** Maximum retention shall be withheld for late or incomplete As Built drawings.

SECTION 01 78 23
OPERATING INSTRUCTIONS AND TRAINING

1. MANUALS: Upon completion of the work, but before the work is accepted by the Government, the Contractor must forward two complete bound sets of instructions, tabbed and identified for reference, for all equipment and/or systems provided under this contract. The instructions shall include component parts, manufacturer's certificates, warranty slips, parts lists, descriptive brochures, and manufacturer's maintenance and operating instructions.

2. TRAINING: The Contractor shall provide two hours of training, which shall explain to the Government’s personnel all procedures necessary to operate and maintain all equipment and systems on a continuing basis. A verification of training shall be provided.

LIST OF SUBMITTALS

SECT	PARA	ITEM	KEY	GENERAL USE COLUMN
01 14 14	1	Pre-Con Site Conditions		
01 32 16	1.a	Construction Schedule		
	1.b	Schedule of Values		
	2.a	Progress Schedule		
01 35 29	3	Safety Plan		
01 51 13	1	Lockout/Tagout Plan		
01 54 30	1	Confined Space Entry Plan		
01 57 23	1.1	State Implementation Documentation		
	1.2	Notarized Letter		
	1.3	VOC rating documentation		
	2	Spill Response Plan		
01 66 13	4	Hazardous Waste Documents		
01 66 16	1	SDS		
	3	Protective Measures		
01 78 00	5	As-Built Drawings		
01 78 23	1	Operating Instructions		
	2	Verification of Training		
02 41 19	1.3.A	Schedule of Selective Demolition Activities		
	1.3.B	Pre-demolition Photographs		
	1.3.C	Landfill Records		
23 05 93	1.3.A	Qualification Data		
	1.3.B	Certified TAB Reports		
23 73 13	1.2.A	Product Data		
	1.2.E	Manufacturer’s Operation and Maintenance Data		
	1.2.B	LEED Submittal		
	1.2.C	Shop Drawings		
	1.2.F	Manufacturer’s Warranty		
	1.2.D	Software and Firmware Operational Documentation		
23 82 19	1.2.A	Product Data		
	1.2.D	Manufacturer’s Operation and Maintenance Data		
	1.2.B	LEED Submittal		
	1.2.C	Shop Drawings		
	1.2.E	Manufacturer’s Warranty		
	1.2.F	Software and Firmware Operational Documentation		
26 00 00	1.3.1	Operation and Maintenance Manuals and Instructions		
	1.3.2	Product Data		
	1.3.3	Wiring Diagrams		

CONTRACT ITEM ACCEPTANCE REQUEST

Contract Number: HSCG83- **DO/TO: HSCG83-**

Contract Specialist: **Project Number:**

Contractor Name:

URGENT YES NO (if yes) CONTRACTOR FAX #: _____

Submittal #_____ **Job Location: _____**

NOTE: **Contractor must mark Deviation column if submittal deviates from contract requirements**

Item No.	Spec Section and Paragraph	Description of Material Include Type, Model #, Manufacturer, Etc.	Deviation	Status

STATUS ABBREVIATION GUIDE:
AC - Accepted
AC w/ CMT - Accepted with Comment
R-Resubmit
Comments:

Typed Name & Title	Signature	Date

NOTE: Review and acceptance of submittals by the Government is intended to verify general conformance with the design intent as shown on the contract drawings and in the specifications. Acceptance by the Contracting Officer's Representative does not relieve the Contractor of responsibility for any errors and/or omissions in the submittals, nor from the responsibility for complying with the requirements of the contract, except with respect to variations described and approved in accordance with FAR 52.243-4 CHANGES.

SECTION 02 41 19
SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Demolition and removal of selected site elements.
   2. Salvage of existing items to be reused or recycled.

B. See Division 01 Section "General Cleanup & Site Restoration of Work Areas" for disposal of demolished materials.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 SUBMITTALS

A. Schedule of Selective Demolition Activities: Indicate detailed sequence of selective demolition and removal work, with starting and ending dates for each activity, interruption of utility services, use of elevator and stairs, and locations of temporary partitions and means of egress. Demolition sequence can be indicated via Division 1 Construction Schedule.

B. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Comply with Division 01 Section "Preconstruction Site Conditions." Submit before Work begins.

C. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.4 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

B. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

C. LEED Requirements for Building Reuse:

1. Credit MR 1.1: Maintain existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and nonstructural roofing material) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
2. Credit MR 1.3: Maintain existing interior nonstructural elements (interior walls, doors, floor coverings, and ceiling systems) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
3. Credit MR 1.2: Maintain existing nonshell, nonstructural components (walls, flooring, and ceilings) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.

D. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

E. Standards: Comply with ANSI A10.6 and NFPA 241.

1.5 PROJECT CONDITIONS

A. Coast Guard personnel will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Coast Guard personnel's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained as far as practical.

1. Before selective demolition, Coast Guard personnel will ensure the work area is clear of items.

C. Notify Contracting Officer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Contracting Officer's Representative (COR).

