UNIVERSITY OF CALIFORNIA, SANTA BARBARA

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HOLDERS OF PLANS AND SPECIFICATIONS:

> Bren Hall Lab Ventilation, Bren Hall-Building 521
> Project No. FM100105S/118-78
> **Addendum No. TWO**

September 3, 2010

Enclosed is **ADDENDUM NO. TWO** to the Construction Documents on the above-captioned project.

Bid date has been changed from Wednesday, September 8, 2010 at 2:30PM to **Thursday, September 16, 2010 at 2:30PM** to be held at:

> CONTRACTING SERVICES
> Facilities Management, Bldg. 439,
> Door #E, Reception Counter
> University of California, Santa Barbara
> Santa Barbara, CA 93106-1030.

Late arrivals shall be disqualified. Please allow time for unforeseen traffic delays, securing a parking permit and potential parking problems.

Anna Galanis
Director, Contracting Services

ADDENDUM NUMBER TWO

to the

Construction Documents
September 3, 2010

GENERAL

The following changes, additions or deletions shall be made to the following document(s) as Indicated; all other conditions shall remain the same.

I.   ADVERTISEMENT FOR BIDS

Item No.

1.   Second page, first paragraph, **CHANGE** to read as follows: "Bid Deadline: Sealed Bids must be received on or before 2:30 P.M. **Thursday, September 16, 2010.** Sealed Bids will be received only at: Contracting Services, Facilities Management, Building 439, Door "E", Reception Counter University of California, Santa Barbara, Santa Barbara, California 93106-1030."

II   SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

Item No.

1.   Number 4, **CHANGE** to read as follows: "Bids will be received on or before the Bid Deadline: **2:30 P.M., Thursday, September 16, 2010** and only at: Contracting Services, Facilities Management, Building 439, Door "E", Reception Counter University of California, Santa Barbara, Santa Barbara, California 93106-1030."

III   SPECIFICATIONS

Item No.

1.   Section 15950, Ventilation Management System, **REPLACE** in it's entirety with attached Revised Section 15950, Ventilation Management System, Revised per Addendum Two, seven pages..

END OF ADDENDUM NO. TWO

REVISED SECTION 15950
VENTILATION MANAGEMENT SYSTEM

PART 1   GENERAL

1.1   RELATED DOCUMENTS

A.   Drawings and general provisions of the Contract, including General Conditions of the Contract, General Conduct of the Work and Special Requirements, and Division 1 Specification Sections, apply to this Section.

1.2   OVERVIEW

A.   This document contains the specification and input/output summaries for a Demand Control Ventilation System (DCVS). The system architecture shall utilize local room sensors and duct probes networked to an Air Sampling Network and Multi-Sensor Monitor(s). The Air Sampling Network shall consist of Air Sampling Controllers and an air packet transportation network that shall transport air samples from the environment being monitored to distributed Multi-Sensor Monitor(s) located throughout the facility. The DCVS shall provide continuous air sampling of environmental conditions as prescribed in the Multi-Sensor Monitor section, report on those conditions via a web based user interface, and interface with other microprocessor based building subsystems as shown on the drawings and as specified.

B.   3rd-Party Interfacing is required on this project according to the following Specification sections for sub-systems:

a.   Building Automation System – Reference: ANSI/ASHRAE 135-2001: BACnet™ - A Data Communication Protocol for Building Automation Systems: This shall include the Standard and all published Addenda.

b.   Coordinate with Facilities Management Automation Supervisor, Sandro Sanchez at 451-9413, for changes to existing building control system to be performed by University personnel.

c.   University will not use an outside contractor to program controls. Controls will be programmed by UCSB. Contractor shall provide Sandro Sanchez, UCSB Facilities Management Automation Supervisor with a new Phoenix lab start-up sheet for each lab. Sandro Sanchez will re-program the new CFM (voltage values) for each lab.

1.3   DEFINITIONS

A.   BAS refers to the Building Automation System.   (Similar terms are: EMS, Energy Management System; BMS, Building Management System; or ATC, Automatic Temperature Control.)

B.   DCVC refers to the Demand Control Ventilation System Contractor or installer. The DCVC is responsible for the implementation of this Section of the Specifications.

C.   DCVS refers to the hardware, software and other components comprising the Demand Control Ventilation System as herein described.

1.4   ACCEPTABLE DEMAND CONTROL VENTILATION SYSTEM CONTRACTOR (DCVC)

A.   The DCVC shall have support services within a 25 mile radius of Project Site and comply with the service requirements of a 24 hour response time. Support services is defined as having complete parts inventory, having all required test and diagnostic equipment, and have trained technicians on the systems specified herein.

B.   The DCVC shall have a minimum of 5 years experience representing and installing integrated Phoenix Controls / Aircuity Systems / Johnson Controls. (Aircuity or equal, no known equal.)

