

BID ADDENDUM NO. 2

June 27, 2023

Elmira City School District
Elementary Schools 2023 Renovations
HUNT No.: 2012-233

BEECHER ELEMENTARY	SED # : 07-06-00-01-0-005-016
BROADWAY ACADEMY	SED # : 07-06-00-01-0-034-022
COBURN ELEMENTARY	SED # : 07-06-00-01-0-002-019
DIVEN ELEMENTARY	SED # : 07-06-00-01-0-006-019
FASSETT ELEMENTARY	SED # : 07-06-00-01-0-008-014
HENDY ELEMENTARY	SED # : 07-06-00-01-0-014-021
PINE CITY ELEMENTARY	SED # : 07-06-00-01-0-033-023

The following Addendum items shall be considered a part of the contract documents prepared by HUNT ENGINEERS, ARCHITECTS, LAND SURVEYORS & LANDSCAPE ARCHITECT D.P.C., Bid Document date of October 21, 2022; issued for bid May 26, 2023.

Revisions to Project Manual issued by this Addendum:

ITEM AD2-1 Refer to Section 23 52 17 – STAINLESS STEEL CONDENSING BOILER

AMEND Section 23 52 17, 1.6, A, 1. to read:”

1. Warranty Period for Fire-Tube Condensing Boilers
 - a. The pressure vessel/heat exchanger shall carry a 15-year from shipment, non-prorated, limited warranty against any failure due to condensate corrosion, thermal stress, mechanical defects or workmanship.
 - b. The pressure vessel is warranted against failure due to thermal shock for the lifetime of the boiler provided the boiler is installed, controlled, operated and maintained in accordance with the operation and maintenance manual.
 - c. The burner shall be conditionally guaranteed against any failure for (5) five years from shipment.
 - d. Manufacturer labeled control panels are conditionally warranted against failure for (3) three years from shipment.
 - e. All other components, with the exception of the igniter, flame detector and O₂ sensor, are conditionally guaranteed against any failure for (2) two years from shipment.”

ITEM AD2-2 Refer to Section 23 52 17 – STAINLESS STEEL CONDENSING BOILER

ADD Section 23 52 17, 2.2, J to read:

- “J. Dual Returns: The boiler shall include dual return connections for low and high return temperature zones for added flexibility and thermal efficiency optimization. The boiler shall not have a minimum flow rate requirement through either return connection as long

as the specified minimum flow of the boiler is met through a combination of the two return connections. Boilers with single return will be deemed unacceptable.”

ITEM AD2-3 Refer to Section 23 52 17 – STAINLESS STEEL CONDENSING BOILER

ADD Section 23 52 17, 2.2, K to read:

“K. O2 sensor located in the Combustion Chamber: The boiler shall be equipped with an Oxygen sensor. The sensor shall be located in the boiler combustion chamber. Boilers without Oxygen sensor or boilers with an Oxygen sensor in the exhaust shall not be acceptable due to measurement estimation and performance accuracy.”

ITEM AD2-4 Refer to Section 23 52 17 – STAINLESS STEEL CONDENSING BOILER

AMEND Section 23 52 17, 2.3 to read:

“2.3 CONTROLS

- A. Refer to Division 23, Section “Instrumentation and Control of HVAC.”
- B. The boiler shall have an integrated boiler control that is capable of operating the boiler and associated accessories including but not limited to: its pumps, valves and dampers.
 - 1. The control shall have a 5 inch color touch screen display as well as six function buttons that are separate from the display. User shall have the ability to navigate the menus via touchscreen or navigation buttons. Controls not equipped with navigation button options shall not be permitted.
 - 2. The control shall be equipped with a multi-color linear LED light to indicate the level of firing and/or air/fuel valve position.
 - 3. The control shall display two temperatures using two dedicated three-digit seven-segment displays.
 - 4. The control shall offer an Enable/Disable toggle switch as well as two buttons for Testing and Resetting the Low Water Cutoff.
- C. The Manager designated boiler control shall be capable of the following functions without the need for additional external controls:
 - 1. Sequence up to 16 boilers,
 - 2. Control boiler variable speed or single speed pumps and/or modulating motorized valves,
 - 3. Operate or modulate a variable or single speed system pump or rotate two system pumps,
 - 4. Control and communicate with up to 6 SmartPlate domestic water heaters and their domestic hot water pump,
 - 5. The control shall connect to other plant boiler controls using RS485 and communicate using Modbus protocol.
- D. The control system shall be segregated into three components: “Edge [ii]” Control Panel, Power Panel and Input/Output Connection Box. The entire system shall be Underwriters Laboratories recognized.
- E. The control panel shall consist of seven individual circuit boards using surface-mount technology in a single enclosure. Each board shall be individually field replaceable. These circuit boards shall include:

1. A microcontroller board with integrated 5 inch touchscreen color display providing the user interface.
 2. A 7-segment display board. This board includes two 3-digit 7-segment displays. These displays shall be used to view a variety of temperature sensor values and operating and startup function status.
 3. An Interface board connects the microcontroller board to internal components using ribbon cables.
 4. An electric low-water cutoff board connects to the test and manual reset functions on the microcontroller board.
 5. A power supply board is designed to provide the different DC voltages to the rest of the boards. It also acts as voltage regulator and reduce power noise.
 6. An ignition and combustion board. This board controls the air/fuel valve and Safety Shutoff Valve, flame status and ignition transformer
 7. A connector board used to connect all external electrical connection.
- F. Combination plant: The managing boiler control shall be capable of setting and managing a combination plant that consist of up to two groups of boilers, their swing boilers and swing valves. The control shall be capable of performing all the listed features without the need for any additional controls. The use of additional controls to achieve any of these functionalities shall be prohibited to simplify installation and plant management. The combination plant control shall have the following capabilities:
1. The control shall operate one group of boilers for heating and another group of boilers for domestic hot water using plate heat exchangers or indirect tanks.
 2. The control shall manage and rotate the lead boiler in each of the two groups independent of the other group.
 3. The control shall be capable of managing one or two swing boilers and their motorized swing valves to direct the output of the swing boiler(s) to one of the two groups based on the plant priority settings. The control shall also connect to the header and return sensors for each of the two groups of boilers and use those values to manage the set point for each group.
 4. The control shall offer two independent logics that run simultaneously managing each group of boilers. Each boiler group logic shall have its temperature values, setpoints, PID and feedback parameters that is independent of the other group settings and parameters.
- G. System Pump lead/lag rotation: The control shall be capable of operating two system pumps. It shall rotate the lead pump based on user time setting. The use of an external pump lead-lag control shall not be permitted unless function is performed by building management system.
- H. Variable Speed Pump: The control shall be capable of modulating a variable speed pump. It shall modulate the pump based on the boiler firing rate, the boiler plant firing rate, or based on the return header temperature differential from supply water temperature on a primary secondary piping application.
- I. Minimum number of boiler plant open valves: The control shall manage the minimum number of boiler motorized valves to reduce variable speed pump flow and energy used. The control shall offer a setting to control the number of valves open during low load and standby operation. Manufacturers without this

feature shall offer additional pump controller and a smaller single speed pump to run during the low load and standby periods.

- J. Control settings transfer using USB: The control shall simplify and significantly lessen startup and boiler setting time by being able to use a USB flash drive to copy settings from one boiler to another boiler. Installers shall use successfully preconfigured boiler settings in their portfolio to newly installed boilers.
- K. Combustion calibration: The control shall offer at least 5 calibration points. The use of less than 5 calibration points is not permitted to improve overall system efficiency under all firing rates. Each combustion calibration point shall operate with 5 to 7% O₂ levels to improve operating efficiency. Deviating away from these values shall not be acceptable.
- L. Assisted Combustion Calibration: The control shall offer an assisted combustion calibration feature to help reduce setup time and improve setup accuracy. The assisted combustion calibration shall adjust the O₂ level at each calibration point to help keep O₂ level within allowable efficiency. The control shall log, date and time stamp the calibrated point combustion values of O₂ and allow the user to log NO_x, CO and flame strength. The control shall check these values against manufacturer allowable combustion values and color identify values out of manufacturer acceptable ranges. As an additional capability, the control shall also have the ability to perform manual combustion calibration. Not having Assisted Combustion Calibration function shall be prohibited.
- M. Valve Balancing: To help simplify installation and as part of a boiler plant, the control shall be capable of controlling an electronic modulating motorized valve for each of the boilers using the manager boiler control. It shall have a built-in logic to provide a maximum flow using an adjustable valve opening percentage point for each boiler. The control shall be capable of closing any valve that has an off boiler. If all boilers are off, the control shall keep at minimum one valve open to protect pumps.
- N. Building Automation: The control shall be able to communicate to Building Management Systems using BACnet and Modbus without the use of external gateways. The control shall be able to communicate over each of the two protocols using IP as well as RS485. The use of external gateways is not acceptable. The control shall be able to communicate to the building management system using:
 - 1. BACnet MS/TP and BACnet IP/Ethernet. When communicating over BACnet IP, the control shall offer an additional layer of IP security by mapping all control BACnet IP communication to the BACnet server's IP and MAC addresses. Not having this level of security shall deem the IP communication insecure and shall not be acceptable.
 - 2. Modbus RTU and Modbus IP.
- O. Unit and Plant Status: The control shall provide a quick view of the unit status and plant status.
 - 1. The unit status screen shall provide temperature setpoint, all water inlet and outlet and supply air and exhaust temperature sensors' values. It shall also provide unit current and target firing rates. Additional screens shall display unit run hours, cycle count and average cycles per hour.

