University of South Carolina, Beaufort

Hilton Head Gateway Campus

Bluffton, SC

USCB HHG Clean Agent Fire Suppression System IT Room

PROJECT NUMBER: CP00400059

JULY 28, 2014

Table of Contents

Project Name: USC Beaufort HHG Clean Agent Fire Suppression System IT Room

Project Number: CP00400059

2008 Edition

SE-311
Invitation for Minor Construction Quotes

SCBO NOTES 2, 4 and 5 APPLY TO THIS INVITATION FOR QUOTES

PROJECT NAME: USC Beaufort HHG Clean Agent Fire Suppression System IT Room

PROJECT NUMBER: CP00400059 **PROJECT LOCATION:** USC - HHG Campus, Bluffton, SC

BID SECURITY REQUIRED? Yes [ ] No [X]

PERFORMANCE BOND REQUIRED? Yes [ ] No [X]

PAYMENT BOND REQUIRED? Yes [ ] No [X] **CONSTRUCTION COST RANGE:** $10,000 - $20,000

DESCRIPTION OF PROJECT:

Furnish and Install all labor and materials needed for a "Total Flood" FM-200 Clean Agent Fire Suppression System in the main IT room in the Hargray Bldg. This project is located on the University of South Carolina, Hilton Head Gateway Campus in Bluffton SC. The design, equipment, installation, testing and maintenance of the system shall comply with NFPA 2001, NFPA 70, NFPA 72, International Fire Code 2012. All items must be ISO 9000 registered. The installer must be certified by the system supplier. Small business participation is encouraged.

A/E NAME: Foster Engineering & Consultants **A/E CONTACT:** Ralph Foster III, P.E.

ADDRESS: 1539 Brockwall Drive **PHONE:** 803-787-4757 **Fax:** NA

CITY: Columbia **STATE:** SC **ZIP:** 29206 **E-MAIL:** fosterengr@sc.rr.com

PLANS ON FILE AT: **AGC:**

DODGE: Facilities Center

OTHER:

PLANS MAY BE OBTAINED FROM: http://purchasing.sc.edu (See Facilites Construction Solicitations & Awards)

PLAN DEPOSIT AMOUNT: $0.00 **IS DEPOSIT REFUNDABLE?** Yes [ ] No [ ]

PRE-QUOTE CONFERENCE? [X] Yes [ ] No **MANDATORY ATTENDANCE?** [ ] Yes [X] No

DATE: 8/14/2014 **TIME:** 10 am **PLACE:** 1 University Blvd. Bluffton SC 29909, Hargray bldg rm142

AGENCY: University of South Carolina

NAME AND TITLE OF AGENCY COORDINATOR: Ms. Aimee Rish, Procurement Specialist II

ADDRESS: 743 Greene Street **PHONE:** 803.777.2261 **Fax:** 803.777.7334

CITY: Columbia **STATE:** SC **ZIP:** 29208 **E-MAIL:** arish@fmc.sc.edu

IFQ CLOSING DATE: 8/21/14 **TIME:** 1pm **LOCATION:** 743 Greene St. Col. SC 29208

IFQ DELIVERY ADDRESSES:

HAND-DELIVERY:
See Mail

MAIL SERVICE:
ATTN: Aimee Rish
University of South Carolina/Bid Enclosed
743 Greene Street, Columbia SC 29208

IS PROJECT WITHIN AGENCY CONSTRUCTION CERTIFICATION? *(Agency MUST check one)* [X] YES [ ] NO

APPROVED BY: _____ _____

(State Engineer) *(Date)*

SE-331
Quote Form

2011 Edition

Quotes shall be submitted only on SE-331

QUOTE SUBMITTED BY: _____
(Offeror's Name)

QUOTE SUBMITTED TO: University of South Carolina
(Agency Name)

FOR PROJECT: CP00400059 *(Number)* USC Beaufort HHG Clean Agent Fire Suppression System *(Name)*

OFFER

1. In response to the Form SE-311, *Request for Minor Construction Quotes*, and in compliance with the *Instructions to Bidders* for the above-named Project, the undersigned **OFFEROR** proposes and agrees, if this Quote is accepted, to enter into a Contract with the **AGENCY** in the form included in the Solicitation Documents, and to perform all Work as specified or indicated in the Solicitation Documents, for the prices and within the time frames indicated in the Solicitation and in accordance with the other terms and conditions stated.
2. Pursuant to Section 11-32-3030(1) of the SC Code of Laws, as amended, **OFFEROR** has submitted Bid Security as follows in the amount and form required by the Solicitation Documents:

☐ Bid Bond with Power of Attorney ☐ Electronic Bid Bond ☐ Cashier's Check
(OFFEROR check one, if Bid Security is required)

3. **OFFEROR** acknowledges the receipt of the following Addenda to the Solicitation documents and has incorporated the effects of said Addenda into its Quote:

ADDENDUM No: _____

4. **OFFEROR** agrees that this Quote, including all bid alternates, if any, may not be revoked or withdrawn after the opening of bids, and shall remain open for acceptance for a period of 30 Days following the Quote Date, or for such longer period of time that **OFFEROR** may agree to in writing upon request of the **AGENCY**.
5. **OFFEROR** agrees that from the compensation to be paid, the **AGENCY** shall retain as Liquidated Damages the amount of for each calendar day the actual construction time required to achieve Substantial Completion exceeds the specified or adjusted Contract Time for Substantial Completion, as provided in the Contract Documents.
6. **OFFEROR** herewith submits its offer to provide all labor, materials, equipment, tools of trades and labor, accessories, appliances, warranties and guarantees, and to pay all royalties, fee, permits, licenses and applicable taxes necessary to complete the following items of construction work:

6.1 BASE BID _____
(enter BASE BID in figures only)

6.2 ALTERNATE NO. 1 _____ **to be ADDED/DEDUCTED from BASE BID.**
(circle one)

6.3 ALTERNATE NO. 2 _____ **to be ADDED/DEDUCTED from BASE BID.**
(circle one)

FEIN/SSN: _____

SC Contractor's License Number: _____

Address: _____

Telephone/Fax _____

E-mail _____

This Quote is hereby submitted on behalf of the Offeror named above.

BY: _____
(Signature of Offeror's Representative)

_____
(Print or Type Name of Offeror's Rpresentative)

ITS: _____

USC SUPPLEMENTAL GENERAL CONDITIONS FOR CONSTRUCTION PROJECTS

1. Contractor's employees shall take all reasonable means not to interrupt the flow of student traffic in building corridors, lobbies and stairs. All necessary and reasonable safety precautions shall be taken to prevent injury to building occupants while transporting materials and equipment through the building to the work area. Providing safe, accessible, plywood pedestrian ways around construction may be required if a suitable alternative route is not available.

2. Fraternization between Contractor's employees and USC students, faculty or staff is strictly prohibited - zero tolerance!

3. USC will not tolerate rude, abusive or degrading behavior on the job site. Heckling and cat-calling directed toward students, faculty or staff or any other person on USC property is strictly prohibited. Any contractor whose employees violate this requirement will be assessed a fine of up to $500 per violation.

4. Contractor's employees must adhere to the University's policy of maintaining a drug-free and smoke-free/tobacco free workplace.

5. Contractor must sign a Contractor Key Receipt/Return form before any keys are issued. Keys must be returned immediately upon the completion of the work. The Contractor will bear the cost of any re-keying necessary due to the loss of or failure to return keys.

6. A welding permit must be issued by the University Fire Marshall before any welding can begin inside a building. Project Manager will coordinate.

7. Contractor must notify the University immediately upon the discovery of suspect material such as those potentially containing asbestos or other such hazardous materials. These materials **must not** be disturbed until approved by the USC Project Manager.

8. At the beginning of the project, the USC Project Manager will establish the Contractor's lay-down area. This area will also be used for the Contractors work vehicles. No personal vehicles will be allowed in this area, or in any areas surrounding the construction site that are not regular or authorized parking lots. Personal vehicles must be parked in the perimeter parking lots. Parking permits can be obtained at the USC Parking Office located in the Pendleton Street parking garage. The lay down area will be clearly identified to the contractor by the PM, with a sketch or drawing provided to Parking. In turn, the contractor will mark off this area with a sign containing the project name, PM name, Contractor name and contact number, and end date. Where this area is subject to foot traffic, protective barriers will be provided as specified by the PM. The area will be maintained in a neat and orderly fashion.

9. Contractor will be responsible for providing its own temporary toilet facilities, unless prior arrangements are made with the USC Project Manager.

10. Use of USC communications facilities (telephones, computers, etc.) by the Contractor is prohibited, unless prior arrangements are made with the USC Project Manager.

