GENERAL:
Bidders are requested to attach this Addendum to the inside front cover of each Project Manual.

Please inform all concerned that the Documents are modified by this Addendum.

Acknowledge receipt of this Addendum by inserting number and date in space provided on the Bid Form.

CHANGES TO THE PROJECT MANUAL

TOC-5 - TABLE OF CONTENTS
Delete Section 16771 Area of Rescue Assistance System.

Section 04810 – UNIT MASONRY ASSEMBLIES
Part 2.1.C.3 – Change colors to Trenwyth Industries “eastern selection” of colors as follows:
Color #1: Change “Tuscan White” to “Gunsmoke” or “Temple Grey” as Architects option.
Color #2: Change “Prescott Gray” to “Ravenstone”.
Color #3: Change “Saginan” to “Colonial Red”.

Section 09672 – SPECIAL RUBBER SHEET FLOORING (SSF-TL)
Part 2.1.B – Add the following acceptable manufacturers provided they meet the requirements of the specifications: “Dynamic Sports Construction: DynaForce 7+2”.

Section 09673 – SPECIAL RUBBER SHEET FLOORING (SSF-P)
Part 2.1.B.1 – Add the following acceptable manufacturer provided they meet the requirements of the specifications: “Beynon Sports Surfaces: Polyturf Plus Pad & Pour” and “Dynamic Sports Construction: DynaForce 7+2 with textured finish”.

Part 2.1.B.2 - Add the following acceptable manufacturer provided they meet the requirements of the specifications. “Beynon Sports Surfaces: Polyturf Plus Pad & Pour” and “Dynamic Sports Construction: DynaForce 7+2 with dust finish”.

ADDENDUM NO. 2
Section 11490 – GYMNASIUM EQUIPMENT
Part 2.3.A – Add the following acceptable manufacturer provided they meet the requirements of the specifications. “Sportable Scoreboards, Inc., www.sportablescoreboards.com”

Part 2.3.B.1.a – Change 20 amps to 5 amps.

Section 11492 – INDOOR CLIMBING WALL
Part 2.1.A. – Add the following acceptable manufacturer provided they meet the requirements of the specifications. “Eldorado Wall Company”

Section 15186 – STEAM CONDENSATE PUMPS
Part 2.1, A, 1 – Add “Weinman” and “Alyan Pump Company.”

Section 15710 – HEAT EXCHANGERS
Part 2.1, A, 1 – Add Thrush Co., Inc.

Section 15900 – BUILDING AUTOMATION SYSTEM
Replace entire section with Section 15900 attached hereto and made part of this Addendum.

REVISIONS TO THE DRAWINGS

DRAWING C4.0
1. Steam and condensate piping note on building – Delete “6” Steam, 3” Condensate Return” and substitute 4” Steam, 2” Pumped Condensate Return.”
2. Delete note: “BUS STOP SHELTER REFER TO ARCH. PLANS FOR ADDITIONAL INFORMATION.”

DRAWING A2.09
5/A2.09 – Delete 16 GA STL HEAD DEFLECTOR SHIELD

End of ADDENDUM NO. 2
SECTION 15900 – BUILDING AUTOMATION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
   A. Drawings and general provisions of the Contract Documents apply to this Section.

1.2 SUMMARY
   A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.
   B. Work Under Other Sections:
      1. All wells, valves, taps, dampers, flow stations, etc. furnished by the BAS manufacturer shall be installed under Section “Hydronic Piping”.
      2. The following shall be provided under Division 16 specifications sections:
         a. 120V power to BAS panels and devices with circuits indicated on the drawings. See paragraph “Coordination” below.
         b. Wiring of power feeds to disconnect switches and starters.
         c. Wiring from disconnect switches and starters to electric motors.
         d. Wiring of any remote start/stop switches and manual or automatic motor speed control devices not furnished under this section of the specifications.

1.3 DEFINITIONS
   A. BAS: Building Automation System
   B. DDC: Direct-digital controls.
   C. IT: Information Technology
   D. IS: Information Systems
   E. LAN: Local area network.
   F. MS/TP: Master-slave/token-passing.

1.4 SYSTEM DESCRIPTION
   A. The Building Automation System (BAS) shall be comprised of Network Area Controller or Controllers (NAC) within the building. NAC shall be a Tridium JACE 4 or 5 series as required by the application. The JACE shall connect to the owner’s local or wide area network and to the existing Tridium Web Supervisor server. Access to the system, either locally in each building, or remotely from a central site or
sites, shall be accomplished through standard Web browsers, via the Internet and/or local area network. Each JACE shall communicate to LonMark/LonTalk and/or BACnet controllers.

B. Control system consists of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking network environment and programmed to control mechanical systems.

C. Control system includes interfaces to the following:

1. Building lighting control system specified in Division 16 Section "Lighting Control Devices".
2. Fire alarm system specified in Division 16 Section "Fire Alarm".

