

Attachment B

Scope of Work and Technical Specification

SCOPE OF WORK

1. **BACKGROUND:** The District plans to have six (6) portable classrooms relocated by others at during this summer. Included in the relocation work will be a 1" conduit pathway from the nearest portable (closest EMS).
2. Contractor shall provide a turnkey solution that includes all labor, material and equipment required to efficiently (1) procure six new units in accordance with the attached WUSD Wall Mounted Heat Pump Specification, (2) remove and dispose of six existing units, (3) reinstall, connect, test and demonstrate that all six new units are fully functioning.
3. Below is a summary table of the total quantities of package units and heat pumps to be replaced at each West Sacramento school:

SCHOOL	HEAT PUMPS	LOCATION
1. WESTFIELD VILLAGE ELEMENTARY	3	508 Poplar Ave.
2. ELKHORN VILLAGE ELEMENTARY	2	750 Cummins Way
3. YOLO EDUCATION CENTER	1	919 Westacre Rd.
TOTAL	6	

4. Schedule of Events:

EVENT	TIME/DATE
Contractor Bid Package is available	8am, March 30, 2016
Site Walk (starting at Yolo Education Center)	10am, April 4, 2016
Contractor Bids Due	10am, April 8, 2016
Evaluation and Selection of Contractor	10am, April 11, 2016
Approval by Board of Education	April 21, 2016
Contract Signed, Insurance and Bonds Provided to District	April 28, 2016
Substantial Completion	July 29, 2016
Final Completion	August 5, 2016

Note: At this time, the District does not have a definitive date when the Contractor can begin the removal/installation of the new units pending the relocation of the portables (as discussed above). Contractor to provide a bullet point schedule that identifies the following:

- Lead time for all new equipment
 - Equipment Submittals for District Approval
 - Date Contractor needs to begin removal/installation of new units in order to meet the Substantial and Final Completion dates provided above
5. Contractor must work closely with the District's project team which includes:
 - District personnel
 - Owner's Representative-Benchmark Consulting Services, Ltd. (BCS)
 - Technical Representative-ARC
 - Energy Management Systems (EMS) consultant-L & H Airco
 6. EMS work shall be performed by L & H Airco under a separate contract with the District. Contractor must familiarize himself/herself with the EMS contractor's scope and schedule and work together as a team to communicate, plan and perform this work.
 7. Immediately upon contract execution, Contractor shall address all requirements for completing background checks and badging of all subcontractors and personnel that will plan to be on any of the District's sites. Badging can be scheduled through the District's Facilities, Construction & Planning office.
 8. No additional information (e.g., As Builts, etc.) will be provided to the Contractor by the District.
 9. No restroom facilities shall be provided by the District.
 10. No parking will be allowed on any asphalt playground. Contractor is responsible to replace all damaged landscape/hardscape. This includes removal of tire marks, spills, damage to asphalt, concrete walls, etc.
 11. Westfield Village will have an active summer school program. Contractor to provide and install up to 80' for safety fencing.
 12. Contractor to keep all sites clean on a daily basis. Contractor can't use the District's dumpsters.
 13. Contractor shall be responsible to secure and protect Contractor's equipment and materials from theft and vandalism at all sites prior to receiving written final acceptance and approval of Contractor's work by District.
 14. Due to the current District's ongoing workload, all requests made by Contractor to the District will require a 48 hour advanced written notice. This includes requests for access, etc.

15. Contractor key personnel shall attend a total of three (3) progress meetings.
16. Contractor to provide detailed design submittals, including sizing and load calculations, ventilation requirements and equipment cut sheets for the District's approval in advance of ordering. Contractor schedule shall include ten (10) business days for the District's review and approval of all submittals and design documents.
17. Contractor's salvage plan must meet all applicable EPA requirements. Contractor shall have complete environmental responsibility for disposal of the existing units in accordance with current environmental laws.
18. Contractor to provide surplus records to the District five (5) working days after successful completion of the project documenting the handling of all oils, lubricants, etc.
19. Contractor to ensure that all equipment is free and clear prior to moving (e.g., remove exterior connections and secure access panels, etc.).
20. Contractor to recover the refrigerant in the existing units.
21. Contractor shall protect the District's property at all times, both inside and out.
22. Contractor to provide the District with draft Start Up Checklist for the District's review and comment 10 working days in advance of turning on any equipment.

