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TO: Bid Responders

FROM: Clark Hughes

DATE: April 30, 2020

SUBJECT: ACCC – VENTILATION CONTROL REPLACEMENT - ADDENDUM #5

You are hereby notified in accordance with the specifications for the above referenced project that the following has been issued to clarify the meaning of the drawings and specifications. The conditions and specifications set forth in this addendum are to be considered as binding as if the same
This addendum includes the following items:

1. **SPECIFICATIONS**: The following specification sections are attached to this addendum. Revisions to the specifications are as noted below:
    a. **01010 SCOPE OF WORK**: The specification language has been revised to clarify that the acceptable manufacturers for the CO detection system shall be Honeywell or approved equal. The basis of design for the CO detection system as shown on the drawings is the E3Point system by Honeywell. The new CO detection system shall be seamlessly integrated into the existing Honeywell Building Management System in accordance with specification section 15900.
    b. **15900 HVAC INSTRUMENTATION AND CONTROLS**: The bidder qualifications have been revised. The list of acceptable manufacturers has been revised to clarify that the approved manufacturers for the CO detection system components shall be Honeywell or approved equal. The existing Honeywell Building Management System shall be expanded to fully and seamlessly integrate the new CO detection system into the existing Honeywell Building Management System in accordance with this specification.

END OF ADDENDUM #5 REVISIONS

Cc: Jim McDonald
Timothy Kolody
Marie Remer

ATTH: Revised Specification

SECTION 01010 – SCOPE OF WORK

PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

A. Owner Identification: Spectra Venue Management
2301 Boardwalk
Atlantic City, NJ 08401
Phone: 609-348-7026

B. Engineer Identification: Remington & Vernick Engineers
845 North Main Street
Pleasantville, NJ 08232

C. Contract Documents:

1. These Specifications and associated drawings indicate the extent of the Contract. Contract Documents were prepared for the Project by Remington & Vernick Engineers, 845 North Main Street, Pleasantville, NJ 08232.

D. General:

1. **Scope Summary:** The project consists of the replacement of the existing carbon monoxide detection system in the parking garage of the Atlantic City Convention Center. The existing system consists of approximately 35 CO detectors located throughout ground floor parking garage. The existing detectors are manufactured by Tox Alert International, Inc. The existing Tox Alert system is connected to 21 roof mounted exhaust fans and 21 roof mounted supply fans. The scope of work for this project will be to replace the existing carbon monoxide detection and fan control system. This includes replacement of all carbon monoxide detectors and associated system controllers to operate the exhaust and supply fans. The new control system will operate with a sequence similar to the existing system.

   The basis of design for the proposed CO detection system shall be Honeywell E3Point. Acceptable manufacturers for the proposed CO detection system are Honeywell or an approved equal. The new gas detection and fan control system shall be seamlessly integrated with the existing Honeywell Building Automation System for remote monitoring and control. The scope of work also includes the replacement of the existing motor control panels located on the exterior of some of the rooftop supply and exhaust fans. These panels shall be replaced in kind as indicated on the contract drawings. The contractor shall provide all labor and materials, including all wiring, conduit, control devices, programming, etc.

2. **Controls**: All new equipment shall be fully integrated into the existing Honeywell Building Management System. Provide all new control devices, wiring, controllers, programming, and all other equipment and work necessary for a complete installation of the proposed control system and the seamless integration into the existing Honeywell BMS. The contractor shall provide all necessary programming and other work required to allow control and monitoring of the new CO detection system and existing supply and exhaust fans by the existing Honeywell BMS. See specification section 15900 for additional information.

    a. Contact for Honeywell Building Management System Integration: **Brad Strauss**, Sr. Account Manager, Honeywell Building Solutions, 609-969-1568 (mobile), 856-437-1837 (office), Brad.Strauss@Honeywell.com

3. **Work Phasing**: The gas detection and exhaust system shall remain operational during all scheduled events at the facility and whenever the parking garage is scheduled to be utilized by the general public. The contractor may leave the existing gas detection system operational in place while the new gas detection system is being installed. When the system or individual fans/sensors are to be removed from service, the contactor shall coordinate this work in advance with the Owner.

4. The facility will be occupied during construction. Proper care must be taken by the Contractor and any of their subcontractors as not to disrupt or interfere with the normal operation of the facility during the entire length of this construction contract. Phasing of the work may be required, and the contractor shall include all associated costs in his bid.

5. The facility shall not be without electrical power throughout the contract. The contractor shall provide temporary power if necessary. The contractor shall provide temporary heating and cooling as needed throughout the duration of the contract.

6. At no point shall the facility be without adequate heating between October 15 and May 15. Provide temporary heating and cooling as needed throughout the duration of the contract.

7. The contractor shall temporarily remove ceiling and temporarily support ceiling devices (lighting, detectors, etc.) as necessary to complete the proposed work. The contract shall restore the existing ceiling to a condition equal to or better than the existing condition upon completion of the proposed work. The contractor shall replace all damaged ceiling tiles, lighting, devices, etc. with new. All new materials shall match existing.