C. The DCVC shall have service personnel certified for both Aircuity and Phoenix controls as well as in-house staff for commissioning, fume hood certification and maintenance of Phoenix and Aircuity systems. (Aircuity or equal, no known equal.)

PART 2 SCOPE OF WORK

2.1 CONTRACTOR RESPONSIBILITIES:

A. The contractor shall furnish all necessary hardware, software, and computing equipment required for a complete and functional system meeting the design intent and as defined in this specification.

B. Installation of all DCVS components; and all electrical work required as an integral part of this section as noted in Part 5.0 Execution including but not limited to Multi-Sensor Monitors, Air Sampling Controllers, Air Sampling Network, Duct Probes, Transformers, Vacuum Pumps, Network Servers, Air Sampling Tubing, etc., shall be by Automated Temperature Control contractor.

2.2 EQUIPMENT

A. System Hardware

1. The contractor shall provide the following:

a. All Air Sampling Controllers, Multi-Sensor Monitors, Duct Probes, Network Servers, Vacuum Pumps, Air Sampling Tubing, Air Sampling Network, transformers, solenoids, relays, switches, sensing devices, indicating devices, and transducers required to perform the functions listed.

B. System Software

1. The contractor shall provide all software identified in this specification. The database required for implementation of these specifications shall be provided by the DCVC, including point descriptor, alarm limits, calibration variables, reports and point summaries. The DCVC shall provide and create the system database using the latest software release, at the time of Shop Drawing approval.

2. The contractor shall provide a BACnet compatible integration server and software to interface with the facility's BAS.

C. Building Ethernet Connection Cabling:

1. The owner shall provide CAT-5e or CAT-6 cabling and installation between the Network Server and the owner's Building Ethernet Connection. Final Building Ethernet Connection shall be coordinated with the University's IT Group.

D. Codes and Regulations

1. All electrical equipment and material and its installation shall conform to the current requirements of the following authorities:

a. Occupational Safety and Health Act (OSHA)

b. National Electric Code (NEC)

c. National Fire Code

2. All Air Sampling Controllers and Multi-Sensor Monitors supplied shall be be listed per:

a. Underwriters Laboratories UL916 for Open Energy Management

3. Where two or more codes conflict, the most restrictive shall apply. Nothing in this specification or related documentation shall be construed to permit work not conforming to applicable codes.

E. The contractor shall have quality control procedures for design and manufacture of facility monitoring systems for precision monitoring, indoor air quality, energy savings and preventative maintenance.

F. The contractor shall provide all test area attribute data and programming and shall coordinate object naming conventions and network map requirements with the owner's internal BAS department. The naming convention shall be submitted with the Shop Drawings for review and approval by owner's BAS department.

2.3   CONTRACTOR (DCVC) EXPERIENCE AND PERFORMANCE

A.   The DCVC installer shall have a local office or representative, staffed with factory trained engineers, fully capable of providing instruction, routine maintenance, and emergency maintenance service on all system components. The contractor shall be responsible for replacement of all products supplied at all times for a period of not less than 1 year following project completion, and the installer shall provide a **48** hour response to a service/warranty call from the owner.

2.4   WARRANTY

A. Repair or replace any defective product and correct any defect in material or workmanship for a period of 12 months following the date of acceptance of the system.

2.5   SENSOR SERVICE EXTENDED WARRANTY YEARS 2,3,4

A. Replace Bren Hall Aircuity sensors with calibrated sensors at 6 month intervals.   (Aircuity or equal, no known equal.)

PART 3   PRODUCTS, HARDWARE

A. AIR SAMPLING NETWORK

1. The Air Sampling Network of the DCVS shall consist of networked based distributed Air Sampling Controllers for routing of discreet air and data packets from the designated test areas/locations back to the Multi-Sensor Monitor; or individual home runs of Air Sampling Tubing from the designated test areas/locations back to the Multi-Sensor Monitor.

2. Air Sampling Network shall be include all electronics, air solenoid valves, sampling manifolds, firmware, and software as furnished as an integral assembly within the Air Sampling Controller or the Multi-Sensor Monitor. Air Sampling Network shall utilize an internal, factory pre-assembled air sampling manifold to interface to the on-board solenoid valves, and push to connect speed fittings for ease of interface to the Air Sampling Tubing. Romex connectors and knockouts shall be factory furnished and installed on the Air Sampling Controller and Multi-Sensor Monitor.

3. Air Sampling Network shall receive commands from the Multi-Sensor Monitor to open the solenoid valve of each test area to be monitored while simultaneously closing all the other solenoid valves in the system. A direct path between the test area and the sensors located with the Multi-Sensor Monitor shall be established to draw a continuous vacuum of air through the Air Sampling Tubing. A continuous duty vacuum pump shall be provided for each Multi-Sensor Monitor.