TECHNICAL SPECIFICATIONS

1. Introduction

This section contains the technical specifications for the complete installation of six (6) heat pumps across three (3) District schools located in the West Sacramento area.

The installation shall include all necessary components as described in this specification and any additional details not included in this specification that are necessary for properly completing the work. All new units to be sized by Contractor to meet the existing heating and cooling loads at ASHRAE 99% design conditions, including the District's plan to add 40 portable tablets and two (2) charging stations (per classroom) for new cooling load calculations.

All systems are currently connected to a Novar control system that will be replaced with Alerton controls. The District will be contracting separately with the controls contractor L & H AirCo for EMS upgrades and retrofits for each system.

Contractor shall meet all code requirements and shall be responsible for and obtain all required State and/or local permits and inspections, including any Title 24 requirements deemed necessary.

The installation shall be in conformance with the most current editions of the NEC (National Electric Code), California Electrical and Building Code, ACCA (Air Conditioning Contractors of America) Standard 5, Title 24 and all other generally accepted standards for the installation of similar systems.

2. Product Requirements

Quality Assurance

- A. Units shall be rated in accordance with ARI Standards 210/240 and 270.
- B. Units shall be designed in accordance with UL Standard 1995 and ANSI Z 21.47.
- C. Units shall be manufactured in a facility registered to ISO 9001 manufacturing quality standard.
- D. Units shall be UL listed and c-UL certified as a total package for safety requirements.
- E. Insulation and adhesives shall meet NFPA 90.1 requirements for flame spread and smoke generation.
- F. Cabinet insulation shall meet ASHRAE Standard 62.1.

Delivery, Storage, Handling

- A. Units shall be stored and handled per manufacturer's recommendations.

HVAC Unit Specifications

- A. General:
 1. Factory-assembled single-piece, heating and cooling units. Contained within the enclosure shall be all factory wiring, piping, controls, refrigerant charge with R-410A refrigerant, and special features required prior to field start-up.
 2. Manufacturers of heat pumps must be Bard. Bard representative contact is Russ Geary 916-716-6726, russ@gearypacific.com.
- B. Unit Cabinet:
 1. Unit cabinet shall be constructed of phosphated, zinc-coated, pre-painted steel.
 2. Normal service shall be through removable cabinet panels.
 3. The unit shall be constructed on a rust-proof unit base that has an externally trapped, integrated sloped drain.
 4. Evaporator fan compartment top surface shall be insulated with a minimum 1/2-in. (12.7 mm) thick, flexible fiberglass insulation, coated on the air side and retained by

adhesive and mechanical means. The evaporator wall sections will be insulated with a minimum semi-rigid foil-faced board capable of being wiped clean. Aluminum foil-faced fiberglass insulation shall be used in the entire indoor air cavity section.

5. Unit shall have a field-supplied condensate trap.

C. Fans:

1. The evaporator fan shall be direct-drive. If fan is multi-speed, fan shall be variable frequency drive (not ECM) and controlled externally by Alerton control system (on board or proprietary motor speed control **NOT** acceptable).
2. Fan wheel shall be made from steel, be double-inlet type with forward curved blades with corrosion resistant finish. Fan wheel shall be dynamically balanced.
3. Condenser fan shall be direct drive propeller type with aluminum blades riveted to corrosion resistant steel spiders, be dynamically balanced, and discharge air vertically.

D. Compressor:

1. Fully hermetic compressors with factory-installed vibration isolation.
2. Scroll compressors shall be standard on all units.

E. Coils:

1. Evaporator and condenser coils shall have aluminum plate fins mechanically bonded to seamless copper tubes with all joints brazed (Copper/copper and vinyl-coated construction available as option). Tube sheet openings shall be belled to prevent tube wear.

F. Heating Section:

1. Induced-draft combustion type with energy saving direct spark ignition system and redundant main gas valve.
2. Induced-draft motors shall provide adequate airflow for combustion.
3. The heat exchangers shall be constructed of aluminized steel for corrosion resistance.
4. Burners shall be of the in-shot type constructed of aluminum coated steel.
5. All gas piping and electric power shall enter the unit cabinet at a single location.
6. All heat pump units to come with electric heat strip.

G. Refrigerant Components:

1. Refrigerant expansion device shall be of the TXV (thermostatic expansion valve) type.

H. Filters:

1. Filter section shall consist of field-installed, throwaway, 2-in. thick filters of commercially available sizes.
2. Filters shall be accessible through an access panel with "no-tool" removal.
3. Unit shall use only one filter size. Multiple sizes are **NOT** acceptable.