8. The Contractor is responsible and obligated to successfully complete the entire project and to complete each and every necessary detail of every item specified and/or is required to complete the specified work regardless of whether or not a particular detail is specifically mentioned in these specifications.

9. The contractor shall provide all temporary utilities required to complete the demolition and new work. Temporary utilities shall include water, electric, heating, and air conditioning as necessary.

10. The contractor shall provide equipment that is compatible with the existing control system at each facility. The contractor shall include in his bid all costs necessary to install controls for new equipment and integrate with the existing Building Automation System.

11. The contractor shall obtain an State of New Jersey licensed electrical contractor, registered and qualified with the State of New Jersey Department of Community Affairs for the installation of all electrical work necessary to complete this project.

12. The Contractor will be required to submit with their bid a proposed work schedule that shall be finalized to reflect actual project milestones after contract award. The project schedule shall follow the requirements of these specifications. Strict adherence to the agreed upon final work schedule will be required for this project. The schedule shall be generated by the Contractor in a Microsoft Project format and shall be updated weekly. Progress reports including the updated schedule (Gantt Chart) will be submitted to the Engineer on a weekly basis. The Building shall not be without electrical power any time except during an agreed upon shutdown as necessary and at no time during the hours of 6 AM to 10 PM, Monday through Friday. The entire building shall not be without adequate occupancy heating at any time after October 15. The Contractor will make provisions for this requirement in the proposal.

13. A Pre-Construction Meeting between the Spectra Venue Management (the Owner), the Engineer, and the Contractor will be required prior to start of construction at a site chosen by the Owner. All allowances/costs for the pre-construction meeting must be included in the Contractor's proposal pricing and submitted with the bid. No additional payments will be made by the Owner for the pre-construction meeting.

14. Contracts:

    a. The Project will be constructed under a single Prime Contracting arrangement.

    b. The contract will be awarded to one Contractor for the work required.

    c. The Contractor's completed bid form shall reflect the actual amount of work required. The amounts on the Contractor's bid form as submitted with their bid will be used to generate the project schedule of values for payment purposes.

    d. The quantities described in the specifications are for the convenience of the contractor only. Items will be paid on a lump sum basis and no additional payment will be made if as-built quantities exceed plan quantities.

    e. All means and methods to complete the scope of work shall be included in the Contractor's bid, even if such is not specifically described herein. Contractor is strongly recommended to visit the site prior to submitting their bid to include all necessary means and methods work to successfully complete the project in their bid.

    f. Only major items of work are given in the Bid Form, but it is the intent of the specifications to secure a completely interconnected and functioning system, and if any workmanship or materials be required which are obviously necessary to carry out the full intent and meaning of the plans and specifications or to be reasonably inferred there from, the cost of such workmanship or materials shall be included in the unit price bid for the major items of work.

    g. Local custom and trade-union jurisdictional settlements do not control the scope of work included in the Prime Contract. When a potential jurisdictional dispute or similar interruption of work is first identified or threatened, the affected Prime Contractor shall promptly negotiate a reasonable settlement to avoid interruption and delays at no additional cost to the Owner.

15. The furnishing of all restoration specified herein required for a complete installation. Any interior or exterior finishes (roofs, ceilings, floors, walkways and walls) and/or landscapes damaged during the installation of the equipment will be repaired /replaced with like materials to the satisfaction of the Owner at no extra cost.

16. The contract price includes a bid item “Allowance”. The allowance is for any additional work that may be required due to unforeseen conditions experienced during the contract period as directed by the Owner/Engineer. Additional work shall only be performed at the direction of the Owner/Engineer.

17. The work shall be in accordance with accepted standards. All demolition materials and scrap shall be disposed of in a legal manner and in accordance with all local, State and Federal or other agencies having jurisdiction.

18. The Contractor shall field verify all existing condition, equipment, and dimensions prior to construction and/or preparation of shop drawings and notify Engineer immediately of major discrepancies.

19. This Scope of Work outlines the general items and distribution of work and shall not be construed as being all-inclusive.

20. The Contractor shall be responsible for applying for and obtaining any and all permits required to satisfactorily complete this construction project. Any costs related to obtaining permits shall be included in the proposal.

21. Codes and Standards: The work as specified and performed for this project shall classify as “renovation work” and as such will comply with all applicable Renovation Sections of the State of New Jersey, Building Code. Where existing equipment is being replaced with new equipment, or wherever additions are made to the existing electrical and mechanical systems said work will comply with the adopted revision of the NEC, NESC, LSC, UL, IBC, NSPC, IMC, IFGC, NFPA, ASME, ANSI or other applicable codes.

22. The Contractor shall be responsible for measuring and recording the existing supply, return, outdoor, and exhaust airflows prior to demolition/modification to equipment, and submit this information in a report to the Engineer. The Contractor shall be responsible for the rebalancing of the new or repaired equipment to their pre-demolition values.