1.5 WARRANTY

A. Provide all services, materials and equipment necessary for the successful operation of the entire BAS system for a period of one year beginning on the date of substantial completion.

B. Services, materials, and equipment shall include but not be limited to:

1. The adjustment, required testing, and repair of the system including all computer equipment, transmission lines, transmission equipment, sensors and control devices.
2. On-line support services shall be provided as follows:
   a. The local BAS representative shall have the capability to monitor and control the facility’s building automation system via a dialup connection. This connection to the facility shall be made within 2 hours of the time a problem is reported.
   b. If the problem is not resolved by local support, the national office of the building automation system manufacturer, having the same dialup capability, shall also attempt to solve the problem online. If the problem cannot be resolved with on-line support, the BAS representative shall dispatch the appropriate personnel to the job site to resolve the problem within 4 hours of the time that the problem is reported.
   c. This coverage shall include normal business hours, after business hours, weekends and holidays.

1.6 SUBMITTALS

A. Pre-submittal meeting: The contractor performing work under this section of the specifications shall attend a meeting for the purpose of coordinating the control system with major pieces of equipment including Air Handling Units, HVAC Package Pumping System, and the Chillers. The meeting shall be held in the Contractor’s trailer on site or other location convenient to the project site. The Contractor shall arrange the meeting. Equipment submittals shall be complete and control submittals shall be roughly 30% complete at the time of the meeting so detailed coordination items can be discussed.

B. Submit 10 complete sets of documentation in the following phased delivery schedule:

1. Schedule of dampers including size, leakage, and flow characteristics.
2. Schedule of valves including leakage and flow characteristics.
3. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated. Include each control device labeled with setting or adjustable range of control.
4. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection. Include the following:

   a. System schematics, including:
      1) Written sequences of operation
      2) Listing of connected data points, including connected control unit and input device.
         a) point names
         b) point addresses
      3) Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
      4) Details of control panel faces, including controls, instruments, and labeling.
      5) Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
      6) Trunk cable schematic showing programmable control unit locations and trunk data conductors.
      7) System graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations. Submittal shall also include a copy of each of the graphics developed for the Graphic User Interface at the Web Supervisor including a flowchart (site map) indicating how the graphics are to be linked to one another for system navigation. The graphics are intended to be 80% - 90% complete at this stage with the only remaining changes to be based on review comments from the A/E design team and/or Owner.
      8) System configuration showing peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.

5. Commissioning plan.

6. Certification as system integrator

C. Maintenance Data: For systems to include in maintenance manuals specified in Division 1. Include the following:

1. Maintenance instructions and lists of spare parts for each type of control device and compressed-air station.
2. Interconnection wiring diagrams with identified and numbered system components and devices.
4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
5. Calibration records and list of set points.

D. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors. Revise Shop Drawings to reflect actual installation and operating sequences.

E. Upon project completion, submit operation and maintenance manuals, consisting of the following:

1. Index sheet, listing contents in alphabetical order
2. Manufacturer’s equipment parts list of all functional components of the system.
3. Auto-CAD disk of system schematics, including wiring diagrams
4. Sequence of operations
5. As-Built interconnection wiring diagrams
7. Trunk cable schematic showing remote electronic panel locations, and all trunk data
8. List of connected data points, including panels to which they are connected and input device (ionization detector, thermostat, etc.)
9. Software and Firmware Operational Documentation: Include the following:
a. Software operating and upgrade manuals.  
b. Program Software Backup: On a magnetic media or compact disc, complete with data files.  
c. Device address list. 
d. Printout of software application and graphic screens.  
e. Software license required by and installed for DDC workstations and control systems. 

10. Software Upgrade Kit: For Owner to use in modifying software to suit future power system revisions or monitoring and control revisions.

11. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

1.7 QUALITY ASSURANCE

A. The BAS system shall be designed and installed, commissioned and serviced by employees trained and certified by the manufacturer of the systems provided. Programming of the JACE and Web Supervisor must be performed by engineers that have met the requirements of the Tridium Certification Program.

B. Manufacturer Qualifications: A firm experienced in manufacturing automatic temperature-control systems similar to those indicated for this Project and with a record of successful in-service performance.

C. All materials and equipment used shall be standard components, regularly manufactured for this and/or other systems and not custom designed specially for this project.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. Electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Section 15, governing radio frequency electromagnetic interference and shall be so labeled.

F. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilation Systems."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to unit manufacturer.

1.9 COORDINATION

A. Control Wiring: The BAS manufacturer shall be responsible for all BAS and Temperature Control wiring for a complete and operable system. All wire and cable shall be plenum rated. Wire and cable shall be run in conduit unless otherwise indicated. Wire and cable in concealed locations may be run without conduit in “J” hooks. Wire and conduit shall be in accordance with Division 16 specification sections and all local, state and national codes and ordinances.