2. The plant status screens shall provide plant temperature setpoint, plant water supply and return temperatures, outdoor temperature and domestic hot water setpoint and current temperatures. Additionally, a status screen shall show the boiler status of each plant unit, plant firing rate.
 3. Unit and Plant event history: The manager control shall display the last 500 historical events per plant or 200 historical events for single unit installations.
- P. Software update: The control shall be capable of field software updates without a need for hardware component(s) replacement. This shall be performed either using software on a USB flash drive or via Internet connection. The software update mechanism shall be performed by a trained technician. The software update menus shall be secured using a password level. After the software update, the control shall retain all of its prior field settings.
- Q. Copy settings from one boiler to the other: To significantly reduce installation time by reducing long repetitive work, the control shall have the capability of saving its settings to a USB flash drive. In addition, the control shall have the ability of copying new settings from a flash drive.
- R. Programmable Inputs and Outputs: The control shall be equipped with multiple relay and analog outputs and dry contact and analog inputs. Each shall be field programmable to meet installation needs. The following I/O options shall be available:
1. Relay outputs: There shall be two output relays that are programmable. The following relay functions shall be selectable:
 - a. Swing Valve 2
 - b. System Pump
 - c. Summer Pump
 - d. Multi-temperature pump
 - e. Pump2
 - f. Louver
 2. Inputs and interlocks: The following control functions shall be available:
 - a. Flow input
 - b. Damper end switch input
 - c. Louver end switch input
 3. Analog output: There shall be three analog outputs that are programmable. The control shall have configurable analog outputs that can be used as one of the following options:
 - a. Boiler pump
 - b. Domestic hot water variable speed pump
 - c. Valve
 - d. Fire rate
 4. Analog input: There shall be three analog inputs that are programmable. The control shall have configurable analog inputs that can be used as one of the following options:
 - a. Remote setpoint
 - b. Smart Plate valve position
 - c. Domestic hot water variable speed pump flow

- S. Backup boiler: The control shall be able to operate a lower efficiency back up boiler during peak periods when main plant boilers are at or close to peak load.
- T. Communication with SmartPlate: The control shall be capable of controlling and monitoring one or multiple plate heat exchanger(s). It shall be able to:
 - 1. Change the domestic hot water temperature setpoint and read its current temperatures.
 - 2. Monitor 3-way valve position.
 - 3. Control the operation of the domestic hot water pump.
- U. The controls shall annunciate boiler and sensor status and include extensive self-diagnostic capabilities.
- V. The control panel shall incorporate:
 - 1. Setpoint High Limit: Setpoint high limit allows for a selectable maximum boiler outlet temperature and acts as temperature limiting governor. Setpoint limit is based on a PID function that automatically limits firing rate to maintain outlet temperature within a 0 to 10 degree selectable band from the desired maximum boiler outlet temperature.
 - 2. Setpoint Low Limit: Allow for a selectable minimum operating temperature.
 - 3. Failsafe Mode: Failsafe mode allows the boiler to switch its mode to operate from an internal setpoint if its external control signal is lost, rather than shut off. This is a selectable mode, enabling the control can to shut off the unit upon loss of external signal, if so desired.
- W. The boiler control system shall incorporate the following additional features for enhanced external system interface:
 - 1. System start temperature feature
 - 2. Pump delay timer
 - 3. Auxiliary start delay timer
 - 4. Auxiliary temperature sensor
 - 5. Analog output feature to enable simple monitoring of temperature setpoint, outlet temperature or fire rate
 - 6. Remote interlock circuit
 - 7. Delayed interlock circuit
 - 8. Easy Setup by providing simplified menu quick settings to expedite plant and boiler setup
 - 9. Delta-T Limiter
 - 10. Freeze protection
 - 11. Fault relay for remote fault alarm
 - 12. Warm-weather shutdown
 - 13. The control shall offer multi-level user security access using different passwords. For additional security, the passwords shall expire if control display was not touched for an extended period 30 minutes.

- X. Each boiler shall include an electric, single-seated combination safety shutoff valve/regulator with proof of closure switch in its gas train. Each boiler shall incorporate dual over-temperature protection with manual reset, in accordance with ASME Section IV and CSD-1.
- Y. O₂-Trim or AERtrim: Each boiler shall be equipped with the patented AERtrim system, an advanced O₂-trim system for condensing boiler applications. The system shall utilize a low cost reliable automotive O₂ sensor that measures and monitors the oxygen content of the exhaust gases. The system shall adjust the blower speed to maintain optimal air-fuel ratios in the event of any site condition changes (air density, gas pressure, BTU content, etc.). The system shall have the following capabilities:
 - 1. Self-Diagnostics
 - a. System Status and Error Messages
 - b. When excessive trimming is occurring
 - c. When O₂ sensor has fallen out of calibration
 - 2. Adjustable parameter settings
 - a. O₂ target and range to meet site requirements
 - b. Schedule daily or weekly self-diagnostics

Output of O₂ information shall be displayed on the Edge [ii] control panel.