23. The Contractor shall be responsible for any modifications to the existing equipment and equipment support (roof or ground mounted) as needed to accommodate the new or repaired equipment.

24. Provide all electrical work in compliance with the 2014 National Electrical Code and the most current International Building Code acknowledged by the State of New Jersey.

1.2 CONTRACT BOILER PLATE

A. If a discrepancy exists between the Spectra Venue Management Boiler Plate and the General Conditions sections, the Global Spectrum Boiler Plate shall govern.

1.3 WORK SEQUENCE

A. Coordination of Work

1. The Contractor is responsible for verification of all existing dimensions and conditions in order to include all associated costs in the bid price for a complete installation as detailed in these specifications. It is strongly recommended that the Contractor visit the site prior to completing the bid form.

2. The Contractor is responsible for the demolition of existing equipment, electrical power, and controls and the installation of the new equipment and related accessories as described in this specification. As stated previously this includes all modifications to existing equipment, systems, and structures; piping and valves; mechanical equipment; control systems; and electrical equipment and systems, as specified herein and as required to deliver a complete, operational system, even if an item is required by not specifically detailed in the contract drawings or specifications.

3. For the purpose of preparing progress schedules and estimates for payments to the Contractor, the Work to be performed under this Contract has been divided into lump sum items. The contractor is responsible and obligated to successfully complete the entire project and to complete each and every necessary detail of each and every item specified in the contract specifications regardless of whether or not a particular detail is specifically mentioned.

4. The Contractor shall provide As-built drawings of the entire installation. The drawings shall be legible, neat and of a quality acceptable to the Engineer. Actual installation with all items clearly identified shall be indicated. Location of installed items and any deviations from contract documents shall be so shown with boxes around the as-built numbers or labels.

5. The Contractor is responsible to file and receive all permits for the project through the appropriate Construction Office (electrical, plumbing, etc.) All associated costs shall be included in the lump sum proposal bid price.

6. The Contractor is responsible for all coordination of the construction work of the project.

7. The Engineer will monitor the progress of the project and review the status of the completion of work. If one or more of the subContractors is delaying the progress of the project, it shall be the responsibility of the Contractor to take necessary action to bring that portion of the project back on schedule.

8. All costs related to project coordination shall be included by the Contractor.

9. Movable Furnishings – The Contractor shall be responsible for moving non-fixed furnishings. Coordinate with Owner as required.

10. Fixed Furnishings – Fixed furnishings shall be covered by the Contractor for protection where appropriate. The Contractor shall be responsible of protecting the fixed furnishings from any large debris. Coordinate with Owner as required.

11. Equipment Salvage – The Owner has the right to first ownership of salvaged equipment.

12. The Contractor shall provide dumpsters on-site throughout the construction period as necessary to be used by all subcontractors with the general contractor maintaining responsibility. The Contractor's use of construction dumpsters on-site shall be at the discretion of the Owner and only at pre-approved locations and times.

1.4 CONTRACTOR USE OF PREMISES

A. General:

1. During the construction period the Owner will occupy the site during construction. The Contractor shall limit use of the premises to construction activities in the areas associated with the new work. The Contractor's use of the premises is limited only by the Owner's right to perform work or to retain other contractors on portions of the Project. Contractor is not to interfere with Owner's Operations.

2. The contractor shall coordinate all construction activities with the Owner prior to performing the work. A detailed project schedule shall be provided as specified herein. Contractor shall conform to the Owner's requirements specific to each site.

3. Unless written permission is secured from the Engineer in advance, the Contractor must not use any materials found on or adjacent to the site of the Work.

B. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.5 OCCUPANCY REQUIREMENTS

A. Full Owner Occupancy: The Owner will occupy the site during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate owner usage. Perform the Work so as not to interfere with the Owner's operations.

B. Each facility shall not be without electrical power or heating at any time during the hours noted herein. Downtime for equipment shall be minimized, and shall be coordinated and approved with the Owner prior to construction. The Contractor will make provisions for this requirement in the proposal. In the event that temporary heating is required during the course of this project, the contractor will provide acceptable temporary heating to the building at no additional cost to the Owner.

1.6 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format and CSI/CSC's "MasterFormat" numbering system.

1. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the table of contents at the

beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 15900 – HVAC INSTRUMENTATION AND CONTROLS

1. GENERAL

1.1. SUMMARY

Intent of this specification is to design, supply, install, commission and service a complete and operating Facility Management System (FMS), utilizing Direct Digital Controls as shown on the drawings and as described herein. This shall include DDC Controls for CO detectors, sensors and relays, all trending, reporting and maintenance management functions related to normal building operations all as indicated on the drawings or elsewhere in this specification.

The FMS Contractor shall furnish all labor, material, equipment, software or any other services not specifically referred to herein or on the plans, those that are required to meet the functional intent of this specification, shall be provided without additional cost to the Owner.