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain electric utilities to the rest of the building in service during selective demolition operations.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly notify the Contracting Officer.

E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.

1. Comply with requirements specified in Division 01 Section "Preconstruction Site Conditions."

F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.

B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Division 01 Section "Staging Areas and Access."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

3.4 SELECTIVE DEMOLITION

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
5. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "General Cleanup & Site Restoration of Work Areas"

B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Contracting Officer’s approval.

C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Protect items from damage during transport and storage.

D. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by COR, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Coast Guard’s property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Comply with requirements specified in Division 01 Section "General Cleanup & Site Restoration of Work Areas."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Balancing air and hydronic systems.

1.2 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

1.3 SUBMITTALS

A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that TAB contractor and this project’s TAB team members meet the qualifications as specified in "Quality Assurance" Article.

B. Certified TAB reports: Submit four copies of reports prepared, as specified in this section, on approved forms certified by TAB firm.

1.4 QUALITY ASSURANCE

A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC or NEBB.

B. Certify TAB field data reports and perform the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

C. TAB Report Forms: Use standard TAB contractor's forms from either AABC or NEBB.

D. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

E. Examine equipment performance data including fan curves.

F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

G. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

H. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

I. Examine operating safety interlocks and controls on HVAC equipment.

J. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Complete system-readiness checks and prepare reports. Verify the following:

1. Permanent electrical-power wiring is complete.
2. Automatic temperature-control systems are operational.
3. Equipment and duct access doors are securely closed.
4. Balance dampers are open.
5. Isolating and balancing valves are open and control valves are operational.
6. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish.

B. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

C. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

C. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

D. Verify that motor starters are equipped with properly sized thermal protection.

E. Check dampers for proper position to achieve desired airflow path.

F. Check for airflow blockages.

G. Check condensate drains for proper connections and functioning.

H. Check for proper sealing of air-handling-unit components.

3.5 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports with pertinent design data, and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against the approved pump flow rate. Correct variations that exceed plus or minus 5 percent.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:

1. Open all manual valves for maximum flow.
2. Check liquid level in expansion tank.
3. Check makeup water-station pressure gage for adequate pressure for highest vent.

4. Check flow-control valves for specified sequence of operation, and set at indicated flow.
5. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
6. Set system controls so automatic valves are wide open to heat exchangers.
7. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

3.6 PROCEDURES FOR MOTORS

A. Motors: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

3.7 PROCEDURES FOR CHILLERS

A. Balance water flow through each evaporator to within specified tolerances of indicated flow with all pumps operating. With only one chiller operating in a multiple chiller installation, do not exceed the flow for the maximum tube velocity recommended by the chiller manufacturer. Measure and record the following data with each chiller operating at design conditions:

1. Evaporator-water entering and leaving temperatures, pressure drop, and water flow.
2. For water-cooled chillers, condenser-water entering and leaving temperatures, pressure drop, and water flow.
3. Evaporator and condenser refrigerant temperatures and pressures, using instruments furnished by chiller manufacturer.
4. Power factor if factory-installed instrumentation is furnished for measuring kilowatts.
5. Kilowatt input if factory-installed instrumentation is furnished for measuring kilowatts.
6. Capacity: Calculate in tons of cooling.
7. For air-cooled chillers, verify condenser-fan rotation and record fan and motor data including number of fans and entering- and leaving-air temperatures.

3.8 PROCEDURES FOR CONDENSING UNITS

A. Verify proper rotation of fans.

B. Measure entering- and leaving-air temperatures.

C. Record compressor data: air pressure drop, refrigerant suction pressure and temperature.

3.9 PROCEDURES FOR BOILERS

A. Hydronic Boilers: Measure and record entering- and leaving-water temperatures and water flow..

3.10 PROCEDURES FOR HEAT-TRANSFER COILS

A. Measure, adjust, and record the following data for each water coil:

1. Entering- and leaving-water temperature.
2. Water flow rate.
3. Water pressure drop.
4. Dry-bulb temperature of entering and leaving air.
5. Wet-bulb temperature of entering and leaving air for cooling coils.
6. Airflow.
7. Air pressure drop.

B. Measure, adjust, and record the following data for each refrigerant coil:

1. Dry-bulb temperature of entering and leaving air.
2. Wet-bulb temperature of entering and leaving air.
3. Airflow.
4. Air pressure drop.
5. Refrigerant suction pressure and temperature

3.11 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.

1. Measure and record the operating speed, airflow, and static pressure of each fan.
2. Measure motor voltage and amperage. Compare the values to motor nameplate information.
3. Check the refrigerant charge.
4. Check the condition of filters.
5. Check the condition of coils.
6. Check the operation of the drain pan and condensate-drain trap.
7. Check bearings and other lubricated parts for proper lubrication.
8. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.

B. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:

1. New filters are installed.
2. Coils are clean and fins combed.
3. Drain pans are clean.
4. Fans are clean.
5. Bearings and other parts are properly lubricated.
6. Deficiencies noted in the preconstruction report are corrected.

C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.

