# REQUEST FOR PROPOSAL

## #6731 – REBID 2

# HVAC Control System Replacement

# Meri Lou Murray Recreation Center

## FOR

# Washtenaw County
# Parks and Recreation Commission

Issued By:

Washtenaw County Purchasing
Administration Building
220 N. Main Street
Ann Arbor, MI 48104

Angela O. Perry
Purchasing Manager
(734) 222-6768

***Proposal Submitted by:***

_____

*Please type* Bidder's Company Name & **include as proposal cover**

# WASHTENAW COUNTY

Finance Department

**Purchasing Division**

220 N. Main, Ann Arbor, MI 48104
Phone (734) 222-6760, Fax (734) 222-6764
www.purchasing.ewashtenaw.org


## RFP #6731- REBID 2

September 20th, 2013

Washtenaw County Purchasing Division on behalf of Washtenaw County Parks and Recreation Commission is issuing a sealed RFP #6731 REBID 2 for HVAC Control System Replacement at the Meri Lou Murray Recreation Center.

**Sealed Proposals:** Vendor will deliver one (1) **unbound original** and three (3) **bound copies** **each with the pricing page flagged** to the County location specified below. In addition, vendor will deliver an electronic copy on a USB drive, CD-RW, or DVD in pdf format to the location specified below:

**Washtenaw County**
**Administration Building**
**Purchasing Division**
**220 N. Main St. Basement**
**Ann Arbor, MI 48104**

## By Monday September 30th, 2013 at 3:00 pm est

**Proposals received after the above cited time will be considered a late bid and are not acceptable unless waived by the Purchasing Manager.**

- Your proposal submission envelope must be clearly marked **"SEALED RFP#6731 REBID 2"**
- Please direct purchasing and procedural questions regarding this RFP to Angela O. Perry **via e-mail only** to perrya@ewashtenaw.org
- Please direct technical questions regarding this RFP to Dept contact **via e-mail only** at keithj@ewashtenaw.org.

Thank you for your interest.

**BID #6731 REBID 2 - For HVAC Control System Replacement**

## PROPOSAL INFORMATION

## I. PROPOSAL DEFINITIONS

### Definitions

| | |
|---|---|
| **"Bidder"** | An individual or business submitting a bid to Washtenaw County |
| **"Contractor/Vendor"** | One who contracts to perform services in accordance with a contract |
| **"County"** | Washtenaw County in Michigan |
| **"WCPARC"** | Washtenaw County Parks and Recreation Commission |

## II. TERMS

A. Washtenaw County reserves the right to reject any and all proposals received as a result of this RFP. If a proposal is selected, it will be the most advantageous regarding price, quality of service, the CONTRACTORS qualifications and capabilities to provide the specified service, and other factors that the County may consider. The County does not intend to award a contract fully on the basis of any response made to the proposal; the County reserves the right to consider proposals for modifications at any time before a contract would be awarded and negotiations would be undertaken with that CONTRACTOR whose proposal is deemed to best meet the County's specifications and needs.

B. The County reserves the right to reject any or all bids, to waive or not waive informalities or irregularities in bids or bidding procedures, and to accept or further negotiate cost, terms, or conditions of any bid determined by the County to be in the best interests of the County even though not the lowest bid.

C. Proposals must be signed by an official authorized to bind the CONTRACTOR to its provisions for at least a period of 90 days. Failure of the successful bidder to accept the obligation of the contract may result in the cancellation of any award.

D. In the event it becomes necessary to revise any part of the RFP, addenda will be provided. Deadlines for submission of RFP's may be adjusted to allow for revisions. To be considered, **one (1) original and three (3) copies** (one copy unbound) and an electronic version in pdf format, submitted on CD-RW, DVD or USB drive must be at the County as indicated on or before the date specified.

E. Proposals should be prepared simply and economically providing a straight-forward, concise description of the CONTRACTOR'S ability to meet the requirements of the RFP. Proposals must be typed. No erasures are permitted. Mistakes may be crossed out and corrected and must be initialed in ink by the person signing the proposal. *CONTRACTOR shall ensure that proposals are submitted using both sides of recycled paper whenever practicable.*

F. In the event, the County receives two or more bids from responsive, responsible bidders, one or more of whom are Washtenaw County Contractors and the bids are substantially equal in price, quality and service, the County shall award the contract to the most responsive, responsible Washtenaw County Contractor. For purposes of this section, Washtenaw County Contractor means a company which has maintained its principal office in Washtenaw County for at least six (6) months. Maintaining a Washtenaw County P.O. Box, is not, in and of itself, sufficient to establish a company as a Washtenaw County Contractor. The County shall have sole discretion under this section to determine if a company qualifies as a Washtenaw County Contractor and if two or more bids are substantially equal.

G. The initial award of this contract shall be for a period of two year(s), with an option to renew an additional one year, pending agreement by both parties.

H. CONFLICT OF INTEREST. Contractor warrants that to the best of contractor's knowledge, there exists no actual or potential conflict between contractor and the County, and its Services under this request, and in the event of change in either contractor's private interests or Services under this request, contractor will inform the County regarding possible conflict of interest which may arise as a result of the change. Contractor also affirms that, to the best of contractor's knowledge, there exists no actual or potential conflict between a County employee and Contractor.

I. The bidder shall be responsible for all costs incurred in the development and submission of this response. Washtenaw County assumes no contractual obligation as a result of the issuance of this RFP, the preparation or submission of a response by a bidder, the evaluation of an accepted response, or the selection of finalists. All proposals, including attachments, supplementary materials, addenda, etc. shall become the property of Washtenaw County and will not be returned to the bidder.

J. Any responses, materials, correspondence, or documents provided to Washtenaw County under this solicitation are subject to the State of Michigan Freedom of Information Act and may be released to third parties in compliance with that Act.

## III. VENDOR SPECIFICATIONS

The proposal shall include **all** of the following information. Failure to include all of the required information may result in disqualification of a Bidder.

A. State the bidder's qualifications to provide the services required by Washtenaw County. Include years in business under your present company name, staff profile and experience.

(Attach as Addendum A)

B. Staff performing the services on-site must be factory certified. A copy of the certificate must be included in the proposal.