The O₂ sensor shall be installed through the unit's burner plate and measure the oxygen content directly within the unit's combustion chamber.

Boilers without an equivalent O₂ trim will be deemed unacceptable. Due to the moisture content of flue gases from condensing boilers, placing the O₂ sensor in the exhaust manifold or stack will be deemed unacceptable.

Boilers which require their O₂ sensor be changed annually will be deemed unacceptable.

- Z. Each boiler shall be onAER ready with a standard Ethernet port and include a 5 year onAER subscription at no additional charge. AERCO's onAER service grants the user online access to real time operation and status of their system plant from any computer, tablet or mobile device along with the following capabilities:
 - 1. Efficiency status and trends
 - 2. O₂ levels
 - 3. Efficiency and performance optimization tips
 - 4. Preventative Maintenance alerts and scheduling
 - 5. Predictive Maintenance algorithms.
 - 6. Warning and error messages
 - 7. Weekly or monthly performance and status reports
 - 8. Manage multiple boiler plants or buildings
 - 9. Customizable dashboard
 - 10. Add email contacts for alerts and reports, including local AERCO trained technicians
 - 11. Manage and store startup, maintenance and service documentation

The boiler manufacturer shall be able to provide a network hub or a network switch to connect up to 16 boilers to an online network.

- AA. Each boiler shall have integrated Boiler Sequencing Technology (BST), capable of multi-unit sequencing with lead-lag functionality and parallel operation. The system will incorporate the following capabilities:
1. Efficiently sequence 2-to-16 units on the same system to meet load requirement.
 2. Integrated control and wiring for seamless installation of optional modulating motorized valve. When valves are utilized, the system shall operate one motorized valve per unit as an element of load sequencing. Valves shall close with decreased load as units turn off, with all valves open under no-load conditions.
 3. Automatically rotate lead/lag amongst the units on the chain and monitor run hours per unit and balance load in an effort to equalize run hours among active units.
 4. Option to manually designate lead and last boiler
 5. Designated manager control, used to display and adjust key system parameters.
 6. Automatic bump-less transfer of master function to next unit on the chain in case of designated master unit failure; master/slave status shall be shown on the individual unit displays.
- BB. For boiler plants greater than 16 units, the Boiler Manufacturer shall supply as part of the boiler package a completely integrated AERCO Control System (ACS) to control all operation and energy input of the multiple boiler heating plant. The ACS shall be comprised of a microprocessor based control utilizing the MODBUS protocol to communicate with the Boilers via the RS-485 port. One ACS controller shall have the ability to operate up to 32 AERCO boilers.

The controller shall have the ability to vary the firing rate and energy input of each individual boiler throughout its full modulating range to maximize the condensing capability and thermal efficiency output of the entire heating plant. The ACS shall control the boiler outlet header temperature within $\pm 2^{\circ}\text{F}$. The controller shall be a PID type controller and uses Ramp Up/Ramp Down control algorithm for accurate temperature control with excellent variable load response. The ACS controller shall provide contact closure for auxiliary equipment such as system pumps and combustion air inlet dampers based upon outdoor air temperature.

The ACS shall have the following anti-cycling features:

- Manual designation of lead boiler and last boiler.
- Lead boiler rotation at user-specified time interval.
- Delay the firing/shutting down of boilers when header temperature within a predefined dead band.

When set on Internal Setpoint Mode, temperature control setpoint on the ACS shall be fully field adjustable from 50°F to 190°F in operation. When set on Indoor/Outdoor Reset Mode, the ACS will operate on an adjustable inverse ratio in response to outdoor temperature to control the main header temperature. Reset ratio shall be fully field adjustable from 0.3 to 3.0 in operation. When set on 4ma to

20ma Temperature Control Mode, the ACS will operate the plant to vary header temperature setpoint linearly as an externally applied 4-20 ma signal is supplied.

When set on MODBUS Temperature Control Mode, the ACS will operate the plant to vary header temperature setpoint as an external communication utilizing the MODBUS protocol is supplied via the RS-232 port. The ACS controller shall have a vacuum fluorescent display for monitoring of all sensors and interlocks. Non-volatile memory backup of all control parameters shall be internally provided as standard. The controller will automatically balance the sequence of operating time on each boiler by a first-on first-off mode and provide for setback and remote alarm contacts. Connection between central ACS system and individual boilers shall be twisted pair low voltage wiring, with the boilers 'daisy-chained' for ease of installation."

End of Addendum (2)