1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
3. If calculations increase or decrease the air flow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
4. Balance each air outlet.

3.12 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 5 percent.
2. Air Outlets and Inlets: Plus or minus 5 percent.
3. Heating-Water Flow Rate: Plus or minus 3 percent.
4. Cooling-Water Flow Rate: Plus or minus 3 percent.

3.13 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Manufacturers' test data.
2. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name.
4. Project location.
5. Engineer’s name and address.
6. Contractor's name and address.
7. Report date.
8. Signature of TAB supervisor who certifies the report.
9. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
10. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

11. Nomenclature sheets for each item of equipment.
12. Data for terminal units, including manufacturer's name, type, size, and fittings.
13. Notes to explain why certain final data in the body of reports vary from indicated values.
14. Test conditions for fans and pump performance forms including the following:

    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Face and bypass damper settings at coils.
    e. Fan drive settings including settings and percentage of maximum pitch diameter.
    f. Inlet vane settings for variable-air-volume systems.
    g. Settings for supply-air, static-pressure controller.
    h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.
6. Balancing stations.
7. Position of balancing devices.

3.14 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
2. Check the following for each system:

a. Measure airflow of at least 10 percent of air outlets.
b. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
c. Verify that balancing devices are marked with final balance position.
d. Note deviations from the Contract Documents in the final report.

B. Final Inspection:
1. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of the COR.
2. COR shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
3. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
4. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

D. Prepare test and inspection reports.

END OF SECTION 230593

SECTION 23 73 13
MODULAR INDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Constant-air-volume, multizone air-handling units.

1.2 SUBMITTALS

A. Product data: Unit dimensions and weight; fan, coil, and motor rated capacities and electrical characteristics; cabinet material, metal thickness, finishes, insulation, and accessories; fan construction and accessories; filter performance characteristics; control devices.

B. LEED submittal: Product data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1-2010, Section 5 - "Systems and Equipment."

C. Shop drawings: Detail equipment assemblies indicating dimensions, weights, loads, required clearances, method of field assembly, components, location and size of field connections, and wiring diagrams for power, signal, and control wiring.

D. Software and firmware operational documentation.

E. Manufacturer’s operation and maintenance data to include repair parts list, detailed instructions on adjusting, servicing, disassembling, and repairing: motors coils, controls and filters.

F. Manufacturer’s warranty.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NFPA Compliance: Comply with NFPA 70. Comply with NFPA 90A for design, fabrication, and installation of air-handling units and components.

C. ARI Certification: Air-handling units and their components shall be factory tested according to ARI 430, "Central-Station Air-Handling Units," and shall be listed and labeled by ARI.

D. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2010, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup" and ASHRAE 90.1-2010 Section 6 - "Heating, Ventilating, and Air-Conditioning."

PART 2 - PRODUCTS

2.1 UNIT CASINGS

A. General Fabrication Requirements for Casings:

1. Casing Joints: Sheet metal screws or pop rivets.
2. Sealing: Seal all joints with water-resistant sealant.
3. Factory Finish for Steel and Galvanized-Steel Casings: Apply manufacturer's standard primer immediately after cleaning and pretreating.
4. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2010.

B. Casing Insulation and Adhesive:

1. Materials: Fiberglass lining meeting NFPA 90A requirements.
2. Location and Application: Factory applied with waterproof adhesive and mechanical fasteners to the internal surface of section panels downstream from, and including, the cooling-coil section.

    a. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in cabinet.
    b. Liner materials applied in this location shall have air-stream surface coated with a temperature-resistant coating or faced with a plain or coated fibrous mat or fabric depending on service-air velocity.

3. Location and Application: Encased between outside and inside casing.

C. Inspection and Access Panels and Access Doors:

1. Panel and Door Fabrication: Formed and reinforced, single- or double-wall and insulated panels of same materials and thicknesses as casing.
2. Inspection and Access Panels:

    a. Fasteners: Two or more camlock type for panel lift-out operation. Arrangement shall allow panels to be opened against air-pressure differential.
    b. Gasket: Neoprene, applied around entire perimeters of panel frames.
    c. Size: Large enough to allow inspection and maintenance of air-handling unit's internal components.

D. Condensate Drain Pans:

1. Fabricated with at least 0.125” per foot slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers,

and return bends) and from humidifiers and to direct water toward drain connection. A minimum of 2 inches deep.

2. Single-wall, galvanized-steel sheet.

3. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Trap height must be large enough for fan total static pressure.

4. Pan-Top Surface Coating: Corrosion-resistant compound.

5. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.

E. Air-Handling Unit Mounting Frame: Formed galvanized-steel channel or structural channel supports, designed for low deflection, welded with integral lifting lugs.

2.2 FAN, DRIVE, AND MOTOR SECTION

A. Fan and Drive Assemblies: Statically and dynamically balanced and designed for continuous operation at maximum-rated fan speed and motor horsepower.

1. Shafts: Designed for continuous operation at maximum-rated fan speed and motor horsepower, and with field-adjustable alignment.