B. Power Wiring:

1. Power wiring indicated (device and circuit designation indicated) on the drawings shall be provided under Division 16.

2. The BAS manufacturer shall be responsible for power wiring not indicated (device or circuit designation not indicated) on the drawings. It shall be the BAS manufacturer’s responsibility to review the contract documents to determine the extent of power wiring included in Division 16.
and to provide additional power wiring as required. Work shall be in accordance with Division 16 specifications and all local, state and national codes and ordinances.

C. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation. All conduits shall be concealed within wall and above ceilings unless indicated otherwise.

D. Coordinate installation of conduit to avoid cutting of finished surfaces.

E. Coordinate equipment with Division 16 Section "Lighting Control Devices" to achieve compatibility with equipment that interfaces with that system.

F. Coordinate equipment with Division 16 Section "Fire Alarm" to achieve compatibility with equipment that interfaces with that system.

G. Coordinate supply of conditioned electrical circuits for control units and operator workstation.

H. Coordinate equipment with Division 16 Section "Panelboards" to achieve compatibility with starter coils and annunciation devices.

I. Coordinate equipment with Division 16 Section "Motor-Control Centers" to achieve compatibility with motor starters and annunciation devices.

J. Coordinate with other systems indicated on the control drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Web Supervisor Server & JACE – Tridium, Inc.
   1. All programming of the JACE and Web Supervisor shall be performed by a Tridium-certified system integrator. Proof of certification shall be provided as part of the submittal.

B. DDC Manufacturers: Subject to compliance with requirements, provide products by:
   1. Alerton, Inc.
   2. Automated Logic Corporation
   3. Honeywell, Inc.
   4. Invensys Building Systems
   5. Johnson Controls, Inc.
   6. Tour Andover Controls
   7. Trane

2.2 BAS EQUIPMENT

A. Operator Workstation: Existing
   1. License nodes: Provide necessary software nodes required to connect JACEs.
   2. Software revision: Update server to latest revision of Tridium Niagara Framework Software.
   3. Application Software: Include the following:
      a. Input/output capability from operator station.
      b. Database creation and support.
c. Add dynamic color graphic displays for this project

d. Alarm processing: Provide alarms for each analog (hi/lo limit) and digital point (command
failed, alarm etc).

e. Event processing.

f. Automatic restart of field equipment on restoration of power.

g. Data collection. Provide trends for each analog point and digital point in the JACE.

Archive JACE logs each day to the Web Supervisor. Space temperature and VAV Box
points shall be logged at 15 minute intervals. All other analog points shall be logged at 1
minute intervals. Digital points shall be logged on a change of status. Runtime for each
lighting zone, fan, pump etc. shall be logged and archived.

h. Graphical development on workstation. Provide web pages as specified below

4. Graphics

   a. Provide a separate graphical representation of each system, described in the sequence
of operation showing data on all points indicated on contract documents. Graphics shall use
3D format where applicable.

   b. All 2-way valve and damper output signals shall be identified as “% open”.

   c. All 3-way or mixing valve and damper output signals shall be identified with a descriptor
that includes % open to one of the ports (identify port, i.e., % open to cooling coil).

   d. All temperature set points shall be adjustable and binary output points commandable
depending on operator privileges.

   e. Any data in the alarm mode shall change color, either yellow (low level) or red (medium
and high level alarm).

   f. Provide a graphical representation of the building floor plan with all temperature sensor
readings and set points shown. Include lighting zone points. Update real-time readings as
they change by a specified amount as programmed in the JACE. Update readings
immediately if an alarm is indicated.

   g. Provide a link on each graphic to an Adobe PDF file of the control drawings for that
system and the sequence of operation. Additional links will be provided to PDF files for
the mechanical equipment O&M manuals. O&M data shall be provided by the engineer
for use by FMCS contractor.

   h. The BAS contractor shall include development time for custom graphics. Final graphic
design layout, points, links, and navigation will be determined by meetings with owner,
engineer, and FMCS contractor after equipment submittals are reviewed and approved.
The BAS contractor shall use the following information as a guide as to what number and
type of graphics that shall be provided.

   i. Floor plans: 100 points per graphic including links to terminal device graphics, water
detection devices, CRU graphics. Floor plans shall indicate real-time temperature,
pressure, humidity, and fire alarm status. Floor plan AutoCAD files shall be made available
for use by the FMCS. A total of 20 floor plan graphics with 100 points each shall be
included.

   j. Chillers. Provide 6 graphics with 100 points and links.

   k. Fire Alarm. 1 General graphic with all Fire Alarm & Security points in addition to points
shown on floor plan.

   l. Terminal Units. 1 graphic with 25 points per each terminal unit in addition to floor plan
points.

   m. Steam and building HW System and Domestic HWS. 3 graphic with 100 points and links.

   n. Electrical Monitoring 4 Graphics 100 points total.

   o. Sump Alarm. 1 Graphic with 5 points.

   p. Lighting 1 graphic with 10 points per each zone in addition to floor plan points.

   q. AHUs. 3 graphics each with 100 points for each AHU.

   r. BAS Riser. 1 graphic with 100 points with status of all JACEs.

   s. Owner specified graphics. 10 additional graphics as define by owner with 100 points each.

u. User accounts. 10 users with various privileges.