11. For all projects over $100,000, including IDC's, an SE-395, Contractor Performance Evaluation, will be completed by the USC Project Manager and reviewed with the GC at the beginning of the project and a copy given to the GC. At the end of the project the form will be completed and a Construction Performance rating will be established.

12. Contractor is responsible for removal of all debris from the site, and is required to provide the necessary dumpsters which will be emptied at least __one (1)__ times per week. Construction waste must not be placed in University dumpsters. The construction site must be thoroughly cleaned with all trash picked up and properly disposed of on a daily basis and the site must be left in a safe and sanitary condition each day. The University will inspect job sites regularly and will fine any contractor found to be in violation of this requirement an amount up to $1,000.00 daily per violation.

13. Contractor must provide all O&M manuals, as-built drawings, and training of USC personnel on new equipment, controls, etc. prior to Substantial Completion. Final payment will not be made until this is completed.

14. Tree protection fencing is required to protect existing trees and other landscape features to be preserved within a construction area. The limits of this fence will be evaluated for each situation with the consultant, USC Arborist and USC Project Manager. The tree protection fence shall be 6' high chain link fence unless otherwise approved by USC Project Manager. No entry or materials storage will be allowed inside the tree protection zone. A 3" layer of mulch shall be placed over the tree protection area to maintain moisture in the root zone if USC Arborist determines that construction may decrease amount of moisture needed to sustain health of tree(s).

15. Contractor shall water trees and other landscape material as directed by USC Arborist until site is returned to Owner.

16. Where it is necessary to cross walks, tree root zones (i.e., under canopy) or lawns the following measures shall be taken: For single loads up to 9,000 lbs., a 3/4" minimum plywood base shall be placed over areas impacted. For single loads over 9,000 lbs., two layers of 3/4" plywood is required.

17. For projects requiring heavy loads to cross walks, tree root zones or lawns on a regular basis (as determined by USC Project Manager), a construction entry road consisting of 10' X 16' oak logging mats placed on 12" coarse, chipped, hardwood base. Mulch and logging mats shall be supplemented throughout the project to keep matting structurally functional.

18. Any damage to existing landscaping (including lawn areas) will be remediated at Contractor's expense before final payment is made.

Contractor Vehicle Requirements on Campus

1. All motorized vehicles on the University campus are expected to travel and park on roadways and/or in parking stalls.

2. All motorized vehicle traffic on USC walkways must first be authorized by USC Grounds Department and USC Project Manager. Violators may be subject to fines and penalties.

3. All motorized vehicles that leak or drip liquids are prohibited from traveling or parking on walks or landscaped areas.

4. Contractors, vendors, and delivery personnel are required to obtain prior parking authorization before parking in a designated space. Violators may be subject to fines and/or penalties. See Item 10 below.

5. Drivers of equipment or motor vehicles that damage university hardscape or landscape will be held personally responsible for damages and restoration expense.

6. Vehicle drivers who park on landscape or drives must be able to produce written evidence of need or emergency requiring parking on same.

7. All vehicles parked on landscape, hardscape, or in the process of service delivery, must display adequate safety devices, i.e. flashing lights, cones, signage, etc.

8. All drivers of equipment and vehicles will be respectful of University landscape, equipment, structures, fixtures and signage.

9. All incidents of property damage will be reported to Parking Services or the Work Management Center.

10. Parking on campus is restricted to spaces designated by Parking Services at the beginning of the project. Once the project manager and contractor agree on how many spaces are needed, the project manager will obtain a placard for each vehicle. This placard must be hung from the mirror of the vehicle, otherwise a ticket will be issued and these tickets cannot be Afixed@. Parking spaces are restricted to work vehicles only; no personal vehicles.

Project Name: USC Beaufort HHG Clean Agent Fire Suppression System IT Room

Project Number: CP00400059

University of South Carolina

CONTRACTOR'S ONE YEAR GUARANTEE

STATE OF _____

COUNTY OF _____

WE_____
as General Contractor on the above-named project, do hereby guarantee that all work executed under the requirements of the Contract Documents shall be free from defects due to faulty materials and /or workmanship for a period of one (1) year from date of acceptance of the work by the Owner and/or Architect/Engineer; and hereby agree to remedy defects due to faulty materials and/or workmanship, and pay for any damage resulting wherefrom, at no cost to the Owner, provided; however, that the following are excluded from this guarantee;

Defects or failures resulting from abuse by Owner.