B. Centrifugal Fan Housings: Fan and motor mounted to same steel frame.

C. Forward-Curved, Centrifugal Fan Wheels: Inlet flange, backplate, and shallow blades with inlet and tip curved forward in direction of airflow and mechanically fastened to flange and backplate; cast-steel hub swaged to backplate and fastened to shaft with set screws.

D. Fan Shaft Bearings: Self-aligning ball or roller bearings rated for 200,000 hours life with adapter mount and two-piece, cast-iron housing with lubrication lines extended to outside unit.

E. Internal Vibration Isolation: Fans shall be factory mounted with manufacturer's standard vibration isolation mounting devices having a minimum static deflection of one inch.

F. Motor: Internally mounted, resiliently isolated from unit casing, statically and dynamically balanced.

2.3 COIL SECTION

A. General Requirements for Coil Section:

1. Water cooling and heating coils furnished with 5/8” O.D. (Type 5) copper tubes, aluminum or copper fins, and four fin spacings.

2. Coil section will allow removal and replacement of coil for maintenance and to allow in-place access for service and maintenance of coil(s), to include complete draining of coil.
3. For multizone units, provide air deflectors and air baffles to balance airflow across coils.
4. Coils shall not act as structural component of unit.

2.4 AIR FILTRATION SECTION

A. General Requirements for Air Filtration Section:

1. Provide 2 inch flat filter section.
2. Use manufacturer recommended filter.
3. Provide filter holding frames arranged for flat orientation. Filters shall be removable from one side or lifted out from access plenum.

2.5 DAMPERS

A. Damper Operators: Comply with requirements in Section 2.6 of this section.

B. Face-and-Bypass Dampers: Opposed-blade, galvanized-steel dampers with steel operating rods rotating in sintered bronze or nylon bearings mounted in a single galvanized-steel frame and with operating rods connected with a common linkage. Provide blade gaskets and edge seals and mechanically fasten blades to operating rod.

2.6 CONTROL SYSTEM

A. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, and accessories to control mechanical systems.

B. Dedicated, programmable, direct digital controller with appropriate point capabilities shall be mounted on each air-handling unit. A portable screen and keypad shall be provided to facilitate local monitoring, troubleshooting, and changing of setpoints.

C. Actuator shall be connected to face and bypass damper to allow for automatic control based on input from time clock (TC-1).

D. Face and Bypass Damper: Automatically controlled via time clock (TC-1) to decrease airflow overnight.

E. Demonstration: Train USCG maintenance personnel to adjust, operate, and maintain HVAC instrumentation and controls. Refer to Division 01 Section "Operating Instructions and Training."

2.7 SOURCE QUALITY CONTROL

A. Fan Performance Rating: Factory test fan performance for airflow, pressure, power, air density, rotation speed, and efficiency. Rate performance according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install plywood subfloor to the wooden joists using adhesive and nails. Ensure the subfloor is level. Install cast-in-place concrete housekeeping pad subfloor with vapor barrier and anchorage devices. Install tiling using adhesive to match existing up to the edge of the housekeeping pad.

B. Concrete housekeeping pad: minimum two inch thickness, chamfered edge, ensure enough height for condensate drain trap.

C. Equipment Mounting: Install air-handling unit on concrete housekeeping pad and secondary drain pan. Secure to anchorage devices, securing unit, secondary drain pan, and concrete base to the structural floor.

D. Arrange installation of units to provide access space around air-handling units for service and maintenance.

E. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with new, clean filters.

F. Install filter-gage, static-pressure taps upstream and downstream of filters. Mount filter gages on outside of filter housing or filter plenum in accessible position. Provide filter gages on filter banks, installed with separate static-pressure taps upstream and downstream of filters.

G. Drawings indicate general arrangement of piping, fittings, and specialties.

H. Install piping adjacent to air-handling unit to allow service and maintenance.

I. Connect piping to air-handling units mounted on vibration isolators with flexible connectors.

J. Connect condensate drain pans using copper tubing. Extend to nearest equipment or floor drain. Construct deep trap at connection to drain pan and install cleanouts at changes in direction.

K. Hot- and Chilled-Water Piping: Install shutoff valve and union or flange at each coil supply connection. Install balancing valve and union or flange at each coil return connection.

L. Refrigerant Piping: Install shutoff valve and union or flange at each supply and return connection.

M. Connect duct to air-handling units with flexible connections.

END OF SECTION 237313

SECTION 23 82 19
FAN COIL UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes fan-coil units and accessories.

1.2 SUBMITTALS

A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.

B. LEED Submittals:

1. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
2. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1-2010, Section 5 - "Systems and Equipment."

C. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection and wiring diagrams for power, signal, and control wiring.

D. Manufacturer’s operation and maintenance data.

E. Manufacturer's warranty

F. Software and firmware operational documentation.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2010, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup" and ASHRAE/IESNA 90.1-2010, Section 6 - "Heating, Ventilating, and Air-Conditioning."