B. JACE
1. All schedules, trends, alarms, and energy management routines shall be implemented in the JACE. Provide embedded JACE series 4 or 5 as required for the applications.

2.3 NETWORKING COMMUNICATIONS

A. The BAS as provided in this Division shall be based on the Niagara Framework (or “Niagara”), a Java-based framework developed by Tridium. Niagara provides an open automation infrastructure that integrates diverse systems and devices (regardless of manufacturer, communication standard or software) into a unified platform that can be easily managed in real time over the Internet using a standard Web browser. Systems not developed on the Niagara Framework platform are unacceptable.

B. It is the owner’s goal to implement an open system that will allow products from various suppliers to be integrated into a unified system in order to provide flexibility for expansion, maintenance, and service of the system. The Owner shall be the named license holder of all software associated with any and all incremental work on the project(s). In addition, the Owner shall receive ownership of all job specific configuration documentation, data files, and application-level software developed for the project. This shall include all custom, job specific software code and documentation for all configuration and programming that is generated for a given project and/or configured for use with the JACE, BAS Server(s), and any related LAN / WAN / Intranet and Internet connected routers and devices. Any and all required IDs and passwords for access to any component or software program shall be provided to the owner. The owner shall determine which organizations to be named in the SI organization ID (“orgid”) of all software licenses. Owner shall be free to direct the modification of the “orgid” in any software license, regardless of supplier, by Tridium, Inc.

C. Peer-to-Peer Network Level: All operator devices either network resident or connected via dial-up modems shall have the ability to access all point status and application report data, and to execute control functions for any and all other devices via the peer-to-peer network. No hardware or software limits shall be imposed on the number of devices with global access to the network data at any time.

1. An Ethernet connection shall be made to the exiting central maintenance host workstation. The contractor performing work under this section of the specifications shall meet with the Owner’s IT or IS department and shall be responsible for providing a complete Ethernet connection over the Owner’s existing network. All software, hardware, wiring, fiber, and components necessary shall be provided.

D. The system shall be accessible through the internet using standard web browsers. Multiple levels of password protection shall be provided.

2.4 DDC CONTROLLERS

A. DDC Controllers shall be stand-alone, multi-tasking, multi-user, real-time digital control processors consisting of modular hardware with plug-in enclosed processors, communication controllers, power supplies and input/output point modules. Controller size shall be sufficient to fully meet the requirements of the contract documents. Each controller shall support a minimum of two (2) LAN Device Networks.
B. Each DDC Controller shall have sufficient memory to support its own operating system and databases, including:

1. Control processes
2. Energy management applications
3. Alarm management applications including custom alarm messages for each level alarm for each point in the system.
4. Historical/trend data for points specified.
5. Maintenance support applications.
7. Operator I/O.
8. Dial-up communications.

C. Each DDC Controller shall support any combination of industry standard inputs and outputs.

D. Provide all processors, power supplies and communication controllers so that the implementation of a point only requires the addition of the appropriate point input/output termination module and wiring.

E. DDC Controllers shall provide a minimum two RS-232C serial data communication ports for operation of operator I/O devices such as industry standard printers, operator terminals, modems and portable laptop operator's terminals. DDC Controllers shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems, Ethernet connections, printers, or terminals.

F. As indicated in the point I/O schedule, the operator shall have the ability to manually override automatic or centrally executed commands at the DDC Controller via local, point discrete, on-board hand/off/auto operator override switches for digital control type points and gradual switches for analog control type points.

1. Switches shall be mounted either within the DDC Controllers key-accessed enclosure, or externally mounted with each switch keyed to prevent unauthorized overrides.

2. DDC Controllers shall monitor the status of all overrides and inform the operator that automatic control has been inhibited. DDC Controllers shall also collect override activity information for reports.

G. DDC Controllers shall provide local LED status indication for each digital input and output for constant, up-to-date verification of all point conditions without the need for an operator I/O device. Graduated intensity LEDs or analog indication of value shall also be provided for each analog output. Status indication shall be visible without opening the panel door.

H. Each DDC Controller shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all panel components. The DDC Controller shall provide both local and remote annunciation of any detected component failures, low battery conditions or repeated failure to establish communication.

I. Isolation shall be provided at all peer-to-peer network terminations, as well as all field point terminations to suppress induced voltage transients consistent with IEEE Standards 587-1980.