Damage caused by fire, tornado, hail, hurricane, acts of God, wars, riots, or civil commotion.

_____
[Name of Contracting Firm]

*By_____

Title_____

*Must be executed by an office of the Contracting Firm.

SWORN TO before me this
_____ day of _____, 2____ (seal)

_____State

My commission expires _____

DIVISION 1 – GENERAL REQUIREMENTS

University of South Carolina, Beaufort

Hilton Head Gateway Campus - Bluffton, SC

USC Beaufort HHG Clean Agent Fire Suppression System IT Room

CP00400059

Provide all labor, materials, drawings, calculations, devices, and coordination to install turnkey FM-200 Clean-Agent Fire Suppression System in IT Room.

General Description – The University of South Carolina, Hilton Head Gateway Campus is accepting bids for the complete installation of a FM-200 Clean-Agent Fire Suppression System in the Hargray Building IT room. Currently the system is configured as a fire sprinkler system, which will damage and destroy valuable records and equipment currently in use in the IT room.

The Contractor (Installer) will be responsible for the following:

- Removal and disconnection of existing fire sprinkler system to allow for the installation of the new FM-200 System.
- Installer must be properly licensed to perform this work. They must also be properly certified to install the manufactured system specified.
- Installer/Contractor must have a Class D license issued by the State Fire Marshal or a mechanical contractor's license.
- Upon issuance of a Purchase Order from USC the installer is to provide all shop drawings, manufactured specifications, flow calculations, along with battery & voltage drop calculations to the Owner and Engineer for review and approval.
- Shop drawings must be signed by the approved manufacturer of the system to be provided.

- Contractor responsible for fan test of the area and provide certified results to the Owner and Engineer for review.
- Any mechanical or electrical shut downs required to install the system must be coordinated in advance with the owner.
- The Installer under the guidance of the manufacturer must test the system prior to turning it over to the owner.
- Any coordination required with Simplex in order to effectively tie the new FM-200 system into the pre-existing fire alarm system is the responsibility of the installer.
- All removal, demolition, signage, devices, equipment, piping, and electrical work called out in the drawings, provided by Foster Engineering are the responsibility of the installer. Coordinate with Simplex for FA device installation.
- The installers bid must include all requirements for a complete turn-key installation acceptable and inspected by the USC Fire Marshall.
- Include within your bid issuing to the owner all service manuals along with the time required to cross train one facility staff member on basic service requirements for the new system.
- Include a one-year labor and parts warranty.
- Include a 5-year Manufacturer's warranty of Clean-Agent System submitted with bid.
- Contractor must provide three references on projects completed of similar scope.
- Contractor must submit proposed schedule of installation to include completion date.
- Contractor must possess all required certifications, licenses, and insurance to perform this work.
- Contractor is responsible for any and all damages to sidewalks, buildings, roof, landscaping, etc. as a result of negligence.

Minimum System Specification Requirements:

NOTE: THE PROPOSED SYSTEM MUST MEET OR EXCEED THE MINIMUM SPECIFICATIONS OUTLINED IN THE ATTACHED DOCUMENT PREPAIRED BY FOSTER ENGINEERING AND CONSULTING. SHOULD ANY INFORMATION CONTAINED IN THIS DOCUMENT CONFLICT WITH STANDARD SPECIFICATIONS THE CONTRACTOR HAS THE RESPONSIBILITY TO MEET OR EXCEED THE PERFORMANCE SPECIFICATIONS PROVIDED.

SUBSTITUTIONS ARE ALLOWED BUT MUST BE APPROVED BY OWNER.

All bidders are strongly encouraged to visit the site to review existing conditions. Any contractors requesting to make a site visit outside the scheduled pre-con may contact Mr. John "JD" Harvey at (843) 540-9778.

END OF SECTION.

SECTION 21 22 00.00 40 - Clean-Agent Fire Suppression System
USC Beaufort – Hargrave Building Computer Server Room

SECTION 1 - GENERAL

I. SCOPE - This specification outlines the requirements for a "Total Flood" Clean Agent Fire Suppression System with automatic detection and control. The work described in this specification includes all labor, materials, equipment and services required, to complete and test the suppression system.

