

ADDENDUM NO. 5
For
Owner: University of Colorado at Boulder
Project Name: PR003039 ECCH – HVAC Mechanical Upgrades, Phase 1 of 2
CRA#: 2007-213
Date: March 17, 2009

ENGINEER:
Cator, Ruma & Associates, Co.
896 Tabor St.
Lakewood, CO 80401
(303) 232-6200
(303) 233-3701 (fax)

General Information:

- 5.1 Addendum #3 Clarification Item #3.3 – If all of the alternates are accepted then all of the terminal boxes will be converted to DDC control.
- 5.2 Addendum #3 Clarification Item #3.4 – See attached mechanical and electrical sheets for additional information regarding electrical power for Phoenix controls and terminal box control power.
- 5.3 Addendum #3 Clarification Item #3.5 – Per the HVAC shop, the CX for this wing is located in the old Real McCoy Mechanical room. The wiring and controls should be routed from this location.

Specifications

Section 15975

- 5.4 See the revised sequence of operation in the attached specification, this sequence overrides the sequence shown on sheet M1.02.

Mechanical Drawings

Sheet Cover

- 5.5 See the revised drawing list on this sheet.

Sheet M2.03

- 5.6 See sheet M2.03 for locations of the Phoenix Control Transformer unit.

Sheet M2.04

- 5.7 See sheet M2.04 for locations of the Phoenix Control Transformer unit.

Electrical Drawings

Sheet E2.01

5.8 See new sheet showing the power requirements for the Phoenix and terminal box controllers.

Sheet E2.01

5.9 See new sheet showing the power requirements for the Phoenix and terminal box controllers.

The preceding addendum shall be made a portion of the contract Documents, and each bidder shall acknowledge receipt of the same in submitting bids. All other conditions and requirements of the Contract Documents will remain unchanged.

END OF ADDENDUM NO. 5

Attachment: Section 15975, Cover Sheet, M2.03, M2.04, E2.01 and E2.02

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SECTION 15975 - SEQUENCE OF OPERATION

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK:

- A. Sequence of operation is hereby defined as the manner and method by which controls function. Requirements for each type of control system operation are specified in this section.
- B. Operating equipment, devices, and system components required for control systems are specified in other Division 15 Controls' sections of these specifications.

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS:

- A. Provide control systems consisting of thermostats, control valves, dampers, operators, indicating devices, interface equipment, and other apparatus required to operate mechanical system and to perform functions specified.
- B. Provide necessary materials and field work necessary to connect control components factory supplied as part of equipment controlled, unless specified otherwise. Generally, self-contained valves, filter gauges, liquid level controllers and similar instruments, are not to be installed under this section.
- C. Unless specified otherwise, provide fully proportional components.
- D. Provide all necessary relays and signal boosters to make the system a full and operable system as required by the sequence of operation.

PART 3 - EXECUTIONS

3.1 TERMINAL BOX CONTROL SEQUENCES:

- A. Variable Air Volume without Reheat: The thermostat shall control the damper operator on the variable volume, pressure independent terminal box. On a drop or rise in temperature below or above set point with a 2deg (adj.) dead band between heating and cooling the thermostat shall modulate the airflow between minimum and maximum scheduled air quantities to satisfy the thermostat set point.
- B. Dual Duct Mixing Box – Non Labs and Labs without hoods: The hot deck and cold deck dampers on terminal box, DD-1, shall be modulated between maximum and minimum positions by thermostat, T-1, to maintain space temperature at a set point of 73°F (adjustable) as follows - hot deck dampers shall be positioned inversely proportional to cold deck dampers. Thermostat, T-1, shall send a signal to controller in addition to its signal to the DD-1 dampers; so that when space temperature is above set point, the make-up requirement is overridden to return space temperature to set point, with general exhaust maintaining room balance. On a drop or rise in temperature below or above set point with a 2deg (adj.) dead band between heating and cooling the thermostat shall modulate the airflow between minimum and maximum scheduled air quantities to satisfy the thermostat set point, heating and cooling shall not occur simultaneous.
- C. Dual Duct Mixing Box – Labs with hoods: The hot deck and cold deck dampers on terminal box, DD-1, shall be modulated between maximum and minimum positions by thermostat, T-1, to maintain space temperature at a set point of 73°F (adjustable) as follows - hot deck

dampers shall be positioned inversely proportional to cold deck dampers. Airflow shall be interlocked with fume hood exhaust to maintain the requirements listed below.

3.2 LAB BENCH EXHAUST CONTROL SEQUENCE:

- A. Fume hood valves, HX-1 and HX-2, shall be modulated by fume hood monitor, MON-1 (MON-2), to maintain a set point fume hood exhaust flow that will keep face velocity across fume hood face at 100 fpm (down to a minimum exhaust CFM as scheduled) based on sash position as sensed by sash position sensor, SAS-1.
- B. Dual Duct terminal box supply air shall be modulated by controller to deliver a volume of supply air that equals the highest of the following three values:
 - Total hood exhaust CFM (as measured by HX-1 and HX-2) less room pressurization air.
 - CFM required to satisfy thermostat.
 - Minimum scheduled make-up air quantity.
- C. General exhaust valve GX-1, shall be modulated by controller to extract room air at a flow rate equal to the sum of supply air CFM and pressurization air minus total hood exhaust CFM. If this calculated value is less than the minimum scheduled flow rate for GX-1, the minimum scheduled value shall take precedence.
- D. Whenever the differential static pressure across HX-1 (2) falls below 0.3" WC, as sensed by differential pressure switch, DPS-1(2), MON-1 (2) shall generate an audible and visual alarm indicating that the valve is outside of its control range.
- E. Whenever the flow sensed by HX-1 (2) does not equal the set point flow to which that valve has been commanded, the fume hood monitor, MON-1 (2), shall generate a valve jam alarm.
- F. A mute button shall silence the audible portion of the alarms. When system conditions return to normal, all alarms shall automatically clear.
- G. Upon a loss of power, HX-1 (2) shall fail to its maximum mechanical limits, and supply air shall fail to its minimum mechanical limit.

END OF SECTION 15975