(Attach as Addendum B)

C. List three (3) references from previous corporate or government customers purchasing similar services. Include business name, contact name and phone number.

(Attach as Addendum C)

D. Review contract provisions and insurance requirements. Note any limitations on any of the articles or providing insurance requirements as outlined in the contract provisions contained in Sample Contract.

(Attach as Addendum D)

## IV. AWARD

Award will be made to the lowest responsive, responsible bidder, with most relevant experience and best qualifications. However, the award may not be based solely on low bid alone.

## V. SCOPE OF WORK

The Contractor will provide all the design materials, labor and equipment necessary to replace the existing pneumatic HVAC control system with a new DDC System at the Meri Lou Murray Recreation Center. Scope of work shall include the following:

A. Network Manager for global system commands, monitoring and data logging.

B. Network Manager shall include graphics package for ease of navigation.

C. Network Manager shall connect to local ethernet network provided by Owner and remote connection via Web Browser.

D. Hardware and software to control constant volume AHU-2 with associated return fan.

E. Hardware and software to control AHU-1 as a single zone VAV unit with associated return fan. Provide a minimum of two averaging air temperature sensors in the gymnasium.

F. Hardware and software to control VAV AHU-3 and associated return fan.

G. Hardware and software to interface with pool AHU.

H. Hardware and software for control of exiting VAV boxes with hot water coils.

I. Hardware and software to control constant volume boxes with hot water coils.

J. Hardware and software to control hot water tempering coils in constant volume system.

K. Hardware and software to control cabinet unit heaters.

L. Hardware and software for control of fin tube radiation, integrated with air side controls where applicable.

M. Hardware and software to control air cooled chiller and circulating pumps. Existing chiller to be replaced spring of 2014. Provide accommodations for new chiller and final connection after replacement.

N. Hardware and software to interface with boilers and hot water circulating pumps.

O. Replace all existing pneumatic activators and control valves with electric.

P. Remove inlet vanes from AHU-3 and return Fan #3, and provide and install VFD’s.

Q. Provide M.E.E.C. certified air and water balance of all systems at completion of project and calibrate all flow on consuming devices. Balance air and water flows to original building drawings.

R. Design/Build controls contractor shall include all higher voltage electrical work that may be required for a complete installation. Work shall be performed by a contractor licensed in the state of Michigan.

S. Provide training of Owner designated employees.

T. Refer to attached control system specification. (Attachment A)

OPTION 1

Contractor shall provide an alternate unit price to replace an existing VAV box with hot water coil if required.

**PERFORMANCE SCHEDULE**

| | |
|---|---|
| RFP issued | Friday, September 20, 2013 |
| Proposal submittal deadline | 3:00 pm, Monday, September 30, 2013 |
| Selection recommendation | Monday, October 7, 2013 |
| Contract award<br>_____ | |
| Begin work<br>_____ | |
| Conclude work<br>_____ | |

## VI. SAMPLE STANDARD PROVISIONS FOR CONTRACTS

If a contract is awarded, the selected contractor will be required to adhere to a set of general contract provisions which will become a part of any formal agreement. These provisions are general principles which apply to all contractors of service to Washtenaw County such as the following:

**Vendor/Contractor Name**

AGREEMENT is made this ____ day of _____**,** 2013, by the COUNTY OF WASHTENAW, a municipal corporation, with offices located in the County Administration Building, 220 North Main Street, Ann Arbor, Michigan 48107("County") and **Vendor Name & physical address (try not to use PO Boxes).** ("Contractor").

In consideration of the promises below, the parties mutually agree as follows:

ARTICLE I - SCOPE OF SERVICES

The Contractor will provide all labor, materials, and equipment to **xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx** as directed by the Parks and Recreation Commission.

ARTICLE II - COMPENSATION

Upon completion and acceptance of the above services and submission of proper invoices, the County will pay the Contractor, for full performance of the work, an amount not to exceed **$XX,XXX** (**spell out** dollars) subject to additions and deductions as documented through authorized change orders.

ARTICLE III - REPORTING OF CONTRACTOR

Section 1 - The Contractor is to report to the Parks Director and will cooperate and confer with him/her as necessary to insure satisfactory work progress.

Section 2 - All reports, estimates, memoranda and documents submitted by the Contractor must be dated and bear the Contractor's name.

Section 3 - All reports made in connection with these services are subject to review and final approval by the County Administrator.

Section 4 - The County may review and inspect the Contractor's activities during the term of this contract.

Section 5 - When applicable**,** the Contractor will submit a final, written report to the County Administrator.

Section 6 - After reasonable notice to the Contractor, the County may review any of the Contractor's internal records, reports, or insurance policies.

ARTICLE IV - TERM

This contract begins on **Month, xx, xxxx** and ends on **Month, xx, xxxx** according to the project schedule and as modified through authorized change orders.

ARTICLE V - PERSONNEL

Section 1 - the contractor will provide the required services and will not subcontract or assign the services without the County's written approval.

Section 2 - The Contractor will not hire any County employee for any of the required services without the County's written approval.

Section 3 - the parties agree that the Contractor is neither an employee nor an agent of the County for any purpose.

## ARTICLE VI - INDEMNIFICATION AGREEMENT

The contractor will protect, defend and indemnify Washtenaw County, its officers, agents, servants, volunteers and employees from any and all liabilities, claims, liens, fines, demands and costs, including legal fees, of whatsoever kind and nature which may result in injury or death to any persons, including the Contractor's own employees, and for loss or damage to any property, including property owned or in the care, custody or control of Washtenaw County in connection with or in any way incident to or arising out of the occupancy, use, service, operations, performance or non-performance of work in connection with this contract resulting in whole or in part from negligent acts or omissions of contractor, any sub-contractor, or any employee, agent or representative of the contractor or any sub-contractor.

## ARTICLE VII - INSURANCE REQUIREMENTS

The Contractor will maintain at its own expense during the term of this Contract, the following insurance:

1. Workers' Compensation Insurance with Michigan statutory limits and Employers Liability Insurance with a minimum limit of $100,000 each accident for any employee.

2. Commercial General Liability Insurance with a combined single limit of $1,000,000 each occurrence for bodily injury and property damage. The County shall be added as "additional insured" on general liability policy with respect to the services provided under this contract.