The intent of this specification is to expand and upgrade the existing AC Convention Center/Honeywell Enterprise Building Integrator (EBI) software package to accommodate new controls required for and specified for this project. Provide all required hardware and software for BACnet integration of new Carbon Monoxide detection system, and new DDC controls for control of exhaust fans as part of this project to the existing Honeywell EBI platform. Upgrade existing EBI platform to latest version. Controls contractor shall provide a complete BACnet control system including connectivity to the existing Honeywell building automation system/network. Provide all required software including point database expansion, point mapping and graphic programming to integrate new system into EBI platform shall be provided under this contract. Upgrade system as required to assure all front-end software, if required, is at current revision.

1.2. Definitions

i. *Algorithm:* A software procedure for solving a recurrent mathematical or logical problem.

ii. *Analog*: A continuously varying signal or value (temperature, current, velocity, etc.).

iii. *Binary:* A two-state system where an "ON" condition is represented by a high signal level and an "OFF" condition is represented by a low signal level.

iv. *Facility Management System (FMS)*: The entire system of hardware and software specifically designed to centrally manage building HVAC and related utilities with seamless integration between various sub-systems within the facility.

v. *FMS Contractor*: The Facility Management System Contractor responsible for the design, supply, install, commission and service of the Facility Management Control System specified herein.

vi. *Control Process*: The software required to perform a complete control loop from input signal to interlock logic, process calculation to final output signal control.

vii. *Control Wiring*: Includes conduit, wire and wiring devices to install a complete Control System including motor control circuits, interlocks, thermostats, switches and like devices. Includes all wiring from a DDC cabinet to all sensors and points defined in the Points List summary or specified

herein and required to execute the sequence of operation. Includes necessary power wiring to all FMS devices, digital controllers including terminal units and actuators.

viii. *Direct Digital Control System*: The portion of the FMS, which provides closed loop control of all CO and associated equipment.

ix. *Distributed Control*: A system whereby all control processing is decentralized and independent of a central computer. The control system is built up of stand-alone controllers. A single controller failure shall not impact more than one system within the FMS

x. *Integration:* The ability of control system components from different manufacturers to connect and provide coordinated control via real-time data exchange through a common communications data exchange protocol. Integration shall extend to the operator's workstation software, which shall support user interaction with all control system components.

xi. *Open technology Offering:* The solution offered must be based on open protocol technology like BACnet®®. The specification includes general requirements for the system offered as well as specific clauses detailing requirements of the open technologies that could be offered. The solutions offered must be based on one technology only. Hybrid solutions utilizing multiple protocols at different levels are not acceptable. The system shall provide a direct BACnet®®® interface. This interface shall provide the functionality to operate a building management system based on Native BACnet®® DDC controllers and other BACnet®® devices. Solutions requiring gateways or data servers are not acceptable.

xii. *Network:* A system of distributed control units that are linked together on a communication highway. A network allows sharing of point information between all control units. Additionally, a network provides central monitoring and control of the entire system from any distributed control unit location. First tier networks shall provide "Peer-to-Peer" communications. Second tier networks shall provide either "Peer-to-Peer", Master-Slave or Supervised Token Passing communications.

xiii. *Operator-Machine Interface*: A method by which an operator communicates with a FMS System. Operator-machine interfacing allows an operator to command, monitor and program the system.

xiv. *Peripheral:* Input / Output equipment used to communicate with the computer and make copies of system outputs. Peripherals include CRT, printer, tape deck, diskette, etc.

xv. *PID Control Loop:* A mathematical calculation used to evaluate a control input and determine the control output value required to maintain the input value at set-point. The PID (Proportional, Integral, Derivative) control loop shall have operator adjustable maximum rate of change, P and D gains and loop response time delay. The loop shall be self-integrating so that no integral constant is required and the loop shall not be subject to "Integral Windup".

xvi. The term "provide" means "provide complete in place", that is, furnished and installed and ready for operation and use.

1.3. QUALIFICATION OF BIDDERS

1.4. Submittals

A. Each submittal shall have a cover sheet with the following information provided: submittal ID number; date; project name, address, and title; BMS Contractor name, address and phone number; BMS Contractor project manager, quality control manager, and project engineer names and phone numbers.

B. Each submittal shall include the following information.

1. BMS riser diagram showing all DDC controllers, operator workstations, CO Sensors, networks repeaters if necessary, and network wiring.

2. One-line schematics and system flow diagrams showing the location of all control devices.

3. Points list for each DDC controller, including: Tag, Point Type, System Name, Object Name, Expanded ID, Display Units, Controller Type, Address, Cable Destination, Module Type, Terminal ID, Panel, Slot Number, Reference Drawing, and Cable Number.