II. APPLICABLE STANDARDS AND PUBLICATIONS
   A. The design, equipment, installation, testing and maintenance of the Clean Agent Suppression System shall comply with the requirements of the following codes and standards:
      1. NFPA 2001 - Clean Agent Fire Extinguishing Systems, 2012 edition
      2. NFPA 70 - National Electrical Code, 2014 edition
      3. NFPA 72 - Standard for Protective Signaling, 2013 edition
      4. International Fire Code, 2012 edition
      5. Manufacture's current listing and installation instructions
   B. The standards listed above and good engineering practices shall be the minimum design standards.

III. REQUIREMENTS - The Suppression System shall be installed per the drawings, specifications and applicable standards. Should a conflict occur between the drawings, specifications, or applicable standards contact Foster Engineering & Consulting, LLC for resolution.
   A. The contractor will coordinate with the Synergy Office Park for the connection of the power supply to the building. The contact person and phone number will be provided to the contractor. The connection will be a 120 VAC power supply to the system control panel.
   B. The contractor is responsible for interlock wiring and controls for shutdown of the HVAC unit within the protected space.

IV. QUALITY ASSURANCE
   A. MANUFACTURER
      1. The manufacturer of the suppression system hardware and detection components shall be ISO 9000 registered.
      2. The name of the manufacturer shall appear on all major components.
      3. All devices, components and equipment shall be the products of the same manufacturer.
      4. All devices, components and equipment shall be new, standard products of the manufacturer's latest design and suitable to perform the functions intended.
      5. All devices and equipment shall be UL listed or FM approved.
      6. Locks for all cabinets shall be keyed alike.
   B. INSTALLER
      1. The installing contractor shall be trained by the supplier to design, install, test and maintain fire suppression systems.

2. The installing contractor shall be an experienced firm regularly engaged in the installation of Clean Agent suppression systems in strict accordance with all applicable codes and standards.
3. The installing contractor must have a minimum of five (5) years of experience in the design, installation and testing of Clean Agent fire suppression systems.
4. The installing contractor will provide a list of five (5) systems of a similar nature and scope installed during the last year as part of the bid package.
5. The installing contractor shall show evidence that his company carries a minimum insurance required by the University of South Carolina.
6. The installing contractor shall maintain, or have access to, a Clean Agent recharging station. The installing contractor shall provide proof of his ability to recharge the Clean Agent system within 24 hours after a discharge. Include the amount of bulk agent storage available.
7. The installing contractor shall be an authorized stocking distributor of the Clean Agent system equipment so that immediate replacement parts are available from inventory.
8. The installing contractor shall show proof of emergency service available on a twenty-four-hour-a-day, seven-day-a-week basis.

C. SUBMITTALS
1. The installing contractor shall submit working plans per NFPA 2001 5.1.2the following design information and drawings for approval by Foster Engineering & Consulting LLC before starting work on this project or submitting to any AHJ:
   i. Working plans complying with NFPA 2001 section 5.1.2.
   ii. Field installation layout drawings having a scale of not less than 1/8" = 1'0".
   iii. A legend identifying all symbols used.
   iv. Complete hydraulic flow calculations, from a UL listed computer program, shall be provided. Calculation sheet(s) must include the manufacturers name and UL listing number for verification. The individual sections of pipe and all fittings, as shown on the isometrics, must be identified and included in the calculation. Total agent discharge time must be shown.
   v. Provide calculations for the battery stand-by power supply taking into consideration the power requirements of all alarms, initiating devices and auxiliary components under full load conditions.
2. Submit drawings, calculations and system component data sheets for approval to the State Fire Marshal, responding fire department, and owner's insurance underwriter before starting installation. If an entity listed above declines review of the system, the contractor will document the communication and include the documentation as part of the submittal below.
3. The contractor shall include a printed copy of all AHJ approvals and as built drawings per NFPA 2001 as part of their project close out documents. The contractor shall provide a CD Rom with electronic copies of all project documents. All documents and the CD Rom shall be placed in a binder and delivered to the owner.

SECTION 2 – SYSTEM REQUIREMENTS

I. SYSTEM DESCRIPTION AND OPERATION

A. The system shall be a Total Flood Clean Agent Suppression System. The system shall provide the minimum design concentration by volume required by the manufacturer for protection of a Class C hazard in throughout the protected spaces, at the minimum anticipated temperature within the protected area. System design shall not exceed the manufactures Lower Observable Effects limits for normally occupied spaces, adjusted for maximum space temperature anticipated, with provisions for room evacuation before agent release. The design concentration shall include sufficient agent to account for leakage based on the enclosure test conducted by the contractor.