3. Automobile Liability Insurance covering all owned, hired and nonowned vehicles with Personal Protection Insurance and Property Protection Insurance to comply with the provisions of the Michigan No Fault Insurance Law, including residual liability insurance with a minimum combined single limit of $1,000,000 each accident for bodily injury and property damage.

Insurance companies, named insureds and policy forms may be subject to the approval of the Washtenaw County Administrator, if requested by the County Administrator. Such approval shall not be unreasonably withheld. Insurance policies shall not contain endorsements or policy conditions which reduce coverage provided to Washtenaw County. Contractor shall be responsible to Washtenaw County or insurance companies insuring Washtenaw County for all costs resulting from both financially unsound insurance companies selected by Contractor and their inadequate insurance coverage. Contractor shall furnish the

Washtenaw County Administrator with satisfactory certificates of insurance or a certified copy of the policy, if requested by the County Administrator.

No payments will be made to the Contractor until the current certificates of insurance have been received and approved by the Administrator. If the insurance, as evidenced by the certificates furnished by the Contractor expires, or is canceled during the term of the contract, services and related payments will be suspended. Contractor shall furnish the County Administrator's Office with certification of insurance evidencing such coverage and endorsements at least ten (10) working days prior to commencement of services under this contract. Certificates shall be addressed to Washtenaw County c/o: Washtenaw County Parks & Recreation Commission & **CR#** _____**,** P. O. Box 8645, Ann Arbor, MI, 48107, and shall provide for 30 day written notice to the Certificate holder of cancellation of coverage.

## ARTICLE VIII - COMPLIANCE WITH LAWS AND REGULATIONS

The Contractor will comply with all federal, state and local regulations, including but not limited to all applicable OSHA/MIOSHA requirements and the Americans with Disabilities Act.

## ARTICLE IX - INTEREST OF CONTRACTOR AND COUNTY

The Contractor promises that it has no interest which would conflict with the performance of services required by this contract. The Contractor also promises that, in the performance of this contract, no officer, agent, employee of the County of Washtenaw, or member of its governing bodies, may participate in any decision relating to this contract which affects his/her personal interest or the interest of any corporation, partnership or association in which he/she is directly or indirectly interested or has any personal or pecuniary interest. However, this paragraph does not apply if there has been compliance with the provisions of Section 3 of Act No. 317 of the Public Acts of 1968 and/or Section 30 of Act No. 156 of Public Acts of 1851, as amended by Act No. 51 of the Public Acts of 1978, whichever is applicable.

## ARTICLE X - CONTINGENT FEES

The Contractor promises that it has not employed or retained any company or person, other than bona fide employees working solely for the Contractor, to solicit or secure this contract, and that it has not paid or agreed to pay any company or person, other than bona fide employees working solely for the Contractor, any fee, commission, percentage, brokerage fee, gifts or any other consideration contingent upon or resulting from the award or making of this contract. For breach of this promise, the County may cancel this contract without liability or, at its discretion, deduct the full amount of the fee, commission, percentage, brokerage fee, gift or contingent fee from the compensation due the Contractor.

## ARTICLE XI - EQUAL EMPLOYMENT OPPORTUNITY

The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, sex, sexual orientation, national origin, physical handicap, age, height, weight, marital status, veteran status, religion and political belief (except as it relates to a bona fide occupational qualification reasonably necessary to the normal operation of the business).

The Contractor will take affirmative action to eliminate discrimination based on sex, race, or a handicap in the hiring of applicant and the treatment of employees. Affirmative action will include, but not be limited to: Employment; upgrading, demotion or transfer; recruitment advertisement; layoff or termination; rates of pay or other forms of compensation; selection for training, including apprenticeship.

The Contractor agrees to post notices containing this policy against discrimination in conspicuous places available to applicants for employment and employees. All solicitations or advertisements for employees, placed by or on the behalf of the Contractor, will state that all qualified applicants will receive consideration for employment without regard to race, creed, color, sex, sexual orientation, national origin, physical handicap, age, height, weight, marital status, veteran status, religion and political belief.

## ARTICLE XII - PREVAILING WAGE RATES

The Contractor agrees that all craftsmen, mechanics and laborers it employs to work on this project shall, at a minimum, receive the prevailing wages and fringe benefits of the Building Trade Department for corresponding classes of craftsmen, mechanics and laborers for the Washtenaw County area, as determined and published by the Davis-Bacon Division of the United States Department of Labor. Contractor agrees that all subcontracts entered into by the Contractor shall contain a similar provision covering any sub-contractor's employees who perform work on this project.

## ARTICLE XIII - EQUAL ACCESS

The Contractor shall provide the services set forth in Article I without discrimination on the basis of race, color, religion, national origin, sex, sexual orientation, marital status, physical handicap, or age.

## ARTICLE XIV - OWNERSHIP OF DOCUMENTS AND PUBLICATION

All documents developed as a result of this contract will be freely available to the public. None may be copyrighted by the Contractor. During the performance of the services, the Contractor will be responsible for any loss of or damage to the documents while they are in its possession and must restore the loss or damage at its expense. Any use of the information and results of this contract by the Contractor must reference the project sponsorship by the County. Any publication of the information or results must be co-authored by the County.

## ARTICLE XV - ASSIGNS AND SUCCESSORS

This contract is binding on the County and the Contractor, their successors and assigns. Neither the County nor the Contractor will assign or transfer its interest in this contract without the written consent of the other.

## ARTICLE XVI - TERMINATION OF CONTRACT

Section 1 - Termination without cause. Either party may terminate the contract by giving thirty (30) days written notice to the other party.

## ARTICLE XVII - PAYROLL TAXES

The Contractor is responsible for all applicable state and federal social security benefits and unemployment taxes and agrees to indemnify and protect the County against such liability.

## ARTICLE XVIII - PRACTICE AND ETHICS

The parties will conform to the code of ethics of their respective national professional associations.

## ARTICLE XIX- CHANGES IN SCOPE OR SCHEDULE OF SERVICES

Changes mutually agreed upon by the County and the Contractor, will be incorporated into this contract by written amendments signed by both parties.