4. Contractor's own written description for each sequence of operations, to include the following:

a) Sequences shall reference input/output and software parameters by name and description.
b) The sequences of operations provided in the submittal by the BMS Contractor shall represent the detailed analysis needed to create actual programming code from the design documents.
c) Points shall be referenced by name, including all software points such as programmable setpoints, range limits, time delays, and so forth.
d) The sequence of operations shall cover normal operation and operation under the various alarm conditions applicable to that system.
e) Control Valve Schedules. This spreadsheet type schedule shall include a separate line for each valve and a column for each of the valve attributes, including: Code Number, Configuration, Fail Position, Pipe Size, Valve Size, Body Configuration, Close off Pressure, Capacity, Valve CV, Calculated CV, Design Pressure, Actual Pressure, and Actuator Type.
f) Catalogued cut sheets of all equipment used. This includes, but is not limited to, the following: DDC panels, peripherals, sensors, actuators, dampers, control air system components, and so forth.
g) Hardware data sheets for all operator workstations, DDC controllers, DDC panels, DDC panel mounted operator interface terminals, sensors, valves & actuators and other field devices .

1.5. O&M Manuals

1. Submit three sets of each manual. Include the following documentation in the Hardware Manual:
a) General description and cut sheets for all components.
b) Detailed wiring and installation illustrations and complete calibration procedures for each field and panel device.
c) Complete trouble-shooting procedures and guidelines.
d) Complete operating instructions for all systems.
e) Maintenance Instructions: Document all maintenance and repair/replacement procedures.

2. Include the following documentation in the DDC Software Manual:
a) Sequence of Operations
b) Flow Chart Diagrams of Programming Objects.
c) Printed listing of controller and operator workstation database files.
d) Software Point Name, Abbreviation List. Include Name, Description, Controller Where Located, Point Type and Point ID.

e) I/O Point List: Include Point Name, Controller Location, Point Number, Control Device, Range and Span.
f) Printouts of all; Reports, Group Listings and Alarm Messages.
g) Index of all DDC point names with documentation manual page number references.

3. Provide three copies of all manufacturers manuals covering the installed system. This shall include, as a minimum:
a) System Engineering Manual
b) System Installation Manual
c) Programming Manual
d) Engineering and Troubleshooting Bulletins
e) Operator Workstation Software Manual
f) All other pertinent manuals published by the control system manufacturer.

1.6. AGENCY AND CODE APPROVALS

All products of the FMS shall be provided with the following agency approvals. Verification that the approvals exist for all submitted products shall be provided with the submittal package. Systems or products not currently offering the following approvals are not acceptable.

- UL-916; Energy Management Systems
- ULC; UL - Canadian Standards Association
- FCC Part 15 Subpart B:2009
- CE Certification for products tested according to EN 61326 – 1: 2006
- BTL Tested and Certified as per applicable device profile.

1.7. SOFTWARE LICENSE AGREEMENT

The Owner shall sign a copy of the manufacturer's standard software and firmware licensing agreement as a condition of this contract. Such license shall grant use of all programs and application software to Owner as defined by the manufacturer's license agreement, but shall protect manufacturer's rights to disclosure of trade secrets contained within such software.

1.8. DELIVERY, STORAGE AND HANDLING

Provide factory-shipping cartons for each piece of equipment and control device. Maintain cartons through shipping, storage, and handling as required to prevent equipment damage. Store equipment and materials inside and protected from weather.

1.9. JOB CONDITIONS

Cooperation with Other Trades: Coordinate the Work of this section with that of other sections to insure that the Work will be carried out in an orderly fashion. It shall be this Contractor's responsibility to check the Contract Documents for possible conflicts between his Work and that of other crafts in equipment location, pipe, duct and conduit runs, electrical outlets and fixtures, air diffusers, and structural and architectural features.

1.10.QUALITY ASSURANCE

The Manufacturer of the FMS digital controllers shall provide documentation supporting compliance with ISO-9001 (Model for Quality Assurance in Design/Development, Production, Installation and Servicing).

2. MATERIALS

A list of approved manufacturers is listed below:

Sl. No.	Item / Products	Approved Make
1	FMS Software	1. Honeywell
2	DDC Controllers	1. Honeywell Native BACnet® Controllers 2. Or approved equal
3	CO Sensors	1. Honeywell 2. Or approved equal

2.1. SYSTEM DESCRIPTION

The entire Facility Management System (FMS) shall be comprised of a network of interoperable, stand-alone digital controllers communicating on an open protocol communication network to the existing Honeywell Enterprise Building Integrator (EBI) host server within the AC Convention Center Network.

The basic controls system also includes all sensors, controllers, instruments, valves, pneumatic actuators, devices, installation and service for a complete and functional controls system. All control devices (valves, dampers, actuators, etc.) are included under the contract unless specifically specified elsewhere in

The Installed system shall provide secure password access to all features, functions and data within the overall FMS in a defined hierarchy.

It is the intent of this project and specification have all existing controls residing on the EBI platform to be on the latest revision of EBI. Provide, if required upgraded software and hardware required to meet this intent.