I. Controls and Safeties:

1. Unit controls shall be complete with a self-contained low voltage control circuit.
2. Compressors shall incorporate a solid-state compressor protector that provides reset capability.
3. All units to come equipped with electromechanical terminal blocks and Belimo LF Series LF24-SR US type actuator controls, BACnet Interface, Honeywell Jade or other **NOT** acceptable.

J. Operating Characteristics:

1. Unit shall be capable of starting and running at 125°F (51°C) ambient outdoor temperature per maximum load criteria of ARI Standard 210.
2. Compressor with standard controls shall be capable of operation down to 40°F (4°C) ambient outdoor temperature.
3. Units shall be provided with fan time delay to prevent cold air delivery before the heat exchanger warms up.
4. Unit shall be provided with 90-second fan time delay after the thermostat is satisfied.

K. Electrical Requirements:

1. All unit power wiring shall enter the unit cabinet at a single location.

L. Efficiency Requirements:

1. All heat pump units must have minimum efficiency ratings of SEER 15 and 8.8 HPSF, in addition to other code required minimum efficiency ratings.

M. Motors:

1. Compressor motors shall be of the refrigerant-cooled type with line-break thermal and current overload protection.
2. All fan motors shall have permanently lubricated bearings, and inherent, automatic reset, thermal overload protection.
3. Condenser fan motor shall be totally enclosed.
4. Evaporator Fan Motor to be high-efficiency brushless DC motor.

N. Compressor Protection:

1. Solid-state control shall protect compressor by preventing "short cycling."

O. Economizers:

1. Economizer controls capable of providing free cooling using outside air.
2. Equipped with low leakage dampers not to exceed 3% leakage, at 1.0 IN. W.C. pressure differential.
3. Spring return motor shuts off outdoor damper on power failure.
4. All units to come equipped with electromechanical terminal blocks and Belimo LF Series

- LF24-SR US type actuator controls, BACnet Interface, Honeywell Jade or other **NOT** acceptable.
5. Fully compliant with Title 24 Fault Detection and Diagnostics, reference Section 120.2(i).
 6. Fully compliant with Title 24 Demand Control Ventilation, reference section 120.1(c)3.

P. Labeling:

1. Contractor to include new engraved plastic labels to match current District labeling scheme on all installed units. District will provide new labeling protocols.

Warranty Requirements

The Air Conditioning Units shall be covered by:

1. A one (1) year parts and labor warranty.
2. A one (1) year refrigerant warranty.
3. A five (5) year compressor, heat exchanger and economizer warranty.

These warranties shall include travel time and expense and provide on-site service and labor.

3. Conduit, Wire, Drain Lines

All apparatus, conduit systems, etc. shall be installed and interconnected so as to form complete systems as herein. Contractor shall furnish and install all work necessary to make complete working systems. Contractor shall be responsible for furnishing and installing all fused disconnect switches, conduits, wire, fittings, etc. for connections. Install all electrical equipment where it is not already installed as a part of a unit. Contractor shall furnish fused disconnect switches if they are not existing. Fuses shall be dual element, rated per equipment manufacturer's requirements. Thermal overload switches shall be furnished for all fractional horsepower motors where such protection is needed but the equipment provided does not have built in thermal protection. Contractor shall provide conduit and wire for controls rated 115V and higher.

A. Conduit

1. Contractor must use galvanized rigid steel conduits (RSC) for any new or replaced conduit.
2. All seal tight connections at units shall be replaced with new seal tight.
3. Contractor cannot utilize any existing conduit that contains fire detection wiring.

B. Wire:

1. All wire installed shall be of a standard manufacturer as approved by the National Board of Fire Underwriters and shall be of the size as required.

2. All wire shall bear the Underwriters' Laboratory label.
3. All power wiring conductors shall be type THWN or THHN copper.