PART 2 - PRODUCTS

2.1 FAN-COIL UNITS

A. Description: Factory-packaged and -tested units rated according to ARI 440, ASHRAE 33, and UL 1995.

B. Coil Section Insulation: Complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.

1. Fire-Hazard Classification: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
2. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

C. Main and Auxiliary Drain Pans: Galvanized steel with plastic liner. Fabricate pans and drain connections to comply with ASHRAE 62.1-2010.

D. Chassis: Galvanized steel where exposed to moisture. Floor-mounting units shall have leveling screws.

E. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins. Include manual air vent and drain valve.

F. Fan and Motor Board: Removable.

1. Fan: Forward curved, double width, centrifugal; directly connected to motor. Thermoplastic or painted-steel wheels, and aluminum, painted-steel, or galvanized-steel fan scrolls.
2. Motor: Permanently lubricated, multispeed; resiliently mounted on motor board.
3. Wiring Termination: Connect motor to chassis wiring with plug connection.

G. Factory, Hydronic Piping Package: Copper tube with wrought-copper fittings and brazed joints. Label piping to indicate service, inlet, and outlet. Three-way, automatic control valve for dual-temperature coil.

H. Basic Unit Controls: Wall-mounted thermostat capable of stand-alone operation with sufficient memory to support its operating system, database, and programming requirements, and with sufficient I/O capacity for the application. Programmable for 7 days and fan settings, usable for 2- and 4-pipe fan coils. Heating/cooling switch. Three speed fan control. Wall-mounted temperature sensor.

1. Configuration: Local keypad and display; diagnostic LEDs for power, communication, and processor; wiring termination to terminal strip or card connected with ribbon cable; memory with bios; and battery backup.

2. Input data includes room temperature set points and occupied/unoccupied periods. Output data includes room temperature, supply air temperature, entering water temperature, operating mode, status.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install fan-coil units to comply with NFPA 90A.

B. Suspend fan-coil units from structure with elastomeric hangers using vibration isolators.

C. Verify locations of thermostats and other exposed control sensors with Drawings and room details before installation. Install devices in existing spaces.

D. Install new filters in each fan-coil unit.

E. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:

1. Install piping adjacent to machine to allow service and maintenance.

2. Connect condensate drain to indirect waste. Install condensate trap of adequate depth to seal against the pressure of fan. Install cleanouts in piping at changes of direction.

F. Connect supply and return ducts to fan-coil units with flexible duct connectors. Comply with safety requirements in UL 1995 for duct connections.

END OF SECTION 238219

SECTION 26 00 00
ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS:

1.1.1 Federal Specifications:

HH-I-553	Insulation Tape, Electrical, (Rubber, Natural, and Synthetic)
HH-I-595	Insulation Tape, Electrical, (Pressure Sensitive Adhesive, Plastic)
WW-C-566	Conduit, Metal, Flexible

1.1.2 American National Standards Institute (ANSI):

C2	National Electrical Safety Code
467	Grounding and Bonding Equipment
C80.1	Rigid Steel Conduit, Zinc-Coated
C80.3	Electrical Metallic Tubing, Zinc-Coated

1.1.3 National Fire Protection Association (NFPA):

70	National Electrical Code (Latest Edition)
72	National Fire Alarm Code (Latest Edition)
101	Life Safety Code

1.1.4 National Electrical Manufacturer's Association (NEMA):

AB 1	Molded Case Circuit Breakers and Molded Case Switches
FB 1	Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
KS 1	Enclosed Switches
OS 1	Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports

PB 1	Panelboards
RN 1	Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
TC 2	Electrical Plastic Tubing and Conduit
TC 3	PVC Fittings for Use with Rigid PVC Conduit and Tubing
WC 3	Rubber-Insulated Wire and Cable
WC 5	Thermoplastic-Insulated Wire and Cable
WD 1	General-Purpose Wiring Devices

1.1.5 AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM):

F512	Standard Specification for Smooth Wall Polyvinyl Chloride PVC) Conduit and Fittings for Underground Installation

1.2 STANDARDS:

1.2.1 Work under this contract shall be performed as stated in these specifications and shall in all respects be done by mechanics skilled in the trade. Workmanship shall meet or exceed the best standard practice.

1.2.2 All electrical work shall be accomplished by qualified electricians under the direct supervision of a state licensed master electrician. The contractor shall submit a copy of the master electrician’s license/certification for review by the Contracting Officer.

1.2.3 Work and materials shall comply with applicable laws, ordinances, rules and regulations, including national, state, and local electrical codes. As a minimum, materials and installation shall comply with NFPA 70.

1.2.4 When materials or equipment must conform to the standards of organizations such as the American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturer's Association (NEMA), and Underwriters Laboratories (UL), proof of such conformance shall be submitted to the Contracting Officer for approval. If an organization uses a label or listing to indicate compliance with a particular standard, the label or listing will be acceptable evidence, unless otherwise specified in the individual paragraphs.

1.2.5 The Contractor shall furnish equipment that is new and a standard product of the manufacturer and currently commercially available. The models quoted shall include the latest

engineering changes of the manufacturer. Where two or more items of the same kind are required, they shall be the product of the same manufacturer.