## ARTICLE XX - CHOICE OF LAW AND FORUM

This contract is to be interpreted by the laws of Michigan. The parties agree that the proper forum for litigation arising out of this contract is in Washtenaw County, Michigan.

## ARTICLE XXI - EXTENT OF CONTRACT

This contract represents the entire agreement between the parties and supersedes all prior representations, negotiations or agreements whether written or oral.

## ARTICLE XXII – ELECTRONIC SIGNATURES

All parties to this contract agree that either electronic or handwritten signatures are acceptable to execute this agreement.

ATTESTED TO:

By:_____
Lawrence Kestenbaum (date)
County Clerk/Register

WASHTENAW COUNTY

By:_____
Robert L. Tetens (date)
Director, Parks & Recreation

APPROVED AS TO FORM:

By:_____
Curtis N. Hedger (date)
Office of Corporation

CONTRACTOR

By:_____
**Vendor/Contractor** (date)

# (Include) PRICE SHEET

**HVAC Control System Replacement $_____**

# SIGNATURE PAGE

| | |
|---|---|
| _____ | _____ |
| Signature | Company Name |
| _____ | _____ |
| Print Name | Company Address |
| _____ | _____ |
| Title | City, County, St. Zip |
| _____ | _____ |
| Telephone # | Fax # |
| _____ | _____ |
| Federal Tax ID # | Email Address for Purchase Orders |

**The above individual is authorized to sign on behalf of company submitting proposal.**

Proposals must be signed by an official authorized to bind the provider to its provisions for at least a period of 90 days.

Signature page must be signed and returned as part of vendor proposal.

☐ By checking this box we hereby certify that we are a Washtenaw County company. If proven otherwise, company may be subject to Disbarment and/or Suspension of doing business with Washtenaw County.

# Attachment A

Temperature controls specifications:

1.1 Scope of Work

A. The temperature controls contractor (TCC) shall replace, remove to existing pneumatic control system and furnish and install a fully integrated building automation system, incorporating direct digital control (DDC) for energy management, equipment monitoring and control as herein specified. The system shall include all required computer software and hardware, controllers, sensors, transmission equipment, system workstations, local panels, conduit, wire, actuators, control valve installation, engineering, database and setup, supervision, commissioning, acceptance test, training, warranty service and, at the owner's option, extended warranty service. The TCC contractor shall also include a complete water/air balance of the existing system by an NEBB certified balance contractor under his/her contract. Balance contractor shall work concurrently with the TCC to calibrate all control valves and measuring devices.

B. The system shall use Lontalk as its native protocol and shall as a minimum include the capability of simultaneous communication to native Bacnet and Modbus components. System components shall be certified by Lonmark and display the Lonmark® logo where applicable. System components that do not have a published Lonmark® profile shall be compatible with the Lonmark® standards. For each Lonworks device that does not have Lonmark certification, the device supplier must provide DRF and XIF files for the device. The system shall be non-proprietary.

C. The TCC shall be capable of total integration of the facility infrastructure systems with user access to all system data either locally over a secure intranet within the building or by remote access by a standard web browser over the internet.

D. The TCC shall communicate to third party systems such as boilers, and dehumidification units, chillers, access control systems, fire-life safety systems and other building management related devices with open, interoperable communication capabilities.

E. Systems that are not native Lontalk must demonstrate integration of Lontalk components via a gateway. All suppliers must be able to demonstrate three (3) proof source sites where integration of Lontalk interoperability is functioning. Additionally, Bacnet components must support the proper level (PICS) to ensure compatibility.

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

1.2 Related Work Specified Elsewhere:

A. Drawings and general provisions of the contract, including general and supplementary conditions apply to work of this section.

B. Coordination with electrical:

1. Installation of all line voltage power wiring shall be by the TCC or a licensed electrical sub-contractor.

1.3 Quality Assurance

A. The system shall be furnished, engineered, and installed by the manufacturers' locally authorized representative. The controls contractor shall have factory-trained technicians to provide instruction, routine maintenance, and emergency service within 24 hours upon receipt of request.

B. The manufacturer of the FMCS digital controllers shall provide documentation supporting compliance with ISO-9000:2000 (model for quality assurance in design/development, production, installation and servicing). Product literature provided by the FMCS digital controller manufacturer shall contain the ISO-9000:2000 certification mark from the applicable registrar.

1.4 Submittals

A. Submit sets of documentation in the following phased delivery schedule:

1. Valve and damper schedules

2. Equipment data cut sheets

3. System schematics, including:
   A. Sequence of operations
   B. Point names
   C. Point addresses
   D. Point to point wiring
   E. Interface wiring diagrams
   F. Panel layouts
   G. System riser diagrams

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

1. Index sheet, listing contents in alphabetical order manufacturer's equipment parts list of all functional components of the system, disk of system schematics, including wiring diagrams

2. Description of sequence of operations

3. As-built interconnection wiring diagrams

4. User's documentation containing product, system architectural and programming information.

5. Trunk cable schematic showing remote electronic panel locations, and all trunk data

6. List of connected data points, including panels to which they are connected and input device (ionization detector, sensors, etc.)

7. Conduit routing diagrams

8. Copy of the warranty

9. Operating and maintenance cautions and instructions

10. Recommended spare parts list

Products

2.1 Acceptable Manufacturers

A. Siemens Talon Control system

B. Automated Logic

C. Johnson Controls system

2.2 The temperature controls system (TCS) shall be comprised of a network of interoperable, stand-alone digital controllers. The TCS shall incorporate Lonworks™ technology using free topology transceivers (FTT-10), and specific conformance to the Lonmark™ interoperability association's v3.0 physical layer guidelines in all unitary, terminal and other device controllers. The system shall include:

A. Network area controllers (NAC's) for distributed system applications, databases and networking functions, shall conform to the Lonmark application layer v3.3 interoperability guidelines

B. Programmable equipment controllers (PEC's) for control of primary mechanical systems and distributed system applications. Controllers shall be fully programmable to create custom control solutions. They shall conform to the Lonmark application layer v3.0 and higher interoperability guidelines.

C. Configurable controllers (CC's) for control of terminal equipment, air handling units, and miscellaneous input/output points. They shall conform to the Lonmark application layer v3.3 interoperability guidelines.