B. MULTI-SENSOR MONITOR

1. The Multi-Sensor Monitor shall be a distributed, network based, multipoint sensing device. The Multi-Sensor Monitor shall be furnished as a complete, self contained unit housing all electronics, sensing card cage, sampling manifolds, flow regulators, pressure regulators,

firmware, and software.

2. The Multi-Sensor Monitor base unit shall consist of an enclosure; hinged door with keyed lock; terminations area for both field wiring and Air Sampling Tubing connections; a communications/processor board; electronic flow measurement and controller assembly; and sensor bay.

3. The Multi-Sensor Monitor shall utilize a card cage to allow for the ease of selection and installation of a diverse array of environmental and specialty sensors. As a minimum, the Multi-Sensor Monitor shall be incorporate the following sensors to meet the required applications:

   a. Carbon Dioxide sensor shall be dual wavelength element, non-dispersive infrared sensor, range of 0 – 3000 ppm, accuracy of < 1.5% of reading, repeatability of +/- 1ppm, resolution of +/- 1ppm, and response time of 5 seconds.

   b. Total Volatile Organic Compounds (TVOC's), sensor shall be photoionization detector element, range of 0-20 ppm (as Isobutylene), accuracy of +/- 2.5% of reading from 10x the Detection Level to full scale as Isobutylene, resolution of 0.01 ppm, and response time of 30 seconds. In addition TVOC sensor shall include a metal oxide sensor, range of 0-100ppm (as Isobutylene), accuracy of +/- 2ppm or 25% of reading whichever is greater.

   c. Particulate Sensor shall use laser scatter technology and measure particles that range in size from 0.3 to 2.5 microns in size (PM2.5). Response time shall not exceed 30 seconds.

   d. Dewpoint Sensor shall be a non-dispersive infrared hygrometer that measures actual dewpoint by measuring true moisture content of the air in parts per million. Accuracy to be ±0.5°F actual dewpoint. Response time not to exceed 10 seconds. Use of temperature and RH sensors to calculate dewpoint are unacceptable.

4. As a minimum, every six months (twice per year), provide calibration with NIST traceable calibration gases and test instrumentation; functional testing; sensor element evaluation to determine useful life and element replacement as required; and evaluation services to insure the ongoing performance of all sensors installed within the Multi-Sensor Monitor. This service shall include, but not be limited to the following:

   a. Provide a factory certified depot to remove all sensors within the Multi-Sensor Monitor on a periodic basis (as a minimum, twice per year), and replace with pre-packaged, certified, industry traceable, factory calibrated sensors. Removed sensors shall be returned to the DCVC for certified factory recalibration, upgrades, sensor element replacement, and component and board repairs. On-site repair, calibration, or sensor element replacement of sensors is unacceptable. Written records shall be provided to the owner for every visit indicating the performance of such calibrations along with all pertinent data.

   b. All costs for the repair and replacement of any defective sensor, and for any consumable element or part on the sensor shall be included.

   c. All system software upgrades to correct bugs, fixes and patches for the sensors shall be included.

5. Sampling Rate - The sensors selected for the Multi-Sensor Monitor, shall insure that the DCVS sampling rate for any given test area/sampling point be no greater than once per every 15 minutes. The FMC shall provide the appropriate level of sensor performance and the required quantity of Multi-Sensor Monitors to guarantee that each test area/sampling point is sampled continuously and uninterrupted no less than once every 15 minutes.

6. The Multi-Sensor Monitor shall house an on-board flow regulator, orifice plate, and differential pressure sensor to maintain a continuous, regulated flow rate through the Air

Sampling Tubing.

7. On-board diagnostics shall continuously perform system checks to insure the integrity of the Air Sampling Tubing against leaks and occlusions.

8. Multi-Sensor Monitors shall operate on 24vac power fed from a common 120/24 vac transformer connected to the Multi-Sensor Monitor.

C. NETWORK SERVER

1. The Network Server (Server) shall provide network management of Multi-Sensor Monitors, Air Sampling Controllers, Air Sampling Network, integration to the BAS via a BACnet/IP interface, and interface to a web based portal for viewing of graphs, charts and data derived from the DCVS.

2. The owner shall provide CAT-5e or CAT-6 cabling and installation between the Network Server's Network Interface Card and the owner's Building Ethernet Connection. Final Building Ethernet Connection shall be coordinated with the owner's IT Group.

D. AIR SAMPLING TUBING

1. The DCVS shall utilize a pre-engineered system of Air Sampling Tubing to facilitate network wide communications; distribution of low voltage power to Air Sampling Controllers and Multi-Sensor Monitors; and provide a sampling medium for air samples all within a single cable.