1.2.6 The existing site installation shall be reviewed by the Contractor prior to procurement, fabrication, or delivery of all materials to verify actual field dimensions, size restrictions, and electrical requirements.

1.2.7 Provide items of a minor nature not specifically called for in these specifications that are required to make the systems complete and operable.

1.3 SUBMITTALS: Items to be submitted are specified in this section and the "List of Submittals". Submittals shall be approved prior to procurement, fabrication, or delivery of all materials.

1.3.1 Operation and Maintenance Manuals and Instructions

1.3.2 Product Data

1.3.3 Wiring Diagrams

1.4 DELIVERY AND STORAGE: Equipment and materials shall be properly stored, adequately protected, and carefully handled to prevent damage before and during installation. Equipment and materials shall be handled, stored, and protected in accordance with the manufacturer's recommendations and as approved by the Contracting Officer. Damaged or defective items, in the opinion of the Contracting Officer, shall be replaced with new items at no cost to the Government.

PART 2 - PRODUCTS

2.1 PANELBOARDS:

2.1.1 NEMA PB 1, UL listed; circuit breaker type, with plug-on type circuit breakers.

2.1.2 Load centers for use as service disconnecting means shall bear the testing laboratory's listing label for use as service entrance equipment. All load centers, except service entrance equipment, shall have ungrounded neutral buses. Load centers shall have a grounding bus separate from the neutral bus and bonded to the load center cabinet. Grounding bus shall have terminals for connecting equipment grounding conductors.

2.1.3 The short circuit current bracing rating of each load center and the short circuit current interrupting rating of the load center's circuit breakers shall not be less than 10,000 AIC, and as noted on the drawings. All equipment shall be fully rated.

2.1.4 Type directories to indicate load service by each circuit and mount in holder behind transparent protective coating.

2.2 CIRCUIT BREAKERS:

2.2.1 NEMA AB 1, UL listed; plug-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. The voltage rating of breakers shall not be less than the voltage rating of the circuits in which they are connected. Do not use tandem circuit breakers.

2.2.2 Provide circuit breakers UL listed as Type HACR for equipment branch circuits, where recommended by the equipment manufacturer.

2.2.3 Circuit breaker with ground fault interrupter shall provide overload, short circuit, and ground fault protection. Breaker shall trip when a fault current to ground is six milliamperes or more, UL Class A.

2.3 CONDUCTORS (600 VOLTS OR LESS): NEMA WC 3, NEMA WC 5; conductors shall be copper. Conductors manufactured more than 12 months before date of delivery to the site shall not be used.

2.3.1 Power Conductors: Minimum size of conductors shall be No. 12 AWG. Interior conductors shall be type THW or THWN. Conductors in exterior raceway shall be Type XHHW. Conductors shall be suitable for use in dry and wet locations at temperatures not exceeding 75 degrees C.

2.3.2 Nonmetallic Sheathed Cable: 600V insulation, rated 60 degrees C, Type NMC.

2.3.3 Control Conductors: Minimum size of conductors shall be No. 14 AWG for Class 1 remote-control and signal circuits and No. 16 AWG for Class 2 remote-control and signal circuits. Minimum size of control conductors for 50 volts and less shall be No. 16 AWG for Class 1 and No. 18 for Class 2. Control circuit voltages in equipment controllers shall not exceed 120 volts.

2.3.4 Color Coding: Achieve by a continuous factory-applied color compound or coating except that where factory-applied coating is not available, apply colored pressure-sensitive tape for a distance of 6 inches along the length of the conductor at terminal points and locations where the conductor is accessible. Color code power and lighting conductors according to the voltage of the electrical system in which they are used.

2.3.6 Wire sizes No. 10 AWG and smaller shall be solid. Wire sizes No. 8 AWG and larger shall be stranded.

2.4 CONDUIT, FITTINGS, AND BOXES:

2.4.1 Interior Boxes: NEMA OS 1; galvanized steel only. Fittings shall conform to NEMA FB 1, galvanized. Plastic boxes shall not be used.

2.4.2 Exterior Boxes: ANSI 514B; cast devices suitable for outdoor environment, gasketed cast

metal covers.

2.4.3 Rigid Steel Conduit: ANSI C80.1; fittings shall conform to NEMA FB 1, galvanized.

2.4.4 Electrical Metallic Tubing (EMT): ANSI C80.3; fittings shall conform to NEMA FB 1, compression type.

2.4.5 PVC Coated Rigid Galvanized Steel Conduit: NEMA RN 1, UL listed; nominal 40 mil thermoplastic vinyl coating, heat fused and bonded to the exterior of the conduit. Fittings shall conform to NEMA FB 1, UL listed.

2.4.6 Rigid PVC Conduit: UL approved heavy wall, schedule 80.

2.4.7 Flexible Metal Conduit: Federal Specification WW-C-566, galvanized steel. Fittings shall conform to NEMA FB 1, galvanized. Liquid-tight conduit shall have a sunlight resistant, PVC jacket.