D. Graphical user interface (GUI), which includes software necessary for a user to interface with the control system and devices. The hardware will be provided by the owner.

1. The physical network shall use polarity insensitive twisted pair wiring and support star, home run, multi-drop, loop, or a mixture of these wiring technologies. The network shall communicate at a minimum 78kbps.

2. All components and controllers supplied under this contract shall be true "peer-to-peer" communicating devices. Components or controllers requiring "polling" by a host to pass control data shall not be acceptable.

3. To prevent any node from flooding the network with message traffic and ensure the receipt of critical data in a timely manner, the maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 5 seconds for network connected user interfaces. All Lonworks components and controllers shall support maximum send time and minimum send time.

4. Communication and integration of 3rd party Lonmark® products shall be accomplished without gateways or interface devices. The 3rd party product supplier shall provide DRF and XIF files for each device.
5. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 60 seconds for remote or dial-up connected user interfaces.

2.3 Network Area Controller (NAC)

A. The NAC shall provide the interface between the field control devices, and provide global supervisory control functions over the control devices connected to the NAC. It shall be capable of executing application control programs to provide:
   1. Calendar functions
   2. Scheduling
   3. Trending
   4. Alarm monitoring and routing
   5. Time synchronization
   6. Integration of Lonworks controller data
   7. Network management functions for all Lonworks based devices
   8. Communication to native Bacnet components
   9. Integration to Modbus components

B. The NAC shall provide multiple, concurrent user access to the system and support for ODBC or SQL. A database resident on the NAC shall be an ODBC-compliant database or must provide an odbc data access mechanism to read and write data stored within it.

C. The NAC shall support standard web browser access via the intranet/internet.

D. The NAC shall provide alarm recognition, storage; routing, management, and analysis to supplement distributed capabilities of equipment or configurable controllers.

   1. The NAC shall be able to route any alarm condition to any defined user location whether connected to a local network or remote via dial-up, telephone connection, or wide-area network.
   2. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including but not 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, i.e.: security, HVAC, fire, etc.

4. Provide timed (schedule) routing of alarms by class, object, group, or node.
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.

E. Alarms shall be annunciated in any of the following manners as user defined:
1. Screen message text

2. Email of the complete alarm message to multiple recipients. Provide the ability to route and email alarms based on:
   A. Day of week
   B. Time of day
   C. Recipient

3. Pagers via paging services that initiate a page on receipt of email message

4. Graphic with flashing alarm object(s)

5. Printed message, routed directly to a dedicated alarm printer

F. The following shall be recorded by the NAC for each alarm (at a minimum):
1. Time and date
2. Location (building, floor, zone, office number, etc.)
3. Equipment (air handler #, etc.)
4. Acknowledge time, date, and user who issued acknowledgement.
5. Number of occurrences since last acknowledgement.

G. Defined users shall be given proper access to acknowledge any alarm, or specific types or classes of alarms defined by the user.

H. A log of all alarms shall be maintained by the NAC and/or a server (if configured in the system) and shall be available for review by the user.

I. Provide a “query” feature to allow review of specific alarms by user defined parameters.

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

K. An error log to record invalid property changes or commands shall be provided and available for review by the user.

L. Data Collection and Storage

1. The NAC shall have the ability to collect data for any property of any object and store this data for future use.

2. The data collection shall be performed by log objects, resident in the NAC that shall have, at a minimum, the following configurable properties:

   A. Designating the log as interval or deviation.

   B. For interval logs, the object shall be configured for time of day, day of week and the sample collection interval.

   C. For deviation logs, the object shall be configured for the deviation of a variable to a fixed value. This value, when reached, will initiate logging of the object.

   D. For all logs, provide the ability to set the maximum number of data stores for the log and to set whether the log will stop collecting when full, or rollover the data on a first-in, first-out basis.

   E. Each log shall have the ability to have its data cleared on a time- based event or by a user-defined event or action.

3. All log data shall be stored in a relational database in the NAC and the data shall be accessed from a server (if the system is so configured) or a standard web browser.

4. All log data, when accessed from a server, shall be capable of being manipulated using standard SQL statements.

5. All log data shall be available to the user in the following data formats:
   A. HTML
   B. XML
   C. Plain text
   D. Comma or tab separated values

6. Systems that do not provide log data in HTML and XML formats at a minimum shall not be acceptable.

7. The NAC shall have the ability to archive its log data either locally (to itself), or remotely to a server or other NAC on the network.

Provide the ability to configure the following archiving properties, at a minimum:

A. Archive on time of day
B. Archive on user-defined number of data stores in the buffer (size)
C. Archive when buffer has reached its user-defined capacity

M. Provide and maintain an audit log that tracks all activities performed on the NAC. Provide the ability to specify a buffer size for the log and the ability to archive log based on time or when the log has reached its user-defined buffer size. Provide the ability to archive the log locally (to the nac), to another NAC on the network, or to a server. For each log entry, provide the following data:

1. Time and date
2. User id
3. Change or activity: i.e., change set point, add or delete objects, commands, etc.

N. The NAC shall have the ability to automatically backup its database. The database shall be backed up based on a user-defined time interval.

1. Copies of the current database and, at the most recently saved database shall be stored in the NAC. The age of the most recently saved database is dependent on the user-defined database save interval.

2. The NAC database shall be stored, at a minimum, in XML format to allow for user viewing and editing, if desired. Other formats are acceptable as well, as long as XML format is supported.

2.4. Programmable Equipment Controllers (PEC)

A. PEC's shall be stand-alone, multi-tasking, real-time digital control processors.

B. The PEC's shall communicate via native Lontalk protocol and be compatible with the Lonmark® standards. Provide a minimum of 4mb random access memory in each PEC.

C. The PEC must communicate peer-to-peer with the all of the network configurable and programmable controllers sharing alarming and scheduling information.

D. Programming of the PEC shall be accomplished by using graphical software that incorporates drag and drop capabilities. The PEC software database must be able to execute all of the specified mechanical

system controls functions. The programming software shall be able to bundle software logic to simplify control sequencing. All values, which make up the PID output value, shall be readable and modifiable at a workstation or portable service tool. Each input, output, or calculation result shall be capable of being shared/bound with any controller or interface device on the network.

