PROJECT: **Repair/Replacement of HVAC System, Building 46 at Kalaeloa, Job No. CA-1813**

PROJECT LOCATION: **Kalaeloa Bldg 46**
91-1227 Enterprise Avenue
Kalaeloa, HI 96707

1. SCOPE OF WORK:

The Contractor/Vendor shall provide all labor, materials, tools and equipment necessary to implement the following:

Provide and replace Chiller and Air-Handling Unit. Contractor to furnish and install:

Item 001:

- Remove and replace one (1**)** 50-ton chiller (CH) install new with built in pump package, include the "Hydronic package"
- Remove and replace one (1) air-handling unit (AHU)
- Provide initial chemical treatment system for chilled water
- In AHU room, repair supply/return air ducting where the existing AHU is located
- Install chemical pot feeder system
- Provide all new chill water piping from potable supply water source, and install all new isolation valves
- Remove and replace all existing chill water lines, and install all new isolation valves
- Insulate new chilled water lines and air ducting connections.
- Remove and replace VFD for 25hp AHU fan motor
- Install DDC devices: AHU CO2 and RH% sensors and temperature return and supply sensors. Map to existing HIARNG DDC server. (refer to item 6 for detailed criteria).
- Provide post test-and-balance (TAB) reports for chilled water system (CWS) (measuring air totals at the AHU only, and to measure chill water flow).

Item 002:

- In first floor mechanical room, demolish existing chiller, dispose all existing nonessential water lines, lagging, piping, electrical wiring, and all other components that will not be required for the install of new chiller and AHU. Dismantle and dispose of exhaust ducting from existing chiller on the left side of building which is the current mechanical room.

Instructions

a. Work will begin by coordinating with the tenants of Building 46 to schedule outages of the air conditioning while the new system is being installed. First, the new chiller will be installed on the concrete pad (provided by other) on the left hand side of the existing mechanical room where the old chiller is presently located. During the installation of the new chiller, water supply line and the new chilled water system, and electrical wiring system will be planned and configured.

b. Secondly, this is where the AC downtime will begin. AHU on the second floor will be completely dismantled and removed. Remove all unnecessary items in that room at this time. Install the new AHU and ducting repair during this phase. Make necessary tie-in to the ducting at this time making any modifications and repairs to properly tie in to the existing building ducts. Contractor shall be responsible to make appropriate modifications for the tie in.
Install new electrical wiring and connect to existing disconnect panel making any necessary adjustment or install of new equipment to make this possible for a safe tie in. Weekend work may be authorized for this portion of the project at no additional cost to the State. Contractor shall submit a proposed schedule and obtain the Project Manager's approval at least 48 hours before proceeding with any work outside of normal business hours.

c. Thirdly, tie in the new AHU to the new chiller and make all the connections complete. Install all DDC control devices and connections along with the new VFD. Make all necessary tie-ins of chilled water system, supply water system, electrical system, provide any necessary fittings, insulations, couplings and all other necessary parts to properly install the new units. All control wiring shall be installed in conduit.

d. Outside air duct is badly deteriorated and shall be replaced in its entirety. Install stainless steel duct, bird screen, and damper. (Located in the AHU room on the left side as you enter that room).

e. Repair/patch roof top ducting where banyan tree plants have penetrated the fiberglass insulation. Clean areas, apply insulation material and reseal damaged areas with similar duct wrap that is on existing ductwork. Recommended for use is elastomeric acrylic coating with polyester fabric and bonding primer. Use thirty (30 square feet) as basis of bid cost estimate.

f. Properly dispose all components of the old system utilizing the guidelines set forth by following rules and laws of federal/state and local authorities governing proper disposal of equipment containing refrigerants and oils.

g. Test complete system after install and make sure everything is working properly and coordinate with controls technicians for proper DDC connectivity and controls.

See Specifications for detailed equipment requirements.

Liquidated damages. Not applicable for this project.

2. INVESTIGATION

a. Contractor responsible to make necessary field surveys and investigations as required to consider the existing conditions. Inspection includes, but is not limited to, determining the condition of the existing equipment and components listed under the scope of work. Note and locate all items needing special attention.

b. Drawings furnished by the government may be used for general information only and contractor is required to verify all measurements and locations. Shall not be relied upon or used as the basis for preparation of design drawings required by this contract.