4. Start-Up and Commissioning Services

- A. Contractor shall be responsible for proper operation of all systems, minor subsystems, and services provided. Contractor is responsible for the start-up and commissioning of every unit installed. All systems must be fully functional and operational after installation. If follow-up work is required to bring the system into compliance with the design intent, the District shall not be charged.
- B. Contractor shall be responsible for preparing a written commissioning and startup procedure including check off list and report format showing design conditions and blanks for indicating actual operating conditions. The report format shall include each piece of equipment and all items that require adjustment. Report to be submitted to the District 10 working days prior to execution of work for review and approval.
- C. Personnel performing commissioning and startup services shall be fully qualified, experienced, and normally engaged in this type of work. If the Contractor does not have such personnel available from their own company, they shall hire, at their own expense, subcontractors who are qualified personnel.
- D. Functional performance testing will not begin until startup, pre-functional testing and balancing are completed and approved by the District for the given system.
- E. Prior to startup, ensure that the systems are ready, including but not limited to, the following: Proper equipment rotation; the systems are flushed and are clean; proper wiring; auxiliary connections; lubrication, venting; controls; all filters and strainers installed; and properly set relief and safety valves.
- F. Equipment or systems shall not be started until systems are completed and/or when other continuing work could possibly damage completed systems if they are in operation.
- G. Contractor shall check all equipment during the initial startup to ensure correct rotation, proper lubrication, adequate fluids or air flows, non-overloading electrical characteristics, proper alignment, and vibration isolation. Systems shall be checked for air flows throughout without blockages. Air conditioning units and systems shall be checked for proper damper connections and positions, aligned and adjusted belt drives, proper lubrication, air filters installed, non-excessive electrical characteristics, and minimal vibration
- H. During initial operation of the system and unit substantial completion, qualified personnel shall be provided and designated for maintaining the equipment and systems in good

running order. Failure of equipment during this period due to lack of proper supervision is the responsibility of the Contractor.

- I. Coordinate with controls contractor to ensure all control systems are calibrated and functioning properly including but not limited to preparing a log to indicate the check, calibration, set point, etc. of each control device. A consolidated log shall be provided to the District with the commissioning and start up reports.
- J. Functional performance tests verify that components, equipment, systems, and interfaces between systems operate correctly. They include operating modes, interlocks, control sequences, and responses to emergency condition.
- K. Functional performance testing and verification may be achieved by direct manipulation of system inputs (i.e. heating or cooling sensors), manipulation of system inputs by building automation system (i.e. software override of sensor inputs), trend logs of system inputs and outputs using building automation system, or short term monitoring of system inputs and outputs using stand-alone data loggers.
- L. If re-testing is necessary because any equipment or system reported to have been successfully started up or pre-functionally tested is found during functional testing to be faulty, the additional cost of retest shall be the responsibility of the Contractor.
- M. Final and complete commissioning, startup reports for all sites shall be submitted 10 working days prior to final acceptance and payment. This report shall be signed by each person doing the commissioning/startup task and by the responsible field person. Report shall include, but not be limited to, date of test; instrument used; date of last calibration; temperatures; set points; rpm; voltage; amperage; pressures; stability; etc.

5. Testing, Adjusting, and Balancing

Contractor must hire a certified and independent qualified Company to provide Testing, Adjusting and Balancing for HVAC Professional Services in accordance with Associated Air Balance Council (AABC) – National Standards for Total System Balance and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) – HVAC Applications, Testing, Adjusting and Balancing manual.

Testing, adjusting, and balancing HVAC systems to produce design objectives, includes the following:

1. Balancing airflow including sub-mains, branches, and terminals, to indicated quantities according to an occupant load of 36 and per the minimum outside air requirements as established by Title 24 requirements.
2. Adjusting total HVAC systems to provide indicated quantities.
3. Measuring electrical performance of HVAC equipment.

4. Setting quantitative performance of HVAC equipment.
5. Verifying that automatic control devices are functioning properly.
6. Reporting results of activities and procedures specified in this Section.
7. Contractor's design submittals must include cfm volumes for each supply register based upon maximum occupancy and current and future anticipated heat loads.

Required Submittals

- A. Strategies and Procedures Plan: Testing, adjusting, and balancing strategies and step-by-step procedures. Include a complete set of report forms intended for use on this Project. The District will review and comment within 10 working days, and the plan must be approved prior to construction.
- B. Certified Testing, Adjusting, and Balancing Reports: Prepared on approved forms certified by the testing, adjusting, and balancing Agent. Reports for all sites shall be submitted for the District's review and approval 10 working days prior to final acceptance and payment.

6. Operations and Maintenance Manuals, Training

- A. Provide Operation and Maintenance manuals and documentation to District personnel 10 working days prior to date of Training.
- B. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with the District in detail to explain all aspects of operation and maintenance.
- C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at designated location.
- D. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.