E. PEC's shall be able to execute custom, job-specific processes defined by the user, to automatically perform calculations and special control routines.

1. A single process shall be able to incorporate measured or calculated data from any and all other PEC's on the network. In addition, a single process shall be able to issue commands to points in any and all other PEC's on the network.

2. Processes shall be able to generate operator messages and advisories to operator i/o devices.

F. Each PEC shall support firmware upgrades without the need to replace hardware.

G. Each PEC shall continuously perform self-diagnostics, which include communication diagnosis and diagnosis of all components.

H. In the event of the loss of normal power, there shall be an orderly shutdown of all PEC's 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 72 hours.

1. Upon restoration of normal power, the PEC shall automatically resume full operation without manual intervention.

2. All PEC's control programming and databases must be stored in flash memory, therefore eliminating data loss, down time and re-load time.

I. Provide a separate PEC for each AHU or other HVAC system. All system points shall reside on a single controller.

2.5 Configurable Controllers (CC)

A. Each CC shall operate as a stand-alone Lonmark® compliant controller capable of performing its specified control responsibilities independent of

other controllers in the network. Each ASC shall be a minimum 16-bit microprocessor based, multi-tasking, multi-user, real time digital control processor.

B. Flash memory reload or updating of an existing control algorithm shall be completed over the network.

C. Network access shall be accomplished at the CC room sensor or the CC. Where applicable, system node access shall be available from connecting to the room sensor jack. Systems that do not have a system access jack from the room sensor shall provide a dedicated network jack next to each room sensor.

D. Controllers shall include all inputs and outputs necessary to perform the specified control sequences. Analog and digital outputs shall be industry standard signals such as 0-10v and 3-point floating control allowing for interface to a variety of industry standard modulating actuators. The CC inputs shall consist of industry standards types such as 10k thermistor, 0-10v, 4-20ma and DI. Inputs shall be electrically isolated from outputs, communications and power. All inputs shall be provided with an auto-calibrate function to eliminate sensing errors.

E. All controller sequences and operation shall provide closed loop control of the intended application. Closing control loops over the network is not acceptable.

F. The CC must be mounted remotely from the room sensor. CC's that are wall mounted with integral room sensors are not acceptable.

G. The control program shall reside in the CC. The application program configuration information shall be stored in non-volatile memory with no battery backup.

H. After a power failure, the CC must run the control application using the current set points and configuration. Reverting to default or factory set points are not acceptable.

I. The CC design must support pre-wiring of the hardware components where the electronics are not exposed to the harsh construction phase environment. It must also support an integral controller/actuator design for the VAV/CV zone level installations where the controller processing and I/O are contained within a 3-point floating actuator housing.

2.6 Graphical User Interface Workstation Hardware

A. The work station will be supplied by the owner and shall consist of desktop computer with a minimum processing speed of 3,000 MHZ with 8 GB RAM and a

60 GB minimum hard drive. It shall include a CD-ROM drive and appropriate connectors and cables for communication connection to the NAC, system controllers, Ethernet and Lonworks network.

2.7 Graphical User Interface software (GUI)

A. Operator workstations must be capable of supporting any Lonmark® compliant product. The operator shall not be able to distinguish the DDC points from different manufacturers when commanding, monitoring points or acknowledging alarms.

B. The software shall provide a multi-tasking type environment that allows the user to run several applications simultaneously. The GUI software shall run on a Windows XP or Windows 7 operating system. The operator shall be able to work in Microsoft word, excel, and other windows based software packages, while concurrently annunciating on-line FMCS alarms and monitoring information.

C. Real-time displays. The GUI, shall at a minimum, support the following graphical features and functions:

1. Graphic screens shall be developed using any drawing package capable of generating a GIF, BMP, OR JPG file format. Use of proprietary graphic file formats shall not be acceptable. In addition to, or in lieu of a graphic background, the GUI shall support the use of scanned pictures.

2. A gallery of HVAC and automation symbols shall be provided including fans, valves, motors, chillers, AHU systems, standard ductwork diagrams and symbols. The user shall have the ability to add custom symbols to the gallery as required.

3. Graphic screens shall have the capability to contain objects for text, real-time values, animation, color spectrum objects, logs, graphs, HTML or XML document links, schedule objects, hyperlinks to other URL's, and links to other graphic screens.

4. Graphics shall support layering and each graphic object shall be configurable for assignment to a layer. A minimum of six layers shall be supported.

5. Modifying common application objects, such as schedules, calendars, and set points shall be accomplished in a graphical manner.

A. Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator.
B. Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.

6. Commands to start and stop binary objects shall be done by mouse command from the pop-up menu. No entry of text shall be required.

7. Adjustments to analog objects, such as set points, shall be done by mouse command using a graphical slider to adjust the value. No entry of text shall be required.

D. System configuration. At a minimum, the GUI shall permit the operator to perform the following tasks, with proper password access:

1. Create, delete or modify control strategies.

2. Add/delete objects to the system.

3. Tune control loops through the adjustment of control loop parameters.

4. Enable or disable control strategies.

5. Generate hard copy records or control strategies on a printer.

6. Select points to be alarm able and define the alarm state.

7. Select points to be trended over a period of time and initiate the recording of values automatically.

E. On-line help. Provide a context sensitive, on-line help system to assist the operator in operation and editing of the system. On-line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information shall be available through the use of hypertext. All system documentation and help files shall be in html format.

F. Each operator shall be required to log on to that system with a user name and password in order to view, edit, add, or delete data. System security shall be selectable for each operator. The system administrator shall have the ability to set passwords and security levels for all other operators. Each operator password shall be able to restrict the operators' access for viewing and/or changing each system application, full screen editor, and object. Each operator shall automatically be logged off of the system if no

keyboard or mouse activity is detected. This auto log-off time shall be set per operator password. All system security data shall be stored in an encrypted format.

G. System diagnostics. The system shall automatically monitor the operation of all modems, network connections, building management panels, and controllers. The failure of any device shall be annunciated to the operator.