3. SHOP DRAWINGS

Provide any shop drawings required to show the general layout of the systems involved and to clearly show the extent, type and detailed work. In addition, provide specific, project-unique details to fully define the work. Drawings shall include but not be limited to:

a. Typical sections
b. Construction details

5. SPECIFICATIONS

CH: 50-Ton Packaged Chiller with minimum load control accessory with CORROSION COATING, PSX-700 coated casing, e-coat for condenser coils. Air cooled scroll chiller, with low noise condenser fans. Across-the-Line Start, Factory Installed CHW Flow Sensor, Factory Installed Control Transformer, Single Point Power Connection, Factory Installed Compressor Sound Blankets, Factory Installed BACnet Open Communications DDC Interface Microchannel Aluminum Tube/Aluminum Fin Condenser Coil, Factory ElectroFin (E-Coat) Coating, Integral Dual 5.0 HP CHW Pump Package.
Include 5 year extended manufacturer's warranty on parts and labor.

CWST: Chilled Water Storage Tank (to match 50-Ton Chiller)

AHU: Air Handling Unit to match 50 Ton Packaged Chiller.
Size 40W, 25.0 HP Premium Efficiency TEFC Motor, 208-230v/3/60Hz
Painted Galvanized Steel Double Wall Sealed Panels w/ R-13 Insulation
Painted Galvanized Steel Solid Inner Wall w/ AgION Antimicrobial Coating
Patented "Level II" Thermal Break Construction Minimizes Sweating
6" Tall Galvanized Steel Base Rail, 2" Angle Filter/RA Mixing Box Section w/ Hinged Door, Horizontal Chilled Water Coil Section, Copper Tube/Aluminum Fin CHW Coil w/ S/S Casing & Non-Ferrous Headers, Draw-Thru Supply Fan Section w/ 2" Spring Isolators & Hinged Door Belt-Drive Forward Curve Supply Fan.
1 set FILTERS 30-35% Efficiency (MERV 8) Pleated Construction Filter, 2" Thick
1 set PADS Neoprene Waffle Pad w/ Steel Plate.

Include 5 year extended manufacturer's warranty on parts and labor.

Exterior fasteners and hardware to be minimum hot-dipped galvanized.

DDC Router: LGR series Line (or approved equal).

DDC controller: Automated Logic ZN141v+ (or approved equal).

DDC controller: Automated Logic ZN551 (or approved equal).

Single air flow board: Automated Logic USF (or approved equal).

Thermostats: Automated Logic ZS Pro Room Sensor ZSP-HC-ALC (or approved equal).

DDC sensor: Automated logic ZS series (or approved equal).

Actuator: Belimo (or approved equal)

A. All equipment and material shall be UL listed and meet Buy America Act requirements and be Energy Star qualified.
B. Equipment and material specified by catalog numbers and names: In case of obsolescence, supersede, or error in identification, the intent implied by the description, application, required performance and the features of competitive brands also listed shall govern.
C. All equipment and materials shall be suitable for intended location and use and include all accessories for proper installation and operation.
D. Chiller coils and cabinet and chilled water storage tank, shall have salt air corrosion protective coating to extend life and improve performance.

6. CRITERIA

a) Web-based system (internet access available). Bldg 46 shall be interfaced to State DOD computer server and software.
b) System security protection will include area dependent access. Access for each user will be Bldg 46, and FMO staff access only.
c) Browser interface to system, additional or special workstation (HMI) software will not be accepted. System must be web-based and compatible with existing State DOD website.
d) Distributed process shall be used. Each major piece of equipment or equipment plant will have a dedicated direct digital controller with battery back-up. Residing in each controller shall be, at minimum, time schedules (including all holidays for the year), system program, and trend logs for a minimum of one day. Major equipment shall include: one control module for the chilled water plant with outdoor rated NEMA enclosure, one control module per AHU, one control module per FCU and one control module per VAV box. Use of multiple modules for any of this equipment shall not be acceptable.
e) Room Sensors (thermostats) shall have digital displays, setpoint adjustment and local (after-hours occupancy) occupancy override.
f) All direct digital controllers shall be native BACnet.
g) Communication cabling shall be high speed ARCnet (156k) using low-capacitance cable.
h) Provide communication output from meters. Provide cabling to existing HIARNG network switch.
i) Provide mapping to existing State DOD statewide BACnet server. (Note: Mapping must be performed by an authorized Automated Logic vendor).
j) The programming language shall be graphical programming, line programming is not acceptable. The system HMI shall include a LOGIC page for every system. This logic page shall allow the operator to view the program logic with the live data display throughout the logic. Authorized operators shall have the capability to change parameters on-line. Programming changes shall be in background mode only.
k) Provide Energy Report software as an integral part of the EMCS.
l) Provide Environmental Index software.
m) Color graphics shall follow the DoD EMCS Graphic Standard.