2.2. OPEN, INTEROPERABLE, INTEGRATED ARCHITECTURES

a) The intent of this specification is to provide an Open System solution that utilizes industry standard communications protocols consisting of peer-to-peer networked, stand-alone, distributed controls in compliance with ANSI/ASHRAE Standard 135-1995/2004 BACnet® communication protocol in one open, interoperable system. Open System communication protocols shall be utilized Top-to-Bottom from front-end Graphical User Interface (GUI) to the field level distributed controllers. Proprietary communications, objects, or communication

"Tiers" are not acceptable allowing highest level of interoperability between control devices and systems.

b) The existing Honeywell Enterprise Building Integrator software shall employ object-oriented technology (OOT) for representation of all data and control devices within the system. In addition, adherence to industry standards including ANSI / ASHRAE™ Standard 135-1995/2004 BACnet® to assure interoperability between all system components is required. For all native BACnet® device, the device supplier must provide a PICS document showing the installed device's compliance level, or BIBB's listing supported objects, properties, and services. All native BACnet® Controllers should confirm to BIBB's profile for B-BC, B-ASC, B-AAC as applicable with the ability to support minimum data read and write functionality listed in the associated control drawings and points list.. Physical connection of BACnet® devices shall be via Ethernet utilizing BACnet® over IP without the need for additional hardware viz. routers and / or gateways.

c) All network controllers supplied under this contract shall be true "peer-to-peer" communicating devices. Plant controllers requiring "polling" by a host to pass data shall not be acceptable.

d) A hierarchical topology is required to assure reasonable system response times and to manage the flow and sharing of data without unduly burdening the customer's internal Intranet network. Systems employing a "flat" single tiered architecture shall not be acceptable.

2.3. NETWORKS

a) The Local Area Network (LAN) shall be either a 10 or 100 Megabits/sec Ethernet network supporting BACnet®, Java, XML, HTTP, and CORBA IIOP for maximum flexibility for integration of building data with enterprise information systems and providing support for multiple Network Area Controllers (NACs), user workstations and, a local host computer system.

b) Local area network minimum physical and media access requirements:

1. Ethernet; IEEE standard 802.3
2. Cable; 10 Base-T, UTP-8 wire, category 5
3. Minimum throughput; 10 Mbps, with ability to increase to 100 Mbps

2.4. NETWORK CONTROLLER (NC)

a) The Network Controller (NC) shall be a Native BACnet® controller based on 32 bit technology to provide the interface between the LAN or WAN and the field control devices, and provide global supervisory control functions over the control devices connected to the NC. The NC shall conform to BACnet® Building Controller (B-BC) profile and be provided with appropriate PIC statement defining BACnet® services and objects supported. BACnet® Data Sharing BIBBs supported shall include at a minimum: RP, RPM, WP, WPM, COV. Alarm and Event, Trending, and scheduling including SCHED-A BIBBs support shall also be supported in BACnet® native communications. The NC shall physically connect to the LAN without the need for additional Router hardware. The NC shall support transmitting and receiving segmented messages as well as BACnet® Broadcast Messages over IP. It should be possible to define any NC in an IP subnet as a BBMD device. The NC shall also support both Secure (https://) and non-secure (http://)

remote web server access using commonly used web browsers. It shall be capable of executing application control programs to provide:

1. Calendar functions
2. Scheduling
3. Trending and Trending Backfill
4. Alarm monitoring and routing
5. Time synchronization
6. Integration of BACnet® devices and BACnet® controller data
7. Integration of MODBUS devices and MODBUS controller data

b) The Network Controller must provide the following hardware features as a minimum:

1. One Ethernet Port -10 / 100 Mbps RJ45
2. One RS-232 port
3. One RS 485 port
4. Three independent BACnet® MS/TP Channel capable of supporting up to 90 Unitary controllers
5. A minimum of 24 On-board I/O, expandable up to 128 hardware points
6. Battery Backup using Gold Capacitor to avoid low battery alarms and subsequent replacement during service life of the controller.
7. Flash memory for long term data backup (If battery backup or flash memory is not supplied, the controller must contain a hard disk with at least 1 gigabyte storage capacity)
8. A Reset Button
9. The NC must be capable of operation over a temperature range of 0 to 50°C
10. The NC must be capable of withstanding storage temperatures of between 5 and 70°C
11. The NC must be capable of operation over a humidity range of 5 to 93% RH, non-condensing

c) Integration

1. Any or all the 3 independent MS/TP channels may be used to integrate MODBUS devices like Energy Meters etc. or BACnet® devices and BACnet® controller data. The FMS contractor shall include if any, license required for this interface within their scope.

d) Event Alarm Notification and actions

1. The NC shall provide alarm recognition, storage; routing, management, and analysis to supplement distributed capabilities of equipment or application specific controllers.
2. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including but limited to:
    a. To alarm
    b. Return to normal
    c. To fault
3. Provide for the creation of an unlimited number of alarm classes for the purpose of routing types and or classes of alarms based on priority
4. Provide timed (schedule) routing of alarms by class, object, group, or priority.
5. Provide alarm generation from binary object "runtime" and /or event counts for equipment maintenance. The user shall be able to reset runtime or event count values with appropriate password control.

d) Control equipment and network failures shall be treated as alarms and annunciated.

e) A log of alarms shall be maintained by the NC

f) Provide a "query" feature to allow review of specific alarms by user defined parameters.

g) A separate log for system alerts (controller failures, network failures, etc.) shall be provided and available for review by the user.

h) An Error Log to record invalid property changes or commands shall be provided and available for review by the user.