B. The system shall be complete in all ways. It shall include all mechanical and electrical installation, all detection and control equipment, agent storage containers, Clean Agent, discharge nozzles, pipe and fittings, manual release and abort stations, audible and visual alarm devices, auxiliary devices and controls, shutdowns, alarm interface, caution/ advisory signs, functional checkout and testing, training and all other operations necessary for a functional, UL Listed and/or FM approved Clean Agent Suppression System.

C. Provide two (2) inspections during the first year of service. Inspections shall be made at 6-month intervals commencing when the system is first placed into normal service.

D. The system(s) shall be actuated by a photoelectric detectors installed for maximum area coverage of 250 ft^2 per detector in the room.

E. The system shall use "Cross-Zoned" detection or require two detectors to be in alarm before system release.

F. Automatic operation of the protected area shall be as follows:

1. Actuation of one (1) detector, within the system, shall:
   i. Illuminate the "ALARM" lamp on the control panel face.
   ii. Energize audible and visual indicator.
   iii. Transfer auxiliary contacts which shall:
      a) Transmit a signal to a fire alarm system, and
      b) Shutdown HVAC equipment (if required by system design).
2. Actuation of a 2nd detector, within the system, shall:
   i. Illuminate the "PRE-DISCHARGE" lamp on the control panel face.
   ii. Energize pre-discharge audible and visual devices that are a distinctly different signal than the "Alarm" above.
   iii. System abort sequence is enabled at this time.
   iv. Time delay of the system activation is not permitted.
3. The Clean Agent system shall discharge and the following shall occur:
   i. Illuminate a "SYSTEM FIRED" lamp on the control panel face.
   ii. Shutdown of all power to high-voltage equipment.

iii. Energize a visual indicator(s) outside the hazard in which the discharge occurred.
iv. Energize a "System Fired" audible device that is a distinctly different signal than the "Pre-discharge and Alarm" signals above.

4. The system shall be capable of being actuated by manual discharge devices located at each exit from either the room. Operation of a manual device shall duplicate the sequence description above except the abort functions shall be bypassed. The manual discharge station shall be of the electrical actuation type and shall be supervised at the releasing panel.

II. MATERIALS AND EQUIPMENT

A. GENERAL REQUIREMENTS

1. The Clean Agent System materials and equipment shall be standard products of the supplier's latest design and suitable to perform the functions intended. When one or more pieces of equipment must perform the same function(s), they shall be duplicates produced by one manufacturer.
2. All devices and equipment shall be UL Listed or FM approved.

B. CLEAN AGENT STORAGE AND DISTRIBUTION

1. Systems shall be designed per the manufacturer's guidelines.
2. The supply shall be located within the hazard area in the location shown on the drawings. The primary location is preferred by the owner. The alternative location may only be used if the primary location impacts system performance or maintenance.
3. The Agent Storage Containers shall be of high-strength low alloy steel construction and conform to the manufacture's guidelines and NFPA 2001.
4. Containers shall be actuated by a resettable electric actuator with mechanical override located at each agent container or connected bank of cylinders. Non-resettable or explosive devices shall not be permitted.
5. Each container shall have a pressure gauge and low pressure switch to provide visual and electrical supervision of the container pressure. The low-pressure switch shall be wired to the control panel to provide an audible and visual "Trouble" alarms in the event the container pressure drops below the manufacture's low pressure limits. The pressure gauge shall be color coded to provide an easy, visual indication of container pressure.
6. Each container shall have a pressure relief provision that automatically operates before the internal pressure exceeds the manufacturer's high pressure limits.
7. Engineered discharge nozzles shall be provided within the manufacturer's guidelines to distribute the Clean Agent throughout the protected spaces. The nozzles shall be designed to provide proper agent quantity and distribution.
   i. Nozzles shall be available in 3/8 in. through 2 in. pipe sizes. Each size shall be available in 180° and 360° distribution patterns.
   ii. Ceiling plates will be used with the nozzles to conceal pipe entry holes through ceiling tiles.