J. In the event of the loss of normal power, there shall be an orderly shutdown of all DDC Controllers to prevent the loss of database or operating system software. Non-volatile memory shall be incorporated for all critical controller configuration data and battery backup shall be provided to support the real-time clock and all volatile memory for a minimum of 100 days.
1. Upon restoration of normal power, the DDC Controller shall automatically resume full operation without manual intervention.

2. Should DDC Controller memory be lost for any reason, the system shall automatically reload the DDC Controller via the local RS-232C port, via telephone line dial-in or Ethernet from the existing network workstation PC.

K. Provide a separate DDC Controller for each AHU or other HVAC system as indicated in Section 3.02. It is intended that each unique system be provided with its own point resident DDC Controller.

2.5 DDC CONTROLLER RESIDENT SOFTWARE FEATURES

A. General:

1. The software programs specified in this Section shall be provided as an integral part of DDC Controllers and shall not be dependent upon any higher-level computer for execution.

B. Control Software Description:

1. The DDC Controllers shall have the ability to perform the following pre-tested control algorithms:
   a. Two-position control
   b. Proportional control
   c. Proportional plus integral control
   d. Proportional, integral, plus derivative control
   e. Automatic tuning of control loops

C. DDC Controllers shall have the ability to perform any or all the following energy management routines:
   1. Time-of-day scheduling
   2. Calendar-based scheduling
   3. Holiday scheduling
   4. Temporary schedule overrides
   5. Start-Stop Time Optimization
   6. Automatic Daylight Savings Time Switchover
   7. Night setback control
   8. Enthalpy switchover (economizer)
   9. Peak demand limiting
   10. Temperature-compensated duty cycling

D. DDC Controllers shall be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.

E. Alarm management shall be provided to monitor and direct alarm information to operator devices. Each DDC Controller shall perform distributed, independent alarm analysis and filtering to minimize operator interruptions due to non-critical alarms, minimize network traffic and prevent alarms from being lost. At no time shall the DDC Controllers ability to report alarms be affected by either operator or activity at a PC workstation, local I/O device or communications with other panels on the network.

F. A variety of historical data collection utilities shall be provided to manually or automatically sample, store and display system data for points as specified.

2.6 APPLICATION SPECIFIC CONTROLLERS (ASC)
A. Each DDC Controller shall be able to extend its performance and capacity through the use of remote application specific controllers (ASCs) through LAN Device Networks.

B. Each ASC shall operate as a stand-alone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a microprocessor-based, multi-tasking, real-time digital control processor. Provide the following types of ASCs as a minimum:

1. Terminal Equipment Controllers

C. Each ASC shall be capable of control of the terminal device independent of the manufacturer of the terminal device.

D. Terminal Equipment Controllers:

1. Provide for control of each piece of equipment, including, but not limited to, the following:
   a. Exhaust fans
   b. Terminal Units

2.7 SENSORS:

A. Temperature Sensors

1. Temperature sensors shall be Resistance Temperature Detector (RTD) or Thermistor as dictated by the requirements of this specification.
2. All temperature sensors shall have two integral pushbuttons which shall override and cancel the space from unoccupied to occupied. In lieu of cancel button, furnish LED which shall illuminate whenever the system is overridden
3. Space Sensor Guards: Unless noted otherwise, provide cast aluminum guards for sensors located in the gymnasium and all public areas.
4. Duct sensors shall be rigid or averaging as specified in the sequence of operations. Averaging sensors shall be a minimum of 5 feet in length.
5. Space Sensor Adjustment: Provide space temperature sensors with warmer/cooler adjustment option. Range of adjustment shall be 3 degrees above or below space temperature setpoint.
6. Accuracy’s shall be +/- 1 degree F for standard applications. Where high accuracy is required, accuracy’s shall be +/- 0.2 degrees F.

B. Carbon-Dioxide Sensor and Transmitter:

1. Solid-state infrared sensor, calibrated for 0 to 2000 PPM, with continuous or averaged reading, 4 to 20 mA output. May be combined with temperature sensor for economy.

C. Static Pressure Sensors:

1. Static pressure sensors shall be differential pressure type. The sensor range shall be closely matched to the system static pressure, - .5 to .5 inches, -1 to 1 inches, 0 to 2.5 inches.
2. Sensor accuracy shall be plus or minus 5% of the sensing range.

D. Humidity Sensors:

1. Humidity sensors shall be capacitance or bulk polymer resistance type.
2. Duct and room sensors have a sensing range of 0 to 95% with accuracy of +/- 5.0% R.H. Duct sensors shall be provided with a sampling chamber.
E. Current Sensing Switch:
   1. Sensor supply voltage and supply current shall be induced from monitored conductor. Contact rating shall be 0.2 amperes at 30 volts DC/AC. Trip setpoint shall be adjustable to +/-1% of range. Current sensing switch wiring shall not be polarity sensitive.