2.5. Native BACnet® Advanced Application Specific Controller (B-AAC)

1. Controller shall be 32 bit microprocessor based BACnet® Advanced Application Controller in accordance with the ANSI/ASHRAE Standard 135-2004 The application control program shall be resident within the same enclosure as the input/output circuitry, which translates the sensor signals. The system supplier must provide a PICS document showing the installed systems compliance level to the ANSI/ASHRAE Standard 135-2004.

2. All Advanced Application Controller shall be fully programmable with the help of Windows based software programming tool and shall at all times maintain their BACnet® compliance. Controllers offering application selection only (non-programmable), require a 15% spare point capacity to be provided for all applications. All control sequences within or programmed into the B-AAC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery, to be retained.

3. Stand-alone, Native BACnet®, UL Listed Application Controllers shall be used to provide direct digital control of HVAC equipment. In addition to their standalone capabilities, they shall also provide the ability networked in a peer-to-peer, BACnet® MS/TP field network to other MS/TP controllers, and VAV/SPC zone controllers on the single MS/TP channel.

These controllers may be used to optimize the energy consumption by implementing various control strategies such as temperature setup/setback etc.

4. Standard features for all Advanced Application Controllers shall include:

a. 32 bit microprocessor based controllers

b. Stand-alone or networked peer-to-peer capabilities on single MS/TP channel, Masters to slave devices are not acceptable

c. Should have on-board Real Time Clock

d. Should support BACnet® intrinsic alarm reporting

e. Should support calendar objects for scheduling

f. Should comply to BACnet® B-AAC device profile

g. Flexibility to be used and connected to Network Controller to expand the I/O capacity of network controller

h. BACnet® MS/TP LAN with configurable baud rate from 9600 to 76.8k baud

i. All Inputs to be Universal Inputs with 12 bit resolution- software selectable as analog or digital with standard and custom ranges.

j. Pulse counting shall be available for any one of binary inputs up to 15Hz frequency

k. Standard P, PI, or PID BACnet® Loop Objects

l. Minimum of one Loop Object for each output

2.6. PACKAGING AND ENVIRONMENT

1. Distributed unitary controller enclosures (panels) shall be locking type, metal cabinet, with common keying. The panels shall have a metal print pocket suitable for storing wiring, service and log information. Indoor panels shall be NEMA 1 enclosures with gaskets. Any panels in cooling tower or chemically treated areas shall be stainless steel (Fiberglass enclosures rated for outside applications are acceptable). VAV box controllers shall have a safety cover but no enclosure is required.

2. The panel, when required, must functionally operate over a temperature range of 0 to 50 , and a humidity range of 0 - 93% non-condensing.

3. DDC panels shall come with a minimum of six pre-existing available knockouts for ease of wiring during installation.

4. The electrical requirements shall be identified and coordinated by the Controls Contractor. Any 230 VAC requirements are to be coordinated with controls/Electrical Contractor.

The controls/Electrical Contractor shall provide 230 VAC power circuits to each panel. 230 VAC power should not be installed in the same panel as 24 VAC. However, if 230 VAC power must be installed in the same panel with 24 VAC power due to design and/or system constraints, the 230 VAC side of the panel shall be physically isolated from the 24VAC side and clearly labeled. Use panduits in each control panel to conceal all wiring. Fuse all transformers.

5. Control panels shall be clearly identified by labels (2" lettering).

6. Provide and install as-built wiring diagrams to indicate the control points on all equipment. Also provide laminated point lists in all control panels.

2.7. GRAPHICAL USER INTERFACE SOFTWARE

Operating System:

The GUI shall run on Microsoft Windows XP or Microsoft Windows 2012 or 2016 Server.

Server Computer

The system server computer shall comprise of the following minimum hardware:

- Intel Core 2 Duo 2.66Ghz
- 4GB of RAM
- Graphics card capable of 1280x1024 pixel resolution and 65K colors
- 12 function-key keyboard
- Mouse pointing device
- 80 GB Hard disk drive
- DVD ROM drive
- TCP/IP adaptor
- UL Listed server computer platform shall be used when UL compliant system is required.

2.8. SYSTEM PROGRAMMING

1. Modify the existing EBI Graphical User Interface software (GUI) with new graphics representing new equipment being installed as part of the project. Existing GUI shall provide the ability to perform system programming and graphic display engineering as part of a complete software package. Access to the programming functions and features of the GUI shall be through password access as assigned by the system administrator.