2.5 DISCONNECT SWITCHES:

2.5.1 Fusible Switch Assemblies: NEMA KS 1, UL listed; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

2.5.2 Nonfusible Switch Assemblies: NEMA KS 1, UL listed; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.

2.5.3 Enclosures: NEMA KS 1; Type 1. The Contractor shall use Type 3R with conduit hubs for exterior applications.

2.5.4 Fuses: If HVAC equipment is not provided with integral overload protection, install fuses which meet type and rating recommendations of the HVAC equipment manufacturer and NFPA 70. Furnish to owner one set of spare fuses of each type and rating installed.

2.6 NAMEPLATES: Provide engraved black bakelite, 1 X 3-1/2 inch, 1/8 inch high white letters for permanent identification of all load centers, disconnect switches, circuit breakers in separate enclosures, motor-starters, and other cabinet-enclosed apparatus.

2.7 TAPE: Insulating natural rubber tape shall meet the requirements of Federal Specification HH-I-553. Vinyl tape shall meet the requirements of Federal Specification HH-I-595.

2.8 WALL PLATES:

2.8.1 Decorative Cover Plate: Smooth plastic in finished areas, color as required.

2.8.2 Outlet Box Plate: Galvanized wiring device cover plate in unfinished areas.

2.8.3 Weatherproof Cover Plate: Gasketed cast metal with hinged gasketed wiring device covers where weatherproof ("WP") indicated.

2.9 WIRING DEVICES:

2.9.1 Duplex Convenience Receptacle: NEMA WD 1; Type 5-20R, color as required, UL listed.

2.9.2 Ground Fault Circuit Interrupter Duplex Receptacle: Duplex convenience receptacle with integral ground fault current interrupter. Trip shall occur when a fault current to ground is six milliamperes or more, color as required.

PART 3 - EXECUTION

3.1 SCOPE:

3.1.1 Install electrical service and control wiring to new HVAC equipment. Install associated disconnect switch and convenience receptacle, if required.

3.2 GENERAL:

3.2.1 As a minimum, installation shall be in accordance with NFPA 70 except as otherwise specified. The installation of equipment shall conform to the instructions issued by the manufacturer.

3.2.2 The Contractor shall furnish all labor, equipment and materials (except as noted), tools, and services necessary for the proper completion of all electrical work for this project in accordance with these specifications, the contract drawings, and the intent thereof.

3.2.3 All work shall be executed in a thorough, workmanlike manner by competent and efficient laborers, mechanics, electricians, or artisans in strict accordance with these specifications and the contract drawings and to the entire satisfaction of the Contracting Officer's representative.

3.2.4 The Contractor shall obtain all necessary permits required for this project.

3.2.5 All material removed (except as noted) shall become the property of the Contractor and shall be removed from Coast Guard property. Its value shall be reflected in the bid price.

3.2.6 The Contractor shall make allowances for voltage drop in accordance with recommendations of NFPA 70 when sizing main circuits, feeders, and branch circuits.

3.3 INTERIOR CUTTING, PATCHING, AND RELATED WORK:

3.3.1 The Contractor shall set and seal all sleeves and shall cut all holes necessary for the installation of his work. The Contractor shall obtain approval from the Contracting Officer's

representative before cutting any holes. No holes shall be cut in finished floor areas.

3.3.2 The Contractor shall have the proper trades patch all holes resulting from this contract, including any holes that are cut unnecessarily and any holes that remain due to removals.

3.3.3 The Contractor shall patch and paint affected areas to sound condition equal to or better than surrounding area finish.

3.3.4 All control devices, junction boxes, pull boxes, and specialties shall be located to provide easy access for operation, repair, and maintenance. Access doors shall be flush type unless otherwise indicated.

3.3.5 The Contracting Officer's representative shall have the right to relocate any outlet or fixture within a ten foot radius and prior to wiring without additional cost to the Government.

3.4 CONDUCTOR AND CONDUIT INSTALLATION:

3.4.1 All circuits run in unfinished areas and exposed shall be installed in conduit. Installation shall conform to the regulations of NFPA 70.

3.4.2 All circuits run in finished areas shall be concealed behind walls, ceilings, and floors Installation shall conform to the regulations of NFPA 70.

3.4.3 Holes through exterior walls shall be cut and sealed by the Contractor. The Contractor shall select sealing materials that are compatible with the exterior of the building and appropriate for the local climate and conditions. The Contractor shall obtain approval from the Contracting Officer's representative before cutting any holes.

3.4.4 Transitions between conduit and nonmetallic sheathed cable or control circuits shall be made in outlet or junction boxes in accessible locations.

3.4.5 Interior conduit 2 inches or smaller shall be EMT unless otherwise indicated.

3.4.6 Interior conduit larger than 2 inches shall be rigid steel unless otherwise indicated.

3.4.7 Exterior, underground conduit shall be rigid PVC unless otherwise indicated.

3.4.8 Exterior, above grade conduit shall be rigid galvanized steel, unless otherwise indicated.

3.4.9 Provide flexible metal conduit for terminations of conduit at equipment that generates vibration or noise and/or is subject to vibration or movement. Flexible metal conduit in wet locations shall be liquid-tight and sunlight resistant. No length of flexible conduit shall exceed four feet.