2. The cable shall consist of a plurality of wires to distribute communications, data and low voltage power throughout the FMS. As a minimum, Air Sampling Tubing shall consist of:

   a. Communications – 22 AWG twisted shield pair with drain wire

   b. Low Voltage Power – 18 AWG, 3 wire

3. An inner pathway, shall be furnished as an integral part of the Air Sampling Tubing to facilitate collection of test area air samples. Pathway shall be lined with a smooth, electrically conductive, chemically inert surface to insure air samples remain pure and uncorrupted and do not adhere to the wall lining during transport.

4. Air Sampling Tubing shall be suitable for riser and plenum applications, be Underwriter's Laboratories Listed to UL CMP and C-UL CMP standards, and carry the appropriate markings throughout the cable length.

E. DUCT PROBES

1. Duct Probe – Duct and Outdoor Air Mount

   a. A duct temperature sensor and a stainless steel air sample probe is to be mounted within one metal general purpose enclosure. Duct sample probe to accept integral Air Sampling Tubing.

   b. Internal coarse filter to screen out large particulate from entering the Air Sampling Tubing.

   c. Terminations:

      1) Air Sampling Tubing – integral speed fitting

   d. Outdoor Air Sensor:

      1) Provide outdoor air sensor for each sensor suite in associated air handler outdoor air intake duct.

F. ROOM PROBES

1. Room Probe – Wall Mount

    a. A room temperature sensor and air sample probe is to be mounted within an electrical junction box. Room sample probe to accept integral Air Sampling Tubing.

    b. Internal coarse filter to screen out large particulate from entering the Air Sampling Tubing.

    c. Terminations:

       1) Air Sampling Tubing – integral speed fitting

PART 4   PRODUCTS, SOFTWARE

A. SYSTEM SOFTWARE OVERVIEW

1. The DCVC shall provide all software required for operation of the DCVS system specified herein. All functionality described herein shall be regarded as a minimum. The DCVC shall provide the following as a minimum:

    a. Completed database.

    b. Configuration of all the Air Sampling Network, Air Sampling Controllers, Multi-Sensor Monitor, Network Server and user interface application programs.

    c. All Configuration Tools, and all software licenses, required to configure and operate all products installed on this project.

B. WEB BASED USER INTERFACE AND DATA MANAGEMENT SYSTEM

1. Included with the system shall be a fully integrated web based user interface and data management system. The data management system shall be password protected and shall be able to store sampled data form all test areas for online viewing and reporting.

2. Unlimited data access, viewing, report generation and remote data storage shall be provided with the DCVS for the duration of the project commissioning and for the entire warranty period.

C. TEST SEQUENCING

1. The system shall allow the operator to designate any test area to be scheduled with an operator command through the Information Management Server.

2. The operator shall be able to make all schedule additions, modifications and deletions to the test schedules. The operator shall have the capability to edit all schedules and then download any or all schedule changes to the DCVS.

PART 5   EXECUTION

A. GENERAL

1. Verify that systems are complete and ensure that the systems are capable of being started and operated in a safe and normal condition before attempting to operate the DCVS.

2. Install software in Air Sampling Controllers, Multi-Sensor Monitors and Network Server. Implement all features of programs to specified requirements and as appropriate for sequence of operation.

3. Connect and configure equipment and software to achieve sequence of operation specified.

4. Provide power for Air Sampling Controllers, Multi-Sensor Monitors, Network Server and associated DCVS components from nearest electrical control panel noted below or as indicated on the electrical drawings—coordinate with Electrical Contractor.

a. Power supply for Air Sampling Controllers, Multi-Sensor Monitors, Network Server and associated DCVS components shall be connected via a dedicated circuit to the building normal electrical distribution panel. A grounding conductor shall be run from building service entrance panel ground bus. Conductor shall be insulated and isolated from other grounded conductors and building conduit system.

G. TRAINING

1. The contractor shall provide factory-trained instructor to give full instructions to designated personnel in the operation, maintenance, and programming of the system. Instructors shall be thoroughly familiar with all aspects of the subject matter they are to teach. The training shall be specifically oriented to the system and interfacing equipment installed.

2. Instructions shall include 2 parts, the "New Equipment Orientation" and the "Product Training".

3. New Equipment Orientation: A "walk-through" session shall include showing where all field equipment is located throughout the area involved in the project.

4. Product Training: Train technical services and maintenance personnel on-site to adjust, operate, and maintain the DCVS. As a minimum:

   a. Train personnel on procedures and schedules for starting and stopping test sequences, troubleshooting, servicing, and maintaining equipment.

   b. Provide operator training on modification of data display, test area descriptors, executing commands, resetting default values, and requesting reports.

END OF SECTION