2. A library of control, application, and graphic objects shall be provided to enable the creation of all applications and user interface screens. Applications are to be created by selecting the desired control objects from the library, dragging or pasting them on the screen, and linking them together using a built in graphical connection tool. Completed applications may be stored in the library for future use. Graphical User Interface screens shall be created in the same fashion.

3. EXECUTION

3.1 INSTALLATION

1. All work described in this section shall be installed, wired, circuit tested and calibrated by factory certified technicians qualified for this work and in the regular employment of the FMS system manufacturer or its exclusive factory authorized installing contracting field office (representative). The installing office shall have a minimum of five years of installation experience with the manufacturer and shall provide documentation in submittal package verifying longevity of the installing company's relationship with the manufacturer. Supervision, calibration and checkout of the system shall be by the employees of the local exclusive factory authorized FMS contracting field office (branch or representative).
2. Install system and materials in accordance with manufacturer's instructions, and as detailed on the project drawing set.
3. Drawings of FMS are diagrammatic only and any apparatus not shown, such as relays, accessories, etc., but required to make the system operative to the complete satisfaction of the Architect shall be furnished and installed without additional cost.
4. Line and low voltage electrical connections to control equipment shown specified or shown on the control diagrams shall be furnished and installed by the FMS sub-contractor in accordance with these specifications.
5. Equipment furnished by the FMS Contractor that is normally wired before installation shall be furnished completely wired. Control wiring normally performed in the field will be furnished and installed by the FMS sub-contractor.
6. All control devices mounted on the face of control panels shall be clearly identified as to function and system served with permanently engraved phenolic labels.

3.2 WIRING

All electrical control wiring and power wiring to the control panels shall be the responsibility of the FMS contractor.

All wiring shall be in accordance with the Project Electrical Specifications, the National Electrical Code and any applicable local codes. All FMS wiring shall be installed in the conduit types specified in the Project Electrical Specifications unless otherwise allowed by the National Electrical Code or applicable local codes. Where FMS plenum rated cable wiring is allowed it shall be run parallel to or at right angles to the structure, properly supported and installed in a neat and workmanlike manner.

3.3 WARRANTY

Equipment, materials and workmanship incorporated into the work shall be warranted for a period of one year from the time of system acceptance.

Within this period, upon notice by the Owner, any defects in the FMS due to faulty materials, methods of installation or workmanship shall be promptly (within 48 hours after receipt of notice) repaired or replaced by the FMS sub-contractor at no expense to the Owner

3.4 WARRANTY ACCESS

The Owner shall grant to the FMS sub-contractor, reasonable access to the FMS during the warranty period.

3.5 ACCEPTANCE TESTING

Upon completion of the installation, the FMS sub-contractor shall load all system software and start-up the system. The FMS sub-contractor shall perform all necessary calibration, testing and de-bugging and perform all required operational checks to insure that the system is functioning in full accordance with these specifications.

The FMS sub-contractor shall perform tests to verify proper performance of components, routines, and points. Repeat tests until proper performance results. This testing shall include a point-by-point log to validate 100% of the input and output points of the DDC system operation.

Upon completion of the performance tests described above, repeat these tests, point by point as described in the validation log above in presence of Owner's Representative, as required. Properly schedule these tests so testing is complete at a time directed by the Owner's Representative. Do not delay tests so as to prevent delay of occupancy permits or building occupancy.

System Acceptance: Satisfactory completion is when the FMS sub-contractor has performed successfully all the required testing to show performance compliance with the requirements of the Contract Documents to the satisfaction of the Owner's Representative. System acceptance shall be contingent upon completion and review of all corrected deficiencies.

3.6 OPERATOR INSTRUCTION, TRAINING

During system commissioning and at such time acceptable performance of the FMS hardware and software has been established the FMS sub-contractor shall provide on-site operator instruction to the owner's operating personnel. Operator instruction shall be done during normal working hours and shall be performed by a competent representative familiar with the system hardware, software and accessories.

The FMS sub-contractor shall provide 40 hours of instruction to the owner's designated personnel on the operation of the FMS and describe its intended use with respect to the programmed functions specified. Operator orientation of the FMS shall include, but not be limited to; the overall operation program, equipment functions (both individually and as part of the total integrated system), commands, systems generation, advisories, and appropriate operator intervention required in responding to the System's operation.

The training shall be in three sessions as follows:

Initial Training: One day session (8 hours) after system is started up and at least one week before first acceptance test. Manual shall have been submitted at least two weeks prior to training so that the owners' personnel can start to familiarize themselves with the system before classroom instruction begins.

First Follow-Up Training: Two days (16 hours total) approximately two weeks after initial training, and before Formal Acceptance. These sessions will deal with more advanced topics and answer questions.

Warranty Follow Up: Two days (16 hours total) in no less than 4 hour increments, to be scheduled at the request of the owner during the one year warranty period. These sessions shall cover topics as requested by the owner such as; how to add additional points, create and gather data for trends, graphic screen generation or modification of control routines.

END OF SPECIFICATION