2.8 AIRFLOW/TEMPERATURE MEASUREMENT DEVICES

A. Products in this section include duct-, plenum-, and fan inlet-mounted airflow measuring devices.

B. Airflow measurement devices shall be EBTRON, Inc. Model GTx116-P and GTx116-F (basis of design)

C. Provide airflow/temperature measurement devices where indicated on the plans. Fan inlet measurement devices shall not be substituted for duct or plenum measurement devices indicated on the plans.

D. Each measurement device shall consist of one or more sensor probe assemblies and a single microprocessor-based transmitter. Each sensor probe assembly will contain one or more independently wired sensor housings. Multiple sensor housings shall be equally weighted and averaged by the transmitter prior to output. Pitot tubes and arrays are not acceptable. Vortex shedding flow meters are not acceptable.

E. All Sensor Probe Assemblies
   1. Each sensor housing shall be manufactured of a U.L. listed engineered thermoplastic.
   2. Each sensor housing shall utilize two hermetically sealed, bead-in-glass thermistor probes to determine airflow rate and ambient temperature. Devices that use “chip” type thermistors are unacceptable. Devices that do not have 2 thermistors in each sensor housing are not acceptable.
   3. Each sensor housing shall be calibrated at a minimum of 16 airflow rates and have an accuracy of +/-2% of reading over the entire operating airflow range. Each sensor assembly shall be calibrated to standards that are traceable to the National Institute of Standards and Technology (NIST).
      a. Devices whose accuracy is the combined accuracy of the transmitter and sensor probes must demonstrate that the total accuracy meets the performance requirements of this specification throughout the measurement range.
   4. The operating temperature range for the sensor probe assembly shall be -20° F to 160° F. The operating humidity range for the sensor probe assembly shall be 0-99% RH (non-condensing).
   5. Each temperature sensor shall be calibrated at a minimum of 3 temperatures and have an accuracy of +/-0.15° F over the entire operating temperature range. Each temperature sensor shall be calibrated to standards that are traceable to the National Institute of Standards and Technology (NIST).
   6. Each sensor probe assembly shall have an integral, U.L. listed, plenum rated cable and terminal plug for connection to a remotely mounted transmitter. All terminal plug interconnecting pins shall be gold plated.
   7. Each sensor assembly shall not require matching to the transmitter in the field.
   8. A single manufacturer shall provide both the airflow/temperature measuring probe(s) and transmitter at a given measurement location.

F. Duct and Plenum Sensor Probe Assemblies
   1. Sensor housings shall be mounted in an extruded, gold anodized, 6063 aluminum tube probe assembly.
   2. The number of sensor housings provided for each location shall be as follows:
      a). Area (sq.ft.) Sensors
         <=1   2
         >1 to <4  4
         4 to <8  6
         8 to <12  8
3. Probe assembly mounting brackets shall be constructed of 304 stainless steel. Probe assemblies shall be mounted using one of the following options:
   a.) Insertion mounted through the side or top of the duct
   b.) Internally mounted inside the duct or plenum
   c.) Standoff mounted inside the plenum
4. The operating airflow range shall be 0 to 5,000 FPM unless otherwise indicated on the plans.

G. Fan Inlet Sensor Probe Assemblies
1. Sensor housings shall be mounted on 304 stainless steel blocks.
2. Mounting rods shall be field adjustable to fit the fan inlet and constructed of nickel plated steel.
3. Mounting feet shall be constructed of 304 stainless steel.
4. The operating airflow range shall be 0 to 10,000 FPM unless otherwise indicated on the plans.

H. Transmitters
1. The transmitter shall have an LCD display capable of displaying airflow and temperature. Airflow shall be field configurable to be displayed as a velocity or a volumetric rate.
2. The transmitter shall be capable of displaying the individual airflow and temperature readings of each sensor on the LCD display.
3. The transmitter shall operate on 24V AC. The transmitter shall not require an isolated power source.
4. The operating temperature range for the transmitter shall be -20° F to 120° F. The transmitter shall be protected from weather and water.
5. The transmitter shall be capable of communicating with the host controls using one of the following interface options:
   a. Linear analog output signal: Field selectable, fuse protected and isolated, 0-10VDC and 4-20mA (4-wire)
   b. RS-485: Field selectable BACnet-MS/TP, ModBus-RTU and Johnson Controls N2 Bus
   c. 10 Base-T Ethernet: Field selectable BACnet Ethernet, BACnet-IP, ModBus-TCP and TCP/IP
   d. LonWorks Free Topology

G. The measuring device shall be UL listed as an entire assembly.

H. The manufacturer’s authorized representative shall review and approve placement and operating airflow rates for each measurement location indicated on the plans. A written report shall be submitted to the consulting mechanical engineer if any measurement locations do not meet the manufacturer’s placement requirements.