H. The system will be provided with a dedicated alarm window or console. This window will notify the operator of an alarm condition, and allow the operator to view details of the alarm and acknowledge the alarm. The use of the alarm console can be enabled or disabled by the system administrator. When the alarm console is enabled, a separate alarm notification window will supersede all other windows on the desktop and shall not be capable of being minimized or closed by the operator. This window will notify the operator of new alarms and un-acknowledged alarms. Alarm notification windows or banners that can be minimized or closed by the operator shall not be acceptable.

2.8 Web Browser

A. The system shall be capable of supporting an unlimited number of clients using a standard web browser such as Internet Explorer. Systems requiring additional software (to enable a standard web browser) to be resident on the client machine, or manufacturer-specific browsers shall not be acceptable.

B. The web browser software shall run on any operating system and system configuration that is supported by the web browser. Web page access and control shall be from system network area controllers, not from the workstation. This prevents the problem of no access to web pages if the workstation is turned off.

C. The web browser shall provide the same view of the system, in terms of graphics, schedules, calendars, logs, etc., and provide the same interface methodology as is provided by the graphical user interface. Systems that require different views or that require different means of interacting with objects such as schedules, or logs, shall not be permitted. The browser shall include background refresh software to all real-time updates without use of a refresh button. No additional software shall be required at the remote internet location other than a standard web browser.

D. The web browser client shall support at a minimum, the following functions:

1. User log-on identification and password shall be required. If an unauthorized user attempts access, a blank web page shall be displayed. Security using java authentication and encryption techniques to prevent unauthorized access shall be implemented.

2. Graphical screens developed for the GUI shall be the same screens used for the web browser client. Any animated graphical objects supported by the GUI shall be supported by the web browser interface.

3. Html programming shall not be required to display system graphics or data on a web page. Html editing of the web page shall be allowed if the user desires a specific look or format.

4. Storage of the graphical screens shall be in the NAC, without requiring any graphics to be stored on the client machine. Systems that require graphics storage on each client are not acceptable.

5. Real-time values displayed on a web page shall update automatically without requiring a manual “refresh” of the web page.

6. User's shall have administrator-defined access privileges. Depending on the access privileges assigned, the user shall be able to perform the following:

    A. Modify common application objects, such as schedules, calendars, and set points in a graphical manner. Schedule times will be adjusted using a graphical slider, without requiring any keyboard entry from the operator. Holidays shall be set by using a graphical calendar, without requiring any keyboard entry from the operator.

    B. Commands to start and stop binary objects shall be done by right-clicking the selected object and selecting the appropriate command from the pop-up menu. No entry of text shall be required.

    C. View logs and charts

    D. View and acknowledge alarms

7. The system shall provide the capability to specify a user's (as determined by the log-on user identification) home page. Provide the ability to limit a specific user to just their defined home page. From the home page, links to other views, or pages in the system shall be possible, if allowed by the system administrator.

8. Graphic screens on the web browser client shall support hypertext links to other locations on the internet or on intranet sites, by specifying the uniform resource locator (URL) for the desired link.

2.9 Lonworks Network Management

A. The graphical user interface software (GUI) shall provide a complete set of integrated Lonworks network management tools for working with Lonworks networks. These tools shall manage a database for all Lonworks devices by type and revision, and shall provide a software mechanism for identifying each device on the network. These tools shall also be capable of defining network data connections between Lonworks devices, known as “binding”. Systems requiring the use of third party Lonworks network management tools shall not be accepted.

B. Network management shall include the following services: device identification, device installation, device configuration, device diagnostics, device replacement, device maintenance and network variable binding.

C. The network configuration tool shall also provide diagnostics to identify devices on the network, to reset devices, and to view health and status counters within devices.

D. These tools shall provide the ability to “learn” an existing Lonworks network, regardless of what network management tool(s) were used to install the existing network, so that existing Lonworks devices and newly added devices are part of a single network management database.

E. The network management database shall be resident in the NAC, ensuring that anyone with proper authorization has access to the network management database at all times. Systems employing network management databases that are not resident at all times, within the control system shall not be accepted.

3.0 Field Devices

A. Provide automatic control valves, automatic control dampers, thermostats, clocks, sensors, controllers, and other components as required for complete installation. Except as otherwise indicated, provide manufacturer's standard control system components as indicated by published product information, designed and constructed as recommended by manufacturer.

B. Temperature sensors

1. Temperature sensors shall be linear precision elements with ranges appropriate for each specific application. Cc room sensors shall provide for direct connection and access to the Lontalk network. Sensors that provide access only to their connected controller shall not be acceptable”

2. Space (room) sensors shall be available with override switch. Space sensor shall have a portable service tool jack to allow communication with the Lonworks system. Space sensor housing shall be constructed with ventilation slots to provide adequate airflow the ambient air space being measured. Space sensors shall not be adjustable at the device.

3. Duct mounted averaging sensors shall incorporate 2 x 4 electrical conduit box housing, and utilize a sensing element incorporated in a copper capillary with a minimum length of 20 feet. The sensor shall be installed according to manufacture recommendation and looped and fastened at a minimum of every 36 inches.

4. Duct mounted point sensors shall incorporate 2 x 4 electrical conduit box housing.

5. Sunshields shall be provided for outside air sensors.

D. Air velocity sensors: the sensor shall use differential pressure to determine airflow rate and have repeatability within 1% of reading and an accuracy of 5% of range. The velocity range shall be from 0 to 3250 fpm.

E. Pressure sensors: the differential pressure sensor shall be temperature compensated and shall vary the output voltage with a change in differential pressure. Sensing range shall be suitable for the application with linearity of 1.5% of full scale and offset of 1% of full scale or better. Sensor shall be capable of withstanding up to 150% of rated pressure without damage.

F. Switches and thermostats

1. The FMCS contractor shall furnish all electric relays and coordinate with the supplier of magnetic starters for auxiliary contact requirements. All electric control devices shall be of a type to meet current, voltage, and switching requirement of their particular application. Relays shall be provided with 24 VAC coils and contacts shall be rated at 10 amps minimum.

2. Low temperature detection thermostats: shall be the manual reset type. The thermostat shall operate in response to the coldest one-foot length of the 20-foot sensing element, regardless of the temperatures at other parts of the element. The element shall be properly supported to cover the entire downstream side of the coil with a minimum of three loops. Separate thermostats shall be provided for each 25 square feet of coil face area or fraction thereof.