n) Color computer Graphics shall be provided for each piece of equipment.
o) Color computer Graphic floor plans shall be provided with thermal graphs. Thermal graphs will indicate each AHU, FCU or VAV Box zone within the floor plan with room numbers and changing colors to indicate the following:
    a. If the space is unoccupied the color will be GRAY
    b. If the space is occupied:
        i. GREEN shall indicate the zone is at set-point.
        ii. YELLOW shall indicate the zone is slightly warmer than set-point.
        iii. ORANGE shall indicate the zone is well above set-point.
        iv. LIGHT BLUE shall indicate the zone is slightly cooler than set-point.
        v. DARK BLUE shall indicate the zone is well below set-point.
        vi. RED shall indicate the zone is in alarm.
        vii. CHARTRUSSE shall indicate that there is not communications to the DDC module.
p) Trending shall be required for every point in the system. Every trend shall be historically trended and saved in the hard drive data base. Exporting of trends shall be included, trends shall be exported to an Excel spreadsheet without the use of any specialty software.
q) All software tools shall be provided and installed on the system computer server. Software tools shall include at minimum:
    a. Data base configuration software and tools.
    b. Graphic programming software.
    c. Graphic designing software.
    d. All implementation software tools required to build this system from scratch.
r) EMCS Specifications

Specifications are to include a concise statement of work for the project, briefly describing the principal features of work to be performed. Include a consolidated list of material submittals (actual materials, shop drawings, brochures, “cut-sheets”, etc.) which are to be submitted to the Project Manager for approval for acceptance prior to the actual construction of the project. All references to material approvals shall state the Project Manager is the acceptance authority.

CSI Section 23 09 00: Instrumentation and Control for HVAC

CSI Section 23 09 23: Direct-Digital Control System for HVAC

CSI Section 23 09 93: Sequence of Operations for HVAC Controls

ASHRAE 135.1: BACnet: Data Communication Protocol for Building Automation and Control Networks

Controllers must be provided with an open license, open system design to include:

Property	Value	
Station Compatibility	In	All
Station Compatibility	Out	All
Tool Compatibility	In	All
Tool Compatibility	Out	All

Points of Interest for each VAV (3 analog, 2 digital, if applicable)
- Zone temp
- Thermostat setpoint
- Static pressure
- VAV actuator open
- VAV actuator close

Points of Interest for each Exhaust Fan (1 analog input/ 1 digital output, if applicable)
- Current sensing
- On/off

Points of Interest for each Split System (3 analog inputs, if applicable)
- Zone temperature
- Supply air temperature
- Condenser current sensing

VFD (if applicable)
- Duct static pressure sensor
- DDC controller
- 3 contactor bypass
- 3% AC line reactors

In the future, we would also like to have the ability to monitor the condensing units for operability with the following data points:
- Saturated liquid refrigerant temperature
- Superheated refrigerant vapors
- High & low pressure sensing (both analog)
- Oil pressure sensing (can be I/O or analog transducer)
- Compressor amps

7. Energy Rebates:

a. Documentation shall be provided for Hawaii Energy rebates offered by the electrical utility company where practicable.

b. Upon completion of project, Contractor shall fill out energy rebate application forms for customer submission to Hawaii Energy.

8. Solid Waste: Submit solid waste report for all demolition material. Report to reflect tonnage of recycled, debris and/or disposal of demolition material.

Eg:

Chiller: Compressor Model 30HL – 050-E-511— Serial 4805Q05808
Condenser 2 SLP# 39M1STD02------

AHU: Carrier 39MN40B005C2622XXS

All piping, chill water lines, expansion tank, plumbing, electrical, and all existing components that needs to be removed and replaced. Leave no nonfunctioning and excess electrical or plumbing or other components in the mechanical room or the AHU room behind.