3.4.10 Install separate conduit systems for each of the following circuits: low voltage, control, and power.

3.4.11 Keep conduit and nonmetallic sheathed cable at least 6 inches away from parallel runs of flues and steam or hot water pipes.

3.4.12 PVC conduit and outlet boxes shall not be used indoors or above ground unless otherwise indicated.

3.4.13 Keep conduit parallel with or at right angles to ceilings, walls, and structural members. Pull boxes or conduit outlet bodies shall be used as necessary to permit conduit to be routed close to corners formed by wall intersections. Support conduit securely by pipe straps, wall brackets, or hangers.

3.4.14 Make changes in direction of conduit runs with symmetrical bends or conduit outlet bodies. Make field-made bends and offsets with a hickey or conduit bending machine. Crushed or deformed conduits shall not be installed. Ends shall be free from dents or flattening. Plaster, dirt, or trash shall be prevented from lodging in conduits, boxes, fittings, and equipment during construction. Free clogged conduits of obstructions.

3.5 CONDUCTOR IDENTIFICATION: Provide conductor identification within each enclosure where a tap, splice, or termination is made. Identification shall be by color-coded insulated conductors, plastic-coated self-sticking printed markers, colored nylon cable ties and plates, or heat shrink type sleeves.

3.6 SPLICES: Make splices in accessible locations. All splices shall be made in outlet or junction boxes. No splices will be permitted in the conduit. Splices in wires No. 10 AWG and smaller shall be made with an insulated wire nut twist-on pressure type connector. Splices in wire No. 8 AWG and larger shall be made with a solderless connector and covered with an insulation material equivalent to the conductor insulation. Do not use twist-on wire nuts with wire larger than No. 10 AWG.

3.7 DEVICES, EQUIPMENT, AND FIXTURES:

3.7.1 Install wall switches with OFF position down.

3.7.2 Install convenience receptacles with grounding pole on top.

3.7.3 Install new wiring devices at the same height as equivalent existing devices. If height is not obvious, contact the Contracting Officer's representative.

3.7.4 Install wiring devices and wall plates flush and level.

3.8 GROUNDING:

3.8.1 All grounding shall be in accordance with Article 250 of NFPA 70. Equipment grounding and bonding shall be in accordance with UL 467.

3.8.2 All conduits shall have a grounding conductor installed. This conductor shall be separate from the electrical system neutral conductor. In addition, all conduits shall be grounded.

3.8.3 Non-current carrying metallic parts associated with electrical equipment shall have a maximum resistance to solid earth ground not exceeding 25 ohms.

3.9 CLEANING AND PROTECTION:

3.9.1 Prior to leaving the job, the contractor shall thoroughly clean all electrical equipment, including all fixtures, loadcenters, motors, and wiring devices.

3.9.2 Protect all government personnel, equipment, and buildings from damage during construction.

3.9.3 The Contractor shall not allow refuse or work debris to accumulate, but shall remove them from the premises when and as directed by the Contracting Officer's representative.

3.10 TESTING:

3.10.1 After the installation and connection of all equipment has been accomplished, the Contractor shall place the equipment in operation and test it in the presence of the Contracting Officer's representative for a period of at least 8 hours to demonstrate that all equipment and devices operate in accordance with the requirements of the drawings and specifications. Any defects or adjustments in the wiring or equipment provided by the Contractor shall promptly be corrected by the Contractor at his expense. The Contractor shall furnish all labor, material, and equipment to accomplish the testing.

3.10.2 Measure steady state load currents at the loadcenter feeder. Should the difference between phases exceed 20 percent, rearrange circuits in the loadcenter to balance the phase loads within 20 percent. Take care to maintain proper phasing for multi-wire branch circuits.

3.10.3 Should any cable fail due to a weakness of conductor insulation or due to defects or injuries incidental to the installation or because of improper installation of cable, cable joints, terminations, or other connections, the Contractor shall make necessary repairs or replace cables as directed.

3.10.4 Acceptance checks and tests shall include, but not be limited to the following:

3.10.4.1 Compare actual connections with wiring diagrams. If differences are found, determine if error is in diagram or in actual wiring and correct as necessary.

3.10.4.2 Inspect all devices, equipment, and materials for damage or maladjustment caused by shipment or installation.

3.10.4.3 Verify that all fuses are the proper types and range.

3.10.4.4 Remove wedges, ties, and blocks installed by the manufacturer to prevent damage during shipment.

3.10.4.5 Verify minimum resistance to ground of all grounding systems.

3.10.4.6 Each device subject to manual operation shall be operated at least three times demonstrating satisfactory operation each time.

3.10.4.7 Test all 600 volt class conductors to verify that no short circuits or accidental grounds exist.

3.10.5 Upon completion of all acceptance checks, settings, and tests, the Contractor shall show by demonstration in service that all circuits and devices are in good operating condition and properly performing their intended function

END OF SECTION 260000