2.9 DAMPERS:
A. Dampers, sized for specific application Ruskin CD 35
B. Damper Operators, electronic Belimo sized for specific application

2.10 DAMPER END SWITCHES:
A. Limit switch with the following characteristics:
   1. Industrial duty
   2. Adjustable lever roller actuator.
   3. One normally open contact and one normally closed contact.
2.11 AUTOMATIC CONTROL VALVES

A. Automatic Control Valves, electronic modulating sized for specific application

2.12 SMOKE DETECTORS

A. Smoke Detectors shall be furnished under Division 16 and installed under this section.
B. Wiring from smoke detectors to fire alarm system shall be under Division 16.
C. Wiring from smoke detectors to mechanical equipment shall be under this section.

2.13 LOW TEMPERATURE DETECTION STAT: By BAS Manufacturer

2.14 CURRENT SENSING RELAYS: By controls contractor for all equipment

2.15 ELECTRIC THERMOSTATS: By BAS Manufacturer

2.16 MISCELLANEOUS RELAYS AND SWITCHES:

A. General: Where required by the sequence of operation switches, relays, and miscellaneous devices necessary to accomplish the sequence shall be provided under this section

PART 3 - EXECUTION

3.1 PROJECT MANAGEMENT

A. Provide a designated project manager who will be responsible for the following:
   1. Construct and maintain project schedule
   2. On-site coordination with all applicable trades and subcontractors
   3. Authorized to accept and execute orders or instructions from owner/architect
   4. Attend project meetings as necessary to avoid conflicts and delays
   5. Make necessary field decisions relating to this scope of work
   6. Coordination/Single point of contact.

3.2 START-UP AND COMMISSIONING

A. When installation of the system is complete, calibrate equipment and verify transmission media operation before the system is placed on-line. Verify that all systems are operable from local controls in the specified failure mode upon panel failure or loss of power.

B. Provide any recommendation for system modification in writing to Architect. Do not make any system modification, including operating parameters and control settings, without prior approval of the Architect.

C. Provide approved commissioning plan and document that each component of the system has been inspected, tested, loop tuned, and commissioned.
3.3 TRAINING

A. Provide 8 hours of training for Owner’s designated operating personnel. Training shall include:

1. Explanation of drawings and operation & maintenance manuals
2. Walk-through of the job to locate control components
3. Operator workstation and peripherals
4. Operation of Portable computer
5. DDC controller and ASC operation/function
6. Operator control functions including graphic generation and field panel programming
7. Explanation of adjustment, calibration and replacement procedures

B. Since the Owner may require personnel to have more comprehensive understanding of the hardware and software, additional training must be available from the Manufacturer. If necessary additional training will be contracted by the Owner at a later date.

3.4 WIRING

A. Wire shall be installed in accordance with Division 16 requirements.

END OF SECTION 15900
REQUEST FOR INFORMATION

Creative Electrical Contractors, Inc.
1907 East Third Street
P.O. Box 528
Farmville, VA 23901

Project: Longwood Student Recreation Center

To: Moseley Architects
Attn: 7800 Lynnhaven Parkway, Suite 200
Virginia Beach, VA 23452

Phone: (757) 368-2800 Fax: (757) 368-2233
From: Estimating Dept

RFI #: 050010-0001
GC RFI#: 9/8/2005
Date: Phone: (434) 392-3802
Fax: (434) 392-5607

REASON FOR REQUEST ACTION REQUESTED PROBABLE EFFECT
☐ Insufficient Information  ☑ Clarification  ☐ Increase Cost
☐ Engineering Conflict  ☐ Direction  ☐ Decrease Cost
☐ Alternate Proposal  ☐ Approval  ☐ Unknown Cost
☑ Clarification  ☐ Unknown Time

RESPONSE REQUIRED BY: 9/15/2005

SPECIFICATION NO

REFERENCE: DRAWING NO.: E0.1
SUBJECT: Longwood Student Recreation Center
INFORMATION NEEDED:

I have noticed symbols for several light fixtures that appear to have the solid circle which designates an Emergency Battery Pack in the fixture (per the Lighting Legend). Some of these fixtures are not marked with "Note 5" in the Fixture Schedule.

Do they still have an Emergency Battery Pack or should they be accompanied by "Note 5" on the Fixture Schedule?

RECOMMENDATION:
Please clarify!

RESPONSE:

Provide Emergency Battery Pack for fixtures that have solid circle which designates an Emergency Battery Pack. Specification Section 16511.2.C.A.1 requires unswitched circuit to feed battery inverter and switched circuit to feed ballasts.

Note 5 was provided to remind Contractors of the unswitched power supply requirement. It may not be listed for all fixture types requiring the unswitched power supply in the Lighting Schedule due to the specifications covering the power requirements.

AUTHORIZED SIGNATURE COMPANY DATE
PREBID QUESTION FORM

PROJECT: STUDENT RECREATION CENTER
Longwood University
Farmville, Virginia
Project Code: 214-16420-2

DATE: 8-30-05

(Note: Bidders must make inquiries at least six working days prior to time set for the receipt of bids.)