8. Distribution piping, and fittings, shall be installed per the manufacturer's requirements, NFPA 2001, and approved piping standards and guidelines. All distribution piping shall be installed by qualified individuals using accepted practices and quality procedures. All piping shall be adequately supported and anchored at all directional changes and nozzle locations.
   i. All piping shall be reamed, blown clear and swabbed with suitable solvents to remove burrs, mill varnish, and cutting oils before assembly.
   ii. All pipe threads shall be sealed with Teflon tape pipe sealant applied to the male thread only.
9. Seismic protection for the system will be provided if required by the local AHJ.

C. CONTROL PANEL
1. The control system and its components shall be UL listed or FM approved for use as a local fire alarm system with releasing device service.
2. The control panel shall be located within the hazard area in the location shown on the drawings.
3. The control system shall perform all functions necessary to operate the system detection, actuation and auxiliary functions.
4. The control system shall include battery standby power to support 24 hours in standby and 5 minutes in alarm.
5. The control system shall be microprocessor based utilizing a distributed processing concept. A single microprocessor failure shall not impact operation of additional modules on the system.
6. The control system must support Cross Zoned Detection.
7. The control system shall supply integrated 2.0 amp power supply circuitry.
8. The control system shall provide at least four (4) initiating circuits.
   i. The circuit shall be capable of Class B (Style A) operation.
   ii. The circuit shall be capable of operating up to fifteen (15) approved detectors or thirty (30) detectors per system.
   iii. The circuit shall be capable of monitoring contact devices configured for manual release, manual alarm, system abort, trouble input or auxiliary (non-fire) input.
9. The control shall contain release circuits for activation of an extinguishing/suppression system.
   i. The circuit shall be capable of Class B (Style Y) operation.
   ii. The circuit shall be rated for 1.5 amp @ 24 VDC.
10. The control system shall contain two (2) indicating appliance circuits for annunciation.
   i. The circuit shall be capable of Class A (Style B) or Class B (Style Y) operation.
   ii. The circuit shall be rated for 1.5 amp @ 24 VDC.
11. The control system shall provide an auxiliary power supply rated for 2 amps @ 24 VDC.
12. The control system shall provide two (2) relays: one for common alarm and one for common trouble and four (4) additional programmable relays.

D. DETECTORS

1. The detectors shall be installed per the manufacturer's specifications and the guidelines of NFPA 72.
2. The detectors shall be spaced as shown on the drawings.
3. The Photoelectric detector shall be manufactured by System Sensor, or equal in quality, performance and features.

E. MANUAL RELEASE (Electric)
1. The electric manual release switch shall be a dual action device which provides a means of manually discharging the Suppression System when used in conjunction with the control system.
2. The Manual Release switch or Manual Pull station shall be a dual action device requiring two distinct operations to initiate a system actuation.
3. Manual actuation shall bypass the abort functions shall cause the system to discharge and shall cause all release and shutdown devices to operate in the same manner as if the system had operated automatically.
4. A Manual Release switch shall be located at each exit from the protected hazard.

F. ABORT STATION
1. The optional Abort Station shall be the "Dead Man" type and shall be located next to each manual switch.
2. The Abort Station shall be supervised and shall indicate a trouble condition at the control panel, if depressed, and no alarm condition exists.
3. "Locking" or "Keyed" abort stations shall not be permitted.

G. AUDIBLE and VISUAL ALARMS
1. Alarm audible and visual signal devices shall operate from the control panel.
2. The Alarm Bell, Alarm Horn and Horn/Strobe devices shall be manufactured by System Sensor, or equal in quality, performance and features.
3. The visual alarm unit shall be a manufactured by System Sensor, or equal in quality, performance and features.
4. A Strobe device shall be placed outside, and above, each exit door from the protected space. Provide an advisory sign at each strobe device.

H. CAUTION and ADVISORY SIGNS
1. Signs shall be provided to comply with NFPA 2001 and the recommendations of the Clean Agent equipment supplier.
   i. Entrance sign: (1) required at each entrance to a protected space.
   ii. Manual discharge sign: (1) required at each manual discharge station.
   iii. Flashing light sign: (1) required at each flashing light over each exit from a protected space.

I. SYSTEM and CONTROL WIRING
1. All system wiring shall be furnished and installed by the contractor.
2. All wiring shall be installed in electrical metallic tubing (EMT), or conduit, and must be installed and kept separate from all other building wiring.