3. Differential pressure switches: pressure differential switches shall have SPDT changeover contact, switching at an adjustable differential pressure set point.

4. Current sensing relays: motor status indications, where shown on the plans, shall be provided via current sensing relays. The switch output contact shall be rated for 30 VDC, .15 amps.

5. Flow switches: motor status indications, where shown on the plans, shall be provided via flow switches. Flow switches shall be of the paddle type equipped with SPDT contacts to establish proof of flow.

G. Damper actuators

1. Actuators shall be designed for mounting directly to the damper shaft without the need for connecting linkages.

2. All actuators having more than 100 lb-in torque output shall have a self-centering damper shaft clamp that guarantees concentric alignment of the actuator's output coupling with the damper shaft. The self-centering clamp shall have a pair of opposed "v" shaped toothed cradles; each having two rows of teeth to maximize holding strength. A single clamping bolt shall simultaneously drive both cradles into contact with the damper shaft.

3. All actuators having more than a 100 lb-in torque output shall accept a 1" diameter shaft directly, without the need for auxiliary adapters.

4. All actuators having more than 100 lb-in torque output shall have an all metal housing made from die-cast aluminum.

5. All actuators must provide overload protection throughout the full range of rotation, enabling the actuator to detect a blockage in the damper and withstand a continuous stall condition without premature failure, or degradation in performance.

6. All spring return actuators shall be capable of clockwise or counterclockwise spring return fail-safe operation.

7. All spring return actuators shall use a continuously engaged mechanical return spring that returns the actuator to a fail-safe position within 15 seconds, under rated temperature and load, in response to a loss of power. Other fail-safe mechanisms which are either engaged only in response to a loss of power, or which are non-mechanical are not acceptable.

8. All actuators shall provide a means of manually positioning the output coupling in the absence of power.

9. Dual independently adjustable auxiliary switches must be integral to the actuator, thus maintaining a low total installed cost. The addition of this feature as an accessory kit is not acceptable.

10. All actuators having more than 100 lb-in torque shall provide a factory mounted electrical cable (3 feet) and conduit fitting, thus maintaining a low total installed cost.

11. All actuators shall not require more than 10 VA.

12. Proportional actuators shall accept a 0-10 VDC or 4-20MA control signal, and provide a 0-10 VDC feedback signal.

13. All actuators shall provide an easily readable high contrast yellow on black position indicator.

14. All actuators shall be designed for a minimum of 50,000 full stroke cycles at the actuator's rated torque and temperatures, and manufactured using iso9002 and ISO14000 registered procedures, and shall be UL873 and CSA22.2 listed.

3.1 Installation Methods

A. Install systems and materials in accordance with manufacturer's instructions, rough-in drawings and equipment details.

B. The term "control wiring" is defined to include providing of wire, conduit, and miscellaneous materials as required for mounting and connecting electric or electronic control devices.

C. All exposed wiring, low and line voltage subject to mechanical damage, shall be run in conduit. Line and low voltage wiring shall be run in separate conduits. Concealed but accessible wiring, except in mechanical

rooms and areas where other conduit and piping are exposed shall run in UL plenum rated cable as approved by local code.

D. All controllers, relays, transducers, etc., required for stand-alone control shall be housed in a NEMA 1 enclosure with a lockable door.

3.2 System Acceptance

A. General: the system installation shall be complete and tested for proper operation prior to acceptance testing for the owner's authorized representative. A letter shall be submitted to the owner requesting system acceptance. This letter shall certify all controls are installed and the software programs have been completely exercised for proper equipment operation. Acceptance testing will commence at a mutually agreeable time within ten (10) calendar days of request. When the field test procedures have been demonstrated to the owner's representative, the system will be accepted. The warranty period will start at this time.

B. Field equipment test procedures: DDC control panels shall be demonstrated via a functional end-to-end test. Such that:

1. All output channels shall be commanded (on/off, stop/start, adjust, etc.) and their operation verified.

2. All analog input channels shall be verified for proper operation.

3. All digital input channels shall be verified by changing the state of the field device and observing the appropriate change of displayed value.

4. If a point should fail testing, perform necessary repair action and retest failed point and all interlocked points.

5. Automatic control operation shall be verified by introducing an error into the system and observing the proper corrective system response.

6. Selected time and set point schedules shall be verified by changing the schedule and observing the correct response on the controlled outputs.

C. As-built documentation: after a successful acceptance demonstration, the contractor shall submit as-built drawings of the completed project for final approval. After receiving final approval, supply "6" complete 11x17 as-built drawing sets, together with AutoCAD diskettes to the owner.

D. Operation and maintenance manuals: submit three copies of operation and maintenance manuals. Include the following

1. Manufacturer's catalog data and specifications on sensors, transmitters, controllers, control valves, damper actuators, gauges, indicators, terminals, and any miscellaneous components used in the system.

2. An operator's manual that will include detailed instructions for all operations of the system.

3. An operator's reference table listing the addresses of all connected input points and output points. Settings shall be shown where applicable.

4. A programmer's manual that will include all information necessary to perform programming functions.

5. Flow charts of the control software programs utilized in the DDC system.

6. Flow charts of the custom software programs utilized in the DDC system as approved.

7. Complete program listing file and parameter listing file for all programs.

8. A copy of the warranty.

9. Operating and maintenance cautions and instructions.

3.3 Training

A. Contractor shall provide to the owner a customized training class outline that is based upon the sites system layout prior to any scheduled training. On-site pre-canned training classes are not acceptable.

B. Factory trained control engineers and technicians shall provide training sessions for the owner's personnel.

C. The control contractor shall conduct two (2) eight-hour training courses for the designated owner's personnel in the maintenance and operation of the control system. One class shall be given upon system acceptance and the other approximately six months into the warranty.

D. The course shall include instruction on specific systems and instructions for operating the installed system to include as a minimum:
   1. HVAC system overview.
   2. Operation of control system
   3. Function of each component
   4. System operating procedures
   5. Programming procedures
   6. Maintenance procedures

3.4 Warranty

A. The control system shall be warranted to be free from defects in both material and workmanship for a period of one (1) year of normal use and service. This warranty shall become effective the date the owner accepts or receives beneficial use of the system.