The following question concerns: (indicate)

Para 1.2 D says all site demolition included in the work. Has any demolition shown on 23.0 been done in the early site package?

The Architect/Engineer's response is:

Approximately 160 LF of asphalt parking area was removed to install the water lines as part of the Early Site Package. Sections of curb on the west and east ends of the parking area were also removed as part of this work. These areas were not reconstructed to pre-construction conditions, but backfilled in preparation for construction activities.

All necessary responses to questions involving a change in the Contract Documents will be made by Addendum.

Question submitted by:

Woodrow Hudson 434-676-8221
Name

Kendale Cossy Co. 434-676-8815
Organization

Note: Use separate form for each question submitted.

Moseley Architects telecopier: (757) 368-2233
Attention: Gil Carpenter
REQUEST A BID DATE EXTENSION BECAUSE OF THE TIME AVAILABLE TO ACCOMPLISH A PROPER ESTIMATE. YOUR COOPERATION WOULD BE APPRECIATED.

The Architect/Engineer's response is:

Refer to Addendum #1 "Notice of Invitation to Bid - IFB" for revised date for receipt of bids.

All necessary responses to questions involving a change in the Contract Documents will be made by Addendum.

Question submitted by: Claude Yelton 804-359-9624
Name  Telephone
EMC Co.  904-359-9634
Organization  Fax No.

Note: Use separate form for each question submitted.

Moseley Architects telescopier: (757) 368-2233
Attention: Gil Carpenter
Manufactures Representative for
PERMA-PIPE / Ricwil Piping Systems
PermAlert Leak Detection Systems
Preferred Utilities Fuel Oil Systems
FLO-SAFE Polypropylene, PVDF
Chemical Pipe Systems
CALPICO Link Seals, Wall Sleeves

Mechanical Pipe Systems
145 Longwood Drive Advance, NC 27006
(336) 996-6370 (336) 996-6354 Fax Email
Palozi@hotmail.com

Fax

To: Jeffrey Hydee @ Moseley Architects
Or Lead Mechanical Engineer
From: Tony Palozzolo

Fax 1-757-368-2233 / 1604-378-8660
Phones 1-757-368-2800
Pages: 1
Date: 9/8/2005

Rec: Student Rec. Center Longwood University 

☐ PROPOSAL ☐ BUDGET ☐ Please Comment ☒ Please Reply

Dear Mr. Hydee, I am the local PERMA-PIPE representative, and have been in this industry for over 20 years. The specification section 15182 indicates an underground steam and condensate system, the contract drawings show a 4" steam and a 2" condensate coming out of building and tying into a 8" steam and 6" condensate on the civil drawings. The first question is the 8" steam line part of this contract? Is the 6" condensate the correct size of condensate? The notes on the civil drawings say coordinate with mechanical engineer for additional information.

Please let me know if we can submit a bid on your project.

Thank you.

Response: REFER TO ADDENDUM #2 UNDER
"Revisions to Drawings, Drawing C4.0, Item 1."
STUDENT RECREATION CENTER  
LONGWOOD UNIVERSITY  
PRE-BID CONFERENCE ATTENDANCE SHEET

Date: Tuesday, August 30, 2005  
2:00 p.m.

Location: Facilities Management Conference Room  
Bristow Building, Room 211  
Longwood University  
Farmville, Virginia

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<th>Name</th>
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<td>2. Tim Dean</td>
<td>Dropo Allen Associates</td>
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<td>804-264-8773 Fax</td>
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<td>4. Lauren Lyons</td>
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<td>5. Woodrow Hudson</td>
<td>Kenbridge Coast</td>
<td>434-676-8221 Fax</td>
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<td>6. Wade Amos</td>
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<td>434-385-1214 Fax</td>
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<td>7. David Black</td>
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<td>434-385-2097 Fax</td>
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<td>8. Jamie English</td>
<td>Branch &amp; Assoc.</td>
<td>540-987-5215 Fax</td>
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# Pre-Bid Conference / On-Site Registry

**Project #: 214-05-Rec Center**  
**Title:** Student Rec Center  
**Buyer:** J. Crowley

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**Representative's Printed Name:**  
Jaime English

**Representative's Signature:**  
[Signature]

**Name of Firm:** Branch & Associates

**Address of Firm:**  
3902 Franklin Road  
Roanoke, VA 24014

**Telephone Number:** 540-903-5215  
**Facsimile Number:** 540-774-2611

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**J. E. Jamerson & Sons, Inc.**  
General Contractor & Building Supplier  
www.jejamerson.com

Kevin O'Brien  
Project Manager  
P. O. Box 395  
402 N. Church Street  
Appomattox, Virginia 24522  
E-mail: kobrien@jejamerson.com
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<td><strong>NAME OF FIRM:</strong></td>
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