3. All system components shall be supported from the building structure and independent of the wiring. Runs of conduit and wiring shall be straight, neatly arranged, properly supported, and installed parallel and perpendicular to walls and partitions.
4. The sizes of the conductors shall be those specified by the manufacturer. Color coded wire shall be used. All wires shall be tagged at all junction points and shall be free from shorts, earth connections (unless so noted on the system drawings), and crosses between conductors. Final terminations between the control panel and the system field wiring shall be made under the direct supervision of a factory-trained representative.
5. All wiring shall be installed by qualified individuals, in a neat and workmanlike manner, to conform to the National Electrical Code except as otherwise permitted for limited energy circuits, as described in NFPA 72. Wiring installation shall meet all local, state codes.
6. The complete system electrical installation, and all auxiliary components, shall be connected to earth ground per the National Electrical Code.

SECTION 3 – TESTING AND DOCUMENTATION

I. SYSTEM INSPECTION and CHECKOUT- After the system installation has been completed, the entire system shall be checked out, inspected and functionally tested by qualified, trained personnel, per the manufacturer's recommended procedures and NFPA 2001 and 72.
   A. All containers and distribution piping shall be checked for proper mounting and installation.
   B. All electrical wiring shall be tested for proper connection, continuity and resistance to earth.
   C. The complete system shall be functionally tested, in the presence of Foster Engineering, and all functions, including system and equipment interlocks, must be operational at least five (5) business days before the final acceptance tests.
      1. Each detector shall be tested per the manufacturer's recommended procedures, and test values recorded.
      2. All system and equipment interlocks, such as audible and visual devices, equipment shutdowns, local and remote alarms, etc. shall function as required and designed.
      3. Each control panel circuit shall be tested for trouble by inducing a trouble condition into the system.

II. TRAINING REQUIREMENTS - Before final acceptance, the installing contractor shall provide operational training to the personnel designated by the owner. The contractor shall offer one (1) training session during a date and time selected by the owner. The training session shall include control panel operation, manual and abort functions, trouble procedures, supervisory procedures, auxiliary functions and emergency procedures. The contractor will provide the owner with a list of personnel attending the class and a copy of the class outline.

III. OPERATION and MAINTENANCE - Before final acceptance, the installing contractor shall provide two (2) complete operation and maintenance instruction manuals to the owner. All aspects of system operation and maintenance shall be detailed, including piping isometrics, wiring diagrams of all circuits, a written description of the system design, sequence of operation and drawing(s)

illustrating control logic and equipment used in the system. Checklists and procedures for emergency situations, troubleshooting techniques, maintenance operations and procedures shall be included in the manual.

IV. AS-BUILT DRAWINGS - Upon completion of each system, the installing contractor shall provide two (2) copies of system "As-Built" drawings per NFPA 2001 to the owner. One copy shall be on paper and the second as a file on the CD Rom provided to the owner. The contractor shall include a copy of engineering drawings with their as-built drawings.

V. ACCEPTANCE TESTS

A. At the time "As-Built" drawings and maintenance/operations manuals are submitted, the installing contractor shall submit a "Test Plan" describing procedures to be used to test the control system(s). The Test Plan shall include a step-by-step description of all tests to be performed and shall indicate the type and location of test apparatus to be employed. The tests shall demonstrate that the operational and installation requirements of this specification have been met. All tests shall be conducted in the presence of the Foster Engineering and shall not be conducted until the Test Plan has been approved.

B. The tests shall demonstrate that the entire control system functions as designed and intended. All circuits shall be tested: automatic actuation, solenoid and manual actuation, HVAC and power shutdowns, audible and visual alarm devices and manual override of abort functions. Supervision of all panel circuits, including AC power and battery power supplies, shall be tested and qualified.

VI. SYSTEM INSPECTIONS

A. The installing contractor shall provide two (2) inspections of the system during the one-year warranty period. The first inspection shall be at the six month interval, and the second inspection at the 12-month interval, after system acceptance. Inspections shall be conducted per the manufacturer's guidelines and the recommendations of NFPA 2001.

B. As a minimum, the contractor will use the attached system the enclose forms to certifying satisfactory system(s) operation and shall include them with the "As Built" packet to be given to the owner upon completion of each inspection. Equivalent forms approved by Foster Engineering may be substituted.

VII. WARRANTY – All Clean Agent system components furnished and installed under this contract shall be warranted against defects in design, materials and workmanship for the full warranty period which is standard with the manufacturer, but in no case less than one (1) year from the date of system acceptance.