SUBMITTALS:

1. Submit to the DOD Project Manager for approval, three (3) sets each of HVAC equipment Manufacturer's product catalog/specifications (Chiller and AHU).

2. Submit to the DOD Project Manager three (3) sets of product catalogs/specifications of all other major non-equipment materials (conduits, wires, disconnect switches, other devices).
3. Submit the CHs/AHU equipment Manufacturer's Warranty stating the following:
   - Five (5) years warranty on parts and seven (5) years warranty on compressors from the date of installation and acceptance, to the original User of the equipment (through DOD Project Manager) if it should prove defective workmanship or defective materials.
   - The Manufacturer shall replace the defective parts or compressors without charges to the Government.
4. Submit a written "warranty" that the completed project shall be free from any workmanship or materials defects for a period of one (1) year (for all non-A/C equipment/units portion of the project) starting from the date of project's formal acceptance. The warranty shall state that, in case of any workmanship defect/s that will occur within the period of one (1) year, the Contractor shall implement the necessary corrective work without charging the Government for the costs of materials, labor, and equipment use.
5. Prior to start of work, the Contractor shall prepare and submit to the DOD Project Manager, the Work and Health/Safety Program for review and approval. The Program shall outline emphasis on the regulations set by OSHA, EPA, and other Federal, State or Local Agencies.

SAFETY MEASURES IMPLEMENTATION, OTHER INSTRUCTIONS TO BIDDERS:

1. The Contractor must implement all safety measures in accordance with the present OSHA, Local, and Federal Government Rules and Regulations. Required Personal Protective Equipment (PPE) shall always be worn by the Contractor's workers during implementation of work. Warning signs/tapes, cones, and barricades shall be posted/in-place where and when necessary.

2. Disposal of old A/C unit (refer to Scope of Work Item No. 1 and Environmental Instructions on Page 08 of 09))
3. The Contractor shall provide own power generating equipment if needed for the job.

HIARNG Environmental Reports preparation/submittals, Permits, and Instructions:

A. Mandatory Environmental Logs and Report
The Contractor shall read and comply with the instructions shown in the attached HIARNG Environmental Contractor Requirements in the preparation and

submittal of Hazardous Materials Inventory Log, Monthly Waste Generation Report, Spill Prevention Control and Countermeasure Plan, and other requirements listed, applicable to the Project.

B. The Contractor shall be responsible for the assessment, application, payment, and for obtaining the required Environmental Permits for the transport and disposal of hazardous and solid wastes.
C. The Contractor shall characterize and identify disposal requirements for old HVAC cooling water, refrigerant, and used oil (which may contain regulated refrigerant) through coordination with HIARNG Environmental Office to ensure compliance with applicable hazardous waste and wastewater regulations and permits.
D. Old HVAC electronic components and fuses shall be disposed in compliance with HIARNG and City and County requirements for E-waste disposal.
E. During CMU walls and concrete slab coring/drilling, the Contractor must recover concrete dust to prevent it from entering storm drains located around Bldg
F. Disposal of chemicals, paint, paint brush, and concrete dust rinse water into any inlets of rain water drain and sewer lines inside the HIARNG Compound and the nearby outside inlets tied in to the HIARNG drain system shall constitute violations of HIARNG's sanitary sewer and NPDES permits. No chemicals or rinsed water shall be disposed into the inlets of HIARNG's rain water or sewer lines/system or on the open grounds inside and nearby the HIARNG Compound. Daily cleaning of paint brushes and other equipment must be done in a way that chemicals and paint-diluted water (waste water) must be contained in the Contractor-owned leak-proof container. All waste water must be hauled out of the HIARNG Compound and dumped into an EPA or City & County approved dumping station.
G. If Contractor-owned electric power generator is brought at site, the Contractor must supply sufficient spill response supplies. If spills occur, the Contractor must implement proper cleanup work immediately.

ATTACHMENTS:

1. Plans pages – A-1.0 Bldg 46 Floor Plan, A4-4 Floor Plan, E4-24 Electrical Plan, Bldg46 CablePath(6 pages)
2. Pictures – Proposed location of 50 ton chiller, Remove existing exhaust air duct (20170822_085230.jpg)
3. HIARNG Environmental Contractor Requirements (two pages)
4. HIARNG Spill Incident Report (one page)
5. Monthly Waste Generation Report (one page)
6. Hazardous Materials Inventory Log (one page)